

12.0 Readers' Guide and Summary

12.0.1 Overview

Chapter 12 is organized much like the other chapters in this document, but because of the chapter's much greater scope, this guide is provided to help the reader navigate through the various components of the chapter.

The chapter is divided into three main sections.

- 12.1, *Environmental Setting/Affected Environment*
- 12.2, *Regulatory Setting*
- 12.3, *Environmental Consequences*

These sections parallel the same sections in other resource chapters. However, the complexity of the environmental analysis warrants further discussion.

12.0.1.1 Relationship of Chapter 12 to the BDCP and California WaterFix Effects Analyses

The Draft BDCP approaches conservation at the natural community level, using specific biological goals and objectives for species to guide the conservation such that the effects of the plan offset any impacts as well as contribute to recovery of the species. Under the California WaterFix BA, the approach to conservation shifts from a natural community-level approach (i.e., habitat conservation plan [HCP]) to a species-level approach (i.e., Section 7)—in other words, from a top-down approach to a bottom-up approach. This approach is suitable and expected for a BA, as well as most NEPA/CEQA documents; however, because of the mix of alternatives of BDCP and non-HCP approaches, Chapter 12 maintains a relatively parallel approach in order to compare the effects of the non-HCP alternatives to those of the HCP alternatives.

For the BDCP alternatives, effects were evaluated using an analysis of the natural communities, consistent with an HCP approach. Under NEPA, each alternative must be considered and discussed at a comparable level of detail. To ensure comparability among the alternatives, including the non-HCP alternatives, the same approach was used for Alternatives 4A, 2D, and 5A in the EIR/EIS.

The BA analysis relies on updated models for giant garter snake, vernal pool crustaceans, and tricolored blackbird, which have been largely updated due to the more refined wetland delineation data available for the DHCCP Conveyance Planning Area (see Section 12.3.2.4) consistent with the footprint for the proposed action, which does not include largescale restoration. The DHCCP Conveyance Planning Area only covers the area that contains all of the infrastructure for the different water conveyance facility alternatives and thus does not include the entire Plan Area evaluated for the BDCP alternatives. Also, the BA only quantifies the effects of the water conveyance facility impacts where the EIR/EIS includes the quantification of restoration effects on terrestrial

1 biological resources. Because of this limitation to the updated models, they could not be used for the
 2 EIR/EIS. In reviewing the analysis in the BA, none of the CEQA or NEPA conclusions would change if
 3 these updated models were used for the EIR/EIS.

4 As discussed in Section 3.3.2.2, *Non-HCP Alternative Environmental Commitments*, of Chapter 3,
 5 much as the Conservation Measures in the BDCP alternatives are meant to satisfy ESA Section 10
 6 and the NCCPA, the Environmental Commitments and associated acreages of protection and
 7 restoration are intended to satisfy CEQA, NEPA, and CESA Section 2081, and ESA Section 7 for
 8 Alternative 4A and the other non-HCP Alternatives. However, for Alternative 4A or other non-HCP
 9 Alternatives, the final acreages of protection and restoration for state and federally listed species
 10 addressed in the CESA Section 2081 and ESA Section 7 documents will ultimately be defined in those
 11 respective permits; therefore, the final acreages of natural community protection and restoration
 12 may differ from those presented in Table 3-9 *Environmental Commitments under Alternative 4A* in
 13 Chapter 3 of the EIR/EIS. The final protection and restoration acreages for impacts on natural
 14 communities and terrestrial species may be adjusted, as appropriate, based on the final mitigation
 15 requirements of the CESA and ESA process, which includes site-specific confirmation of species
 16 habitat acreages for those species covered under those permits.

17 **12.0.2 Environmental Setting/Affected Environment**

18 The *Environmental Setting/Affected Environment* section introduces the reader to historic trends in
 19 biodiversity of the study area, then describes the resources considered in each alternative's analysis,
 20 as summarized below.

21 **12.0.2.1 Natural Communities**

22 The natural communities listed below are found within the terrestrial biology study area and are
 23 described in the *Environmental Setting/Affected Environment*. For simplicity, Cultivated Lands and
 24 Developed Lands, which are not natural communities but provide habitat for terrestrial species, are
 25 included in the Natural Communities category. No in-depth analysis was conducted of those two
 26 land cover types, but their value is addressed in the species-level analyses.

- 27 ● Tidal Perennial Aquatic
- 28 ● Tidal Brackish Emergent Wetland
- 29 ● Tidal Freshwater Emergent Wetland
- 30 ● Valley/Foothill Riparian
- 31 ● Nontidal Perennial Aquatic
- 32 ● Nontidal Freshwater Perennial Emergent Wetland
- 33 ● Alkali Seasonal Wetland Complex
- 34 ● Vernal Pool Complex
- 35 ● Managed Wetland
- 36 ● Other Natural Seasonal Wetland
- 37 ● Grassland
- 38 ● Inland Dune Scrub

- 1 • Cultivated Lands
- 2 • Developed Lands

3 Many of the natural communities are aquatic in nature, but they are considered in this chapter in the
 4 context of their habitat values to terrestrial biological resources. Fish and other aquatic species are
 5 considered in Chapter 11, *Fish and Aquatic Resources*.

6 **12.0.2.2 Special-Status Species**

7 Although the BDCP focuses on 45 covered terrestrial wildlife and plant species, these constitute a
 8 subset of a considerably larger number of special-status wildlife and plant species analyzed in the
 9 EIR/EIS pursuant to NEPA and CEQA (a total of 149 species). For this analysis, no organizational
 10 distinction has been made between covered and noncovered species. However, as described in
 11 detail in Section 12.3.2, *Methods for Analysis*, the analysis of effects on covered species is derived
 12 from the analysis conducted for the BDCP as detailed in Appendix 5.J, *Effects on Natural*
 13 *Communities, Wildlife, and Plants*, of the Draft BDCP.¹ Species-specific habitat models were
 14 developed for the BDCP analysis; this level of modeling was not developed for noncovered species.
 15 The special-status species addressed in this chapter are listed in Tables 12-2 and 12-3.

16 **12.0.3 Environmental Consequences**

17 This EIR/EIS analyzes 19 alternatives, including the No Action Alternative. Many of the alternatives
 18 would have identical or very similar effects on terrestrial biological resources. Accordingly, this
 19 section presents detailed analyses of five alternatives (Alternatives 1A, 1B, 1C, 4, 4A, and 9) that
 20 would have varying effects associated with their significantly different footprints for the water
 21 conveyance facilities. The other action alternatives (Alternatives 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 2D,
 22 and 5A) are analyzed in a comparative, summary fashion, focusing on the slight differences in effect
 23 as compared with the effects of the six alternatives analyzed in detail.

24 Impacts are numbered consecutively beginning with Impact BIO-1 for each alternative. The
 25 numbering proceeds through each community and species to Impact BIO-186. Impacts BIO-187
 26 through BIO-191 are discussed only at the very end of the chapter, in Sections 12.3.5, *Cumulative*
 27 *Effects*, and Section 12.3.6, *Effects on Other Conservation Plans*.

28 The alternatives are broken into the BDCP alternatives (1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, 8,
 29 and 9), and non-HCP alternatives associated with the California WaterFix (2D, 4A, and 5A). The
 30 former include conservation measures, while the WaterFix alternatives are not associated with a
 31 habitat conservation plan (HCP) and therefore only include Environmental Commitments. The BDCP
 32 itself amounts to a series of 21 numbered conservation measures, and nearly all BDCP actions would
 33 stem from these conservation measures. Of primary importance in this chapter are Conservation
 34 Measure (CM) 1, which regards construction and operation of water conveyance facilities, and ten
 35 conservation measures (CM2–CM11) that focus on or that would otherwise effect terrestrial habitat.
 36 In this chapter, these actions are identified by proper name (e.g., *CM4 Tidal Natural Communities*
 37 *Restoration*), by the activity involved (e.g., tidal habitat restoration) or simply by conservation
 38 measure number (e.g., CM4). The actions under CM2–CM11 are also often called restoration,

¹ As described in Chapter 1, *Introduction*, Section 1.1, the Final EIR/EIS includes the 2013 Draft EIR/EIS, BDCP, 2015 RDEIR/SDEIS, and all associated appendices with these documents; as well as revisions to these documents as contained in this Final EIR/EIS.

1 protection, management, or enhancement activities. Meanwhile, Alternatives 4A, 2D, and 5A take a
 2 different approach to achieve the applicable regulatory standards under Section 7 of the
 3 Endangered Species Act (ESA) and Section 2081(b) of the California Endangered Species Act (CESA)
 4 while also complying with NEPA and CEQA. A subset of those activities proposed in the conservation
 5 strategy for the BDCP would still be implemented under the non-HCP alternatives – specifically,
 6 portions of the actions proposed under CM3, CM4, CM6, CM7, CM8, CM9, CM10, CM11, CM12, CM15,
 7 and CM16. However, these activities would not be “conservation measures.” The term “conservation
 8 measure” is often used in the context of HCPs under Section 10(a)(2) of the ESA and Natural
 9 Community Conservation Plans (NCCPs) under the Natural Community Conservation Planning Act
 10 (NCCPA). Because Alternative 4A contemplates ESA compliance through Section 7 of the ESA and
 11 Section 2081 of CESA, different terminology has been adopted to reflect the difference in permitting
 12 strategies under state and federal endangered species laws. These repackaged and limited elements
 13 of the original BDCP Conservation Measures are instead referred to as Environmental Commitments.
 14 To minimize confusion, they are numbered to track the parallel BDCP Conservation Measures:
 15 Environmental Commitments 3, 4, 6, 7, 8, 9, 10, 11, 12, 15, and 16, as summarized in Table 3-17.

16 The addition of Alternatives 4A, 2D, and 5A requires a new No Action Alternative to be defined that
 17 matches the time horizon for the non-HCP alternatives and provides a baseline or point of
 18 comparison for NEPA purposes. The BDCP alternatives use the No Action Alternative Late Long
 19 Term (LLT) while the non-HCP alternatives use the No Action Alternative Early Long Term (ELT).
 20 The No Action Alternative (ELT) includes most of the assumptions used for the No Action
 21 Alternative Late Long Term (LLT) as described in Appendix 3D, *Defining Existing Conditions, No*
 22 *Action Alternative, No Project Alternative, and Cumulative Impact Conditions*, including continued
 23 State Water Project (SWP)/Central Valley Project (CVP) operational assumptions used in CALSIM II
 24 modeling and on-going programs, projects and policies that would continue in the absence of action
 25 alternatives. Two exceptions include planned Yolo Bypass improvements and habitat restoration
 26 required by the U.S. Fish and Wildlife Service (USFWS) Biological Opinion (BiOp). Because
 27 Alternatives 4A, 2D, and 5A do not include these Yolo Bypass and habitat restoration actions they
 28 are now assumed for the No Action Alternative (ELT); they are actions that would be required to
 29 occur with or without implementation of Alternatives 4A, 2D, or 5A. Other programs, projects, and
 30 policies assumed for the No Action Alternative (LLT) are also assumed for the No Action Alternative
 31 (ELT) but the ELT period assumes a shorter time horizon of approximately 15 years following
 32 project approval. These programs, projects and policies are presented in Tables 3D-1 and 3D-2 in
 33 Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and*
 34 *Cumulative Impact Conditions*, and include those with clearly defined management and/or
 35 operational plans, including facilities under construction as of February 13, 2009.

36 12.0.4 Organization of Resources

37 Under each alternative, the biological resources are organized in the order shown below.

- 38 • **Natural Communities.** This heading is followed by a subheading for each of the communities
 39 listed above.
- 40 • **Wildlife Species.** Species are listed in taxonomic order: invertebrates, amphibians, reptiles,
 41 birds, and mammals. In some cases, where multiple species would be subject to the same or very
 42 similar impacts, several species are grouped together (e.g., nonlisted vernal pool invertebrates,
 43 least Bell’s vireo and yellow warbler, Cooper’s hawk and osprey).

- 1 • **Plant Species.** Plant species are grouped together by natural community (e.g., vernal pool
- 2 plants, tidal wetland plants).
- 3 • **General Terrestrial Biology Effects.** This category examines the following resource topics.
- 4 ○ Wetlands and Other Waters of the United States.
- 5 ○ Shorebirds and Waterfowl.
- 6 ○ Common Wildlife and Plants.
- 7 ○ Invasive Plant Species.
- 8 ○ Compatibility with Plans and Policies.

9 The cumulative effects analysis and the review of action alternatives consistency with other habitat
 10 conservation plans/natural community conservation plans for all alternatives are provided in
 11 Sections 12.3.5, *Cumulative Effects*, and Section 12.3.6, *Effects on Other Conservation Plans*.

12 **12.0.5 Organization of Impacts**

13 Each impact is presented as a NEPA analysis, using the appropriate terminology for presence or
 14 absence of adverse effects. A NEPA effects conclusion is included at the end of the NEPA evaluation.
 15 This analysis is followed by a CEQA conclusion, which is identified as such. The CEQA conclusion
 16 uses the terminology appropriate to describing the presence or absence of significant impacts.
 17 Where impacts are further divided into two timeframe conclusions—near-term and late long-
 18 term—these subheadings appear in both the NEPA and the CEQA analyses. The near-term effects,
 19 which would occur over the first 10 years of project implementation, are addressed separately
 20 because they relate primarily to construction of the water conveyance facilities. For the BDCP
 21 alternatives, effects that would result from CM1 are analyzed at a project level, while the late long-
 22 term effects are those associated with all actions that would occur over the 50-year timeframe of the
 23 BDCP. For the non-HCP alternatives, the entire project (construction, operations and maintenance)
 24 is evaluated at a project level. The effects of the Environmental Commitments were evaluated at a
 25 programmatic level because no details were available at the time of EIR/EIS preparation regarding
 26 specific locations of restoration and protection actions.

27 **12.0.6 Summary of Effects**

28 Chapter 12 is lengthy due to the large number of alternatives analyzed and the large number of
 29 special-status plants and wildlife that are addressed. This summary has been prepared to highlight
 30 the major effects of the action alternatives, primarily in tabular form, and to provide a method of
 31 comparing effects of the action alternatives. The No Action Alternative is discussed in a brief
 32 narrative without quantitative comparisons. The differences in effects that would be created by the
 33 alternatives are determined primarily by the location, capacity, and design of water conveyance
 34 facilities and the amount and type of habitat restoration and enhancement proposed under the
 35 BDCP. Table 3-1 in Chapter 3, *Description of Alternatives*, provides a brief overview of the action
 36 alternatives.

37 The major differences the alternatives have in water conveyance facilities and restoration/
 38 enhancement elements are summarized below. This discussion is followed by a discussion of the
 39 differences in effects the alternatives would have on natural communities, jurisdictional wetlands
 40 and other waters, and special-status wildlife and plant species. All of the discussions of wildlife and

1 plants in this summary section focus solely on special-status species, which are defined as species
 2 that are protected by federal or state law or species that are considered sensitive by federal, state, or
 3 local resource agencies. See Section 12.1.3, *Special-Status Species*, for a comprehensive definition.

4 **12.0.6.1 Differences among the Alternatives**

5 **Pipeline/Tunnel Designs**

6 Alternatives 1A, 2A, 3, 4, 5, 6A, 7, 8, 2D, 4A, and 5A would all use a pipeline/tunnel design to convey
 7 water. With the exception of Alternatives 5, 7, 2D, 4A, and 5A, they would have the same habitat
 8 restoration and enhancement program. The BDCP alternatives include habitat restoration and
 9 enhancement under the conservation measures. The non-HCP alternatives (2D, 4A, and 5A) include
 10 habitat restoration under Environmental Commitments. The alternatives differ in capacity to divert
 11 water from the north Delta; therefore, they would have different numbers of intakes: Alternatives
 12 1A, 2A, 6A, and 2D each would convey up to 15,000 cubic feet per second (cfs) of Sacramento River
 13 flow from the north Delta to Clifton Court Forebay, and each alternative would use five intakes on
 14 the eastern bank of the river. Effects of Alternatives 1A, 2A, 6A, and 2D on terrestrial biological
 15 resources would be similar. However, while Alternatives 1A, 2A, and 6A include up to 65,000 acres
 16 of tidal wetland restoration, Alternative 2D only includes up to 300 acres of tidal wetland
 17 restoration, as described in Section 3.5.19 of Chapter 3, *Description of Alternatives*.

18 Alternatives 4, 7, 8, and 4A would convey up to 9,000 cfs of Sacramento River flow in tunnels and
 19 would use three intakes on the eastern bank of the river. Alternatives 4 and 4A were designed to
 20 maximize the use of public lands and minimize the size of the forebay in the north Delta; therefore,
 21 Alternatives 4 and 4A conveyance facilities would have a somewhat different location than
 22 Alternative 7 or 8 facilities. Alternatives 4 and 4A would place reusable tunnel material (RTM, the
 23 material generated by excavating the water conveyance tunnels) in 6-foot high storage sites, while
 24 all other alternatives are assumed to place the material in 10-foot high storage sites (see Chapter 3,
 25 Section 3.6.1.2, *Conveyance Facilities*, for further details). Use of 10-foot-high RTM storage sites
 26 could substantially reduce effects in storage site areas under Alternatives 4 and 4A. Alternative 4
 27 includes up to 65,000 acres of tidal wetland restoration, while Alternative 4A only includes up to
 28 295 acres of tidal wetland restoration, as described in Section 3.5.18 of Chapter 3, *Description of*
 29 *Alternatives*. Alternatives 7 and 8 would have identical conveyance facility footprints, but Alternative
 30 7 would include an additional 20 linear miles of channel margin habitat enhancement on Delta
 31 waterways and 10,000 acres of additional seasonally inundated floodplain restoration along south
 32 Delta rivers.

33 Alternative 3 would have a capacity to divert 6,000 cfs of Sacramento River flow and would use two
 34 eastern bank intakes, and Alternatives 5 and 5A would divert 3,000 cfs using one eastern bank
 35 intake. Tidal habitat restoration would be limited to 25,000 acres under Alternative 5, compared
 36 with the 65,000 acres for all other alternatives. Tidal restoration under Alternative 5A includes up to
 37 55 acres of tidal wetland restoration, as described in Section 3.5.20 of Chapter 3, *Description of*
 38 *Alternatives*.

39 **Other Designs**

40 Alternatives 1B, 2B, and 6B would use five intakes on the eastern bank of the Sacramento River to
 41 divert 15,000 cfs of Sacramento River flow into a canal on the eastern edge of the Delta that feeds
 42 into Clifton Court Forebay. These alternatives would have the same restoration and enhancement

1 program as all alternatives except Alternatives 5, 7, 2D, 4A, and 5A. Alternatives 1B, 2B, and 6B
2 would have similar effects on terrestrial biological resources.

3 Alternatives 1C, 2C, and 6C would use five intakes on the western bank of the Sacramento River to
4 divert 15,000 cfs into a new canal and tunnel system on the western edge of the Delta. These
5 alternatives would have the same restoration and enhancement program as all alternatives except
6 Alternatives 5, 7, 2D, 4A, and 5A. Alternatives 1C, 2C, and 6C would have similar effects on terrestrial
7 biological resources.

8 The separate corridors design of Alternative 9 would include construction of two screened intakes
9 on the Sacramento River near Walnut Grove, operable barriers and other water control structures
10 within Delta waterways, and dredging of Middle River and Victoria Canal to create facilities that
11 would convey 15,000 cfs of water across the Delta to the export pumps using existing channels.
12 Delta fish migration corridors would be separated from water diversion flows. Alternative 9 would
13 have the same restoration and enhancement program as all alternatives except Alternatives 5, 7, 2D,
14 4A, and 5A.

15 **12.0.6.2 Comparison of the Effects of the Alternatives**

16 **Effects on Natural Communities and Cultivated Lands**

17 Implementing the alternatives would affect natural communities and cultivated lands in two
18 primary ways. Large acreages of natural communities would be permanently eliminated by the
19 construction of water conveyance facilities. These lands would no longer be available as plant and
20 wildlife habitat. Even larger acreages of natural communities would be lost through conversion from
21 one habitat type to another as part of restoration activities; these lands would not be lost as wildlife
22 habitat, but the mix of habitats in the study area would be substantially modified. To fully
23 understand the effects of the alternatives, the permanent losses and conversions must be considered
24 in combination.

25 **Losses Resulting from Construction of Facilities and Conversion Associated with Restoration**

26 Natural community acreages that would be permanently or temporarily lost or converted by
27 implementation of the action alternatives are summarized in Table 12-ES-1. Generally speaking for
28 the action alternatives, the east alignment alternatives (1B, 2B, and 6B) would have the largest effect
29 on terrestrial natural communities (91,725–92,301 acres), depending on the intakes involved)
30 because of their large water conveyance canal. The west alignment alternatives (1C, 2C, and 6C)
31 would have a smaller overall effect (86,961–86,966 acres). The effects of the pipeline/tunnel
32 alternatives other than Alternative 5 (1A, 2A, 3, 4, 6A, 7 and 8) would be smaller still (76,600–
33 80,305 acres). The separate corridors alternative (9) would have a slightly smaller overall effect
34 than most of the pipeline/tunnel alternatives (74,413 acres). Alternative 5, which is also a
35 pipeline/tunnel alternative, would have an even smaller effect (40,989 acres) of all the action
36 alternatives because of its much smaller tidal restoration goal. Alternatives 2D, 4A, and 5A would
37 have the smallest effects because of much smaller tidal restoration goals (8,967 acres under
38 Alternative 2D; 8,276 acres under Alternative 4A; and 7,623 acres under Alternative 5A).

39 Differences among the pipeline/tunnel alternatives result mainly from differences in the amount of
40 restoration. The largest loss or conversion of acreage for restoration would occur under Alternative
41 7, which would include 10,000 additional acres of floodplain restoration; Alternative 5 would have a
42 smaller effect because it would restore 40,000 fewer acres of tidal habitat. The non-HCP alternatives

1 introduced in the RDEIR/SDEIS (2D, 4A, and 5A) would have much smaller impacts on biological
2 resources because they are not presented as HCP/NCCPs with large amounts of restoration over a
3 50-year period, and would restore less than 300 acres of tidal habitat.

4 The location of the conveyance facilities determines the type of effect on natural communities. The
5 west alignment facilities would be located in the western Delta, including areas west of Clifton Court
6 Forebay where the facilities would affect substantially greater alkali seasonal wetland complex
7 acreage than the other alternatives would affect. The alkali seasonal wetland complex natural
8 community affected by the west alignment alternatives would be 88–94 acres, while the range for
9 the other BDCP alternatives would be 59–73 acres (Table 12-ES-1). Alternatives 2D, 4A, and 5A
10 would include 2 acres of alkali season wetland complex. Acreages of effects on other natural
11 community types are broadly overlapping among east alignment, west alignment, and
12 pipeline/tunnel alternatives, with generally smaller effects under the pipeline/tunnel alternatives,
13 and much smaller effects under the non-HCP alternatives. The exception would be Alternative 7
14 because of its 10,000 acres of additional seasonally inundated floodplain restoration.

15 Among the pipeline/tunnel alternatives, Alternative 7 would have the largest effect on the
16 valley/foothill riparian, nontidal perennial aquatic, and grassland natural communities and
17 cultivated lands because of its additional 10,000 acres of restoration. Alternative 4 would have the
18 largest effect of the pipeline/tunnel alternatives on tidal perennial aquatic, tidal freshwater
19 emergent wetland, nontidal freshwater perennial emergent wetland, alkali seasonal wetland
20 complex, and vernal pool complex natural communities because RTM storage sites would be 6 feet
21 high instead of 10 feet high as in all other alternatives (see Chapter 3, Section 3.6.1.2, *Conveyance*
22 *Facilities*), and because of additional RTM storage facilities near Clifton Court Forebay, where vernal
23 pool complex and alkali seasonal wetland complex natural communities would be affected. Of the
24 pipeline/tunnel alternatives, Alternative 5, which would have a smaller restoration area and only
25 one water intake, would have the smallest effect on the valley/foothill riparian, nontidal perennial
26 aquatic, and grassland natural communities and cultivated lands (Table 12-ES-1). Alternative 5
27 would also provide a smaller benefit to tidal wetland habitats because of the alternative's smaller
28 tidal marsh restoration area. Alternatives 2D, 4A, and 5A would provide some of the least benefits to
29 tidal wetland habitats with 9–11 acres. These non-HCP alternatives would also provide the least
30 benefits to tidal perennial aquatic, nontidal freshwater perennial emergent wetland, alkali seasonal
31 wetland complex, vernal pool complex natural communities, and grassland.

32 Alternative 9 would have a smaller effect on cultivated lands than all other action alternatives other
33 than Alternative 5 would have. However, Alternative 9 would have the largest effect on tidal
34 perennial aquatic, tidal freshwater emergent wetland, valley/foothill riparian, and nontidal
35 freshwater emergent wetland natural communities. These Alternative 9 losses would be primarily
36 temporary and associated with the initial dredging of Middle River and Victoria Canal to improve
37 their flow capacity.

38 Under the No Action Alternative, there would be no water conveyance facilities construction effects
39 on natural communities. Also, there would be no restoration, protection, and enhancement of
40 natural communities resulting from the other conservation measures, or Environmental
41 Commitments under the non-HCP alternatives. Several programs that are under way or in the
42 planning stages to increase wetlands and riparian natural communities in the absence of a BDCP or
43 California WaterFix project will benefit natural communities and increase wildlife-friendly
44 agriculture in the study area. The potential exists for levee deterioration and repairs, global climate
45 change and associated sea level rise, and seismic activity that damages levees to result in substantial
46 loss of terrestrial natural communities and cultivated land habitats.

1 **Table 12-ES-1. Direct Effects of Alternatives on Natural Communities and Cultivated Lands in the Terrestrial Biological Resources Study Area**
 2 **(acres)^a**

Alternative ^c	Natural Community Type/Cultivated Land ^b											
	Tidal Perennial Aquatic	Tidal Freshwater Emergent Wetland	Valley/Foothill Riparian	Nontidal Perennial Aquatic	Nontidal Freshwater Perennial Emergent Wetland	Alkali Seasonal Wetland Complex	Vernal Pool Complex	Managed Wetland	Other Natural Seasonal Wetland	Grassland	Cultivated Land	Total
1A	224	21	892	290	128	72	375	13,899	0	2,907	58,369	77,178
1B	221	27	896	293	137	72	375	13,838	0	3,087	72,778	91,725
1C	186	9	932	311	131	94	437	13,959	4	3,007	67,895	86,966
2A	232	20	893	290	128	72	375	13,899	0	2,923	58,875	77,708
2B	249	33	910	293	138	72	375	13,840	0	3,117	73,273	92,301
2C	186	9	932	311	131	88	437	13,959	4	3,008	67,895	86,961
2D ^d	285	9	78	63	4	2	47	126	0	673	7,679	8,967
3	184	18	873	290	128	72	375	13,899	0	2,869	57,891	76,600
4 ^d	308	20	868	333	131	73	394	13,855	0	2,954	58,379	77,315
4A ^d	280	11	72	66	7	2	47	61	0	687	7,043	8,276
5	161	18	721	168	79	59	272	7,454	0	2,468	29,587	40,989
5A ^d	277	9	56	63	4	2	47	52	0	646	6,467	7,623
6A	224	21	892	290	128	72	375	13,899	0	2,907	58,369	77,178
6B	221	27	896	293	137	72	375	13,838	0	3,087	72,778	91,725
6C	186	9	932	311	131	94	437	13,959	4	3,007	67,895	86,966
7	200	22	957	334	128	73	375	13,899	0	2,975	61,341	80,305
8	193	20	879	290	128	72	375	13,899	0	2,890	58,060	76,807
9 ^e	546	193	1,116	269	151	72	372	13,846	0	2,756	55,091	74,413

^a Direct effects include both permanent and temporary effects.

^b Tidal Brackish Emergent Wetland (all approximately 1 acre) and Inland Dune Scrub (no effect) are not shown.

^c Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

^d Alternatives 2D, 4,4A, and 5A also include 2,019 acres of dredging of open water in Clifton Court Forebay (1,931 acres) and other temporary disturbances (368 acres) to tidal perennial aquatic not shown in the table.

^e Alternative 9 also includes dredging of 517 acres of open water in Middle River and Victoria and North Canals not shown in the table.

1 **Increases Associated with Protection and Restoration**

2 The principal intent of the BDCP and California WaterFix is to improve habitat conditions for
3 covered special-status species in the Plan Area through habitat protection, restoration, and
4 enhancement. These improvements would occur incrementally over the life of the project's
5 restoration activities. Tables 12-ES-2 and ES-2A summarize the natural communities protection and
6 restoration acreage goals under conservation measures for the BDCP alternatives and
7 Environmental Commitments for the non-HCP alternatives. Each of the alternatives analyzed in this
8 chapter, except Alternatives 5 and 7 and the No Action Alternative, would include these goals. For
9 the BDCP alternatives, the 69,275 acres of natural communities and cultivated land protection and
10 the 83,839 acres of natural communities restoration (Table 12-ES-2), combined with the Plan's goals
11 of enhancement of all new conservation lands, would provide a substantial offset for the temporary
12 and permanent losses associated with facilities construction and habitat conversion of these
13 alternatives, which would range from 74,413 to 92,301 acres. The tidal, nontidal, riparian, and
14 seasonal wetland expansions would provide long-term benefits for most special-status and common
15 species in the Plan Area. The exception would be habitat for species that rely heavily on modified
16 landscapes, including cultivated lands and managed wetland. The acreages of habitat provided by
17 these land cover types would be reduced; however, the value they provide would be enhanced by
18 the management activities that would accompany habitat protection and restoration actions
19 directed by the Plan.

20 Because it would restore 40,000 fewer acres of tidal marsh, Alternative 5 would have a much
21 smaller cultivated lands and managed wetland conversion effect compared with the other
22 alternatives. However, Alternative 5 would also provide 40,000 fewer acres of tidal wetland and
23 transitional uplands than the other alternatives would offer. Nonetheless, Alternative 5 would
24 provide for expansions of all the key natural communities targeted by the Plan when compared with
25 Existing Conditions and the No Action Alternative. Alternative 7 would result in a more substantial
26 reduction of cultivated lands and managed wetland in the Plan Area, but a net expansion of the key
27 natural communities addressed in the Plan. Also, Alternative 7 would provide an additional 10,000
28 acres of riparian and floodplain habitat associated with seasonally inundated floodplain restoration
29 when compared with the other alternatives.

30 With the exception of Alternatives 5 and 7, CM3 and CM4 would provide 153,114 acres of natural
31 communities protection and restoration. The non-HCP alternatives, with Environmental
32 Commitment 3, would provide approximately 12,000 to 15,000 acres of natural communities
33 protection and restoration. Environmental Commitments 4, 6, 7, 8, 9, 10, 11, 12, 15, and 16 would
34 provide at least another 1,000 to 2,000 acres of protection and restoration.

35 The No Action Alternative does not include a comprehensive plan for expansion of natural
36 communities that provide habitat for special-status and common species found in the Plan Area.
37 There would be no large-scale conversions of cultivated lands and managed wetland; there would be
38 numerous disassociated projects and programs that would result in relatively small losses of these
39 managed lands in favor of wetland and riparian habitats.

40 The proposed restoration and protection for Alternatives 2D, 4A, and 5A are presented in Table 12-
41 ES-2A.

1

Table 12-ES-2. Natural Communities Protection and Restoration Included in the BDCP

BDCP Conservation Measures	Acres
Protection	
<i>CM3: Natural Communities Protection and Restoration</i>	
Valley/foothill riparian	750
Vernal pool complex	600
Alkali seasonal wetland complex	150
Grassland	8,000
Managed wetland	1,500
Managed wetland (natural community)	6,600
Cultivated lands (non-rice)	48,125
Cultivated lands (rice)	500
Cultivated lands (rice or equivalent)	3,000
Nontidal marsh	50
Total Protection	69,275
Restoration	
<i>CM4: Tidal Natural Communities Restoration^a</i>	
Tidal brackish emergent wetland	6,000
Tidal freshwater emergent wetland	24,000
Tidal perennial aquatic (below mean lower low water)	N/A
Tidal wetland of any type and transitional uplands	35,000
Subtotal: Tidal wetland restoration	65,000
<i>CM5: Seasonally Inundated Floodplain Restoration^b</i>	10,000
<i>CM6: Channel Margin Enhancement^c</i>	20 miles
<i>CM7: Riparian Natural Community Restoration</i>	5,000
<i>CM8: Grassland Natural Community Restoration</i>	2,000
<i>CM9: Vernal Pool and Alkali Seasonal Wetland Complex Restoration</i>	
Vernal pool complex	67
Alkali seasonal wetland complex	72
<i>CM10: Nontidal Marsh Restoration</i>	
Nontidal marsh	1,200
Managed wetland	500
Total Restoration	83,839
Total Protection and Restoration	153,114

^a Under Alternative 5, 25,000 acres of tidal habitat would be restored under CM4.

^b Under Alternative 7, 20,000 acres of seasonally inundated floodplain would be restored under CM5.

^c Under Alternative 7, 40 linear miles of channel margin habitat would be enhanced under CM6.

2

1 **Table 12-ES-2A Environmental Commitments under Alternatives 2D, 4A, and 5A**

Environmental Commitment 3: Natural Communities Protection and Restoration	Alternative 2D	Alternative 4A	Alternative 5A
Valley/Foothill Riparian	Up to 120 acres	Up to 103 acres	Up to 87 acres
Grassland	Up to 1,078 acres	Up to 1,060 acres	Up to 1,033 acres
Vernal Pool Complex and Alkali Seasonal Wetland Complex	Up to 188 acres	Up to 188 acres	Up to 188 acres
Nontidal Marsh	Up to 194 acres	Up to 119 acres	Up to 119 acres
Cultivated Lands	Up to 13,432 acres	Up to 11,870 acres	Up to 11,301 acres
Total	Up to 15,012 acres	Up to 13,340 acres	Up to 12,728 acres
Environmental Commitment 4: Tidal Natural Communities Restoration	Up to 300 acres	Up to 295 acres	Up to 292 acres
Environmental Commitment 6: Channel Margin Enhancement	Up to 5.5 levee miles	Up to 4.6 levee miles	Up to 3.1 levee miles
Environmental Commitment 7: Riparian Natural Community Restoration	Up to 293 acres	Up to 251 acres	Up to 213 acres
Environmental Commitment 8: Grassland Natural Community	Up to 1,088 acres	Up to 1,070 acres	Up to 1,043 acres
Environmental Commitment 9: Vernal Pool and Alkali Seasonal Wetland Complex Restoration	Up to 48 acres	Up to 48 acres	Up to 48 acres
Environmental Commitment 10: Nontidal Marsh Restoration	Up to 1,356 acres	Up to 832 acres	Up to 832 acres
Environmental Commitment 11: Natural Communities Enhancement and Management	At sites protected or restored under Environmental Commitments 3–10		
Environmental Commitment 12: Methylmercury Management	At sites restored under Environmental Commitment 4		
Environmental Commitment 15: Localized Reduction of Predatory Fishes	At north Delta intakes and at Clifton Court Forebay		
Environmental Commitment 16: Nonphysical Fish Barrier	At Georgiana Slough		

2

3 **Effects on Wetlands and Other Waters of the United States**

4 The estimated area of fill (permanent and temporary) of wetlands and other waters of the United
5 States potentially under jurisdiction of the U.S. Army Corps of Engineers (jurisdictional waters) from
6 constructing the water conveyance facilities would be largest under Alternative 9 (Table 12-ES-3).
7 Fill of jurisdictional waters would be relatively similar under the east (1B, 2B, and 6B), and west (1C,

2C, and 6C) alignments, less under the modified pipeline/tunnel alignments (2D, 4, 4A, and 5A), and substantially less under the pipeline/tunnel alternatives (1A, 2A, 3, 5, 6A, 7, and 8). Of these alternatives, the fill would be largest under Alternative 2B. Under Alternatives 2D, 4, 4A, and 5A larger areas of nonwetland waters of the United States would be temporarily disturbed due to work in Clifton Court Forebay; however, the forebay would ultimately expand by 450 acres and thus largely offset any losses there. Implementing Alternative 5 would result in the least fill of nonwetland waters of the United States.

Under the No Action Alternative, there would be no water conveyance facilities construction effects on jurisdictional wetlands and other waters of the United States. Also, there would be no restoration, protection, and enhancement of jurisdictional wetlands resulting from the BDCP's other conservation measures. Jurisdictional wetlands could increase in area and habitat value under several programs that are under way or in the planning stages to increase wetlands and riparian natural communities in the absence of a BDCP. The potential exists for levee deterioration and repairs, global climate change and associated sea level rise, and seismic activity that damages levees to result in substantial loss of jurisdictional wetlands.

Table 12-ES-3. Fill of Wetlands and Other Waters of the United States from Construction of Water Conveyance Facilities (CM1) (acres)

Alternative ^a	Wetlands	Other Waters of the United States	Total Waters of the United States
1A	142	284	426
1B	317	486	803
1C	180	619	799
2A	144	304	448
2B	330	525	855
2C	180	619	799
2D ^b	249	485	734
3	134	242	376
4 ^b	259	440	698
4A ^b	259	440	698
5	134	221	355
5A ^b	232	441	673
6A	142	284	426
6B	317	486	803
6C	180	619	799
7	140	251	391
8	140	251	291
9 ^c	231	776	1,007

^a Dark shading= pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

^b Additional temporary impact of 1931 acres to Clifton Court Forebay due to dredging.

^c Additional temporary impact of 669 acres to tidal channel, forest, scrub-shrub, and emergent wetland due to dredging effects.

1 **Effects on Invertebrates**

2 The acreages of effects on special-status invertebrate species' habitats that would result from action
3 alternatives are summarized below in Table 12-ES-4. Restoration, protection, and management
4 actions would account for the majority of the effects on invertebrates.

5 Most of the effects on vernal pool species and valley elderberry longhorn beetle for the BDCP
6 alternatives would result from tidal natural communities restoration. Alternative 5, which would
7 have 40,000 fewer acres of tidal habitat restoration, would have substantially less effect on vernal
8 pool species and valley elderberry longhorn beetle relative to the other alternatives. The other 14
9 BDCP alternatives differ in their effects on these species based on the alternatives' respective
10 conveyance alignments (vernal pool species and valley elderberry longhorn beetle), the number and
11 location of intakes along the Sacramento River (valley elderberry longhorn beetle), and the amount
12 of floodplain restoration (valley elderberry longhorn beetle under Alternative 7). As seen in Table
13 12-ES-4, the west alignment (Alternatives 1C, 2C, and 6C) would result in the greatest effect on
14 vernal pool crustaceans. This greater effect would be due to construction of a canal west of Clifton
15 Court Forebay that would pass through an area of vernal pool complex and alkali seasonal wetland
16 that could provide vernal crustacean habitat. Alternative 9 effects on valley elderberry longhorn
17 beetle would be the greatest due to effects on riparian habitat along Middle River. The 10,000-acre
18 increase in seasonal floodplain restoration under Alternative 7 would result in effects on 100
19 additional acres of suitable valley elderberry longhorn beetle habitat. Alternative 7 would be the
20 same as Alternative 8 except for Alternative 7's greater floodplain restoration and channel margin
21 enhancement. However, the seasonal floodplain restoration under Alternative 7 would by the late
22 long-term result in an overall benefit to valley elderberry longhorn beetle by creating approximately
23 3,000 additional acres of riparian habitat. The remaining BDCP alternatives differ in their effects on
24 valley elderberry longhorn beetle due to the number and location of intakes along the Sacramento
25 River.

26 All of the BDCP alternatives except Alternatives 5 and 7 would have the same potential effects on
27 Sacramento and Antioch Dunes anthicid beetles as result of tidal habitat restoration, seasonal
28 floodplain restoration, and channel margin enhancement. Alternative 5 would have less potential
29 effect on the anthicid beetles due to decreased tidal habitat restoration (40,000 acres less) and
30 Alternative 7 would have greater potential effect due to a greater amount of seasonal floodplain
31 restoration (10,000 more acres) and channel margin enhancement (20 more miles). However
32 Alternative 7's additional restoration in the long run would likely increase the amount of habitat
33 available to anthicid beetles beyond that produced under the other alternatives.

34 Alternative 5 would also have fewer potential effects on delta green ground beetle if tidal habitat
35 restoration is excluded from the Cache Slough area. All of the other alternatives would have the
36 same potential effect on delta green ground beetle.

37 The non-HCP alternatives (2D, 4A, and 5A) would have substantially fewer impacts on vernal pool
38 crustaceans and valley elderberry longhorn beetle compared with the BDCP alternatives due to
39 having much fewer impacts from restoration. Of these alternatives, Alternative 5A would have fewer
40 impacts on valley elderberry longhorn beetle habitat because of having fewer intakes along the
41 Sacramento River. The impacts on other invertebrate species would be the same for these three
42 alternatives.

1 Potential effects on callippe silverspot butterfly would be the same for all alternatives because
2 potential grassland protection and management, which could result in effects on the species, would
3 not differ.

4 Under the No Action Alternative, the effects on invertebrate species resulting from water
5 conveyance facilities construction would not occur and neither would the benefits and contributions
6 to recovery resulting from the other BDCP conservation measures. As seen in Table 12-7 in Section
7 12.3.3.1, *No Action Alternative*, there are several existing or proposed conservation projects under
8 the No Action Alternative that could benefit some of the invertebrate species, including riparian
9 habitat and floodplain restoration projects. However, many of these projects and plans do not
10 provide the same magnitude of conservation and contribution to recovery of invertebrate species
11 within the Delta that the BDCP offers and were not developed in consideration of the needs and
12 interests of all of the covered invertebrate species addressed by the BDCP. Vernal pool crustacean
13 habitat could be negatively affected by some of the proposed tidal habitat restoration projects listed
14 in Table 12-7. Also, these No Action Alternative projects would not provide the same contributions
15 to invertebrate species recovery that the BDCP offers because the BDCP would provide habitat
16 protection and restoration beyond what is typically required for mitigation of individual projects.

1 **Table 12-ES-4. Direct Effects of Alternatives on Invertebrate Habitat in the Terrestrial Biological Resources Study Area (acres)^a**

Alternative ^b	Vernal Pool Crustaceans ^c	Valley Elderberry Longhorn Beetle	Nonlisted Vernal Pool Invertebrates ^d	Sacramento and Antioch Dunes Anthicid Beetles	Delta Green Ground Beetle ^e	Callippe Silverspot Butterfly ^e
1A	375	1,560	375	NA	0	0
1B	376	1,544	376	NA	0	0
1C	453	1,550	453	NA	0	0
2A	375	1,572	375	NA	0	0
2B	376	1,572	376	NA	0	0
2C	453	1,551	453	NA	0	0
2D	48	365	48	NA	0	0
3	375	1,526	375	NA	0	0
4	395	1,557	395	NA	0	0
4A	48	372	48	NA	0	0
5	272	1,269	272	NA	0	0
5A	48	318	48	NA	0	0
6A	375	1,560	375	NA	0	0
6B	376	1,544	376	NA	0	0
6C	453	1,550	453	NA	0	0
7	375	1,634	375	NA	0	0
8	375	1,533	375	NA	0	0
9	372	1,872	372	NA	0	0

^a Direct effects include both permanent and temporary.

^b Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

^c Vernal pool crustaceans are California linderiella, Conservancy fairy shrimp, longhorn fairy shrimp, midvalley fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp.

^d Nonlisted vernal pool invertebrates are Blennosperma vernal pool andrenid bee, hairy water flea, Ricksecker's water scavenger beetle, curved-foot hygrotus beetle, molestan blister beetle.

^e Alternatives could affect species but would not result in a loss of potential habitat. This potential affect would be the same for all alternatives.

NA = Not Available (alternatives have a potential for a loss of habitat that can't be quantified).

1 **Effects on Amphibians and Reptiles**

2 The effects on habitat for special-status amphibian and reptile species' resulting from the
3 alternatives are summarized below in Table 12-ES-5. All of these species would be affected by the
4 different conveyance facilities and some species would be largely affected by tidal habitat
5 restoration (California tiger salamander, giant garter snake, and western pond turtle). Other
6 conservation measures that would affect amphibians and reptiles are Yolo Bypass fisheries
7 enhancement, seasonal floodplain restoration, and recreational improvements. Some of these
8 species, such as California red-legged frog, San Joaquin coachwhip, and Blainville's horned lizard,
9 have restricted ranges and, therefore, would be affected by only a few of the conservation measures.

10 California red-legged frog would be affected only by water conveyance facilities of the alternatives
11 and by proposed recreational improvements because most other conservation activities would not
12 extend into its range in the study area. The west alignment alternatives (1C, 2C, and 6C) and
13 Alternatives 4 and 9 would have substantially less effect on California red-legged frog relative to the
14 other alternatives because Alternatives 1C, 2C, 4, 6C, 9 would have smaller borrow and spoils areas
15 to the southwest of Clifton Court Forebay, where habitat for a number of amphibian and reptile
16 species exists. Alternatives 2D, 4A, and 5A would also only affect California red-legged frog with the
17 construction of the water conveyance facility and would have the same impact because they share
18 the same construction footprint around Clifton Court Forebay.

19 California tiger salamander would mostly be affected by tidal habitat restoration and, to a lesser
20 extent, by the conveyance facilities construction, Yolo Bypass fisheries improvement, recreational
21 facility improvements, and conservation hatchery construction. The action alternatives differ from
22 one another in their potential to affect California tiger salamander mostly based on the location and
23 size of borrow and spoils areas to the southwest of Clifton Court Forebay. Most of the pipeline/
24 tunnel alternatives (1A, 2A, 3, 6A, 7, and 8) and the eastern alignment alternatives (1B, 2B, and 6B)
25 would result in the greatest effect on California tiger salamander because of their construction
26 activity southwest of Clifton Court Forebay. The reduced amount of tidal habitat restoration under
27 Alternative 5 would result in substantially less effect when compared with all of the other
28 alternatives. Alternatives 2D, 4A, and 5A would affect California tiger salamander with the
29 construction of the water conveyance facility and potentially tidal restoration and would have the
30 same impact because they share the same construction footprint around Clifton Court Forebay and
31 are estimated to affect the same amount of habitat with tidal restoration.

32 Giant garter snake would be affected mostly by tidal natural communities restoration and
33 conveyance facilities construction, and to a lesser extent by Yolo Bypass fisheries improvements and
34 seasonal floodplain restoration. Effects of the alternatives would differ from one another mostly
35 based on their respective alignments and Alternative 5's reduced amount of tidal habitat
36 restoration. Other smaller differences would result from the number and location of intakes along
37 the Sacramento River. Alternative 9 would result in the greatest effect on giant garter snake due to
38 the larger amounts of in-channel work that would be required; however, most of the Alternative 9
39 effects would be temporary. The east conveyance alignment (Alternatives 1B, 2B, and 6B) would
40 also result in large effects on giant garter snake and would create barriers to movement across the
41 species' range in the study area. Alternative 5, which would restore 40,000 fewer acres tidal habitat,
42 would result in substantially less effect than the other alternatives (roughly 900–1,000 fewer acres
43 impacted). However, giant garter snake would also have substantially less tidal freshwater emergent
44 wetland habitat restored under Alternative 5 relative to the other alternatives. Alternatives 2D, 4A,

1 and 5A would affect giant garter snake primarily from water conveyance facility construction and
2 thus differ mostly due to the different number and location of intakes. Alternative 4A, also includes
3 geotechnical exploration impacts, which accounts for 55 acres of impacts and explains why its
4 impacts on giant garter snake are greater than under 2D, which has more intakes.

5 For most of the action alternatives, western pond turtle would be affected primarily by tidal habitat
6 restoration, and secondarily by conveyance facilities construction and Yolo Bypass fisheries
7 improvements. Alternatives 4 and 9 would have substantial effects resulting from conveyance
8 facilities construction associated with the dredging of aquatic habitat (Clifton Court Forebay for
9 Alternative 4 and Middle River for Alternative 9). Alternative 4 would have the greatest effect on
10 western pond turtle relative to the other alternatives; however, nearly all of this difference is
11 associated with the temporary effect of dredging Clifton Court Forebay, which is identified as
12 aquatic habitat for the species. Alternative 5 would have the least effect on western pond turtle
13 because of the alternative's 40,000 fewer acres of tidal habitat restoration. Alternatives 2D, 4A, and
14 5A would also have relatively large effects on western pond turtle that are largely due to the
15 temporary dredging of Clifton Court Forebay (1,931 acres). The differences between these
16 alternatives are due to the number of intakes along the Sacramento River and the geotechnical
17 exploration impacts under Alternative 4A, which account for 50 acres of impact.

18 Among the other special-status reptiles, only San Joaquin coachwhip and Blainville's horned lizard
19 would experience quantifiable effects. Only conveyance facilities construction would affect
20 coachwhip and horned lizard. Alternatives 4, 2D, 4A, and 5A would have the largest effect of all of
21 the alternatives due to the activities around Clifton Court Forebay. Alternative 9 would have
22 substantially less effect than all of the other alternatives because it would generally avoid modifying
23 grassland habitat in the vicinity of Clifton Court Forebay. Alternatives 2D, 4A, and 5A would have the
24 same effects on other special-status reptiles because they share the same footprint around Clifton
25 Court Forebay.

26 Under the No Action Alternative, there would be no water conveyance facilities construction effects
27 on amphibian and reptile species. Also, there would be no benefits and contributions to recovery
28 from the BDCP's other conservation measures. As seen in Table 12-7 in Section 12.3.3.1, *No Action*
29 *Alternative*, there are several existing or proposed conservation activities under the No Action
30 Alternative that could benefit amphibian and reptile species, including grassland and vernal pool
31 protection and management as part of several approved or pending habitat conservation plans and
32 natural community conservation plans that overlap with the Plan Area. However, many of these
33 projects and plans do not provide the same magnitude of reptile and amphibian habitat
34 conservation and contribution to recovery within the Delta that the BDCP offers and were not
35 developed in consideration of the needs and interests of all of the covered reptile and amphibian
36 species that the BDCP addresses.

1 **Table 12-ES-5. Direct Effects of Alternatives on Amphibian and Reptile Habitat in the Terrestrial Biological Resources Study Area (acres)^a**

Alternative ^b	California Red-Legged Frog	California Tiger Salamander	Giant Garter Snake	Western Pond Turtle	Special-Status Reptiles ^c
1A	183	797	3,902	1,669	338
1B	184	801	4,180	1,749	335
1C	97	716	4,020	1,703	350
2A	183	795	3,918	1,667	338
2B	184	801	4,233	1,779	335
2C	97	716	4,021	1,703	350
2D	65	109	975	2,697	371
3	183	797	3,843	1,657	338
4	77	685	4,174	4,007	371
4A	65	109	983	2,747	371
5	183	554	3,011	1,315	338
5A	65	109	893	2,696	371
6A	183	797	3,902	1,669	338
6B	184	801	4,180	1,749	335
6C	97	716	4,020	1,703	350
7	183	797	3,997	1,751	338
8	183	797	3,850	1,666	338
9	24	634	4,497	2,708	30

^a Direct effects include both permanent and temporary.

^b Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

^c Special-status reptiles are silvery legless lizard, San Joaquin coachwhip, and Blainville's horned lizard.

1 Effects on Birds

2 The conversion of special-status bird species habitat that would result from the action alternatives is
3 summarized below in Table 12-ES-6. Each of the conservation measures, or Environmental
4 Commitments under the non-HCP alternative, that would actively convert habitat under all of the
5 alternatives would affect at least one of the bird species addressed in this EIR/EIS. The conveyance
6 facilities for the alternatives generally account for a small fraction of the effects relative to the other
7 conservation measures. However, the conveyance facilities under the east alignment (Alternatives
8 1B, 2B, and 6B) and Alternative 9 would contribute substantially to effects on birds. For most
9 alternatives, tidal habitat restoration generally would account for the majority of the effects on
10 birds. The decrease in tidal natural communities restoration associated with Alternatives 5 (40,000
11 fewer acres) and the non-HCP alternatives would decrease the effects on most bird species habitat,
12 in some cases by more than half; however, species that utilize tidal habitats would also not receive
13 the long-term benefits of the restored tidal habitat that would occur under the other alternatives.
14 The larger acreage of seasonal floodplain restoration under Alternative 7 would not result in a
15 substantial increase in effects on birds relative to the other alternatives, but Alternative 7's
16 additional riparian and freshwater emergent wetland habitat restoration would provide greater
17 benefits relative to the other alternatives.

18 California clapper rail and black tern would be affected similarly by all of the alternatives, except for
19 the non-HCP alternatives, which would affect none. None of the alternatives would affect bank
20 swallow habitat.

21 Black rail, least Bell's vireo, yellow warbler, Suisun song sparrow, saltmarsh common yellowthroat,
22 western yellow-billed cuckoo, yellow-breasted chat, Cooper's hawk, osprey, cormorants, herons,
23 egrets, least bittern, white-faced ibis, and Modesto song sparrow would be affected generally the
24 same (impacted habitat acreages would differ by 1% to 3%) under all of the BDCP alternatives
25 except Alternatives 5 and 9. With its 40,000 fewer acres of tidal habitat restoration, Alternative 5
26 would effect substantially fewer acres of habitat (20 to 50% less) for these species relative to the
27 other alternatives. However, black rail, Suisun song sparrow, and saltmarsh common yellowthroat
28 would also not receive the long-term benefit of the additional tidal habitat restoration offered by the
29 other alternatives. Alternative 9 would result in greater effect on most of these species because
30 Alternative 9 would have greater effects on valley/foothill riparian, tidal freshwater emergent
31 wetland, and nontidal freshwater perennial emergent wetland natural communities; however, most
32 of the riparian habitat affected by Alternative 9 is considered low-value habitat for these species.
33 Alternatives 2D, 4A, and 5A would affect substantially less of these habitats, and would result in no
34 effect on Suisun song sparrow, and saltmarsh common yellowthroat habitats.

35 Greater and lesser sandhill cranes, Swainson's hawk, tricolored blackbird, western burrowing owl,
36 white-tailed kite, golden eagle, ferruginous hawk, short-eared owl, northern harrier, mountain
37 plover, California horned lark, grasshopper sparrow, loggerhead shrike, and yellow-headed
38 blackbird all have their impact acreages trend in the same manner across the alternatives. The east
39 alignment, in particular Alternative 2B (larger effects associated with intake pipeline construction),
40 would result in the largest effect on these species because of the east alignment's greater effects on
41 cultivated lands and grasslands. Alternative 5, with its decreased tidal habitat restoration, would
42 result in the least effects on these species of all of the alternatives but it would also provide fewer
43 benefits to those species that use tidal habitat. The non-HCP alternatives would affect less habitat for
44 greater and lesser sandhill cranes, Swainson's hawk, tricolored blackbird, western burrowing owl,

1 white-tailed kite, golden eagle, ferruginous hawk, short-eared owl, northern harrier, mountain
2 plover, California horned lark, grasshopper sparrow, loggerhead shrike, and yellow-headed
3 blackbird.

4 California least tern would be affected by all of the alternatives similarly except for Alternatives 4, 5,
5 9, 2D, 4A, and 5A. Alternatives 4 and 9 would result in substantially larger effects because of
6 dredging activities in tidal perennial aquatic habitat; however these effects would be temporary.
7 Alternative 5 would result in less effect on this habitat because of the alternative's reduced tidal
8 habitat restoration. For Alternatives 2D, 4A, and 5A, the effects on special-status birds would be
9 substantially less than under the BDCP alternatives because of the much smaller amounts of
10 restoration. The impacts from Alternative 2D would generally be greater on special-status birds
11 because of the larger impacts on cultivated lands that are used by these species for foraging.
12 Alternative 4A would have greater impacts on a few species that predominantly use wetland
13 habitats because of the inclusion of geotechnical exploration as part of Alternative 4A.

14 Under the No Action Alternative, there would be no water conveyance facilities construction effects
15 on bird species. Also, there would be no benefits and contributions to recovery from the BDCP's
16 other conservation measures. As seen in Table 12-7 in Section 12.3.3.1, *No Action Alternative*, there
17 are several existing or proposed conservation projects under the No Action Alternative that could
18 benefit bird species, including tidal habitat restoration, freshwater emergent wetland restoration,
19 grassland protection, and riparian habitat restoration, as well as the management of agricultural
20 lands and managed wetlands for the benefits of wildlife. However, many of these projects and plans
21 do not provide the same magnitude of conservation and contribution to recovery of bird habitat
22 within the Delta that the BDCP offers and were not developed in consideration of the needs and
23 interests of all of the covered bird species addressed by the BDCP. Furthermore, under the No Action
24 Alternative, both gradual and catastrophic natural phenomena, such as continued Delta island land
25 subsidence, levee degradation and failure from floods or seismic events, and climate change, could
26 affect the grasslands, cultivated lands, and valley/foothill riparian habitat used by birds in the study
27 area (see Appendix 3E, *Potential Seismic and Climate Change Risks to SWP/CVP Water Supplies*).
28 These changes could, in the long term, benefit species that use open waters and tidal wetlands, but
29 habitat in the Delta would decline for those species that use cultivated lands, grasslands, and
30 riparian vegetation.

1 **Table 12-ES-6. Direct Effects of Alternatives on Bird Habitat in the Terrestrial Biological Resources Study Area (acres)^a**

Alternative ^b	California Black Rail	California Clapper Rail	California Least Tern	Greater Sandhill Crane	Lesser Sandhill Crane	Least Bell's Vireo & Yellow Warbler	Suisun Song Sparrow & Saltmarsh Yellowthroat	Swainson's Hawk	Tricolored Blackbird	Western Burrowing Owl	Western Yellow-Billed Cuckoo	White-Tailed Kite	Yellow-Breasted Chat
1A	3,132	77	243	7,372	15,881	812	3,688	55,306	43,612	45,576	666	59,567	811
1B	3,131	77	240	13,186	23,861	819	3,688	65,739	51,616	51,889	673	69,935	817
1C	3,133	77	204	8,113	21,495	823	3,688	62,459	48,341	50,433	677	66,281	822
2A	3,131	77	250	7,596	16,106	811	3,688	55,551	43,865	45,818	664	59,801	811
2B	3,131	77	266	13,473	24,151	829	3,688	66,035	51,904	52,156	682	70,240	830
2C	3,132	77	204	8,113	21,495	823	3,688	62,460	48,341	50,433	677	66,283	823
2D	8	0	2,295	5,229	5,329	57	0	7,404	6,693	7,134	43	7,430	56
3	3,131	77	202	7,036	15,546	803	3,688	54,989	43,337	45,297	658	59,245	803
4	3,140	77	2,362	6,966	14,875	794	3,688	54,864	43,341	45,405	667	59,126	813
4A	13	0	2,299	4,576	4,676	60	0	6,748	6,177	6,453	47	6,777	59
5	1,542	77	178	6,886	8,444	661	1,637	29,519	25,293	26,445	545	31,203	661
5A	8	0	2,254	4,152	4,252	49	0	6,314	5,819	6,084	37	6,336	49
6A	3,132	77	243	7,372	15,881	812	3,688	55,306	43,612	45,576	666	59,567	811
6B	3,131	77	240	13,186	23,861	819	3,688	65,739	51,616	51,889	673	69,935	817
6C	3,133	77	204	8,113	21,495	823	3,688	62,459	48,341	50,433	677	66,281	822
7	3,131	77	217	7,110	15,623	858	3,688	57,965	45,303	47,870	699	62,052	858
8	3,131	77	211	7,110	15,620	809	3,688	55,040	43,414	45,366	662	59,301	809
9	3,439	77	1,082	5,022	13,845	1,047	3,688	53,516	42,161	44,287	890	57,835	1,047

^a Direct effects include both permanent and temporary effects.

^b Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

Alternative ^b	Cooper's Hawk & Osprey	Golden Eagle & Ferruginous Hawk	Cormorants, Herons & Egrets	Short- Eared Owl & Northern Harrier	Redhead & Tule Greater White- Fronted Goose	Mountain Plover	Black Tern	California Horned Lark & Grasshopper Sparrow	Least Bittern & White- Faced Ibis	Loggerhead Shrike	Modesto Song Sparrow	Bank Swallow	Yellow- Headed Blackbird
1A	677	29,424	893	50,507	NA	29,424	491	29,424	13,185	49,812	3,607	0	44,007
1B	707	34,581	897	57,123	NA	34,581	491	34,581	13,119	59,116	3,568	0	49,126
1C	732	33,637	933	55,870	NA	33,637	491	33,637	13,108	56,881	3,704	0	48,071
2A	681	29,365	893	50,493	NA	29,365	491	29,365	13,185	49,996	3,608	0	43,945
2B	714	34,602	910	57,223	NA	34,602	491	34,602	13,126	60,863	3,588	0	49,153
2C	733	33,638	932	55,870	NA	33,638	491	33,638	13,108	56,882	3,704	0	48,071
2D	53	5,311	78	5,626	NA	5,311	0	5,311	6	6,970	217	0	6,057
3	665	29,183	873	50,263	NA	29,183	491	29,183	13,183	49,529	3,586	0	43,757
4	669	29,606	868	50,879	NA	29,606	491	29,606	13,112	49,515	3,486	0	44,892
4A	50	4,942	72	5,187	NA	4,942	0	4,942	9	6,464	150	0	5,626
5	577	16,129	721	27,117	NA	16,129	152	16,129	6,805	25,773	2,998	0	24,121
5A	39	4,531	56	4,786	NA	4,531	0	4,531	6	5,961	121	0	5,190
6A	677	29,424	893	50,507	NA	29,424	491	29,424	13,185	49,812	3,607	0	44,007
6B	707	34,581	897	57,123	NA	34,581	491	34,581	13,119	59,116	3,568	0	49,126
6C	732	33,637	933	55,870	NA	33,637	491	33,637	13,108	56,881	3,704	0	48,071
7	743	30,720	957	52,434	NA	30,720	491	30,720	13,185	52,462	3,673	0	45,323
8	668	29,270	879	50,348	NA	29,270	491	29,270	13,185	49,581	3,594	0	43,843
9	760	28,690	1,116	49,811	NA	28,690	491	28,690	13,109	48,125	3,974	0	43,382

^a Direct effects include both permanent and temporary effects.

^b Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

NA = Not applicable, no quantitative analysis conducted.

1 **Effects on Mammals**

2 The effects of the BDCP alternatives on habitat for special-status mammal species are summarized
3 below in Table 12-ES-7. There is no general trend in mammal effects across the alternatives.
4 Because the majority of the mammal groups addressed in this EIR/EIS have restricted ranges within
5 the study area, the various conservation measures would affect mammals differently based on their
6 specific location. Riparian brush rabbit and riparian woodrat are restricted to the southernmost
7 portion of the study area and, therefore, would be primarily affected by seasonal floodplain
8 restoration in this area and by the water conveyance facilities. Salt marsh harvest mouse and Suisun
9 shrew within the study area are restricted to Suisun Marsh and would only be affected by tidal
10 habitat restoration. San Joaquin kit fox and American badger are only considered to occur in the
11 grasslands in the southwest portion of the study area and would thus only be affected by the
12 conveyance facilities construction. San Joaquin pocket mouse and bat species roosting habitat could
13 occur throughout the study area and thus would be affected by various conservation measures.

14 As noted above, riparian brush rabbit and riparian woodrat would be affected primarily by
15 floodplain restoration and the conveyance facilities, and to a lesser degree by tidal habitat
16 restoration. The west conveyance alignment (Alternatives 1C, 2C, and 6C) would result in the least
17 effect on riparian brush rabbit due to the location of the alignment in the southern portion of the
18 study area. Riparian woodrat would be least affected by Alternative 5 due to the decrease in tidal
19 habitat restoration. Alternative 7, with its increased floodplain restoration, would result in the
20 greatest effects on both species; however, in the long term, riparian brush rabbit and riparian
21 woodrat would benefit from the expansion of riparian habitat with well-developed understory that
22 would occur as part of Alternative 7's 10,000 acres of additional seasonal floodplain restoration.
23 Alternatives 2D, 4A, and 5A would impact riparian brush rabbit and Sand Joaquin kit fox similar to
24 the BDCP alternatives because these species would only be affected by water conveyance facility
25 construction. The non-HCP alternatives would have no effect on riparian woodrat.

26 Salt marsh harvest mouse and Suisun shrew would be affected similarly by all BDCP alternatives
27 except Alternative 5. Though this alternative would decrease the effects on these species, it also
28 would limit the amount of habitat converted from managed wetland to tidal brackish emergent
29 wetland, thereby decreasing the benefit to these species in the long term. The non-HCP alternatives
30 would have no effect on these species.

31 San Joaquin kit fox and American badger would be affected only by the water conveyance facilities of
32 the alternatives. The west alignment (Alternatives 1C, 2C, and 6C) would have the largest effect on
33 these species. Alternative 9, the Through Delta/Separate Corridors alternative, would affect 90%
34 less habitat acreage than the other alternatives. The non-HCP alternatives would have similar
35 impacts on San Joaquin kit fox and American badger as the BDCP alternatives.

36 As mentioned above, San Joaquin pocket mouse and bat species would be affected by multiple
37 conservation measures because of their broad habitat distribution. Therefore, a decrease in the
38 areal extent of any one of these measures associated with a particular alternative would result in a
39 decrease in effect on these species. The largest effect on the mouse and the bat species would result
40 from Alternative 2B because of the areal extent of the east alignment and the number and location of
41 intakes. Of the BDCP alternatives, the least effect on these species would result from Alternative 5
42 due to the decrease in the number of intakes and the reduction in tidal habitat restoration. However,
43 the non-HCP alternatives, 2D, 4A, and 5A, would have the smallest effect of all the alternatives for
44 these species.

1 **Table 12-ES-7. Direct Effects of Alternatives on Mammal Habitat in the Terrestrial Biological Resources Study Area (acres)^a**

Alternative ^b	Riparian Brush Rabbit	Riparian Woodrat	Salt Marsh Harvest Mouse	Suisun Shrew	San Joaquin Kit Fox & American Bader	San Joaquin Pocket Mouse	Special-Status Bat Species (roosting only) ^c
1A	349	84	6,968	401	348	2,906	2,215
1B	338	85	6,968	401	345	3,087	2,578
1C	245	85	6,968	401	361	3,008	2,250
2A	349	84	6,968	401	348	2,923	2,302
2B	338	85	6,968	401	345	3,117	2,672
2C	245	85	6,968	401	361	3,008	2,249
2D	233	0	0	0	330	673	293
3	347	84	6,968	401	348	2,869	2,089
4	374	84	6,968	401	334	2,955	2,046
4A	250	0	0	0	330	686	269
5	311	75	3,746	164	348	2,468	1,130
5A	233	0	0	0	330	646	248
6A	349	84	6,968	401	348	2,907	2,214
6B	338	85	6,968	401	345	3,087	2,578
6C	245	85	6,968	401	361	3,007	2,249
7	470	158	6,968	401	348	2,975	2,277
8	349	84	6,968	401	348	2,890	2,175
9	372	87	6,968	401	33	2,756	2,140

^a Direct effects include both permanent and temporary.

^b Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

^c Special-status bat species are big brown bat, California myotis, hoary bat, little brown myotis, Mexican free-tailed bat, silver-haired bat, western red bat, western small-footed myotis, Yuma myotis, canyon bat, pallid bat, Townsend's big-eared bat, western mastiff bat; only effects on roosting habitat shown here.

1 Under the No Action Alternative, there would be no water conveyance facilities construction effects
2 on mammal species. Also, there would be no benefits and contributions to recovery from the other
3 BDCP conservation measures. As seen in Table 12-7 in Section 12.3.3.1, *No Action Alternative*, there
4 are several existing or proposed conservation projects under the No Action Alternative that could
5 benefit mammal species, including tidal habitat restoration, grassland protection, and riparian
6 habitat restoration. However, many of these projects and plans do not provide the same magnitude
7 of conservation and contribution to recovery of mammal habitat within the Delta that the BDCP
8 offers and were not developed in consideration of the needs and interests of all of the covered
9 mammal species addressed by the BDCP.

10 **Effects on Plants**

11 Because the distribution of covered plant species in the study area is only partially documented, a
12 habitat model was created for each species to ensure that effects on the species were not
13 underestimated. The modeled habitat is essentially a distribution map for each species based on the
14 characteristics, such as vegetation types, soil types, land forms, and elevation ranges, of habitat in
15 which the species are known to occur. In the effects analysis, these habitat models served as
16 surrogates for the amount and location of habitat for each covered plant species. The determination
17 of effects of the alternatives on special-status plant species rely on the habitat models. The effects
18 are summarized below by the natural communities in which the species occur. Tables 12-ES-8
19 through 12-ES-14 summarize these effects.

20 **Vernal Pool Plants**

21 Seventeen covered and noncovered special-status vernal pool plant species are present in the study
22 area. Under the pipeline/tunnel alternatives (1A, 2A, 3, 5, 6A, 7, and 8) and the east alignment
23 alternatives (1B, 2B, and 6B), no known occurrences of these species would be affected, and
24 modeled vernal pool habitat would be affected primarily by tidal natural communities restoration
25 activities. Under the BDCP modified pipeline/tunnel alternative (Alternative 4), one occurrence of
26 alkali milk-vetch and 16 additional acres of modeled vernal pool habitat would be affected by
27 construction of the water conveyance facilities. The greatest effects on vernal pool plant species
28 would occur under the west alignment alternatives (1C, 2C, and 6C); three occurrences of alkali
29 milk-vetch and two occurrences of Ferris' goldfields and 77 additional acres of modeled vernal pool
30 habitat would be affected by construction of the west alignment water conveyance features. The
31 non-HCP alternatives would have fewer impacts on vernal pool plants compared to the BDCP
32 alternatives due to having substantially fewer impacts from tidal restoration. Because they share the
33 same footprint around Clifton Court Forebay, all three of these alternatives would affect vernal pool
34 plants the same, with one occurrence of alkali milk-vetch and 49 acres of modeled vernal pool plant
35 habitat. Alternative 9 would have the fewest effects on vernal pool plant species, affecting no known
36 occurrences of these species, and affecting modeled vernal pool habitat only through tidal natural
37 communities restoration activities.

38 **Alkali Seasonal Wetland Plants**

39 Eight covered and noncovered special-status alkali seasonal wetland plant species occur in the study
40 area. The BDCP east alignment alternatives (1C, 2C, and 6C) would result greatest impacts on
41 special-status alkali seasonal wetland plant modeled habitat and occurrences. Under the BDCP
42 modified pipeline/tunnel alternative (Alternative 4), two occurrences of San Joaquin spearscale, 10
43 additional acres of modeled habitat for San Joaquin spearscale, and 75 additional acres of modeled

1 habitat for Delta button-celery would be affected by construction of the water conveyance facilities
 2 relative to the other pipeline/tunnel alternatives (1A, 2A, 3, 5, 6A, 7 and 8). Alternative 9 would have
 3 the fewest effects on alkali seasonal wetland plant species of the BDCP alternatives because
 4 construction of the water conveyance facilities would affect no known occurrences and no modeled
 5 habitat of alkali seasonal wetland plants. However, the non-BDCP alternatives (2D, 4A, and 5A)
 6 would have the least impacts on alkali seasonal wetland plants of all the action alternatives due to
 7 having substantially fewer impacts from tidal restoration. All three of these alternatives would
 8 roughly affect alkali seasonal wetland plants the same because they share the same footprint around
 9 Clifton Court Forebay; however, Alternative 2D would have one more acre of impact on heartscale
 10 modeled habitat due to having a larger amount of tidal restoration and Alternative 5A would have
 11 one fewer acre of San Joaquin spearscale modeled habitat relative to the other two non-BDCP
 12 alternatives due to having fewer acres of tidal restoration.

13 **Grassland Plants**

14 Thirteen covered and noncovered special-status grassland plant species occur in the study area.
 15 Under all BDCP alternatives, one occurrence of Carquinez goldenbush and four acres of modeled
 16 habitat for Carquinez goldenbush would be affected by tidal habitat restoration, and one occurrence
 17 of Parry's rough tarplant would be affected by Yolo Bypass fisheries enhancements. Under the
 18 pipeline/tunnel alternatives (1A, 2A, 3, 5, 6A, 7, and 8), the east alignment alternatives (1B, 2B, and
 19 6B), Alternative 4, and Alternative 9, no additional covered and noncovered grassland plant species
 20 would be affected by construction of the water conveyance facilities. However, under the west
 21 alignment alternatives (1C, 2C, and 6C), one occurrence of Keck's checker-mallow and one
 22 occurrence of caper-fruited tropidocarpum could be affected by construction of the water
 23 conveyance facilities. All three non-HCP alternatives (2D, 4A, and 5A) would have fewer impacts on
 24 special-status grassland plants compared to the BDCP alternatives due to having substantially less
 25 impacts from tidal restoration. They would affect no occurrences of grassland plant species and
 26 would affect 1 acre of modeled habitat for Carquinez goldenbush. All three of these alternatives
 27 would affect special-status grassland plants the same because they share the same footprint around
 28 Clifton Court Forebay.

29 **Valley/Foothill Riparian Plants**

30 Four covered and noncovered special-status valley/foothill riparian plant species occur in the study
 31 area. All BDCP alternatives would effect these species as a result of floodplain levee construction and
 32 increased frequency and duration of flooding. All three non-HCP alternatives (2D, 4A, and 5A) would
 33 have fewer impacts on special-status valley/foothill riparian plant habitat, and no occurrences,
 34 compared to the BDCP alternatives due to having substantially less impacts from tidal restoration
 35 and no floodplain restoration. All three of these alternatives would affect special-status
 36 valley/foothill riparian plants the same because they all avoid modeled habitat and occurrences for
 37 these species.

38 **Tidal Wetland Plants**

39 Eight covered and noncovered special-status tidal wetland plant species are present in the study
 40 area. The effects of restoration actions would be similar under all BDCP alternatives. The modeled
 41 habitat for special-status tidal wetland plants affected by the BDCP alternatives is generally similar
 42 except for Alternative 9, which would impact substantially more habitat from in-channel dredging.
 43 The number of occurrences affected are generally similar. All three non-HCP alternatives (2D, 4A,

1 and 5A) would have fewer impacts on special-status tidal wetland plants (fewer occurrences and
2 fewer impacts on modeled habitat) compared to the BDCP alternatives due to having substantially
3 less impacts from tidal restoration and no floodplain restoration. Alternative 5A would result in the
4 fewest impacts on these species and Alternatives 4A and 2D would be roughly the same except for
5 greater impacts on side-flowering skullcap from Alternative 4A.

6 **Inland Dune Plants**

7 Five noncovered special-status inland dune plant species are present in the study area. None of the
8 action alternatives would affect the inland dune plants.

9 **Nontidal Wetland Plants**

10 Six noncovered special-status nontidal wetland plant species are present in the study area. The west
11 alignment alternatives (1C, 2C, and 6C) would have the fewest effects on covered and noncovered
12 tidal wetland plants as a result of constructing the water conveyance facilities. The east alignment
13 alternatives (1B, 2B, and 6B) would affect the greatest number of occurrences. The modified
14 pipeline/tunnel alternative (Alternative 4) would have a level of effects similar to that of the east
15 alignment alternatives and Alternative 9. The pipeline/tunnel alternatives (1A, 2A, 3, 5, 6A, 7, and 8)
16 would have slightly fewer effects on nontidal wetland plants than the east alignment alternatives,
17 Alternative 4, and Alternative 9. All three non-HCP alternatives (2D, 4A, and 5A) would have roughly
18 similar impacts on special-status non tidal wetland plants compared to the BDCP alternatives. Of
19 the non-HCP alternatives, Alternative 5A would result in the fewest impacts on these species, and
20 Alternatives 4A and 2D would be roughly the same.

21 **No Action Alternative**

22 Under the No Action Alternative, there would be no water conveyance facilities construction effects
23 on plant species. Also, there would be no benefits and contributions to recovery from the BDCP's
24 other conservation measures. As seen in Table 12-7 in Section 12.3.3.1, *No Action Alternative*, there
25 are several existing or proposed conservation projects under the No Action Alternative that could
26 benefit some of the special-status plant species. However, many of these projects and plans are
27 primarily focused on providing habitat for wildlife and do not provide the specific conservation and
28 contribution to recovery of these plants species within the Delta that the BDCP offers, especially
29 considering that conversion of habitat in the Delta as a result of climate change may reduce the
30 distribution of plant species in the study area.

1 **Table 12-ES-8. Direct Effects of Alternatives on Vernal Pool Plant Species in the Terrestrial Biological**
 2 **Resources Study Area (acres and occurrences)^a**

Alternative ^b	Modeled Vernal Pool Plant Habitat (acres)	Occurrences																
		Alkali milk-vetch	Dwarf downingia	Boggs Lake hedge-hyssop	Legenere	Heckard's pepper-grass	Ferris' milk-vetch	Vernal pool smallscale	Hogwallow starfish	Contra Costa goldfields	Ferris' goldfields	Cotula-leaf navarretia	Baker's navarretia	Colusa grass	Bearded popcorn-flower	Delta woolly-marbles	Saline clover	Solano grass
1A	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1B	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1C	452	3	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
2A	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2B	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2C	452	3	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
2D	49	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	391	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4A	49	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5A	49	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6A	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6B	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6C	452	3	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
7	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	372	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

^a Direct effects include both permanent and temporary.

^b Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

1 **Table 12-ES-9. Direct Effects of Alternatives on Alkali Seasonal Wetland Plant Species in the Terrestrial Biological Study Area (acres and occurrences)^a**

Alternative ^b	Modeled Habitat (acres)				Occurrences							
	San Joaquin spearscale	Brittlescale	Heartscale	Delta button-celery ^c	San Joaquin spearscale	Brittlescale	Heartscale	Delta button-celery	Heckard's peppergrass	Crownscale	Palmate-bracted bird's-beak	Recurved larkspur
1A	748	4	306	21	1	0	0	0	1	1	0	0
1B	748	4	306	21	1	0	0	0	1	1	0	0
1C	823	5	307	130	3	0	1	0	1	1	0	1
2A	749	4	306	21	1	0	0	0	1	1	0	0
2B	749	4	306	21	1	0	0	0	1	1	0	0
2C	823	4	307	130	3	0	1	0	1	1	0	1
2D	96	1	15	97	1	0	0	0	0	1	0	0
3	748	4	306	21	1	0	0	0	1	1	0	0
4	758	4	306	96	2	0	0	0	1	1	0	0
4A	96	1	14	97	1	0	0	0	0	1	0	0
5	748	4	306	21	0	0	0	0	1	1	0	0
5A	95	1	14	97	1	0	0	0	0	1	0	0
6A	748	4	306	21	1	0	0	0	1	1	0	0
6B	748	4	306	21	1	0	0	0	1	1	0	0
6C	823	5	307	130	3	0	1	0	1	1	0	1
7	750	4	306	21	1	0	0	0	1	1	0	0
8	748	4	306	21	1	0	0	0	1	1	0	0
9	680	4	306	0	1	0	0	0	1	0	0	0

^a Direct effects includes both permanent and temporary.

^b Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

^c Delta button celery habitat includes both alkali seasonal wetlands and valley/foothill riparian. Habitat effects for the species can be found in both Tables 12-ES-8 and 12-ES-10.

1 **Table 12-ES-10. Direct Effects of Alternatives on Grassland Plant Species in the Terrestrial Biological**
 2 **Study Area (acres and occurrences)^a**

Alternative ^b	Modeled Habitat (acres)	Occurrences												
	Carquinez goldenbush	Carquinez goldenbush	Big tarplant	Round-leaved filaree	Pappose tarplant	Parry's rough tarplant	Small-flowered morning-glory	Diamond-petaled poppy	Streamside daisy	Stinkbells	Fragrant fritillary	Gairdner's yampah	Keck's checker-mallow	Caper-fruited tropidocarpum
1A	4	1	0	0	0	1	0	0	0	0	0	0	0	0
1B	4	1	0	0	0	1	0	0	0	0	0	0	0	0
1C	4	1	0	0	0	1	0	0	0	0	0	0	1	1
2A	4	1	0	0	0	1	0	0	0	0	0	0	0	0
2B	4	1	0	0	0	1	0	0	0	0	0	0	0	0
2C	4	1	0	0	0	1	0	0	0	0	0	0	1	1
2D	1	0	0	0	0	0	0	0	0	0	0	0	0	0
3	4	1	0	0	0	1	0	0	0	0	0	0	0	0
4	4	1	0	0	0	1	0	0	0	0	0	0	0	0
4A	1	0	0	0	0	0	0	0	0	0	0	0	0	0
5	4	0	0	0	0	1	0	0	0	0	0	0	0	0
5A	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6A	4	1	0	0	0	1	0	0	0	0	0	0	0	0
6B	4	1	0	0	0	1	0	0	0	0	0	0	0	0
6C	4	1	0	0	0	1	0	0	0	0	0	0	1	1
7	4	1	0	0	0	1	0	0	0	0	0	0	0	0
8	4	1	0	0	0	1	0	0	0	0	0	0	0	0
9	4	1	0	0	0	1	0	0	0	0	0	0	0	0

^a Direct effects includes both permanent and temporary.

^b Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

3

1 **Table 12-ES-11. Direct Effects of Alternatives on Valley/Foothill Riparian Plant Species in the**
 2 **Terrestrial Biological Study Area (acres and occurrences)^a**

Alternative ^b	Modeled Habitat (acres)		Occurrences			
	Delta button-celery ^c	Slough thistle	Delta button-celery	Slough thistle	Northern California black walnut	Wright's trichocoronis
1A	15	11	1	2	0	0
1B	15	11	1	2	0	0
1C	15	11	1	2	0	0
2A	15	11	1	2	0	0
2B	15	11	1	2	0	0
2C	15	11	1	2	0	0
2D	0	0	0	0	0	0
3	15	11	1	2	0	0
4	15	11	1	2	0	0
4A	0	0	0	0	0	0
5	15	11	1	2	0	0
5A	0	0	0	0	0	0
6A	15	11	1	2	0	0
6B	15	11	1	2	0	0
6C	15	11	1	2	0	0
7	30	23	1	2	0	0
8	15	11	1	2	0	0
9	15	11	1	2	0	0

^a Direct effects includes both permanent and temporary.

^b Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

^c Delta button celery habitat includes both alkali seasonal wetlands and valley/foothill riparian. Habitat effects for the species can be found in both Tables 12-ES-9 and 12-ES-11.

1 **Table 12-ES-12. Direct Effects of Alternatives on Tidal Wetland Plant Species in the Terrestrial Biological Study Area (acres and occurrences)^a**

Alternative ^b	Modeled Habitat (acres)					Occurrences							
	Delta mudwort/ Mason's lilaeopsis	Side- flowering skullcap	Soft bird's- beak	Delta tule pea/Suisun Marsh aster	Suisun thistle	Delta mudwort	Delta tule pea	Mason's lilaeopsis	Side- flowering skullcap	Soft bird's- beak	Suisun Marsh aster	Suisun thistle	Bolander's water hemlock
1A	48	10	73	3	73	3	25	23	0	7	27	0	3
1B	53	13	73	5	73	3	28	18	2	7	27	0	3
1C	41	22	73	1	73	3	26	17	0	7	27	0	3
2A	50	7	73	3	73	3	25	23	0	7	27	0	3
2B	58	12	73	5	73	3	28	18	2	7	27	0	3
2C	41	22	73	1	73	3	26	17	0	7	27	0	3
2D	37	4	0	2	0	0	0	8	1	0	3	0	0
3	41	7	73	3	73	3	25	23	0	7	27	0	3
4	62	17	73	4	73	3	26	23	1	7	29	0	3
4A	37	7	0	2	0	0	0	8	1	0	3	0	0
5	37	7	73	3	73	3	11	15	0	3	14	0	2
5A	28	2	0	2	0	0	0	6	1	0	3	0	0
6A	48	10	73	3	73	3	25	23	0	7	27	0	3
6B	53	13	73	5	73	3	28	18	2	7	27	0	3
6C	41	22	73	1	73	3	26	17	0	7	27	0	3
7	45	12	73	4	73	3	25	23	0	7	27	0	3
8	48	10	73	3	73	3	25	23	0	7	27	0	3
9	163	173	73	26	73	10	30	27	2	7	27	0	3

^a Direct effects includes both permanent and temporary.

^b Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

1 **Table 12-ES-13. Direct Effects of Alternatives on Inland Dune Plant Species in the Terrestrial Biological**
 2 **Study Area (occurrences)^a**

Alternative ^b	Occurrences				
	Hoover's cryptantha	Antioch Dunes wild-buckwheat	Mt. Diablo wild-buckwheat	Contra Costa wallflower	Antioch Dunes evening-primrose
1A	0	0	0	0	0
1B	0	0	0	0	0
1C	0	0	0	0	0
2A	0	0	0	0	0
2B	0	0	0	0	0
2C	0	0	0	0	0
2D	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
4A	0	0	0	0	0
5	0	0	0	0	0
5A	0	0	0	0	0
6A	0	0	0	0	0
6B	0	0	0	0	0
6C	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	0	0	0

^a Direct effects includes both permanent and temporary.

^b Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

3

1 **Table 12-ES-14. Direct Effects of Alternatives on Nontidal Wetland Plant Species in the Terrestrial**
 2 **Biological Study Area (occurrences)^a**

Alternative ^b	Occurrences					
	Watershield	Bristly sedge	Woolly rose-mallow	Eelgrass pondweed	Sanford's arrowhead	Marsh skullcap
1A	1	2	13	0	2	0
1B	0	4	15	0	3	0
1C	0	0	4	1	1	0
2A	1	2	13	0	2	0
2B	0	4	15	0	3	0
2C	0	0	4	1	1	0
2D	1	2	13	0	1	0
3	1	2	12	0	2	0
4	1	3	15	0	2	0
4A	1	3	14	0	1	0
5	1	2	8	0	2	0
5A	1	2	8	0	1	0
6A	1	2	13	0	2	0
6B	0	4	15	0	3	0
6C	0	0	4	1	1	0
7	1	2	13	0	2	0
8	1	2	13	0	2	0
9	0	1	14	1	2	1

^a Direct effects includes both permanent and temporary.

^b Dark shading = pipeline/tunnel, light shading = east alignment, no shading = west alignment and separate corridors (Alternative 9).

3

4 **12.1 Environmental Setting/Affected Environment**

5 This section describes the environmental setting/affected environment for the terrestrial biological
 6 resources present in the chapter study area (the area in which impacts may occur). The chapter
 7 study area is slightly larger than the BDCP Plan Area because the study area encompasses the Plan
 8 Area and two potential transmission corridors outside of the Plan Area referred to as “Areas of
 9 Additional Analysis” in the remainder of the chapter (see Figure 12-1). The section presents the
 10 natural communities and other land cover types, the special-status and common terrestrial wildlife
 11 and plants, and the terrestrial invasive plants found in the study area. A brief discussion of the
 12 historical modifications of ecosystem processes and functions of the Plan Area is also included
 13 because it is crucial to an understanding of the current status of natural communities and terrestrial
 14 plants and wildlife addressed in the BDCP. The common and scientific names of special-status plant
 15 and wildlife species mentioned in this chapter and their association with natural communities and
 16 other land cover types of the study area are included in Tables 12-2 and 12-3 in Section 12.1.3,
 17 *Special-Status Species*. The common and scientific names and legal status of all special-status plant

1 and wildlife species with potential to occur in the study area are listed in Appendix 12A, *Special-*
 2 *Status Species with Potential to Occur in the Study Area*. All common and special-status species
 3 mentioned in this chapter are listed in Appendix 12B, *Common and Scientific Names of Terrestrial*
 4 *Species*.

5 Both the setting and the impact analysis contained in this chapter are focused on the geographic
 6 areas proposed for construction of water conveyance facilities and on the areas identified in the
 7 BDCP as most likely to support habitat restoration, enhancement and protection. These geographic
 8 areas have been characterized as conservation zones (CZs) that encompass the entire Plan Area,
 9 and, for tidal marsh and floodplain restoration, as restoration opportunity areas (ROAs) that focus
 10 on smaller regions of the Plan Area (see Figure 12-1). CZs were established to focus specific
 11 conservation efforts on portions of the Plan Area that have similar landscape characteristics and
 12 that represent logical geographic and landform divisions. ROAs were established to identify those
 13 locations considered to be the most appropriate for the restoration of tidal habitats and floodplains
 14 within the Plan Area and within which restoration goals for tidal and associated upland natural
 15 communities would be achieved. The ROAs are large land areas centered on Suisun Marsh, the west
 16 and south Delta areas, Cache Slough, and the Cosumnes/Mokelumne area in the east Delta (see
 17 Figure 12-1). These landscape divisions are described in more detail in BDCP Chapter 3, Section
 18 3.2.2, *Identifying Conservation Zones and Restoration Opportunity Areas*. The Areas of Additional
 19 Analysis are not included in either the CZs or the ROAs.

20 **12.1.1 Historical Trends in Biodiversity of the Plan Area**

21 As described in Chapter 3, *Description of Alternatives*, and shown on Figure 3-1, the Plan Area
 22 consists of the statutory Delta, the Suisun Marsh and Yolo Bypass. Historical modifications of
 23 ecosystem processes and functions in the Plan Area have had a great influence on the current
 24 conditions of natural communities and special-status species. These changes to the ecosystem are
 25 discussed in Chapter 11, *Fish and Aquatic Resources*. A brief overview of major historical trends in
 26 terrestrial biodiversity is provided below.

27 The abundance of native wildlife and plant species has been reduced over time as a result of the
 28 extensive historical modifications to and loss of the habitats in the Plan Area. Because of habitat loss,
 29 large mammal species, such as tule elk, have been extirpated, and small mammal species, such as
 30 riparian brush rabbit, have been reduced in number and now occur only in scattered locations. The
 31 remnant marshes are now habitat for several species listed by the California Department of Fish and
 32 Wildlife (CDFW) as rare, threatened, or endangered, such as the California black rail and Mason's
 33 lilaepsis. Nevertheless, the Plan Area lies in a central portion of the Pacific Flyway and continues to
 34 provide vital migratory, wintering, and breeding habitat for migratory birds, especially in
 35 designated wildlife management areas (e.g., Suisun Marsh and Yolo Bypass), where habitat
 36 management is optimized for managed species, including waterfowl, shorebirds, and wading birds.
 37 For example, although waterfowl have been reduced in numbers, the Delta still provides habitat for
 38 26 species of wintering waterfowl (Bay Institute 1998). The Pacific Flyway is also particularly
 39 important for shorebirds and neotropical migratory birds.

40 Although fragmented, limited riparian habitat remains in the Plan Area. Remnant patches of tall
 41 riparian trees, such as Fremont cottonwood, western sycamore, and Goodding's black willow, occur,
 42 but the reproduction of these species is greatly impaired by lack of active floodplain habitat and
 43 hydrologic modifications (e.g., straightened and dredged channels, levees separating riparian
 44 vegetation from channel). The number of species of nesting birds and mammals found in the Plan

1 Area that depend on riparian habitat has declined during the last 150 years (Bay Institute 1998).
 2 Reports from early explorers describe the Delta and adjacent lands as an area with much greater
 3 wildlife species diversity than is currently found (Bay Institute 1998).

4 Grasslands with vernal pools support high levels of endemic biodiversity in the Central Valley
 5 (Witham et al. 1998 and references therein). This habitat type occurs in the northeast and
 6 southwest areas of the Plan Area. The vernal pool landscape in the northeast Plan Area has been
 7 affected by leveling for agricultural land uses (e.g., Stone Lakes National Wildlife Refuge [NWR]). The
 8 alkali grassland that supports vernal pools in the southwest Plan Area has been fragmented by
 9 agricultural and residential development and by water management projects. Only limited habitat
 10 remains for vernal pool species, such as fairy shrimp and native plants. It is estimated that
 11 throughout the Central Valley, the acreage of grasslands with vernal pools has declined from 7
 12 million acres during the 1700's to about 895,000 acres in 2005 (Holland and Hollander 2007;
 13 Holland 2009). Approximately 135,000 acres were estimated to have been lost from 1976 to 2005.
 14 (Holland 2009).

15 Most of the land in the Plan Area has been converted to agricultural land uses, which provide limited
 16 habitat value to most species. However, some species, including Swainson's hawk and greater
 17 sandhill crane, use the alfalfa and field crop areas for foraging. Besides changing land use,
 18 agricultural practices can include 1) building levees, which modify hydrology, 2) applying pesticides
 19 and fertilizers, which alters surface and groundwater quality (see Chapter 6, *Surface Water*) and
 20 may be toxic to certain species, and 3) other activities that can be detrimental to native plant and
 21 wildlife habitat.

22 12.1.2 Land Cover Types

23 The land cover types discussed in this chapter are derived from various sources. Within the Plan
 24 Area, these cover types are based on the natural communities that are defined and delineated in the
 25 BDCP for the purposes of the NCCP component of the Plan (see BDCP Chapter 2, Section 2.3.4,
 26 *Natural Communities*). For the two portions of the study area that extend beyond the Plan Area
 27 boundary, the natural communities were mapped using a series of mapped datasets, reports and
 28 aerial imagery prepared by the U.S. Department of Agriculture (USDA), the U.S. Geological Survey,
 29 CDFW, and other agencies. Natural communities within the study area are mapped in Figure 12-1.
 30 The description of each natural community below includes a discussion of how that natural
 31 community functions as habitat for common and special-status terrestrial plants and wildlife.
 32 Semiaquatic wildlife and plant species and their habitats are also discussed, as appropriate.
 33 Although there is some overlap in the discussion with Chapter 11, *Fish and Aquatic Resources*, this
 34 section explains how aquatic areas provide habitat for primarily terrestrial plants, vernal pool and
 35 seasonal wetlands (other than vernal pools) invertebrates, amphibians, reptiles, birds, and
 36 terrestrial mammals. Also discussed in this section are cultivated lands and developed lands, which
 37 are not natural communities but which do provide certain types of habitat and are, therefore,
 38 included with the natural communities.

39 12.1.2.1 Natural Community Mapping Methods

40 The discussion of natural communities is based, in part, on BDCP Chapter 2, *Existing Ecological*
 41 *Conditions*. Background data for the BDCP were collected through an extensive search of various
 42 sources, including current scientific literature (e.g., journal articles, conference proceedings, and
 43 textbooks), published reports, technical documents, and agency-maintained data (e.g., data

1 maintained by the Interagency Ecological Program, CDFW, California Department of Water
2 Resources [DWR], and other agencies). Natural communities were generally defined and described
3 using the Multi-Species Conservation Strategy (CALFED Bay-Delta Program 2000).

4 The natural communities were delineated in the Delta using the vegetation and land use
5 classification developed for the Delta by CDFW (Hickson and Keeler-Wolf 2007). Vegetation in the
6 legal Delta, excluding parts of Chipps and Van Sickle islands, was classified and mapped by CDFW
7 during 2005–2006 for use in the Delta Regional Ecosystem Restoration Implementation Plan
8 (DRERIP). Vegetation was sampled according to the California Native Plant Society (CNPS) Rapid
9 Assessment Protocol. The CDFW system follows Sawyer et al. (2009), which is consistent with the
10 National Vegetation Classification System for the United States (Grossman et al. 1998).

11 A “crosswalk” table was developed by CDFW between the fine-scale vegetation types classified and
12 mapped by CDFW during 2005–2006 and the corresponding broad biological community
13 classifications used in the BDCP. Polygons from the fine-scale CDFW map were combined using a
14 geographic information system (GIS). The portion of the Plan Area not sampled by CDFW during the
15 Delta mapping project was delineated by SAIC ecologists and entered into a GIS using 2005 USDA
16 Farm Service Agency National Agriculture Imagery Program (NAIP) color aerial photography with 1-
17 meter (3.3-foot) resolution. This imagery was photographically interpreted to identify the natural
18 communities present in portions of the Plan Area that were not sampled by CDFW.

19 Natural communities in Suisun Marsh and on Chipps and Van Sickle islands were delineated in 2006
20 by Boul and Keeler-Wolf (BDCP Chapter 2, *Existing Ecological Conditions*). Vegetation types in Suisun
21 Marsh were primarily determined by wetland management strategies. These strategies were used to
22 combine the CDFW Suisun Marsh vegetation types into BDCP natural communities, in combination
23 with the San Francisco Estuary Institute’s EcoAtlas GIS dataset. The resulting categorized Suisun
24 Marsh vegetation dataset was then compared with NAIP 2005 aerial imagery by ecologists
25 preparing the BDCP and refined as necessary. Subsequently, the dataset was merged with the BDCP
26 Delta natural community type cover dataset.

27 Instead of using the Yolo County Natural Heritage GIS data to represent crop types in the upper Yolo
28 Bypass north of I-80, the DWR land use survey data for Yolo County from 2008 were used to assign
29 crop types to the cultivated lands land cover type dataset. The DWR land use dataset was not
30 available when the BDCP vegetation dataset was originally created. To maintain consistency when
31 and where possible within the crop type classifications, the DWR dataset was used in place of the
32 Yolo County data (see BDCP Appendix 2.B, *Vernal Pool Complex Mapping and Modifications to*
33 *Natural Community Mapping*).

34 Data from the South Sacramento Habitat Conservation Plan (SSHCP) and modified by ICF biologists
35 as necessary following a review of USDA data and Google Earth imagery was used to define
36 vegetation cover for the eastern Area of Additional Analysis. Agricultural areas were defined based
37 on DWR land cover information. The SSHCP and DWR land cover data were crosswalked to the
38 BDCP natural community types.

39 The western Area of Additional Analysis was mapped by ICF biologist and GIS specialists using
40 USDA imagery and 2012 Google Earth imagery. The mapped areas were then ground truthed by ICF
41 biologists in May 2012 to verify the accuracy of the GIS mapping and to further refine the
42 agricultural classifications.

1 In addition, a separate dataset was generated to describe vernal pool characteristics present in the
 2 Plan Area. Vernal pool complexes were identified and mapped with the help of aerial photographs;
 3 existing vernal pool GIS data sets; California Natural Diversity Database (CNDDDB) records of vernal
 4 pool species; and topographic data, using Light Detection and Ranging (LiDAR). See BDCP Chapter 2,
 5 *Existing Ecological Conditions*, for a detailed methods description.

6 A mapping effort independent of natural communities mapping was conducted for wetlands and
 7 open water that are regulated as jurisdictional wetlands by Section 404 of the Clean Water Act. This
 8 mapping effort was designed to aid in future permitting processes for BDCP planned actions,
 9 specifically construction of the water conveyance facilities. The mapping methodology and wetlands
 10 nomenclature is distinctly different from that used in the natural communities analysis for the BDCP
 11 and this document. The methods used to conduct this mapping are described in Section 12.3.2.4. The
 12 results of this mapping and the relationship between BDCP implementation and these jurisdictional
 13 wetlands is described in detail in the General Terrestrial Biological Effects sections of each
 14 alternative analysis later in this chapter (see Section 12.3.3, *Effects and Mitigation Approaches*, and
 15 Section 12.3.4, *Effects and Mitigation Approaches—Alternatives 4A, 2D, and 5A*).

16 **12.1.2.2 Special-Status and Other Natural Communities**

17 Twelve of the natural community types occurring in the study area are, for the purposes of this
 18 EIR/EIS, identified as special-status natural communities. These communities are considered special
 19 status because they include specific vegetation alliances that are recognized by CDFW as of limited
 20 distribution statewide or within a county or region (CNDDDB Rank of S1–S3), or because they require
 21 focused analysis under these federal and state laws and regulations:

- 22 • CEQA.
- 23 • Section 1602 of the California Fish and Game Code.
- 24 • Section 404 of the Clean Water Act (CWA).
- 25 • California’s Porter-Cologne Water Quality Control Act (Porter-Cologne Act).

26 These laws and regulations are discussed in Section 12.2, *Regulatory Setting*. Special-status natural
 27 communities may be of special concern to resource agencies and conservation organizations for a
 28 variety of reasons, including their locally or regionally declining status or because they provide
 29 important habitat to common and special-status species. Many of these habitats are monitored and
 30 reported in the CNDDDB, which is maintained by CDFW. The following natural communities, all of
 31 which are found within the study area, are considered special-status natural communities.

- 32 • Tidal Perennial Aquatic
- 33 • Tidal Mudflat
- 34 • Tidal Brackish Emergent Wetland
- 35 • Tidal Freshwater Emergent Wetland
- 36 • Valley/Foothill Riparian
- 37 • Nontidal Perennial Aquatic
- 38 • Nontidal Freshwater Perennial Emergent Wetland
- 39 • Alkali Seasonal Wetland Complex

- 1 • Vernal Pool Complex
- 2 • Managed Wetland
- 3 • Other Natural Seasonal Wetland
- 4 • Inland Dune Scrub

5 Of these twelve natural communities, all but the inland dune scrub have elements of aquatic habitat
6 or potential aquatic habitat (valley/foothill riparian) protected under the CWA and Porter-Cologne
7 Act. The regulated aquatic resources have been grouped into the following wetland and open water
8 categories (the hydrology-based wetland types originally mapped for the Draft EIR/EIS have been
9 reclassified into the following habitat-based types to facilitate the permitting process).

- 10 • Wetlands
 - 11 ○ Perennial
 - 12 ○ Emergent
 - 13 ○ Scrub-Shrub
 - 14 ○ Forest
 - 15 ○ Seasonal
 - 16 ○ Vernal Pool
 - 17 ○ Seasonal wetland
 - 18 ○ Alkaline Wetland
- 19 • Other Waters of the United States
 - 20 ○ Nontidal
 - 21 ○ Agricultural Ditch
 - 22 ○ Natural Channel
 - 23 ○ Pond
 - 24 ○ Lake
 - 25 ○ Tidal
 - 26 ○ Tidal Channel
 - 27 ○ Conveyance
 - 28 ○ Clifton Court Forebay

29 Impacts on waters of the United States discussed in Section 12.3.3, *Effects and Mitigation*
30 *Approaches*, and Section 12.3.4, *Effects and Mitigation Approaches—Alternatives 4A, 2D, and 5A*, are
31 presented in the Wetlands and Other Waters of the United States categories listed above. These
32 groupings ensure that impacts are assessed, and mitigation assigned, to categories of aquatic
33 resources typically required by regulatory agencies.

34 One other natural community (grassland) and two land cover types (cultivated lands and developed
35 lands) also are present in the study area but are not considered special-status natural communities.
36 Though some grasslands, cultivated lands, and developed lands provide habitat for special-status

species, as a natural community and a land cover type these areas are not of limited distribution and do not in themselves require particular regulatory consideration for the vegetation that occurs there (e.g., these areas are not regulated wetlands). Throughout the remainder of the chapter, these three community/land cover types are addressed in the context of the other natural communities. The cultivated lands land cover type is treated as a natural community in the BDCP to meet the requirements of the NCCPA and to recognize its value to covered species addressed in the Plan. Tidal mudflat, which is listed above, is not mapped separately, and occurs at the edges between tidal perennial aquatic, tidal freshwater emergent, and tidal brackish emergent wetland. Therefore, the tidal mudflat natural community is not addressed separately in detail in this chapter.

The study area natural communities are described below, including how each is used by common and special-status plant and wildlife species. Information on natural communities and associated plant and wildlife species was summarized from BDCP Chapter 2, Section 2.3.4, *Natural Communities*. Table 12-2 and Table 12-3 list the special-status species (covered and noncovered species) supported by these natural communities. The acreages of each natural community within the Plan Area and this chapter's study area are presented in Table 12-1.

Table 12-1. Area (in acres) of Natural Community Types in the Terrestrial Biology Study Area

Natural Community Type	Plan Area	Areas of Additional Analysis	Study Area Total	Percentage of the Study Area
Tidal Perennial Aquatic	86,263	0	86,263	10
Tidal Brackish Emergent Wetland	8,501	0	8,501	<1
Tidal Freshwater Emergent Wetland	8,856	0	8,856	1
Valley/Foothill Riparian	17,644	322	17,966	2
Nontidal Perennial Aquatic	5,489	78	5,567	<1
Nontidal Freshwater Perennial Emergent Wetland	1,385	124	1,509	<1
Alkali Seasonal Wetland Complex	3,723	0	3,723	<1
Vernal Pool Complex	11,284	849	12,133	1
Managed Wetland	70,698	100	70,798	8
Other Natural Seasonal Wetland	276	566	842	<1
Grassland	76,315	1,732	78,047	9
Inland Dune Scrub	19	0	19	<1
Cultivated Lands	481,909	5,197	487,106	56
Developed	90,278	382	90,660	10
Total	862,640	9,350	871,990	100.0

Tidal Perennial Aquatic

The tidal perennial aquatic natural community is defined as deep-water aquatic (greater than 10 feet deep from mean lower low tide [i.e., 19-year average of the lowest of the two low tides during the daily tidal cycle]) and shallow aquatic (less than or equal to 10 feet deep from mean lower low tide) zones of estuarine bays, river channels, and sloughs. Under present operations, tidal perennial aquatic in the Delta is mainly freshwater habitat, with brackish and saline conditions occurring in the western Delta (CZs 5 and 10) at times of high tides and low flows into the western Delta. It is freshwater in the Yolo Bypass (CZ 2) and mainly brackish and saline in Suisun Marsh (CZ 11).

1 Eight plant community alliances (i.e., unique species assemblages) mapped in the Plan Area occur
2 within the tidal perennial aquatic natural community (Hickson and Keeler-Wolf 2007). (A
3 comparison table “crosswalk” for the alliances that make up the tidal perennial aquatic community
4 can be found in BDCP Chapter 2, Section 2.3.4, *Natural Communities*.) Aquatic vegetation in the study
5 area can be separated into two general categories: floating aquatic vegetation and submerged
6 aquatic vegetation (Cowardin et al. 1979). The geographic extent of this vegetation changes
7 frequently because it depends on highly variable physical factors, such as depth, turbidity, water
8 flow, salinity, substrate, and nutrient availability.

9 Floating aquatic vegetation extends over the open water surface, either as free-floating plants or as
10 colonies extending from plants rooted in banks. Most floating aquatic vegetation in the Delta
11 consists of highly invasive nonnative plants such as water hyacinth, which commonly occurs in
12 dense floating mats thick enough to create anoxic conditions in ditches and canals.

13 Floating aquatic vegetation also occurs in sloughs, especially near their source of origin where flows
14 are slow. Abundant floating aquatic vegetation frequently presents a nuisance to boaters. Even
15 native floating aquatic species may become overabundant and invasive in nutrient-rich waters of
16 urban and agricultural watersheds with diminished tidal and freshwater outflows. Floating aquatic
17 vegetation borders marshes along large sloughs and small tidal channels in the Delta and may
18 accumulate in such large quantities that it may affect marsh vegetation by smothering it with
19 decomposing masses of debris.

20 Submerged aquatic plants have leaves and stems that are fully submerged for all or nearly all of
21 their life-cycle, and they often have root systems reduced to minimal anchorage structures in pond
22 or river beds. Many native submerged aquatic species, including pondweeds (e.g., sago pondweed)
23 and stoneworts (green algae structurally similar to vascular plants), are highly valuable food plants
24 for waterfowl and nursery habitat for aquatic invertebrates and fish. Submerged aquatic vegetation
25 may form patches or beds of extensive bottom “canopy” habitat. In the Delta, nonnative invasive
26 submerged aquatic species dominate and replace native species in naturally open water slough
27 beds. Brazilian waterweed, also known as *Egeria*, is invasive and extremely competitive with native
28 species, and it is capable of surviving at great water depths. It has structural characteristics that
29 create suitable cover and shelter for predatory nonnative fish in tidal slough beds. Restoration of
30 shallow or deep subtidal habitats in the Delta may be viewed unfavorably because of Brazilian
31 waterweed, which is rapidly established in these habitats.

32 Aquatic plant communities that are dominated by native species would be considered special-status
33 communities because they provide suitable habitat for special-status plants and animals. These
34 communities would, in most cases, be considered jurisdictional waters of the United States and
35 regulated by the U.S. Army Corps of Engineers (USACE) under Section 404 of the CWA. They would
36 also be regulated by a California Regional Water Quality Control Board (RWQCB) as waters of the
37 state under the Porter-Cologne Act.

38 Wildlife species associated with tidal aquatic habitats vary with water depth and other habitat
39 features. Deeper open water areas without vegetation provide foraging habitat for wildlife such as
40 terns, gulls, osprey, diving ducks, such as ring-necked duck and canvasback, and river otters, which
41 feed primarily on fish, crayfish, and other aquatic organisms. Shallower water with submerged or
42 floating aquatic vegetation provides foraging habitat for reptiles, such as western pond turtle, and
43 dabbling ducks, such as American widgeon and Northern pintail, which feed on a variety of
44 invertebrates and plant material. Tables 12-2 and 12-3 list special-status plant and wildlife species

1 supported by the tidal perennial aquatic natural community. The community's distribution in the
2 study area is mapped in Figure 12-1.

3 **Tidal Mudflat**

4 The tidal mudflat natural community typically occurs as sediments in the intertidal zone between
5 the mean high tide and the mean lower low tide. This natural community is exposed above water at
6 low tide and is typically associated with tidal freshwater emergent wetland or tidal brackish
7 emergent wetland at its upper edge. Because tidal mudflat has been mapped as part of the tidal
8 perennial aquatic, tidal brackish emergent wetland and tidal freshwater emergent wetland
9 communities, it is not shown on Figure 12-1 or listed in Tables 12-1, 12-2, or 12-3. Tidal mudflat can
10 be found throughout the study area but differs slightly in nature in the Suisun Marsh (CZ 11) and in
11 the Delta because physical factors, such as rates of sediment erosion and deposition and duration of
12 tidal inundation, vary. Tidal mudflat is a special-status natural community because activities within
13 this community would be regulated as wetlands by Section 404 of the CWA and waters of the state
14 under the Porter-Cologne Act.

15 Tidal mudflat is important habitat for two of the covered plant species: Mason's lilaopsis and Delta
16 mudwort (Fiedler and Zebell 1993; Witham and Kareofelas 1994). Suisun marsh aster, another
17 covered species, is also found on tidal mudflats in the Delta. A great abundance and diversity of
18 invertebrates are found at varying depths in the substrate, and they support a variety of foraging
19 shorebirds, wading birds, and dabbling ducks, such as western sandpiper, dunlin, long- and short-
20 billed dowitchers, whimbrel, long-billed curlew, great egret, black-crowned night-heron, cinnamon
21 and green-winged teal, and mallard. As the tide rises and mudflats are inundated with deeper water,
22 wildlife species composition shifts to species described above for submerged aquatic vegetation.

23 **Tidal Brackish Emergent Wetland**

24 The tidal brackish emergent wetland natural community is a transitional community between tidal
25 perennial aquatic and terrestrial upland communities. In the study area, tidal brackish emergent
26 wetland exists in the San Francisco Bay saltwater/Delta freshwater mixing zone that extends from
27 near Collinsville (CZs 5, 10, and 11) westward to the Carquinez Strait. Tidal brackish emergent
28 wetland is present on the south side of Suisun Bay and on islands in midchannel but is most
29 extensive in Suisun Marsh (CZ 11). The distribution of tidal brackish emergent wetland in the study
30 area is shown on Figure 12-1.

31 The tidal brackish emergent wetland community in the study area is found in undiked areas of
32 Suisun Marsh, such as Rush Ranch and Hill Slough; along undiked shorelines on the south shore of
33 Suisun Bay; and on undiked in-channel islands, such as Browns Island. Eight plant community
34 alliances mapped in the Plan Area fall within the tidal brackish emergent wetland natural
35 community (Hickson and Keeler-Wolf 2007; Keeler-Wolf and Vaghti 2000).

36 Tidal brackish emergent wetland in the study area is characterized by tall herbaceous wetland plant
37 species that line the channels down to the depth of mean lower low tide. Dominant plant species
38 include hard-stem bulrush, California bulrush, common reed, and cattail (Suisun Ecological
39 Workgroup 1997; Grewell et al. 2007). Dominant species present between the channels and the
40 marsh plain include pickleweed, saltgrass, saltmarsh dodder, spearscale, and Baltic rush. Tidal
41 brackish emergent wetland in the Suisun Marsh area is habitat for several special-status plant
42 species: soft bird's-beak and Suisun thistle, both federally listed as endangered, and Suisun Marsh
43 aster, San Joaquin spearscale, and Bolander's water-hemlock. Channels in tidal brackish emergent

1 wetland may be flooded or exposed, depending on tidal stage. The marsh plain is usually free of
2 standing water but may be flooded at very high tides. Wildlife use of channels is similar to that of
3 tidal mudflats and in some cases tidal perennial aquatic, especially in larger channels. On the marsh
4 plain and in channels with vegetative cover, typical wildlife present include ornate shrew, song
5 sparrow, and red-winged blackbird. Tables 12-2 and 12-3 list special-status plant and wildlife
6 species supported by the tidal brackish emergent wetland natural community. The community's
7 distribution is mapped in Figure 12-1. Tidal brackish emergent wetland is a special-status natural
8 community because activities within this community would be regulated as wetlands by Section 404
9 of the CWA and as waters of the state under the Porter-Cologne Act.

10 **Tidal Freshwater Emergent Wetland**

11 The tidal freshwater emergent wetland natural community is typically a transitional community
12 between tidal perennial aquatic and valley/foothill riparian or terrestrial upland communities
13 across a range of hydrologic and soil conditions. In the study area, the tidal freshwater emergent
14 wetland community often occurs at the shallow, slow-moving or stagnant edges of freshwater
15 waterways or ponds in the intertidal zone and is subject to frequent long-duration flooding. The
16 distribution of tidal freshwater emergent wetland in the study area is shown on Figure 12-1.

17 Tidal freshwater emergent wetland vegetation naturally occurs along a hydrologic gradient in the
18 transition zone between open water and riparian vegetation or upland terrestrial vegetation such as
19 grasslands or woodlands. In the study area, there are abrupt transitions to agricultural cover,
20 managed wetlands, and boundaries formed by levees and other artificial landforms. Seventeen plant
21 community alliances mapped in the Plan Area fall within the tidal freshwater emergent wetland
22 natural community (Hickson and Keeler-Wolf 2007).

23 Tidal freshwater emergent wetland is regularly and occasionally flooded tidal marshlands with very
24 low levels of soil salinity. These communities can be categorized based on their frequency of
25 inundation. The low elevation tidal freshwater emergent wetland is influenced by the daily tides and
26 is flooded more times than not. Middle-elevation tidal freshwater emergent wetland is regularly
27 flooded, but the soil is exposed above the water level for many hours each day. High-elevation tidal
28 freshwater emergent wetland is occasionally flooded by tides or flood events but includes
29 depressions that remain flooded after tides recede.

30 Low-elevation tidal freshwater emergent wetland typically is dominated by tules and occasionally
31 includes species of cattails. They are highly productive but support few species other than tules that
32 tolerate deep, prolonged tidal flooding. The middle-elevation tidal freshwater emergent wetland is
33 more diverse in plant species (e.g., bur-reed, broadleaf arrowhead, and water smartweed), even
34 though this community may also be dominated by tules.

35 Middle-elevation tidal freshwater emergent wetland is less abundant than low-elevation tidal
36 freshwater emergent wetland and often represents a more mature marsh condition with long
37 periods of peat accumulation or sediment deposition. Much of this plant community has been
38 converted to other land uses, such as agriculture. Invasive nonnative plants, such as yellow flag iris
39 and purple loosestrife, tend to invade this species-rich freshwater zone. The middle-elevation tidal
40 freshwater emergent wetland zone grades into the uppermost end of tidal freshwater marsh (high-
41 elevation intertidal marsh zone). This high-elevation type of tidal freshwater marsh is also rare but
42 is well developed in a few locations in the Delta.

1 The high-elevation tidal freshwater emergent wetland zone can be dominated by grass and grasslike
 2 species, such as Baltic rush, creeping wildrye, and saltgrass. It typically includes large patches of
 3 yerba mansa and wild heliotrope. Special-status plant species commonly found in this plant
 4 community include Suisun marsh aster and woolly rose-mallow. Large thickets of nonnative
 5 Himalayan blackberry invade high-elevation tidal freshwater emergent wetland, converting the
 6 marsh to riparian scrub thickets. High-elevation tidal freshwater emergent wetland may naturally
 7 grade into low-elevation grasslands (dense stands of saltgrass and creeping wildrye) or seasonal
 8 wetland transition zones, or it may end abruptly at the edges of steep levees or eroded riverbanks.

9 Wildlife species composition in sparsely vegetated areas in low-elevation tidal freshwater emergent
 10 wetland is similar to the composition described above under tidal perennial aquatic and tidal
 11 mudflat. Other wildlife that use these productive wetlands as foraging habitat and the dense
 12 vegetation as cover, especially in the low- and middle-elevations, include western pond turtle,
 13 wading birds (egrets and herons), waterfowl (ducks, geese, and swans), shorebirds (e.g., rails,
 14 plovers, sandpipers), and perching birds. Common nesting birds include red-winged blackbird,
 15 marsh wren, common yellowthroat, and black-crowned night-heron. American beaver and muskrat
 16 forage on marsh plants and use them for cover and den material. Tables 12-2 and 12-3 list the
 17 special-status plant and wildlife species supported by the tidal freshwater emergent wetland natural
 18 community.

19 Most wetlands in this category would qualify as wetlands subject to USACE jurisdiction under
 20 Section 404 of the CWA. All tidal freshwater emergent wetland would be considered waters of the
 21 state and be regulated under the Porter-Cologne Act. If located adjacent to a stream or lake, it would
 22 also be subject to regulation under Section 1602 of the California Fish and Game Code.

23 **Valley/Foothill Riparian**

24 Broadly defined, the valley/foothill riparian natural community is often a transition zone between
 25 aquatic and upland terrestrial habitat and is found in a wide range of geologic, soil, and other
 26 environmental conditions (e.g., variable light and nutrient availability) throughout the study area
 27 (Bay Institute 1998; Vaghti and Greco 2007). The current extent of the valley/foothill riparian
 28 community represents a small proportion of its historical extent in the study area. Historically,
 29 valley/foothill riparian vegetation was distributed along all major and minor waterways and
 30 floodplains throughout the study area (Bay Institute 1998). The loss of riparian vegetation
 31 throughout California, estimated to be 85%–95%, was caused by human activities, such as river and
 32 stream channelization, levee building, vegetation removal to stabilize levees, and extensive
 33 agricultural and urban development (Riparian Habitat Joint Venture 2004).

34 Valley/foothill riparian communities occur in the study area most often as long, linear patches
 35 separating other terrestrial biological communities and agricultural or urban land, or in low-lying,
 36 flood-prone patches near river bends, canals, or breached levees (Figure 12-1). An exception is in
 37 conservation areas where large tracts of riparian forest are being restored, such as the Cosumnes
 38 River Preserve. Generally, however, this natural community is located along many of the major and
 39 minor waterways, oxbows, and levees in the study area, including the Sacramento River (CZs 3, 4,
 40 and 5), the Sacramento River Deep Water Ship Channel (CZs 2 and 3), the Yolo Bypass (CZ 2), and
 41 channels of the San Joaquin River and the Delta (CZs 5, 6, and 7). Patches of riparian vegetation are
 42 also found on the interior of leveed Delta islands, along drainage channels and pond margins, and in
 43 abandoned, low-lying fields.

1 CDFW identified 41 plant community alliances in the Delta that fall within the valley/foothill
 2 riparian natural community (Hickson and Keeler-Wolf 2007). These assemblages are discussed
 3 below in general terms under the riparian scrub, and riparian forest and woodland subcategories.
 4 Tables 12-2 and 12-3 list the special-status plant and wildlife species supported by the
 5 valley/foothill riparian natural community. The community is mapped in Figure 12-1.

6 ***Riparian Scrub***

7 Riparian scrub in the study area consists of woody riparian shrubs forming dense thickets. Species
 8 may include willows, blackberries, buttonbush, mulefat, and other shrub species. These thickets are
 9 usually associated with higher, sloping, better-drained edges of marshes, or topographic high areas,
 10 such as levee remnants and elevated flood deposits. Thickets may occur along shorelines of ponds or
 11 banks of channels in tidal or nontidal freshwater habitats. Willow thickets and dead branches or
 12 trees (snags) in riparian woodland provide important habitat for a wide range of wildlife species.
 13 During extreme floods, dense and tall riparian willow thicket canopies may remain partially above
 14 water levels, trap debris and sediment, and act as permeable barriers to wave energy traveling
 15 across open water. Nonnative Himalayan blackberry thickets are a common element of riparian
 16 scrub communities along levees and throughout pastures within the levees.

17 Riparian scrub is considered a special-status natural community because this community supports a
 18 range of sensitive species, has overall importance to biodiversity, and is subject to CDFW regulation
 19 under Section 1602 of the California Fish and Game Code and Fish and Game Code Section 3503
 20 when nesting bird species are present. Riparian scrub located in areas subject to frequent flooding
 21 or ponding also may qualify as wetlands subject to USACE jurisdiction under Section 404 of the
 22 CWA, and waters of the state under the Porter-Cologne Act.

23 ***Riparian Forest and Woodland***

24 The study area supports winter-deciduous, broadleaved trees, up to 60 feet in height in the riparian
 25 forest and woodlands, where the canopy cover ranges from relatively open to very dense. At
 26 present, riparian forest and woodland communities dominated by tree species are mostly limited to
 27 narrow bands along sloughs, channels, rivers, and other freshwater features throughout the study
 28 area. Cottonwoods and willow mixed with Oregon ash, box elder, and California sycamore are the
 29 most common riparian trees in central California. Valley oak is common in riparian areas in the
 30 Central Valley, as are species of walnut. Riparian woodland often has a shrubby understory
 31 consisting of the similar species discussed above in riparian scrub. Equivalent communities, as
 32 described by Holland (1986), include great valley cottonwood riparian forest, great valley mixed
 33 riparian forest, great valley oak riparian forest, and white alder riparian forest.

34 Riparian forest and woodland are considered sensitive natural communities because they are
 35 subject to CDFW regulations under California Fish and Game Code Section 1602 and Fish and Game
 36 Code Section 3503 when nesting bird species are present. Riparian forest and woodlands are also
 37 considered sensitive communities because they have sustained considerable losses throughout the
 38 state. Riparian habitat supports a wide variety of wildlife species. Riparian trees are used for
 39 nesting, foraging, and protective cover by many bird species, including black-headed grosbeak, tree
 40 swallow, Bewick's wren, and Cooper's hawk. Riparian canopies provide nesting and foraging habitat
 41 for common mammals, such as western gray squirrel. Understory shrubs provide cover for
 42 mammals such as desert cottontail and for ground-nesting birds, such as spotted towhee, that forage
 43 among the vegetation and leaf litter. Mammals such as raccoon and opossum benefit from the
 44 variety of berries, invertebrates, small mammals, and bird eggs that provide food.

1 **Nontidal Perennial Aquatic**

2 Nontidal perennial aquatic natural communities in the Delta can range in size from small ponds in
3 uplands to large lakes, such as North and South Stone Lakes (CZ 4). The nontidal perennial aquatic
4 natural community can be found in association with any terrestrial habitat and can transition into
5 nontidal freshwater perennial emergent wetland and valley/foothill riparian. This natural
6 community is differentiated from the tidal perennial aquatic natural community described above by
7 a physical separation from the tidally influenced sloughs and channels in the Delta.

8 Dominant plant species present in the nontidal perennial aquatic natural community include most of
9 the species mentioned above for the tidal perennial aquatic natural community, including floating
10 water primrose, water hyacinth, and Brazilian waterweed. Vegetation in nontidal perennial aquatic
11 can be similarly characterized as floating aquatic vegetation and submerged aquatic vegetation (see
12 description above).

13 Nontidal perennial aquatic communities provide foraging habitat and winter roosting habitat for
14 wildlife that depends on other habitats for breeding and cover. Typical species include pied-billed
15 grebe, western grebe, ruddy duck, canvasback, bufflehead, and river otter. Tables 12-2 and 12-3 list
16 special-status plant and wildlife species supported by the nontidal perennial aquatic natural
17 community. The community is mapped in Figure 12-1. The nontidal perennial aquatic community is
18 a special-status natural community because activities within this community would be regulated as
19 wetlands by Section 404 of the CWA and waters of the state under the Porter-Cologne Act. When this
20 community is associated with a lake or stream, it may also be regulated under Section 1602 of the
21 California Fish and Game Code.

22 **Nontidal Freshwater Perennial Emergent Wetland**

23 The nontidal freshwater perennial emergent wetland community is composed of permanently
24 saturated wetlands, including meadows, dominated by emergent plant species that do not tolerate
25 permanent saline or brackish conditions (CALFED Bay-Delta Program 2000). Nontidal freshwater
26 perennial emergent wetland communities in the study area occur in small fragments along the edges
27 of the nontidal perennial aquatic and valley/foothill riparian natural communities (Figure 12-1).
28 These emergent wetlands typically occur on the land side of the Delta levees. Shallow emergent
29 wetlands (water less than 3 feet deep) are dominated by thick, tall, highly productive stands of tules
30 and cattails.

31 Many of the nontidal freshwater perennial emergent wetland that occurs in the study area is
32 disturbed, either through hydrologic disturbance or by physical disturbances. Broad, deeply flooded
33 areas that are covered by open water most of the year and that develop emergent mud beds late in
34 the growing season effectively alternate between seasonal ponds and freshwater marshes. Physical
35 disturbance are direct, such as channel dredging, or indirect as a result of adjacent agricultural,
36 commercial, or residential activities. Disturbed nontidal freshwater perennial emergent wetland
37 that occurs in ditches supports a higher proportion of cattails than undisturbed nontidal freshwater
38 marshes. Characteristic forbs and grasslike species associated with nontidal freshwater perennial
39 emergent wetland include a mix of native and nonnative species, such as cocklebur, curly dock,
40 several knotweed species, common spikerush, rabbit-foot grass, and dallisgrass. The higher
41 elevation edges of freshwater marsh gradients may be characterized by abrupt transitions to
42 terrestrial vegetation, or they may transition into vegetation of alkali seasonal wetlands, riparian
43 woodland, or riparian scrub.

1 Nontidal freshwater perennial emergent wetland provides important foraging, breeding, and winter
2 roosting habitat for a variety of wildlife species; dense emergent vegetation provides concealment
3 from predators. Reptiles and amphibians associated with marsh habitats include common garter
4 snake, Pacific chorus frog, and bullfrog. Locally common to abundant wading birds (egrets and
5 herons), waterfowl (ducks, geese, and swans), shorebirds (e.g., rails, plovers, sandpipers), and
6 perching birds (e.g., red-winged blackbird, marsh wren, common yellowthroat) use nontidal marsh
7 habitat for foraging, cover, and nesting. American beavers and muskrats forage on marsh plants and
8 use them for cover and den material. River otter forage on fish, amphibians, and invertebrates as
9 well as use the cover provided by thickets and tall wetland plants. Tables 12-2 and 12-3 list special-
10 status plant and wildlife species supported by the nontidal freshwater perennial emergent wetland
11 natural community. The nontidal freshwater perennial emergent wetland community is a special-
12 status natural community because activities within this community would be regulated as wetlands
13 by Section 404 of the CWA and waters of the state under the Porter-Cologne Act. When this
14 community is associated with a lake or stream, it may also be regulated under Section 1602 of the
15 California Fish and Game Code.

16 **Alkali Seasonal Wetland Complex**

17 Alkali seasonal wetland complex occurs on alkaline soils with ponded or saturated soil conditions
18 for prolonged periods during the growing season. The vegetation of alkaline seasonal wetlands is
19 composed of salt-tolerant plant species adapted to wetland conditions and high salinity levels. This
20 natural community “complex” includes both seasonally ponded and saturated wetlands and the
21 surrounding matrix of grassland. It is typically found either at the historical locations of lakes or
22 ponds in the Yolo Basin (CZ 2) in and around the CDFW Tule Ranch Preserve (Witham 2003) where
23 salts accumulated through evaporation, or in upland locations, such as basin rims and seasonal
24 drainages, that receive salts in runoff from distant upslope salt-bearing rock. Areas near Suisun
25 Marsh (CZ 11) and the Clifton Court Forebay (CZ 8) are examples of the latter locations (Figure
26 12-1).

27 The composition of alkali seasonal wetland complex can be highly variable from site to site, and
28 these wetlands may include species typically associated with the Holland communities of alkali
29 grassland, alkali sink, chenopod scrub, brackish marsh, valley sink scrub, and alkaline vernal pools
30 (Holland 1986). Alkaline seasonal wetlands can support a richness of species, and they often provide
31 suitable habitat for a number of special-status plant species. Dominant grasses in alkaline seasonal
32 wetlands and surrounding grassland include saltgrass and wild barley. The associated herb cover
33 consists of salt-tolerant species, including saltbush, alkali heath, alkali weed, alkali mallow, and
34 common spikeweed. The study area includes small stands of alkali sink scrub (also known as valley
35 sink scrub), which are characterized by iodine bush. Alkali seasonal wetland complex is rare in the
36 study area, occurring primarily around Clifton Court Forebay, southeastern Solano County, and in
37 the Yolo Bypass.

38 Alkali seasonal wetland complex is considered a special-status community because it provides
39 suitable habitat for many special-status plants and animals, and in many cases is considered
40 jurisdictional wetlands regulated by USACE under Section 404 of the CWA, and waters of the state
41 under the Porter-Cologne Act.

1 During winter and spring, when alkali seasonal wetlands are filled with water, plants, and aquatic
2 life, the wetlands act as an important foraging habitat for a variety of common wildlife species,
3 including great blue heron and great egret. Alkali seasonal wetlands support common wildlife
4 species, including dabbling ducks, invertebrates such as various native bee species, and reptiles and
5 amphibians, such as the common garter snake and Pacific chorus frog. Tables 12-2 and 12-3 list
6 special-status plant and wildlife species supported by the alkali seasonal wetland complex natural
7 community.

8 **Vernal Pool Complex**

9 The vernal pool complex natural community is characterized by interconnected and isolated groups
10 of vernal pool wetlands and seasonal swales in the matrix of the grassland natural community
11 (described below). The vernal pool complex community is rare in the study area and is generally
12 contiguous with vernal pool habitat adjacent to the study area (Figure 12-1). It was mapped
13 specifically for the BDCP using a range of methods because there were no available data sets with
14 the appropriate level of detail or spatial extent. Details of the methods used to map the Vernal Pool
15 Complex community are presented above in the introduction to Section 12.1.2.1, *Natural Community*
16 *Mapping Methods*. In the study area, vernal pool grassland occurs in the vicinity of Stone Lakes NWR
17 (CZ 4), Yolo Bypass (CZ 2), southeastern Solano County (CZ 1), Jepson Prairie, and Clifton Court
18 Forebay (CZ 8).

19 Vernal pools are seasonal wetlands that form in shallow depressions underlain by hardpan or a
20 dense clay subsurface layer. These depressions fill with rainwater and surface runoff; the subsurface
21 layers restrict infiltration into the subsoil and the depressions remain inundated throughout the
22 winter, and sometimes as late as early summer. Vernal pools are found in areas of level or gently
23 undulating topography in the lowlands of California, especially in the grasslands of the Central
24 Valley. Although these wetlands are typically small, some vernal pools can reach several acres in
25 size. Rising spring temperatures cause the water in vernal pools to evaporate, promoting the growth
26 of concentric bands of various plant species, especially native wildflowers, along the shrinking edge
27 of the pool. Vernal pool vegetation in California is characterized by a high percentage of native
28 species, several of which have restricted ranges. Many plant species, and a number of animal species
29 associated with vernal pools, are federally or state listed as rare, threatened, or endangered.

30 Vernal pools and vernal pool grassland are considered special-status natural communities because
31 they provide vital habitat for many special-status plants and animals. They are of concern to CDFW,
32 and when they meet specific criteria established by USACE, they are considered jurisdictional
33 wetlands under Section 404 of the CWA. The vernal pools could also be considered waters of the
34 state under the Porter-Cologne Act.

35 During winter and spring, when vernal pools or seasonal wetlands are filled with water, plants, and
36 aquatic life, they act as an important foraging habitat for a variety of common wildlife species,
37 including great blue heron and great egret. Vernal pools and seasonal wetlands support common
38 wildlife species, including dabbling ducks, invertebrates such as various native bee species, and
39 reptiles and amphibians, such as the common garter snake and Pacific chorus frog. The uplands that
40 surround vernal pools also provide habitat for pollinators of native vernal pool plants (e.g., solitary
41 bees) as well as refugia for amphibian species that utilize these pools for breeding. Tables 12-2 and
42 12-3 list special-status plant and wildlife species supported by the vernal pool complex natural
43 community.

1 Degraded vernal pools has been characterized as a subset of the vernal pool complex natural
2 community for purposes of this EIR/EIS. This designation applies to those areas where vernal pool
3 terrain was historically present but where the original topography has been disturbed by grading
4 activities. These areas retain their seasonal hydrology—ponding water for extended periods during
5 the rainy season—because the underlying claypan or hardpan soil layer characteristic of vernal pool
6 complexes is still intact. They were identified where grasslands were underlain by soil types typical
7 for vernal pools (see BDCP Chapter 2, Section 2.3.4, *Natural Communities*) but where interpretation
8 of aerial photography showed disturbed topography and on-the-ground observations indicated that
9 seasonal ponding is occurring and habitat for vernal pool species is present. Despite the disturbance,
10 areas mapped as grassland with degraded vernal pools can still function as habitat for federally
11 listed and state-listed vernal pool species. Tables 12-2 and 12-3 list special-status plant and wildlife
12 species that could occur in degraded vernal pool grassland. These species are similar to those
13 described for the vernal pool complex natural community.

14 **Managed Wetland**

15 The managed wetland natural community consists of areas that are intentionally flooded and
16 managed during specific seasonal periods to enhance habitat values for specific wildlife species
17 (CALFED Bay-Delta Program 2000). The associated ditches and drains used to manage the water
18 level are included in this community. In Suisun Marsh (CZ 11), land management practices largely
19 dictate natural community types. The classification as either tidal brackish emergent wetland, as
20 described above, or as managed wetland is determined by the presence of a levee or dike and the
21 side of the structure on which the vegetation is located. San Francisco Estuary Institute's EcoAtlas
22 GIS dataset was used as a general guide to determine whether vegetation units in Suisun Marsh
23 would be considered managed wetland or tidal brackish emergent wetland. This natural community
24 is considered special-status because many of the wetland areas that are part its mosaic of habitats
25 qualify as wetlands protected by Section 404 of the CWA, and waters of the state protected by the
26 Porter-Cologne Act. The community is also of special interest to resource agencies responsible for
27 managing waterfowl and shorebird populations in California.

28 Managed wetland is distributed throughout the study area. Substantial acreage of this type occurs in
29 the Yolo Bypass (CZ 2), Stone Lakes NWR (CZ 4), Cosumnes River Preserve (CZ 4), and Suisun Marsh
30 (CZ 11) (Suisun Ecological Workgroup 1997; California Department of Fish and Game 2008a; U.S.
31 Fish and Wildlife Service 2007a). Several islands in the central Delta support large areas of this
32 community type, including Mandeville Island, Medford Island, Holland Tract, and Bradford Island
33 (CZ 6). The far western edge of the Delta, including Van Sickle and Chipps islands (CZ 5), and Suisun
34 Marsh (CZ 11) also includes managed wetlands. Water at the far western border of the study area
35 and in Suisun Marsh can be more brackish compared with other portions of the Delta where this
36 community occurs (Suisun Ecological Workgroup 1997).

37 The typical hydrologic management regime includes flooding during the winter arrival of migratory
38 birds, followed by a slow draw down to manage plant seed production and to control mosquito
39 populations. Summer irrigation may also be conducted (U.S. Fish and Wildlife Service 2007a). The
40 management of Suisun Marsh is unique because water salinity is a significant management issue and
41 water use is carefully regulated (Suisun Ecological Workgroup 1997).

42 The managed wetland community is characterized by robust, perennial emergent vegetation and
43 annual-dominated moist-soil grasses and forbs in freshwater areas (Hickson and Keeler-Wolf 2007)
44 and often by pickleweed and brass buttons in brackish water areas. Vegetation that is important to

1 waterfowl includes alkali bulrush, grand redstem, brass buttons, knotweed, barnyard grass,
 2 burhead, and swamp timothy (Suisun Ecological Workgroup 1997; U.S. Fish and Wildlife Service
 3 2007a). During periods when water is drained from the habitat, a wide variety of annual grasses and
 4 forbs germinate and grow beneath and in the space around clumping emergent plants, such as
 5 cattails and tules.

6 Managed wetlands are often managed specifically as habitat for wintering waterfowl species,
 7 including northern pintail, mallard, American wigeon, green-winged teal, northern shoveler,
 8 gadwall, cinnamon teal, ruddy duck, canvasback, white-fronted goose, and Canada goose. Some
 9 wetlands are also managed for breeding waterfowl, especially mallards. They also may be managed
 10 specifically for the high diversity of shorebirds (e.g., at the Yolo Basin Wildlife Area) that also rely on
 11 wetlands in the study area for habitat during winter and long-distance migrations. Species regularly
 12 observed during these periods include western and least sandpiper, long- and short-billed
 13 dowitchers, dunlin, greater and lesser yellowlegs, whimbrel, long-billed curlew, and wilson's
 14 phalarope. Other wildlife that uses managed wetlands includes those described for tidal brackish
 15 emergent wetland (especially for managed wetland in Suisun Marsh), nontidal freshwater perennial
 16 emergent wetland, and tidal freshwater emergent wetland. Tables 12-2 and 12-3 list special-status
 17 plant and wildlife species supported by the managed wetland natural community. The community is
 18 mapped in Figure 12-1.

19 **Other Natural Seasonal Wetland**

20 The other natural seasonal wetlands natural community encompasses all the remaining natural (not
 21 managed) seasonal wetland communities other than vernal pools and alkali seasonal wetlands.
 22 These areas mapped by CDFW (Hickson and Keeler-Wolf 2007) consist of seasonally ponded,
 23 flooded, or saturated soils dominated by grasses, sedges, or rushes. Other natural seasonal wetlands
 24 are freshwater wetlands characterized by ponded or saturated soil conditions during winter and
 25 spring and by dry soil conditions throughout summer and fall until the first substantial rainfall. The
 26 vegetation of seasonal wetlands is typically composed of wetland generalist species such as hyssop
 27 loosestrife, cocklebur, dallis grass, Bermuda grass, barnyard grass, and Italian ryegrass, which
 28 typically occur in frequently disturbed sites. Some of the dominant plant species in other natural
 29 seasonal wetland are the same as those cultivated in the managed wetland community. Species
 30 dominance varies according to flooding regime.

31 Other natural seasonal wetlands is considered a special-status natural community because it
 32 typically qualifies as jurisdictional wetlands subject to USACE jurisdiction under Section 404 of the
 33 CWA, and wetlands subject to regulation under the Porter-Cologne Act. Wildlife species and plants
 34 associated with seasonal wetlands are discussed in the previous description of the vernal pool
 35 complex community. Table 12-2 lists the covered species supported by the other natural seasonal
 36 wetland natural community; the community is mapped in Figure 12-1.

37 **Grassland**

38 The grassland community is a spectrum ranging from natural to intensively managed vegetation
 39 dominated by grasses. At the more natural end of the spectrum, this natural community consists of
 40 introduced or native annual and perennial grasses and forbs (nongrass herbaceous species)
 41 (Hickson and Keeler-Wolf 2007). At the intensively managed end of the spectrum, it includes
 42 nonirrigated pasturelands (CALFED Bay-Delta Program 2000). Grasslands are often found adjacent
 43 to wetland and riparian habitats and are the dominant community on managed levees in the Delta

1 (Hickson and Keeler-Wolf 2007). The distribution of the grassland community in the study area is
2 shown on Figure 12-1.

3 Grassland communities are generally dominated by nonnative species, such as wild oats, various
4 bromes and barleys, Italian ryegrass, filarees, mustards, wild radish, mallows, vetches, and star-
5 thistles. They may also support infrequent native annual and perennial grasses and forbs. In some
6 areas of the Delta, the grassland community is interspersed with vernal pool complex, alkali
7 seasonal wetland complex, and other natural seasonal wetland natural community types. The recent
8 revision of *A Manual of California Vegetation* (Sawyer et al. 2009) recognizes the broad spectrum of
9 grassland types and includes vegetation types ranging from those that are completely dominated by
10 nonnative annual grasses to grasslands that are dominated by perennial native grasses. Within the
11 study area, the grassland community that contains patches of other vegetation types can include
12 alkali milk-vetch, Heckard's pepper-grass, and San Joaquin spearscale.

13 The grassland community designation has also been applied to areas that have been cleared of their
14 natural vegetation cover, such as levee faces and edges of agricultural fields and roads. Vegetation in
15 these areas is best characterized as ruderal. Ruderal vegetation is dominated by herbaceous,
16 nonnative, plant species, some of which are considered invasive (see discussion in Section 12.1.4,
17 *Invasive and Noxious Plant Species*). Representative species that occur in ruderal grassland areas are
18 common mallow, bull thistle, bindweed, poison hemlock, wild lettuce, Russian thistle, and many
19 nonnative annual grasses, including wild oats, bromes, and barleys. Ruderal vegetation on
20 maintained levees throughout the Delta can be a persistent source of seeds of nonnative plants,
21 some of which are considered invasive. Some native annuals, such as common spikeweed and
22 willowherb, are also common.

23 Fallow fields and disturbed fields (ruderal lands) often are dense, monotypic stands of invasive
24 ("weedy") plants that provide limited wildlife values. The range of invasive plant species in the Delta
25 consists of herbaceous, shrub, and tree species that can occur in aquatic, wetland, and/or upland
26 habitats. Wildlife habitat values can be affected by invasive plant species through several means,
27 including physical alteration of habitat structure (e.g., the formation of dense stands that restrict
28 wildlife movement, or a reduction in suitable cover and nest sites) altering food webs (e.g., reducing
29 invertebrate prey populations), and disrupting biogeochemical processes (e.g., altering the timing of
30 carbon availability).

31 Ruderal and grassland communities provide foraging, breeding, and cover habitat value for a variety
32 of wildlife species, including gopher snake, western racer, western meadowlark, red-tailed hawk,
33 western harvest mouse, and California vole. Wildlife communities in fallow and ruderal fields are
34 often similar to those in cultivated row crop or silage fields. The absence of active cultivation
35 increases the potential for successful bird nesting; however, these habitats provide limited breeding
36 habitat for grassland-associated wildlife, such as western meadowlark, American goldfinch, and red-
37 winged blackbird. Tables 12-2 and 12-3 list special-status plant and wildlife species supported by
38 grassland and cultivated lands.

39 **Inland Dune Scrub**

40 The inland dune scrub natural community is composed of vegetated, stabilized sand dunes
41 associated with river and estuarine systems. In the study area, the inland dune scrub community
42 consists of remnants of low-lying ancient stabilized dunes related to the Antioch Dunes formation
43 located near the town of Antioch (CZ 10). The historic vegetation of these largely stabilized ancient
44 interior dunes included perennial grassland, oak woodland, and local "blowout" areas (naturally

1 disturbed, unstable, wind-eroded and depositional sites, or river-cut sand cliffs, within stabilized
2 dunes) that supported the distinctive dune species that survive at the Antioch Dunes NWR.

3 The remaining dune remnants in the Delta are highly fragmented and in many cases are dominated
4 by nonnative weedy vegetation and trees, as opposed to the characteristic native vegetation of
5 interior dune remnants at Antioch Dunes NWR. Stabilized sand dunes are found on Brannan Island,
6 south of Dutch Slough (CZ 5), and in other small areas throughout the study area. Plant communities
7 found on dune soils typically are dominated by ripgut brome, yellow star-thistle, telegraph weed,
8 wild lettuce, wild radish, beach suncup, and yarrow, with occasional shrubs such as deerweed, nude
9 buckwheat, Chamisso's lupine, and silver bush lupine.

10 Inland dune scrub is considered a special-status natural community because it provides suitable
11 habitat for Antioch Dunes evening primrose and Contra Costa wallflower, which are federally and
12 state listed as endangered. Because of their limited distribution, the presence of sensitive species,
13 and their declining geographic extent, dunes are also tracked by CDFW.

14 Rare invertebrates have been collected at the isolated dune habitat at Antioch Dunes NWR since the
15 1930s. Wildlife species associated with this habitat include mammals, such as Botta's pocket gopher,
16 California ground squirrel, Townsend's mole, and black-tailed jackrabbit; reptiles, such as western
17 racer, side-blotched lizard, and western fence lizard; and various resident and migratory bird
18 species. Tables 12-2 and 12-3 list special-status plant and wildlife species supported by the inland
19 dune scrub natural community. The community is mapped in Figure 12-1.

20 **Cultivated Lands**

21 Cultivated lands is the predominant land cover type in the study area. These lands have been
22 subdivided into two broad types – cropland and non-cropland – to better understand the
23 relationship between cultivated lands and the species analyzed in this chapter. Cropland includes
24 the major crops and cover types in agricultural production, including small grains (wheat and
25 barley), field crops (corn, sorghum, and safflower), truck crops (tomatoes and sugar beets), forage
26 crops (hay and alfalfa), irrigated pastures, orchards, and vineyards. Non-cropland includes
27 agricultural areas used for farmsteads, livestock feedlots, dairies, poultry farms, and small roads,
28 ditches and nonplanted areas associated with cultivated lands.

29 The distribution of seasonal crops varies annually within the study area, depending on crop-rotation
30 patterns and market forces. A more detailed description of the distribution of crop types is provided
31 in Chapter 14, *Agricultural Resources*. General cropping practices result in monotypic stands of
32 vegetation for the growing season and bare ground in fall and winter. Regular maintenance of fallow
33 fields, roads, ditches, and levee slopes, can reduce the establishment of ruderal vegetation or native
34 plant communities. Tables 12-2 and 12-3 list special-status plant and wildlife species supported by
35 cultivated lands. These lands are mapped in Figure 12-1. Some of the principal crop types and their
36 value to wildlife are discussed below.

37 ***Alfalfa***

38 Alfalfa is an irrigated, intensively mowed, leguminous crop that constitutes a dynamic habitat.
39 Vegetation structure varies with the growing, harvesting, and fallowing cycles. Alfalfa is rotated
40 periodically with other crops, such as vegetables and cereal grains. It is a very productive crop that
41 does not require frequent tilling, so it can support large populations of small mammals (e.g., voles)
42 and invertebrate species. As a result, it provides high-value foraging habitat for wildlife, including

1 wading birds, shorebirds, blackbirds, and hawks. Some of these species, such as shorebirds, use the
 2 fields when they are periodically flood irrigated. Alfalfa can be particularly important to Swainson's
 3 hawk, white-tailed kite, and other raptor species, which capitalize on high prey densities and cycles
 4 of increased prey availability when the fields are being irrigated and mowed.

5 ***Irrigated Pasture***

6 Irrigated pastures are managed grasslands that are not typically tilled or disturbed frequently. They
 7 are usually managed with a low structure of native herbaceous plants, cultivated species, or a
 8 mixture of both. Irrigated pastures provide breeding opportunities for ground-nesting birds and
 9 burrowing animals, such as burrowing owl, western meadowlark, California ground squirrel, and
 10 Botta's pocket gopher. The open structure of irrigated pastures provides foraging habitat for
 11 grassland-foraging wildlife, such as red-tailed hawk, northern harrier, American kestrel, and coyote.

12 ***Rice***

13 Rice is a flood-irrigated crop of seed-producing annual grasses. It is maintained in a flooded state
 14 until near maturation. Rice is usually grown in areas that previously supported natural wetlands,
 15 and many wetland wildlife species use rice fields, especially waterfowl and shorebirds. Waste grain
 16 also provides food for species such as ring-necked pheasant and sandhill crane. Other wildlife that
 17 use rice fields include giant garter snake, bullfrog, and wading birds that forage on aquatic
 18 invertebrates and small vertebrates, such as crayfish and small fishes. Rice fields provide habitat for
 19 a range of wintering waterfowl species in the Yolo Bypass. In particular, the practice of flooding rice
 20 fields in winter to allow rice stubble to rot, instead of burning rice stubble in the fall, provides a wide
 21 variety of ducks and geese an opportunity to loaf or forage in rice fields in winter and important
 22 foraging habitat for shorebirds. Fallow rice fields also provide important habitat for geese, cranes,
 23 large herons and egrets and can also provide breeding habitat for waterfowl such as mallards and
 24 gadwall.

25 ***Other Cultivated Crops***

26 Other cultivated crops include grain and seed crops, as well as row crops and silage. Grain and seed
 27 crops are annual grasses that are grown in dense stands and include corn, wheat and barley, and
 28 others. Because the dense growth makes it difficult to move through these fields, most of the wildlife
 29 values are derived during the early growing period, and especially following the harvest, when
 30 waste grain is accessible to waterfowl and other birds, such as sandhill cranes. In some areas of the
 31 Delta, grain fields support a substantial proportion of the sandhill crane population that winters in
 32 California.

33 Although generally of lesser value to wildlife than native habitats, row crop and silage fields often
 34 support abundant populations of small mammals, such as western harvest mouse and California
 35 vole. These species in turn attract predators such as gopher snake, western racer, American kestrel,
 36 and red-tailed hawk. Other reptile and bird species prey on the insect populations abundant in row
 37 crop and silage fields, including western fence lizard, Brewer's blackbird, American crow, and the
 38 nonnative European starling.

39 ***Orchards***

40 Orchards are habitats dominated by a single tree species. Trees are usually kept fairly low and
 41 bushy, with a mostly closed canopy and an open understory. Orchards usually are grown on fertile
 42 land that formerly supported diverse and productive natural habitats and wildlife. Orchard habitats

1 are used by several common woodland-associated species, such as western gray squirrel, American
 2 robin, red-tailed hawk, bats, and the nonnative black rat. The western red bat (a state species of
 3 special concern, see Special-Status Species below) is known to roost in orchards which may serve as
 4 an alternative habitat to the species' more preferred habitat of large cottonwoods, sycamores, and
 5 oaks (Pierson et al. 2006)

6 **Vineyards**

7 Vineyards are single-species vines grown in rows on trellises. Rows are normally formed by
 8 intertwining vines, with open spaces between the rows, and movement between rows is restricted.
 9 The spaces between rows either are barren soil or are composed of a cover crop of natural or
 10 domesticated herbaceous plants. Vineyards are usually grown on fertile land that formerly
 11 supported diverse and productive natural habitats and wildlife. Except for some common species,
 12 such as mourning dove, and raptors that use perches and nest boxes installed to attract raptors to
 13 control pest species, vineyards provide little wildlife habitat.

14 **Developed Lands**

15 Additional lands in the study area that were not designated with a natural community type are
 16 characterized here as developed lands. Developed lands include lands with residential, industrial,
 17 and urban land uses, as well as landscaped areas, riprap, road surfaces and other transportation
 18 facilities. Developed lands support some common plant and wildlife species, whose abundance and
 19 species richness vary with the intensity of development. Dense urban areas support less wildlife
 20 than less dense suburban settings support. Suburban areas with mature trees (ornamental or
 21 native) can approximate a natural environment and more native species may occur than in other
 22 urban settings. Bird species include house sparrow, house finch, western scrub-jay, and European
 23 starling in more urban zones, progressing to wren, bushtit, white-tailed kite, red-tailed hawk, red-
 24 shouldered hawk, and California quail in more suburban environments.

25 Mammal species in urban residential areas include raccoon, opossum, and striped skunk, with black-
 26 tailed deer and black-tailed jackrabbit in more suburban settings. California slender salamander,
 27 gopher snake, and western fence lizard could also be present in these areas. Riprap on levees
 28 provides potential upland habitat for a number of aquatic wildlife species, including the federally
 29 and state-listed giant garter snake (see BDCP Appendix 2.A, Section 2A.28.2, and the following
 30 section for more species information). Riprap on levees provides a thermal gradient, warm surfaces
 31 and cooler underground refuges, similar to burrows adjacent to aquatic habitats in locations where
 32 burrows may be limiting. Riprap is included in a GIS data layer in the habitat modeling completed
 33 for the BDCP.

34 **12.1.3 Special-Status Species**

35 This section addresses plant and wildlife species selected for coverage under the BDCP and other
 36 special-status species that have a potential to occur in the study area or to be adversely affected by
 37 the BDCP but that did not meet the BDCP screening criteria for covered species.

38 As described in BDCP Appendix 1.A, *Evaluation of Species Considered for Coverage*, the BDCP
 39 planning process included an evaluation of 234 special-status species for coverage under the BDCP.
 40 Species considered for BDCP coverage were limited to special-status species that were known or
 41 believed to occur near the Plan Area. All such species met one or more of the following criteria.

- 1 • Are listed as threatened or endangered under ESA.
- 2 • Are proposed or candidates for listing under ESA.
- 3 • Are listed as threatened or endangered under CESA.
- 4 • Are candidates for listing under CESA.
- 5 • Are California species of special concern.
- 6 • Are California fully protected species.
- 7 • Are USFWS birds of conservation concern.
- 8 • Are National Marine Fisheries Service (NMFS) species of concern.
- 9 • Are plants listed as rare under the California Native Plant Protection Act (NPPA).
- 10 • Are plants with a California Rare Plant Rank (CRPR) of 1A, 1B, or 2.

11 The BDCP evaluation process used four criteria to determine which special-status species were
12 proposed for coverage under the BDCP.

- 13 • Listing status of the species.
- 14 • Likelihood that the species is present in the Plan Area or other areas within the geographic
15 scope.
- 16 • Potential for the species to be adversely affected by BDCP covered activities, including the
17 implementation of conservation measures.
- 18 • Information available to determine effects on species and to identify effective conservation
19 measures.

20 Species that met all four criteria were proposed for coverage under the BDCP, as described in BDCP
21 Appendix 1.A. These covered species are listed in Table 12-2 and are analyzed in this EIR/EIS. Table
22 12-2 also identifies the BDCP natural communities and land cover types that these species are
23 associated with. More detailed descriptions of the habitat models used for the covered species can
24 be found in BDCP Appendix 2.A, *Covered Species Accounts*. The location of the impact discussions for
25 each of these species can be tracked by the impact numbers listed in the table. Impacts are
26 numbered sequentially under each alternative discussion in Section 12.3, *Environmental*
27 *Consequences*.

28 A similar but slightly expanded set of criteria was used for identifying other special-status species
29 that did not meet the criteria for inclusion in the BDCP but that do warrant inclusion this EIR/EIS. In
30 the EIR/EIS, special-status species are legally protected or otherwise considered sensitive by
31 federal, state, or local resource agencies. Special-status species are species, subspecies, or varieties
32 that fall into one or more of these categories.

- 33 • Are listed as threatened or endangered under ESA.
- 34 • Are proposed or candidates for listing under ESA.
- 35 • Are listed as threatened or endangered under CESA.
- 36 • Are plants listed as rare under the NPPA.
- 37 • Are candidates for listing under CESA.

- 1 • Are taxa (i.e., taxonomic categories or groups) that meet the criteria for listing, even if not
2 currently included on any list, as described in Section 15380 of the State CEQA Guidelines (e.g.,
3 species that appear on the CDFW special animals list).
- 4 • Are California species of special concern.
- 5 • Are California fully protected species.
- 6 • Are species identified on the Western Bat Working Group list (1998).
- 7 • Are plants ranked as “rare, threatened, or endangered in California” (CRPR 1B and 2).
- 8 • Are plants that may warrant consideration on the basis of local significance or recent biological
9 information (CEQA Guidelines Section 15380[d]), which may include some CRPR 3 and 4 species
10 (plants about which more information is needed to determine their status and plants of limited
11 distribution).
- 12 • Some plant species included on the CNDDDB *Special Plants, Bryophytes, and Lichens List* (current
13 list available: <http://www.dfg.ca.gov/biogeodata>).
- 14 • Are plants considered to be locally significant species, that is, species that are not rare from a
15 statewide perspective but are rare or unique in a local context, such as within a county or region
16 (CEQA Section 15125 [c]) or are so designated in local or regional plans, policies, or ordinances
17 (CEQA Guidelines, Appendix G).

18 Table 12-3 provides a list of noncovered special-status species that are addressed in this EIR/EIS.
19 Table 12-3 also identifies the BDCP natural communities and land cover types that these species are
20 associated with. More detailed descriptions of the habitat models developed by ICF and used for the
21 noncovered species analysis can be found below in Sections 12.1.3.2 and 12.1.3.3. The location of the
22 impact discussions for each of these species can be tracked by the impact numbers listed in the
23 table. Impacts are numbered sequentially under each alternative discussion in Section 12.3,
24 *Environmental Consequences*.

1 Table 12-2. Covered Special-Status Species Supported by the Natural Communities, Cultivated Lands and Developed Lands of the Study Area

Common Name <i>Scientific Name</i>	Impact Number(s)	Natural Communities											Developed Lands	Cultivated Lands	
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G			IDS
Mammals															
Riparian brush rabbit <i>Sylvilagus bachmani riparius</i>	152-154				X								X		
Riparian woodrat (San Joaquin Valley) <i>Neotoma fuscipes riparia</i>	155-157				X										
Salt marsh harvest mouse <i>Reithrodontomys raviventris</i>	158, 159		X		X			X		X			X ^a		
San Joaquin kit fox <i>Vulpes macrotis mutica</i>	162, 163								X				X		X
Suisun shrew <i>Sorex ornatus sinuosus</i>	160-161		X		X			X ^a					X ^a		
Birds															
California black rail <i>Laterallus jamaicensis coturniculus</i>	57-61		X	X			X			X					
California clapper rail <i>Rallus longirostris obsoletus</i>	62-65		X	X											
Greater sandhill crane <i>Grus canadensis tabida</i>	69-71							X	X	X	X	X			X
Least Bell's vireo <i>Vireo bellii pusillus</i>	75-79				X										
Suisun song sparrow <i>Melospiza melodia maxillaris</i>	80-82		X	X						X					
Swainson's hawk <i>Buteo swainsoni</i>	83-86				X			X	X	X	X	X			X
Tricolored blackbird <i>Agelaius tricolor</i>	87-90		X	X	X		X	X	X	X	X	X			X
Western burrowing owl <i>Athene cunicularia hypugaea</i>	91-94							X	X	X	X	X			X

Common Name <i>Scientific Name</i>	Impact Number(s)	Natural Communities												Developed Lands	Cultivated Lands	
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G	IDS			
Western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	95-99				X											
White-tailed kite <i>Elanus leucurus</i>	100-103				X			X	X	X	X	X				X
Yellow-breasted chat <i>Icteria viriens</i>	104-108				X											
Reptiles																
Giant garter snake <i>Thamnophis gigas</i>	49-51	X		X	X	X	X	X	X	X	X	X	X	X	X ^b	X
Western pond turtle <i>Actinemys marmorata</i>	52-54	X	X	X	X	X	X	X	X	X	X	X	X			X
Amphibians																
California red-legged frog <i>Rana draytonii</i>	44, 45			X	X	X	X	X	X	X	X	X				X
California tiger salamander (Central Valley distinct population segment [DPS]) <i>Ambystoma californiense</i>	46-48								X	X		X	X			
Invertebrates																
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	35-37				X					X ^c			X ^c			
California linderiella <i>Linderiella occidentalis</i>	32-34								X	X						
Conservancy fairy shrimp <i>Branchinecta conservatio</i>	32-34								X	X						
Longhorn fairy shrimp <i>Branchinecta longiantenna</i>	32-34								X	X						
Midvalley fairy shrimp <i>Branchinecta mesovallensis</i>	32-34								X	X						
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	32-34								X	X						

Common Name <i>Scientific Name</i>	Impact Number(s)	Natural Communities												Developed Lands	Cultivated Lands	
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G	IDS			
Vernal pool tadpole shrimp <i>Lepidurus packardii</i>	32-34							X	X							
Plants																
Alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>	169							X	X				X			
Boggs Lake hedge-hyssop <i>Gratiola heterosepala</i>	169								X							
Brittlescale <i>Atriplex depressa</i>	170							X	X							
Carquinez goldenbush <i>Isocoma arguta</i>	171												X			
Delta button celery <i>Eryngium racemosum</i>	170, 172				X			X	X							
Delta mudwort <i>Limosella australis</i>	173		X	X	X											
Delta tule pea <i>Lathyrus jepsonii</i> var. <i>jepsonii</i>	173		X	X	X											
Dwarf downingia <i>pusilla</i>	169								X							
Heartscale <i>Atriplex cordulata</i>	170							X	X				X			
Heckard's peppergrass <i>Lepidium latipes</i> var. <i>heckardii</i>	169, 170							X	X							
Legenere <i>Legenere limosa</i>	169								X							
Mason's lilaepsis <i>Lilaeopsis masonii</i>	173		X	X	X											
San Joaquin spearscale <i>Atriplex joaquiniana</i>	170							X	X							
Side-flowering skullcap <i>Scutellaria lateriflora</i>	173			X	X							X				

Common Name <i>Scientific Name</i>	Impact Number(s)	Natural Communities											Developed Lands	Cultivated Lands		
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G			IDS	
Slough thistle <i>Cirsium crassicaule</i>	172				X		X									
Soft bird's-beak <i>Chloropyron molle</i> subsp. <i>molle</i>	173		X													
Suisun Marsh aster <i>Symphyotrichum lentum</i>	173		X	X	X											
Suisun thistle <i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>	173		X													

Natural community codes:

- TPA = tidal perennial aquatic.
- TBEW = tidal brackish emergent wetland.
- TFEW = tidal freshwater emergent wetland.
- VFR = valley/foothill riparian.
- NPA = nontidal perennial aquatic.
- NFPEW = nontidal freshwater perennial emergent wetland.
- ASWC = alkali seasonal wetland complex.
- VPC = vernal pool complex.
- MW = managed wetland.
- ONSW = other natural seasonal wetland.
- G = grassland (also includes the subcategory of degraded vernal pool complex).
- IDS = inland dune scrub.

^a These communities are identified as secondary habitats within 150 feet of primary habitat in the BDCP species model.
^b Riprap along Plan Area waterways is considered developed land and is included in the habitat modeling for giant garter snake.
^c Vernal pool complex and grasslands within 200 feet of streams are considered potential habitat for this species in the BDCP model.

1 **Table 12-3. Noncovered Special-Status Species Supported by the Natural Communities, Cultivated Lands and Developed Lands of the Study**
 2 **Area**

Common Name <i>Scientific Name</i>	Impact Number(s)	Natural Communities												Developed Lands	Cultivated Lands	
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G	IDS			
Invertebrates																
Antioch Adrenid Bee <i>Perdita scitula antiochensis</i>	-													X		
Antioch Dunes Anthicid Beetle <i>Anthicus antiochensis</i>	41				X									X		
Antioch Dunes halictid bee <i>Sphcodogastra antiochensis</i>	-													X		
Antioch Efferian Robberfly <i>Efferia antiochi</i>	-													X		
Antioch Mutillid Wasp <i>Myrmosula pacifica</i>	-													X		
Antioch Sphecid Wasp <i>Philanthus nasalis</i>	-													X		
Blennosperma Vernal Pool Andrenid Bee <i>Andrena blennospermatis</i>	38-40								X	X						
Callippe Silverspot Butterfly <i>Speyeria callippe</i>	43												X			
Curved-foot Hygrotus Diving Beetle <i>Hygrotus curvipes</i>	38-40								X	X						
Delta Green Ground Beetle <i>Elaphrus viridis</i>	42									X			X			
Hairy Water Flea <i>Dumontia oregonensis</i>	38-40								X	X						
Hurd's Metapogon Robberfly <i>Metapogon hurdi</i>	-													X		
Lange's Metalmark Butterfly <i>Apodemia mormo langei</i>	-													X		
Middlekauff's Shieldback Katydid <i>Idiostatus middlekauffi</i>	-													X		
Molestan Blister Beetle <i>Lytta molesta</i>	38-40									X			X			

Common Name <i>Scientific Name</i>	Impact Number(s)	Natural Communities											Developed Lands	Cultivated Lands		
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G			IDS	
Redheaded Sphecid Wasp <i>Eucerceris ruficeps</i>	-													X		
Ricksecker's Water Scavenger Beetle <i>Hydrochara rickseckeri</i>	38-40							X	X							
Sacramento Anthicid Beetle <i>Anthicus sacramento</i>	41				X									X		
Reptiles																
Blainville's horned lizard <i>Phrynosoma blainvillii</i>	55, 56												X	X		
San Joaquin coachwhip <i>Coluber flagellum ruddocki</i>	55, 56							X	X				X			
Silvery legless lizard <i>Anniella pulchra pulchra</i>	55, 56													X		
Birds																
Bank swallow <i>Riparia riparia</i>	146, 147				X											
Black crowned night heron <i>Nycticorax nycticorax</i>	117-120				X											
Black tern <i>Chlidonias niger</i>	129a- 129c															X
California horned lark <i>Eremophila alpestris actia</i>	130-133							X	X				X			X
California least tern <i>Sternula antillarum browni</i>	66-68	X														
Cooper's hawk <i>Accipiter cooperii</i>	109-112				X											
Double-crested cormorant <i>Phalacrocorax auritus</i>	117-120				X											
Ferruginous hawk <i>Buteo regalis</i>	113-116							X	X				X			X
Golden eagle <i>Aquila chrysaetos</i>	113-116							X	X				X			X
Grasshopper sparrow <i>Ammodramus savannarum</i>	130-133							X	X				X			X

Common Name <i>Scientific Name</i>	Impact Number(s)	Natural Communities											Developed Lands	Cultivated Lands		
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G			IDS	
Great blue heron <i>Ardea herodias</i>	117-120				X											
Great egret <i>Ardea alba</i>	117-120				X											
Least bittern <i>Ixobrychus exilis</i>	134-137			X			X			X	X					
Lesser sandhill crane <i>Grus canadensis canadensis</i>	72-74							X	X	X	X	X				X
Loggerhead shrike <i>Lanius ludovicianus</i>	138-141							X	X			X				X
Mountain plover <i>Charadrius montanus</i>	125-128							X	X			X				X
Northern harrier <i>Circus cyaneus</i>	121-124		X	X			X	X	X	X	X	X				X
Osprey <i>Pandion haliaetus</i>	119-112				X											
Redhead <i>Aythya americana</i>	178-183						X			X						
Saltmarsh common yellowthroat <i>Geothlypis trichas sinuosa</i>	80-82		X	X						X						
Short-eared owl <i>Asio flammeus</i>	121-124		X	X			X	X	X	X	X	X				X
Snowy egret <i>Egretta thula</i>	117-120				X											
Song sparrow "Modesto" population <i>Melospiza melodia</i>	142-145			X	X		X			X	X					
Tule greater white-fronted goose <i>Anser albifrons</i>	178-183						X			X						
White-faced ibis <i>Plegadis chihi</i>	134-137			X			X			X	X					
Yellow warbler <i>Setophaga petechia</i>	75-79				X											
Yellow-headed blackbird <i>Xanthocephalus xanthocephalus</i>	148-151			X			X	X	X	X	X	X				X

Common Name <i>Scientific Name</i>	Impact Number(s)	Natural Communities												Developed Lands	Cultivated Lands
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G	IDS		
Mammals															
American Badger <i>Taxidea taxus</i>	162, 163								X	X			X		
Big brown bat <i>Eptesicus fuscus</i>	166-168	X	X	X	X	X	X	X	X	X	X	X	X	X	X
California myotis <i>Myotis californicus</i>	166-168	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Canyon bat <i>Parastrellus hesperus</i>	166-168												X	X	
Hoary bat <i>Lasiurus cinereus</i>	166-168	X	X	X	X	X	X	X	X	X	X	X	X		X
Little brown myotis <i>Myotis lucifugus</i>	166-168	X	X	X	X	X	X	X	X	X	X	X			X
Mexican free-tailed bat <i>Tadarida brasiliensis</i>	166-168	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pallid bat <i>Antrozus pallidus</i>	166-168												X	X	X
San Joaquin pocket mouse <i>Perognathus inornatus inornatus</i>	164, 165												X		
Silver-haired bat (migration only) <i>Lasionycteis noctivagans</i>	166-168				X	X	X	X	X	X	X	X	X	X	X
Townsend's big-eared bat <i>Corynorhinus townsendii</i>	166-168	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Western mastiff bat <i>Eumops perotis</i>	166-168									X			X	X	X
Western red bat <i>Lasiurus blossevillii</i>	166-168				X	X	X						X		X
Western small-footed myotis <i>Myotis ciliabrum</i>	166-168	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Yuma myotis <i>Myotis yumanensis</i>	166-168	X	X	X	X	X	X	X	X	X	X	X		X	X

Common Name <i>Scientific Name</i>	Impact Number(s)	Natural Communities												Developed Lands	Cultivated Lands	
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G	IDS			
Plants																
Ferris's milk vetch <i>Astragalus tener</i> var. <i>ferrisiae</i>	169							X	X							
Crownscale <i>Atriplex coronata</i> var. <i>coronata</i>	170							X	X							
Vernal pool smallscale <i>Atriplex persistens</i>	169								X							
Big tarplant <i>Blepharizonia plumosa</i>	171												X			
Watershield <i>Brasenia schreberi</i>	175					X	X									
Round-leaved filaree <i>California macrophylla</i>	171												X			
Bristly sedge <i>Carex comosa</i>	175						X									
Pappose tarplant <i>Centromadia parryi</i> subsp. <i>parryi</i>	171							X					X			
Parry's rough tarplant <i>Centromadia parryi</i> subsp. <i>rudis</i>	171							X	X				X			
Palmate-bracted bird's-beak <i>Chloropyron palmatum</i>	170							X	X							
Bolander's water-hemlock <i>Cicuta maculata</i> var. <i>bolanderi</i>	173		X	X												
Small-flowered morning-glory <i>Convolvulus simulans</i>	171												X			
Hoover's cryptantha <i>Cryptantha hooveri</i>	174												X	X		
Recurved larkspur <i>Delphinium recurvatum</i>	170							X					X			
Streamside daisy <i>Erigeron bioletti</i>	171												X			
Antioch Dunes buckwheat <i>Eriogonum nudum</i> var. <i>psychicola</i>	174													X		
Mt. Diablo buckwheat <i>Eriogonum truncatum</i>	174												X			

Common Name <i>Scientific Name</i>	Impact Number(s)	Natural Communities												Developed Lands	Cultivated Lands
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G	IDS		
Contra Costa wallflower <i>Erysimum capitatum</i> var. <i>angustatum</i>	174												X		
Diamond-petaled California poppy <i>Eschscholzia rhombipetala</i>	171												X		
Stinkbells <i>Fritillaria agrestis</i>	171												X		
Fragrant fritillary <i>Fritillaria liliacea</i>	171												X		
Hogwallow starfish <i>Hesperovax caulescens</i>	169									X			X		
Woolly rose-mallow <i>Hibiscus lasiocarpus</i> subsp. <i>occidentalis</i>	175			X	X		X								
Northern California black walnut <i>Juglans hindsii</i>	172				X										
Contra Costa goldfields <i>Lasthenia conjugens</i>	169									X					
Ferris' goldfields <i>Lasthenia ferrisiae</i>	169							X	X						
Cotulaleaf navarretia <i>Navarretia cotulifolia</i>	169							X	X				X		
Baker's navarretia <i>Navarretia leucocephala</i> subsp. <i>bakeri</i>	169									X					
Colusa grass <i>Neostapfia colusana</i>	169									X					
Antioch Dunes evening-primrose <i>Oenothera deltoides</i> subsp. <i>howellii</i>	174													X	
Gairdner's yampah <i>Perideridia gairdneri</i> ssp. <i>gairdneri</i>	171												X		
Bearded popcorn-flower <i>Plagiobothrys hystriculus</i>	169									X					
Eel grass pondweed <i>Potamogeton zosteriformis</i>	175					X	X								
Delta woolly marbles <i>Psilocarphus brevissimus</i> var. <i>multiflorus</i>	169									X					

Common Name <i>Scientific Name</i>	Impact Number(s)	Natural Communities											Developed Lands	Cultivated Lands		
		TPA	TBEW	TFEW	VFR	NPA	NFPEW	ASWC	VPC	MW	ONSW	G			IDS	
Sanford's arrowhead <i>Sagittaria sanfordii</i>	175			X		X	X									
Marsh skullcap <i>Scutellaria galericulata</i>	175			X	X		X									
Keck's checkerbloom <i>Sidalcea keckii</i>	171												X			
Wright's trichocoronis <i>Trichocoronis wrightii</i> var. <i>wrightii</i>	172				X		X									
Saline clover <i>Trifolium hydrophilum</i>	169		X						X	X						
Caper-fruited tropidocarpum <i>Tropidocarpum capparideum</i>	171								X				X			
Solano grass <i>Tuctoria mucronata</i>	169									X						

Natural community codes:

- TPA = tidal perennial aquatic.
 TBEW = tidal brackish emergent wetland.
 TFEW = tidal freshwater emergent wetland.
 VFR = valley/foothill riparian.
 NPA = nontidal perennial aquatic.
 NFPEW = nontidal freshwater perennial emergent wetland.
 ASWC = alkali seasonal wetland complex.
 VPC = vernal pool complex.
 MW = managed wetland.
 ONSW = other natural seasonal wetland
 G = grassland.
 IDS = inland dune scrub.

1 **12.1.3.1 Critical Habitat**

2 Critical habitat refers to areas designated by the USFWS for the conservation of species listed as
3 threatened or endangered under the ESA. When a species is proposed for listing under the ESA, the
4 USFWS considers whether there are certain areas essential to the conservation of the species.

5 Critical habitat is defined in Section 3 of the ESA as follows.

- 6 1. The specific areas within the geographical area occupied by a species at the time it is listed
7 in accordance with the Act, on which are found those physical or biological features:
 - 8 a. essential to the conservation of the species, and
 - 9 b. that may require special management considerations or protection; and
- 10 2. Specific areas outside the geographical area occupied by a species at the time it is listed,
11 upon a determination that such areas are essential for the conservation of the species.

12 Any federally action (permit, license, or funding) in critical habitat requires that federal agency to
13 consult with the USFWS where the action has potential to adversely modify the habitat for the
14 species.

15 The federally listed wildlife and plant species that have designated critical habitat within the study
16 area are presented in Table 12-4 below. Critical habitat for each species is presented in the figures
17 referenced in the species discussions in Sections 12.1.3.3 and 12.1.3.4.

18 **Table 12-4. Designated Critical Habitat within the Study Area for Wildlife and Plant Species**

Species	Acres of Critical Habitat
Vernal pool tadpole shrimp	9,579
Conservancy fairy shrimp	3,340
Vernal pool fairy shrimp	11,090
Delta green ground beetle	321
California tiger salamander, Central California DPS	1,780
California red-legged frog	3,321
Suisun thistle	2,034
Soft bird's-beak	1,706
Contra Costa wallflower	305
Antioch Dunes evening primrose	305
Contra Costa goldfields	5,138
Solano grass	0.4
Colusa grass	0.4

19

20 **12.1.3.2 Special-Status Wildlife Species**

21 Table 12A-2 in Appendix 12A, *Special-Status Species with Potential to Occur in the Study Area*,
22 provides information on the 116 special-status wildlife species that were identified for
23 consideration in the EIR/EIS, including common and scientific name, listing status (federal, state,

1 global rank, and/or state rank), notes on the species habitat, distribution in California, and potential
 2 for occurrence in the study area. The species listed in this table were generated from queries of the
 3 CNDDDB and the USFWS for the counties within the study area. Twenty-eight of these species are
 4 covered species in the BDCP and 88 are noncovered species addressed in this EIR/EIS.

5 The following summaries provide information on the species' habitat requirements, distribution,
 6 and occurrences within the study area. The habitat and distribution information for covered species
 7 is largely based on the species account information found in BDCP Appendix 2.A, *Covered Species*
 8 *Accounts*. The habitat models for noncovered species described below were based on one or more of
 9 the following characteristics: species range; natural communities in which the species are found;
 10 specific vegetation alliances within each natural community; and occurrence records. In cases where
 11 covered and noncovered species have the same habitat requirements (e.g., the covered least Bell's
 12 vireo and the noncovered yellow warbler), modeled habitat for the covered species was applied to
 13 the noncovered species. For a few species that have specific habitat elements that are at a smaller
 14 scale than the minimum mapping units used in the BDCP vegetation/land cover dataset (e.g., sand
 15 bar habitat for anthicid beetles) the extent of habitat was qualitatively evaluated. Species occurrence
 16 data were obtained from the CNDDDB and from field surveys conducted in support of the Delta
 17 Habitat Conservation and Conveyance Program (DHCCP) (Appendix 12C, *2009 to 2011 Bay Delta*
 18 *Conservation Plan EIR/EIS Environmental Data Report*). Additional occurrence records were
 19 obtained from a number of species experts (Hansen, Ivey, pers. comm.) which are maintained in a
 20 DHCCP GIS data set.

21 The following summaries include species account information found in BDCP Appendix 2.A *Covered*
 22 *Species Accounts*, except where otherwise cited.

23 **Vernal Pool Crustaceans**

24 ***California Linderiella***

25 California linderiella, which has a NatureServe conservation status of vulnerable and a state
 26 conservation status of imperiled to vulnerable, occurs in a variety of vernal pools and other seasonal
 27 wetlands in the Central Valley and central coastal California. According to the BDCP habitat model
 28 for this species, vernal pool complexes and alkali seasonal wetlands in CZ 8 provide potential
 29 California linderiella habitat in the study area (Figure 12-5). There are 382 occurrences of California
 30 linderiella throughout the state, including 13 in the study area (California Department of Fish and
 31 Wildlife 2013). The study area includes portions of the Jepson Prairie core recovery area, which was
 32 developed in part for the conservation of California linderiella.

33 ***Conservancy Fairy Shrimp***

34 Conservancy fairy shrimp, a federally listed endangered species, occurs in large turbid vernal pools
 35 from Butte and Tehama Counties south to Ventura County. According to the BDCP habitat model for
 36 this species, vernal pool complexes and alkali seasonal wetlands in CZ 8 provide potential
 37 Conservancy fairy shrimp habitat in the study area (Figure 12-5). There are 34 known occurrences
 38 of Conservancy fairy shrimp range-wide, six of which are in the study area (California Department of
 39 Fish and Wildlife 2013). The study area includes a portion of Jepson Prairie, which is a core recovery
 40 area for Conservancy fairy shrimp and supports three of these occurrences. The Collinsville core
 41 recovery area, which was developed in part for Conservancy fairy shrimp, also lies within the study
 42 area on the western edge of the Montezuma Hills but has no documented occurrences. In addition,

1 the study area contains critical habitat for Conservancy fairy shrimp between Potrero Hills and the
2 northern limits of the study area, near Suisun Marsh.

3 ***Longhorn Fairy Shrimp***

4 Longhorn fairy shrimp, a federally listed endangered species, is typically found in small pools of
5 relatively short ponding duration and in pools with alkali soils in scattered locations from Alameda
6 to San Luis Obispo Counties. According to the BDCP habitat model for this species, vernal pool
7 complexes and alkali seasonal wetlands in CZ 8 provide potential longhorn fairy shrimp habitat.
8 There are no records of longhorn fairy shrimp in the study area, although there are occurrences
9 southwest of the study area in the Byron Hills area (Figure 12-5) (California Department of Fish and
10 Wildlife 2013). This area is part of the Altamont Hills core recovery area, which was developed in
11 part for the recovery of longhorn fairy shrimp. A portion of this recovery area lies within the study
12 area, just west of Clifton Court Forebay. This general area represents the most suitable habitat for
13 the species in the study area. This species is very rare, with only 10 recorded occurrences
14 throughout the state.

15 ***Midvalley Fairy Shrimp***

16 Midvalley fairy shrimp, which has a NatureServe conservation status of imperiled, occurs in vernal
17 pools and other seasonal wetlands in the Central Valley from Sacramento County to Fresno County.
18 According to the BDCP habitat model for this species, vernal pool complexes and alkali seasonal
19 wetlands in CZ 8 provide potential midvalley fairy shrimp habitat in the study area (Figure 12-5).
20 There are 99 CNDDDB species occurrences throughout the state, including seven CNDDDB occurrences
21 in the study area and one DHCCP occurrence (California Department of Fish and Wildlife 2013,
22 Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). The
23 study area contains a portion of the Altamont Hill core recovery area, which was developed in part
24 for the conservation of midvalley fairy shrimp.

25 ***Vernal Pool Fairy Shrimp***

26 Vernal pool fairy shrimp, a federally listed threatened species, occurs in vernal pools and other
27 seasonal wetlands (including ditches) in the Central Valley from Shasta County to Tulare County and
28 in the central and southern Coast Ranges from Solano County to Ventura County. According to the
29 BDCP habitat model for this species, vernal pool complexes and alkali seasonal wetlands CZ 8
30 provide potential vernal pool fairy shrimp habitat in the study area. There are 608 recorded
31 occurrences throughout the state (California Department of Fish and Wildlife 2013; Appendix 12C,
32 *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*), including 18 in the
33 study area (Figure 12-5). Some locations have multiple records from recent DHCCP surveys
34 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). The
35 study area covers portions of the Altamont Hills and Jepson Prairie core recovery areas, which were
36 developed in part for the recovery of vernal pool fairy shrimp. The study area also includes critical
37 habitat for vernal pool fairy shrimp from the Potrero Hills to the northern limits of the study area
38 near Suisun Marsh, and in an area just west of Clifton Court Forebay.

39 ***Vernal Pool Tadpole Shrimp***

40 Vernal pool tadpole shrimp, which is listed as endangered under ESA, occurs in a variety of vernal
41 pool and seasonal wetlands, typically those that pool into late spring, from Shasta County to Tulare
42 County in the Central Valley and foothills, and in portions of the Bay Area in Alameda and Contra

1 Costa Counties. According to the BDCP habitat model for this species, vernal pool complexes and
 2 alkali seasonal wetlands in CZ 8) provide potential vernal pool tadpole shrimp habitat in the study
 3 area (Figure 12-5). There are 274 species occurrences throughout the state, including 16 in the
 4 study area (California Department of Fish and Wildlife 2013). The study area covers portions of the
 5 Collinsville and Jepson Prairie core recovery areas, which were developed in part for the recovery of
 6 vernal pool tadpole shrimp. The study area also includes critical habitat for vernal pool tadpole
 7 shrimp from the Potrero Hills to the northern limits of the study area near Suisun Marsh.

8 **Valley Elderberry Longhorn Beetle**

9 Valley elderberry longhorn beetle's life cycle is dependent on elderberry shrubs (its host plant) that
 10 are adjacent to, or contiguous with, riparian forests, floodplains, or relict elderberry savannas. The
 11 species, which is federally listed as threatened, occurs within the Central Valley and foothills up to
 12 3,000 feet in elevation. BDCP modeled habitat for valley elderberry longhorn beetle within the study
 13 area is composed of valley/foothill riparian, grassland within 200 feet of streams, and vernal pool
 14 complex within 200 feet of streams (Figure 12-6). There are 201 extant CNDDDB records for valley
 15 elderberry longhorn beetle across its range, including three within the study area (California
 16 Department of Fish and Wildlife 2013). During surveys conducted in 2009, DWR identified several
 17 areas with elderberry shrubs along Delta channels within the proposed water conveyance facilities
 18 alignments (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data*
 19 *Report*). DHCCP mapped 312 locations with shrubs, mostly within the north and east Delta.

20 **Nonlisted Vernal Pool Invertebrates**

21 ***Blennosperma Vernal Pool Andrenid Bee***

22 *Blennosperma vernal pool andrenid bee*, which has a NatureServe conservation status of imperiled,
 23 is a solitary, ground-nesting bee that occurs in upland areas around vernal pools where its pollen
 24 and nectar source, the vernal pool plant *Blennosperma*, grows (California Department of Fish and
 25 Game 2006a). This species is known to occur throughout central California. Potential habitat in the
 26 study area includes vernal pool complexes and alkali seasonal wetlands in CZ 8 (Figure 12-7). The
 27 analysis for this species utilizes the BDCP's habitat model for vernal pool crustaceans. There are 15
 28 CNDDDB records for this species across its range. One of these occurrences is located in the western
 29 most portion of CZ 1 in the Jepson Prairie area (California Department of Fish and Wildlife 2013).

30 ***Hairy Water Flea***

31 The hairy water flea, which has a NatureServe conservation status ranging from critically imperiled
 32 to vulnerable, and a conservations status of critically imperiled in California, is a small crustacean
 33 that occurs in vernal pools and is currently known to occur only in Agate Desert near Medford,
 34 Oregon and in Sacramento and Solano Counties (NatureServe 2011a, U.S. Fish and Wildlife Service
 35 2006). Vernal pool complexes and alkali seasonal wetlands in CZ 8 represent potential habitat for
 36 this species in the study area. The analysis for this species utilizes the BDCP's habitat model for
 37 vernal pool crustaceans. There are two CNDDDB records for this species in California, neither of
 38 which is in the study area, though one occurs just to the north of CZ 11 near Travis Air Force Base
 39 (Figure 12-7) (California Department of Fish and Wildlife 2013).

1 ***Ricksecker's Water Scavenger Beetle***

2 Ricksecker's water scavenger beetle, which has a NatureServe conservation status ranging from
3 critically imperiled to imperiled, occurs in vernal pools and ponds in Northern California. Potential
4 habitat for this species in the study area includes freshwater aquatic habitat (ponds), vernal pool
5 complexes, and alkali seasonal wetlands in CZ 8 (Figure 12-7). The analysis for this species utilizes
6 the BDCP's habitat model for vernal pool crustaceans. At the scale of the mapping used for BDCP, no
7 freshwater ponds were mapped. There are 13 CNDDDB records for this species across its range, two
8 of which are located in the study area. One is located in the western most portion of CZ 1 in the
9 Jepson Prairie area and the other at Cosumnes River Preserve north of I-5 in CZ 4 (California
10 Department of Fish and Wildlife 2013).

11 ***Curved-Foot Hygrotus Diving Beetle***

12 Curved-foot hygrotus diving beetle, which has a NatureServe conservation status of critically
13 imperiled, occurs in vernal pools and alkali wetlands in Alameda and Contra Costa Counties
14 (California Department of Fish and Wildlife 2013; NatureServe 2011b). Vernal pool complexes and
15 alkali wetlands in the western portions of CZs 7, 8, and 9, and in the eastern portion of CZ 10
16 represent potential habitat for this species (Figure 12-7). The analysis for this species utilizes the
17 BDCP's habitat model for vernal pool crustaceans. There are 21 CNDDDB records for this species
18 across its range. Six of them occur within western portion of the study area north and south of the
19 city of Brentwood (California Department of Fish and Wildlife 2013).

20 ***Molestan Blister Beetle***

21 Molestan blister beetle, which has a NatureServe conservation status of imperiled, is typically
22 associated with flowers in dried vernal pools within central California (California Department of
23 Fish and Game 2006b). Vernal pool complexes and alkali seasonal wetlands in CZ 8 represent
24 potential habitat for this species in the study area (Figure 12-7). The analysis for this species utilizes
25 the BDCP's habitat model for vernal pool crustaceans. There are 17 CNDDDB records for this species
26 across its range. One of these is within the study area and is located near the town of Brentwood in
27 CZ 9 (California Department of Fish and Wildlife 2013).

28 **Sacramento and Antioch Dunes Anthicid Beetles**

29 Sacramento anthicid beetle, which has a NatureServe conservation status of critically imperiled,
30 occurs on interior sand dunes (inland dune scrub) and sand bars, and has also been found in dredge
31 spoil heaps (California Department of Fish and Game 2006c). The species is found in several
32 locations along the Sacramento and San Joaquin Rivers, from Shasta to San Joaquin Counties, and at
33 one site along the Feather River at Nicolas (California Department of Fish and Game 2006c). Suitable
34 habitat within the study area includes the dunes at Antioch Dunes NWR, sand bars along the
35 Sacramento and San Joaquin Rivers, and sandy dredge spoil piles. There are 13 extant records of
36 Sacramento anthicid beetle across its range, seven of which occur within the study area (Figure 12-
37 8) (California Department of Fish and Wildlife 2013).

38 Antioch Dunes anthicid beetle, which also as a NatureServe conservation status of critically
39 imperiled, occurs on interior sand dunes (inland dune scrub) and sand bars, typically areas that are
40 unvegetated (California Department of Fish and Game 2006d). The species apparently has been
41 extirpated from the type locality at Antioch Dunes and has more recently been documented along
42 the Sacramento River in Glenn, Tehama, Shasta, and Solano Counties, and from one site at Nicolas on

1 the Feather River in Sutter County (California Department of Fish and Game 2006d). Antioch Dunes
 2 NWR, sand bars along the Sacramento and San Joaquin Rivers provide potential habitat within the
 3 study area, and possibly sandy, dredge spoil piles. There are five extant records of Antioch Dunes
 4 anthicid beetle across its range, one of which is within the study area and is just north of Rio Vista
 5 (Figure 12-9) (California Department of Fish and Wildlife 2013).

6 In the north Delta, three general areas were identified from a 2012 review of Google Earth imagery
 7 appear to have accumulations of sandy soils (with some vegetation), possibly from dredge disposal,
 8 are Decker Island, the western portion of Bradford Island, and the southwestern tip of Grand Island.
 9 A review of aerial photographs in the south Delta identified sandbar habitat along the San Joaquin
 10 River from the southern end of the Plan Area downstream to an area just north of its crossing of I-5.
 11 An additional area along Paradise Cut was identified just north of I-5. These areas could be occupied
 12 by Sacramento and Antioch Dunes anthicid beetles.

13 **Inland Dune Scrub Invertebrate Species**

14 Although the Plan Area contains habitat for the inland dune scrub invertebrate species described in
 15 this section, BDCP actions would have no effects on inland dune scrub invertebrates. Construction
 16 and operations and maintenance of the water conveyance facilities (CM1) and other conservation
 17 measures would not affect the species' or their habitat. Therefore, the inland dune scrub
 18 invertebrate species described here are not addressed in Section 12.3, *Environmental Consequences*.

19 ***Lange's Metalmark Butterfly***

20 A federally listed endangered species, Lange's metalmark butterfly is entirely dependent on
 21 nakedstem buckwheat as its larval host plant and as its primary adult nectar plant. This plant is
 22 restricted to sandy, well drained soils (U.S. Fish and Wildlife Service 2008). The Antioch Dunes NWR
 23 has the only known extant populations of Lange's metalmark within the study area (Figure 12-10)
 24 (U.S. Fish and Wildlife Service 2008). No other suitable habitat for this species has been identified
 25 within the study area.

26 ***Antioch Efferian Robberfly***

27 Antioch efferian robberfly, which has a NatureServe conservation status ranging from critically
 28 imperiled to vulnerable, is known only from Contra Costa and Fresno Counties (California
 29 Department of Fish and Wildlife 2013). Little is known about the species, but it is assumed to occur
 30 in sand dunes and loose sandy soils (California Department of Fish and Game 2006e, Entomological
 31 Consulting Ltd. 2005). The inland dune scrub habitat at the Antioch Dunes NWR represents the only
 32 suitable habitat identified in the study area (Figure 12-10). There are four CNDDDB records of this
 33 species in California, one of which is within the study area and is located at the Antioch Dunes NWR
 34 (California Department of Fish and Wildlife 2013).

35 ***Redheaded Sphecic Wasp***

36 Redheaded sphecic wasp, which has a NatureServe conservation status ranging from critically
 37 imperiled to vulnerable, and ranging from critically imperiled to imperiled in California, nests in
 38 sand and is known from a few sites in the Delta and foothills of the Central Valley (Entomological
 39 Consulting Ltd. 2005; California Department of Fish and Wildlife 2013). The Antioch Dunes (the
 40 species type locality) likely represents the only suitable habitat for this species in the study area

1 (Figure 12-10). There are three CNDDDB records of this species in California, including one within the
2 study area at the Antioch Dunes NWR (California Department of Fish and Wildlife 2013).

3 ***Middlekauff's Shieldback Katydid***

4 Middlekauff's shieldback katydid, which has a NatureServe conservation status ranging from
5 critically imperiled to imperiled and a status of imperiled in California, is known only from the
6 Antioch Dunes and is believed to have lived on various shrubs indigenous to the dunes (California
7 Department of Fish and Wildlife 2013, Entomological Consulting Ltd 2005). The only CNDDDB record
8 for this species in California is at the Antioch Dunes (Figure 12-10) (California Department of Fish
9 and Wildlife 2013).

10 ***Hurd's Metapogon Robberfly***

11 Hurd's metapogon robberfly is known from only two locations, the Antioch Dunes and in Fresno
12 County, where it is thought to be extirpated (California Department of Fish and Wildlife 2013). The
13 species, which has a NatureServe conservation status ranging from critically imperiled to
14 vulnerable, is believed to occur in sand dunes and loose sandy soils (Entomological Consulting Ltd.
15 2005). The inland dune scrub habitat at the Antioch Dunes NWR represents the only suitable habitat
16 identified in the study area (Figure 12-10).

17 ***Antioch Mutillid Wasp***

18 Antioch mutillid wasps usually nest in the ground in sandy soils (Entomological Consulting Ltd.
19 2005). This species, with a NatureServe conservation status of possibly extinct, is known from the
20 Antioch Dunes, Yolo County and Inyo County (California Department of Fish and Wildlife 2013). The
21 Antioch Dunes NWR is believed to represent the only habitat for this species in the study area
22 (Figure 12-10).

23 ***Antioch Andrenid Bee***

24 Antioch andrenid bee, which has a NatureServe conservation status of critically imperiled, occurs in
25 interior dunes and is currently known only from the Antioch Dunes NWR (California Department of
26 Fish and Game 2006f; California Department of Fish and Wildlife 2013). The dune habitat at Antioch
27 Dunes NWR represents the only habitat for this species in the study area (Figure 12-10).

28 ***Antioch Sphecid Wasp***

29 Antioch sphecid wasp, which has a NatureServe conservation status of critically imperiled, occurs in
30 inland marine sand hills and nests in sandy ground (California Department of Fish and Game
31 2006g). The species was originally thought to only occur at the Antioch Dunes (where it is thought
32 to be extirpated) but was more recently found in the Zayante sand hills of Santa Cruz County
33 (California Department of Fish and Game 2006g; California Department of Fish and Wildlife 2013).
34 The dune habitat at Antioch Dunes represents the only habitat for this species in the study area,
35 though, as mentioned previously, it is believed that this population has been extirpated (Figure 12-
36 10).

37 ***Antioch Dunes Halictid Bee***

38 The Antioch Dunes halictid bee, which has a NatureServe conservation status of critically imperiled,
39 occurs in sandy habitats and depends on its primary host plant, Antioch Dunes evening primrose

1 (Shepherd 2005). The species is known only from the Antioch Dunes, which is within the study area
2 (Figure 12-10) (California Department of Fish and Wildlife 2013).

3 **Delta Green Ground Beetle**

4 Delta green ground beetle typically occurs on the margins of vernal pools and in bare areas along
5 trails and roadsides, where individuals often hide in cracks in the mud and under low-growing
6 vegetation (U.S. Fish and Wildlife Service 2009a). The current known range of this federally listed
7 threatened species is in the area of Jepson Prairie, generally bound by Travis Air Force Base to the
8 west, State Route (SR) 113 to the east, Hay Road to the north, and Creed Road to the south (Arnold
9 and Kavanaugh 2007). Suitable habitat in the study area would be vernal pool complexes and annual
10 grasslands in the general Jepson Prairie area (Figure 12-11). There are six extant CNDDDB records for
11 delta green ground beetle throughout its range. One of these records occurs within the study area
12 within Jepson Prairie along the western edge of CZ 1 (California Department of Fish and Wildlife
13 2013). This record is actually a compilation of several observations from 1978 to 2002 (California
14 Department of Fish and Wildlife 2013). This general area is also critical habitat for delta green
15 ground beetle (45 FR 52807-52810). Portions of the Jepson Prairie Core Recovery Area lie within
16 the study area. The recovery plan calls for the protection of 100% of the delta green ground beetle
17 occurrences and 95% of the Jepson Prairie Core Recovery Area (U.S. Fish and Wildlife Service 2005).

18 **Callippe Silverspot Butterfly**

19 The callippe silverspot butterfly, which is listed as endangered under ESA, is found in grassy hills
20 surrounding San Francisco Bay that support the species' native host-plant, Johnny jump-ups.
21 Suitable habitats are typically in areas influenced by coastal fog with hilltops available for adult
22 congregation and mating. Preferred nectar flowers used by adults include thistles (blessed milk
23 thistle, and coyote wildmint). Other native nectar sources include hairy false goldeneaster, coast
24 buckwheat, mourning bride, and California buckeye. There are five extant records of callippe
25 silverspot in the CNDDDB (California Department of Fish and Wildlife 2013) for the San Bruno
26 Mountain population in San Mateo County, and several records for a second population in the
27 Cordelia Hills in western Solano County, part of which is in CZ 11 in the study area west of I-680
28 (U.S. Fish and Wildlife Service 2009b). Another area of potential habitat for the species (grassy hills
29 with Johnny jump-ups) in the study area is Potrero Hills (Figure 12-12). Suitable habitat has been
30 identified in this general area but the species has not been observed during surveys of portions of
31 Potrero Hills (Solano County 2005; Arnold pers. comm.). There is no critical habitat designated for
32 this species.

33 **California Red-Legged Frog**

34 The California red-legged frog is listed as threatened under ESA and is a California species of special
35 concern. Pools in perennial and seasonal streams and stock ponds provide potential breeding
36 habitat for this species. In addition to breeding habitat, the California red-legged frog also requires
37 upland non-breeding habitat for cover, aestivation, and migration and other movements. Potential
38 cover habitat consists of all aquatic, riparian, and upland areas that provide cover, such as animal
39 burrows, boulders or rocks, organic debris such as downed trees or logs, and industrial debris;
40 agricultural features such as drains, watering troughs, spring boxes, abandoned sheds, or hay stacks
41 may also be used (61 FR 25813). Incised stream channels with portions narrower and depths
42 greater than 18 inches also may provide important summer sheltering habitat (61 FR 25813).
43 Accessibility to cover habitat is essential for the survival of red-legged frogs within a watershed and

1 can be a factor limiting frog populations. Movement corridors may include annual grasslands,
2 riparian corridors, woodlands, and sometimes active agricultural lands (Fellers and Kleeman 2007).

3 There are 26 CNDDDB occurrences within the study area (California Department of Fish and Wildlife
4 2013) (Figure 12-13). There are also 3 non-CNNDB occurrences for this species in the study area.
5 Most of the occurrences are west of Clifton Court Forebay (CZs 7 and 8). Three of the occurrences of
6 California red-legged frog are west of Interstate-680 in CZ 11 and there is an additional occurrence
7 in a small creek south of Antioch in CZ 10. There are no other reported occurrences in the study
8 area. The study area represents the extreme eastern edge of the species' coastal range, which
9 extends westward and southward from the study area border into the grassland foothills of eastern
10 Contra Costa and Alameda Counties (see BDCP Appendix 2.A, *Covered Species Accounts*).

11 Approximately 2,460 acres of designated critical habitat for the California red-legged frog overlaps
12 with the study area along the western edge of CZ 11 in critical habitat unit SOL-1. An additional 862
13 acres of designated critical habitat is also present along the western edge of CZ 8 in critical habitat
14 unit ALA-2.

15 DHCCP conducted surveys for California red-legged frog from 2009–2011 in Contra Costa County in
16 CZ 8 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*)
17 and identified one juvenile and two adult California red-legged frogs near Clifton Court Forebay. Egg
18 masses and larvae were discovered at another location in the general vicinity of Clifton Court
19 Forebay. In 2010, four California red-legged frogs were identified at two sites in Contra Costa
20 County, but no evidence of reproduction was found at these sites. Larvae were found again at the
21 site where larvae had been identified in 2009, but they were not found at four newly surveyed sites.
22 California red-legged frog surveys were limited in 2011, with only four new parcels identified with
23 potential aquatic habitat available. No adult or juvenile California red-legged frogs were observed or
24 heard, and no larvae were detected during dipnetting at the surveyed locations (Appendix 12C).

25 **California Tiger Salamander**

26 California tiger salamander, which is listed as threatened under both ESA and CESA, is endemic to
27 California. Approximately 80% of the species' original vernal pool habitat has been lost across its
28 range. California tiger salamander modeled habitat is divided into aquatic habitat, which consists of
29 vernal pools the species uses for breeding, and terrestrial cover and aestivation habitat, which
30 consists of grasslands with burrows within 1.24 miles of breeding habitat and where California tiger
31 salamander live most of the year.

32 There are 20 CNDDDB records from the study area (California Department of Fish and Wildlife 2013).
33 There is also one non-CNNDB occurrence for this species in the study area. California tiger
34 salamander occurs within the study area in CZ 8 west of Clifton Court Forebay and in CZ 11 in the
35 Potrero Hills (Figure 12-14). Potential habitat exists in vernal pool habitats in Yolo and Solano
36 Counties (CZs 1, 2, and 3) west of Liberty Island and in the vicinity of Stone Lakes in Sacramento
37 County (CZ 4). DWR found California tiger salamander west of Clifton Court Forebay in the same
38 vicinity as several of the CNNDB (California Department of Fish and Wildlife 2013) records
39 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*).
40 There is also a small, isolated population near Manteca, south of Highway 120 in CZ 7.

41 Approximately 1,781 acres of designated critical habitat unit 2 (Jepson Prairie Unit) for California
42 tiger salamander overlap the study area in CZ 1. While this area is located within the Cache Slough
43 Complex, it is not expected to be affected by BDCP tidal habitat restoration actions.

1 Over 200 vernal pools were surveyed for amphibian species in the vicinity of Clifton Court Forebay
 2 and Stone Lakes NWR in 2009 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*
 3 *Environmental Data Report*). No California tiger salamander eggs were found. An additional 28
 4 vernal pools were surveyed later in the same year in Sacramento, San Joaquin, and Contra Costa
 5 Counties and no eggs were found. Three larvae were collected in 2009 at one of two sites where
 6 larval surveys were conducted in Contra Costa County. In 2010, one larva was found in the same
 7 pool as in 2009. However, no larvae were found in the other four sites surveyed. In 2011, larvae
 8 were detected at two ponds. One detection corresponded with a 2005 CNDDDB record and the other
 9 possibly matched with a 1982 record. However, the 2011 surveys were limited to larval dipnetting
 10 because land access was limited (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*
 11 *Environmental Data Report*).

12 **Giant Garter Snake**

13 The giant garter snake, which is listed as threatened under both ESA and CESA, resides in marshes,
 14 ponds, sloughs, small lakes, low-gradient streams, and other waterways, and in agricultural
 15 wetlands, including irrigation and drainage canals, rice fields, and the adjacent uplands (58 FR
 16 54053). Habitat requirements are: (1) adequate water during the snake's active season (early-spring
 17 through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as
 18 cattails and bulrushes, accompanied by vegetated banks for escape cover and foraging habitat
 19 during the active season; (3) basking habitat of grassy banks and openings in waterside vegetation;
 20 and (4) higher elevation uplands for cover and refuge from flood waters during the snake's winter
 21 dormant season (Hansen and Brode 1980, Hansen 1986; U.S. Fish and Wildlife Service 2012). In
 22 some rice-growing areas, giant garter snakes have adapted well to vegetated, artificial waterways
 23 and associated rice fields (Hansen and Brode 1993). The giant garter snake resides in small mammal
 24 burrows and soil crevices located above prevailing flood elevations throughout its winter dormancy
 25 period (U.S. Fish and Wildlife Service 2012). Burrows are typically located in sunny exposures along
 26 south- and west-facing slopes. Occurrence records indicate that giant garter snakes are currently
 27 distributed in 13 unique population clusters coinciding with historical flood basins, marshes,
 28 wetlands, and tributary streams of the Central Valley (Hansen and Brode 1980; Brode and Hansen
 29 1992; U.S. Fish and Wildlife Service 1999). These populations are isolated, without protected
 30 dispersal corridors to other adjacent populations, and are threatened by land use practices and
 31 other human activities, including development of wetland and suitable agricultural habitats. USFWS
 32 recognizes these 13 extant populations (58 FR 54053): Butte Basin, Colusa Basin, Sutter Basin,
 33 American Basin, Yolo Basin-Willow Slough, Yolo Basin-Liberty Farms, Sacramento Basin, Badger
 34 Creek-Willow Creek, Coldani Marsh, East Stockton Diverting Canal and Duck Creek, North and South
 35 Grassland, Mendota, and Burrell-Lanare. These populations extend from Fresno north to Chico and
 36 encompass 11 counties: Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano,
 37 Stanislaus, Sutter, and Yolo Counties.

38 There are 42 CNDDDB occurrences for giant garter snake in the study area in CZs 1, 2, 4, and 5 (Figure
 39 12-15) (California Department of Fish and Wildlife 2013). There are also 9 non-CNDDDB occurrences
 40 for this species in the study area (Hansen 2006, 2007, 2008, 2009). The study area includes 2 of the
 41 13 giant garter snake subpopulations identified in the draft recovery plan for this species: the two
 42 subpopulations are in the Yolo Bypass/Willow Slough (CZ 2) and Coldani Marsh/White Slough (CZ
 43 4) areas. Recent survey efforts suggest that extant giant garter snake populations continue to persist
 44 in these two subpopulations (Hansen 2011). While a few isolated records also occur within the
 45 Sacramento-San Joaquin Delta, surveys conducted since the mid-1980s suggest that much of the

1 Delta is unoccupied or supports few giant garter snakes. There have been recent sightings of giant
2 garter snake in the vicinity of Little Connection Slough and Empire Tract, approximately 6 miles
3 southwest of the Coldani Marsh/White Slough area (Hansen pers. comm.). These isolated records
4 also suggest that while giant garter snakes may have occupied this region at one time, longstanding
5 reclamation of wetlands for intense agricultural applications has eliminated most suitable habitat
6 (Hansen 1986) and prohibited the reestablishment of viable giant garter snake breeding
7 populations.

8 In 2009 DHCCP conducted surveys for giant garter snake in portions of the study area (Appendix
9 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). Despite an
10 intensive survey effort, no giant garter snake were observed or captured. Visual encounter surveys
11 were conducted on accessible parcels with suitable habitat in 2009 concurrently with either habitat
12 assessment reconnaissance surveys conducted in April and with trapping surveys conducted from
13 May through September. Trapping surveys were conducted on 97 parcels where 62 individual trap
14 lines were set for a total of approximately 42,700 trap-days. No additional trapping surveys for giant
15 garter snake were conducted in 2010. A limited number of visual encounter surveys were conducted
16 in spring 2010, and the species was not encountered. Following the 2009 trapping effort, giant
17 garter snake expert Eric Hansen began independently surveying one trap location 6 weeks after one
18 of DHCCP's traps had been removed and successfully captured more than one giant garter snake
19 (*Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*).

20 In 2009 and 2010, Eric Hansen (2011) surveyed the Coldani Marsh/White Slough area. Mr. Hansen
21 captured 27 individual giant garter snakes in the Upland Canal along the west and southwest edges
22 of the Coldani Marsh, which is an emergent tule marsh (Figure 12-15B). Giant garter snakes were
23 not captured or observed in any of the ponds or in any of the other emergent tidal marshes at the
24 White Slough Wildlife Area despite the close proximity and ample connectivity amongst habitats
25 (Hansen 2011). This might be partially due to the fact that Coldani Marsh differs from other densely
26 vegetated perennial marsh in the area in that tidal influence is strongly muted and there is limited
27 access for large aquatic predators such as largemouth and striped bass. Mr. Hansen noted that while
28 he did not have access to conduct surveys, several locations near the Coldani Marsh and Upland
29 Canal, including eastern Sycamore Slough, Dredger Cut, and Hog Slough contain promising habitat in
30 the study area.

31 **Western Pond Turtle**

32 The western pond turtle is a California species of special concern primarily found in natural aquatic
33 habitats. The species inhabits impoundments, irrigation ditches, and other artificial and natural
34 water bodies (Ernst et al. 1994). Western pond turtle is usually found in stagnant or slow-moving
35 freshwater habitats and sometimes in brackish habitats (Ernst et al. 1994). The western pond turtle
36 is uncommon in high gradient streams, most likely due to low water temperatures, rapid current
37 velocity, and few food resources (Jennings and Hayes 1994).

38 Historically, western pond turtles inhabited most water bodies throughout their range, but the
39 series of warm, shallow lakes and extensive slough systems that formerly covered most of the floor
40 of the Central Valley represented their optimal habitat (Jennings et al. 1992). Western pond turtles
41 are common throughout many parts of the Delta, including island interiors, particularly main
42 irrigation and drainage canals or ditches, including toe drains. The species has the potential to occur
43 along most of the slower-moving sloughs and other natural watercourses and in artificial channels

1 and other water bodies in the study area where essential habitat elements (streamside cover, logs
2 and other debris for basking, and adjacent upland habitats) are present (Figure 12-16).

3 Upland habitats are also important to western pond turtles for nesting, overwintering, and overland
4 dispersal (Holland 1994). Nesting sites may be 1,312 feet or more from the aquatic habitat, although
5 usually the distance is much less and generally around 328 feet (Jennings and Hayes 1994).
6 Dispersal habitat can be up to 1.86 miles from aquatic habitat but is typically less than 0.5 mile
7 away. Dispersal habitat is similar to upland nesting habitat types but also includes agricultural land.
8 Grasslands and riparian areas provide western pond turtle upland nesting and overwintering
9 habitat.

10 There are 62 reported occurrences for western pond turtle throughout the study area in CZs 3–11
11 (California Department of Fish and Wildlife 2013). DHCCP reported incidental observations for
12 western pond turtle during surveys for listed shrimp species and giant garter snake, but did not
13 specify exact locations (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*
14 *Environmental Data Report*).

15 **Silvery Legless Lizard, San Joaquin Coachwhip and Blainville’s Horned Lizard**

16 These three reptile species are California species of special concern and could occur in suitable
17 habitat in the study area: silvery legless lizard, San Joaquin coachwhip, and Blainville’s horned
18 lizard.

19 The silvery legless lizard is associated with a variety of vegetation types on sandy soils with
20 accessible moisture, primarily, but not exclusively, in semistabilized dunes. The species is
21 distributed in patches from Antioch southward along the coast, and to the foothills, San Joaquin
22 Valley, and southern Sierra Nevada. There are seven CNDDDB occurrences in CZ 10, and a probable
23 extinct occurrence in CZ 9 (California Department of Fish and Wildlife 2013)(Figure 12-17). The
24 occurrences were reported from 1966 to 2005; several of these may no longer be present because of
25 development and loss of habitat. One of the occurrences in CZ 10 is associated with inland dune
26 habitat at the Antioch Dunes NWR and may still be extant. The remaining locations are patchy and
27 fragmented by roads and development.

28 The San Joaquin coachwhip occurs in open habitats, including grasslands, savannas, open-canopy
29 scrub, and chaparral, with available rodent burrows for cover. The species ranges across the San
30 Joaquin Valley and associated foothills to the west and could occur in CZs 7 and 8 in upland habitat
31 in the southern portion of the study area around Clifton Court Forebay. There are no reported
32 occurrences in the study area. There are three occurrences within 2–5 miles of the study area west
33 of CZs 7 and 8 (Figure 12-17) (California Department of Fish and Wildlife 2013). Coachwhips could
34 be present in grassland and alkali seasonal wetland complex habitats in both of those CZs.

35 The Blainville’s horned lizard is associated with a variety of open habitats, including chaparral, oak
36 savanna, inland dunes, and grassland. The species is found primarily in areas with sandy, friable
37 soils, scattered shrubs, and abundant ant colonies (Figure 12-17). The species’ range covers most of
38 west-central and southwestern California below 8,000 feet elevation. There are 18 occurrences
39 within 1.3–15 miles of the study area (California Department of Fish and Wildlife 2013). The
40 Blainville’s horned lizard could occur in the stabilized dunes along the western water facilities
41 conveyance alignment in CZ 10, in the grasslands near Clifton Court Forebay (CZ 7 and 8), and north
42 of Stone Lake (CZ 4).

1 **California Black Rail**

2 California black rail, which is listed as threatened under CESA and which is a USFWS bird of
 3 conservation concern and a fully protected species under the Fish and Game Code, inhabits high
 4 elevation areas of tidal saltwater and brackish marshes and freshwater marshes in several areas of
 5 California and isolated locations in western Arizona (Eddleman et al. 1994). Approximately 80% of
 6 the California black rail subspecies resides in the San Francisco Bay (Evens et al. 1991). There are 40
 7 CNDDDB occurrences of California black rail in the study area (Figure 12-18). Most CNDDDB
 8 occurrences within the study area are from Suisun Marsh in CZ 11, though several occurrences have
 9 been reported in the central study area (California Department of Fish and Wildlife 2013). DHCCP
 10 black rail breeding season surveys detected two presumed nest sites in 2009, 24 presumed nest
 11 sites in 2010 and three presumed nest sites in 2011 (Appendix 12C, *2009 to 2011 Bay Delta*
 12 *Conservation Plan EIR/EIS Environmental Data Report*). The majority of presumed breeding rails
 13 were in CZ 6, but rails were also detected in CZs 4, 5, and 9. Natural communities in the study area
 14 containing suitable California black rail habitat are tidal brackish emergent wetland, tidal
 15 freshwater emergent wetland, alkali seasonal wetland complex, and managed wetland. Detailed
 16 information on California black rail can be found in BDCP Appendix 2.A, *Covered Species Accounts*.

17 **California Clapper Rail**

18 California clapper rail, which is listed as endangered under both ESA and CESA and which is a fully
 19 protected species under the Fish and Game Code, is found within the tidal channels and low
 20 elevation areas of salt and brackish marshes of the San Francisco Bay Area. Its distribution within
 21 the study area is restricted to Suisun Marsh in CZ 11 (Figure 12-19). However, tidal freshwater
 22 emergent wetlands west of Highway 160, which lie within CZ 5, may provide some isolated patches
 23 of suitable habitat. There are 14 CNDDDB occurrences of California clapper rail in the study area all in
 24 CZ 11 (California Department of Fish and Wildlife 2013). Detailed information on California clapper
 25 rail can be found in BDCP Appendix 2.A, *Covered Species Accounts*.

26 **California Least Tern**

27 California least tern, which is listed as endangered under both ESA and CESA and which is a fully
 28 protected species under the Fish and Game Code, occurs from the San Francisco Bay Area to the tip
 29 of the Baja California peninsula. There are two CNDDDB occurrences of California least tern in the
 30 study area (California Department of Fish and Wildlife 2013) (Figure 12-20). Nesting has been
 31 reported from two sites within the study area (CZ 11) in Suisun Marsh and at the Pittsburgh
 32 Generating Plant; nesting has also occurred in two other sites just outside the study area boundary.
 33 California least terns nest in loose colonies on barren or sparsely vegetated sandy or gravelly
 34 substrates above the high tide line along the coastline and in lagoons and bays of the California
 35 coast. In the San Francisco Bay Area and Suisun Bay, nesting colonies are typically located in
 36 abandoned salt ponds and along estuarine shores, often using artificially or incidentally created
 37 habitat (Rigney and Granholm 2005; Marschalek 2008). Overall, there is little to no natural nesting
 38 habitat available in the study area. While much of the tidal perennial aquatic habitat (open water) is
 39 suitable for tern foraging, current and any future nesting would be incidental and based on the
 40 availability and suitability of artificial features, such as gravel piles or unused gravel roads in the
 41 immediate vicinity of open water habitats. Suitable foraging habitat for California least tern is any
 42 tidal perennial aquatic habitat.

1 **Greater Sandhill Crane**

2 Greater sandhill cranes are winter residents in the study area, arriving during early September,
3 reaching maximum densities during December and January and departing during early March.
4 Portions of the study area are used regularly and by large numbers of greater sandhill cranes
5 (California Department of Fish and Wildlife 2013). Greater sandhill crane is a fully protected species
6 under the Fish and Game Code and listed as threatened under CESA. These lands make up what is
7 designated as the greater sandhill crane use area in the greater sandhill crane habitat model (see
8 BDCP Appendix 2.A, *Covered Species Accounts*). Sandhill cranes primarily forage in harvested row
9 crops (primarily grains such as corn) and tend to congregate in small to large flocks. In the study
10 area (Figure 12-21), foraging habitat consists mainly of harvested corn fields, followed by winter
11 wheat, irrigated pastures, alfalfa fields, and fallow fields (BDCP Appendix 2.A, *Covered Species*
12 *Accounts*). Mid-day loafing typically occurs in wetlands and flooded fields along agricultural field
13 borders, levees, rice checks, and ditches, and in alfalfa fields or pastures. Night roosting is in
14 shallowly flooded open fields and open wetlands interspersed with uplands. Sandhill cranes are
15 sensitive to human disturbance and only occur in agricultural areas that contain suitable crops
16 (BDCP Appendix 2.A, *Covered Species Accounts*).

17 **Lesser Sandhill Crane**

18 Lesser sandhill cranes do not breed in California but are winter residents and migrants in the study
19 area, arriving during early September and reaching maximum densities during December and
20 January and departing during early March (California Department of Fish and Wildlife 2013,
21 Littlefield 2008). Lesser sandhill crane is a California species of special concern and large numbers
22 of lesser sandhill cranes use portions of the study area regularly. Sandhill cranes primarily forage in
23 row crops (primarily grains, such as corn) and tend to congregate in small to large flocks. In the
24 study area, lesser sandhill crane foraging habitat is consistent with greater sandhill crane (although
25 the foraging values of crop types differ between the two subspecies) and consists mainly of
26 harvested corn fields, winter wheat, irrigated pastures, alfalfa fields, and fallow fields (Figure 12-
27 22). Mid-day loafing typically occurs in wetlands and flooded fields along agricultural field borders,
28 levees, rice checks, and ditches, and in alfalfa fields or pastures. Night roosting is in shallowly
29 flooded open fields and open wetlands interspersed with uplands. Sandhill cranes (both greater and
30 lesser) use similar roost sites and are both sensitive to human disturbance. Lesser sandhill cranes
31 are less traditional than greater sandhill cranes and are more likely to move between different roost
32 site complexes and different wintering regions. The wintering range is ten times larger than the
33 greater sandhill crane's and lesser sandhill crane's average foraging flight radius from roost sites is
34 twice that of greater sandhill cranes (Ivey pers. comm.).

35 **Least Bell's Vireo**

36 Least Bell's vireo is a state and federally endangered riparian obligate species whose potential
37 habitat within the study area is restricted to the valley/foothill riparian natural community. The
38 study area represents part of the center of the species' historical range, but least Bell's vireo has
39 been almost entirely absent from the study area since at least the 1970s due to widespread habitat
40 loss (Figure 12-23). There is one CNDDDB occurrence of Least Bell's vireo in the study area
41 (California Department of Fish and Wildlife 2013). A recent sighting in April 2010 of two singing
42 males in the Yolo Bypass Wildlife Area, and a second sighting of least Bell's vireo in the spring of
43 2011 suggests the species may have the potential to re-establish within the study area. Detailed
44 information on least Bell's vireo can be found in BDCP Appendix 2.A, *Covered Species Accounts*.

1 **Yellow Warbler**

2 Yellow warbler, California species of special concern and a USFWS bird of conservation concern, is a
 3 riparian obligate species which was once a common breeder in the Central Valley (Riparian Habitat
 4 Joint Venture 2004, Grinnell and Miller 1944). It's potential habitat within the study area is
 5 restricted to valley/foothill riparian habitats. The study area represents part of the center of the
 6 species' historical range. However, the species is largely extirpated as a breeder in the Sacramento
 7 Valley, the Delta and San Joaquin Valley because of widespread habitat loss (Riparian Habitat Joint
 8 Venture 2004). A single breeding pair was recorded in 2002 on the San Joaquin Wildlife Refuge
 9 (south of the study area) and the number of nesting territories has increased each year to 25
 10 territories in 2011 (Dettling et al. 2012). The increase in yellow warbler territories is largely
 11 attributed to the riparian habitat restoration within the refuge. Although there are no confirmed
 12 breeding accounts, the species has been documented in the study area over the breeding season
 13 within the past 10 years (California Department of Fish and Wildlife 2013) (Figure 12-24).

14 **Suisun Song Sparrow**

15 Suisun song sparrow, a USFWS bird of conservation concern and a California species of special
 16 concern, is endemic to the tidal marshes of Suisun Bay. Breeding habitat consists of tidal brackish
 17 emergent wetland and tidal freshwater emergent wetland in the study area west of Sherman Island.
 18 Managed wetlands, low marsh and upland transitional zones for high tide refugia constitute
 19 secondary habitat. Within the study area, the species occupies suitable habitat in the extreme
 20 western Delta and the Suisun Marsh (Figure 12-25). There are 25 CNDDDB extant occurrences of
 21 Suisun song sparrow from this portion of the study area (California Department of Fish and Wildlife
 22 2013). The hypothetical footprint for BDCP conservation activities overlaps with nine of these
 23 occurrences, all within Suisun Marsh in areas subject to tidal habitat restoration. Detailed
 24 information on Suisun song sparrow can be found in BDCP Appendix 2.A, *Covered Species Accounts*.

25 **Saltmarsh Common Yellowthroat**

26 Saltmarsh common yellowthroat is endemic to the greater San Francisco Bay region, with its eastern
 27 limits reaching to Alameda County and Suisun Bay (Gardali and Evens 2008). Breeding habitat
 28 consists of tidal brackish emergent wetland and tidal freshwater emergent wetland in the study area
 29 west of Sherman Island. Managed wetlands, low marsh and upland transitional zones for high tide
 30 refugia constitute secondary habitat. Within the study area, saltmarsh common yellowthroat
 31 occupies suitable habitat in the extreme western Delta and Suisun Marsh (Figure 12-26). The
 32 species is a USFWS bird of conservation concern and a California species of special concern. There
 33 are 17 CNDDDB extant occurrences of saltmarsh common yellowthroat in the study area: 13 in CZ 11
 34 and four in CZ 5 (California Department of Fish and Wildlife 2013). The hypothetical footprint for
 35 BDCP conservation components overlaps with five of these occurrences, all within Suisun Marsh in
 36 areas subject to tidal habitat restoration.

37 **Swainson's Hawk**

38 The Swainson's hawk, listed as a threatened species under CESA, is found in the study area mainly
 39 from early March through mid-September (see BDCP Appendix 2.A, *Covered Species Accounts*). It
 40 tends to nest in large trees, typically along stringers of riparian wooded vegetation, but also in
 41 roadside trees, rows or isolated trees in fields, or along field borders, small groves, farmyards, and
 42 residential rural areas (Estep 2007, 2008). Foraging takes place over the open country, historically
 43 grassland, but today Swainson's hawk forages mostly on irrigated cropland and pastureland. The

1 Swainson's hawk is closely associated with cultivated lands. Most of the study area consists of
 2 cultivated land and most is considered to have some value as foraging habitat for Swainson's hawk
 3 (see BDCP Appendix 2.A, *Covered Species Accounts*). However, the habitat value of crop types differ
 4 widely because of their growth and structure, which influences accessibility by foraging hawks, and
 5 because of prey abundance. There are 456 CNDDDB occurrences of Swainson's hawk in the study area
 6 (Figure 12-27) (California Department of Fish and Wildlife 2013). In addition, DHCCP and other
 7 surveys have detected 306 Swainson's hawk nests in the study area. Detailed information on
 8 Swainson's hawk can be found in BDCP Appendix 2.A, *Covered Species Accounts*.

9 **Tricolored Blackbird**

10 Tricolored blackbird is candidate for listing as endangered under CESA. They are a colonial nesting
 11 passerine that are largely restricted to California. More than 95% of the California breeding
 12 population of tricolored blackbirds occurs in the Central Valley (Kyle and Kelsey 2011). There are
 13 few reported historical nesting records of tricolored blackbirds nesting in the Plan Area (Neff 1937;
 14 Beedy et al. 1991). However, more recent surveys have documented occasional nesting colonies
 15 along the fringe of Suisun Marsh, in the Yolo Bypass, and along the southwestern perimeter of the
 16 Plan Area (see BDCP Appendix 2.A, *Covered Species Accounts*). While breeding colonies are
 17 uncommon, the Delta is recognized as a major wintering area for the species (Hamilton 2004, Beedy
 18 2008). Tricolored blackbirds nest colonially in large dense stands of freshwater marsh, riparian
 19 scrub, and other shrubs and herbs. Foraging habitat consists of grassland, managed wetlands,
 20 natural seasonal wetlands and diverse cultivated land cover types. Within the study area, modeled
 21 tricolored blackbird breeding and foraging habitat occur in all CZs (Figure 12-28). There are three
 22 CNDDDB occurrences of tricolored blackbird in the study area; one in CZ 1 and two in CZ 7 (California
 23 Department of Fish and Wildlife 2013). In addition, there are 48 occurrences from other surveys,
 24 including DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*
 25 *Environmental Data Report*). Detailed information on tricolored blackbird can be found in BDCP
 26 Appendix 2.A, *Covered Species Accounts*.

27 **Western Burrowing Owl**

28 The western burrowing owl is a California species of special concern and a year-round resident of
 29 the Central Valley and other portions of central California. In the study area, it is found mainly in
 30 grasslands and pasturelands west of the Sacramento River Deep Water Ship Channel in Yolo and
 31 Solano Counties, as well as along the study area's western edge from approximately
 32 Brentwood/Antioch to Tracy (Figure 12-29). Areas with greater densities of burrowing owls are
 33 mostly uncultivated, are less exposed to ground disturbances, and harbor larger and more stable
 34 populations of California ground squirrels (see BDCP Appendix 2.A, *Covered Species Accounts*). There
 35 are 144 CNDDDB occurrences of western burrowing owl in the study area (California Department of
 36 Fish and Wildlife 2013). In addition, DHCCP surveys and other surveys have documented 27
 37 occurrences of the species. All nests recorded during DHCCP surveys were in the southwest corner
 38 of the study area in alkali grassland-scrub habitat that is heavily disturbed, has extensive patches of
 39 bare ground, and has substantial ground squirrel activity. For more detail on western burrowing
 40 owl habitat requirements, see BDCP Appendix 2.A, *Covered Species Accounts*.

41 **Western Yellow-Billed Cuckoo**

42 Western yellow-billed cuckoo is a riparian obligate species whose habitat within the study area is
 43 restricted to valley/foothill riparian natural communities. Western yellow-billed cuckoo is proposed

1 for listing as threatened under ESA, a USFWS bird of conservation concern, and listed as endangered
2 under CESA. The historical distribution of western yellow-billed cuckoo extended throughout the
3 Central Valley, but the species is now widely extirpated, with less than 1% of suitable habitat
4 remaining in the Sacramento Valley. The remaining habitat lies between Colusa and Red Bluff.
5 Several migrating western yellow-billed cuckoo have been spotted within the study area, but most
6 of the suitable riparian habitat occurs in patches too small to support breeding pairs, and no
7 confirmed recent breeding records exist. The Riparian Bird Conservation Plan (Riparian Habitat
8 Joint Venture 2004) suggests that minimum patch size to benefit the species should be
9 approximately 50–100 acres, with a minimum width of 100 meters. There is one CNDDDB occurrence
10 of western yellow-billed cuckoo in the study area along the Stanislaus River in the southeastern
11 corner of the study area (California Department of Fish and Wildlife 2013)(Figure 12-30). In
12 addition, one occurrence was detected in DHCCP surveys but nesting was not confirmed (Appendix
13 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). For more detail
14 on western yellow-billed cuckoo habitat requirements, see BDCP Appendix 2.A, *Covered Species*
15 *Accounts*.

16 **White-Tailed Kite**

17 The white-tailed kite is a fully protected species under the Fish and Game Code and inhabits or uses
18 low-elevation open grasslands, savannah-like habitats, agricultural areas, wetlands, and oak
19 woodlands (Dunk 1995). There are seven CNDDDB records of white-tailed kite nests in the study area
20 (California Department of Fish and Wildlife 2013)(Figure 12-31). In addition, ten nests were
21 detected during DHCCP surveys; nine in 2009 and one in 2011 (Appendix 12C, *2009 to 2011 Bay*
22 *Delta Conservation Plan EIR/EIS Environmental Data Report*). Most white-tailed kites nest in the
23 Sacramento Valley are found in oak and cottonwood riparian forests, valley oak woodlands, or other
24 groups of trees and are usually associated with compatible foraging habitat consisting of low-
25 growing, herbaceous vegetation in patches of more than 1,500 square meters (Erichsen et al. 1996).
26 Pasture and hay crops, compatible row and grain crops, and natural vegetation such as seasonal
27 wetlands and annual grasslands provide foraging habitat for this species (Erichsen 1995). The
28 white-tailed kite is excluded from narrow bands of riparian vegetation by Swainson's hawks, and
29 therefore requires wide patches of nesting habitat where its range overlaps with the Swainson's
30 hawk. For more detail on white-tailed kite habitat requirements, see BDCP Appendix 2.A, *Covered*
31 *Species Accounts*.

32 **Yellow-Breasted Chat**

33 Yellow-breasted chat is a USFWS bird of conservation concern and a California species of special
34 concern. Yellow-breasted chat nest and forage in valley/foothill riparian habitat with a thick
35 understory shrub layer. Details of plant alliances that compose suitable yellow-breasted chat habitat
36 are provided in BDCP Appendix 2.A, *Covered Species Accounts*. There are no CNDDDB occurrences of
37 yellow-breasted chat from the study area (California Department of Fish and Wildlife 2013)(Figure
38 12-32). However, field surveys for the DHCCP documented 13 occurrences in 2009 surveys, nine in
39 2010, and 29 in 2011 during the breeding season, although no nests were confirmed (Appendix 12C,
40 *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). The National
41 Audubon Society (2008) also noted pairs of yellow-breasted chat at Liberty Island, Sherman Island
42 and Piper Slough in the central Delta. The hypothetical footprint for BDCP activities overlaps with
43 one of the DHCCP (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*
44 *Data Report*) occurrences on the north end of Sherman Island, an area subject to tidal habitat
45 restoration.

1 Cooper's Hawk and Osprey

2 Cooper's hawk and osprey are species on the CDFW watch list. In California, the year-round range of
 3 the Cooper's hawk includes most of the wooded portions of the state (Polite 2005). Osprey breed
 4 primarily in northern California from the Cascade Range to Lake Tahoe and south to Marin County.
 5 Their year-round range includes the northern and western portions of the Central Valley (Polite
 6 1995). Cooper's hawk and osprey are primarily riparian tree-nesting species, although both species
 7 will also nest on man-made structures or in urban areas. Despite their high frequency of use of man-
 8 made structure for nest sites, osprey rely on fish for 99% of their diet; therefore, osprey tend to nest
 9 in close proximity to water (Poole et al. 2002). While Cooper's hawk nest in dense stands of riparian
 10 forest (Polite 2005), osprey prefer more open stands or nest platforms (Poole et al. 2002). Within
 11 the study area, suitable Cooper's hawk and osprey nesting habitat exists in all CZs and consists of
 12 valley/foothill riparian habitat with an overstory component (Figure 12-33). There are no CNDDDB
 13 occurrences of Cooper's hawk or osprey nesting in the study area (California Department of Fish and
 14 Wildlife 2013. During DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
 15 *EIR/EIS Environmental Data Report*), observers recorded one Cooper's hawk nesting territory in CZ
 16 5 (although no nest was found) and three osprey nest sites at the south end of CZ 2. Two of the
 17 osprey nests were found, both on towers or poles.

18 Golden Eagle and Ferruginous Hawk

19 Golden eagle is a USFWS bird of conservation concern and is fully protected under the CDFW code.
 20 Ferruginous hawk is a USFWS bird of conservation concern. Golden eagles nest primarily on cliffs
 21 and hunt in nearby open habitats, such as grasslands, oak savannas, and open shrublands (Grinnell
 22 and Miller 1944) although trees are also used for nesting. There is limited suitable nesting habitat
 23 for golden eagles in the study area and there are no records of nesting with the exception of one
 24 CNDDDB occurrence on the western border of CZ 11 (California Department of Fish and Wildlife
 25 2013). Ferruginous hawks do not breed in California and there is no suitable nesting habitat in the
 26 study area. However, suitable foraging habitat occurs throughout the entire study area for both
 27 golden eagle and ferruginous hawk. The primary foraging habitat for golden eagle and ferruginous
 28 hawk is open, dry grassland habitats (Polite and Pratt 1999, Bechard and Schmutz 1995), but also
 29 includes similar cultivated lands such as grain and hay crops, recently plowed fields, and pastures
 30 (Figure 12-34). Three CNDDDB ferruginous hawk wintering occurrences have been recorded in the
 31 study area— one each in CZs 4, 8, and 11 (California Department of Fish and Wildlife 2013).

32 Cormorants, Herons, and Egrets

33 Tree-nesting waterbirds, specifically, double-crested cormorant, great blue heron, great egret,
 34 snowy egret, and black-crowned night heron, typically use rookeries (colonial nest sites) that often
 35 include interspecies nesting with other species in this group. These species have high fidelity to nest
 36 sites and, while most species need mature, riparian trees, rookeries for black-crowned night heron
 37 have also been located in riparian scrub (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
 38 *EIR/EIS Environmental Data Report*). Within the study area, suitable riparian habitat for rookeries
 39 occurs primarily along or within the Delta's rivers and sloughs on mid-channel islands (Figure 12-
 40 35) (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*).
 41 CNDDDB records showed occurrences of rookeries for double-crested cormorant (three in CZ 4 and
 42 one in CZ 5), great blue heron (one in CZ 4 and one in CZ 5) and great egret (both in CZ 4) in the
 43 study area (California Department of Fish and Wildlife 2013). In addition, DHCCP surveys conducted
 44 in 2009, observed cormorant, heron, and egret rookeries throughout the Delta. Eight double-crested

1 cormorant rookeries (representing more than 300 individuals) were detected throughout the Delta
 2 in riparian trees. All but one of the rookeries were located on instream islands or existing preserves.
 3 Six were adjacent to marsh, one was adjacent to grassland/scrub, and one was adjacent to alkali sink
 4 habitat. DHCCP surveyors also observed 19 great blue heron rookeries (representing more than 263
 5 individuals) in riparian trees adjacent to sloughs, rivers, or marshes throughout the Delta. Eleven of
 6 the rookeries were on instream islands, six were adjacent to marsh complexes, and two were
 7 adjacent to grasslands/scrub habitat. Of the eight rookeries not found on instream islands, six were
 8 on preserved lands. Eleven great egret rookeries (representing at least 271 individuals) were all
 9 recorded in riparian trees throughout the Delta. Six rookeries were found in marsh complexes, three
 10 on instream islands, one along a slough in alkali sink scrub habitat, and one was in a farm complex
 11 (adjacent to an apparent marsh/slough remnant). All six rookeries adjacent to marsh were on
 12 preserved lands. Four snowy egret rookeries (representing eight individuals) were detected in the
 13 north Delta in riparian trees on preserved lands adjacent to or in marsh complexes. None were
 14 observed nesting on instream islands. Four black-crowned night heron rookeries (representing 12
 15 herons) were also detected. Two were located in riparian scrub in the south Delta near Clifton Court
 16 Forebay. The other two were located in riparian trees north and south of Walnut Grove.

17 **Short-Eared Owl and Northern Harrier**

18 Short-eared owl and northern harrier are marsh-associated ground nesting birds and are both
 19 California species of special concern. In California, the short-eared owl occurs either as a resident or
 20 as a winter visitor. The breeding range is patchily distributed throughout the state, including
 21 portions of the Sacramento and San Joaquin Valleys, northeastern California, and a few scattered
 22 coastal sites (Roberson 2008). The northern harrier is a year-round resident in California and its
 23 breeding range covers northern California, the central valley, the central coast, and portions of
 24 southern deserts (Davis and Niemela 2008). Breeding and foraging habitat for short-eared owl and
 25 northern harrier in the study area includes wetland natural communities, grasslands, and grassland-
 26 like cultivated lands such as pastures and alfalfa fields (Figure 12-36). There is one CNDDDB
 27 occurrence of short-eared owl in the study area, in CZ 11 (California Department of Fish and Wildlife
 28 2013). Grizzly Island in Suisun Marsh supports the only known breeding population of short-eared
 29 owl in the study area, although small numbers have been documented episodically at the Cosumnes
 30 River Preserve and in Byron in Contra Costa County. DHCCP surveyors did not detect short-eared
 31 owl nesting in the central Delta. There are no CNDDDB occurrences of northern harrier in the study
 32 area (California Department of Fish and Wildlife 2013). However, northern harrier nests were
 33 detected during DHCCP surveys (20 nests in 2009, 5 nests in 2010, and 15 nests in 2011; Appendix
 34 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*), and there is
 35 suitable nesting and foraging habitat throughout the study area. No nesting northern harriers were
 36 observed in the north Delta during DHCCP surveys, although individuals were commonly observed
 37 there throughout the nesting season.

38 **Redhead, Tule Greater White-Fronted Goose, and Cackling (Aleutian Canada) Goose**

39 Redhead is a California species of special concern. The year-round range of redhead includes the
 40 Central Valley, northeastern California and Southern California. Suitable breeding habitat for
 41 redhead in the study area is in managed wetlands and nontidal freshwater emergent wetlands
 42 (Beedy and Deuel 2008, Granholm 2008, Figure 12-37). Redhead nests were not detected during
 43 DHCCP surveys (2009–2011), nor are there any CNDDDB occurrences of breeding redhead in the
 44 study area (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data*
 45 *Report*; California Department of Fish and Wildlife 2013). However, small numbers of redhead nest

1 in private duck clubs and public refuges where summer water levels are greater than 1 meter deep
 2 (Beedy and Deuel 2008). The Tule greater white-fronted goose is a California species of special
 3 concern. The nesting range is in southern Alaska, but the species winters in the Central Valley,
 4 primarily in the Sacramento, Delevan and Colusa NWRs in the Sacramento Valley, in addition to duck
 5 clubs and rice fields in the Sacramento Valley and Suisun Marsh (Duel and Takekawa 2008). Impact
 6 analysis for these species is discussed within the shorebirds and waterfowl sections, in Impacts BIO-
 7 178 through BIO-183.

8 **Mountain Plover**

9 The mountain plover is a California species of special concern, a USFWS bird of conservation
 10 concern and is proposed threatened under ESA. The Central Valley is one of a few key wintering
 11 areas for the Mountain Plover (Hickey et al. 2003). Suitable habitat for mountain plover includes
 12 heavily grazed grassland, short hay crops such as alfalfa, freshly tilled fields, and alkali flats (Knopf
 13 and Rupert 1995; Hunting and Edson 2008). There are two CNDDDB occurrences of mountain plover
 14 in the west tail of the study area along Flannery Road and this is a traditional wintering area for the
 15 species. Suitable habitat exists in all CZs, and there are records of mountain plover outside of the
 16 study area adjacent to CZ 1 (Figure 12-38) (California Department of Fish and Wildlife 2013).

17 **Black Tern**

18 Black tern is a California species of special concern that historically bred in freshwater marshes and
 19 in the Central Valley. Their current breeding range overlaps with the northern tip of the study area,
 20 and suitable nesting habitat for black tern includes rice fields, flooded cultivated lands, and short
 21 emergent wetlands (Shuford 2008). Although, there are no confirmed CNDDDB occurrences of
 22 breeding black tern in the study area (California Department of Fish and Wildlife 2013), the species
 23 has been documented in rice fields in the Sacramento Valley and Yolo Basin. Suitable nesting habitat
 24 for black tern in the study area consists of freshwater wetlands and rice fields in CZ 2 (Figure 12-
 25 39).

26 **California Horned Lark and Grasshopper Sparrow**

27 The grasshopper sparrow is a California species of special concern. The species breeding range in
 28 California is fragmented throughout the state west of the Cascade-Sierra Nevada Crest (Dobkin and
 29 Granholm 2008, Vickery 1996). The species nest in shorter, moderately grazed open grasslands but
 30 have also been recorded in grassland-like cultivated lands such as alfalfa (Unitt 2008, Grinnell and
 31 Miller 1944). In the Central Valley, loss of native and nonnative grassland through agriculture and
 32 urbanization have further fragmented grasshopper sparrow's patchy breeding distribution (Unitt
 33 2008).

34 The CNDDDB reports one occurrence of grasshopper sparrow in the study area, in CZ 11 (California
 35 Department of Fish and Wildlife 2013) (Figure 12-40). In addition, five active grasshopper sparrow
 36 nests were detected during DHCCP surveys in 2009 (Appendix 12C, *2009 to 2011 Bay Delta
 37 Conservation Plan EIR/EIS Environmental Data Report*). The California horned lark is on the CDFW
 38 watch list. The year-round range of the California horned lark encompasses the majority of the state
 39 west of the Cascade-Sierra Nevada Crest (Green 2007) and it is common to abundant in open
 40 grasslands and similar habitats including alfalfa, fallow fields and pastures. Suitable breeding habitat
 41 for California horned lark exists throughout the study area, particularly in the western tail and in the
 42 alkali sink habitat in the study area's southern portion (Figure 12-40).

1 **Least Bittern and White-Faced Ibis**

2 Least bittern is a California species of special concern and a USFWS bird of conservation concern.
 3 The white-faced ibis is on the CDFW watch list. There are no CNDDDB occurrences of breeding least
 4 bittern or white-faced ibis in the study area (Figure 12-41) (California Department of Fish and
 5 Wildlife 2013). However, there are recent breeding season records of least bittern near Freeport (CZ
 6 4), in the Yolo Bypass (CZ 2), and on Joice Island in Suisun Marsh (CZ 11) (Sterling 2008). In
 7 addition, there was one unconfirmed breeding least bittern occurrence in the Stone Lakes NWR
 8 during 2010 DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*
 9 *Environmental Data Report*). Breeding white-faced ibis have been recorded in the Yolo Bypass
 10 Wildlife Area (CZ 2), but are not expected to breed in the remainder of the study area (Figure 12-
 11 41). Freshwater and brackish marshes with tall emergent vegetation and managed wetlands
 12 (Sterling 2008) in the northern part of the Plan Area (limited to CZ 2, CZ 4, and CZ 11) provide
 13 suitable breeding habitat for least bittern whereas white-faced ibis breeding habitat is limited to
 14 freshwater emergent and managed wetlands (Granholm 2005).

15 **Loggerhead Shrike**

16 The loggerhead shrike is a California species of special concern and a USFWS bird of conservation
 17 concern. Loggerhead shrikes use a variety of open grasslands across their range, including
 18 grasslands, desert scrub, shrub-steppe, and open savannah (Yosef 1996). Loggerhead shrikes nest in
 19 shrubs and trees surrounded by open habitat. In the Central Valley, loggerhead shrikes show a
 20 positive association with grasslands, irrigated pasture, and grain and hay crops (Pandolfino and
 21 Smith 2012) but have also been detected in alkali seasonal wetland (Figure 12-42). Loggerhead
 22 shrikes in the Central Valley were shown to have neither a positive or negative association with row
 23 crops (Pandolfino and Smith 2012). However, because so little is known about the species in
 24 California, these were included as low-value habitat because they may provide foraging
 25 opportunities for loggerhead shrike. There are two CNDDDB occurrences of loggerhead shrike in the
 26 study area: one in CZ 7 and one in CZ 9 (California Department of Fish and Wildlife 2013). In
 27 addition, 10–15 active loggerhead shrike nests were detected during DHCCP surveys in 2009 and
 28 2011, respectively around the Clifton Court Forebay in CZ 8 (Appendix 12C, *2009 to 2011 Bay Delta*
 29 *Conservation Plan EIR/EIS Environmental Data Report*).

30 **Song Sparrow “Modesto” Population**

31 Song sparrow “Modesto” population (hereafter referred to as Modesto song sparrow), is ubiquitous
 32 in the Delta and nests throughout the study area. The Modesto song sparrow, a state species of
 33 special concern, was a valid subspecies until 2001 and may be again after additional taxonomic
 34 analysis (Gardali 2008). The population is endemic to the north-central portion of the Central Valley
 35 and the Bay-Delta is one of two areas with the highest population densities. There are no CNDDDB
 36 records of Modesto song sparrow in the study area. However, surveyors detected more than 2,000
 37 occurrences during DHCCP surveys in 2009, 2010, and 2011 (Appendix 12C, *2009 to 2011 Bay Delta*
 38 *Conservation Plan EIR/EIS Environmental Data Report*). Little is known about the specific habitat
 39 requirements for the Modesto song sparrow (Gardali 2008). However, emergent marsh and riparian
 40 scrub provide breeding habitat (Grinnel and Miller 1944, Figure 12-43), In addition, the species has
 41 been observed to nest in valley oak riparian forests with a dense blackberry understory, vegetated
 42 irrigation canals and levees, and recently planted Valley Oak restoration sites (Gardali 2008).

1 **Bank Swallow**

2 The bank swallow is a threatened species under CESA. Bank swallows are a colonial-breeding
3 migrant, arriving in California in mid-March and departing for their wintering grounds by August
4 (California Department of Fish and Game 1992, Garrison 2004). Approximately 75% of the breeding
5 population in California occurs along the Sacramento and Feather Rivers, upstream of the Plan Area
6 where nesting habitat is threatened by flood control and bank protection (California Department of
7 Fish and Game 1992). Bank swallows require fine textured sandy soils and create their burrows in
8 vertical banks along rivers, streams, or other water. The species is dependent on bank erosion from
9 high winter river flows to create suitable burrow substrate (Garrison 1999, Garrison 2004, Moffat et
10 al. 2005). There are three CNDDDB records of bank swallow colonies in the study area, two at the
11 northern end of the study area in CZ 2 (one colony with an estimated 120 burrows, and one colony
12 with an estimated 20 burrows), and one on Brannan-Andrus Island in CZ 5 with unknown colony
13 size (California Department of Fish and Wildlife 2013). DHCCP surveys for bank swallow were
14 conducted in selected areas within the Plan Area during 2008, but suitable habitat for bank swallow
15 was not encountered and no bank swallows were detected (Appendix 12C, *2009 to 2011 Bay Delta
16 Conservation Plan EIR/EIS Environmental Data Report*). There is little to no other nesting habitat
17 available in the study area (Figure 12-44). The majority of potential habitat for bank swallow in the
18 study area is covered in rip rap for bank stabilization, or is made of unsuitable substrate for bank
19 swallow colonies to form.

20 **Yellow-Headed Blackbird**

21 Yellow-headed blackbird is a California species of special concern. Within the study area, suitable
22 yellow-headed blackbird breeding habitat includes freshwater emergent wetlands, while associated
23 foraging habitat includes irrigated pastures and alfalfa fields (Twedt and Crawford 1995, Jamarillo
24 2008, Figure 12-45). There are two CNDDDB occurrences from the 1800s of yellow-headed blackbird
25 in the study area; one in CZ 7, which is no longer freshwater marsh habitat, and one in CZ 3
26 (California Department of Fish and Wildlife 2013). In addition, four confirmed yellow-headed
27 blackbird occurrences were detected in the south central Delta during 2009 and 2010 DHCCP
28 surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data
29 Report*) but breeding was not confirmed for the species.

30 **Riparian Brush Rabbit**

31 The riparian brush rabbit, which is listed as endangered under both ESA and CESA, is a riparian
32 obligate species found in association with a dense shrub layer typically located under an open
33 canopy of valley oaks (Williams et al. 2008). Brush rabbits are dependent on brushy understory
34 cover for protection and use tunnels beneath dense vegetation to avoid predators (Orr 1940,
35 Chapman 1971). Populations of the riparian brush rabbit are known to have occurred historically in
36 riparian forests along the San Joaquin and Stanislaus Rivers and some tributaries to the San Joaquin
37 River (U.S. Fish and Wildlife Service 1998). As a result of habitat loss and fragmentation, the species
38 has since been reduced to populations in only two areas: an approximately 258-acre patch in
39 Caswell Memorial State Park on the Stanislaus River, immediately southwest of the study area; and
40 several small, isolated or semi-isolated patches totaling approximately 270 acres along Paradise Cut
41 and Tom Paine Slough and channel of the San Joaquin River in the south Delta, within CZ 7 in the
42 study area (Figure 12-46) (Williams et al. 2002 and 2008). Recently, on October 11, 2012, a single
43 female riparian brush rabbit was captured near Durham Ferry Road in riparian habitat along the
44 San Joaquin River between Caswell MSP and Lathrop (Bradbury pers. comm.). This is only the 2nd

1 naturally occurring population documented outside of Caswell MSP. The study area consists of a
2 large proportion of the species' total range (see BDCP Appendix 2.A, *Covered Species Accounts*).

3 DWR conducted surveys for both the riparian brush rabbit and riparian woodrat (described below)
4 in the Plan Area (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*
5 *Data Report*) during 2008 and 2009. A total of 296 parcels were surveyed over the three field
6 seasons, but neither species was captured during three seasons of trapping. Access restrictions
7 limited the number of sites with high-value habitat available for survey. From intensive field work in
8 the Stewart Tract area (since 1998) and in other nearby areas (Caswell Memorial State Park,
9 Buffington Tract, Faith Ranch, San Joaquin River NWR) over the past 10–30 years, there is every
10 reason to believe that one or both species are also present in similar habitat at the southern end of
11 the study area. Populations of riparian brush rabbit are present in these more southern areas of the
12 study area, where the California State University, Stanislaus, Endangered Species Recovery Program
13 and its federal and state partner agencies have initiated a captive propagation and reintroduction
14 program for the species using breeders from the Stewart Tract area. In addition, since 2003, 30
15 brush rabbits have been captured at the San Joaquin River NWR and many more have been captured
16 at Caswell Memorial State Park. It is believed that there is a greater probability of documenting
17 riparian brush rabbit and perhaps riparian woodrat in areas south of SR 4 and SR 12 (mostly in San
18 Joaquin County) than in central and northern parts of the study area; however, these species could
19 be present in the central and northern parts of the study area.

20 **Riparian Woodrat**

21 The riparian woodrat, which is listed as endangered under ESA and as a California species of special
22 concern, is a riparian obligate species whose typical habitat includes a canopy of valley oak and a
23 moderate to dense shrub understory with abundant dead branches and downed woody material
24 (Williams 1986).

25 There are three extant CNDDDB riparian woodrat occurrences in the species' range, none of which are
26 in the study area (California Department of Fish and Wildlife 2013). The current known range of the
27 species is confined to a small area in northern San Joaquin County immediately south of the study
28 area, with the nearest known extant CNDDDB occurrence approximately 1.5 to 2 miles to the
29 southeast of CZ 7, in Caswell State Park (Figure 12-47). An additional extant population might occur
30 just outside the study area, near Vernalis along the San Joaquin River, although there have been no
31 sightings of the species at this location since the 1970s (Williams and Kilburn 1992). Based on the
32 proximity of these occurrences, the riparian woodrat potentially occurs in suitable habitat in the
33 study area, in CZ 7, or could occupy this area in the future (see BDCP Appendix 2.A, *Covered Species*
34 *Accounts*). See riparian brush rabbit discussion above for information on DHCCP survey results for
35 riparian woodrat and potential for occurrence in the study area.

36 **Salt Marsh Harvest Mouse**

37 Salt marsh harvest mouse is endemic to salt marshes of San Francisco, San Pablo, and Suisun Bays.
38 Salt marsh harvest mouse, which is listed as endangered under both ESA and CESA and which is a
39 fully protected species under the Fish and Game Code, is found primarily in tidal brackish emergent
40 wetlands dominated by pickleweed. The species is also known to use areas of managed wetland. In
41 Suisun Marsh it is known to use areas of tidal wetlands and managed wetland. Areas containing
42 mixed wetland vegetation appear to be just as preferable to salt marsh harvest mouse as areas
43 dominated by pickleweed (Sustaita et al 2011). The species also requires escape cover during high
44 tides, which has been modeled as upland habitat within 150 feet of the wetted edge, which may

1 include areas of grassland, valley/foothill riparian and some areas mapped as alkali seasonal
2 wetlands. The species distribution within the study area is thought to extend from Suisun Marsh
3 eastward along the northern edge of the Sacramento River and eastward along the southern edge of
4 the San Joaquin River as far east as the vicinity of Collinsville and Antioch west of Sherman Island
5 (LSA Associates 2007) (Figure 12-48). There are 137 extant records for salt marsh harvest mouse
6 across its range, 48 of which occur within the study area (California Department of Fish and Wildlife
7 2013).

8 **San Joaquin Kit Fox**

9 The San Joaquin kit fox, which is listed as endangered under ESA and threatened under CESA, is
10 restricted to modeled grassland habitat along the study area's southwestern edge in CZs 7-10. The
11 study area represents the extreme northeastern corner of the species' range in California, which
12 extends westward and southward from the Plan Area border. The northern range of the San Joaquin
13 kit fox (including the study area) was most likely marginal habitat historically and has been further
14 degraded due to development pressures, habitat loss, and fragmentation (Clark et al. 2007a).
15 CNDDDB (California Department of Fish and Wildlife 2013). reports twelve occurrences of San
16 Joaquin kit foxes along the extreme western edge of the Plan Area within CZ 8, south of Brentwood
17 (Figure 12-49). However, Clark et al. (2007b) provide evidence that a number of CNDDDB
18 occurrences in the northern portion of the species' range may be coyote pups misidentified as kit
19 foxes. Smith et al. (2006) suggest that the northern range may possibly be a population sink for the
20 San Joaquin kit fox.

21 In the vicinity of the study area, San Joaquin kit foxes inhabit grazed grasslands and grasslands with
22 associated wind farms. The species also sometimes occurs adjacent to and forages in tilled and
23 fallow fields and irrigated row crops (Bell 1994). Remaining patches of northern hardpan vernal
24 pool, northern claypan vernal pool, alkali meadow, and alkali playa types also provide foraging
25 habitat when in association with grasslands or other suitable denning habitats.

26 Dens are typically in relatively flat terrain or in gently sloping hills, washes, drainages, and roadside
27 berms. Occupied habitats are usually associated with loose-textured soils to facilitate den
28 construction (Grinnell et al 1937, Egoscue 1962, Morrell 1972). Shallow soils with close proximity to
29 bedrock, soils with high water tables, and impenetrable hardpan layers are generally avoided
30 (Morrell 1972, O'Farrell and Gilbertson 1979, O'Farrell et al. 1980, McCue et al. 1981). Kit foxes will
31 also modify burrows dug by other animals, such as California ground squirrel.

32 **Suisun Shrew**

33 Suisun shrew, a California species of special concern, is typically found in dense, low-lying
34 vegetation in tidal marshes. It uses adjacent upland habitats as refugia during prolonged flooding.
35 Suisun shrew is currently found along the northern borders of San Pablo and Suisun bays and in
36 Suisun Marsh, Southampton Marsh, the Napa Marshes, and as far east as Grizzly Island (Figure 12-
37 50). The species distribution in the study area is limited to the general Suisun Marsh area and its
38 modeled habitat in the Plan Area consists of tidal brackish emergent wetland and grassland areas
39 within 150 feet of the wetted edge. There are 15 extant records for Suisun shrew across its range, six
40 of which occur within the study area (California Department of Fish and Wildlife 2013).

Special-Status Bat Species

There is potential for at least thirteen different bat species to be present in the study area (Figure 12-51), including four California species of special concern and nine species ranked from low to moderate priority by the Western Bat Working Group (1998) (Table 12A-2 in Appendix 12A, *Special-Status Species with Potential to Occur in the Study Area*). In 2009, DHCCP conducted a large-scale effort that involved habitat assessments, bridge surveys, and passive acoustic monitoring surveys for bats. No surveys were conducted in 2010. With the availability for access to new parcels, additional habitat assessments were conducted in 2011. The results are summarized briefly below (see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report* for details on methods and results, and Table 12A-2 in Appendix 12A).

DHCCP positively identified nine special-status bat species and detected potential calls of two additional special-status bat species (pallid bat and canyon bat) that could not be confirmed with 90% confidence (Table 12-5). Two other bats, the western mastiff bat and Townsend's big-eared bat, were not detected during the DHCCP surveys but have potential to occur in the study area.

Table 12-5. Bat Species Identified from Acoustic Monitoring at 20 Locations in 10 Habitat Types

Habitat Type	Number of Parcels (N)	Species of Special Concern		Common Species									Total Bat Species (Confirmed and Potential)
		Western Red	Pallid	Yuma Myotis	California Myotis	Canyon Bat	Western Small-Footed Myotis	Little Brown Myotis	Big Brown	Silver-Haired	Hoary	Mexican Free-Tailed	
Grassland/Disturbed	3	P ^a		X ^b				X	X		X	X	6
Grassland/Riparian Scrub	1			X	X		X	X	X			X	6
Agriculture	3	X		X	P	P	P	X	X		X	X	9
Vineyard	1	X	P	X	X	P		X	P	P	X	X	10
Residential	1	X		X	X		X	X	X	P	P	X	9
Orchard	1	X	P	P	X	P	X		P		X	X	9
Riparian Forest	5	X		X	X	P	X	X	X	P	X	X	10
Oak Forest with Slough	2	P		X	X	P	X	X	X	P	P	X	10
Wetland	2	X		X	X		X	X	X		X	X	8
Eucalyptus	1	X	P			P		X		X	X	X	7

Source: Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*.

^a Potential call of this species but lacks species-distinguishing characteristics.

^b Confirmed bat species with at least 90% confidence.

X = confirmed.

P = potential.

The majority of the parcels assessed during 2009 and 2011 contained bat foraging and roosting features and were considered highly suitable habitat. Nearly all of the highly suitable parcels contained wetlands, channels, sloughs, ponds, or irrigation ditches associated with agricultural land

1 uses. Nearly all of the highly suitable parcels also contained large trees, buildings, barns, or sheds
 2 that could support roosting bats. At the time of the 2009 field surveys, evidence of bat presence
 3 (bats, guano, urine staining, odor, or vocalizations) was observed on the undersides of 32 of the 145
 4 existing bridges in the study area. Bats were observed under six of the bridges including four
 5 bridges with Mexican free-tailed bats and two bridges with unidentified bat species. One of the
 6 bridges, over the Yolo Causeway, was used by approximately 10,000 Mexican free-tailed bats,
 7 indicating a maternity roost. A second roost site of about 50 unidentified species was observed
 8 under a bridge in eastern Solano County. Surveyors found guano that was segmented at two
 9 potential night roost locations underneath concrete box beam bridges that spanned large flowing
 10 waterways. Segmented guano could indicate the presence of Townsend's big-eared bat, which was
 11 not confirmed. Neither of these bridges would provide day or maternity roosting for Townsend's
 12 big-eared bats.

13 **Bat Species Detected in the Study Area**

- 14 ● **Big brown bat:** Occurs throughout California. Roosts opportunistically in buildings, bridges,
 15 palm thatch, snags, tree hollows and in rock crevices. Forages over wide range of habitats. This
 16 species was detected in the Plan Area in 2009 (Appendix 12C, *2009 to 2011 Bay Delta*
 17 *Conservation Plan EIR/EIS Environmental Data Report*).
- 18 ● **California myotis:** Roosts alone or in small groups in crevices and cavities in trees and rocks;
 19 occasionally roosts in human structures. Maternity colonies of up to 52 individuals have been
 20 documented in large snags and under tree bark. Forages over a variety of habitats, including arid
 21 habitats, open lands, forest canopies, forest margins, and water. This species was detected in the
 22 Plan Area in 2009 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*
 23 *Environmental Data Report*).
- 24 ● **Hoary bat:** Ranges widely, but populations in the Central Valley are most likely migratory, not
 25 reproductive. Typically roosts alone in a variety of broadleaf tree species such as cottonwood
 26 and sycamore; also found roosting in conifers. May be found in a range of vegetation and roost
 27 substrates during migration. This species was detected in the Plan Area in 2009 (Appendix 12C,
 28 *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). Documented
 29 occurrence during migration in the Montezuma Hills, adjacent to study area (Sacramento
 30 Municipal Utility District 2010). There are four CNDDDB (2013) recorded occurrences.
- 31 ● **Little brown myotis:** Roosts opportunistically in a variety of structures from trees to buildings.
 32 Forages in a range of habitats, but typically over water. Likely fall latitudinal or elevational
 33 migrant to colder areas with caves of suitable temperature regime for hibernation. This species
 34 was detected in the Plan Area in 2009 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
 35 *EIR/EIS Environmental Data Report*).
- 36 ● **Mexican free-tailed bat:** Roosts in large colonies in bridges and buildings in the Central Valley;
 37 breeding colonies may be concentrated in relatively few sites. Also roosts in caves, rock crevices,
 38 mines and tunnels. Forages over a range of habitats. One of the larger known breeding colonies
 39 in California occurs under the I-80 bridge in the Yolo Bypass. This species was detected in the
 40 Plan Area under four bridges 2009 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
 41 *EIR/EIS Environmental Data Report*).
- 42 ● **Silver-haired bat:** Typically roosts in tree cavities, crevices and under loose bark. May also use
 43 leaf litter, buildings, mines and caves. Breeds in coastal and montane coniferous forests, valley
 44 foothill woodlands, pinyon-juniper woodlands, and valley foothill and montane riparian

1 habitats; may occur in any habitat during migration. Breeding range does not include the Delta,
 2 which lacks suitable habitat; only a few scattered breeding locations are known in the San
 3 Francisco Bay Area, Central Valley, or central coast, all outside of the legal Delta. May occur
 4 throughout California during migration. This species was detected in the Plan Area in 2009
 5 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*).
 6 Documented occurrence in the Montezuma Hills, adjacent to the study area (Curry et al. 2010).

- 7 ● **Western red bat:** Historically used old-growth riparian habitat. Highly tied to riparian
 8 vegetation for all life stages. Red bats use riparian and associated habitat (orchards) for all of
 9 their life stages, including roosting and feeding in riparian zones. Mature riparian broadleaf
 10 forest in the Central Valley is primary summer breeding habitat for the species in California
 11 (females and pups). Riverside orchards may also be used as maternity roosts. Roosts alone or in
 12 small family groups in tree foliage and occasionally in shrubs; prefers habitat edges and mosaics
 13 with trees that are protected from above and open below with open areas for foraging, including
 14 grasslands, shrublands, and open woodlands. Documented foraging in most habitat types in the
 15 Delta; roosting documented in the Delta in Brannan Island State Recreation Area near the
 16 central portion of the western conveyance alignment in 2009 (Appendix 12C, *2009 to 2011 Bay
 17 Delta Conservation Plan EIR/EIS Environmental Data Report*). Occurrence documented during
 18 the fall in the Montezuma Hills (Sacramento Municipal Utility District 2010). Acoustical records
 19 during maternity season at several locations within the planning area (Pierson et al. 2006).
 20 There are six CNDDDB (2013) recorded occurrences in the study area.
- 21 ● **Western small-footed myotis:** Particularly associated with coniferous forests and rocky xeric
 22 habitats. Typically roosts in rock crevices in mines, caves, and occasionally in buildings, bridges
 23 and other human structures. Forages over a variety of habitats. This species was detected in the
 24 Plan Area in 2009 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS
 25 Environmental Data Report*).
- 26 ● **Yuma myotis:** Strongly associated with water sources. Roosts in a variety of structures,
 27 including bridges, buildings, caves, mines, trees and rock crevices. Has been known to roost in
 28 cliff swallow nests. Typically forages low over water. This species was detected in the Plan Area
 29 in 2009 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data
 30 Report*).

31 ***Bat Species with Potential to Occur in the Study Area***

- 32 ● **Canyon bat:** Found in arid habitats throughout California and in lower elevation montane
 33 forests with significant rocky areas. Typically roosts in or under rocks, in crevices in cliffs, rocky
 34 slopes or scattered boulders. Unsubstantiated records of roosting in burrows. Could occur in the
 35 Delta but not expected in significant numbers because of limited suitable habitat. Potential calls
 36 identified during DHCCP 2009 acoustic surveys (Appendix 12C, *2009 to 2011 Bay Delta
 37 Conservation Plan EIR/EIS Environmental Data Report*).
- 38 ● **Pallid bat:** Occurs in deserts, grasslands, shrublands, woodlands, and forests; most common in
 39 open, dry habitats; typically roosts in rock crevices, also in tree hollows, bridges, and buildings,
 40 in colonies ranging from one to more than 200 individuals. May roost and forage throughout the
 41 Delta, with the highest likelihood in the uplands that surround Clifton Court Forebay. Potential
 42 call identified during acoustic surveys by DHCCP in 2009 (Appendix 12C, *2009 to 2011 Bay Delta
 43 Conservation Plan EIR/EIS Environmental Data Report*).

- 1 • **Townsend's big-eared bat:** The Townsend's big-eared bat has never been reported in the
 2 study area or its vicinity. However, the species is known to occur at three mine sites on the Little
 3 Blue Ridge in northwestern Yolo County, and at two sites in Alameda County, one near Calaveras
 4 Reservoir and the other in the hills south of Livermore (California Department of Fish and
 5 Wildlife 2013). The closest occurrence is approximately 6.4 miles from the study area. The study
 6 area does not contain caves or mines, which are often used as roosting habitat by Townsend's
 7 big-eared bats. However, some populations of Townsend's big-eared bat use buildings and other
 8 man-made structures, such as tunnels and bridges, and individuals have been reported to use
 9 basal hollows in large trees as roost sites. Possible Townsend's bat guano was identified under
 10 two of the bridges during the 2009 DHCCP bridge surveys (Appendix 12C, *2009 to 2011 Bay
 11 Delta Conservation Plan EIR/EIS Environmental Data Report*). The species forages primarily
 12 along edges of wooded habitats and along streams (Kunz and Martin 1982). Thus, the species
 13 has the potential to occur in the study area, where it would likely forage and roost along larger
 14 riparian corridors.
- 15 • **Western mastiff bat:** Typically roosts in crevices in cliffs and rocky outcrops, in colonies of
 16 fewer than 100 individuals. May also roost in bridges, caves and buildings that allow sufficient
 17 height and clearance for dropping into flight. There is at least one record of this species roosting
 18 in an untrimmed palm tree. Forages in a variety of grassland, shrub, and wooded habitats,
 19 including riparian and urban areas, although most commonly in open, arid lands. May occur
 20 throughout the Delta but suitable roosting habitat is limited. Not detected during DHCCP
 21 acoustic surveys in 2009 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS
 22 Environmental Data Report*).

23 **San Joaquin Pocket Mouse**

24 The San Joaquin pocket mouse inhabits grassland and scrub habitats with friable soils. The species
 25 has a NatureServe conservation status of apparently secure, but a status ranging from imperiled to
 26 vulnerable in California. Its year-round range spans the San Joaquin Valley, Delta, Sacramento Valley
 27 through Colusa County, and portions of the southern Coast Ranges. The species may occur in
 28 grasslands in the study area that contain friable soils (Figure 12-52). There are 109 CNDDDB records
 29 for San Joaquin pocket mouse across its range. There are two CNDDDB records of San Joaquin pocket
 30 mouse in the southern portion of the Delta in CZ 8 near Clifton Court Forebay (California
 31 Department of Fish and Wildlife 2013).

32 **American Badger**

33 Within the study area, habitat for American badger, a state species of special concern, is restricted to
 34 grassland along the Plan Area's southwestern edge in CZs 7-10 (Figure 12-53). The study area
 35 represents the extreme northeastern corner of the species' range in California, which extends
 36 westward and southward from the study area border. There are five American badger records in the
 37 study area (California Department of Fish and Wildlife 2013). Two are from 1938 and no longer
 38 extant. The remaining three are all located in CZ 8, west of Clifton Court Forebay.

39 **12.1.3.3 Special-Status Plant Species**

40 Table 12A-1 in Appendix 12A, *Special-Status Species with Potential to Occur in the Study Area*,
 41 presents detailed information on the special-status plant species known or with potential to occur in
 42 study area and includes their common and scientific name, listing status (federal, state, and CNPS),
 43 notes on the species habitat, distribution in California, flowering period, and potential for

1 occurrence in the study area. Nineteen of these species are covered species in the BDCP. The other
 2 67 species are noncovered species, 36 of which are addressed only in this EIR/EIS. Noncovered
 3 species in Table 12A-1 that are not known to occur in the study area and that would not be affected
 4 by the action alternatives were not addressed further.

5 The following summaries provide information on the plant species habitat requirements,
 6 distribution, and occurrences within the study area. The habitat and distribution information for
 7 covered species is largely based on the species account information found in Appendix 2.A *Covered*
 8 *Species Accounts*, of the BDCP. The habitat and distribution information for noncovered species was
 9 developed for the EIR/EIS by ICF staff. The habitat models for noncovered species described below
 10 were based on one or more of the following characteristics: species range; natural communities in
 11 which they are found; specific vegetation alliances within each natural community; and occurrence
 12 records. Species occurrence data were obtained from the CNDDDB and from field surveys conducted
 13 in support of the DHCCP (Appendix 12C, *2009–2011 Bay Delta Conservation Plan EIR/EIS*
 14 *Environmental Data Report*).

15 **Vernal Pool Plants**

16 **Alkali Milk-Vetch**

17 Alkali milk-vetch, which has a CRPR of 1B.2, is known from the southern Sacramento Valley,
 18 northern San Joaquin Valley, and the eastern San Francisco Bay Area (Wojciechowski and
 19 Spellenberg 2012 p. 750). It grows in alkali grassland and alkali vernal pools and playas (California
 20 Department of Fish and Wildlife 2013). Alkali seasonal wetland complex, vernal pool complex, and
 21 managed wetland are the natural community types in the study area that may provide habitat for
 22 alkali milk-vetch (Figure 12-54). Occurrences have been reported within or abutting CZ 1 (six
 23 records), CZ 2 (four records), CZ 6 (one record), CZ 8 (two records), and CZ 11 (four records)
 24 (California Department of Fish and Wildlife 2013). The threats to alkali milk-vetch are development,
 25 competition from nonnative plants, trampling, energy transmission line construction, and habitat
 26 destruction, particularly from the conversion of habitat to agriculture (California Native Plant
 27 Society 2012a).

28 **San Joaquin Spearscale**

29 San Joaquin spearscale, which has a CRPR of 1B.2, is known from the western edge of the Central
 30 Valley and adjacent foothills from Glenn County to Tulare County (Zacharias 2012 p. 634). It grows
 31 in iodine bush scrub, alkali meadow, and alkali grasslands (California Department of Fish and
 32 Wildlife 2013). Natural community types in the study area that may provide habitat for San Joaquin
 33 spearscale are grassland and alkali seasonal wetland complex (Figure 12-54). San Joaquin
 34 spearscale occurrences have been reported within or abutting CZ 1 (two records), CZ 5 (one record),
 35 CZ 6 (one record), CZ 8 (seven records), CZ 9 (four records), and CZ 11 (five records) (California
 36 Department of Fish and Wildlife 2013). The threats to San Joaquin spearscale are grazing,
 37 agriculture, and development (California Native Plant Society 2012d).

38 **Dwarf Downingia**

39 Dwarf downingia, which has a CRPR of 2.2, is known from the inner North Coast Ranges, southern
 40 Sacramento Valley, and the northern and central portions of the San Joaquin Valley (Schultheis 2012
 41 p. 591). It occurs in vernal pools (Schultheis 2012 p. 591, California Department of Fish and Wildlife
 42 2013). The natural community type in the study area that may provide habitat for dwarf downingia

1 is vernal pool complex (Figure 12-54). Dwarf downingia occurrences have been reported within or
 2 abutting CZ 1 (eight records), CZ 4 (one record), and CZ 11 (three records) (California Department
 3 of Fish and Wildlife 2013). The threats to dwarf downingia are competition from nonnative plants,
 4 urbanization, development, agriculture, grazing, vehicles, and industrial forestry (California Native
 5 Plant Society 2012h).

6 **Boggs Lake Hedge-Hyssop**

7 Boggs Lake hedge-hyssop, which is state-listed as endangered and has a CRPR of 1B.2, is a vernal
 8 pool endemic known from the inner North Coast Ranges, central Sierra Nevada foothills, Sacramento
 9 Valley, the Modoc Plateau, and one occurrence in Oregon (Estes 2012 p. 1012). The natural
 10 community type in the study area that provides habitat for Boggs Lake hedge-hyssop is vernal pool
 11 complex. A single CNDDDB occurrence has been reported within CZ 1 (Figure 12-54) (California
 12 Department of Fish and Wildlife 2013). Threats to Boggs Lake hedge-hyssop are agriculture,
 13 development, grazing, trampling, and vehicles (California Native Plant Society 2012j).

14 **Legenere**

15 Legenere, which has a CRPR of 1B.1, is known from the southern Sacramento Valley, southern North
 16 Coast Ranges, northern San Joaquin Valley, Santa Cruz Mountains, and Mount Hamilton ranges
 17 (Morin 2012 p. 594). It occurs in vernal pools and other seasonal wetlands (California Department
 18 of Fish and Wildlife 2013). The natural community type in the study area that provides habitat for
 19 legenere consists of vernal pool complex (Figure 12-54). Legenere occurrences have been reported
 20 within or abutting CZ 1 (five records), CZ 4 (two records), and CZ 11 (one record) (California
 21 Department of Fish and Wildlife 2013). Threats to legenere are grazing, road widening, competition
 22 from nonnative plants, and development (California Native Plant Society 2012m).

23 **Heckard's Peppergrass**

24 Heckard's peppergrass, which has a CRPR of 1B.2, is known from the Sacramento Valley and
 25 northern San Joaquin Valley (California Department of Fish and Wildlife 2013). It occurs in alkali
 26 grasslands, alkali meadow, and alkali vernal pools (California Department of Fish and Wildlife
 27 2013). Alkali seasonal wetland complex and vernal pool complex are the natural community types in
 28 the study area that may provide habitat for Heckard's pepper grass (Figure 12-54). Heckard's
 29 peppergrass occurrences have been reported in CZ 1 (one record), CZ 2 (two records), and CZ 4 (two
 30 records) (California Department of Fish and Wildlife 2013). Reported threats to Heckard's pepper
 31 grass include disking for fire breaks and trampling (California Department of Fish and Wildlife
 32 2013).

33 **Ferris's Milk-Vetch**

34 Ferris's milk-vetch, which has a CRPR of 1B.1, is historically known from the Central Valley from
 35 Butte County to Alameda County but currently occurs only in Butte, Glenn, Colusa, and Yolo Counties
 36 (California Department of Fish and Wildlife 2013). It grows in alkali meadows and alkaline flats,
 37 often on clay soils (Wojciechowski and Spellenberg 2012 p. 750, California Department of Fish and
 38 Wildlife 2013). Natural community types in the study area that may provide habitat for Ferris's
 39 milk-vetch are alkali seasonal wetland complex and vernal pool complex (Figure 12-54).
 40 Occurrences of Ferris's milk-vetch have been reported within or abutting CZ 1 (one record) and CZ 2
 41 (two records) (California Department of Fish and Wildlife 2013), and in CZ 8 (three records).
 42 Threats to Ferris's milk-vetch are habitat conversion and degradation and grazing.

1 **Vernal Pool Smallscale**

2 Vernal pool smallscale, which has a CRPR of 1B.2, is known from widely scattered occurrences in the
3 Central Valley from Colusa County to Tulare County (California Department of Fish and Wildlife
4 2013). It grows in alkali vernal pools (Zacharias 2012 p. 636). The natural community type in the
5 study area that may provide habitat for vernal pool smallscale is vernal pool complex (Figure 12-
6 54). Occurrences of vernal pool smallscale have been reported within CZ 1 (one record) and CZ 11
7 (one record) (California Department of Fish and Wildlife 2013). Possible threats to vernal pool
8 smallscale are flood-management activities and agriculture (California Native Plant Society 2012t).

9 **Hogwallow Starfish**

10 Hogwallow starfish, which has a CRPR of 4.2, is known primarily from the Great Valley region of the
11 California Floristic Province and the adjacent foothills but also occurs in the South Coast and
12 Peninsular ranges (Morefield 2012a: 348). It grows in clay flats, vernal pools, and other habitats
13 with heavy clay soils (Morefield 2012a). Natural community types in the study area that provide
14 habitat for hogwallow starfish are grassland and vernal pool complex (Figure 12-54). Hogwallow
15 starfish was historically collected in Antioch and has been collected at locations adjacent to CZs 1, 2,
16 and 11 (Consortium of California Herbaria 2012f). Threats to hogwallow starfish are agriculture and
17 development (California Native Plant Society 2012jj).

18 **Ferris' Goldfields**

19 Ferris' goldfields, which has a CRPR of 4.2, is known from the Sacramento and San Joaquin Valleys
20 and the valleys of the adjacent foothills (Consortium of California Herbaria 2012g). It occurs in
21 alkaline vernal pools and wet saline flats (Chan and Ornduff 2012, p. 367). Natural community types
22 in the study area that provide habitat for Ferris' goldfields consist of alkali seasonal wetland
23 complex and vernal pool complex. Ferris' goldfields occurrences are present in CZs 8 and 9 (Figure
24 12-54). Ferris' goldfields occurrences in Contra Costa County are locally significant because they are
25 at the northwestern edge of the species distribution. Threats to Ferris' goldfields are development
26 and agriculture (California Native Plant Society 2012nn).

27 **Cotulaleaf Navarretia**

28 Cotulaleaf navarretia, which has a CRPR of 4.2, has a limited distribution in the inner North Coast
29 Ranges, Sacramento Valley, San Francisco Bay Area, and northern South Coast Ranges (Consortium
30 of California Herbaria 2012h). It occurs in heavy clay soils of vernal pools, seasonal alkali wetlands,
31 and grasslands. Natural community types in the study area that provide habitat for cotulaleaf
32 navarretia consist of alkali seasonal wetland complex, vernal pool complex, and grassland (Figure
33 12-54). Cotulaleaf navarretia occurrences in Contra Costa County are locally significant because they
34 are at the southern end of the species distribution. Threats to cotulaleaf navarretia are nonnative
35 plants and habitat alteration (California Native Plant Society 2012yy).

36 **Contra Costa Goldfields**

37 Contra Costa goldfields is federally listed as endangered and has a CRPR of 1B.1. Contra Costa
38 goldfields is known from scattered occurrences in the southwestern edge of the Sacramento Valley
39 and the valleys of the San Francisco Bay Area and the Central Coast (Chan and Ornduff 2012 p. 366).
40 It grows in vernal pools, swales, and wet meadows (Chan and Ornduff 2012 p. 366, California
41 Department of Fish and Wildlife 2013). The natural community type in the study area that provides

1 potential habitat for Contra Costa goldfields is vernal pool complex (Figure 12-54). Occurrences of
 2 Contra Costa goldfields have been reported within and adjacent to CZ 10 (one record) and CZ 11 (six
 3 records) (California Department of Fish and Wildlife 2013). Threats to Contra Costa goldfields are
 4 development, alterations to habitat (including hydrology), overgrazing, and competition with
 5 nonnative plants (California Native Plant Society 2012mm).

6 **Baker's Navarretia**

7 Baker's navarretia, which has a CRPR of 1B.1, is known from the inner North Coast Ranges and
 8 western Sacramento Valley (California Department of Fish and Wildlife 2013). It occurs in vernal
 9 pools and swales on clay or alkali soils (California Department of Fish and Wildlife 2013). The
 10 natural community type in the study area that provides habitat for Baker's navarretia is vernal pool
 11 complex. Baker's navarretia has been reported adjacent to the study area and in CZs 1 and CZ 2
 12 (Figure 12-54) (California Department of Fish and Wildlife 2013). Threats to Baker's navarretia are
 13 agriculture, development, habitat alteration, and road construction (California Native Plant Society
 14 2012oo).

15 **Colusa Grass**

16 Colusa grass is federally listed as threatened, state-listed as endangered, and has a CRPR of 1B.1.
 17 Colusa grass is known from the Central Valley with scattered occurrences from Colusa County to
 18 Merced County (Reeder 2012). It grows in the bottoms of large, deep vernal pools (California
 19 Department of Fish and Wildlife 2013). The natural community type in the study area that provides
 20 habitat for Colusa grass is vernal pool complex. One occurrence of Colusa grass is present in CZ 1
 21 and other occurrences are adjacent to CZs 1 and 2 (Figure 12-54) (California Department of Fish and
 22 Wildlife 2013). Threats to Colusa grass are competition with nonnative plants, agriculture,
 23 development, overgrazing, and flood-management actions (California Native Plant Society 2012pp).

24 **Bearded Popcorn-Flower**

25 Bearded popcorn-flower, which has a CRPR of 1B.1, is present in the southern interior North Coast
 26 Range and the southern Sacramento Valley (Preston et al. 2010). Bearded popcorn-flower was
 27 presumed extinct until rediscovered in 2005 (Preston et al. 2010). It occurs in vernal pools and
 28 vernal swales and also in other vernal moist areas in grasslands (Preston et al. 2010). Natural
 29 community types in the study area that provide habitat for bearded popcorn-flower are vernal pool
 30 complex and grassland (Figure 12-54). Bearded popcorn-flower occurs within CZs 2 and 11
 31 (California Department of Fish and Wildlife 2013). Threats to bearded popcorn-flower are disking,
 32 development, and competition with nonnative plants (California Native Plant Society 2012rr).

33 **Saline Clover**

34 Saline clover, which has a CRPR of 1B.2, is known from the Sacramento Valley, the northwestern San
 35 Joaquin Valley, the San Francisco Bay Area, and the Central Coast (Vincent and Isely 2012 p. 795). It
 36 occurs in marshes, vernal pools and swales, and iodine bush scrub, generally on saline or alkaline
 37 soils (California Department of Fish and Wildlife 2013). Alkali seasonal wetland complex, vernal
 38 pool complex, and tidal brackish emergent wetland are the natural community types in the study
 39 area that provide potential habitat for saline clover (Figure 12-54). Eight occurrences of saline
 40 clover have been reported in CZ 1 (one record), CZ 2 (one record), CZ 4 (five records), and CZ 11
 41 (one record) (California Department of Fish and Wildlife 2013). Threats to saline clover are
 42 development, trampling, road construction, and vehicles (California Native Plant Society 2012ww).

1 **Solano Grass**

2 Solano grass is federally and state-listed as endangered and has a CRPR of 1B.1. Solano grass is
 3 known from only three occurrences in the southwestern Sacramento Valley in Solano and Yolo
 4 Counties, where it grows in vernal pools (California Department of Fish and Wildlife 2013). The
 5 natural community type in the study area that provides habitat for Solano grass is vernal pool
 6 complex. All three CNDDDB records for Solano grass are located within or adjacent to CZs (Figure 12-
 7 54). One CNDDDB record of Solano grass occurs within CZ 11, and the other occurrences are adjacent
 8 to CZ 1 (California Department of Fish and Wildlife 2013). Competition from nonnative plants is a
 9 threat to Solano grass (California Native Plant Society 2012xx).

10 **Delta Woolly-Marbles**

11 Delta woolly-marbles has a CRPR of 4.2. It is known from scattered locations in the Sacramento
 12 Valley, San Francisco Bay Area, and northern San Joaquin Valley (Morefield 2012b: 407). It grows in
 13 vernal pools. The natural community type that provide habitat for Delta woolly-marbles is vernal
 14 pool complex. Three occurrences are present in the study area, one in CZ 1, one in CZ 4, and one in
 15 CZ 11 (Figure 12-54) (Consortium of California Herbarium 2012h). Delta woolly-marbles is locally
 16 uncommon in the study area. Current threats for Delta woolly-marbles are unknown but are likely to
 17 include habitat alteration (California Native Plant Society 2012bbb).

18 **Alkali Seasonal Wetland Plants**

19 **Brittlescale**

20 Brittlescale, which has a CRPR of 1B.2, is known from the eastern and western portions of the
 21 Central Valley and the adjacent foothills on the Central Valley's west side (Zacharias 2012 p. 633-
 22 634, California Department of Fish and Wildlife 2013). It grows in iodine bush scrub and alkali
 23 grasslands on the margins of vernal pools, swales, slickspots and scalds (California Department of
 24 Fish and Wildlife 2013). Alkali seasonal wetland complex, and vernal pool complex are the natural
 25 community types in the study area that may provide habitat for brittlescale (Figure 12-55).
 26 Brittlescale occurrences have been reported within or abutting CZ 1 (two records), CZ 8 (two
 27 records), and CZ 11 (three records) (California Department of Fish and Wildlife 2013). The threats
 28 to brittlescale are development, grazing, and trampling (California Native Plant Society 2012c).

29 **Heartscale**

30 Heartscale, which has a CRPR of 1B.2, is known from the western side of the Central Valley and the
 31 valleys of adjacent foothills (Zacharias 2012 p. 633, California Department of Fish and Wildlife
 32 2013). It grows in iodine bush scrub, alkali meadow, and alkali grasslands on the margins of vernal
 33 pools, swales, slickspots and scalds (California Department of Fish and Wildlife 2013). The natural
 34 community types in the study area that may provide heartscale habitat is alkali seasonal wetland
 35 complex (Figure 12-55). Heartscale occurrences have been reported within or abutting CZ 1 (three
 36 records), CZ 6 (one record), CZ 8 (one record), and CZ 11 (one record) (California Department of
 37 Fish and Wildlife 2013). The threats to heartscale are competition from nonnative plants and
 38 trampling (California Native Plant Society 2012b).

1 **Delta Button Celery**

2 Delta button celery, which is state-listed as endangered and has a CRPR of 1B.1, occurs in the
 3 northern San Joaquin Valley (Preston et al. 2012 p. 182). It is associated with vernal mesic
 4 depressions that occur within the historic floodplain of the San Joaquin River, which can be
 5 characterized as vernal pool complex or, when stands of trees and shrubs occur in a mosaic with
 6 open areas of pools and swales, as valley/foothill riparian (Figure 12-55) (California Department of
 7 Fish and Wildlife 2013). Three Delta button celery occurrences have been reported within or
 8 abutting CZ 7 (two records) and CZ 9 (one record) (California Department of Fish and Wildlife
 9 2013). The threats to Delta button celery are flood-management activities, competition from
 10 nonnative plants, and agriculture (California Native Plant Society 2012i).

11 **Crownscale**

12 Crownscale, which has a CRPR of 4.2, is known from the southern Sacramento Valley, eastern San
 13 Joaquin Valley, eastern San Francisco Bay Area, and the inner South Coast Ranges (Zacharias 2012 p.
 14 633). It occurs in chenopod scrub, alkaline grassland, and alkaline vernal pools (California Native
 15 Plant Society 2012zz). Alkali seasonal wetland complex and vernal pool complex are the natural
 16 community types that may provide habitat for crownscale in the study area. Occurrences of
 17 crownscale have been reported in CZs 7, 8, 9, and 11 (Figure 12-55) (Consortia of California Herbaria
 18 2012a). In addition, reported occurrences of heartscale and Lost Hills crownscale from the vicinity
 19 of Byron are presumed to be crownscale (R. Preston pers. comm.). Crownscale occurrences in the
 20 study area are locally significant because they are at the northern edge of the species distribution.

21 **Palmate-Bracted Bird's-Beak**

22 Palmate-bracted bird's-beak, is federally and state-listed as endangered and has a CRPR of 1B.1.
 23 Palmate-bracted bird's-beak is known from the Livermore Valley and scattered locations in the
 24 Central Valley from Colusa County to Fresno County (Wetherwax and Tank 2012 p. 966; California
 25 Department of Fish and Wildlife 2013). It occurs in iodine bush scrub, alkali meadow, and alkali
 26 grassland, often on the margins of swales, scalds, or vernal pools (California Department of Fish and
 27 Wildlife 2013). Natural community types in the study area that may provide habitat for palmate-
 28 bracted bird's-beak are alkali seasonal wetland complex and vernal pool complex (Figure 12-55). A
 29 single occurrence of palmate-bracted bird's-beak was reported in CZ 6 near Stockton, but it was last
 30 observed in 1881 and is possibly extirpated (California Department of Fish and Wildlife 2013).
 31 Threats to palmate-bracted bird's-beak are agriculture, urbanization, vehicles, altered hydrology,
 32 grazing, and development (California Native Plant Society 2012z).

33 **Recurved Larkspur**

34 Recurved larkspur, which has a CRPR of 1B.2, was formerly widespread in the Central Valley from
 35 Colusa County to Kern County, although it has been extirpated from the Sacramento Valley (Koontz
 36 and Warnock 2012 p. 1411; California Department of Fish and Wildlife 2013). It occurs in chenopod
 37 scrub and grassland on poorly drained, fine, alkaline soils (Koontz and Warnock 2012 p. 1411).
 38 Natural community types in the study area that may provide habitat for recurved larkspur are
 39 grassland and seasonal alkali wetland complex. Four occurrences of recurved larkspur have been
 40 reported in CZ 8 (Figure 12-55) (California Department of Fish and Wildlife 2013). Threats to
 41 recurved larkspur are grazing and trampling (California Native Plant Society 2012cc).

1 **Grassland Plants**

2 **Caper-Fruited Tropicocarpum**

3 Caper-fruited tropidocarpum, which has a CRPR of 1B.1, is historically known from the northwest
4 San Joaquin Valley and adjacent Diablo Range foothills and has recently been reported from Fresno,
5 Monterey, and San Luis Obispo Counties (California Department of Fish and Wildlife 2013). It grows
6 in alkali grasslands. Grassland and alkali seasonal wetland complex are the natural community types
7 in the study area that may provide habitat for caper-fruited tropidocarpum (Figure 12-56).
8 Occurrences of caper-fruited tropidocarpum have been reported within or abutting CZ 7 (four
9 records), CZ 8 (two records), and CZ 9 (one record) (California Department of Fish and Wildlife
10 2013). Possible threats to caper-fruited tropidocarpum are grazing, military activities, competition
11 with nonnative plants, and trampling (California Native Plant Society 2012r).

12 **Carquinez Goldenbush**

13 Carquinez goldenbush, which has a CRPR of 1B.1, is known from the southern Sacramento Valley
14 between Jepson Prairie and Suisun Marsh (Keil 2012b p. 360, California Department of Fish and
15 Wildlife 2013). It occurs in grasslands with alkali soils. The natural community type in the study
16 area that provides habitat for Carquinez goldenbush is grassland (Figure 12-56). Carquinez
17 goldenbush occurrences have been reported within or abutting CZ 1 (three records) and CZ 11
18 (seven records) (California Department of Fish and Wildlife 2013). Probable threats to Carquinez
19 goldenbush are development and agriculture (California Native Plant Society 2012k).

20 **Big Tarplant**

21 Big tarplant, which has a CRPR of 1B.1, is known from the eastern San Francisco Bay Area and
22 northwestern San Joaquin Valley (Baldwin 2012a). It occurs in annual grasslands on clay to clay-
23 loam soils, usually on slopes (California Department of Fish and Wildlife 2013). The natural
24 community type in the study area that may provide habitat for big tarplant is grassland (Figure 12-
25 56). Occurrences of big tarplant have been reported in CZ 7 (one record) and CZ 10 (three records)
26 and adjacent to CZ 6 (one record) (California Department of Fish and Wildlife 2013). Residential
27 development poses a threat to big tarplant. The extirpation of historical occurrences is likely the
28 result of agriculture and competition from nonnative plants (California Native Plant Society 2012u).

29 **Round-Leaved Filaree**

30 Round-leaved filaree, which has a CRPR of 1B.1, is known from scattered occurrences in the Central
31 Valley, southern North Coast Ranges, San Francisco Bay Area, South Coast Ranges, Channel Islands,
32 Transverse ranges, and Peninsular ranges (Alarcón et al. 2012). It occurs in grasslands and open,
33 grassy areas in oak woodland (California Department of Fish and Wildlife 2013). The natural
34 community type in the study area that may provide habitat for round-leaved filaree is grassland
35 (Figure 12-56). Four occurrences of round-leaved filaree have been reported within or adjacent to
36 CZ 6 (one record), CZ 7 (two records), and CZ 10 (one record) (California Department of Fish and
37 Wildlife 2013). Threats to round-leaved filaree are habitat alteration, feral pigs, vehicles,
38 competition from nonnative plants, urbanization, pipeline construction, and possibly grazing
39 (California Native Plant Society 2012v).

1 **Pappose Tarplant**

2 Pappose tarplant, which has a CRPR of 1B.2, is known from the northern Central Coast, the North
3 Coast Ranges, and the southern Sacramento Valley (Baldwin 2012b p. 274). It occurs in grassland, at
4 the margins of coastal salt marsh, and in alkaline seeps and springs (Baldwin 2012b). Natural
5 community types in the study area that may provide habitat for pappose tarplant are alkali seasonal
6 wetland complex and grassland. Eight occurrences of pappose tarplant have been reported within or
7 adjacent to CZ 11 (Figure 12-56) (California Department of Fish and Wildlife 2013). Threats to
8 pappose tarplant are habitat disturbance, agriculture, competition from nonnative species,
9 development, grazing, and road maintenance (California Native Plant Society 2012x).

10 **Parry's Rough Tarplant**

11 Parry's rough tarplant has a CRPR of 4.2. It occurs in scattered grassland remnants in the
12 Sacramento and northern San Joaquin Valleys (Baldwin 2012b p. 274). It occurs in grasslands,
13 sometimes at the margins of marshes or vernal pools, or in ruderal habitat (Baldwin 2012b p. 274).
14 Grassland, alkali seasonal wetland complex, and vernal pool complex are natural community types
15 in the study area that may provide habitat for Parry's rough tarplant (Figure 12-56). Five
16 occurrences of Parry's rough tarplant have been reported from CZs 2, 3, 4, and 6 (Lazar pers. comm.;
17 Consortia of California Herbaria 2012b). Although common and abundant in a few locations, many
18 of the occurrences are small and localized, often small, disturbed patches in road or railroad rights-
19 of-way. Parry's rough tarplant occurrences in the study area are locally significant because the
20 species' habitat in the study area has been greatly diminished and fragmented by conversion to
21 agricultural land (California Native Plant Society 2012y).

22 **Small-Flowered Morning-Glory**

23 Small-flowered morning-glory has a CRPR of 4.2. It occurs at scattered locations in coastal California
24 and the Coast Ranges from Contra Costa County to San Diego County and in the southern Sierra
25 Nevada foothills (Consortium of California Herbaria 2012c). Habitat for small-flowered morning-
26 glory consists of grasslands or open grassy areas in chaparral or coastal sage scrub, usually on clay
27 soils, but sometimes on serpentine soils (Preston and Dempster 2012: 659). Potential habitat for
28 small-flowered morning-glory would be grasslands along the western edges of CZs 7, 8, and 9.
29 Although no occurrences are known from the study area, three occurrences are reported from areas
30 adjacent to the study area, and suitable habitat is present in the study area (Figure 12-56). Small-
31 flowered morning-glory occurrences in Contra Costa County are locally significant because they are
32 at the northern edge of the species distribution and disjunct from the nearest occurrences in
33 Stanislaus County. It is threatened by development and possibly threatened by nonnative plants
34 (California Native Plant Society 2012bb).

35 **Diamond-Petaled California Poppy**

36 Diamond-petaled California poppy, which has a CRPR of 1B.1, was known historically from the
37 interior foothills of the North and South Coast Ranges but is currently known from only three
38 locations in Alameda County and San Luis Obispo County (Hannan and Clark 2012 p. 984, California
39 Department of Fish and Wildlife 2013). The natural community type in the study area that may
40 provide habitat for diamond-petaled California poppy is grassland. Two historic occurrences of
41 diamond-petaled California poppy are in the study area (Figure 12-56). One occurrence overlaps
42 with CZ 7 and CZ 8, and the second occurrence is located within CZ 10 (California Department of

1 Fish and Wildlife 2013). Threats to diamond-petaled California poppy are agriculture and grazing
2 (California Native Plant Society 2012gg).

3 **Stinkbells**

4 Stinkbells, which has a CRPR of 4.2, is known from the foothills of the North and South Coast Ranges,
5 the Sierra Nevada foothills, and the Central Valley (McNeal and Nees 2012 p. 1388, Consortium of
6 California Herbaria 2012e). It occurs in grasslands and in grassy, open areas in chaparral, oak
7 woodland, and pinyon-juniper woodland, usually on clay or serpentine soils (California Native Plant
8 Society 2012hh). The natural community type in the study area that may provide habitat for
9 stinkbells is grassland. A single occurrence of stinkbells has been reported along the southern
10 boundary of CZ 10 and is presumed extant (Figure 12-56) (California Department of Fish and
11 Wildlife 2013). Threats to stinkbells are development and grazing (California Native Plant Society
12 2012hh).

13 **Fragrant Fritillary**

14 Fragrant fritillary, which has a CRPR of 1B.2, is known from the southern Sacramento Valley,
15 southern North Coast Ranges, San Francisco Bay Area, and northern Central Coast (California
16 Department of Fish and Wildlife 2013). It occurs in grasslands, coastal prairie, and open, grassy
17 areas in coastal scrub and oak woodlands, often on serpentine soils (California Department of Fish
18 and Wildlife 2013; California Native Plant Society 2012ii). The natural community type in the study
19 area that provides habitat for fragrant fritillary is grassland (Figure 12-56). Occurrences of fragrant
20 fritillary have been reported within CZ 1 (four records) and CZ 11 (one record) (California
21 Department of Fish and Wildlife 2013). Threats to fragrant fritillary are grazing, agriculture,
22 urbanization, competition from nonnative plants, and possibly recreational activities (California
23 Native Plant Society 2012ii).

24 **Streamside Daisy**

25 Streamside daisy has a CRPR of 3, indicating that more information is needed on the distribution
26 and level of threat. However, only 31 occurrences have been recorded (Consortium of California
27 Herbaria 2012d), indicating that the species is rare. The species occurs along the western edge of
28 the Klamath ranges and outer North Coast Ranges from Humboldt County south to Solano County.
29 Dry slopes and rock outcrops, often along rivers, provide habitat for streamside daisy (Keil and
30 Nesom 2012 p. 317). One occurrence is present in CZ 11, west of Interstate 680, and a second
31 occurrence near Cordelia is adjacent to the study area (Figure 12-56).

32 **Gairdner's Yampah**

33 Gairdner's yampah has a CRPR of 4.2. It occurs primarily along the California coast and inland into
34 the North Coast Ranges (Constance and Wetherwax 2012 p. 196). It grows in seasonally wet areas in
35 coastal prairie and grasslands and in open, grassy areas in chaparral and broadleaved upland forest
36 (California Native Plant Society 2012ccc). Although no occurrences are known from the study area,
37 Gairdner's yampah occurs in areas adjacent to CZ 11, and suitable habitat occurs in CZ 11
38 (Consortium of California Herbaria 2012i). Natural community types in the study area that provide
39 habitat for Gairdner's yampah are grasslands and vernal pool complex (Figure 12-56). Gairdner's
40 yampah occurs in widely scattered locations and is locally uncommon in the study area. Gairdner's
41 yampah is threatened by agriculture, grazing, nonnative plants, habitat alteration, and urbanization
42 (California Native Plant Society 2012ccc).

1 **Keck's Checkerbloom**

2 Keck's checkerbloom is federally listed as endangered. It has no state listing status but has a
 3 California Rare Plant Rank of 1B.1 (California Department of Fish and Wildlife 2013). Prior to 2009,
 4 Keck's checkerbloom was known from only three occurrences in Tulare County. During a review of
 5 specimens in preparation for the revised treatment of *Sidalcea* for the Jepson Manual second edition,
 6 Hill (2009) determined that specimens collected from occurrences in Napa, Yolo, and Solano
 7 Counties should also be regarded as Keck's checkerbloom. Therefore, the current range for the
 8 species is the southern Inner North Coast Ranges, the southern Sacramento Valley, and the southern
 9 Sierra Nevada foothills (Hill 2012a p.893). Habitat for the species usually is grassy areas within blue
 10 oak woodland, often on clay soils, at elevations between 280 and 1,950 feet (California Department
 11 of Fish and Wildlife 2013; Hill 2012a). Grassland is the natural community type in the study area
 12 that may provide habitat for Keck's checkerbloom. No occurrences have been reported from the
 13 Plan Area, but two occurrences are adjacent to the east side of CZ 11, one of which is within the
 14 study area for the western power alternative (Figure 12-56). Potential threats to Keck's
 15 checkerbloom include grazing and competitive from nonnative grasses, and one occurrence has
 16 been extirpated by conversion to an orchard (California Department of Fish and Wildlife 2013).

17 **Valley/Foothill Riparian Plants**

18 **Delta Button Celery**

19 Delta button celery, which is state-listed as endangered and has a CRPR of 1B.1, occurs in the
 20 northern San Joaquin Valley (Preston et al. 2012 p. 182). It is associated with vernal mesic
 21 depressions that occur within the historic floodplain of the San Joaquin River, which can be
 22 characterized as vernal pool complex or, when stands of trees and shrubs occur in a mosaic with
 23 open areas of pools and swales, as valley/foothill riparian (Figure 12-57) (California Department of
 24 Fish and Wildlife 2013). Three Delta button celery occurrences have been reported within or
 25 abutting CZ 7 (two records) and CZ 9 (one record) (California Department of Fish and Wildlife
 26 2013). The threats to Delta button celery are flood-management activities, competition from
 27 nonnative plants, and agriculture (California Native Plant Society 2012i).

28 **Slough Thistle**

29 Slough thistle, which has a CRPR of 1B.1, is known from the San Joaquin Valley in Kern, Kings, and
 30 San Joaquin Counties (Keil 2012a p. 285; California Department of Fish and Wildlife 2013). It occurs
 31 in freshwater marsh along sloughs and river banks, often in clay or alkali soils (California
 32 Department of Fish and Wildlife 2013). Natural community types in the study area that may provide
 33 habitat for slough thistle are nontidal freshwater perennial emergent wetland and valley/foothill
 34 riparian (Figure 12-57). Two CNDDDB occurrences of slough thistle have been reported in CZ 7
 35 (California Department of Fish and Wildlife 2013). The threats to slough thistle are agriculture and
 36 competition from nonnative plants (California Native Plant Society 2012f).

37 **Northern California Black Walnut**

38 Native stands of northern California black walnut have been assigned a CRPR of 1B.1; however,
 39 individual trees of this species are generally considered to be naturalized, rather than native
 40 (California Native Plant Society 2012ll). Native stands of northern California black walnut were
 41 historically present in the California in the southern portion of the Inner North Coast Ranges, the
 42 southern Sacramento Valley, the northern San Joaquin Valley, and the San Francisco Bay Area

1 (Whittemore 2012 p. 833). The last two native stands of northern California black walnut are
 2 located in Napa and Contra Costa Counties but fall outside the study area (California Department of
 3 Fish and Wildlife 2013). An historic occurrence, which was reported on both sides of the
 4 Sacramento River between Freeport and Rio Vista, is believed to be extirpated (California
 5 Department of Fish and Wildlife 2013). The natural community type in the study area that provides
 6 potential habitat for northern California black walnut is valley/foothill riparian (Figure 12-57).
 7 Threats to northern California black walnut are urbanization, conversion to agriculture, and
 8 hybridization with orchard trees (California Native Plant Society 2012ll).

9 **Wright's Trichocoronis**

10 Wright's trichocoronis, which has a CRPR of 2.1, is known from scattered locations in the Central
 11 Valley and South Coast (Keil and Powell 2012). It has been found in various wetland types, including
 12 alkaline meadow and floodplain wetlands, sometimes in drying mud (California Department of Fish
 13 and Wildlife 2013). Natural community types in the study area that provide potential habitat for
 14 Wright's trichocoronis consist of nontidal freshwater perennial emergent wetland and
 15 valley/foothill riparian. An historic occurrence of Wright's trichocoronis in CZ 7 was last seen in
 16 1914 (Figure 12-57) (California Department of Fish and Wildlife 2013). Wright's trichocoronis is
 17 threatened by habitat loss to agriculture and urbanization (California Native Plant Society 2012uu).

18 **Tidal Wetland Plants**

19 **Delta Mudwort**

20 Delta mudwort, which has a CRPR of 2.1, is mostly known from the Sacramento-San Joaquin Delta
 21 and from a single occurrence in Marin County (Wetherwax 2012). It is native to the East Coast of
 22 North America and may have been introduced to California (Wetherwax 2012). It grows on the bare
 23 soil of mudflats and river banks and on pilings, riprap, and other exposed substrates (California
 24 Department of Fish and Wildlife 2013). Tidal brackish emergent wetland, tidal freshwater emergent
 25 wetland, and valley/foothill riparian are the natural community types in the study area that may
 26 provide habitat for Delta mudwort (Figure 12-58). Delta mudwort occurrences have been reported
 27 within or abutting CZ 1 (one record), CZ 3 (one record), CZ 5 (24 records), CZ 6 (22 records), CZ 8
 28 (four records), CZ 10 (three records), and CZ 11 (three records) (California Department of Fish and
 29 Wildlife 2013). Threats to Delta mudwort in California are erosion, recreation, trampling, flotsam
 30 deposition, riprap, possible tidal gate installation, grazing on adjacent land, fishing access,
 31 streambank alteration for wetlands restoration, trash, levee maintenance/upgrades, rising sea
 32 levels, and increased salinity (California Native Plant Society 2012o).

33 **Delta Tule Pea**

34 Delta tule pea, which has a CRPR of 1B.2, occurs in tidal habitats along the margins of San Pablo Bay,
 35 Suisun Bay, Suisun Marsh, and the rivers and sloughs of the Delta (California Department of Fish and
 36 Wildlife 2013). It grows in brackish and freshwater marsh, generally on the margins of sloughs and
 37 marshes (California Department of Fish and Wildlife 2013). Tidal brackish emergent wetland, tidal
 38 freshwater emergent wetland, and valley/foothill riparian habitat are the natural community types
 39 in the study area that may provide habitat for Delta tule pea (Figure 12-58). Delta tule pea
 40 occurrences have been reported within or abutting CZ 1 (five records), CZ 3 (three records), CZ 4
 41 (two records), CZ 5 (30 records), CZ 6 (16 records), CZ 9 (two records), and CZ 11 (47 records)

1 (California Department of Fish and Wildlife 2013). Threats to Delta tule pea are water diversions,
2 agriculture, and erosion (California Native Plant Society 2012l).

3 **Mason's Lilaepsis**

4 Mason's lilaepsis is state-listed as rare under the California Native Plant Protection Act (CNPPA)
5 and has a CRPR of 1B.1. Mason's lilaepsis occurs in Suisun Bay, Suisun Marsh, and the Delta
6 (California Department of Fish and Wildlife 2013). It grows on the bare soil of mudflats and river
7 banks and on pilings, riprap, and other exposed substrates (California Department of Fish and
8 Wildlife 2013). Natural community types in the study area that may provide habitat for Mason's
9 lilaepsis are tidal brackish emergent wetland, tidal freshwater emergent wetland, and
10 valley/foothill riparian (Figure 12-58). Mason's lilaepsis occurrences have been reported within or
11 abutting CZ 1 (seven records), CZ 2 (two records), CZ 3 (three records), CZ 4 (one record), CZ 5 (51
12 records), CZ 6 (59 records), CZ 7 (two records), CZ 8 (14 records), CZ 9 (six records), CZ 10 (eight
13 records), and CZ 11 (26 records) (California Department of Fish and Wildlife 2013). Threats to
14 Mason's lilaepsis are erosion, channel stabilization, development, flood-management projects,
15 recreation, agriculture, shading resulting from marsh succession, and competition with invasive
16 water hyacinth (*Eichhornia crassipes*) (California Native Plant Society 2012n).

17 **Side-Flowering Skullcap**

18 Side-flowering skullcap, which has a CRPR of 2.2, is known in California from the Delta (California
19 Department of Fish and Wildlife 2013). It is more widespread outside of California, where it ranges
20 north to British Columbia and to the East Coast (Olmstead 2012 p. 856). It occurs in wet meadows
21 and marshes, often on logs (Olmstead 2012 p. 856, California Department of Fish and Wildlife 2013).
22 Natural community types in the study area that may provide habitat for side-flowering skullcap
23 consist of tidal freshwater emergent wetland and valley/foothill riparian (Figure 12-58). Side-
24 flowering skullcap occurrences have been reported in CZ 4 (three records) and CZ 5 (nine records)
25 (California Department of Fish and Wildlife 2013). Water recreation and hydrological alterations
26 may be threats to side-flowering skullcap (California Department of Fish and Wildlife 2013,
27 California Native Plant Society 2012p).

28 **Soft Bird's-Beak**

29 Soft bird's-beak, known from the northern Central Coast and the Delta (Wetherwax and Tank 2012
30 p. 966), is federally listed as endangered, state listed as rare under the CNPPA, and has a CRPR of
31 1B.2. It grows in coastal salt marsh (Wetherwax and Tank 2012 p. 966, California Department of
32 Fish and Wildlife 2013). Natural community types in the study area that may provide habitat for soft
33 bird's-beak are tidal brackish emergent wetland and managed wetland (Figure 12-58). Soft bird's-
34 beak occurrences have been reported within or abutting CZ 10 (one record) and CZ 11 (13 records)
35 (California Department of Fish and Wildlife 2013). The threats to soft bird's-beak are feral pigs,
36 erosion, competition from nonnative plants, marsh drainage, and trampling (California Native Plant
37 Society 2012e).

38 **Suisun Marsh Aster**

39 Suisun Marsh aster has a CRPR of 1B.2. Suisun Marsh aster occurrences have been reported in the
40 Delta, particularly in Suisun Marsh and Suisun Bay, and in Contra Costa, Napa, Sacramento, San
41 Joaquin, and Solano Counties (California Department of Fish and Wildlife 2013). It grows in
42 freshwater marsh, especially along sloughs (California Department of Fish and Wildlife 2013).

1 Natural community types in the study area that may provide habitat for Suisun Marsh aster are tidal
 2 brackish emergent wetland, tidal freshwater emergent wetland, and valley/foothill riparian (Figure
 3 12-58). Occurrences of Suisun Marsh aster have been reported within or abutting CZ 1 (seven
 4 records), CZ 2 (seven records), CZ 3 (six records), CZ 4 (two records), CZ 5 (56 records), CZ 6 (36
 5 records), CZ 7 (two records), CZ 10 (seven records), and CZ 11 (41 records) (California Department
 6 of Fish and Wildlife 2013). Threats to Suisun Marsh aster are erosion, marsh habitat alteration and
 7 loss, and possibly herbicide application (California Native Plant Society 2012q).

8 **Suisun Thistle**

9 Suisun thistle is federally listed as endangered and has a CRPR of 1B.1. It is known only from Suisun
 10 Marsh, where it grows in tidal marsh (Keil 2012a p. 286). Natural community types in the study area
 11 that may provide habitat for Suisun thistle are tidal brackish emergent wetland and managed
 12 wetland. Four CNDDDB occurrences of Suisun thistle have been reported in CZ 11 (Figure 12-58)
 13 (California Department of Fish and Wildlife 2013). The threats to Suisun thistle are foot traffic and
 14 cattle tramping (California Native Plant Society 2012g).

15 **Bolander's Water-Hemlock**

16 Bolander's water-hemlock, which has a CRPR of 2.1, is known from occurrences along California's
 17 South Coast and Central Coast regions and from Suisun Marsh (Wetherwax and Constance 2012). It
 18 grows in coastal brackish and freshwater marshes (Wetherwax and Constance 2012; California
 19 Department of Fish and Wildlife 2013). Tidal brackish emergent wetland and tidal freshwater
 20 emergent wetland are natural community types in the study area that may provide habitat for
 21 Bolander's water-hemlock (Figure 12-58). Eight occurrences of Bolander's water-hemlock have
 22 been reported in CZ 1 (one record), CZ 5 (two records), CZ 10 (one record), and CZ 11 (four records)
 23 (California Department of Fish and Wildlife 2013). Threats to Bolander's water-hemlock are
 24 development, competition from nonnative plants, and hydrological alterations (California Native
 25 Plant Society 2012aa).

26 **Inland Dune Plants**

27 **Hoover's Cryptantha**

28 Hoover's cryptantha, which has a CRPR of 1A, was last seen in 1939 (California Native Plant Society
 29 2012aaa). The historic range of Hoover's cryptantha was the northern and central San Joaquin
 30 Valley (Kelley et al. 2012 p. 463). It was collected while growing in coarse, sandy soils (Johnston
 31 1937). Natural community types in the study area that may provide habitat for Hoover's cryptantha
 32 are inland dune scrub and grassland (Figure 12-59). Hoover's cryptantha was collected in 1908 in
 33 CZ 10 from sand hills east of Antioch, but the exact location is unknown and the species may have
 34 been extirpated because of development (California Department of Fish and Wildlife 2013).

35 **Antioch Dunes Buckwheat**

36 Antioch Dunes buckwheat, which has a CRPR of 1B.1, is known from a single occurrence in the
 37 Antioch Dunes in Contra Costa County (Reveal 2007). Habitat for Antioch Dunes buckwheat in the
 38 study area is limited to inland dune scrub (Figure 12-59). The occurrence of Antioch Dunes
 39 buckwheat is located in CZ 10 (California Department of Fish and Wildlife 2013). A potential threat
 40 to Antioch Dunes buckwheat is competition from nonnative plants (California Native Plant Society
 41 2012dd).

1 **Mt. Diablo Buckwheat**

2 Mt. Diablo buckwheat, which has a CRPR of 1B.1, was historically known from Alameda, Contra
3 Costa, and Solano Counties and was recently rediscovered on Mt. Diablo (California Department of
4 Fish and Wildlife 2013; California Native Plant Society 2012ee). Potential habitat for Mt. Diablo
5 buckwheat in the study area consists of grassland and inland dune scrub. Two occurrences of Mt.
6 Diablo buckwheat have been reported within CZ 10 and CZ 11 (Figure 12-59) (California
7 Department of Fish and Wildlife 2013). The primary threat to Mt. Diablo buckwheat has been
8 habitat loss, and the remaining population is potentially threatened by trampling and competition
9 from nonnative plant (California Native Plant Society 2012ee).

10 **Contra Costa Wallflower**

11 Contra Costa wallflower, is federally and state-listed as endangered and has a CRPR of 1B.1. Contra
12 Costa wallflower is known only from three occurrences on the Antioch Dunes in Contra Costa
13 County (California Department of Fish and Wildlife 2013), which fall within CZ 10 (Figure 12-59).
14 Habitat for Contra Costa wallflower in the study area is restricted to inland dune scrub. Threats to
15 Contra Costa wallflower are agricultural conversion, industrial development, mining, and
16 competition from nonnative plants (California Native Plant Society 2012ff).

17 **Antioch Dunes Evening-Primrose**

18 Antioch Dunes evening-primrose is federally and state-listed as endangered and has a CRPR of 1B.1.
19 Antioch Dunes evening-primrose is endemic to the Antioch Dunes in Contra Costa County, although
20 it has been introduced at several transplantation sites (California Department of Fish and Wildlife
21 2013). Potential habitat for Antioch Dunes evening-primrose in the study area is restricted to inland
22 dune scrub. The native occurrences of Antioch Dunes evening-primrose in the study area are located
23 in CZ 10 (Figure 12-59). Three transplant sites are located in CZ 5 (California Department of Fish
24 and Wildlife 2013). Threats to Antioch Dunes evening-primrose are agriculture, mining, competition
25 from nonnative plants, and industrial development (California Native Plant Society 2012qq).

26 **Nontidal Wetland Plants**

27 **Watershield**

28 Watershield, which has a CRPR of 2.3, is known from scattered occurrences in northern and central
29 California, although it has a world-wide distribution (Rosatti 2012). It is an aquatic species that
30 occurs in ponds and slow streams (Rosatti 2012). Nontidal perennial aquatic and nontidal
31 freshwater perennial emergent wetland are the natural community types in the study area that may
32 provide habitat for watershield (Figure 12-60). Watershield occurrences have been reported within
33 CZ 4 (one record) and CZ 5 (one record) and adjacent to the eastern boundary of CZ 6 (one record)
34 (California Department of Fish and Wildlife 2013).

35 **Bristly Sedge**

36 Bristly sedge, which has a CRPR of 2.1, is known from scattered occurrences in California, primarily
37 in Northern California; it also occurs in Oregon, Washington, and elsewhere in North America (Zika
38 et al 2012 p. 1322; California Department of Fish and Wildlife 2013). It occurs in marshes at the
39 margins of sloughs and lakes (California Department of Fish and Wildlife 2013). The natural
40 community type in the study area that may provide habitat for bristly sedge is nontidal freshwater
41 perennial emergent wetland (Figure 12-60). Occurrences of bristly sedge have been reported within

1 CZ 4 (nine records), CZ 5 (seven records), and CZ 6 (two records) (California Department of Fish and
 2 Wildlife 2013). Threats to bristly sedge are road maintenance, marsh drainage, agriculture, grazing,
 3 flooding for The Delta Wetlands Project, competition from nonnative plants, and control treatments
 4 for water hyacinth (California Department of Fish and Wildlife 2013; California Native Plant Society
 5 2012w).

6 **Woolly Rose-Mallow**

7 Woolly rose-mallow, which has a CRPR of 1B.2, is known from scattered occurrences in the Cascade
 8 Range foothills, Sacramento Valley and the Delta (Hill 2012b). It grows in freshwater marsh along
 9 river banks and sloughs (Hill 2012b; California Department of Fish and Wildlife 2013). Nontidal
 10 freshwater perennial emergent wetland, tidal freshwater emergent wetland, and valley/foothill
 11 riparian are the natural community types in the study area that provide habitat for woolly rose-
 12 mallow (Figure 12-60). Woolly rose-mallow occurrences have been reported within and adjacent to
 13 CZ 1 (two records), CZ 3 (nine records), CZ 4 (10 records), CZ 5 (27 records), CZ 6 (49 records), CZ 7
 14 (two records), CZ 8 (14 records), and CZ 9 (seven records) (California Department of Fish and
 15 Wildlife 2013). Threats to woolly rose-mallow are habitat disturbance, development, agriculture,
 16 recreational activities, weed control measures, erosion, and channelization of the Sacramento River
 17 and its tributaries (California Native Plant Society 2012kk).

18 **Eel-Grass Pondweed**

19 Eel-grass pondweed, which has a CRPR of 2.2, is known in California from scattered occurrences in
 20 the southern interior North Coast Ranges, the Central Valley, and the Modoc Plateau (Hellquist et al.
 21 2012 p. 1501). It is a perennial aquatic species that grows in ponds, lakes and streams (Hellquist et
 22 al. 2012 p. 1501). Natural community types in the study area that provide potential habitat for eel-
 23 grass pondweed consist of nontidal perennial aquatic and nontidal freshwater perennial emergent
 24 wetland. One occurrence of eel-grass pondweed has been reported in CZ 6 (Figure 12-60) (California
 25 Department of Fish and Wildlife 2013).

26 **Sanford's Arrowhead**

27 Sanford's arrowhead, which has a CRPR of 1B.2, is known from widely scattered locations in the
 28 North Coast, Klamath ranges, Cascade Range foothills, Central Valley, and South Coast (Turner et al.
 29 2012). It occurs in freshwater ponds, marshes, streams and ditches with standing or slow-moving
 30 water (California Department of Fish and Wildlife 2013). Natural community types in the study area
 31 that provide potential habitat for Sanford's arrowhead are nontidal perennial aquatic and tidal and
 32 nontidal freshwater perennial emergent wetland (Figure 12-60). Occurrences of Sanford's
 33 arrowhead have been reported within or abutting CZ 2 (two records), CZ 3 (three records), CZ 4
 34 (seven records), CZ 5 (10 records), and CZ 6 (one record) (California Department of Fish and
 35 Wildlife 2013). Threats to Sanford's arrowhead are grazing, development, recreational activities,
 36 competition with nonnative plants, road widening, and channel alteration (California Native Plant
 37 Society 2012ss).

38 **Marsh Skullcap**

39 Marsh skullcap, which has a CRPR of 2.2, occurs in the northern Sierra Nevada and Modoc Plateau
 40 (Olmstead 2012 p. 856). Disjunct populations have been reported from the Delta (California
 41 Department of Fish and Game 2013). It occurs in marshes, wet meadows, and other wetland
 42 communities, often on streambanks (Olmstead 2012 p. 856, California Department of Fish and

1 Wildlife 2013). Natural community types in the study area that provide potential habitat for marsh
 2 skullcap consist of tidal and nontidal freshwater perennial emergent wetland and valley/foothill
 3 riparian (Figure 12-60). Marsh skullcap occurrences have been reported in CZ 4 (one record), CZ 5
 4 (two records), and CZ 6 (three records) (California Department of Fish and Wildlife 2013). Potential
 5 threats include hydrology alteration (California Native Plant Society 2012tt).

6 **12.1.4 Invasive and Noxious Plant Species**

7 This section discusses the applications of the terms *invasive plants* and *noxious weeds*, defines
 8 invasive plants for the purposes of this EIR/EIS chapter, provides general discussion on the effects
 9 of invasive plants on native species and natural communities, and identifies the invasive species that
 10 primarily affect the natural communities in the study area. The invasive species discussed below
 11 may affect more than one natural community. Information about the role of invasive plants as
 12 stressors to native fisheries is provided in Chapter 11, *Fish and Aquatic Resources*.

13 **12.1.4.1 Definitions**

14 The study area contains both aquatic and terrestrial plant species that have been designated as
 15 invasive plants and/or noxious weeds. Although these two descriptive terms are sometimes used
 16 interchangeably, it is important to note that there are implications associated with the use of each
 17 term. The term noxious weed is a designation used by government agencies, such as USDA and the
 18 California Department of Food and Agriculture (CDFA), for plant species that have been identified as
 19 pests by law or regulation. Invasive plants may be considered as such from a scientific perspective
 20 because of their ability to spread to areas that are far from their point of introduction (Richardson et
 21 al. 2000: 93). Plant species can also be identified as invasive from a political perspective through
 22 formal recognition by non-governmental organizations, such as the California Invasive Plant Council,
 23 which maintains a list of invasive plants that threaten California's wildlands. For the purpose of this
 24 EIR/EIS, invasive plants are species that have been identified as noxious weeds by USDA or CDFA, or
 25 as invasive plants by the California Invasive Plant Council (Cal-IPC) (California Invasive Plant
 26 Council 2006 and 2007; California Department of Food and Agriculture 2010; U.S. Department of
 27 Agriculture 2012).

28 **12.1.4.2 General Effects on Native Species and Natural Communities**

29 According to the California Department of Fish and Game's *California Aquatic Invasive Species*
 30 *Management Plan*, invasive species threaten the diversity or abundance of native species through
 31 competition for resources, predation, parasitism, hybridization with native populations,
 32 introduction of pathogens, or physical or chemical alteration of the invaded habitat (California
 33 Department of Fish and Game 2008a:ix). Invasive plants can change the invaded habitat by altering
 34 fire regimes, hydrology (e.g., sedimentation and erosion), light availability, nutrient cycling, and soil
 35 chemistry (California Invasive Plant Council 2006:1). Unlike the native plants they displace, many
 36 invasive plant species do not provide the food, shelter, or other habitat components on which many
 37 native fish and wildlife species depend. Invasive species also have the potential to harm human
 38 health and the economy by adversely affecting natural ecosystems, water delivery, flood protection
 39 systems, recreation, agricultural lands, and developed areas (California Department of Fish and
 40 Game 2008a: ix, xi).

12.1.4.3 Invasive Plant Species in Natural Communities

The six counties that overlap with the study area contain more than 250 plants that have been identified as invasive by Cal-IPC (Calflora 2012). Invasive species are present in all of the natural communities in the study area. A discussion of the invasive species that primarily affect each natural community is provided below.

Tidal Perennial Aquatic

Invasive plants have exhibited a pronounced negative effect on the tidal perennial aquatic natural community and the special-status species that inhabit it. Water hyacinth and Brazilian waterweed are the two most well-studied aquatic invasive plant species in this natural community. Additional information about the role of aquatic invasive plants as stressors to native fisheries is provided in Chapter 11, *Fish and Aquatic Resources*.

Water hyacinth, a floating perennial, has been designated as a “C”² weed by CDFA and has a “High”³ weed rating from Cal-IPC (California Invasive Plant Council 2006; California Department of Food and Agriculture 2010). Water hyacinth is distributed nearly worldwide; it occurs throughout California but the highest density of reported occurrences is in the Delta (DiTomaso and Healy 2003: 52–54; California Invasive Plant Council 2012). Water hyacinth has a high growth rate in favorable conditions and forms dense, floating mats that clog waterways, displaces native flora and fauna, supports habitat for mosquitoes, and changes the amount of dissolved oxygen, pH, and temperature in affected waters (DiTomaso and Healy 2003: 52–54). Water hyacinth reproduces by seeds and vegetatively via stolons; dispersal occurs through water (e.g., flooding) and human activities (e.g., fishing and boating) or by sticking to the feathers or feet of waterfowl (DiTomaso and Healy 2003: 52–54).

Brazilian waterweed, a submerged perennial, has also been designated as a ‘C’ weed by CDFA and has a ‘High’ weed rating from Cal-IPC (California Invasive Plant Council 2006; California Department of Food and Agriculture 2010). Brazilian waterweed occurs throughout the U.S.; most of the reported occurrences in California are in northern California, particularly in the Delta (California Invasive Plant Council 2012). Brazilian waterweed forms dense stands or subsurface mats that displace native flora and fauna, restrict water flow, increase flooding, clog pumps and boat propellers, and decrease recreational use of waterbodies (DiTomaso and Healy 2003: 96–105). Brazilian waterweed reproduces vegetatively by stolons and stem fragments; dispersal occurs through water, waterfowl, and human activities (e.g., fishing and boating) (DiTomaso and Healy 2003: 96–105).

South American spongeplant, a submerged aquatic perennial, is a more recently identified aquatic invasive plant threat. South American spongeplant, which was identified in the Delta in 2008, has been designated by CDFA as an “A” rated pest⁴. South American spongeplant has the capacity to

² State-endorsed holding action and eradication only when found in a nursery; action related to halt the spread outside nurseries is at the discretion of the county agricultural commissioner.

³ Species that have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure; their reproductive biology and other attributes facilitate moderate to high dispersal rates and establishment (California Invasive Plant Council 2006:3).

⁴ An “A” rated invasive plant is a pest of known economic or environmental detriment and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment.

1 rapidly disperse, cover large areas of open water, degrade fish and wildlife habitat, and interfere
 2 with pumping and irrigation systems. South American spongeplant reproduces vegetatively and by
 3 seeds; dispersal is facilitated by wind, currents, tidal action, waterfowl, and human activities (e.g.,
 4 boating). (Anderson and Akers 2011: 4, 5).

5 **Tidal Mudflat**

6 There are no available data regarding the impacts of nonnative invasive species on this community.
 7 Where tidal mudflat exists within the valley/foothill riparian natural community, problematic plant
 8 species are likely to include giant reed and perennial pepperweed. Additionally, water hyacinth
 9 (discussed above) seedlings frequently establish in mud along shorelines with fluctuating water
 10 levels (DiTomaso and Healy 2003: 52–54).

11 Giant reed is a perennial grass that has been designated as a “B”⁵ weed by CDFG and has a “High”
 12 weed rating from Cal-IPC (California Invasive Plant Council 2006; California Department of Food
 13 and Agriculture 2010). Giant reed occurs in river valleys in central and northern California, in the
 14 San Francisco Bay area, and is spreading in the north coast (California Invasive Plant Council 2012).
 15 Giant reed, which can tolerate some salinity, forms dense monocultures that displace native flora,
 16 reduce wildlife habitat, amplify siltation and flooding, and increase the susceptibility of riparian
 17 areas to fire due to its high flammability. Giant reed reproduces vegetatively from rhizomes, rhizome
 18 fragments, and stem fragments (DiTomaso and Healy 2003: 254–262). Giant reed is spreading in
 19 tidal areas, where it frequently occurs on the backside of levees adjacent to sloughs (Vaghti and
 20 Keeler-Wolf 2004: 35).

21 Perennial pepperweed, a perennial, has also been designated as a “B” weed by CDFG and has a
 22 “High” weed rating from Cal-IPC (California Invasive Plant Council 2006; California Department of
 23 Food and Agriculture 2010). Perennial pepperweed occurs throughout the western United States
 24 and is widespread in California (DiTomaso and Healy 2003: 171–175; California Invasive Plant
 25 Council 2012). Perennial pepperweed can tolerate saline and alkaline conditions and forms dense
 26 colonies that displace native flora (DiTomaso and Healy 2003: 171–175). Perennial pepperweed
 27 reproduces by seed and vegetatively by creeping roots and root fragments (DiTomaso and Healy
 28 2003: 171–175).

29 **Tidal Brackish Emergent Wetland**

30 Invasive plants have exerted detrimental effects on the tidal brackish emergent wetland and the
 31 special-status species that occur there. The most well-studied invasive plant species in this natural
 32 community is perennial pepperweed (also discussed above). Other invasive plants that can
 33 negatively affect this natural community are fennel, giant reed (discussed above), pampas grass,
 34 barbglass, and rabbitsfoot grass.

35 Vegetation mapping studies in Suisun Marsh and the San Francisco Estuary found that perennial
 36 pepperweed occurs most frequently and/or is spreading in tidal wetlands (Vaghti and Keeler-Wolf
 37 2004:35; Boul et al. 2007: 20; Environmental Science Associates 2007: 6-2). The displacement by
 38 perennial pepperweed represents a substantial threat to the population sustainability of soft bird's-

⁵ A “B” rated invasive plant is a pest of known economic or environmental detriment and, if present in California, it is of limited distribution. If found in California, they are subject to state endorsed holding action and eradication only to provide for containment (i.e., when in a nursery). At the discretion of the county agricultural commissioner they are subject to eradication, containment, suppression, control, or other holding action.

1 beak, a BDCP covered species that occurs in this natural community (Grewell 2005: 1, 61; U.S. Fish
2 and Wildlife Service 2009d: 13). Perennial pepperweed is also considered a major threat to Suisun
3 thistle, a BDCP covered species that occurs only in the salt and brackish marshes within Suisun
4 Marsh (Fiedler et al. 2007: 211–212; U.S. Fish and Wildlife Service 2009c: 2, 11).

5 Fennel, a perennial herb, has a “High” weed rating from Cal-IPC (California Invasive Plant Council
6 2006). Fennel occurs throughout California, and dense local populations have been reported in the
7 San Francisco Bay region, Santa Cruz Island, Palos Verdes peninsula, and Camp Pendleton
8 (California Invasive Plant Council 2012). Fennel occurs in disturbed areas, particularly ruderal sites
9 adjacent to fresh or brackish water and on the banks of creeks, estuaries, and bays (Klinger 2000:
10 198–202). Fennel alters the vegetative structure and composition of natural communities, possibly
11 by outcompeting native species for resources (Klinger 2000: 198–202). Fennel spreads from root
12 crowns and seeds that are dispersed by wildlife, humans (e.g., vehicular traffic, clothing), and water
13 (Klinger 2000: 198–202; California Invasive Plant Council 2012).

14 Pampas grass, a perennial grass, has a “High” weed rating from Cal-IPC (California Invasive Plant
15 Council 2006). Pampas grass is found in coastal areas, the Coast Ranges, the Central Valley, the
16 Mojave Desert, and the western Traverse Ranges (California Invasive Plant Council 2012). Pampas
17 grass, along with the nonnative genotype of common reed, typically colonizes along channels, in the
18 marsh plain transition zone, and along the upland/marsh transition zone. Pampas grass reproduces
19 via seeds that are dispersed by wind (California Invasive Plant Council 2012).

20 Additionally, nonnative barbgrass and rabbitsfoot grass threaten the sustainability of soft bird’s-
21 beak by functioning as ineffective host plants that result in seed mortality (Grewell 2005: 1).

22 **Tidal Freshwater Emergent Wetland**

23 The primary invasive plants that affect the tidal freshwater emergent wetland natural community
24 are perennial pepperweed and giant reed, which are discussed above.

25 **Valley/Foothill Riparian**

26 The susceptibility of riparian areas to invasion by invasive plants appears to be strongly determined
27 by local landscape structure and disturbance regimes for a particular site (Planty-Tabacchi et al.
28 1996: 604, 605). In the study area, the primary invasive species that can negatively affect the
29 valley/foothill riparian natural community are giant reed (discussed above), perennial pepperweed
30 (also discussed above), and red sesbania. Perennial pepperweed can spread rapidly in riparian
31 floodplain areas (Hogle et al. 2006: 8). Other invasive species that occur in this natural community
32 are black locust, tamarisk (multiple species), and Himalayan blackberry.

33 Red sesbania has been designated as a “B” weed by CDFA and has a “High” weed rating from Cal-IPC
34 (California Invasive Plant Council 2006; California Department of Food and Agriculture 2010). Red
35 sesbania can form dense thickets that displace native flora and fauna (Platenkamp and Hunter 2003:
36 114). Red sesbania establishes in moist, open substrates in riparian areas, marshes, and the margins
37 of ponds, canals, and ditches (DiTomaso and Healy 2003: 7). Thickets on channel banks, gravel bars,
38 and instream islands may also cause a substantial increase in hydraulic roughness (i.e., flooding and
39 erosion)(Platenkamp and Hunter 2003: 4, 5).

1 **Nontidal Perennial Aquatic**

2 The primary invasive plants in the nontidal perennial aquatic natural community are Brazilian
3 waterweed (discussed above), Eurasian watermilfoil, and water hyacinth (discussed above).

4 Eurasian watermilfoil, a submersed aquatic perennial, has been designated as a “C” weed by CDFA
5 and has a “High” weed rating from Cal-IPC (California Invasive Plant Council 2006; California
6 Department of Food and Agriculture 2010). Similar to Brazilian waterweed and water hyacinth,
7 Eurasian watermilfoil forms thick mats at the water surface that displace native aquatic flora and
8 fauna, shade aquatic habitat, detract from recreational use of waterways, and clog irrigation pipes
9 and canals (San Francisco Estuary Institute 2003:11). Eurasian watermilfoil inhabits freshwater
10 lakes, ponds, and slow-moving canals in northern and central California (California Invasive Plant
11 Council 2012). Eurasian watermilfoil reproduces by rhizomes, stem fragments, and axillary buds
12 (DiTomaso and Healy 2003: 93). The dispersal of stem fragments is facilitated by waterfowl,
13 mechanical harvesting, boating, and dumping aquarium or pond contents (DiTomaso and Healy
14 2003: 93).

15 **Nontidal Freshwater Perennial Emergent Wetland**

16 The primary invasive plants that affect the nontidal freshwater perennial emergent wetland natural
17 community are Brazilian waterweed, Eurasian watermilfoil, and water hyacinth, which are
18 discussed above and which form dense mats that clog waterways and displace native flora and
19 fauna.

20 **Alkali Seasonal Wetland Complex**

21 The primary invasive plants that affect or could affect the alkali seasonal wetland complex natural
22 community in the study area are Italian ryegrass and perennial pepperweed (discussed above).

23 Italian ryegrass has a “Moderate”⁶ weed rating from Cal-IPC and is found throughout California
24 (California Invasive Plant Council 2006; California Invasive Plant Council 2012). Italian ryegrass
25 forms dense stands in areas adjacent to alkali sinks and appears to have ecotypes that are more
26 tolerant of the severe conditions in inundated alkali sinks, which could threaten native alkali species
27 (Dawson et al. 2007: 328, 333). As previously mentioned, perennial pepperweed can tolerate
28 alkaline conditions (DiTomaso and Healy 2003: 171–175). There are no data describing the effects
29 of invasive plant species on wildlife species in this natural community.

30 **Vernal Pool Complex**

31 The invasive plants in the vernal pool complex invade the pool interiors or the adjacent grasslands.

32 Waxy manna grass is a primary invasive plant in pool interiors. Waxy manna grass occurs throughout
33 the Central Valley from Shasta County to Fresno County and has a “Moderate” weed rating from Cal-
34 IPC (California Invasive Plant Council 2012). The invasion of vernal pools by waxy manna grass is

⁶ Species that have substantial and apparent (but typically not severe) ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread (California Invasive Plant Council 2006:3).

1 widespread and was undetected until relatively recently because of taxonomic confusion with a
2 native species (Gerlach et al. 2009: 92).

3 The primary invaders that have a substantial known or potential effect on grasslands in vernal pool
4 complexes are perennial pepperweed (also discussed above), yellow starthistle, medusahead,
5 purple starthistle, barb goatgrass, Italian ryegrass, and Italian thistle (Swiecki and Bernhardt 2002:
6 34; Witham 2003: 18; Witham 2006: 41–46; Hopkinson et al. 2008: 20–24).

7 Yellow starthistle, an annual herb, has been designated as a “C” weed by CDFA and has a “High”
8 weed rating from Cal-IPC (California Invasive Plant Council 2006; California Department of Food
9 and Agriculture 2010). Yellow starthistle displaces native flora and fauna, depletes soil moisture in
10 annual grasslands, and is toxic to horses (DiTomaso and Gerlach 2000: 103). Yellow starthistle is
11 widely distributed throughout California and reproduces from seeds; a large individual can generate
12 almost 75,000 seeds that are primarily transported by human activities (DiTomaso and Gerlach
13 2000: 103; California Invasive Plant Council 2012).

14 Medusahead, an annual grass, has been designated as a “C” weed by CDFA and has a “High” weed
15 rating from Cal-IPC (California Invasive Plant Council 2006; California Department of Food and
16 Agriculture 2010). Medusahead is distributed throughout northwestern California and reproduces
17 through seeds (California Invasive Plant Council 2012). Medusahead negatively affects natural
18 communities by outcompeting native flora, forming a layer of thatch that thwarts the germination
19 and survival of native plants, increasing the risk of fire, tying up nutrients, and being palatable to
20 livestock and native fauna wildlife only at the onset of the growing season (Kan and Pollack 2000:
21 310, 311).

22 Purple starthistle, an annual, biennial, or perennial herb, has been designated as a “B” weed by CDFA
23 and has a “Moderate” weed rating from Cal-IPC (California Invasive Plant Council 2006; California
24 Department of Food and Agriculture 2010). The highest density of purple starthistle occurrences is
25 in the northern and central Coast Ranges (California Invasive Plant Council 2012). Purple starthistle
26 reproduces by seeds, frequently displaces desired native vegetation (Randall 2000: 96; California
27 Invasive Plant Council 2012).

28 Barb goatgrass, an annual grass, has been designated as a “B” weed by CDFA and has a “High” weed
29 rating from Cal-IPC (California Invasive Plant Council 2006; California Department of Food and
30 Agriculture 2010). The highest density of barb goatgrass occurrences is in the Sierra foothill
31 grasslands of central California (California Invasive Plant Council 2012). Barb goat grass is
32 unpalatable to cattle and can wound livestock by embedding in their mouths or eyes (California
33 Invasive Plant Council 2012). Barb goatgrass reproduces by seed.

34 Italian thistle, an annual or biennial herb grass, has been designated as a “C” weed by CDFA and has
35 a “Limited”⁷ weed rating from Cal-IPC (California Invasive Plant Council 2006; California
36 Department of Food and Agriculture 2010). Italian thistle has been reported throughout the Central
37 Valley, Sierra foothill grasslands, and along the coast (California Invasive Plant Council 2012). Italian
38 thistle reproduces by seed, displaces native flora, is generally avoided as forage because of the

⁷ Species that are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic (California Invasive Plant Council 2006:3).

1 spines, and has the potential to spread grass fires to tree canopies in oak savannah (Bossard and
2 Lichti 2000:88).

3 **Managed Wetland**

4 The primary invasive species that affect managed wetlands are comparable to those discussed
5 above for tidal brackish emergent wetland and tidal freshwater emergent wetland natural
6 communities.

7 **Other Natural Seasonal Wetland**

8 The invasive species that primarily affect the other natural seasonal wetland community are waxy
9 mannagrass, Italian ryegrass, and perennial pepperweed, which are discussed above (Hogle et al.
10 2006; Dawson et al. 2007; Gerlach et al. 2009).

11 **Grassland**

12 The primary invasive species that affect the grassland natural community in the study area are
13 comparable to those that occur in grassland in vernal pool complexes (discussed above).

14 **Inland Dune Scrub**

15 The invasive species found in the inland dune scrub in the study area are typically dominated by
16 ripgut brome, yellow starthistle, telegraph weed, wild lettuce, and wild radish. Ripgut brome, yellow
17 starthistle (also discussed above), vetch (multiple species), and Russian thistle are the invasive
18 plants of primary concern at Antioch Dunes NWR. The spread of invasive plants is the major threat
19 to the federally listed Antioch Dunes evening primrose and Contra Costa wallflower because
20 invasive plants outcompete native vegetation for resources (e.g., sunlight, water) and stabilize the
21 remaining dune areas; the Antioch Dunes evening primrose needs regular disturbance for
22 germination. Additionally, the spread of ripgut brome and yellow starthistle on the refuge reduces
23 the amount of buckwheat available to the federally listed Lange's metalmark butterfly. (U.S. Fish and
24 Wildlife Service 2001:24, 28, 31, 42).

25 Ripgut brome, an annual grass, has a "Moderate" rating from Cal-IPC and is distributed throughout
26 California (California Invasive Plant Council 2006 and 2007; California Invasive Plant Council 2012).
27 Ripgut brome displaces native vegetation and increases wildfire frequency because of its
28 flammability during the dry season (California Invasive Plant Council 2012). Ripgut brome spreads
29 from seeds that are dispersed through the movement of water and soil or carried by animals, people,
30 and equipment (California Invasive Plant Council 2012).

31 Russian thistle, an annual herb, has been designated as a "C" weed by CDFA and has a "Limited"
32 weed rating from Cal-IPC (California Invasive Plant Council 2006 and 2007; California Department
33 of Food and Agriculture 2010). Russian thistle occurs throughout California and can be a fire hazard,
34 impede traffic, and act as the host plant for the beet leaf-hopper, an agricultural pest (California
35 Invasive Plant Council 2012). Russian thistle spreads via seeds.

36 **Cultivated Lands**

37 Cultivated lands in the study area consist primarily of crops that are intermixed with small areas of
38 natural habitat, such as riparian corridors or wetlands. Past and ongoing ground disturbance (e.g.,
39 tillage and irrigation) associated with cultivated lands facilitate the establishment of invasive plants,

1 which colonize the perimeter of active agricultural fields and rapidly germinate in fallow fields.
 2 Maintenance activities, such as herbicide application and regular cultivation, are implemented in
 3 active fields to reduce the effects of invasive plants. Invasive plants that are commonly found in
 4 cultivated lands are wild radish, bindweed, fennel, field mustard, and Bermuda grass.

5 **12.2 Regulatory Setting**

6 Specific federal, state and local laws, regulations, policies, executive orders and plans that affect, or
 7 have the potential to affect how terrestrial biological resources are impacted, used or managed
 8 during implementation of the action alternatives are discussed in this section.

9 **12.2.1 Federal Plans, Policies, Regulations, and Executive** 10 **Orders**

11 **12.2.1.1 Sections 404 and 401 of the Clean Water Act**

12 Section 404 of the CWA requires a project applicant to obtain a permit from USACE before engaging
 13 in any activity that involves any discharge of dredged or fill material into waters of the United States,
 14 including wetlands. Section 401 of the CWA is administered by state agencies and is discussed below
 15 under state plans, policies, and regulations. Waters of the United States is defined to encompass
 16 navigable waters of the United States; interstate waters; all other waters where their use,
 17 degradation, or destruction could affect interstate or foreign commerce; tributaries to any of these
 18 waters; and wetlands that meet any of these criteria or are adjacent to any of these waters or their
 19 tributaries. Wetlands are defined under Section 404 as those areas that are inundated or saturated
 20 by surface water or groundwater at a frequency and duration sufficient to support, and that under
 21 normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated
 22 soil conditions. Wetlands must meet three delineation criteria to be subject to jurisdiction by USACE.

- 23 • They support hydrophytic vegetation (i.e., plants that grow in saturated soil).
- 24 • They have hydric soil types (i.e., soils that are wet or moist enough to develop anaerobic
 25 conditions).
- 26 • They have wetland hydrology.

27 USACE would likely have jurisdiction under Section 404 over actions associated with some elements
 28 of the action alternatives. Because the USACE jurisdiction and scope would not include an entire
 29 action alternative, USACE would likely make multiple permit decisions over the course of
 30 implementing the various elements of an action alternative (regional general permits or individual
 31 permits). As an example, it is expected that construction implementation of the water conveyance
 32 facility would require permits under the CWA.

33 In 2008, USACE and the EPA issued national regulations, known as the *Mitigation Rule* governing
 34 compensatory mitigation for activities authorized by permits issued by USACE (33 Code of Federal
 35 Regulations [CFR] Sections 325, 332), and in 2015, the USACE South Pacific Division issued *Regional*
 36 *Compensatory Mitigation and Monitoring Guidelines* (Final January 12, 2015) (Division Guidelines) to
 37 supplement the national Mitigation Rule. Compensatory mitigation under the Mitigation Rule and
 38 Division Guidelines fulfill the long standing national goal of replacing the loss of wetland and other
 39 aquatic resource acreages and functions, known as the “no net loss” goal in the National Wetlands

1 Mitigation Action Plan (U.S. Environmental Protection Agency and U.S. Army Corps of Engineers
2 2002). To achieve the no net loss goal, USACE and EPA have concluded that, where appropriate and
3 practicable, compensatory mitigation “should provide, at a minimum one for one functional
4 replacement (i.e., no net loss of values), with an adequate margin of safety.” The long-term objective
5 of the no net loss policy is to increase wetland acreages and functions nationally.

6 The Mitigation Rule defines compensatory mitigation as 1) restoring existing wetlands or
7 reestablishing former wetlands; 2) creating new wetlands in upland areas; 3) enhancing the
8 functional values of degraded wetlands; and 4) preserving wetlands restoration aquatic resources.
9 Restoration is generally the preferable form of compensatory mitigation because the likelihood of
10 success is greater while the impacts to potentially ecologically important uplands are less, as
11 compared to creation. Moreover, the potential gains in terms of aquatic resources functions are
12 oftentimes greater with restoration as compared to enhancement and preservation (33 CFR Section
13 332.3(a)(2)). The Mitigation Rule and Division Guidelines stress the benefits of a watershed
14 approach to compensatory mitigation, and compensatory mitigation generally should be located in
15 the same watershed as the impact site, and where it is most likely to successfully replace lost
16 functions and services (33 CFR Section 332.3; Division Guidelines, Section 3.2)

17 Sections 404 and 401 of the CWA are relevant to terrestrial biological resources in the study area
18 because wetlands and waters of the United States provide habitat to both special-status and
19 common terrestrial species.

20 **12.2.1.2 Endangered Species Act**

21 Pursuant to the federal ESA, USFWS and NMFS have authority over projects that may result in take
22 of a species listed as threatened or endangered under the act. *Take* is defined under the ESA, in part,
23 as killing, harming, or harassing. Under federal regulations, take is further defined to include habitat
24 modification or degradation that results, or is reasonably expected to result, in death or injury to
25 wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or
26 sheltering. If a likelihood exists that a project would result in take of a federally listed species, either
27 an incidental take permit, under Section 10(a) of the ESA, or a federal interagency consultation,
28 under Section 7 of the ESA, is required. Section 7 of the federal ESA also provides the USFWS
29 authority to regulate the adverse modification of critical habitat for listed species, when the action
30 requires federal funding or approval. The potential for federally listed wildlife and plant species to
31 occur in the study area is discussed above in Section 12.1.3, *Special-Status Species*. A discussion of
32 critical habitat in the study area is presented in Section 12.1.3.1.

33 **12.2.1.3 Fish and Wildlife Coordination Act**

34 The Fish and Wildlife Coordination Act (FWCA) ensures that fish and wildlife receive equal
35 consideration with water resources development during planning and construction of federal water
36 projects by requiring that the federal agencies consult with USFWS and the state wildlife resources
37 agency before the waters of any stream or other body of water are impounded, diverted, deepened
38 or otherwise controlled or modified. The FWCA requires that the views of USFWS and the state
39 agency be considered when evaluating impacts and determining mitigation needs. NEPA regulations
40 further require that an EIS meet the consultation requirements of the FWCA. Therefore, the FWCA
41 consultation requirements for the action alternatives are being satisfied through the EIR/EIS
42 process. Terrestrial biological resources are a principal focus of the FWCA coordination occurring
43 for the action alternative conservation planning process.

1 **12.2.1.4 CALFED Bay-Delta Program**

2 Federal and state agencies developed a regulatory and management strategy to implement a long-
3 term comprehensive plan to restore ecological health and improve water management for beneficial
4 uses of the Bay-Delta system. The federal agencies involved in the CALFED Bay-Delta Program are
5 the U.S. Bureau of Reclamation (Reclamation), USFWS, NMFS, USACE, and the U.S. Environmental
6 Protection Agency (EPA). The state agencies involved in the program are CDFW, DWR, and the State
7 Water Resources Control Board (State Water Board) (CALFED Bay-Delta Program 2000).

8 In August of 2000, the CALFED Record of Decision was signed and included eleven program
9 elements to improve the health and sustainability of the Bay-Delta ecosystem so that it may become
10 a more reliable source of drinking water and irrigation water for 25 million Californians and 7.5
11 million acres of agricultural land. Program goals, milestones, and actions are outlined in the CALFED
12 Multi-Species Conservation Strategy. CDFW and its federal partner agencies are completing a
13 Conservation Strategy for Stage 2 of ERP (through 2030). Although the CALFED ROD remains in
14 effect and many of the state, federal and local projects begun under CALFED continue, future
15 direction and administration must be coordinated through the Delta Stewardship Council and be
16 consistent with the pending Delta Plan, which is discussed below in State Plans, Policies, and
17 Regulations.

18 The CALFED program has four objectives.

- 19 ● Provide optimal water quality.
- 20 ● Improve and increase aquatic and terrestrial habitats, and improve ecological functions in the
21 Bay-Delta Estuary to support sustainable populations of diverse plant and animal species.
- 22 ● Reduce shortages between water supplies and current and projected demands on the system.
- 23 ● Reduce the risk of failure of Delta levees that protect land use and associated economic
24 activities, water supply, and other infrastructure and ecosystems.

25 **12.2.1.5 Migratory Bird Treaty Act**

26 The Migratory Bird Treaty Act (MBTA) domestically implements a series of international treaties
27 that provide for migratory bird protection. The MBTA authorizes the Secretary of the Interior to
28 regulate the taking of migratory birds. The act further provides that it shall be unlawful, except as
29 permitted by regulations, "to pursue, take, or kill any migratory bird, or any part, nest or egg of any
30 such bird..." (Title 16, USC, Section 703). This prohibition includes both direct and indirect acts,
31 although harassment and habitat modification are not included unless they result in direct loss of
32 birds, nests, or eggs. The current list of species protected by the MBTA can be found in the March 1,
33 2010 Federal Register (75 FR 9281). This list contains several hundred species including essentially
34 all native birds. Permits for take of nongame migratory birds can be issued only for specific
35 activities, such as scientific collecting, rehabilitation, propagation, education, taxidermy, and
36 protection of human health and safety and of personal property. USFWS publishes a list of birds of
37 conservation concern (BCC) to identify migratory nongame birds that are likely to become
38 candidates for listing under ESA without additional conservation actions. The BCC list is intended to
39 stimulate coordinated and collaborative conservation efforts among federal, state, tribal, and private
40 parties. Implementation of the action alternatives has the potential to both positively and negatively
41 affect bird species protected under the MBTA.

1 **12.2.1.6 Rivers and Harbors Act**

2 Under Section 10 of the Rivers and Harbors Act of 1899, the construction of structures in, over, or
 3 under, excavation of material from, or deposition of material into navigable waters are regulated by
 4 USACE. Navigable waters of the United States are defined as those waters subject to the ebb and flow
 5 of the tide shoreward to the mean high-water mark or those that are currently used, have been used
 6 in the past, or may be susceptible for use to transport interstate or foreign commerce. A Letter of
 7 Permission or permit from USACE is required prior to any work begun within navigable waters.
 8 Numerous terrestrial species that are addressed in this EIR/EIS require navigable waters for a part
 9 of their habitat.

10 **12.2.1.7 Comprehensive Conservation Plans for National Wildlife Refuges**

11 USFWS is directed to develop comprehensive conservation plans (CCP) to guide the management
 12 and resource use for each refuge of the National Wildlife Refuge System under requirements of the
 13 National Wildlife Refuge Improvement Act of 1997. Refuge planning policy also directs the process
 14 and development of CCPs. A CCP provides a description of the desired future conditions and long-
 15 range guidance necessary for meeting refuge purposes. It also guides management decisions and
 16 sets forth strategies for achieving refuge goals and objectives within a 15-year timeframe. The
 17 USFWS adopted a CCP for Stones Lakes NWR in 2007. Many of the species analyzed in the EIR/EIS
 18 are affected by the management practices of the Stone Lakes NWR.

19 **12.2.1.8 North American Waterfowl Management Plan and Central Valley** 20 **Joint Venture**

21 In 1986, the United States and Canada signed the North American Waterfowl Management Plan
 22 (NAWMP). It provides a broad framework for waterfowl management and includes
 23 recommendations for wetland and upland habitat protection, restoration, and enhancement.
 24 Implementing the NAWMP is the responsibility of designated joint ventures. The Central Valley
 25 Habitat Joint Venture formally organized in 1988 as one of the original six priority joint ventures
 26 formed under the NAWMP. Renamed the Central Valley Joint Venture in 2004, the Management
 27 Board now oversees the membership of 21 federal and state agencies and conservation
 28 organizations. The organization's 2006 Implementation Plan broadens the scope of conservation
 29 activities to include objectives for shorebirds, waterbirds, and riparian songbirds. The management
 30 objectives of the NAWMP affect several of the bird species analyzed in the EIR/EIS.

31 **12.2.1.9 Federal Noxious Weed Act and Code of Federal Regulations (Title** 32 **7, Part 360)**

33 These laws and regulations are primarily concerned with the introduction of federally designated
 34 noxious weed plants or seeds across the United States' international borders. The Federal Noxious
 35 Weed Act (7 USC Sections 2801–2813) also regulates the interstate movement of designated
 36 noxious weeds under USDA's permit system. This act would be a factor in any decisions to import
 37 construction materials and equipment as part of CM1, including aggregate, from out-of-state or out-
 38 of-country.

1 **12.2.1.10 Executive Order 11990: Protection of Wetlands**

2 Executive Order 11990 (May 24, 1977) established the protection of wetlands and riparian systems
 3 as the official policy of the federal government. The executive order requires all federal agencies to
 4 consider wetland protection as an important part of their policies, take action to minimize the
 5 destruction, loss, or degradation of wetlands, and preserve and enhance the natural and beneficial
 6 values of wetlands. Most of the terrestrial habitats considered in this chapter are wetlands or are
 7 immediately adjacent to wetlands.

8 **12.2.1.11 Executive Order 13112: Invasive Species**

9 Executive Order 13112 (February 3, 1999) directs all federal agencies to prevent and control the
 10 introduction and spread of invasive nonnative species in a cost-effective and environmentally sound
 11 manner to minimize their effects to economic, ecological, and human health. The executive order
 12 was intended to build upon existing laws, such as NEPA, the Nonindigenous Aquatic Nuisance
 13 Prevention and Control Act, the Lacey Act, the Plant Pest Act, the Federal Noxious Weed Act, and the
 14 ESA. The executive order established a national Invasive Species Council composed of federal
 15 agencies and departments, as well as a supporting Invasive Species Advisory Committee composed
 16 of state, local, and private entities. The council and advisory committee oversee and facilitate
 17 implementation of the executive order, including preparation of the National Invasive Species
 18 Management Plan. Federal activities addressing invasive aquatic species are now coordinated
 19 through this council and through the National Aquatic Nuisance Species Task Force. Federal
 20 agencies with any decision-making authority over the action alternatives and its implementation
 21 must ensure that construction and restoration actions do not result in the spread of invasive species
 22 into terrestrial habitats.

23 **12.2.1.12 Executive Order 13186: Responsibilities of Federal Agencies to** 24 **Protect Migratory Birds**

25 Executive Order 13186 (January 10, 2001) directs federal agencies that have, or are likely to have, a
 26 measurable negative effect on migratory bird populations to develop and implement a
 27 memorandum of understanding with USFWS to promote the conservation of migratory bird
 28 populations. The various memoranda of understanding include implementation actions and
 29 reporting procedures for each agency's formal planning process, such as preparation of resource
 30 management plans. The BDCP is a resource management plan with the potential to affect migratory
 31 birds and their habitat in the Plan Area.

32 **12.2.1.13 Executive Order 13443: Facilitation of Hunting Heritage and** 33 **Wildlife Conservation**

34 The purpose of Executive Order 13443 (August 16, 2007) is to direct federal agencies that maintain
 35 programs and activities having a measurable effect on public land management, outdoor recreation,
 36 and wildlife management to facilitate the expansion and enhancement of hunting opportunities, and
 37 the management of game species and their habitat. Proposed actions have the potential to affect
 38 game species in the Plan Area, particularly waterfowl and upland game birds.

1 **12.2.2 State Plans, Policies, and Regulations**

2 **12.2.2.1 California Endangered Species Act**

3 CESA (California Fish and Game Code Sections 2050–2116) states that all native species or
4 subspecies of a fish, amphibian, reptile, mammal, or plant and their habitats that are threatened with
5 extinction and those experiencing a significant decline that, if not halted, would lead to a threatened
6 or endangered designation will be protected or preserved.

7 Under Section 2081 of the Fish and Game Code, a permit from CDFW is required for projects that
8 could result in the take of a species that is state-listed as threatened or endangered. Under CESA,
9 *take* of a species means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch
10 capture, or kill (California Fish and Game Code, Section 86). The definition does not include *harm* or
11 *harass*, as the definition of take under ESA does. As a result, the threshold for take under CESA is
12 higher than that under ESA. For example, habitat modification is not necessarily considered take
13 under CESA. The potential for state-listed wildlife and plant species to occur in areas that could be
14 affected by the action alternatives is discussed above in Special-Status Species. The new
15 subalternatives (4A, 2D, and 5A) would comply with CESA through Section 2081.

16 **12.2.2.2 Fully Protected Species**

17 Fish and Game Code Sections 3511, 3513, 4700, and 5050 pertain to fully protected wildlife species
18 (birds in Sections 3511 and 3513, mammals in Section 4700, and reptiles and amphibians in Section
19 5050) and strictly prohibit the take of these species. CDFW cannot issue a take permit for fully
20 protected species, except under narrow conditions for scientific research or the protection of
21 livestock, or if an NCCP has been adopted. The action alternatives have the potential to affect seven
22 fully protected species (six birds and the salt marsh harvest mouse).

23 **12.2.2.3 California Native Plant Protection Act**

24 Fish and Game Code Sections 1900–1913 codify the Native Plant Protection Act of 1977 (NPPA),
25 which is intended to preserve, protect, and enhance endangered or rare native plants in the state.
26 Under Section 1901, a species is *endangered* when its prospects for survival and reproduction are in
27 immediate jeopardy from one or more causes. A species is *rare* when, although not threatened with
28 immediate extinction, it exists in such small numbers throughout its range that it may become
29 endangered if its present environment worsens. The NPPA gave the California Fish and Game
30 Commission the power to designate native plants as endangered or rare, and the act protected
31 endangered and rare plants from take. According to CDFW, a CESA Section 2081 permit for
32 incidental take of listed threatened and endangered plants from all activities is required, except for
33 activities specifically authorized by the NPPA. Because rare plants are not included under CESA,
34 mitigation measures for impacts on rare plants are specified in a formal agreement between CDFW
35 and the project proponent.

36 CNPS has developed and maintains lists of plants of special concern in California, as described above
37 under Special-Status Species. CNPS-listed species have no formal legal protection, but the values and
38 importance of these lists are widely recognized. Plants listed on CNPS Lists 1A, 1B, and 2 meet the
39 definitions of endangered under Fish and Game Code Section 1901 and may qualify for state listing.
40 Therefore, for purposes of this analysis, they are considered rare plants pursuant to Section 15380
41 of CEQA.

12.2.2.4 Section 1600 of the California Fish and Game Code

Sections 1600–1603 of the Fish and Game Code state that it is unlawful for any person or agency to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources, or to use any material from the streambeds, without first notifying CDFW. A Lake and Streambed Alteration Agreement must be obtained if effects are expected to occur. The regulatory definition of a stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks, and that supports wildlife, fish, or other aquatic life. This definition includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation. CDFW’s jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. The information contained in this chapter could be used in future applications for streambed alteration agreements associated with the construction elements of the action alternative conservation measures or Environmental Commitments.

12.2.2.5 Sections of the California Fish and Game Code Pertaining to Invasive Species

CDFW is one of the primary state agencies responsible for state efforts to prevent the introduction of new invasive species, detect and respond to introductions when they occur, and manage and prevent the spread of established invasive species. This responsibility is derived from California Fish and Game Code Sections 2116–2127, 2150–2157, 2185–2195, 2270–2272, 2300–2302, 6400–6403, and 15000 et seq. These sections relate to the importation, transfer, and possession of live wild animals, aquatic plants, and fish into the state; the placement of live aquatic animals and plants in state waters; and the operation of aquaculture industries. The various construction elements of the action alternatives have the potential to introduce or spread invasive species into natural habitats of the species considered in this chapter.

12.2.2.6 Natural Communities Conservation Planning Act

Fish and Game Code Sections 2800–2835 detail the state’s policies on the conservation, protection, restoration, and enhancement of the state’s natural resources and ecosystems. The intent of the legislation is to provide for conservation planning as an officially recognized policy that can be used as a tool to eliminate conflicts between the protection of natural resources and the need for growth and development. In addition, the legislation promotes conservation planning as a means of coordination and cooperation among private interests, agencies, and landowners, and as a mechanism for multispecies and multihabitat management and conservation. One conservation plan adopted pursuant to the NCCPA falls within the study area (the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan, which is discussed below) and at least two other NCCPs are in the planning stages. The BDCP alternatives were prepared in compliance with the NCCPA. The development of NCCPs is an alternative to obtaining take authorization under Section 2081 of the Fish and Game Code. The new subalternatives (4A, 2D, and 5A) are not being prepared in compliance with the NCCP.

12.2.2.7 Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Act definition, *waters of the state* are “any surface water or groundwater, including saline waters, within the boundaries of the state.” Although all waters of the United States that are within the borders of California are also waters of the state, the reverse is not true.

1 Therefore, California retains authority to regulate discharges of waste into any waters of the state,
 2 regardless of whether USACE has concurrent jurisdiction under CWA Section 404, and defines
 3 *discharges to receiving waters* more broadly than the CWA does.

4 Waters of the state fall under the jurisdiction of the nine RWQCBs. Under this act, each RWQCB must
 5 prepare and periodically update water quality control basin plans. Each basin plan sets forth water
 6 quality standards for surface water and groundwater, as well as actions to control nonpoint and
 7 point sources of pollution. California Water Code Section 13260 requires any person discharging
 8 waste, or proposing to discharge waste, in any region that could affect the waters of the state to file a
 9 report of discharge (an application for waste discharge requirements [WDRs]) with the applicable
 10 RWQCB. California Water Code Section 13050 authorizes the State Water Board and the affiliated
 11 RWQCB to regulate biological pollutants. Aquatic invasive plants discharged to receiving waters are
 12 an example of this kind of pollutant. Construction and restoration activities associated with the
 13 action alternatives that may discharge wastes into the waters of the state must meet the discharge
 14 control requirements of the Porter-Cologne Act.

15 **12.2.2.8 California Food and Agriculture Code**

16 More than 30 different sections of the California Food and Agriculture Code pertain to the state's
 17 mandate to prevent the introduction and spread of injurious animal pests, plant diseases, and
 18 noxious weeds. Most of these statutes and their associated regulations (Title 3 of the California Code
 19 of Regulations [CCR]) are contained in Food and Agriculture Code Sections 403, 461, 5004, 5021–
 20 5027, 5301–5310, 5321–5323, 5401–5404, 5421, 5430–5432, 5434, 5761–5763, 7201, 7206–7207,
 21 and 7501–7502. These codes describe procedures and regulations concerning: plant quarantines,
 22 regulation of noxious weed seed, emergency pest eradications to protect agriculture, pests as public
 23 nuisances, vectors of infestation and infection, the sale, transport and propagation of noxious weeds,
 24 and the protection of native species and forests from weeds. CDFA enforces most of these statutes
 25 and their relevant regulations (California Department of Fish and Game 2008a). Construction and
 26 restoration activities associated with the action alternatives must meet the pest and vector control
 27 requirements of this code.

28 **12.2.2.9 Harbors and Navigation Code**

29 Article 2, Section 64 of the Harbors and Navigation Code designates the California Department of
 30 Boating and Waterways (CDBW) as the lead state agency to cooperate with other state, local, and
 31 federal agencies to control water hyacinth, Brazilian waterweed, and South American spongeplant in
 32 the Delta, its tributaries, and Suisun Marsh. Any action alternative-related activities to restore or
 33 modify Plan Area habitats must be undertaken in cooperation with CDBW to avoid the spread of
 34 these invasive plants.

35 **12.2.2.10 Delta Protection Act of 1992**

36 The Delta Protection Act of 1992 (Water Code Section 12220) established the Delta Protection
 37 Commission (DPC) to prepare and oversee a comprehensive Land Use and Resources Management
 38 Plan (LURMP) for the Delta Primary Zone. The Primary Zone consists of the lands in the Delta's
 39 central portion that were not within either the urban limit line or sphere of influence line of any
 40 local government's general plan or studies as of January 1, 1992. The Primary Zone encompasses
 41 487,625 acres (approximately 66% of the statutory Delta) of varied land uses, waterways, and
 42 levees in parts of Contra Costa, Sacramento, San Joaquin, Solano, and Yolo Counties. The remaining

1 areas of the legal Delta are designated as the Secondary Zone and are not under Commission land
2 use jurisdiction (Delta Protection Commission 2010).

3 The DPC in 1995 adopted a LURMP for the Primary Zone to address land uses and resource
4 management—with a particular emphasis on agriculture, which was designated by the Delta
5 Protection Act as the primary use of this zone—wildlife habitat, and recreation. In 2000, the LURMP
6 policies were adopted as regulations (Title 14, CCR, Chapter 3, *Regulations Governing Land Use and*
7 *Resources Management in the Delta*); the plan was revised and reprinted in 2002.

8 The Delta Protection Act was amended in 2009 by the Sacramento-San Joaquin Delta Reform Act (SB
9 1 X7), which modified the DPC's composition and responsibilities. The DPC has since adopted an
10 updated LURMP, which became effective on November 6, 2010. It contains policies to protect the
11 Delta's unique character, expand public access and recreation, and locate new transmission lines
12 and utilities within existing corridors to minimize impacts (Delta Protection Commission 2010).
13 These policies are required to be incorporated into the local general plans of the counties with
14 jurisdiction over portions of the Primary Zone. Local planning decisions may be appealed to DPC for
15 a determination of consistency with the LURMP. Nothing in the law makes the LURMP binding on
16 state agencies such as DWR as a project proponent. For a more detailed discussion of the LURMP,
17 please see Chapter 13, *Land Use*.

18 **12.2.2.11 Delta Vision Strategic Plan**

19 The Delta Vision Blue Ribbon Task Force (Task Force) was created in 2006 by Executive Order S-17-
20 06. The Task Force was charged with creating strategies to repair ecological damage to the Delta and
21 methods for sustaining the Delta in future decades. The Delta Vision Strategic Plan (Strategic Plan)
22 was approved and adopted unanimously by the Task Force on October 17, 2008 (Governor's Delta
23 Vision Blue Ribbon Task Force 2008). The Strategic Plan is intended to ensure a reliable water
24 supply for the two-thirds of California's population that depends, in whole or in part, on water from
25 the Delta. The vision for the Delta is based on two interdependent goals: restore the Delta, and
26 create a more reliable water supply.

27 The Task Force determined that creation of a reliable water delivery system could help to restore
28 the ecosystem. It recommended that the state analyze a two-channel approach to water delivery,
29 improving the Delta's existing conveyance channel and adding a second channel to carry water to
30 export pumps. The Task Force also recommended increasing storage capacity and modifying
31 operations, which would improve water supply reliability.

32 The Task Force further recommended reduced dependence on water from the Delta in order to cut
33 the risk of a failed Delta conveyance system and lessen risks to the ecosystem. The Strategic Plan
34 acknowledged that a revitalized Delta ecosystem would require reduced diversions at critical times
35 (Governor's Delta Vision Blue Ribbon Task Force 2008). The Task Force formulated seven goals,
36 including establishing a new governing structure, enhancing the Delta's cultural, recreational, and
37 agricultural values, and promoting statewide water conservation.

38 **12.2.2.12 Delta Stewardship Council**

39 Signed by the governor in 2009, the Sacramento-San Joaquin Delta Reform Act (Water Code Section
40 85000 et seq.) created a new Delta Stewardship Council (DSC) and gave this body broad oversight of
41 Delta planning and resource management. The DSC has been tasked with developing and
42 implementing a long-term, comprehensive management plan (Delta Plan) that emphasizes the

1 coequal goals of “providing a more reliable water supply for California and protecting, restoring, and
 2 enhancing the Delta ecosystem” (Water Code Section 85300(a)) as the foundation for state decisions
 3 regarding Delta management.

4 Among other things, the Reform Act contains three specific mandates for the DSC.

- 5 • Include measures in the Delta Plan to promote statewide water conservation, water use
 6 efficiency, and sustainable use of water, as well as improvements to water conveyance/storage
 7 and operation of both to achieve the coequal goals.
- 8 • Include measures in the Delta Plan that attempt to reduce risks to people, property, and state
 9 interests in the Delta by promoting effective emergency preparedness, appropriate land uses,
 10 and strategic levee investments.
- 11 • Determine whether state or local agency projects are consistent with the Delta Plan.

12 In addition, the Reform Act requires the Delta Plan to cover five topic areas and goals.

- 13 • Increased water supply reliability
- 14 • Restoration of the Delta ecosystem
- 15 • Improved water quality
- 16 • Reduced risks of flooding in the Delta
- 17 • Protection and enhancement of the Delta

18 Although it had a deadline of December 31, 2011 to adopt a Delta Plan, the DSC continued preparing
 19 the plan until the final Delta Plan was adopted on May 16, 2013. Following adoption of the Delta
 20 Plan, covered actions are required to be consistent with the Delta Plan. Additionally, the DSC must
 21 incorporate the BDCP into the approved Delta Plan if the BDCP meets certain requirements.
 22 Specifically, CDFW must approve the BDCP as an NCCP, and CDFW must determine that the BDCP
 23 complies with Water Code Section 85320 and that the BDCP has been approved under the ESA as a
 24 Habitat Conservation Plan. Delta Reform Act compliance for the non-HCP alternatives 4A, 2D, and
 25 5A, involving construction and operation of water intakes in the north Delta and associated
 26 conveyance facilities would, be achieved through either the Delta Plan Consistency certification
 27 process or through a possible future amendment to the Delta Plan. Appendix 3J, *Alternative 4A*
 28 *(Proposed Project) Compliance with the 2009 Delta Reform Act*, discusses an approach that may be
 29 considered for Alternative 4A to meet the Delta Plan Consistency requirements.

30 **12.2.2.13 California Aquatic Invasive Species Management Plan**

31 The California Aquatic Invasive Species Management Plan (CAISMP) provides a comprehensive,
 32 coordinated effort between state agencies and other entities to prevent new invasions, minimize
 33 impacts from established aquatic invasive species, and establish priorities for action statewide.
 34 CAISMP identifies eight primary objectives and actions needed to minimize the harmful effects of
 35 aquatic invasive species on ecosystems, the economy, and human health. An example of the
 36 implementation of CAISMP’s long-term control and management objective in the Delta is CDBW’s
 37 Aquatic Weed Control Program, which primarily focuses on the control of Brazilian waterweed and
 38 water hyacinth. These control practices must be taken into consideration in developing restoration
 39 actions for the terrestrial and aquatic species.

1 **12.2.2.14 California Wetlands Conservation Policy**

2 The goals of the California Wetlands Conservation Policy, adopted in 1993 (Executive Order W-59-
3 93), are “to ensure no overall net loss, and achieve a long-term net gain in the quantity, quality, and
4 permanence of wetlands acreage and values in California, in a manner that fosters creativity,
5 stewardship, and respect for private property;” to reduce procedural complexity in the
6 administration of state and federal wetlands conservation programs; and to make restoration,
7 landowner incentive programs and cooperative planning efforts the primary focus of wetlands
8 conservation. This policy is consistent with the expansion of wetlands proposed in the action
9 alternatives.

10 **12.2.2.15 Suisun Marsh Preservation Act and Suisun Marsh Protection Plan**

11 The Nejedly-Bagley-Z’berg Suisun Marsh Preservation Act of 1974 (SB 1981) was designed to
12 protect Suisun Marsh from residential, commercial, and industrial development. The act directed the
13 San Francisco Bay Conservation and Development Commission (BCDC) and CDFW to prepare a
14 protection plan for Suisun Marsh “to preserve the integrity and assure continued wildlife use” of the
15 marsh. The objectives of the protection plan are to preserve and enhance the quality and diversity of
16 the Suisun Marsh’s aquatic and wildlife habitats, and to ensure upland areas adjacent to the marsh
17 remain in uses compatible with marsh protection.

18 In December 1976, BCDC submitted the Suisun Marsh Protection Plan (Protection Plan) to the
19 governor and the legislature. The Protection Plan identifies a Primary Management Area, which
20 encompasses approximately 89,000 acres of bays, sloughs, tidal marsh, wetlands, and lowland
21 grasslands, and a Secondary Management Area, which encompasses approximately 22,500 acres of
22 significant buffer lands (San Francisco Bay Conservation and Development Commission 2007). The
23 Protection Plan is a more specific application of the policies of the San Francisco Bay Plan (Bay Plan)
24 that addresses the unique characteristics of Suisun Marsh. The policies of both the Bay Plan and the
25 Protection Plan apply in the marsh. In the event of a policy conflict between the Bay Plan and the
26 Protection Plan, the policies of the Protection Plan take precedence. The Suisun Marsh Protection
27 Plan was last amended in November 2007.

28 The Suisun Marsh Preservation Act of 1977 (AB 1717) was enacted to incorporate the findings and
29 policies contained in the Bay Plan into state law. The act designates the BCDC as the state agency
30 with regulatory jurisdiction over Suisun Marsh and calls for the Suisun Resource Conservation
31 District (SRCD) to have responsibility for water management in the marsh.

32 **12.2.2.16 Suisun Marsh Preservation Agreement**

33 On March 2, 1987, the Suisun Marsh Preservation Agreement (SMPA) was signed by DWR, CDFW,
34 Reclamation, and SRDC. The purpose of the SMPA was to establish mitigation for impacts on salinity
35 from the SWP, CVP, and other upstream diversions. The SMPA contains these objectives.

- 36 ● Ensure that Reclamation and DWR maintain a water supply of adequate quantity and quality for
37 managed wetlands within Suisun Marsh. This is to mitigate adverse effects on these wetlands
38 from SWP and CVP operations, as well as a portion of the adverse effects of other upstream
39 diversions.
- 40 ● Improve Suisun Marsh wildlife habitat on these managed wetlands.

- 1 • Define the obligations of Reclamation and DWR necessary to ensure the water supply,
2 distribution, management facilities, and actions necessary to accomplish these objectives.
- 3 • Recognize that water users in Suisun Marsh (i.e., existing landowners) divert water for wildlife
4 habitat management within Suisun Marsh.

5 On June 20, 2005, a revised SMPA was signed to make channel water salinity requirements
6 consistent with the State Water Board's Decision 1641, and to replace additional large-scale water
7 management facilities with landowner water and management activities to meet the SMPA
8 objectives in the western portion of Suisun Marsh. The agencies that are party to this agreement are
9 also participating in development of the BDCP and must ensure that the BDCP is consistent with the
10 intent to protect wetlands and wildlife in the Suisun Marsh. No restoration is planned in Suisun
11 Marsh under California WaterFix.

12 **12.2.2.17 Central Valley Flood Protection Plan**

13 The Central Valley Flood Protection Plan (CVFPP) was approved by the California Flood Protection
14 Board in June of 2012. The CVFPP provides for a new framework of flood management and flood
15 risk reduction in both the Sacramento and San Joaquin River Basins. It was developed to comply
16 with the Central Valley Flood Protection Act of 2008.

17 This new plan is focused on providing 200-year flood protection to urban areas in the two river
18 basins, reducing flood risks to small communities and protecting agricultural lands from damage
19 due to flooding. It also has goals, however, that mirror the goals of the action alternatives, including:

- 20 • Promote natural dynamic hydrologic and geomorphic processes.
- 21 • Increase and improve the quantity, diversity, and connectivity of riparian, wetland, flood plain,
22 and shaded riverine aquatic habitats, including the agricultural and ecological values of these
23 lands.
- 24 • Promote the recovery and stability of native species populations and overall biotic community
25 diversity.

26 The CVFPP includes provisions to include elements of the action alternatives into the overall flood
27 protection actions, once the proposed project is approved. This would include actions to modify the
28 Yolo Bypass and Fremont and Sacramento Weirs.

29 **12.2.2.18 Yolo Bypass Wildlife Area Land Management Plan**

30 The Yolo Bypass Wildlife Area Land Management Plan (LMP) was finalized in June 2008 (California
31 Department of Fish and Game 2008b). The LMP is a general policy guide to CDFW management of
32 the wildlife area and is intended to contribute to habitat management that uses natural processes to
33 create a sustainable system over the long term. The policies are based on an ecosystem approach to
34 habitat management consistent with the principles of the Ecosystem Restoration Program included
35 in the CALFED Bay-Delta Program as implemented by the California Bay-Delta Authority and CDFW.
36 The terrestrial biological resources of the Yolo Bypass that are supported by the LMP have the
37 potential to be affected by implementing CM2 in the BDCP. CM2 is not included as part of California
38 WaterFix.

1 **12.2.3 Regional and Local Plans, Policies, and Regulations**

2 **12.2.3.1 City and County General Plans**

3 This section provides a general discussion of goals, objectives, and policies related to terrestrial
 4 biological resources in the adopted general plans for each county or incorporated city in the Delta.
 5 As discussed in Chapter 13, *Land Use*, state and federal agencies and some local or regional agencies
 6 involved with the location or construction of facilities for the production, generation, storage,
 7 treatment, or transmission of water, generally are not subject to local land use regulations.

8 **Alameda County**

9 **East County Area Plan**

10 Land use planning in the eastern portion of Alameda County is governed by the East County Area
 11 Plan (ECAP), which was adopted by the county in May 1994. In November 2000, the Alameda
 12 County electorate approved Measure D, the Save Agriculture and Open Space Lands Initiative, which
 13 amended portions of the county's general plan, including the ECAP (Alameda County 2000).

14 The Open Space Element of the ECAP addresses sensitive lands and regionally significant open
 15 space, including biological resources. In addition, the East Alameda County Conservation Strategy
 16 (EACCS) was developed in 2010 as a planning document that identifies regionally-coordinated
 17 mitigation strategies aimed at conserving endangered or threatened species, under the ESA, certain
 18 nonlisted species, and habitat in order to offset specific anticipated development, transportation,
 19 and infrastructure projects (East Alameda County Conservation Strategy Steering Committee 2010).
 20 The EACCS does not allow local agencies to approve permits for projects that could adversely impact
 21 threatened and endangered species. Instead, it provides guidance during the project planning and
 22 permitting process to ensure that impacts are offset in a biologically effective manner.

23 **Contra Costa County**

24 **Contra Costa County General Plan**

25 The Contra Costa County General Plan was adopted in January 1991 and was amended in 1996 and
 26 2005 to reflect changes to the Land Use Map and the incorporation of the City of Oakley (Roche pers.
 27 comm. 2009). Three goals in the general plan's Conservation Element provide broad guidance for
 28 preservation of plant and animal habitat in the county. The element includes policies that are
 29 intended to protect natural habitat, ecological resources, and riparian zones in the county (Contra
 30 Costa County 2005).

31 **City of Oakley General Plan**

32 The City of Oakley General Plan was adopted in December 2002. The plan's Open Space and
 33 Conservation Element addresses protection and enhancement of environmental resources,
 34 including biological resources in the Delta. The Open Space and Conservation Element includes one
 35 goal and two policies relevant to the preservation and enhancement of terrestrial biological
 36 resources (City of Oakley 2002).

1 **Sacramento County**

2 **Sacramento County General Plan**

3 The Sacramento County General Plan was adopted on November 9, 2011. The general plan Open
 4 Space Element addresses preservation of natural resources over an extensive area that includes
 5 terrestrial and aquatic habitats and agricultural areas. The Open Space Element contains policies
 6 regarding protection of wetlands preserves, riparian corridors, woodlands, and floodplains. The
 7 element also calls for preparation of a comprehensive open space preservation strategy. The
 8 Conservation Element contains policies relating to habitat protection, management and restoration,
 9 vernal pools and other wetlands, channel modifications, maintenance of river and stream functions,
 10 native and landmark tree protections, and special-status species (Sacramento County 2011).

11 **City of Sacramento General Plan**

12 The City of Sacramento 2030 General Plan was adopted on March 3, 2009. The Environmental
 13 Resources Element of the General Plan addresses protection of biological resources, including
 14 wildlife habitat, open space corridors, and ecosystems. Eight policies from the Environmental
 15 Resources Element are applicable to the action alternatives (City of Sacramento 2009).

16 **San Joaquin County**

17 **San Joaquin County General Plan**

18 San Joaquin County General Plan 2010 was adopted in 1992. The plan's Resources Element
 19 addresses protection of biological resources, including wetlands; riparian areas; rare, threatened,
 20 and endangered species and their habitats; potentially rare or commercially important species;
 21 vernal pools; significant oak groves; and heritage trees. Five policies from the Resources Element
 22 are considered applicable to the action alternatives (San Joaquin County 1992). The general plan is
 23 currently undergoing revision.

24 **Solano County**

25 **Solano County General Plan**

26 The Solano County General Plan was adopted in August 2008 and approved by the voters in
 27 November 2008. The plan's Resources Element addresses conservation of biological resources
 28 throughout the county and specifically within the Delta. Six Resource Element policies concerning
 29 natural habitats and biological resources, and, more specifically, concerning the presence of special-
 30 status species, wetlands, special-status natural communities, and habitat connections, are
 31 considered applicable to the action alternatives (Solano County 2008a).

32 General plan policies and other polices, programs, and regulations to preserve and enhance the
 33 wildlife habitat of Suisun Marsh and to ensure retention of upland areas adjacent to the marsh in
 34 uses compatible with its protection have been developed as part of Solano County's component of
 35 the Suisun Marsh Local Protection Program. These policies are included as Appendix C of the Solano
 36 County General Plan and were certified by BCDC on November 3, 1982, and amended on February 2,
 37 1999 (Solano County 2008b).

1 **City of Rio Vista General Plan**

2 The City of Rio Vista General Plan was adopted in July 2002. The plan's Resource Conservation and
3 Management Element addresses conservation of resources, including biological resources. Two
4 policies from this element concerning wetlands and native riparian habitat protection are
5 considered applicable to the action alternatives (City of Rio Vista 2002).

6 **Yolo County**

7 **Yolo County General Plan**

8 The Yolo County General Plan was adopted on November 10, 2009. The plan integrates, by
9 reference, locally effective parts of the DSC's Land Use and Resource Management Plan for the
10 Primary Zone of the Delta. Numerous goals, policies and actions related to the Delta are spread
11 throughout General Plan elements. Conservation and Open Space Element policies concerning
12 special-status communities, heritage valley oak trees, roadside tree rows, special-status species,
13 riparian corridors, native habitat restoration and conservation, and floodplain management are
14 considered applicable to the BDCP (Yolo County 2009). In addition, a policy in the Conservation and
15 Open Space Element calls for ensuring that changes to operation of the Yolo Bypass and Fremont
16 Weir do not damage Yolo County agricultural, development and infrastructure interests. Another
17 Conservation and Open Space Element policy addresses compatibility of the BDCP with the
18 Clarksburg Agricultural District (Yolo County 2009). Many of these goals and policies would also be
19 considered applicable to the California WaterFix.

20 **12.2.3.2 Habitat Conservation Plans**

21 The relationship between the BDCP and other conservation plans that include portions of the study
22 area is discussed in detail in Section 12.3.6, *Effects on Other Conservation Plans*, at the end of this
23 chapter. The plans that are discussed include the East Alameda Conservation Strategy, the East
24 Contra Costa County HCP/NCCP, the San Joaquin County Multi-species Habitat Conservation and
25 Open Space Plan, the South Sacramento HCP, the Solano County Multi-species Habitat Conservation
26 Plan and the Yolo HCP/NCCP.

27 **12.3 Environmental Consequences**

28 This section describes potential direct (temporary, periodic and permanent), indirect, and
29 cumulative effects on terrestrial biological resources that would result with implementation of each
30 alternative. The impact analysis considers each of the alternatives' proposed features in four
31 principal areas: construction of the water conveyance facilities' structural components, which are
32 project-level features; operations and maintenance of these components, which are project-level
33 components; implementation of water management operational scenarios and other covered
34 activities described in Chapter 3, *Description of Alternatives*, which are project-level features; and
35 other conservation components, which are programmatic features. The organization of this section
36 provides for a separate analysis of each of the 19 alternatives being considered, including the No
37 Action Alternative. Six of the project alternatives (1A, 1B, 1C, 4, 4A, and 9) represent the major water
38 conveyance facility options analyzed in this chapter. From a terrestrial biological resources
39 perspective, the differences in effect between these alternatives are related to the construction of
40 the water conveyance facilities (CM1). All other conservation actions (CM2–CM21) are the same,

1 except under Alternatives 5 and 7. The impacts of Alternatives 1A, 1B, 1C, 4, 4A, and 9 are discussed
2 in detail in this chapter. The other action alternatives (2A, 2B, 2C, 2D, 3, 5, 5A, 6A, 6B, 6C, 7, and 8)
3 have very similar or identical project features and impacts on terrestrial biological resources as the
4 major conveyance facility alternatives listed above. All of the alternatives are compared with
5 Existing Conditions and No Action Alternative baselines. To avoid repeating identical analyses for
6 these alternatives (2A, 2B, 2C, 2D, 3, 5, 5A, 6A, 6B, 6C, 7, and 8), their effects are compared, as
7 appropriate, with Alternatives 1A–1C and 4A (for 2D and 5A) to highlight differences among the
8 alternatives. Differences are presented in summary tables and text format and the reader is referred
9 to the similar major conveyance facility alternative for the comparable detailed analysis.

10 Within each alternative, the analysis focuses on the resources of concern: natural communities,
11 covered animal and plant species, and noncovered animal and plant species. Because this document
12 is designed to satisfy both NEPA and CEQA requirements, each impact analysis presents a NEPA and
13 a CEQA conclusion. The NEPA conclusion has been reached by comparing the effect of the proposed
14 alternative with the effects of the No Action Alternative (the NEPA point of comparison). The CEQA
15 conclusion has been reached by comparing the effect of the proposed alternative to Existing
16 Conditions (the CEQA baseline). The cumulative analysis for all resources and all alternatives and
17 the potential for conflicts with other HCPs are included in separate sections at the end of the
18 chapter.

19 Terrestrial biological resources associated with the streams and reservoirs upstream of the study
20 area and within the SWP/CVP Export Service Areas are not discussed in detail in this section. The
21 potential for growth-related effects on terrestrial biological resources in the SWP/CVP Export
22 Service Areas is discussed in Chapter 30, *Growth Inducement and Other Indirect Effects*. The potential
23 for project-related changes in average reservoir and river stages upstream of the Delta to affect
24 wetland and riparian habitats in reservoir inundation zones and along streambanks was considered
25 and is discussed in brief for potentially affected natural communities in the study area. CALSIM II
26 model predictions for reservoir volume and discharges for different water-year types and
27 appropriate rating curves (see Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*)
28 were used to predict average water surface elevations (stage) by water-year types. Based on a
29 review of these predictions, it was determined that the changes that could occur upstream of the
30 study area would be within the range of variation in water levels and flows that historically occur in
31 these water bodies. The terrestrial wildlife and vegetation that is supported by these water bodies
32 exist within this variation; changes in the pattern of high and low water levels in certain water-year
33 types and certain months would be expected as a result of implementing the BDCP. Where these
34 operational changes might affect the distribution of natural communities, these changes are
35 discussed in the operation and maintenance impact analyses. Where natural community changes
36 might affect special-status species, these effects are described in the operations and maintenance
37 analyses for those species.

38 **12.3.1 Determination of Effects**

39 The impacts of the action alternatives on terrestrial biological resources may result from
40 construction, operation and maintenance of water conveyance facilities, and from construction and
41 implementation of other conservation measures (Environmental Commitments under Alternatives
42 4A, 2D, and 5A). This impact analysis assumes that an action alternative would have an effect on
43 terrestrial biological resources if it would directly or indirectly harm or harass individuals or

1 populations of the species considered in this chapter, remove or damage the habitat of these species,
2 or create barriers to the movement of these species.

3 **12.3.1.1 Development of Significance Criteria**

4 The CEQA Guidelines (Title 14, Division 6, Chapter 3 of the CCR), at Section 15064.7, encourage
5 public agencies to develop thresholds of significance to use in determining the significance of
6 environmental effects when complying with CEQA. In this same section, the CEQA Guidelines define
7 a threshold of significance as “an identifiable quantitative, qualitative or performance level of a
8 particular environmental effect, non-compliance with which means the effect will normally be
9 determined to be significant by the agency and compliance with which means the effect normally
10 will be determined to be less than significant.” Although Section 15064.7 authorizes a public agency
11 subject to CEQA to conduct a formal public process for formulating significance thresholds that
12 would apply to all of the agency’s projects, the courts have recognized that, in preparing an
13 individual CEQA document, a lead agency may informally develop significance criteria applicable to
14 particular projects, provided that such criteria are supported by substantial evidence. (See, e.g.,
15 *Oakland Heritage Alliance v. City of Oakland* (2011) 195 Cal.App.4th 884, 896–897; *Citizens for*
16 *Responsible Equitable Environmental Development v. City of Chula Vista* (2011) 197 Cal.App.4th 327,
17 336.)

18 Here the significance criteria used to evaluate impacts on biological resources are based on and
19 incorporate guidance contained in Section 1508.27 of the Council on Environmental Quality (CEQ)
20 NEPA regulations regarding significance determinations; the mandatory findings of significance, as
21 listed in Section 15065 of the State CEQA Guidelines (Title 14, Chapter 3 of the CCR); and criteria
22 contained in Appendix G, “Environmental Checklist Form,” of the CEQA Guidelines.

23 The CEQ NEPA regulations found in Title 40, CFR focus federal agencies’ attention on impacts on
24 endangered and threatened species. Section 1508.27 of those regulations defines the word
25 *significantly*, which comes into play in the statutory mandate under NEPA for federal agencies to
26 prepare Environmental Impact Statements for major federal actions *significantly* affecting the
27 human environment (42 USC Section 4321). Under Section 1508.27, federal agencies, in determining
28 whether a major federal action significantly affects the human environment, should consider both
29 the *context* and the *intensity* of the effects at issue. Context relates to the setting for the proposed
30 action (i.e., whether it is regional or local in scale). Intensity “refers to the severity of impact.”
31 Among the factors to be considered in assessing intensity are “[t]he degree to which the action may
32 adversely affect an endangered or threatened species or its habitat that has been determined to be
33 critical under the Endangered Species Act of 1973.”

34 In enacting CEQA, the legislature found and declared that it was the policy of the state, among other
35 things, to “[p]revent the elimination of fish or wildlife species due to man’s activities” and “insure
36 that fish and wildlife populations do not drop below self-perpetuating levels” (Public Resources
37 Code Section 21001[c]). Under CEQA Guidelines Section 15065, which echoes this policy statement,
38 impacts are significant under CEQA if a proposed project would result in any of the conditions listed
39 below.

- 40 ● Substantially reduce the habitat of a fish or wildlife species.
- 41 ● Cause a fish or wildlife population to drop below self-sustaining levels.
- 42 ● Threaten to eliminate a plant or animal community.

- 1 • Substantially reduce the number or restrict the range of an endangered, rare or threatened
2 species.

3 These impact categories, originally formulated in the 1970s, are broadly framed and leave room for
4 expert judgment and application. The sample Initial Study Checklist found in Appendix G to the
5 CEQA Guidelines identifies questions lead agencies should generally ask with respect to a proposed
6 project's potential impacts on biological resources. These questions are often used to give rise to
7 significance thresholds where a proposed project would do any of the following.

- 8 • Have a substantial adverse effect, either directly or through habitat modifications, on any
9 species identified as a candidate, sensitive, or special status species in local or regional plans,
10 policies, or regulations, or by USFWS or CDFW.
- 11 • Have a substantial adverse effect on any riparian habitat or other sensitive natural community
12 identified in local or regional plans, policies, regulations, or by USFWS or CDFW.
- 13 • Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of
14 the CWA (including marsh, vernal pool, coastal) through direct removal, filling, hydrological
15 interruption, or other means.
- 16 • Interfere substantially with the movement of any native resident or migratory fish or wildlife
17 species or with established native resident or migratory wildlife corridors, or impede the use of
18 native wildlife nursery sites.
- 19 • Conflict with any local policies or ordinances protecting biological resources, such as a tree
20 preservation policy or ordinance.
- 21 • Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community
22 Conservation Plan, or other approved local, regional, or state habitat conservation plan.

23 **12.3.1.2 Significance Criteria for Terrestrial Biological Resources**

24 For this analysis, all of the general criteria described above have been tailored to deal with
25 terrestrial species and applied to all determinations of effect for each impact mechanism discussed
26 in the following pages. All aspects of the action alternatives are subject to these criteria, including
27 the construction, operation and maintenance of water conveyance facilities, and the implementation
28 of other conservation measures (Environmental Commitments under Alternatives 4A, 2D, and 5A).
29 Based on the foregoing general criteria, an alternative would have an adverse effect under NEPA and
30 a significant adverse impact under CEQA on terrestrial biological resources if it meets any of the
31 criteria listed below.

- 32 • Have a substantial adverse effect, either through direct mortality or through habitat
33 modifications, including designated critical habitat, on any terrestrial plant or wildlife species
34 identified as a candidate, sensitive, or special-status species in local or regional plans, policies,
35 or regulations, or by CDFW or USFWS, including substantially reducing the number or
36 restricting the range of an endangered, rare, or threatened species. For purposes of this analysis,
37 an effect would be substantial if it would result in:
- 38 ○ The adverse modification of critical habitat designated by the USFWS;
- 39 ○ A permanent reduction in the acreage and value of modeled habitats for special-status
40 species (as defined in the BDCP);

- 1 ○ A permanent reduction in the acreage and value of habitat for noncovered wildlife species
2 within the study area;
- 3 ○ A permanent reduction in the acreage and value of known occupied habitat for noncovered
4 plant species (based on specific occurrence records) within the study area;
- 5 ○ A reduction in the availability of mature trees that provide suitable nesting or roosting
6 habitat for special-status birds;
- 7 ● Have a substantial adverse effect on any sensitive natural community identified in local, state, or
8 federal regional plans, policies, or regulations, including long-term degradation of a sensitive
9 plant community because of substantial alteration of a landform or site conditions. For purposes
10 of this analysis, an effect would be substantial if it would result in a permanent reduction in the
11 acreage and value of the sensitive natural community within the study area.
- 12 ● Have a substantial adverse effect on federally or state protected wetlands, including marsh,
13 vernal pool, and coastal wetlands, through direct removal. For purposes of this analysis, an
14 effect would be substantial if it would result in a permanent reduction in the acreage of a
15 wetland regulated under Section 404 of the Clean Water Act or the Porter-Cologne Water
16 Quality Control Act.
- 17 ● Substantially reduce the habitat of a common terrestrial plant or wildlife species. For purposes
18 of this analysis, an effect would be considered substantial if it would cause a common terrestrial
19 plant or wildlife population to drop below self-sustaining levels, or threaten to eliminate a
20 common terrestrial plant or animal community within the study area.
- 21 ● Interfere substantially with the movement of any native resident or migratory wildlife species
22 or with established native resident or migratory wildlife corridors, or impede the use of native
23 wildlife nursery sites.
- 24 ● Conflict substantially with goals set forth in an approved recovery plan for a federally listed
25 terrestrial plant or wildlife species, or with goals set forth in an approved State Recovery
26 Strategy (Fish and Game Code Section 2112) for a state-listed terrestrial plant or wildlife
27 species. For purposes of this analysis, a conflict would be considered substantial if it would
28 eliminate the possibility of achieving any goal included in a recovery plan.
- 29 ● Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community
30 Conservation Plan, or other approved local, regional, or state habitat conservation plan. For
31 purposes of this analysis, a conflict would exist if an action alternative:
- 32 ○ Eliminated existing or planned conservation sites identified in an HCP/NCCP.
- 33 ○ Required protection, conversion or restoration of cropland or natural communities to the
34 extent that an existing HCP/NCCP could not achieve its conservation goals.
- 35 ○ Required protection, conversion or restoration of cropland or natural communities to the
36 extent that the Central Valley Joint Venture 2006 Implementation Plan could not achieve its
37 conservation goals.
- 38 ● Result in effects on terrestrial biological resources that are individually limited but cumulatively
39 considerable.

40 In the impact discussions that start in Section 12.3.3, the NEPA significance determination follows
41 the main body of the impact analysis. The CEQA significance determination is included in an
42 independent concluding section.

12.3.2 Methods for Analysis

This section describes the methods used to assess the effects of implementing the project alternatives on terrestrial biological resources.

For preparation of the EIR/EIS, the information used to conduct the environmental consequences analysis came primarily from the sources listed below.

- BDCP GIS natural community database.
- BDCP and Appendices.
- Field surveys conducted during 2009 to 2011 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*).
- Natural community and wildlife habitat mapping for areas outside of the Plan Area (see Section 12.1.2.1).
- Results of hydrodynamic and salinity modeling (See Chapter 4, *Approach to Environmental Analysis*; Chapter 6, *Surface Water*; Chapter 7, *Groundwater*; and Chapter 8, *Water Quality*, for more information on the methodology for these assessments).
- Results of hydraulic modeling conducted by ESA PWA to determine the extent of tidal marsh expansion in marsh restoration areas (BDCP Appendix 5E, *Habitat Restoration*⁸).
- *BDCP Waterfowl Effects Analysis* (Ducks Unlimited 2013)
- Draft *Bay Delta Conservation Plan Supplemental Shorebird Effects Analysis* (ICF International 2013).
- GIS data layers of water conveyance facilities developed by DWR and other conservation measure footprints developed by BDCP staff.
- DWR mapping of jurisdictional wetlands and waters of the United States within the water conveyance facilities corridors (California Department of Water Resources 2013a, 2013b).

12.3.2.1 Analysis Approach

The methods used to address permanent, temporary, periodic, and indirect effects in this chapter are similar to those used in the BDCP effects analysis (BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*) that were developed for natural communities and BDCP-covered species (Table 12-2 lists covered species). Effects on special-status species that are not covered in the BDCP (referred to as noncovered species; listed in Table 12-3) were evaluated using generally the same methods and assumptions outlined in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, and assessed based on the species habitats (as they are defined in Sections 12.1.3.2 and 12.1.3.3) and occurrences. In addition, other biological resources issues were considered, including effects on state and federally protected wetlands and waters, common plant and wildlife species, wildlife movement corridors, waterfowl and shorebirds, potential for introducing or spreading invasive plants and consistency with other plans and policies.

⁸ As described in Chapter 1, *Introduction*, Section 1.1, Final EIR/EIS should be understood to include not only the EIR/EIS itself and its appendices, but also the proposed BDCP documentation, including all appendices, and the Biological Assessment.

1 Development of the BDCP effects analysis involved literature review, development of species-
2 specific habitat models for covered species, review of known occurrences of special-status species
3 based on CNDDDB and CNPS Inventory records, review of information obtained from species experts,
4 limited field surveys by DWR, and GIS analyses. The BDCP includes an extensive, detailed
5 methodology documenting the specifics of the approach and assumptions for assessing the effects of
6 implementing the BDCP (BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*).
7 Most of these methods were also used for the EIR/EIS analysis of the environmental consequences
8 for terrestrial biological resources. The EIR/EIS team evaluated the affected acreages for covered
9 species and natural communities and confirmed that the determination of effects appropriately
10 considered the specific species assumptions included in the species accounts and defined methods
11 of the BDCP. However, it should be recognized that the BDCP analysis addresses the effects of
12 implementing the BDCP on the covered species list (focusing on requirements of ESA, CESA, and
13 NCCPA). The EIR/EIS assesses a broader range of environmental consequences associated with ESA,
14 CESA, and NCCPA, as well as CEQA, NEPA, CWA, MBTA, and other applicable regulations addressing
15 biological resources. The EIR/EIS does not use the *net effects* assessment method included in the
16 BDCP to identify the benefits to species of implementing the Plan. The determination of benefits to
17 species and the need for mitigation in the EIR/EIS is outlined below in Section 12.3.2.5, *Methods*
18 *Used to Consider Mitigation*. The determination of benefits for the BDCP alternatives (1A, 1B, 1C, 2A,
19 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, 8, and 9) relies on the acreage commitments defined in the BDCP and for
20 the non-HCP alternatives (4A, 2D, and 5A) relies on the acreages presented in Chapter 3, *Description*
21 *of Alternatives*, Section 3.5.

22 The acreages for the Environmental Commitments under Alternatives 4A (Table 3-9 in Chapter 3),
23 2D (Table 3-10), and 5A (Table 3-11) were developed by taking into consideration the analysis
24 conducted in Appendix 12D, *Feasibility Assessment of Conservation Measures Offsetting Water*
25 *Conveyance Facilities Construction Impacts on Terrestrial Biological Resources*, for the BDCP
26 alternatives, which used typical mitigation ratios to determine the sufficiency of the BDCP
27 conservation strategy as CEQA and NEPA mitigation (i.e., whether the BDCP conservation strategy
28 includes sufficient land acquisition and restoration to adequately mitigate the impacts of CM1 for
29 purposes of CEQA and NEPA).

30 The first step involved estimating the acreages of natural communities and modeled habitat that
31 could be affected by the construction of Alternative 4A and other non-HCP Alternatives. To
32 approximate the estimated effects from Alternative 4A and the other non-HCP alternatives, the same
33 natural community mapping and species models used for the BDCP alternatives were utilized. The
34 resulting estimates are relatively conservative when considering the resolution of this data (i.e., the
35 natural community and modeled habitat data tend to overestimate the extent of these features
36 across the Plan Area), as well as because access to specific areas along the potential construction
37 footprints were limited (see also the discussion of the environmental setting/affected environment
38 within this chapter).

39 The next step involved applying typical mitigation ratios to the water conveyance facility impacts on
40 natural communities to obtain the restoration and protection acreages necessary to mitigate these
41 impacts. Once these initial natural community restoration and protection acreages were identified,
42 they were then compared with the mitigation requirements for species addressed in the EIR/EIS
43 that use these natural communities as habitat. Several of the species analyzed in the EIR/EIS utilize
44 the same general natural communities but may only use specific subsets of these natural
45 communities or are geographically restricted to certain portions of the study area where these
46 natural communities occur. Therefore, the total acreages of proposed natural community

1 restoration and protection were increased to account for species needs. For example, if species A
 2 needed 5 acres of riparian scrub protected and species B needed 5 acres of mature riparian
 3 protected, then up to 10 acres of valley/foothill riparian would be protected in total and where the
 4 habitat needs for both species are the same, the mitigation acreage would be the same.

5 The next step was then to estimate the impacts the proposed restoration would have on natural
 6 communities and species habitats within the study area. Assumptions on where restoration would
 7 likely occur (e.g., which CZs and ROAs) and how it would be implemented were taken from the
 8 relevant BDCP Conservation Measures to determine which natural communities would likely be
 9 affected by these activities. Where restoration efforts were anticipated to result in additional
 10 impacts on natural communities and species habitats, the restoration and protection acreages where
 11 increased accordingly. Through this iterative process, project biologists were able to determine the
 12 maximum acreages for natural community protection and restoration that would be sufficient to
 13 offset the loss or conversion of natural communities and species habitats from water conveyance
 14 construction and proposed restoration activities.

15 **Direct and Indirect Effects**

16 This impact analysis contains an assessment of both the direct and reasonably foreseeable indirect
 17 effects of the action alternatives. This analysis establishes the maximum potential for impacts and
 18 may not reflect the final impact as some restoration and protection actions have been analyzed
 19 programmatically. Direct effects of constructing water conveyance facilities for individual
 20 alternatives as well as implementing conservation measures/Environmental Commitments consist
 21 of habitat removal and construction or inundation-related disturbances, mortality of wildlife or
 22 plants, immediate displacement of wildlife, immediate degradation of habitats, and direct removal of
 23 natural communities.

24 Indirect effects consist of project-related effects that would occur later in time or farther removed in
 25 distance than the direct effects. These potential effects consist of alterations to species habitats that
 26 are adjacent to directly affected areas (e.g., changes in hydrology in adjacent areas), disturbances to
 27 nearby wildlife during construction (e.g., disruption of breeding and foraging behaviors from noise,
 28 light and glare), and other effects occurring later in time (e.g., collisions of birds with transmission
 29 lines built to meet BDCP requirements and fragmentation of habitat). Indirect effects can result both
 30 from construction and from operations and maintenance (e.g., ground disturbance could result in
 31 the spread and establishment of invasive plants).

32 Indirect effects for both covered and noncovered species were assessed qualitatively, except for
 33 effects on vernal pool crustaceans and greater sandhill crane, which were assessed quantitatively.
 34 Indirect effects for vernal pool crustaceans were estimated by buffering water conveyance and
 35 hypothetical restoration footprints by 250 feet. Other sources that supported analysis of indirect
 36 effects included the greater sandhill crane noise analysis (BDCP Appendix 5.J, Attachment 5J.D,
 37 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*), EIR/EIS
 38 Chapter 23, *Noise*, and Table 5.J-4 and 5.J-5 in BDCP Appendix 5.J, *Effects on Natural Communities,*
 39 *Wildlife, and Plants*.

40 The direct effects of constructing the water conveyance facilities would be the result of, but would
 41 not be limited to, the types of actions listed below.

- 1 • Clearing and grubbing for physical water conveyance components (e.g., intake facilities and
2 infrastructure, levees), staging areas, storage/stockpile areas, construction crew parking, and
3 construction access roads.
- 4 • Excavating and drilling for physical water conveyance components (e.g., geotechnical
5 exploration, borrow pits, pipelines, forebays, sedimentation basins, canals, tunnel access shafts).
- 6 • Dredging waterways.
- 7 • Importing, distributing, storing, or disposing of fill, borrow, spoil, or dredge material.
- 8 • On-road and off-road traffic from construction vehicles (e.g., water and cement trucks), personal
9 vehicles of construction staff, and transport of construction equipment within the study area
10 and to/from the study area.

11 As discussed in Chapter 3, Section 3.6.1.10 *Geotechnical Exploration*, DWR has developed a Draft
12 Geotechnical Exploration Plan for the Alternative 4 conveyance alignment (also applicable to
13 Alternative 4A). This would include 1,500 to 1,550 locations for drilling boreholes (each
14 approximately 8 inches in diameter, which will be grouted) and cone penetration testing, which
15 consists of pushing a cone connected to a series of rods into the ground at a constant rate, allowing
16 continuous measurements of resistance to penetration both at the cone tip and the sleeve behind
17 the cone tip. Also, 60 shallow test pit excavations will be dug (typically 4 feet wide, 12 feet long, and
18 12 feet deep). All of these activities will take place in area where surface and subsurface features for
19 the water conveyance facilities are planned. The various on-land exploration methods may last from
20 a few hours to several days. The exact locations of these activities are not yet known.

21 Preliminary estimates of temporary impacts from geotechnical exploration for Alternatives 4 and 4A
22 were made based on DWR's experience with these type of activities and some preliminary field
23 estimates. A geographic footprint represented in GIS data layers was used to conservatively estimate
24 the area potentially disturbed by geotechnical exploration activities. This footprint consisted of a
25 series of points along the conveyance alignment that were selected based on an assessment of the
26 needs for more detailed geotechnical information. It is expected that the geotechnical exploration
27 sites will result in approximately 0.84 acre of disturbance per site, which includes a 0.23-acre
28 (10,000 square feet) area of temporary disturbance for drilling and staging plus an additional 0.61
29 acres of temporary disturbance associated with accessing the sites, which would consist of overland
30 travel in agricultural areas and grasslands and which could result in temporary disturbance to
31 vegetation. For the analysis, the geotechnical exploration sites, which are represented by points in
32 GIS, were overlain on the conveyance footprint and intersected with the surface footprints and
33 subsurface footprints to establish geotechnical exploration zones. Not all surface features were
34 included as part of the surface geotechnical exploration zones because features had not been
35 identified as potential geotechnical exploration sites (i.e., these areas did not have geotechnical
36 exploration site GIS point data within in them). The area of the geotechnical exploration zones was
37 then combined with the number of geotechnical exploration sites to estimate the total temporary
38 impact. Estimates of impacts on natural communities and modeled habitat for species were
39 generated by applying the proportion of the estimated impact acreages within the geotechnical
40 exploration zones to the known acreage of natural communities and modeled habitat within each
41 zone.

42 The direct and indirect effects of operating and maintaining the water conveyance facilities would
43 result from a wide range of activities over the life of the action alternatives. The proposed intake
44 facilities (including intake pumping plants, sedimentation basins and solids lagoons) would require

1 scheduled routine or periodic adjustment and tuning to remain consistent with design intentions.
 2 Emergency maintenance is also anticipated. Routine facility maintenance would consist of activities
 3 such as painting, cleaning, repairs, and other tasks to operate facilities in accordance with design
 4 standards after construction and commissioning. Maintenance activities associated with river
 5 intakes could include removal of sediments, debris, and biofouling materials. These maintenance
 6 actions could require suction dredging or mechanical excavation around intake structures;
 7 dewatering; or use of underwater diving crews, boom trucks or rubber wheel cranes, and raft- or
 8 barge-mounted equipment. Sediment in solids lagoons and channels would also be removed
 9 periodically.

10 Maintenance requirements for the canal segments of alternatives would include erosion control,
 11 control of vegetation and rodents, embankment repairs in the event of flooding and wind wave
 12 action, and monitoring of seepage flows. The sediment traps constructed in channels and canals
 13 would be periodically dredged to remove the trapped sediment.

14 Direct and indirect effects from implementation of habitat restoration and enhancement
 15 conservation measures would be anticipated to result from the types of actions listed below.

- 16 • Grading, excavation, and placement of fill material.
- 17 • Breaching, modification, or removal of existing levees and construction of new levees.
- 18 • Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,
 19 electric transmission and gas lines, irrigation infrastructure).
- 20 • Construction of new infrastructure (e.g., buildings, roads, fences, electric transmission and gas
 21 lines, irrigation infrastructure).
- 22 • Removal of existing vegetation and planting/seeding of vegetation.
- 23 • Controlling the establishment of nonnative vegetation to encourage the establishment of target
 24 native plant species.
- 25 • Control of nonnative predator and competitor species (e.g., feral cats, rats, nonnative foxes).

26 Habitat management actions include all activities undertaken to maintain the intended functions of
 27 protected, restored, and enhanced habitats over the term of the action alternatives. Habitat
 28 management actions that could create direct and indirect effects on terrestrial biological resources
 29 are anticipated to include the activities listed below.

- 30 • Minor grading, excavation, and filling to maintain infrastructure and habitat functions (e.g., levee
 31 maintenance; grading or placement of fill to eliminate fish stranding locations).
- 32 • Maintenance of infrastructure (e.g., buildings, roads, fences, electric transmission and gas lines,
 33 irrigation infrastructure, fences).
- 34 • Maintaining vegetation and vegetation structure (e.g., grazing, mowing, burning, trimming).
- 35 • Ongoing control of terrestrial and aquatic nonnative plant and wildlife species.

36 **Effects Duration**

37 Some effects described in this chapter have been categorized based on their duration. Proposed
 38 project effects on terrestrial biological resources could be permanent, temporary, or periodic, as
 39 defined below.

1 Effects have been categorized as *permanent* where a biological resource would be removed or lost
2 and would not be replaced at its original site. Permanent effects would occur primarily at
3 construction sites. Construction of aboveground water conveyance structures and ancillary facilities,
4 and similar structures or facilities associated with other conservation measures would permanently
5 remove or alter habitats and could result in the loss of individual special-status plants or animals.
6 Development and use of reusable tunnel material (RTM) storage sites have been characterized as
7 permanent losses of biological resources because of the uncertainty of replacing the resource and
8 the length of time between the loss of the resource and the first opportunity to restore or replace the
9 resource after dewatering and chemical characterization of the RTM (as much as 5 to 10 years).
10 Activities associated with tunneling and RTM placement are likely to occur across multiple years at
11 RTM storage areas.

12 Even though RTM-related resource damage is being considered permanent for purposes of the
13 impact analysis, there is an environmental commitment to reuse the material or dispose of it at
14 appropriate facilities, as described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*. It
15 is anticipated that much of the material would be removed from storage areas and applied, as
16 appropriate, as bulking material for levee maintenance or as fill material for habitat restoration
17 projects, or would be put to other beneficial reuses. Following removal of material, stockpiled
18 topsoil at RTM storage areas would be reapplied, and disturbed areas would be returned as near as
19 feasible to preconstruction conditions.

20 Effects have been categorized as *temporary* where construction-related habitat losses would be
21 restored to the affected area's predisturbance condition within one year of completing construction.
22 The types of areas that would be expected to be restored include borrow and spoil disposal sites,
23 barge facility work areas, bridge/control work areas, bridge work areas, canal work areas, intake
24 work areas, pumping plant work areas, channel enlargement work areas, control structure work
25 areas, dredging work areas, operable barrier work areas, pipeline work areas, railroad work areas,
26 temporary access road work areas, safe haven work areas, and siphon work areas. Because water
27 conveyance construction would take place over a 9 to 14-year period with varying periods of
28 activity at individual construction sites, there is uncertainty as to the length of time these
29 temporarily affected areas would be disturbed prior to restoration. Therefore, temporary effects on
30 some terrestrial plants and wildlife are treated as a permanent loss of habitat for the purposes of
31 determining the amount of conservation action necessary to offset these effects.

32 Effects have been categorized as *periodic* where they would result from cyclical or irregular
33 activities associated with operation of the water conveyance facilities or other conservation
34 measures associated with the action alternatives. Periodic inundation effects on the biological
35 resources of the Yolo Bypass would result from modifications to the Fremont Weir and controlled
36 flooding of the bypass, which would cause inundation at a frequency, duration, and magnitude that
37 exceeds the current inundation regime (a result of implementing CM2 under the BDCP alternatives).
38 Periodic dredging of Middle River and Victoria Canal under Alternative 9 (Through Delta/Separate
39 Corridors) would cause sedimentation and turbidity in adjacent wetlands and riparian habitat.
40 Periodic inundation resulting from seasonal floodplain restoration (CM5 under the BDCP
41 alternatives) would affect natural communities and special-status species occupying the newly
42 created floodplains.

1 **Effects Time Periods**

2 Effects of the BDCP were also evaluated for two timeframes for all natural communities and special-
 3 status species: the near-term, which extends from years 1–10 of BDCP implementation; and the late
 4 long-term, which covers the entire 50-year term of the BDCP, after which the ESA and NCCPA
 5 permits expire (years 1–50). Most of the water conveyance facilities would be constructed during
 6 the near-term, along with initial implementation of habitat restoration, enhancement, and
 7 protection, and other conservation components. The habitat restoration, enhancement, and
 8 protection, and the activities associated with the other conservation components would be initiated
 9 at the outset of Plan implementation and would continue to be implemented throughout the lifetime
 10 of the permits. Table 3-4 in Chapter 3, *Description of Alternatives*, provides a summary of the BDCP's
 11 restoration and protection commitments for each time period.

12 The estimate for constructing the water conveyance facilities has changed from 10 years (near-
 13 term) under the Draft EIR/EIS to 9 to 14 years for the Final EIR/EIS. The analysis for the BDCP
 14 alternatives still refers to the near-term time period and considers all water conveyance impacts
 15 over this time period. The proposed restoration and protection considered for the near-term
 16 analysis still refers to the acreages put forth in Table 3-4 in Chapter 3, *Description of Alternatives*,
 17 (Table 6-2 in BDCP Chapter 6, *Plan Implementation*) for years 1–10 because these acreages were
 18 developed to be in rough proportion to the impacts for water conveyance construction; furthermore,
 19 the BDCP commits to pace the implementation of the conservation measures such that they may not
 20 fall behind the pace of covered activity impacts by more than 10%, which complies with the NCCPA
 21 requirement for rough proportionality.

22 Alternatives 4A, 2D, and 5A were evaluated over the early long-term in order to cover the entire
 23 water conveyance construction period.

24 **12.3.2.2 Methods Used to Assess Natural Community Effects**

25 The natural community effects analysis includes a discussion of individual conservation measures
 26 (Environmental Commitments under Alternatives 4A, 2D, and 5A) and the combined effects of
 27 implementing all of the BDCP conservation measures (Environmental Commitments): habitat
 28 restoration actions, other conservation measures, and construction and operation of the water
 29 conveyance facilities. The direct and indirect effects of these actions and operation and maintenance
 30 of all facilities have been included. In addition, effects on habitat value have been considered and
 31 addressed where relevant, including effects of habitat fragmentation, connectivity, patch size and
 32 degradation of habitat functions. These effects have been assessed qualitatively based on changes in
 33 the distribution and extent of each natural community removed or gained relative to existing
 34 distributions. For the BDCP alternatives, this assessment has been conducted by reviewing water
 35 conveyance facilities and hypothetical restoration and enhancement area footprints over aerial
 36 imagery to determine whether these activities would fragment existing natural communities or
 37 disrupt potentially important wildlife migration corridors. For Alternatives 4A, 2D, and 5A, the same
 38 assessment described above was applied to the water conveyance facility footprint, but no
 39 hypothetical restoration or enhancement footprints were available. Migration corridor and habitat
 40 fragmentation and connectivity as they relate to natural community distribution have also been
 41 considered qualitatively by reviewing landscape linkages (within the Plan Area and on a regional
 42 scale) identified by CDFW and reported in the BDCP (see BDCP Chapter 3, Table 3.2-3, and Figure
 43 3.2-16), and by considering how physical facilities might impede terrestrial species movement
 44 through natural communities and conservation lands. Field survey information reported in

1 Appendix 12C and information collected in reconnaissance site visits by qualified biologists have
 2 also contributed to qualitative assessments of habitat heterogeneity, presence of buffers, and
 3 species-specific habitat requirements

4 The natural community effects assessment includes an assessment of effects on wetlands and other
 5 sensitive habitats. Restoration and enhancement measures and construction of water conveyance
 6 facilities would have temporary and permanent effects on wetlands. Natural communities that could
 7 qualify as wetlands are tidal and nontidal perennial aquatic, tidal freshwater emergent wetland,
 8 nontidal freshwater perennial emergent wetland, vernal pool complex, alkali seasonal wetland
 9 complex, managed wetland, other natural seasonal wetland, and valley/foothill riparian.

10 **Water Conveyance Facilities**

11 The GIS layers depicting all water conveyance construction activities that could affect the natural
 12 communities (e.g., grading, excavation, paving) have been overlain with the natural communities GIS
 13 layer. Direct effects of constructing water conveyance facilities have been classified as permanent or
 14 temporary based on the duration of the effect as described above under *Effects Duration*. Indirect
 15 effects on natural communities from constructing the water conveyance facilities are not discussed
 16 in detail in this chapter. The Plan contains a substantial list of avoidance and minimization measures
 17 that would be implemented during water conveyance facilities construction to avoid and minimize
 18 effects on adjacent wetlands and other vegetation types, as described in Appendix 3B, *Environmental*
 19 *Commitments, AMMs, and CMs*.

20 **Restoration, Enhancement, and Protection**

21 Habitat restoration, enhancement and protection actions under the BDCP alternatives are proposed
 22 for implementation over the 50-year life of the Plan, or would be implemented concurrent with the
 23 construction of the water conveyance facilities under Alternatives 4A, 2D, and 5A. Implementing
 24 CM2–CM11 under the BDCP, or Environmental Commitments 3, 4, 6–11 under Alternatives 4A, 2D,
 25 and 5A, which are focused on habitat restoration, enhancement, and protection, would result in
 26 physical changes to existing terrestrial biological resources. The BDCP conservation measures
 27 designed to address “other stressors” on aquatic species (CM12–CM21, or Environmental
 28 Commitments 12, 15, and 16 under the non-HCP alternatives) were not considered to have effects
 29 on terrestrial biological resources, but are discussed briefly where applicable in Section 12.3,
 30 *Environmental Consequences*.

31 Detailed plans for restoration, enhancement, and preservation actions have not been prepared for
 32 multiple reasons: 1) because the habitat restoration and enhancement would be implemented, if
 33 feasible, in areas with willing sellers, none of whom has been identified; 2) to maintain flexibility in
 34 the BDCP for adaptive management; and 3) because BDCP implementation has a long timeframe.
 35 However, although specific locations proposed for habitat restoration and enhancement have not
 36 been defined at this time, the EIR/EIS must quantify the environmental effects to the degree of
 37 specificity available for the project description. Therefore, the assessment of the effects for the
 38 habitat restoration and enhancement was programmatic. The analysis has focused on the
 39 geographic areas identified in the BDCP as most likely to support restoration, enhancement and
 40 protection. These geographic areas have been characterized as CZs that encompass the entire Plan
 41 Area (see Figures 3-1 and 12-1), and, for tidal natural communities restoration, as ROAs that focus
 42 on smaller regions of the Plan Area (see Figure 12-1). These geographic divisions are described in
 43 Section 12.1 *Environmental Setting/Affected Environment*.

1 For the programmatic analysis of the BDCP alternatives, natural communities that might be
 2 modified for habitat restoration were quantified using a GIS layer that included preliminary
 3 footprints for some types of restoration. Preliminary footprints were established for *CM2 Yolo*
 4 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
 5 *Inundated Floodplain Restoration*. The acreages of natural community types that would be removed
 6 by restoration were calculated, as were the acreages of natural community types that would develop
 7 after restoration based on site attributes, such as soil types and topography. For riparian, nontidal,
 8 and grassland restoration, impacts were estimated using the methods and assumptions that are
 9 summarized in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. For
 10 Alternatives 4A, 2D, and 5A, no hypothetical footprints for tidal restoration were available;
 11 therefore, impacts were estimated. These impacts were estimated by first assuming that tidal
 12 restoration under these alternatives would take place in the Cache Slough and West Delta ROAs
 13 (areas most likely to have tidal restoration conducted for the benefit of fish), then developing the
 14 proportions of natural communities occurring in these two ROAs combined, and then multiplying
 15 those proportions by the proposed tidal restoration acreage under Alternatives 4A, 2D, and 5A.
 16 Additional methods and assumptions listed in BDCP Appendix 5.J, *Effects on Natural Communities,*
 17 *Wildlife, and Plants*, were also applied to the tidal restoration estimates for Alternatives 4A, 2D, and
 18 5A. Additional NEPA and CEQA considerations may be necessary in the future when actual
 19 restoration projects are proposed.

20 In addition to the direct loss of terrestrial communities associated with the conversion, indirect
 21 effects associated with a change in tidal action, and changes in salinity could occur. Potential
 22 changes to terrestrial communities associated with changes to tidal actions were evaluated using
 23 output from two-dimensional hydrodynamic RMA modeling.

24 **12.3.2.3 Methods Used to Assess Species Effects**

25 The analysis of effects on terrestrial plant and wildlife species in this chapter considers the direct
 26 and indirect effects of implementing proposed project conservation actions for restoration,
 27 enhancement, and preservation (CM2–CM11 under BDCP alternatives, and Environmental
 28 Commitments 3, 4, 6–11 under Alternatives 4A, 2D, and 5A), and water conveyance facilities. The
 29 assessment evaluates permanent, temporary, and periodic effects on terrestrial species, including
 30 special-status species.

31 From 2009 through 2011, DHCCP and consulting biologists conducted field surveys for special-
 32 status species that have the potential to occur in the Plan Area. These surveys were limited to public
 33 lands and to private lands that were accessible for the surveys. The methods and a summary of the
 34 results for these surveys are provided in Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
 35 *EIR/EIS Environmental Data Report*. All observed special-status species occurrences were entered
 36 into a GIS database. The survey results were in some cases used to modify the BDCP species-habitat
 37 models. The survey results were primarily used to verify species-habitat relationships. These results
 38 were used together with occurrence data in the CNDDDB to determine whether construction
 39 footprints would affect these species occurrences; in some cases, project footprints were modified to
 40 avoid sensitive areas. Since the release of the DHCCP report (Appendix 12C), some of the DHCCP
 41 occurrence data has been incorporated into the CNDDDB. As noted above, the DHCCP surveys did not
 42 occur on all lands within the conveyance alignment footprints and the CNDDDB data is limited by
 43 where previous surveys have occurred; therefore, the actual effects to individuals or populations
 44 may be higher than is presented in the species effects discussions for the water conveyance facilities.

1 Covered Species

2 For covered species, the BDCP team developed species-habitat models that are presented in BDCP
3 Appendix 2.A, *Covered Species Accounts*. These GIS-based species-habitat models consist of a GIS
4 layer of potentially suitable habitat for the species based on its habitat requirements, which were
5 modeled using several GIS data sources depicting vegetation, soils, topography, land use, and other
6 parameters. The methods used by the BDCP to determine effects on covered species are described in
7 BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The analysis of the effects
8 from conveyance facility construction and restoration actions were analyzed quantitatively where
9 specific (conveyance facilities) or hypothetical (restoration) footprints were available. Effects from
10 other conservation actions, such as enhancement, management, operations, and maintenance were
11 analyzed qualitatively.

12 The species-habitat models were reviewed by the EIR/EIS lead agencies, USFWS, and CDFW. The
13 models have limitations in their ability to estimate habitat area with precision. In some cases, they
14 may overestimate the extent of habitat because they do not incorporate information such as
15 microhabitat conditions and other site-specific variables (e.g., water depth, habitat structure).
16 Conversely, because of minimum mapping unit limitations, some of the models identify areas as
17 nonhabitat that do support species habitat. For example, habitat areas that are smaller than the
18 minimum mapping unit size (1 acre) may not be identified. This may be important for species that
19 can use small, isolated habitats, such as birds that nest in isolated individual trees or small groups of
20 trees. Where applicable, wildlife species' habitat was also identified according to type (e.g., breeding,
21 foraging, or dispersal habitat).

22 It is important to note that although the models portray a reasonable distribution of habitat for each
23 covered species, they do not necessarily indicate with certainty that covered species are restricted
24 to those areas. Instead, the models indicate that nonhabitat areas have a much lower probability of
25 species occurrence compared with areas identified as habitat. In some cases the BDCP models were
26 developed using site-specific species occurrence information from the CNDDDB and information from
27 extensive field surveys conducted in and around water conveyance facility footprints by DWR
28 (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*).
29 BDCP species-habitat models were used to identify suitable habitat as a regionwide evaluation tool
30 in this EIR/EIS.

31 Effects of constructing water conveyance facilities on covered species have been analyzed using the
32 same species-habitat GIS models as were used for restoration measures. Facility footprints were
33 overlain on species' habitat GIS layers, and the acreages of temporary and permanent effects were
34 calculated. Depending on the species biology, indirect effects were assessed either quantitatively or
35 qualitatively, based on a description of the construction activities (see Chapter 3, *Description of the*
36 *Alternatives*). To make the water conveyance facilities impact analysis more site-specific, species
37 occurrence data were evaluated as a component of the value assessment for habitat. DHCCP and
38 consulting biologists conducted extensive field surveys recently in and around the conveyance
39 facilities footprint and alternative alignments for this facility. Therefore, occurrence data have been
40 used to assess effects of the conveyance facilities construction (CM1) to a greater extent than they
41 are used to assess effects of other conservation measures.

42 Effects of construction noise on greater sandhill crane habitat were estimated by calculating the
43 distances from construction sites subject to noise above 60 dBA (A-weighted decibels), and 50 dBA
44 (see Section 11F.5.1 of Appendix 11F, *Substantive BDCP Revisions*; for a discussion of noise levels,

1 see Chapter 23, *Noise*). Construction activities were classified into five construction activity types
2 that each were assumed to have a typical noise level. Categories of noise sources at construction
3 sites (measured at 50 feet distance) are listed below.

- 4 • Impact pile driving: 101 dBA.
- 5 • Multiple source construction activities: 96 dBA.
- 6 • Conveyor belt return/load/booster drive (Alternative 4 only): 85 dBA.
- 7 • Conveyor belt mid-segment (Alternative 4 only): 75 dBA.
- 8 • Heavy trucks: 85 dBA.

9 Pile driving was analyzed separately due to the unique characteristics of noise produced from this
10 noise source (intermittent impact noise). Multiple source construction noise was characterized by
11 calculating the noise levels that would be produced when the loudest six pieces of construction
12 equipment were operating simultaneously, and noise from heavy trucks was calculated assuming
13 three heavy trucks operating in the same general area simultaneously.

14 To assess the potential effect of noise on sandhill cranes the noise level expected was calculated for
15 known roosting habitat (at temporary and permanent roosts), and in modeled foraging habitat.
16 Calculations assumed direct line-of-sight (no intervening barriers) with an atmospheric noise
17 attenuation rate of approximately 6 dBA with each doubling of distance plus an additional
18 attenuation of 1.5 dBA noise absorption due to propagation over soft ground (e.g., agricultural land,
19 open natural habitat). Therefore, total noise attenuation was calculated as 7.5 dBA per doubling of
20 distance from the source. For construction noise, distance to noise level contours were calculated
21 from the edge of each identified construction area, giving a conservative worst-case estimate of
22 noise levels because most of the construction activity would not take place on the perimeter of each
23 site.

24 Overlay of the noise contours on the modeled foraging and known temporary and permanent roost
25 sites was used to calculate the areas affected by expected worst-case noise levels above 60 dBA and
26 50 dBA. When the noise levels from different noise categories overlapped, the category with the
27 highest noise level was assumed to be operating. More detail on the methods for determining the
28 construction noise effects on greater sandhill crane habitat can be found in Section 11F.5.1 of
29 Appendix 11F, *Substantive BDCP Revisions*.

30 Using global position system receivers, the DHCCP surveys also mapped locations of elderberry
31 shrubs (which are used by valley elderberry longhorn beetle to complete its lifecycle) in the DHCCP
32 Conveyance Planning Area, where accessible. The spatial data collected consisted of point and line
33 data and was attributed with size class, habitat found in, an estimate of the number of stems, and in
34 some cases the estimate of the number of shrubs associated with a spatial feature (i.e., some lines
35 represented as many as 160 shrubs). To determine the number of elderberry shrubs potentially
36 impacted by CM1 for each alternative, ICF GIS staff intersected the conveyance alignment
37 alternatives with the elderberry shrub line and point data. Where an individual line represented
38 multiple shrubs along a channel, an estimate of the number of shrubs impacted by a particular
39 conveyance alignment was generated by multiplying the number of shrubs represented by the line
40 by the proportion of the line intersected by the conveyance alignment. For example, if a 1,000-foot-
41 long line representing 100 shrubs had 500 feet of its length intersected by one of the conveyance
42 alignment alternatives, then the 100 shrub total was multiplied by 0.50 (500/1,000) to come up
43 with an estimate of 50 shrubs impacted.

1 Changes in salinity, selenium and methylmercury and their potential effects on covered species have
2 been assessed qualitatively based on extrapolation of water quality modeling results. These
3 potential effects are based on salinity modeling results that were used to predict the extent of
4 available habitat for species that depend on brackish or freshwater tidal emergent wetland, as well
5 as modeling results for selenium and methylmercury (see Chapter 8, *Water Quality*, and BDCP
6 Appendix 5.D, *Contaminants*).

7 **Noncovered Species**

8 Effects on noncovered species were determined in GIS using the same construction and hypothetical
9 footprints overlain on habitat models developed by ICF staff for these species. As described in
10 Sections 12.1.3.2 and 12.1.3.3, modeled habitat for noncovered species in the study area was defined
11 by one or more of the following characteristics: species range; natural communities in which the
12 species are found; and occurrence records. In cases where covered and noncovered species have the
13 same habitat requirements (e.g., the covered least Bell's vireo and the noncovered yellow warbler),
14 modeled habitat for the covered species was applied to the noncovered species. For a few species
15 that have specific habitat elements that are at a smaller scale than the minimum mapping units used
16 in the BDCP vegetation/land cover dataset (e.g., sand bar habitat for anthicid beetles) the extent of
17 habitat and impacts from conservation measures were qualitatively evaluated.

18 **Plant Species**

19 Detailed habitat models similar to those in the BDCP have not been created for noncovered special-
20 status plant species (Table 12-3). The impact analysis relies largely on species occurrences but also
21 considers impacts on the natural communities in which species occur and considers models for
22 covered species that have the same habitat requirements as noncovered species have. Species
23 occurrence information in the study area was obtained from the CNDDDB and surveys conducted for
24 the Delta Habitat Conservation and Conveyance Program (Appendix 12C, *2009 to 2011 Bay Delta
25 Conservation Plan EIR/EIS Environmental Data Report*). GIS data layers have been created for the
26 noncovered special-status plant species, with separate layers based on whether the occurrences are
27 geographically specific or nonspecific. Impacts have been determined by overlaying the footprint of
28 conservation measures on the mapped occurrences. All occurrences partly or completely
29 overlapped by the footprint have been considered to be affected. All impacts resulting from ground
30 disturbance have been assumed to be permanent, even if the disturbed area would be later restored,
31 because there is no basis for assuming that the restored habitat would still be suitable for the
32 affected species. Indirect effects, such as the predicted shifts in salinities or increased erosion in
33 wetlands, have been assessed qualitatively.

34 **Wildlife Species**

35 For noncovered wildlife species, ICF EIR/EIS staff described relationships between natural
36 communities and species habitat that were developed based on literature and review of species
37 databases, including CNDDDB and California Wildlife Habitat Relationships (CWHHR), and that are
38 discussed in Section 12.1.3.2. ICF GIS staff developed habitat models for noncovered species for use
39 in determining effects following the descriptions provided in Section 12.1.3.2 and in coordination
40 with ICF biologists.

41 Changes in salinity, selenium and methylmercury and their potential effects on noncovered species
42 have been assessed qualitatively based on extrapolation of water quality modeling results. These
43 potential effects are based on salinity modeling results that were used to predict the extent of

1 available habitat for species that depend on brackish or freshwater tidal emergent wetland, as well
2 as modeling results for selenium and methylmercury (see Chapter 8, *Water Quality*, and BDCP
3 Appendix 5.D, *Contaminants*).

4 **Common Species**

5 Common plant and wildlife species are considered in the context of project effects on natural
6 communities. There is a very wide range in natural communities and associated common species in
7 the study area. To the extent that natural communities are directly or indirectly affected by BDCP
8 actions, the associated common species are also affected. The potential for effects on these common
9 species are offset to varying degrees by the long-term conservation strategies contained in the BDCP
10 and the habitat protection and restoration that is envisioned in those conservation strategies.

11 **Wildlife Corridors**

12 The potential effects of the alternatives on wildlife corridors in the study area were primarily
13 evaluated using GIS data from the California Essential Habitat Connectivity (CEHC) Project and from
14 a landscape linkage analysis conducted for the BDCP (see BDCP Chapter 3, Section 3.2.5, *Landscape*
15 *Linkages*). This information was used to determine if any of the BDCP actions would result in
16 barriers across known or potential natural lands that serve as wildlife corridors or conflict with
17 BDCP Objective L3.1 and siting and reserve design criteria defined in *CM3 Natural Communities*
18 *Protection and Restoration*. The alternatives were also evaluated for effects on wildlife corridors by
19 reviewing aerial imagery with the proposed conveyance facilities alternatives, ROAs, the natural
20 community data, CNDDDB records, and data from DHCCP surveys. Effects on wildlife corridors for
21 individual species are addressed in more detail in their respective effects discussions.

22 The CEHC Project was commissioned by the California Department of Transportation and CDFW
23 with the purpose of making transportation and land-use planning more efficient and less costly,
24 while helping reduce dangerous wildlife-vehicle collisions (Spencer et al 2010). The CEHC identified
25 natural blocks of habitat across California and areas that potentially provide linkages between these
26 blocks. The CEHC identifies these areas as Essential Connectivity Areas (ECAs). The ECAs were not
27 developed for the purpose of defining areas subject to specific regulations by the CDFW or other
28 agencies. The ECAs are identified as lands likely to be important to wildlife movement between
29 large, mostly natural areas at the statewide level. The ECAs form a functional network of wildlands
30 that are considered important to the continued support of California's diverse natural communities.
31 The ECAs were not developed for the needs of particular species but were based primarily on the
32 concept of ecological integrity, which considers the degree of land conversion, residential housing
33 impacts, road impacts, and status of forest structure (for forested areas) (Spencer et al 2010). In
34 addition, consideration was given to the degree of conservation protection and areas known to
35 support high biological values, such as mapped critical habitat and hotspots of species endemism
36 (Spencer et al 2010). The ECAs are intended as placeholder polygons that can inform land-planning
37 efforts, but they should eventually be replaced by more detailed linkage designs, developed at finer
38 resolution at the regional and ultimately local scale based on the needs of particular species and
39 ecological processes.

40 With this in mind, the ECAs were overlain on the study area to identify whether these general areas
41 represent potential habitat linkages for wildlife that occur within or likely disperse through the
42 study area. Four general areas were identified within the study area that contain ECAs (Figure 12-2).
43 The first area is composed of three separate ECAs that converge in the Yolo Bypass: one coming

1 from the north (Yolo Bypass-Sacramento Bypass ECA), one coming from the south (Little Holland
 2 Tract/Yolo Bypass-Yolo Bypass ECA), and one from the east from CZ 4, across CZ 3, linking the Yolo
 3 Bypass to Stone Lakes (Stone Lake-Yolo Bypass ECA). Another ECA was identified coming into CZ 4
 4 from the east, generally following the Cosumnes Preserve and terminating at I-5 (Bear Slough-
 5 Browns Creek ECA). Another was identified in the central Delta generally running north-south from
 6 CZ 5 into CZ 6, from Staten Island to Mandeville Island (Mandeville Island-Staten Island ECA). The
 7 last area is in CZ 11 and consists of an ECA coming into Suisun Marsh from the northwest (Grizzly
 8 Island-Lake Marie ECA).

9 CDFW staff participating in the development of the BDCP identified potential linkages important for
 10 covered species for incorporation into the reserve design process (see BDCP Chapter 3, Section
 11 3.2.5, *Landscape Linkages*). These linkages were inferred from the BDCP land cover data, species
 12 occurrence data, and covered species habitat models (see BDCP Figure 3.2-16). These linkages were
 13 drawn at a regional level as broad swaths of natural land cover types rather than specific alignments
 14 or corridors. Two types of linkages were identified in the BDCP: regional connections, which focus
 15 on maintaining linkages with areas outside the Plan Area, and connections within the Plan Area,
 16 which focus on linking populations within the Plan Area. These linkages were developed with
 17 individual species or a suite of species in mind. The purpose and likely benefit of each linkage shown
 18 in BDCP Figure 3.2-16 are presented in BDCP Chapter 3, Table 3.2-3. A summary of the purpose for
 19 and a list of the covered species likely to benefit from the 11 linkages is presented below.

20 **Regional Connections**

- 21 1. *Jepson Prairie* – Provide connectivity within Jepson Prairie and between CZs 1 and 11; benefit
 22 vernal pool crustaceans and plants, and California tiger salamander.
- 23 2. *West to Contra Costa County* – Provide connectivity between the Plan Area and protected lands
 24 in East Contra Costa County; benefit vernal pool crustaceans and plants, alkali seasonal wetland
 25 plants, California red-legged frog, California tiger salamander, and San Joaquin kit fox.
- 26 3. *Yolo Bypass* – Provide connectivity for adult fish migration through Yolo Bypass; benefit adult
 27 salmonids and sturgeon, and juvenile salmonids and Sacramento splittail.
- 28 4. *San Joaquin River to the south* – Provide connectivity for natural community and species habitat
 29 functions; benefit riparian brush rabbit, riparian woodrat, least Bell's vireo, yellow-breasted
 30 chat, yellow-billed cuckoo, Swainson's hawk, and white-tailed kite.

31 **Connections within the Plan Area**

- 32 5. *San Joaquin River* – Provide aquatic and riparian connectivity along the San Joaquin River;
 33 benefit riparian brush rabbit, riparian woodrat, least Bell's vireo, yellow-breasted chat, yellow-
 34 billed cuckoo, Swainson's hawk, and white-tailed kite.
- 35 6. *Middle River* – Provide riparian connectivity along the Middle River; benefit riparian brush
 36 rabbit, riparian woodrat, least Bell's vireo, yellow-breasted chat, yellow-billed cuckoo,
 37 Swainson's hawk, and white-tailed kite.
- 38 7. *Old River* – Provide riparian connectivity along the Old River from San Joaquin River to Clifton
 39 Court Forebay; benefit riparian brush rabbit, riparian woodrat, least Bell's vireo, yellow-
 40 breasted chat, yellow-billed cuckoo, Swainson's hawk, and white-tailed kite.

- 1 8. *Deep Water Ship Channel* – Provide direct route for fish migration along San Joaquin River to
 2 spawning habitat upstream of Stockton; benefit Chinook salmon, steelhead, green sturgeon, and
 3 white sturgeon.
- 4 9. *Sacramento River* – Provide sufficient flows through Sacramento River downstream of North
 5 Delta intakes and limit entrainment to retain movement capacity for covered fish; benefit delta
 6 smelt, longfin smelt, Chinook salmon, steelhead, green sturgeon, and white sturgeon.
- 7 10. *Cosumnes to Stone Lakes* – Provide at least two greater sandhill crane roosting and foraging sites
 8 connecting the population in the vicinity of Cosumnes River Preserve with the population in the
 9 vicinity of Stone Lakes NWR.
- 10 11. *White Slough to Stone Lakes* – Provide giant garter snake habitat connecting the White Slough
 11 population to habitat in the Stone Lakes area

12 The linkages depicted in BDCP Figure 3.2-2 are included in Figure 12-2 for the purpose of
 13 identifying potential conflicts between wildlife corridors to be enhanced and developed under *CM3*
 14 *Natural Communities Protection and Restoration* and the CM1 alternatives being considered in the
 15 EIR/EIS. Where applicable, these potential conflicts are also addressed in the effects discussions for
 16 individual terrestrial species.

17 **12.3.2.4 Methods Used to Assess Wetlands and Other Waters of the** 18 **United States**

19 The term *waters of the United States* is an encompassing term used by USACE for areas that are
 20 subject to federal regulation under Section 404 of the CWA. Waters of the United States are
 21 categorized as *wetlands* or *other waters of the United States*. Each of these categories is described
 22 below.

23 USACE defines *wetlands* as areas that are inundated or saturated by surface water or groundwater at
 24 a frequency and duration that is sufficient to support, and that under normal circumstances do
 25 support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR
 26 328.3[b]; 40 CFR 230.3). For a wetland to qualify as a jurisdictional aquatic site, and therefore be
 27 subject to regulation under CWA Section 404, it must support a prevalence of hydrophytic
 28 vegetation, hydric soils, and wetland hydrology.

29 *Other waters of the United States* are water bodies that are regulated under Section 404 of the CWA
 30 but do not typically display all three of the wetland indicators identified above.

31 As stated in Chapter 3, *Description of Alternatives*, this document is intended to provide project-level
 32 CEQA and NEPA analysis for *CM1 Water Facilities and Operation*, and program-level analyses for all
 33 other BDCP covered activities. To support the approval of a water conveyance alternative at the
 34 project level, it will be necessary to consider its effects on wetlands and waters of the United States
 35 at a detailed level. This analysis will be part of the Section 404 Clean Water Act application process,
 36 as is needed to support compliance with the Act, and which must occur prior to issuing a Record of
 37 Decision for the project's 404 permit action under terms of NEPA. A jurisdictional wetlands
 38 determination has not been undertaken for other elements of the BDCP because more specific detail
 39 must be developed for individual conservation actions before a specific area of effect can be
 40 identified.

1 The wetland classification system used to delineate wetlands and waters of the United States for the
2 analysis in this chapter is different from that used to develop natural communities in the BDCP. The
3 BDCP natural communities development process and methods are described in Section 12.3.2.2,
4 *Methods Used to Assess Natural Community Effects*. The method for mapping and quantifying
5 potential wetlands and waters of the United States for this EIR/EIS was developed and implemented
6 by DWR. Wetland mapping followed protocols developed for the Sacramento-San Joaquin Delta,
7 which were adapted from the Bay Area Aquatic Resources Inventory (BAARI; San Francisco Estuary
8 Institute 2011). DWR used an analysis of electronic geographic data using a GIS to delineate
9 potential wetlands within the Conveyance Planning Areas. DWR interpreted digital aerial imagery
10 from 2005–2010 to identify wetland vegetation and other aquatic features. Additional sources of
11 information were also consulted including the CDFW GIS dataset showing vegetation and land use
12 for the Sacramento San Joaquin Delta (Hickson and Keeler-Wolf 2007), digital elevation data
13 (LiDAR), historical aerial imagery available on Google Earth, Natural Resource Conservation Service
14 soil maps, and the USFWS National Wetland inventory maps.

15 Field data was collected at a limited number of accessible sites in support of this GIS-based
16 determination. DWR environmental scientists conducted wetland delineations following the method
17 in the *1987 Corps of Engineers Wetland Delineation Manual* (U.S. Army Corps of Engineers 1987) and
18 the Arid West Supplement (U.S. Army Corps of Engineers 2008). DWR plotted the locations of the
19 field wetland data points on the wetland map. Most data points confirmed the mapped wetland
20 boundaries, but slight adjustments to wetland polygons were made if necessary. The wetland
21 delineation was submitted to the USACE for verification in August 2014. The final verified
22 delineation incorporated changes requested by the USACE.

23 Table 12-6 classifies the potentially jurisdictional wetland and other water types mapped in the
24 Conveyance Planning Areas with the corresponding type from the Cowardin classification system
25 (Cowardin et al. 1979). These wetland features are stored in a geographic feature class within a
26 geodatabase. Descriptions of the mapped wetland types are included below.

1 **Table 12-6. Wetlands and Other Waters of the United States**

	Wetland/Water Type	Map Label Codes	Cowardin Code	Type in Draft EIR/EIS
Wetlands				
Perennial	Emergent	EM	PEM Palustrine-emergent	Tidal wetland and nontidal wetland
	Scrub-Shrub	SS	PSS Palustrine-scrub-shrub	Tidal wetland and nontidal wetland
	Forest	FO	PFO Palustrine-forested	Tidal wetland and nontidal wetland
Seasonal	Vernal Pool	VP	PEM2 Palustrine-emergent-nonpersistent	Seasonal wetland
	Seasonal Wetland	SW	PEM Palustrine-emergent	Seasonal wetland
	Alkaline Wetland	AW	PEM Palustrine-emergent or PSS Palustrine-scrub-shrub	Seasonal wetland
Other Waters of the United States				
Nontidal	Agricultural Ditch	AD	R4 Riverine-Intermittent	Nontidal flow
	Natural Channel	CH	R4 Riverine-Intermittent	Nontidal flow
	Depression	DE	PUB Palustrine-unconsolidated bottom	Pond or lake
	Lake	LA	L1UB Lacustrine-Limnetic unconsolidated bottom	Pond or lake
Tidal	Tidal Channel	TC	R1UB Riverine-Tidal-unconsolidated bottom	Tidal flow
	Conveyance	CO	N/A Concrete or rock-lined conveyance channels	Muted tidal flow
	Clifton Court Forebay	CCF	R1UB Riverine-Tidal-unconsolidated bottom	Clifton Court Forebay

1 **Perennial Wetlands**

2 Perennial wetlands are dominated by persistent hydrophytic vegetation. Three types of perennial
3 wetlands were mapped in the Project Area based on the growth form of the vegetation. (The types
4 below were designated as Tidal Wetlands or Nontidal Wetlands in the Draft EIR/EIS.)

5 **Emergent Wetland**

6 Emergent wetlands are dominated by emergent marsh plants such as tules and cattails, or native or
7 ruderal hydrophytic herbaceous forbs. Nontidal emergent wetlands occur above the waterline in
8 ditches or other nontidal channels, at the edge of ponds or lakes, or where seepage occurs on the
9 landside of levees. Tidal emergent wetlands occur in the vegetated zone along tidal or muted tidal
10 channels, in areas such as mud flats, waterside levee toes, and in-channel islands.

11 **Scrub-Shrub Wetlands**

12 Scrub-shrub wetlands are dominated by woody vegetation that is less than 6 m tall and includes
13 riparian shrubs such as native blackberries, dogwoods, buttonbush, and California wild rose, as well
14 as willow and cottonwood seedlings or saplings. Scrub-shrub wetlands may occur in depressions or
15 other nontidal areas such as the banks of ditches and the edges of ponds or lakes. This plant
16 community also occurs in tidally influenced areas along tidal channels and on in-channel islands.

17 **Forested Wetlands**

18 Forested wetlands are defined by woody vegetation that is 6 m tall or taller. Riparian trees in the
19 study area include: Goodding's willow, arroyo willow, sandbar willow, and Fremont's cottonwood.
20 Forested wetlands are found in areas with tidal and nontidal water regimes, as described for scrub-
21 shrub wetlands.

22 **Seasonal Wetlands**

23 Three types of seasonal wetlands were mapped in the study area. Seasonal wetlands are usually dry
24 for part of the year and therefore exhibit vegetation that is patchy or not persistent throughout the
25 year. Strongly alkaline or saline conditions may also cause the soil to be barren of vegetation in
26 some areas. (The types below were all designated as Seasonal Wetlands in the Draft EIR/EIS.)

27 **Vernal Pool**

28 Vernal pool wetlands are depressions with an impervious soil horizon close to the surface. These
29 depressions fill with rainwater and may remain inundated through spring or early summer; they
30 often occur in complexes of many small pools that are hydrologically interconnected. Vernal pools
31 support distinct plant species adapted to the characteristic flooding and drying cycles of the habitat.

32 **Seasonal Wetland**

33 A type of seasonal wetland occurs in the central Delta within plowed agricultural fields. Although a
34 system of pumps and drainage ditches controls water levels on the subsided islands, a high water
35 table persists in some areas. Upland crops are planted in the surrounding fields but hydrophytic
36 ruderal forbs become established in the wet areas, and crops usually fail if planted there. The
37 vegetation in these wetlands consists of annual weeds that do not persist through the winter.

1 **Alkaline Wetland**

2 Alkaline wetlands are a type of seasonal wetland influenced by strongly alkaline or saline soils.
3 Alkaline wetlands support alkaline or saline tolerant species such as iodine bush and alkali heath,
4 but may also have large unvegetated areas that are seasonally ponded or saturated.

5 **Nontidal Waters**

6 In the Delta five types of nontidal waters were mapped as the open water portion of either naturally
7 occurring features or unnatural features that were excavated and/or diked. Nontidal waters may
8 occur in depressions of various sizes or in channels with either intermittent or perennially flowing
9 water. The vegetation associated with these waters is discussed separately in the *Perennial Wetlands*
10 and *Seasonal Wetlands* sections. (The types below were designated as either Nontidal Flow or
11 Pond/Lake in the Draft EIR/EIS.)

12 **Agricultural Ditches**

13 Throughout the Delta there are many ditches constructed for the purpose of irrigating and/or
14 draining agricultural land. The mapped ditches range in size from one to 22 meters wide. They are
15 generally unvegetated with mud bottoms, but may support floating species such as duckweed or
16 water hyacinth.

17 **Natural Channels**

18 Nontidal natural channels exist on the northeast and southwest edges of the Project Area. These
19 include a section of the Cosumnes River and several small channels linking other water features. All
20 of these features flow intermittently. The substrate in natural channels may be mud, or sand, gravel,
21 and cobbles.

22 **Depressions**

23 Depressions are ponds that are permanently, seasonally, or artificially wet, with little to no rooted
24 vegetation on a mud or sand bottom. They may be artificially filled or result from a high water table.
25 Depressions are less than 20 acres in size with a depth of less than 2 meters. These water bodies are
26 often created in grazing lands for use as stock ponds, and may be diked or otherwise artificially
27 impounded.

28 **Lakes**

29 Lakes have characteristics similar to depressions, but are greater than 20 acres in size and may have
30 a wave-formed shoreline.

31 **Tidal Waters**

32 Tidal waters are the open water portions of aquatic features that are influenced by the rise and fall
33 of the tides. Man-made structures such as gates or culverts may restrict tidal influence to various
34 degrees. The vegetation associated with these waters is discussed separately in the *Perennial*
35 *Wetlands* and *Seasonal Wetlands* sections.

1 **Tidal Channels**

2 Tidal channels may be naturally occurring perennial riverine waterways, though most have been
3 modified with leveed banks and often reinforced with rock revetment. Water velocity and depth
4 fluctuates under tidal influence, and the channel bottom is generally comprised of mud or sand.
5 Tidal channels that have been created by excavation are usually straight rather than sinuous, and
6 usually have heavily diked or reinforced banks. These excavated channels were often created to
7 provide for navigation, water conveyance, material for levees, or to raise the land surface on
8 adjacent property. Tidal channels are largely unvegetated, or may support floating or submerged
9 aquatic vegetation.

10 **Conveyance Channels**

11 Several large rock-lined conveyance channels were mapped in the study area. These constructed
12 water features were mapped along with all other aquatic resources in the Project Area because they
13 may be subject to some tidal effects and therefore may be considered jurisdictional by USACE. (This
14 type was designated as Muted Tidal Flow in the Draft EIR/EIS.)

15 **Clifton Court Forebay**

16 Clifton Court Forebay, a constructed reservoir, is a highly modified perennial water body which is
17 semi-enclosed by land, and engineered to be periodically open to tidal influences via a moveable
18 gate structure. The Forebay is characterized by an artificial rock shore (rock revetment) and an
19 aquatic bed of varying depths. The forebay is largely unvegetated, however, emergent perennials
20 such as cattails and tules are found in shallow areas, and submerged aquatics such as Brazilian
21 waterweed are found in areas of moderate depth.

22 The features of the action alternatives include canals, tunnels intakes, forebays, pumping plants,
23 staging areas, and borrow and spoil areas and are considered to have either permanent or
24 temporary impacts. These features are stored in a geographic feature class within a geodatabase and
25 were used to determine the surface impact for each alternative.

26 To determine effects resulting from CM1 construction, the GIS layer of potentially jurisdictional
27 wetland and other waters was intersected with the layer of project footprint surface features for
28 each proposed EIR/EIS alternative. The resulting polygons identify the areas of potential impacts on
29 jurisdictional waters. Acreages of each type of impacted wetland were calculated for each
30 alternative and are presented in the wetlands and waters of the United States impact discussions in
31 Section 12.3.3, *Effects and Mitigation Approaches*, and Section 12.3.4, *Effects and Mitigation*
32 *Approaches—Alternatives 4A, 2D, and 5A*.

33 The GIS data layer of wetlands and other waters of the United States used in this process includes all
34 potentially jurisdictional waters, including those waters that may be later determined by USACE to
35 be isolated or otherwise non-jurisdictional. Although some potential wetlands may not have been
36 identified in areas where hydrology is extensively manipulated by agricultural activity, the use of
37 this methodology and the GIS data layer likely results in an overestimation of the wetlands and
38 waters that would be affected and would require permitting. The actual construction footprints are
39 expected to be smaller than design footprints, including the large intake footprints extending into
40 the Sacramento River. Also, the GIS methodology used to assign a footprint to the transmission
41 corridors involved creating a continuous band of effect along the entire alignment rather than
42 attempting to place individual transmission tower footprints along the alignment. Finally, the

1 potential jurisdictional wetlands mapping included a delineation of all agricultural-related ditches
 2 and canals; some of these waterways are likely to be determined non-jurisdictional during the
 3 permitting process.

4 The habitat protection and restoration activities associated with other BDCP conservation measures
 5 (CM2–CM10) would alter the acreages and functions and values of wetlands and waters of the
 6 United States in the study area through the course of the BDCP protection and restoration program.
 7 Because these conservation measures have not been defined to the level of site-specific footprints, it
 8 is not possible to delineate and quantify these effects in detail. Several of the conservation measures
 9 (CM2, CM4, and CM5) have been described with theoretical footprints for purposes of the effects
 10 analysis contained in Chapter 5 of the BDCP. These theoretical footprints have been used to predict
 11 the acres of natural communities that would be affected through loss or conversion, which gives
 12 some indication of jurisdictional wetland effects. Any CM2–CM10 effects ascribed to tidal perennial
 13 aquatic, tidal brackish emergent, tidal freshwater emergent, other natural seasonal, nontidal
 14 freshwater perennial emergent, and nontidal perennial aquatic wetlands natural communities are
 15 likely to also be effects on wetlands and other waters of the United States. Effects ascribed to other
 16 natural communities and land cover types with small jurisdictional wetland components
 17 (valley/foothill riparian, alkali seasonal wetland complex, vernal pool complex, managed wetland,
 18 grassland and cultivated lands) are not easily converted to effects on wetlands and other waters of
 19 the United States by the use of theoretical footprints. Because of this lack of detail, a programmatic
 20 assessment is provided for these other conservation measures. In the programmatic impact analysis,
 21 it has been assumed that 100% of the predominantly wetland natural communities mentioned
 22 above and 10% of all of the non-wetland natural communities mentioned above would qualify as
 23 wetlands or other waters of the United States under the CWA.

24 **Relationship to Waters of the State**

25 As noted in Section 12.2.2.7, *Porter-Cologne Water Quality Control Act*, waters of the state includes
 26 “any surface water or groundwater, including saline waters, within the boundaries of the state”,
 27 which is a broader definition than that of waters of the United States (see Section 12.2.1.1 *Sections*
 28 *404 and 401 of the Clean Water Act*). As discussed above, DWR’s delineation of waters of the United
 29 States includes all potentially jurisdictional waters, including those waters that may be later
 30 determined by USACE to be isolated or otherwise non-jurisdictional (e.g., agricultural ditches and
 31 canals). Because DWR’s delineation did not exclude any such wetlands and waters, the delineation
 32 also represents what would be considered waters of the state within the Plan Area. Therefore, the
 33 analyses and conclusions for effects on waters of the United States in Sections 12.3.3 and 12.3.4
 34 under Impact BIO-176: *Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and*
 35 *Other Waters of the United States* and Impact BIO-177: *Effects of Implementing Other Conservation*
 36 *Measures (CM2–CM10) on Wetlands and Other Waters of the United States* would also apply to waters
 37 of the state.

38 **12.3.2.5 Methods Used to Consider Mitigation**

39 The potential environmental effects of each project alternative have been analyzed independently
 40 below. In many cases, the potential effects on individual natural communities or special-status
 41 species created by each project element (the Conservation Measures/Environmental Commitments)
 42 have also been independently identified. In most cases, these independent effects have been
 43 compiled into a summary conclusion. All effects identified as adverse and potentially significant
 44 have been evaluated for the feasibility of mitigation after first considering whether avoidance and

1 minimization measures (AMMs) and the conservation measures built into the BDCP would lessen
2 the significant adverse environmental effects. Permanent and temporary impacts have been treated
3 the same in considering the need for mitigation.

4 To consider AMMs as a source of avoiding or reducing effects, each AMM was reviewed for its
5 relevance to the impact (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*, for a full list
6 of AMMs). If the measure was deemed capable of avoiding or reducing significant impacts, it was
7 identified in the analysis.

8 The second consideration was the near-term and long-term protection and restoration activities
9 contained in BDCP conservation measures and biological goals and objectives (BGOs). Each of these
10 activities was reviewed for its relevance to the effect. Where relevant, the magnitude of each
11 protection and restoration activity was considered in relation to the potential effect. Where the
12 potential for significant environmental effects remained despite the conservation measures and
13 AMMs, specific mitigation measures were identified.

14 The BDCP includes a net effects analysis that estimates beneficial effects of the Plan (see BDCP
15 Chapter 5, *Effects Analysis*, Tables 5.6-7 and 5.6-8). This net effects analysis was reviewed in the
16 process of developing the EIR/EIS analyses. However, the firm commitments of the conservation
17 measures and BGOs in the BDCP were the principal elements in developing CEQA and NEPA
18 conclusions. Where BDCP effects are related to construction of the water conveyance facilities and
19 are likely to involve site-specific protection or restoration activities, the text refers the reader to
20 Appendix 12D, *Feasibility Assessment of Conservation Measures Offsetting Water Conveyance Facilities
21 Construction Impacts on Terrestrial Biological Resources*. This appendix contains an analysis of the
22 BDCP's near-term conservation measures and their ability to offset the effects of water conveyance
23 facilities construction on terrestrial biological resources. The analysis includes a consideration of the
24 feasibility of the restoration and protection actions in light of the project-specific level of analysis
25 that has been conducted for the water conveyance facilities. The content of Appendix 12D has been
26 closely coordinated with the monitoring and adaptive management program developed for the
27 BDCP.

28 The process used in Appendix 12D to determine whether the BDCP near-term protection and
29 restoration actions would sufficiently offset water conveyance facilities' effects on natural
30 communities includes an initial comparison of water conveyance facilities' near-term effects with
31 the total near-term natural community protection and restoration goals contained in the Plan (see
32 Tables 12D-9 to 12D-13 in Appendix 12D, *Feasibility Assessment of Conservation Measures Offsetting
33 Water Conveyance Facilities Construction Impacts on Terrestrial Biological Resources*). Because a
34 project-level of analysis has been applied to the water conveyance element of the Plan, the
35 comparison has also been made between a typical project-level mitigation ratio for the natural
36 community and the near-term protection and restoration goals. If these goals meet or exceed the
37 typical project-level mitigation requirement, and if the BDCP includes a commitment to timely
38 conservation actions that address any loss in habitat value during the near-term timeframe, the
39 conservation actions have been considered sufficient to offset the effect. The timeliness of
40 conservation actions has been judged independently for each natural community. The Biological
41 Goals and Objectives outlined in BDCP Chapter 3, *Conservation Strategy*, have also been reviewed for
42 more specific information that has been developed to guide protection and restoration actions. The
43 general availability of lands to be used as compensation for water conveyance effects has also been
44 evaluated in Appendix 12D.

1 The process used in Appendix 12D to determine whether BDCP near-term conservation actions
 2 would sufficiently offset water conveyance effects on special-status wildlife and plants is similar to
 3 that for natural communities, except that effects are described in terms of modeled habitat lost.
 4 These losses have been compared with the BDCP planned conservation of natural communities that
 5 make up that modeled habitat and the BDCP goals and objectives that specify the timing, location
 6 and nature of habitat improvements needed to offset effects on special-status species. As with
 7 natural communities, the appropriateness of the timing of conservation actions is also considered in
 8 determining the sufficiency of near-term offsets.

9 The typical mitigation ratios contained in Tables 12D-9 to 12D-13 in Appendix 12D have been used
 10 only for analytical purposes in the EIR/EIS to determine the sufficiency of the BDCP conservation
 11 strategy as CEQA and NEPA mitigation (i.e., whether the BDCP conservation strategy includes
 12 sufficient land acquisition and restoration to adequately mitigate the impacts of CM1 for purposes of
 13 CEQA and NEPA). These ratios reflect and are consistent with the professional judgment and
 14 scientific knowledge of the biologists who worked on this chapter and the BDCP, and reflect their
 15 collective experience in environmental permitting, preparation of HCPs/NCCPs and similar natural
 16 resource management plans, and preparation of CEQA documents for state, regional, and local
 17 agencies. It is recognized that there is a sizeable range in mitigation ratios used in environmental
 18 documents. The ratios generally depend on level of ecological function lost and level of confidence in
 19 the ability of the mitigation measures to replace that function. Given that many of the impacts of
 20 implementing the BDCP would occur on degraded habitats and the BDCP conservation measures
 21 include commitments to specific performance standards, the ratios used in this chapter are
 22 considered reasonable.

23 Mitigation ratios were not used to develop the BDCP conservation strategy for purposes of
 24 complying with ESA or NCCPA; therefore, these mitigation ratios are not mentioned in BDCP
 25 Chapter 3, and would not be used to ensure plan compliance with those two statutes. Instead,
 26 compliance with ESA and NCCPA would be determined by ensuring rough proportionality between
 27 effects and conservation as a whole.

28 The typical mitigation ratios used in Appendix 12D take into account several factors typically used
 29 during project-level evaluations.

- 30 ● The sensitivity and rarity of natural communities. More sensitive or rare communities have
 31 higher ratios.
- 32 ● The importance of natural communities as habitat for the covered species. Communities that
 33 support more covered species have higher ratios.
- 34 ● Threats to the natural community and the need for preservation to help alleviate those threats.
 35 Communities with more threats have a higher preservation ratio.
- 36 ● The uncertainty in the success of restoration efforts, including evidence in other areas that
 37 similar restoration works. Communities with more uncertain restoration have a higher
 38 restoration ratio.

39 The difference between the land acquisition and restoration needed to offset construction effects
 40 and that needed for the entire conservation strategy should not alone be viewed as the BDCP's
 41 contribution to recovery (i.e., beyond mitigation). There are many additional components of the
 42 conservation strategy not captured in this analysis that also conserve the covered species and
 43 contribute to their recovery. For example, enhancement and management of natural communities

1 (CM11), which involves creating specific vegetation structure or composition, would also help to
2 conserve covered wildlife and plants. See the biological goals and objectives in Section 3.3 of the
3 BDCP for a full description of all Plan requirements that would help to conserve the covered species.
4 The numeric targets for natural community acquisition and restoration are only a part of those
5 requirements.

6 As discussed above, offsets for impacts on terrestrial biological resources generally take the form of
7 accelerated efforts to restore or protect similar biological resources as part of the overall
8 conservation plan. The proposed timing of these restoration and protection measures are
9 documented (in 5-year increments) in Chapter 3, Table 3-4, of this document, and in BDCP Chapter
10 6, Table 6-2. The authors of this chapter have compared the restoration and protection timing
11 indicated in these tables with the anticipated timing of construction and restoration that might
12 eliminate habitat. Although it would be desirable from a habitat-availability perspective to have the
13 restoration and protection offsets in place simultaneously with the occurrence of impacts (this is not
14 a regulatory requirement), in some instances there may be short-term lag times between the
15 occurrence of the impacts, and the maturation of restored habitats and protection and enhancement
16 of existing habitats. As specified in Chapter 6, Section 6.1.2 of the BDCP, in order to meet the NCCPA
17 requirement for rough proportionality, the Plan commits to pace the implementation of the
18 conservation measures such that they may not fall behind the pace of covered activity impacts by
19 more than 10%. Such short-term delays have been accounted for in the formulation of offset
20 strategies such as the use of ratios for restoration or protection. Except where specifically noted in
21 impact discussions later in this chapter, such minor delays should not by themselves lead to short-
22 term or permanent adverse or significant impacts. Because of the availability within the study area
23 of like habitats to sustain affected species until the offset lands are fully functional, in only a few
24 instances, identified in specific impact discussions below, would such delays lead to short-term
25 adverse or significant effects on species. For example, although there may be short-term delays in
26 the creation of restored wetlands, the species that inhabit the impacted wetlands would persist in
27 other wetlands available within the study area until offset lands are functional. Except where
28 specifically noted later in this chapter, these short-term losses are not expected to be adverse or
29 significant because the acreages involved would be relatively small compared with total suitable
30 habitat within the study area and because the short-term losses would primarily be associated with
31 lower value habitat. In addition, restoration under CM2 through CM11 would offset these losses
32 with higher value habitats.

12.3.3 Effects and Mitigation Approaches

12.3.3.1 No Action Alternative

The No Action Alternative describes expected future conditions for terrestrial biological resources resulting from a continuation of existing policies and programs by federal, state, and local agencies in the absence of the action alternatives. As described in Chapter 3, *Description of Alternatives*, the No Action Alternative analysis takes into consideration Existing Conditions, programs already adopted during the early stages of development of the EIR/EIS, facilities that were permitted or under construction during the early stages of development of the EIR/EIS, and foreseeable changes in land and water management associated with existing plans, policies and legal mandates that would occur with or without the project. The assumptions that are included in the No Action alternative are further defined in Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*. The appendix includes an extensive list of existing programs, projects and policies that should be considered in all resource analyses (Tables 3D-2 and 3D-A.). An additional list of programs, projects and policies that were in the process of being implemented during the early stages of EIR/EIS development and that have been considered under the No Action Alternative are listed in Table 3D-4. These lists have been reviewed as they relate to terrestrial biological resources; the projects and programs listed in Table 12-7 are considered the most relevant to the No Action Alternative discussion in this chapter.

For this analysis, it has been assumed that the urban land uses in the study area would be only slightly modified from those of today because only limited types of development are allowed in the Primary Zone of the Delta, and urban expansions in the remainder of the study area are difficult to predict, given the strong influence of economic conditions and local planning restrictions. Two relatively large proposed urban developments, Mountain House northwest of Tracy and River Islands, west of Lathrop, are known and have the potential to remove over 7,200 acres of agricultural land in the southern portion of the study area. There is also the potential that urban expansion in the lands surrounding the study area could either directly or indirectly affect the terrestrial biological resources in the study area.

Table 12-7. Programs, Projects, and Policies Included In No Action Alternative for the Terrestrial Biological Resources Analysis

Agency	Program/Project/Policy	Comments
Alameda County	East Alameda County Conservation Strategy	Approved in 2011. There is less than a 2% overlap with BDCP and this overlap only occurs in one conservation zone. Currently no planned conservation activity in the overlap area.
California Department of Fish and Wildlife	Calhoun Cut/Lindsey Slough Restoration	Increase intertidal marsh habitat and adjacent riparian habitat on 927 acres in Cache Slough ROA.
California Department of Fish and Wildlife	Ecosystem Restoration Program Conservation Strategy	Created in 2000. Ongoing program to preserve, restore, and enhance terrestrial natural communities and ecosystems in the San Francisco Bay and Sacramento-San Joaquin Delta. Protected and restored more than 150,000 acres of habitat, including 3,900 acres and 59 miles of riparian and riverine aquatic habitat (as of 2010) after 7 of the planned 30 years of the project.

Agency	Program/Project/Policy	Comments
California Department of Fish and Wildlife	Fremont Landing Conservation Bank	Established in 2006. Enhances 40 acres of riparian habitat and restores 60 acres of riparian woodlands and sloughs.
California Department of Fish and Wildlife	Grizzly Island Wildlife Area Land Management Plan	Estuarine marsh that contains about 15,300 acres of wildlife habitat. Will continue to be managed for wildlife.
California Department of Fish and Wildlife	Lower Sherman Island Wildlife Area Land Management Plan	Ongoing program. Directs habitat and species management on 3,100 acres of marsh and open water.
California Department of Fish and Wildlife	Private Lands Incentive Program	Includes 29,000 acres of habitat in Tulare Basin, Grasslands, Suisun Marsh, and Sacramento Valley. Encourages development and enhancement of habitat for shorebirds and waterfowl on private lands.
California Department of Fish and Wildlife	Restoring Ecosystem Integrity in the Northwest Delta	Originally funded in 2004. Ongoing program. Focused on habitat restoration. Currently concentrating acquisition efforts on 3 specific properties consisting of about 150 acres and baseline monitoring.
California Department of Fish and Wildlife	Staten Island Wildlife-Friendly Farming Demonstration	Ongoing program. Objective is ecosystem restoration; 2,500–5,000 acres of corn will be flooded to increase habitat availability and to improve wildlife-friendly agriculture to foster recovery of at-risk species and to investigate effects of agriculture on water quality.
California Department of Fish and Wildlife	Yolo Bypass Wildlife Area Land Management Plan	Ongoing program. Provides for multiple use management of 16,000 acres of mixed agricultural, grassland and managed wetland habitats.
California Department of Water Resources	Delta Levees Flood Protection Program	Ongoing program. Includes modification to Delta levees within the Sacramento-San Joaquin Delta and portions of the Suisun Marsh. The project works with 60 reclamation districts and strives to complete levee rehabilitation projects with no net loss of habitat in the Delta.
California Department of Water Resources	Levee Repair-Levee Evaluation Program	Ongoing program. Upgrading levees along the Sacramento and San Joaquin Rivers and Delta; 1,600 miles of levees included in Central Valley.
State and Federal Water Contractors	Lower Yolo Restoration Project	In Cache Slough ROA, reintroduce tidal action to half of 3,408-acre Yolo Ranch.
California Department of Water Resources	Dutch Slough Tidal Marsh Restoration Project	Converts 240–840 acres from agricultural uses and grazing to wetland, riparian, and upland habitats.
California Partners in Flight	Riparian Habitat Joint Venture	Ongoing program. Promotes and supports riparian conservation and enhancement, contributes to flood control and maximizes habitat available to wildlife. Protects and restores riparian areas with intact adjacent upland habitats.
Central Valley Joint Venture Program	Central Valley Joint Venture	Ongoing program. Strives to protect, restore, and enhance wetlands. Contributes to habitat conservation on a total of 714,000 acres in California.

Agency	Program/Project/Policy	Comments
Contra Costa County and East Contra Costa County Habitat Conservancy	East Contra Costa County HCP/NCCP	Approved in 2007. Encompasses about 175,000 inventory acres and contains 30,000 acres of preserved land. Purpose is to purchase, restore, and permanently protect large, interconnected and biologically rich blocks of habitat. Occurs almost entirely out of the BDCP boundary.
Contra Costa Water District	Contra Costa Canal Fish Screen Project	Completed in 2011. Designed to restore Delta ecosystems. Minor terrestrial impact at fish screen sites.
Contra Costa Water District, U.S. Bureau of Reclamation, and California Department of Water Resources	Contra Costa Water District's Middle River Intake and Pump Station (Alternative Intake Project)	Completed in 2010. Resulted in permanent conversion of 6–8 acres of rural agricultural land. Features about 12,000 feet of pipe across Victoria Island and under Old River.
National Marine Fisheries Service, U.S. Bureau of Reclamation, and Department of Water Resources	Biological Opinion on the Long-Term Operations of the Central Valley Project and State Water Project	Ongoing program. Action area consists of the Oroville Reservoir, Feather River downstream of Oroville, Sacramento River downstream of Feather River, Sacramento-San Joaquin Delta, and adjacent habitats that are dependent on or influenced by waterways. Designed to conserve freshwater, estuarine, nearshore, and offshore sites. Includes 8,000-acre tidal wetland restoration requirement.
Reclamation District 2093	Liberty Island Conservation Bank	Under implementation. Permits and approvals acquired in 2009. Project site is on northern tip of Liberty Island, within the southern area of the Yolo Bypass where it flows into the northwest Sacramento/San Joaquin River Delta. Over 160 acres in the project site with about 50 proposed to be converted to open water channels, emergent marsh wetland, and riparian habitat. Focuses on Delta fish habitat but will restore 2.7 acres of riparian habitat.
Sacramento Area Flood Control Agency, Central Valley Flood Protection Board, and U.S. Army Corps of Engineers	Flood Management Program	Ongoing program. Supports flood management planning in Sacramento and San Joaquin Valleys. To be updated every 5 years with first update to be completed in 2017. Combined total of about 2.2 million acres of land within the Central Valley.
San Joaquin Council of Governments	San Joaquin County Multi-Species Habitat Conservation and Open Space Plan	Ongoing program. Approved in 2011. Includes most of San Joaquin County. Assumes 100,000 acres of open land conversion and provides about 100,000 acres of preserves. About 35% of this plan overlaps with BDCP so competition for restoration sites and land acquisition would exist. There are 39 covered species in common and very similar land acquisition targets, such as riparian forests and grasslands.
U.S. Army Corps of Engineers	CALFED Levee Stability Program	Includes maintaining and improving levee stability in the Delta. Long-term strategy will include ecosystem restoration. Partially funds McCormack-Williamson Tract Restoration in Cosumnes-Mokelumne ROA; 1,500 acres of tidal and floodplain restoration.

Agency	Program/Project/Policy	Comments
Bureau of Reclamation	Delta Mendota Canal/ California Aqueduct Intertie	Construction completed in April 2012. Includes construction of a pump and 500-foot pipeline between the two canals near the Jones Pumping Plant. No special-status plant community affected.
Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Department of Water Resources and Department of Fish and Wildlife	San Joaquin River Restoration Program	Initiated in 2006. Ongoing program; 150 miles of the river is planned for restoration, including within the BDCP Plan Area.
U.S. Fish and Wildlife Service, Bureau of Reclamation and California Department of Fish and Wildlife	San Joaquin Basin Action Plan	Includes a habitat acquisition and wetland enhancement project on 23,500 acres in northern San Joaquin River basin.
U.S. Fish and Wildlife Service	Recovery Plan for Sacramento-San Joaquin Delta Native Fishes	Includes developing additional shallow water habitat, riparian vegetation zones and tidal marsh to restore wetland habitats throughout the Bay-Delta ecosystem.
U.S. Fish and Wildlife Service	Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan	Drafted in 2006. Ongoing program. Directs habitat and species management on 17,600 acres of grassland, managed wetland and riparian habitat.
U.S. Fish and Wildlife Service, Bureau of Reclamation, and Department of Water Resources	Biological Opinion on the Long-Term Operations of the Central Valley Project and State Water Project (Delta smelt)	Ongoing program. Directs restoration of at least 8,000 acres of intertidal and related subtidal habitat for delta smelt in the Delta and Suisun Marsh.
Zone 7 Water Agency and Department of Water Resources	South Bay Aqueduct Improvement and Enlargement Project	Under construction. Estimated completion in 2012. More than 40 miles of pipelines and a 500 acre-foot reservoir will be built. No significant effects expected to terrestrial biology habitats.

1

2 **Effects on Terrestrial Natural Communities**

3 Changes to land use and land management have the greatest potential to affect terrestrial natural
4 communities and land cover types in the study area if the current water management policies and
5 activities associated with the plans and programs in Table 12-7 continue in the absence of the action
6 alternatives. Under the No Action Alternative, local, state and federal programs to preserve open
7 space and agricultural lands would continue to be implemented, as described in Chapter 13, *Land*
8 *Use*. The management of state- and federally owned wildlife areas, including Grizzly Island, Sherman
9 Island and Yolo Bypass State Wildlife Areas, and Stone Lakes NWR, would continue to focus on
10 multiple uses, including wildlife habitat improvement, public access for wildlife viewing, wildlife-
11 friendly agricultural production and hunting opportunities. These areas are primarily managed
12 wetlands and cultivated land, with smaller areas of tidal and nontidal wetlands, grassland and small
13 linear patches of valley/foothill riparian habitat. These areas will continue to be managed and

1 enhanced to benefit both special-status and common wildlife that use these natural communities.
2 The many privately owned managed wetlands would continue to support primarily wintering
3 waterfowl and associated aquatic and terrestrial species. The urban and infrastructure land uses in
4 the Delta would be only slightly modified from those of today for the reasons stated above. Any
5 urban expansion would likely be on the periphery of existing towns and cities and would result in
6 the gradual removal of primarily cultivated land and nonnative grassland.

7 A continuation of current water management strategies used by state, federal and local water
8 purveyors would not significantly modify the principal natural communities in the study area.
9 Periodic levee and channel maintenance activities associated with current strategies would result in
10 localized disturbances to valley/foothill riparian, grassland and tidal perennial aquatic natural
11 communities, and to a lesser extent to tidal brackish and tidal freshwater emergent wetlands. To the
12 extent that ongoing levee repair and replacement involves use of reinforcing rock and
13 discouragement of replanting streamside vegetation, there could be a gradual decline in the extent
14 and value of valley/foothill riparian habitat and grassland along minor and major waterways.
15 Several of the water management projects listed in Table 12-7 require localized removal of natural
16 communities and agricultural land for expanding infrastructure. Most of these activities are on the
17 periphery or just outside of the study area, including the Contra Costa Water District fish screen and
18 diversion structure modifications, the Delta Mendota Canal/California Aqueduct intertie project, and
19 the South Bay Aqueduct improvement project.

20 There are many programs either under way or in the planning stages to increase wetland and
21 riparian habitats in the study area. Some of the larger programs are listed below.

- 22 ● DWR Dutch Slough Tidal Marsh Restoration Project (1,165 acres to wetlands and uplands).
- 23 ● State and federal water contractors' Lower Yolo Restoration Project (3,408 acres of tidal and
24 riparian restoration on Yolo Ranch)
- 25 ● USFWS/Reclamation/DFG San Joaquin Basin Action Plan (23,500 acres of land acquisition and
26 wetland enhancement).
- 27 ● USFWS Recovery Plan for Sacramento-San Joaquin Delta native fishes (creation of shallow water
28 habitat, riparian vegetation, tidal marsh).
- 29 ● CDFW Lower Sherman Island Wildlife Area Land Management Plan (3,100 acres of marsh and
30 open water management).
- 31 ● CDFW Yolo Bypass Wildlife Area Management Plan (16,000 acres of managed agricultural,
32 wetland, grassland and vernal pool complex habitat).
- 33 ● CDFW Grizzly Island Wildlife Area Management Plan (15,300 acres of estuarine marsh managed
34 for waterfowl and wetland habitats).
- 35 ● USACE McCormack-Williamson Tract Restoration (1,500 acres of tidal restoration in the east
36 Delta).
- 37 ● USFWS Stone Lakes Wildlife Refuge Management Plan (18,000 acres of managed agricultural,
38 wetland, grassland and riparian habitats).

39 Ongoing implementation of these plans and programs would result in some decline of cultivated
40 lands in the study area. There are also plans, however, to continue and expand partnerships with
41 agricultural interests to manage croplands for wildlife-friendly crops.

1 In the longer term, both gradual and catastrophic natural phenomena could affect the mix of open
2 water, tidal wetland, agricultural and riparian forest natural communities in the study area through
3 continued land subsidence on Delta islands, levee degradation and potential failure from floods or
4 seismic events, and climate change (see Appendix 3E, *Potential Seismic and Climate Change Risks to*
5 *SWP/CVP Water Supplies*). Based on trends in land use conversions in the Delta during recent years,
6 these natural changes would result in the conversion of additional cultivated land and possibly
7 managed wetlands to tidal wetlands and open water.

8 **Effects on Special-Status and Common Wildlife and Plants**

9 The gradual conversion of cultivated land, managed wetland and grassland in the study area, and the
10 loss of Delta island habitat to inundation due to levee failure, have the potential to affect specific
11 special-status and common wildlife and plants, depending on the location of these effects. Loss of
12 certain types of cultivated land could reduce foraging habitat for nesting raptors, including
13 Swainson's hawk and white-tailed kite, and for over-wintering waterfowl and wading birds,
14 including greater sandhill crane, greater yellow-legs, snow goose and northern pintail. A large
15 variety of wintering waterfowl and shorebirds rely on harvested rice and corn fields for a food
16 source. Managed wetlands serve a similar function. An expansion of tidal wetlands would provide
17 benefits to species such as salt marsh harvest mouse, California black rail and California clapper rail.
18 Flooding of Delta islands would result in additional cultivated land losses and would not provide
19 significant benefit to most terrestrial species, as the study area does not have a shortage of open
20 water habitat.

21 **Effects of Global Climate Change on Terrestrial Biological Resources**

22 Under the No Action alternative, global climate change is expected to result in many physical
23 changes to the Plan Area. From a terrestrial biology perspective, the most significant changes would
24 include a gradual rise in sea level, increasing water and air temperatures, more frequent drought
25 and extreme rainfall events, and changes in the hydrologic patterns of the rivers and the Delta
26 channels that influence the terrestrial and aquatic habitats used by terrestrial plants and wildlife.
27 The climate change analysis included in Chapter 29 considers sea level increases at levels ranging
28 from 18 to 55 inches (see Chapter 29, *Climate Change*, Section 29.5.1.2). Air temperatures are
29 projected to rise by 2–5 degrees F by 2050 and water temperatures are projected to increase as
30 some proportion (2–3 degrees F) of the air temperature rise (see Appendix 29C, *Climate Change and*
31 *the Effects of Reservoir Operations on Water Temperatures in the Study Area*, Section 29C.2.1). The
32 changed frequency of drought and extreme rainfall events has not been predicted, but is expected to
33 be a factor in future California conditions with global climate change. Hydrologic conditions in the
34 rivers and Delta channels are expected to be altered by changes in precipitation patterns, with a
35 portion of precipitation shifting from snow to rainfall in the winter months. This would increase
36 river flows in winter and early spring, and decrease flows in the remainder of the year as snowmelt
37 runoff decreases. The changes in river flows would generate subsequent changes in west Delta and
38 Suisun Marsh salinity levels.

39 The physical changes in conditions in the study area related to the climate change described above,
40 especially the sea level rise, would change the distribution and value of study area habitats. Sea level
41 rise is expected to gradually inundate existing habitats on the periphery of the Delta, in the lower
42 Yolo Bypass, in the Cache Slough/Lindsay Slough area, and the northern and southern edges of
43 Suisun Marsh. A potential pattern of inundation, which assumes a 55 inch sea level rise, is shown
44 graphically in Figure 29-1. The effects of climate change on the Plan Area's natural communities and

1 special-status species are discussed in detail in Appendix 5.A.1, *Climate Change Implications for*
2 *Natural Communities and Terrestrial Species*, of the BDCP.

3 Tidal brackish and freshwater marsh in Suisun Marsh, the Lindsay Slough/Cache Slough area, and
4 the lower Yolo Bypass could be gradually inundated and converted to more subtidal habitat. In areas
5 where there is no upland barrier (levees, roads, residential development, agricultural fields), some
6 portion of the tidal marsh may re-establish upslope with the higher water levels, if there is sufficient
7 sediment available to provide an appropriate substrate. However, decreases in sediment availability
8 that have occurred in the Delta and Suisun Marsh over time and that may continue, may not keep
9 pace if the higher estimated rates of sea level rise occur (Barnard et. al 2013). The result could be a
10 gradual loss of these tidal marshes in these parts of the study area. Where barriers exist upslope of
11 existing marsh, the tidal marsh habitat could be gradually inundated and subtidal areas would
12 remain. Subtidal habitat is less valuable to the special-status and common terrestrial plants and
13 wildlife of the study area, including ground-nesting birds such as California black rail. Low-lying
14 upland grassland, seasonal wetlands and riparian areas could also be gradually converted to tidal
15 marsh, but would be expected to re-establish upslope where open ground exists and there are no
16 physical barriers. Where these incursions bisect existing wildlife corridors, the ability of certain
17 species to move and interact with adjacent populations would decrease. Population numbers of
18 riparian, grassland and tidal marsh species would be likely to decrease and population distribution
19 would be altered. The habitats adjacent to study area waterways would also be exposed to more
20 frequent inundation and desiccation as precipitation levels show greater fluctuation.

21 In the Delta, where more of the land is separated from tidal action by man-made levees, sea level
22 rise would be likely to affect narrower bands of habitat along the inside of these levees as there is a
23 vertical rise in tidal levels. These narrow bands of habitat include grassland, riparian areas of willow
24 and brambles, and tidal freshwater marsh. There are few areas in the Delta where the land gradually
25 slopes away from tidal channels, allowing for some migration of tidal marsh upslope as water levels
26 gradually rise. These areas are more likely to eventually be converted to subtidal habitat. As with
27 Suisun Marsh and the lower Yolo Bypass, population numbers of riparian, grassland and tidal marsh
28 species would be likely to decrease and population distribution would be altered.

29 Appendix 5A.1, *Climate Change Implications for Natural Communities and Terrestrial Species*, of the
30 BDCP describes potential effects of climate change on specific covered species. Under the No Action
31 Alternative, gradual warming of the environment, sea level rise and a shorter rain season would
32 place added stress on wetland habitats, especially those under tidal influence. Special-status plants
33 such as the Suisun marsh aster, Mason's lilaepsis and Delta tule pea may see a shrinking of suitable
34 habitat as tidal marsh is inundated. Wetland-associated birds, including California black rail,
35 California clapper rail, Suisun song sparrow and tri-colored blackbird may lose nesting and foraging
36 habitat to shrinking tidal marsh in the study area. Shortened rainy seasons may reduce late spring
37 and summer habitats for aquatic species such as giant garter snake, California tiger salamander and
38 western pond turtle.

39 Land subsidence, sea level rise, gradual or catastrophic levee failure, or a combination of these
40 conditions, should they occur, would result in flooding and inundation that could significantly
41 damage existing facilities and infrastructure, uproot and kill vegetation to an unknown extent,
42 permanently flood Delta islands, and drastically alter the salinity of Delta waterways and wetlands.
43 Depending on the extent and duration of flooding, significant short- and long-term changes could
44 occur in the availability of shallow tidal wetlands, riparian and grassland habitats and managed
45 lands useful to certain special-status and common species (e.g., cultivated land, managed wetland).

1 Depending on the amount of human intervention to drain islands and rebuild levees, there may be a
2 gradual succession of habitats less valuable to the plant and animal species currently relying on the
3 Delta for growth and seed production, cover, breeding, nesting, resting, movement corridors and
4 foraging. Refer to Appendix 3E, *Potential Seismic and Climate Change Risks to SWP/CVP Water*
5 *Supplies*, for a further discussion of seismic and climate change effects that might occur in the study
6 area under the no action condition.

7 As described in Chapter 3, *Description of Alternatives*, many of the ongoing programs that influence
8 the study area include development of future projects that would require additional project-level
9 environmental review. Future federal actions would be required to comply with NEPA, ESA, and
10 other federal laws and regulations. Future state and local actions would be required to comply with
11 CEQA, CESA, and other federal, state and local laws and regulations. Compliance and permit
12 requirements would be implemented on a case-by-case basis.

13 **NEPA Effects:** The overall direction of existing and ongoing programs and policies that influence
14 land conversion and land management in the study area is toward maintaining the mix of
15 agricultural, recreational, water management, and wildlife uses that make the Delta, Yolo Bypass
16 and Suisun Marsh valuable resources for the entire state. Some actions that will be taken in the
17 absence of a BDCP will continue to expand natural and manmade terrestrial and wetland habitats
18 that will either benefit or have no effect on the special-status and common plants and wildlife with
19 habitat in the study area. These activities may also result in impacts to some species but the overall
20 benefit of these activities would not be adverse for many species in the near-term. There is the
21 potential, however, for long-term trends in levee deterioration, global climate change, and seismic
22 activity that could damage levees and result in significant changes in natural communities and
23 cultivated lands by the late long-term time period. Major changes in tidal and nontidal wetland,
24 riparian, managed wetland, and cultivated land habitats would be an adverse effect on most
25 terrestrial biological resources by the late-long term, although for some species, especially those
26 that occur in the study area at higher elevations, there may be no effect or these effects would not be
27 adverse (see Table ES-8 in the *Executive Summary*).

28 **CEQA Conclusion:** Under the No Action Alternative, existing plans, programs and policies would
29 affect terrestrial biological resources in the study area in a mostly positive way. Many plans and
30 programs call for expanded development and management of wetland and riparian habitats and
31 increased management of cultivated lands for joint benefit to the farmer and wildlife. The
32 implementation of these plans and programs could also impact some terrestrial biological resources,
33 although on balance impacts would be offset by habitat improvements so that the plans and
34 programs would result in less-than-significant impacts under CEQA in the near-term.

35 In the longer term, there are risks associated with natural processes that could damage or destroy
36 Delta levees that protect both natural habitats and agricultural lands. The risks include flood-related
37 levee deterioration, potential for seismically induced levee collapse, and sea level rise associated
38 with climate change. These long-term risks, if unchecked, could result in a significant impact on the
39 terrestrial biological resources of the study area by the late-long term, although for some species,
40 especially those that occur in the study area at higher elevations, there may be no impact or the
41 impact may be less than significant by the late-long term (see Table ES-8 in the *Executive Summary*).

1 **12.3.3.2 Alternative 1A—Dual Conveyance with Pipeline/Tunnel and**
2 **Intakes 1–5 (15,000 cfs; Operational Scenario A)**

3 Section 3.5.2 in Chapter 3, *Description of Alternatives*, provides details of Alternative 1A, and Figure
4 3-2 depicts the alternative.

5 **Natural Communities**

6 **Tidal Perennial Aquatic**

7 Construction, operation, maintenance, and management associated with the conservation
8 components of Alternative 1A would have no long-term adverse effects on the habitats associated
9 with the tidal perennial aquatic natural community. Initial development and construction of CM1,
10 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal or modification of
11 this community (see Table 12-1A-1). Full implementation of Alternative 1A would also include the
12 following conservation actions over the term of the BDCP to benefit the tidal perennial aquatic
13 natural community (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 14 • Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
15 accommodate sea level rise (Objective L1.3, associated with CM4)
- 16 • Within the restored and protected tidal natural communities and transitional uplands, restore
17 or create tidal perennial aquatic natural community as necessary when creating tidal emergent
18 wetland (Objective TPANC1.1, associated with CM4)
- 19 • Control invasive aquatic vegetation that adversely affects native fish habitat (Objective
20 TPANC2.1, associated with CM13)

21 There is a variety of other, less specific conservation goals and objectives in the BDCP that would
22 improve the value of tidal perennial aquatic natural community for terrestrial species. As explained
23 below, with the restoration and enhancement of these amounts of habitat, in addition to AMMs,
24 impacts on tidal aquatic natural community would not be adverse for NEPA purposes and would be
25 less than significant for CEQA purposes.

26 Note that two time periods are represented in Table 12-1A-1 and the other tables contained in the
27 analysis of Alternative 1A. The near-term (NT) acreage effects listed in the table would occur over
28 the first 10 years of Plan implementation. The late long-term (LLT) effects contained in these tables
29 represent the combined effects of all activities over the entire 50-year term of the Plan. This table
30 and all impact tables in the chapter include reference to only those conservation measures that
31 would eliminate natural community acreage either through construction or restoration activities, or
32 that would result in periodic inundation of the community.

1 **Table 12-1A-1. Changes in Tidal Perennial Aquatic Natural Community Associated with Alternative**
2 **1A (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	48	48	133	133	0	0
CM2	8	8	11	11	9-36	0
CM4	11	18	0	0	0	0
CM5	0	2	0	5	0	39
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	67	76	144	149	9-36	39

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-1: Changes in Tidal Perennial Aquatic Natural Community as a Result of**
5 **Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,
7 CM4, CM5, and CM6 would permanently affect an estimated 76 acres and temporarily remove 149
8 acres of tidal perennial aquatic natural community in the study area. These modifications represent
9 less than 1% of the 86,263 acres of the community that is mapped in the study area. The majority of
10 the permanent and temporary effects would happen during the first 10 years of Alternative 1A
11 implementation, as water conveyance facilities are constructed and habitat restoration is initiated.
12 Natural communities restoration would add 8,300 acres of tidal wetlands, including an estimated
13 3,400 acres of tidal perennial aquatic natural community during the same period, which would
14 expand the area of that habitat and offset the losses. The 3,400-acre increase is estimated, based on
15 modeling reported in BDCP Appendix 3.B, Table 5, by comparing existing Plan Area subtidal habitat
16 to near-term subtidal habitat with the Plan. The BDCP beneficial effects analysis (BDCP Chapter 5,
17 Section 5.4.1.2) indicates that, while there would be no minimum restoration requirement for the
18 tidal perennial aquatic natural community, an estimated approximately 27,000 acres of tidal
19 perennial aquatic natural community would be restored based on tidal restoration modeling. This
20 estimate is based on Table 5 in BDCP Appendix 3.B, subtracting late long-term without project
21 acreage from late long-term acreage with project acreage.

22 The individual effects of each relevant conservation measure are addressed below. A summary
23 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
24 conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance
2 facilities would permanently remove 48 acres and temporarily remove 133 acres of tidal
3 perennial aquatic community. Most of the permanent loss would occur where Intakes 1–5
4 encroach on the Sacramento River’s east bank between Freeport and Courtland (see Terrestrial
5 Biology Mapbook, a support document to the EIR/EIS, for a detailed view of proposed facilities
6 overlain on natural community mapping). The footings and the screens at the intake sites would
7 be placed into the river margin and would displace moderately deep to shallow, flowing open
8 water with a mud substrate and very little aquatic vegetation. A small area (less than 1 acre) of
9 this community would also be lost to intermediate forebay construction approximately 1.2 miles
10 south of Hood Franklin Road and immediately west of Stone Lakes NWR. The temporary effects
11 on tidal perennial aquatic habitats would occur at numerous locations, including in the
12 Sacramento River at Intakes 1–5, and at temporary barge unloading facilities established at five
13 locations along the tunnel route. The barge unloading construction would temporarily affect the
14 Sacramento River just downstream of Walnut Grove, the North Mokelumne River adjacent to the
15 east side of Tyler Island, the San Joaquin River in the Venice Reach just south of Venice Island,
16 Middle River on the east side of Bacon Island just downstream of Empire Reach, and the North
17 Victoria Canal between Woodward and Victoria Islands. The details of these locations can be
18 seen in the Terrestrial Biology Mapbook. These losses would take place during the near-term
19 construction period.
- 20 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
21 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
22 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
23 Sacramento Weir improvements. Some of these activities could involve excavation and grading
24 in tidal perennial aquatic areas to improve passage of fish through the bypasses. Based on
25 hypothetical construction footprints, a total of 8 acres could be permanently lost and another 11
26 acres could be temporarily removed. This activity would occur primarily in the near-term
27 timeframe.
- 28 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
29 footprints, implementation of CM4 would affect 18 acres of tidal perennial aquatic community.
30 CM4 involves conversion of existing natural communities to a variety of tidal wetlands,
31 including tidal perennial aquatic, tidal brackish emergent, and tidal freshwater emergent
32 wetlands. Specific locations for these conversions are not known. The 18 acres could remain
33 tidal perennial aquatic with a modified tidal prism, or they could eventually be converted to one
34 of the other tidal wetland types. For purposes of this analysis, a conservative approach has been
35 taken and the effect has been discussed simultaneously with the habitat losses associated with
36 other conservation measures. An estimated 65,000 acres of tidal wetlands would be restored
37 during tidal habitat restoration, consistent with BDCP Objective L1.3. Of these acres, an
38 estimated 27,000 acres of tidal perennial aquatic habitat would be restored, based on modeling
39 conducted by ESA PWA (refer to Table 5 in BDCP Appendix 3.B). This restoration would be
40 consistent with BDCP Objective TPANC1.1. Approximately 3,400 acres of the restoration would
41 happen during the first 10 years of Alternative 1A implementation, which would coincide with
42 the timeframe of water conveyance facilities construction. The remaining restoration would be
43 spread over the following 30 years. Tidal natural communities restoration is expected to be
44 focused in the ROAs identified in Figure 12-1. Some of the restoration would occur in the lower
45 Yolo Bypass, but restoration would also be spread among the Suisun Marsh, South Delta,
46 Cosumnes/Mokelumne and West Delta ROAs.

- 1 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
2 would permanently remove 2 acres and temporarily remove 5 acres of tidal perennial aquatic
3 habitat. The construction-related losses would be considered a permanent removal of the tidal
4 perennial aquatic habitats directly affected. This activity is scheduled to start following
5 construction of water conveyance facilities, which is expected to take 10 years. Specific locations
6 for the floodplain restoration have not been identified, but it is expected that much of the
7 activity would occur in the south Delta along the major rivers. Floodplain restoration along the
8 San Joaquin River would improve connectivity for a variety of species that rely on tidal
9 perennial aquatic habitat. The regional and Plan Area landscape linkages along the San Joaquin
10 River are included in Figure 12-2.
- 11 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
12 of small amounts of tidal perennial aquatic habitat along 20 miles of river and sloughs. The
13 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity
14 would occur on tidal perennial aquatic habitat margins, including levees and channel banks. The
15 improvements would occur within the study area on sections of the Sacramento, San Joaquin
16 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

17 The following paragraphs summarize the combined effects discussed above and describe other
18 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
19 also included.

20 ***Near-Term Timeframe***

21 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would
22 affect the tidal perennial aquatic community through CM1 construction losses (48 acres permanent
23 and 133 acres temporary) and the CM2 construction losses (8 acres permanent and 11 acres
24 temporary). The habitat would be lost primarily along the Sacramento River at intake sites or in the
25 northern Yolo Bypass. Approximately 11 acres of the inundation and construction-related effects
26 from CM4 would occur during the near-term throughout the ROAs mapped in Figure 12-1.

27 The construction losses of this special-status natural community would represent an adverse effect
28 if they were not offset by avoidance and minimization measures and restoration actions associated
29 with BDCP conservation components. Loss of tidal perennial aquatic natural community would be
30 considered both a loss in acreage of a sensitive natural community and a loss of waters of the United
31 States as defined by Section 404 of the CWA. However, the creation of approximately 3,400 acres of
32 high-value tidal perennial aquatic natural community as part of CM4 during the first 10 years of
33 Alternative 1A implementation would offset this near-term loss, avoiding any adverse effect. Typical
34 project-level mitigation ratios (1:1 for restoration) would indicate 211 acres of restoration would be
35 needed to offset (i.e., mitigate) the 211 acres of effect (the total permanent and temporary near-term
36 effects listed in Table 12-1A-1) associated with near-term activities including water conveyance
37 facilities construction.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
39 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
40 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
41 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
42 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
43 included in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 Implementation of Alternative 1A as a whole would result in relatively minor (less than 1%)
3 conversions or losses to tidal perennial aquatic community in the study area. These losses or
4 conversions (76 acres of permanent and 149 acres of temporary loss) would be largely associated
5 with construction of the water conveyance facilities (CM1), construction of Yolo Bypass fish
6 improvements (CM2), and inundation during tidal marsh restoration (CM4). Inundation conversions
7 would occur through the course of the BDCP restoration program at various tidal restoration sites
8 throughout the study area. By the end of the Plan timeframe, a total of more than 27,000 acres of
9 high-value tidal perennial aquatic natural community would be restored (estimated from Table 5 in
10 BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). The restoration would occur over a
11 wide region of the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache
12 Slough, and South Delta ROAs (see Figure 12-1).

13 **NEPA Effects:** The creation of approximately 3,400 acres of high-value tidal perennial aquatic
14 natural community as part of CM4 during the first 10 years of Alternative 1A implementation would
15 offset near-term losses associated with construction activities for CM1, CM2, CM4 and CM6, avoiding
16 any adverse effect. Alternative 1A, which includes restoration of an estimated 27,000 acres of this
17 natural community over the course of the Plan, would not result in a net long-term reduction in the
18 acreage of a sensitive natural community; the effect would be beneficial.

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Alternative 1A would result in the loss or conversion of approximately 211 acres of tidal perennial
22 aquatic natural community due to construction of the water conveyance facilities (CM1) and fish
23 passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The
24 construction losses would be primarily along the Sacramento River at intake sites and within the
25 northern section of the Yolo Bypass, while inundation conversions would be at various tidal
26 restoration sites throughout the study area. The losses and conversions would be spread across the
27 10-year near-term timeframe. These losses and conversions would be offset by planned restoration
28 of an estimated 3,400 acres of high-value tidal perennial aquatic natural community scheduled for
29 the first 10 years of Alternative 1A implementation (CM4). AMM1, AMM2, AMM6, AMM7, and
30 AMM10 would also be implemented to minimize impacts. Because of these offsetting near-term
31 restoration activities and AMMs, impacts would be less than significant. Typical project-level
32 mitigation ratios (1:1 for restoration) would indicate that 211 acres of restoration would be needed
33 to offset (i.e., mitigate) the 211 acres of loss or conversion. The restoration would be initiated at the
34 beginning of Plan implementation to minimize any time lag in the availability of this habitat to
35 special-status species, and would result in a net gain in acreage of this sensitive natural community.

36 **Late Long-Term Timeframe**

37 At the end of the Plan period, 225 acres of the natural community would be lost or converted and an
38 estimated 27,000 acres of this community would be restored. There would be no net permanent
39 reduction in the acreage of this sensitive natural community within the study area. Therefore,
40 Alternative 1A would not have a substantial adverse effect on this natural community; the impact
41 would be beneficial.

1 **Impact BIO-2: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal**
2 **Perennial Aquatic Natural Community**

3 Two Alternative 1A conservation measures would modify the water depths and inundation regimes
4 of both natural and man-made waterways in the study area. CM2, which is designed to improve fish
5 passage and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic
6 inundation of tidal perennial aquatic natural community on small acreages, while CM5 would expose
7 this community to additional flooding as channel margins are modified and levees are set back to
8 improve fish habitat along some of the major rivers and waterways throughout the study area.

- 9
- 10 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1A
11 would result in an increase in the frequency, magnitude and duration of inundation-related
12 changes in water depth and velocity of 9–36 acres of tidal perennial aquatic natural community.
13 The methods used to estimate these inundation acreages are described in BDCP Appendix 5.J,
14 *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected by
15 inundation would vary with the flow volume that would pass through the newly constructed
16 notch in the Fremont Weir. The 9-acre increase in inundation would be associated with a notch
17 flow of 1,000 cfs, and the 36-acre increase would result from a notch flow of 4,000 cfs. Plan-
18 related increases in flow through Fremont Weir would be expected in 30% of the years. Most of
19 the tidal perennial aquatic community occurs in the southern section of the bypass on Liberty
20 Island, and, to a lesser extent, along the eastern edge of the bypass, including the Tule Canal/Toe
21 Drain. The anticipated change in management of flows in the Yolo Bypass includes more
22 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some
23 years, later releases into the bypass in spring months (April and May). The modification of
24 periodic inundation events would be expected to be beneficial to the ecological function of tidal
25 perennial aquatic habitat in the bypass as it relates to BDCP covered aquatic species. The Yolo
26 Bypass waterway is the key element in the Yolo Bypass landscape linkage mapped in Figure 12-
27 2 and described in detail in BDCP Chapter 3, Table 3.2-3. The change in periodic inundation in
28 the bypass would not substantially modify its value for special-status or common terrestrial
29 species. Water depths and water flow rates would increase over Existing Conditions and the No
30 Action condition in approximately 30% of the years, but it would not fragment the habitat or
31 make it less accessible to special-status or common terrestrial species. The modifications would
32 not result in a loss of this community. The plant species associated with this community are
33 adapted to inundation. The extended inundation would be designed to expand foraging and
34 spawning habitat for Delta fishes. The effects of these changes in the inundation regime on
35 terrestrial species that rely on tidal perennial aquatic habitats are discussed in detail later in this
36 chapter, under the individual species assessments.
 - 37 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a
38 seasonal increase in the frequency and duration of flooding of 39 acres of tidal perennial aquatic
39 habitat. Specific locations for this restoration activity have not been identified, but they would
40 likely be focused in the south Delta area, along the major rivers and Delta channels. The more
41 frequent exposure of these wetlands to stream flooding events would be beneficial to the
42 ecological function of tidal perennial aquatic habitats, especially as they relate to BDCP target
43 aquatic species. The plant species associated with these tidal perennial aquatic areas are
adapted to inundation and would not be substantially modified.

1 In summary, 48–75 acres of tidal perennial aquatic community in the study area would be subjected
2 to more frequent increases in water depth and velocity from flood flows as a result of implementing
3 two Alternative 1A conservation measures (CM2 and CM5). Tidal perennial aquatic community is
4 already, by definition, permanently inundated aquatic habitat of value to terrestrial and aquatic
5 species in the study area; therefore, periodic changes in water depth and velocity would not result in
6 a net permanent reduction in the acreage of this community in the study area.

7 **NEPA Effects:** Increasing periodic inundation of tidal perennial aquatic natural community would
8 not have an adverse effect on the community.

9 **CEQA Conclusion:** An estimated 48–75 acres of tidal perennial aquatic community in the study area
10 would be subjected to more frequent increases in water depth and velocity as a result of
11 implementing CM2 and CM5 under Alternative 1A. Tidal perennial aquatic community is already, by
12 definition, permanently inundated aquatic habitat of value to aquatic and terrestrial species in the
13 study area. The periodic changes in water depth and velocity would not result in a net permanent
14 reduction in the acreage of this community in the study area. Therefore, there would be no
15 substantial adverse effect on the community. The impact would be less than significant.

16 **Impact BIO-3: Modification of Tidal Perennial Aquatic Natural Community from Ongoing** 17 **Operation, Maintenance and Management Activities**

18 Once the physical facilities associated with Alternative 1A are constructed and the stream flow
19 regime associated with changed water management is in effect, there would be new ongoing and
20 periodic actions associated with operation, maintenance and management of the facilities and
21 conservation lands that could affect tidal perennial aquatic natural community in the study area. The
22 ongoing actions include the diversion of Sacramento River flows in the north Delta, and reduced
23 diversions from south Delta channels. These actions are associated with CM1 (see Impact BIO-2 for
24 effects associated with CM2). The periodic actions would involve access road and conveyance facility
25 repair, vegetation management at the various water conveyance facilities and habitat restoration
26 sites (CM13), levee repair and replacement of levee armoring, channel dredging, and habitat
27 enhancement in accordance with natural community management plans. The potential effects of
28 these actions are described below.

- 29 • *Modified river flows upstream of and within the study area and reduced diversions from south*
30 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
31 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
32 channels (associated with Operational Scenario A) would not result in the permanent reduction
33 in acreage of a sensitive natural community in the study area. Flow levels in the upstream rivers
34 would not change such that the acreage of tidal perennial aquatic community would be reduced
35 on a permanent basis. Some increases and some decreases would be expected to occur during
36 some seasons and in some water-year types, but there would be no permanent loss. Similarly,
37 increased diversions of Sacramento River flows in the north Delta would not result in a
38 permanent reduction in tidal perennial aquatic community downstream of these diversions.
39 Tidal influence on water levels in the Sacramento River and Delta waterways would continue to
40 be dominant. Reduced diversions from the south Delta channels would not create a reduction in
41 this natural community.

42 The periodic changes in flows in the Sacramento River, Feather River, and American River
43 associated with Alternative 1A operations would affect salinity, water temperature, dissolved
44 oxygen levels, turbidity, contaminant levels, and dilution capacity in these rivers and Delta

1 waterways. These changes are discussed in detail in Chapter 8, *Water Quality*. Potentially
2 substantial increases in electrical conductivity (salinity) are predicted for the Delta and Suisun
3 Marsh as a result of increased export of Sacramento River water. These salinity changes are not
4 expected to result in a permanent reduction in the acreage or value of tidal perennial aquatic
5 natural community for terrestrial species in the study area.

- 6 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
7 conveyance facilities and levees associated with the BDCP action have the potential to require
8 removal of adjacent vegetation and could entail earth and rock work in tidal perennial aquatic
9 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering tidal
10 perennial aquatic habitats. These activities would be subject to normal erosion, turbidity and
11 runoff control management practices, including those developed as part of *AMM2 Construction*
12 *Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
13 vegetation removal or earthwork adjacent to or within aquatic habitats would require use of
14 sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces. Proper
15 implementation of these measures would avoid permanent adverse effects on this community.
- 16 • *Vegetation management.* Vegetation management in the form of physical removal and chemical
17 treatment would be a periodic activity associated with the long-term maintenance of water
18 conveyance facilities and restoration sites. Vegetation management is also the principal activity
19 associated with *CM13 Invasive Aquatic Vegetation Control* and is consistent with BDCP Objective
20 TPANC2.1. Use of herbicides to control nuisance vegetation could pose a long-term hazard to
21 tidal perennial aquatic natural community at or adjacent to treated areas. The hazard could be
22 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
23 onto the natural community, or direct discharge of herbicides to tidal perennial aquatic areas
24 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
25 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce
26 hazards to humans and the environment from use of various chemicals during maintenance
27 activities, including the use of herbicides. These commitments are described in Appendix 3B,
28 *Environmental Commitments, AMMs, and CMs*, including the commitment to prepare and
29 implement spill prevention, containment, and countermeasure plans and stormwater pollution
30 prevention plans. Best management practices, including control of drift and runoff from treated
31 areas, and use of herbicides approved for use in aquatic environments would also reduce the
32 risk of affecting natural communities adjacent to water conveyance features and levees
33 associated with restoration activities.

34 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
35 normal ecological function of tidal aquatic habitats in planned restoration areas. The treatment
36 activities would be conducted in concert with the California Department of Boating and
37 Waterways' invasive species removal program. Eliminating large stands of water hyacinth and
38 Brazilian waterweed would improve habitat conditions for some aquatic species by removing
39 cover for nonnative predators, improving water flow and removing barriers to movement (see
40 Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also benefit terrestrial
41 species that use tidal perennial aquatic natural community for movement corridors and for
42 foraging. Vegetation management effects on individual species are discussed in the species
43 sections on following pages.

- 1 • *Channel dredging.* Long-term operation of the Alternative 1A intakes on the Sacramento River
2 would include periodic dredging of sediments that might accumulate in front of intake screens.
3 The dredging would occur in tidal perennial aquatic natural community and would result in
4 short-term increases in turbidity and disturbance of the substrate. These conditions would not
5 eliminate the community, but would diminish its value for special-status and common species
6 that rely on it for movement corridor or foraging area. The individual species effects are
7 discussed later in this chapter.
- 8 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
9 communities within the Plan Area (CM11). For tidal perennial aquatic natural community, a
10 management plan would be prepared that specifies actions to improve the value of the habitats
11 for covered species. Actions would include control of invasive nonnative plant and animal
12 species, restrictions on vector control and application of herbicides, and maintenance of
13 infrastructure that would allow for movement through the community. The enhancement efforts
14 would improve the long-term value of this community for both special-status and common
15 species.

16 The various operations and maintenance activities described above could alter acreage of tidal
17 perennial aquatic natural community in the study area through changes in flow patterns and
18 changes in periodic flooding of this community. Activities could also introduce sediment and
19 herbicides that would reduce the value of this community to common and sensitive plant and
20 wildlife species. Other periodic activities associated with the Plan, including management,
21 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
22 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
23 enhance the value of the community. While some of these activities could result in small reductions
24 in acreage, these reductions would be greatly offset by restoration activities planned as part of *CM4*
25 *Tidal Natural Communities Restoration*. The management actions associated with levee repair,
26 periodic dredging and control of invasive plant species would also result in a long-term benefit to
27 the species associated with tidal perennial aquatic habitats by improving water movement.

28 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net
29 permanent reduction in this sensitive natural community within the study area. Therefore, there
30 would be no adverse effect on the community.

31 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A would
32 have the potential to create minor losses in total acreage of tidal perennial aquatic natural
33 community in the study area, and could create temporary increases in turbidity and sedimentation.
34 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
35 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize
36 these impacts, and other operations and maintenance activities, including management, protection
37 and enhancement actions associated with *CM3 Natural Communities Protection and Restoration*) and
38 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
39 improved water movement in these habitats. Long-term restoration activities associated with *CM4*
40 *Tidal Natural Communities Restoration* would greatly expand this natural community in the study
41 area. Ongoing operation, maintenance and management activities would not result in a net
42 permanent reduction in the acreage or value of this sensitive natural community within the study
43 area. Therefore, there would be a less-than-significant impact on the tidal perennial aquatic natural
44 community.

1 **Tidal Brackish Emergent Wetland**

2 Construction, operation, maintenance and management associated with the conservation
3 components of Alternative 1A would have no adverse effect on the habitats associated with the tidal
4 brackish emergent wetland natural community. Habitat restoration and construction associated
5 with CM1, CM2, CM5 and CM6 would not remove tidal brackish emergent wetland; levee breaching
6 and minor construction associated with CM4 may temporarily remove small amounts of this natural
7 community (see Table 12-1A-2). Full implementation of Alternative 1A would include the following
8 conservation actions over the term of the BDCP to benefit the tidal brackish emergent wetland
9 natural community.

- 10 • Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
11 accommodate sea level rise (Objective L1.3 associated with CM4)
- 12 • Within the restored and protected tidal natural communities and transitional uplands, include
13 sufficient transitional uplands along the fringes of restored brackish and freshwater tidal
14 emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow for
15 the future upslope establishment of tidal emergent wetland communities (Objective L1.7,
16 associated with CM4)
- 17 • Within the restored and protected tidal natural communities and transitional uplands, restore
18 or create at least 6,000 acres of tidal brackish emergent wetland in Conservation Zone 11
19 (Objective TBEWNC1.1 associated with CM4)
- 20 • Restore connectivity to isolated patches of tidal brackish emergent marsh where isolation has
21 reduced effective use of these marshes by the species that depend on them (Objective
22 TBEWNC1.3 associated with CM4)
- 23 • Create topographic heterogeneity in restored tidal brackish emergent wetland to provide
24 variation in inundation characteristics and vegetative composition (Objective TBEWNC1.4
25 associated with CM4)
- 26 • Limit perennial pepperweed to no more than 10% cover in tidal brackish emergent wetland
27 natural community within the reserve system (Objective TBEWNC2.1 associated with CM11)

28 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
29 3.3 that would improve the value of tidal brackish emergent wetland natural community for
30 terrestrial species. As explained below, with the restoration and enhancement of these amounts of
31 habitat, in addition to implementation of AMMs, impacts on this natural community would not be
32 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-2. Changes in Tidal Brackish Emergent Wetland Natural Community Associated with**
 2 **Alternative 1A (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0	0
CM4	Unk.	Unk.	Unk.	Unk.	0	0
CM5	0	0	0	0	0	0
CM6	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-4: Changes in Tidal Brackish Emergent Wetland Natural Community as a Result of**
 5 **Implementing BDCP Conservation Measures**

6 Construction and operation of the Alternative 1A water conveyance facilities (CM1) would not affect
 7 tidal brackish emergent wetland natural community. Restoration of tidal marsh habitats associated
 8 with CM4 would require site preparation, earthwork, and other site activities that could remove
 9 tidal brackish emergent wetland. Levee modifications, grading or contouring, filling to compensate
 10 for land subsidence, and creation of new channels could also result in the removal of tidal brackish
 11 emergent wetland. All of this construction and land modification activity that could affect tidal
 12 brackish emergent wetland would occur in Suisun Marsh (CZ 11). The acreage of loss has not been
 13 calculated because the specific locations for site preparation and earthwork have not been
 14 identified, but the loss would likely be very small (less than 1 acre). These activities would occur in
 15 small increments through the course of the BDCP restoration program. The protection and
 16 restoration elements of CM4 would greatly exceed any of the short-term losses described above. At
 17 least 6,000 acres of tidal brackish emergent wetland would be restored in the Plan Area (BDCP
 18 Objective TBEWNC1.1 associated with CM4), with 2,000 acres of restoration occurring in the near-
 19 term timeframe (Table 12-1A-2). In addition, the habitat and ecosystem functions of BDCP restored
 20 tidal brackish emergent wetland would be maintained and enhanced (CM11). The BDCP beneficial
 21 effects evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.3.2) states that at least 6,000 acres of
 22 tidal brackish emergent wetland community would be restored in CZ 11, and that tidal natural
 23 communities restoration would decrease habitat fragmentation by providing additional connectivity
 24 between isolated patches of tidal brackish emergent wetland. This restoration would also occur
 25 under Alternative 1A.

1 The restoration activities associated with CM4 in Suisun Marsh would result in other effects that
 2 could alter the habitat value of tidal brackish emergent wetland. Disturbances associated with levee
 3 breaching and grading or contouring would increase opportunities for the introduction or spread of
 4 invasive species. Implementation of CM11 would limit this risk through invasive species control and
 5 wetland management and enhancement activities to support native species. Tidal flooding of dry
 6 areas could also increase the bioavailability of methylmercury in Suisun Marsh. Site-specific
 7 conditions would dictate the significance of this hazard to tidal brackish marsh vegetation and
 8 associated wildlife. According to the Suisun Marsh Plan EIR/EIS (Bureau of Reclamation et al. 2010,
 9 pg. 5.2-18), marsh creation may generate less methylmercury than is currently being generated by
 10 managed wetlands. However, this has not been confirmed through comprehensive studies. Because
 11 of the difficulty in assessing this risk at a programmatic level, it will need to be considered at a
 12 project level. Site-specific restoration plans that address the creation and mobilization of mercury,
 13 and monitoring and adaptive management as described in *CM12 Methylmercury Management*, would
 14 be available to address the uncertainty of methylmercury levels in restored tidal marsh. Water
 15 temperature fluctuations in newly created marsh and the potential for increased nitrogen
 16 deposition associated with construction vehicles are also issues of concern that are difficult to
 17 quantify at the current stage of restoration design. None of these effects is expected to limit the
 18 extent or value of tidal brackish emergent wetland in the study area.

19 **NEPA Effects:** The increase of tidal brackish emergent wetland associated with CM4 would be a
 20 beneficial effect on the natural community.

21 **CEQA Conclusion:** Tidal brackish emergent wetland natural community could experience small
 22 losses in acreage in Suisun Marsh (CZ 11) as a result of the large-scale tidal marsh restoration
 23 planned as part of CM4. These losses (not expected to exceed 1 acre) would be associated with levee
 24 modification, site preparation and other earthwork needed to expose diked lands to tidal influence.
 25 Because at least 6,000 acres of tidal brackish emergent wetland would be restored in the Plan Area
 26 as part of CM4, including 2,000 acres restored in the near-term timeframe, there would be a large
 27 increase in tidal brackish emergent wetland both in the near-term and over the life of the Plan.
 28 Indirect effects associated with the expansion of tidal brackish emergent wetland natural
 29 community, including the potential spread of invasive species, the generation of methylmercury,
 30 increases in marsh water temperatures, and increased nitrogen deposition are not expected to have
 31 a significant impact on this natural community in the study area. Therefore, this impact would be
 32 beneficial.

33 **Impact BIO-5: Modification of Tidal Brackish Emergent Wetland Natural Community from**
 34 **Ongoing Operation, Maintenance and Management Activities**

35 Once the physical facilities associated with CM1 and CM4 of Alternative 1A are constructed and the
 36 water management practices associated with changed reservoir operations, diversions from the
 37 north Delta, and marsh restoration are in effect, there would be new ongoing and periodic actions
 38 that could affect tidal brackish emergent wetland natural community in the study area. The ongoing
 39 actions would involve water releases and diversions, access road and levee repair, replacement of
 40 levee armoring, channel dredging, and habitat enhancement in accordance with natural community
 41 management plans. The potential effects of these actions are described below.

- 42 • *Modified river flows upstream of and within the study area and reduced diversions from south*
 43 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
 44 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta

1 channels (associated with Operational Scenario A) would not result in the permanent reduction
 2 in acreage of tidal brackish emergent wetland natural community in the study area. Flow levels
 3 in the upstream rivers would not directly affect this natural community because it does not exist
 4 upstream of the Delta. Increased diversions of Sacramento River flows in the north Delta would
 5 not result in a permanent reduction in tidal brackish emergent wetland downstream of these
 6 diversions. Salinity levels in Suisun Marsh channels would be expected to increase with reduced
 7 Sacramento River outflows (see Chapter 8, Section 8.3.3.9), but this change would not be
 8 sufficient to change the acreage of brackish marsh. This natural community persists in an
 9 environment that experiences natural fluctuations in salinity due to tidal ebb and flow. Reduced
 10 diversions from the south Delta channels would not create a reduction in this natural
 11 community.

12 The increased diversion of Sacramento River flows in the north Delta would result in reductions
 13 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The
 14 reduction is estimated to be approximately 9% of the river's current sediment load for
 15 Alternative 4, which has a north Delta diversion capacity of 9,000 cfs under Operational
 16 Scenario H (see BDCP Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3 for a detailed analysis of
 17 this issue). Alternative 1A, which would have a 15,000 cfs diversion capacity (Operational
 18 Scenario A), would be expected to reduce the sediment load by approximately 15%, assuming
 19 that most of the sediment would be removed during high river flow periods when north Delta
 20 pumping would normally be running at or near intake capacity. This would contribute to a
 21 decline in sediment reaching the Delta and Suisun Marsh that has been occurring over the past
 22 50-plus years due to a gradual depletion of sediment from the upstream rivers. The depletion
 23 has been caused by a variety of factors, including depletion of hydraulic mining sediment in
 24 upstream areas, armoring of river channels and a cutoff of sediment due to dam construction on
 25 the Sacramento River and its major tributaries (Wright and Schoellhamer 2004; Barnard et al.
 26 2013).

27 Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on
 28 tidal marsh, including tidal brackish emergent wetland. Sediment trapped by the marsh
 29 vegetation allows the emergent plants to maintain an appropriate water depth as water levels
 30 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The BDCP
 31 proponents have incorporated an environmental commitment (see Appendix 3B, Section
 32 3B.2.18, *Disposal and Reuse of Spoils, Reusable Tunnel Material and Dredged Material*) into the
 33 project that would lessen this potential effect. The Sacramento River water diverted at north
 34 Delta intakes would pass through sedimentation basins before being pumped to water
 35 conveyance structures. The commitment states that sediment collected in these basins would be
 36 periodically removed and reused, to the greatest extent feasible, in the Plan Area for a number of
 37 purposes, including marsh restoration, levee maintenance, subsidence reversal, flood response,
 38 and borrow area fill. The portion of the sediment re-introduced to the Delta and estuary for
 39 marsh restoration would remain available for marsh accretion. With this commitment to reuse
 40 in the Plan Area, the removal of sediment at the north Delta intakes would not result in a net
 41 reduction in the acreage and value of this special-status marsh community. The effect would not
 42 be adverse (NEPA) and would be less than significant (CEQA).

- 43 ● *Access road and levee repair.* Periodic repair of access roads and levees associated with the BDCP
 44 actions has the potential to require removal of adjacent vegetation and could entail earth and
 45 rock work in tidal brackish emergent wetland habitats. This activity could lead to increased soil
 46 erosion, turbidity and runoff entering these habitats. The activities would be subject to normal

1 erosion, turbidity and runoff control management practices, including those developed as part
2 of AMM2 Construction Best Management Practices and Monitoring and AMM4 Erosion and
3 Sediment Control Plan. Any vegetation removal or earthwork adjacent to or within aquatic
4 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation
5 of disturbed surfaces. Proper implementation of these measures would avoid permanent
6 adverse effects on this community.

- 7 • *Vegetation management.* Vegetation management in the form of physical removal and chemical
8 treatment (CM11) would be a periodic activity associated with the long-term maintenance of
9 restoration sites. Use of herbicides to control nuisance vegetation could pose a long-term hazard
10 to tidal brackish emergent wetland natural community at or adjacent to treated areas. The
11 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
12 stormwater onto the natural community, or direct discharge of herbicides to wetland areas
13 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
14 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce
15 hazards to humans and the environment from use of various chemicals during maintenance
16 activities, including the use of herbicides. These commitments are described in Appendix 3B,
17 including the commitment to prepare and implement spill prevention, containment, and
18 countermeasure plans and stormwater pollution prevention plans. Best management practices,
19 including control of drift and runoff from treated areas, and use of herbicides approved for use
20 in aquatic environments would also reduce the risk of affecting natural communities adjacent to
21 levees associated with tidal wetland restoration activities.
- 22 • *Channel dredging.* Long-term maintenance of tidal channels that support wetland expansion in
23 Suisun Marsh would include periodic dredging of sediments. The dredging would take place
24 adjacent to tidal brackish emergent wetland natural community and would result in short-term
25 increases in turbidity and disturbance of the substrate. These conditions would not eliminate
26 the community, but would diminish its value in the short term for special-status and common
27 species that rely on it for cover, movement corridor or foraging area. The individual species
28 effects are discussed later in this chapter.
- 29 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
30 communities within the Plan Area (CM11). For tidal brackish emergent wetland natural
31 community, a management plan would be prepared that specifies actions to improve the value
32 of the habitats for covered species. Actions would include control of invasive nonnative plant
33 and animal species, fire management, restrictions on vector control and application of
34 herbicides, and maintenance of infrastructure that would allow for movement through the
35 community. The enhancement efforts would improve the long-term value of this community for
36 both special-status and common species.

37 The various operations and maintenance activities described above could alter acreage and value of
38 tidal brackish emergent wetland natural community in the study area through water operations,
39 levee and road maintenance, channel dredging and vegetation management in or adjacent to this
40 community. Activities could also introduce sediment and herbicides that would reduce the value of
41 this community to common and sensitive plant and wildlife species. Other periodic activities
42 associated with the Plan, including management, protection and enhancement actions associated
43 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*
44 *Enhancement and Management*, would be undertaken to enhance the value of the community. While
45 some of these activities could result in small changes in acreage, these changes would be greatly
46 offset by restoration activities planned as part of *CM4 Tidal Natural Communities Restoration*. The

1 management actions associated with levee repair, periodic dredging and control of invasive plant
2 species would also result in a long-term benefit to the species associated with tidal brackish
3 emergent wetland habitats by improving water movement. Ongoing operation, maintenance and
4 management activities would not result in a net permanent reduction in this sensitive natural
5 community within the study area.

6 **NEPA Effects:** There would be no adverse effect on the tidal brackish emergent wetland natural
7 community.

8 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A would
9 have the potential to create minor changes (not exceeding 1 acre) in total acreage of tidal brackish
10 emergent wetland natural community in the study area, and could create temporary increases in
11 turbidity and sedimentation. The activities could also introduce herbicides periodically to control
12 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and
13 AMM5 would minimize these impacts, and other operations and maintenance activities, including
14 management, protection and enhancement actions associated with *CM3 Natural Communities*
15 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
16 create positive effects, including improved water movement in these habitats. Long-term restoration
17 activities associated with *CM4 Tidal Natural Communities Restoration* would greatly expand tidal
18 brackish emergent wetland natural community in the study area. Ongoing operation, maintenance
19 and management activities would not result in a net permanent reduction in this sensitive natural
20 community within the study area. Therefore, there would be a less-than-significant impact.

21 **Tidal Freshwater Emergent Wetland**

22 Construction, operation, maintenance and management associated with the conservation
23 components of Alternative 1A would have no long-term adverse effects on the habitats associated
24 with the tidal freshwater emergent wetland natural community. Initial development and
25 construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary
26 removal of small acreages of this community (see Table 12-1A-3). Full implementation of
27 Alternative 1A would also include the following conservation actions over the term of the BDCP to
28 benefit the tidal freshwater emergent wetland natural community.

- 29 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
30 accommodate sea level rise (Objective L1.3 associated with CM4)
- 31 ● Within the 65,000 acres of tidal natural communities and transitional uplands, include sufficient
32 transitional uplands along the fringes of restored brackish and freshwater tidal emergent
33 wetlands to accommodate up to 3 feet of sea level rise where possible and allow for the future
34 upslope establishment of tidal emergent wetland communities (Objective L1.7, associated with
35 CM4)
- 36 ● Within the 65,000 acres of tidal natural communities, restore or create at least 24,000 acres of
37 tidal freshwater emergent wetland in Conservation Zones 1, 2, 4, 5, 6 and/or 7 (Objective
38 TFEWNC1.1, associated with CM4)
- 39 ● Restore tidal freshwater emergent wetlands in areas that increase connectivity among
40 conservation lands (Objective TFEWNC1.2, associated with CM4)
- 41 ● Restore and sustain a diversity of marsh vegetation that reflects historical species compositions
42 and high structural complexity (Objective TFEWNC2.1, associated with CM4)

- 1 • Create topographic heterogeneity in restored tidal freshwater emergent wetland to provide
2 variation in inundation characteristics and vegetative composition (Objective TFEWNC2.2,
3 associated with CM4)

4 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
5 3.3 that would improve the value of tidal freshwater emergent wetland natural community for
6 terrestrial species. As explained below, with the restoration and enhancement of these amounts of
7 habitat, in addition to implementation of AMMs, impacts on this natural community would not be
8 adverse for NEPA purposes and would be less than significant for CEQA purposes.

9 **Table 12-1A-3. Changes in Tidal Freshwater Emergent Wetland Natural Community Associated**
10 **with Alternative 1A (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	6	6	6	6	0	0
CM2	6	6	0	0	24-58	0
CM4	1	1	0	0	0	0
CM5	0	1	0	1	0	3
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	13	14	6	7	24-58	3

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

11

12 **Impact BIO-6: Changes in Tidal Freshwater Emergent Wetland Natural Community as a Result**
13 **of Implementing BDCP Conservation Measures**

14 Construction and land grading activities that would accompany the implementation of CM1, CM2,
15 CM4, CM5, and CM6 would permanently eliminate an estimated 14 acres and temporarily remove 7
16 acres of tidal freshwater emergent wetland natural community in the study area. These
17 modifications represent less than 1% of the 8,856 acres of the community that is mapped in the
18 study area. The majority of the permanent and temporary losses would happen during the first 10
19 years of Alternative 1A implementation, as water conveyance facilities are constructed and habitat
20 restoration is initiated. Natural communities restoration would add at least 24,000 acres of tidal
21 freshwater emergent wetland natural community during the course of Plan restoration activities,
22 which would expand the area of that habitat and offset the losses. The BDCP beneficial effects
23 evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.4.2) states that the implementation of *CM4*
24 *Tidal Natural Communities Restoration* would restore at least 24,000 acres of tidal freshwater

1 emergent wetland community in Cache Slough (Conservation Zones 1, 2, and 3), the
2 Cosumnes/Mokelumne (Conservation Zone 4), West Delta (Conservation Zone 5 and 6), and South
3 Delta (Conservation Zone 7) ROAs. The BDCP evaluation also states that the objectives in the Plan
4 would promote vegetation diversity and structural complexity (as incorporated into the restoration
5 design) in restored tidal freshwater marsh. The same restoration actions would be undertaken as
6 part of Alternative 1A.

7 The individual effects of each relevant conservation measure are addressed below. A summary
8 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
9 conservation measure discussions.

- 10 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance
11 facilities would permanently remove 6 acres and temporarily remove 6 acres of tidal freshwater
12 emergent wetland community. Most of the loss associated with intake construction would be in
13 the vicinity of Hood, just south of the Hood Franklin Road, and along rivers and canals in the
14 central Delta as a result of barge unloading facility construction (Middle River on the east side of
15 Bacon Island and the North Victoria Canal at the north end of Victoria Island; see Terrestrial
16 Biology Mapbook). These losses would take place during the near-term construction period.

17 There is the potential for increased nitrogen deposition associated with construction vehicles
18 during the construction phase of CM1. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related*
19 *Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been
20 concluded that this potential deposition would pose a low risk of changing tidal freshwater
21 emergent wetland natural community because the construction would occur primarily
22 downwind of the natural community and the construction would contribute a negligible amount
23 of nitrogen to regional projected emissions. No adverse effect is expected.

- 24 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
25 construction or channel modification activities within the Yolo and Sacramento Bypasses,
26 including improvements in flow through the west side channel of the bypass, Putah Creek
27 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. All of
28 these activities could involve excavation and grading in tidal freshwater emergent wetland areas
29 to improve passage of fish through the bypasses. Based on hypothetical construction footprints,
30 a total of 6 acres could be permanently lost to these activities. The loss is expected to occur
31 during the first 10 years of Alternative 1A implementation.

- 32 • *CM4 Tidal Natural Communities Restoration*: Based on hypothetical footprints of this restoration
33 activity, initial land grading and levee modification could permanently remove up 1 acre of tidal
34 freshwater emergent wetland natural community. This loss would occur during the near-term
35 timeframe throughout the ROAs identified for tidal wetland restoration. At the same time, an
36 estimated 24,000 acres of tidal freshwater emergent wetland community would be restored
37 during tidal habitat restoration, consistent with Objective TFEWNC1.1 (associated with CM4).
38 Approximately 8,850 acres of the restoration would happen during the first 10 years of
39 Alternative 1A implementation, which would coincide with the timeframe of water conveyance
40 facilities construction. The remaining restoration would be spread over the following 30 years.
41 Tidal wetland communities restoration is expected to be focused in the ROAs identified in Figure
42 12-1. Restoration would be located and designed to improve habitat connectivity (Objective
43 TFEWNC1.2), improve marsh species diversity (Objective TFEWNC2.1), and provide variation in
44 inundation characteristics (Objective TFEWNC2.2). Some of the restoration would happen in the

1 lower Yolo Bypass, but restoration would also be spread among the Suisun Marsh, South Delta,
 2 Cosumnes/Mokelumne and West Delta ROAs.

3 The restoration activities associated with CM4 in the Plan Area ROAs would result in other
 4 effects that could alter the habitat value of tidal freshwater emergent wetland. Disturbances
 5 associated with levee breaching and grading or contouring would increase opportunities for the
 6 introduction or spread of invasive species. Implementation of CM11 would limit this risk
 7 through invasive species control and wetland management and enhancement activities to
 8 support native species. Flooding of dry areas for tidal freshwater marsh creation could also
 9 increase the bioavailability of methylmercury, especially in the Cache Slough,
 10 Cosumnes/Mokelumne and Suisun Marsh ROAs. Site-specific conditions would dictate the
 11 significance of this hazard to marsh vegetation and associated wildlife. Because of the difficulty
 12 in assessing this risk at a programmatic level, it will need to be considered at a project level.
 13 Site-specific restoration plans that address the creation and mobilization of mercury, and
 14 monitoring and adaptive management as described in *CM12 Methylmercury Management*, would
 15 be available to address the uncertainty of methylmercury levels in restored tidal marsh. Water
 16 temperature fluctuations in newly created marsh is also an issue of concern that is difficult to
 17 quantify at the current stage of restoration design. None of these effects is expected to limit the
 18 extent or value of tidal freshwater emergent wetland in the study area.

- 19 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
 20 would permanently remove 1 acre and temporarily remove 1 acre of tidal freshwater emergent
 21 wetland habitat. The construction-related losses would be considered a permanent removal of
 22 the habitats directly affected. The majority of seasonally inundated floodplain restoration is
 23 expected to be implemented along the lower San Joaquin River in the south and central Delta
 24 areas. Floodplain restoration along the San Joaquin River would improve connectivity for a
 25 variety of species that rely on freshwater marsh and riparian habitats. The regional and Plan
 26 Area landscape linkages along the San Joaquin River are included in Figure 12-2. This activity is
 27 scheduled to start following construction of water conveyance facilities, which is expected to
 28 take 10 years.
- 29 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
 30 of small amounts of tidal freshwater emergent wetland habitat along 20 miles of river and
 31 sloughs. The extent of this loss cannot be quantified at this time, but the majority of the
 32 enhancement activity would take place on narrow strips of habitat, including levees and channel
 33 banks. The improvements would occur within the study area on sections of the Sacramento, San
 34 Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

35 The following paragraphs summarize the combined effects discussed above and describe other
 36 BDCP conservation actions that would offset or avoid these effects. NEPA and CEQA impact
 37 conclusions are also included.

38 ***Near-Term Timeframe***

39 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would
 40 affect the tidal freshwater emergent wetland natural community through CM1 construction losses
 41 (6 acres permanent and 6 acres temporary), CM2 construction losses (6 acres permanent), and CM4
 42 construction losses (1 acre permanent). The tidal freshwater emergent wetland natural community
 43 would be lost in the north Delta near Hood, in the central Delta on the fringes of Bacon and Victoria
 44 Islands, and at various locations within the Yolo Bypass and the tidal restoration ROAs.

1 The construction losses of this special-status natural community would represent an adverse effect
 2 if they were not offset by avoidance and minimization measures and restoration actions associated
 3 with BDCP conservation components. Loss of tidal freshwater emergent wetland natural community
 4 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
 5 defined by Section 404 of the CWA. However, the creation of 8,850 acres of tidal freshwater
 6 emergent wetland natural community as part of CM4 during the first 10 years of Alternative 1A
 7 implementation would more than offset this near-term loss, avoiding any adverse effect. Typical
 8 project-level mitigation ratios (1:1 for restoration) would indicate that 19 acres of restoration would
 9 be needed to offset (i.e., mitigate) the 19 acres of loss (the total permanent and temporary near-term
 10 effects listed in Table 12-1A-3).

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 12 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
 13 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
 14 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas.
 15 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are included in
 16 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

17 ***Late Long-Term Timeframe***

18 Implementation of Alternative 1A as a whole would result in relatively minor (less than 1%) losses
 19 of tidal freshwater emergent wetland community in the study area. These losses (16 acres of
 20 permanent and 7 acres of temporary loss) would be largely associated with construction of the
 21 water conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and levee
 22 modification and land grading for tidal marsh restoration (CM4) and floodplain restoration (CM5).
 23 The CM4 and CM5 losses would occur during the course of conservation actions at various tidal and
 24 floodplain restoration sites throughout the study area. By the end of the Plan timeframe, a total of
 25 24,000 acres of this natural community would be restored over a wide region of the study area,
 26 including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Slough, and South Delta ROAs (see
 27 Figure 12-1).

28 ***NEPA Effects:*** The creation of 8,850 acres of tidal freshwater emergent wetland natural community
 29 as part of CM4 during the first 10 years of BDCP implementation would more than offset the
 30 construction and inundation-related effects of implementing CM1, CM2, CM4 and CM5, avoiding any
 31 adverse effect in the near-term. Because of the 24,000 acres of tidal freshwater emergent wetland
 32 restoration that would occur over the course of the Plan, Alternative 1A would not result in a net
 33 long-term reduction in the acreage of a sensitive natural community; the effect would be beneficial.

34 ***CEQA Conclusion:***

35 ***Near-Term Timeframe***

36 Alternative 1A would result in the loss of approximately 19 acres of tidal freshwater emergent
 37 wetland natural community due to construction of the water conveyance facilities (CM1) and fish
 38 passage improvements (CM2), and tidal marsh restoration (CM4). The construction losses would
 39 occur in both the north Delta near Hood and in the central Delta on the fringes of Bacon and
 40 Woodward Islands. The losses would be spread across a 10-year near-term timeframe and would be
 41 offset by planned restoration of 8,850 acres of tidal freshwater emergent wetland natural
 42 community scheduled for the first 10 years of Alternative 1A implementation (CM4). AMM1, AMM2,
 43 AMM6, AMM7, and AMM10 would also be implemented to minimize impacts. Because of these

1 offsetting near-term restoration activities and AMMs, impacts would be less than significant. Typical
2 project-level mitigation ratios (1:1 for restoration) would indicate that 19 acres of restoration would
3 be needed to offset (i.e., mitigate) the 19 acres of loss. The restoration would be initiated at the
4 beginning of Plan implementation to minimize any time lag in the availability of this habitat to
5 special-status species, and would result in a net gain in acreage of this sensitive natural community.

6 **Late Long-Term Timeframe**

7 At the end of the Plan period, 21 acres of tidal freshwater emergent wetland natural community
8 would be lost to conservation activities, and 24,000 acres of this community would be restored.
9 There would be no net permanent reduction in the acreage of this sensitive natural community
10 within the study area. Therefore, Alternative 1A would not have a substantial adverse effect on this
11 natural community; the impact would be beneficial.

12 **Impact BIO-7: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 13 **Freshwater Emergent Wetland Natural Community**

14 Two Alternative 1A conservation measures would modify the inundation/flooding regimes of both
15 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
16 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
17 of tidal freshwater emergent wetland natural community on small acreages, while CM5 would
18 expose this community to additional flooding as channel margins are modified and levees are set
19 back to improve fish habitat along some of the major rivers and waterways throughout the study
20 area.

- 21 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1A
22 would result in an increase in the frequency, magnitude and duration of inundation of 24–58
23 acres of tidal freshwater emergent wetland natural community. The methods used to estimate
24 these inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*
25 *Wildlife, and Plants*. The area more frequently inundated would vary with the flow volume that
26 would pass through the newly constructed notch in the Fremont Weir. The 24-acre increase in
27 inundation would be associated with a notch flow of 1,000 cubic feet per second (cfs), and the
28 58-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow
29 through Fremont Weir would be expected in 30% of the years. Most of this community occurs in
30 the southern section of the bypass on Liberty Island, on the fringes of tidal perennial aquatic
31 habitats. Smaller areas are scattered among the cropland within the bypass, south of Interstate
32 80. The anticipated change in management of flows in the Yolo Bypass includes more frequent
33 releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some years,
34 later releases into the bypass in spring months (April and May). The modification of periodic
35 inundation events would not adversely affect the ecological function of tidal freshwater
36 emergent wetland habitats and would not substantially modify its value for special-status or
37 common terrestrial species. The plants in this natural community are adapted to periodic
38 inundation events within the Yolo Bypass. The effects of this inundation on wildlife and plant
39 species are described in detail in later sections of this chapter.
- 40 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a
41 seasonal increase in the frequency and duration of inundation of 3 acres of tidal freshwater
42 emergent wetland habitats. Specific locations for this restoration activity have not been
43 identified, but they would likely be focused along the major rivers and Delta channels in the
44 south Delta. The reconnection of these wetlands to stream flooding events would be beneficial to

1 the wetlands' ecological function, especially as they relate to the BDCP's target terrestrial and
2 aquatic species. Foraging activity and refuge sites would be expanded into areas currently
3 unavailable or infrequently available to some aquatic species.

4 In summary, 27-61 acres of tidal freshwater emergent wetland natural community in the study area
5 would be subjected to more frequent inundation from flood flows as a result of implementing two
6 Alternative 1A conservation measures (CM2 and CM5). Tidal freshwater emergent wetland natural
7 community is a habitat of great value to both terrestrial and aquatic species in the study area.

8 **NEPA Effects:** Periodic inundation would not result in a net permanent reduction in the acreage or
9 value of tidal freshwater emergent wetland natural community in the study area. Therefore, there
10 would be no adverse effect.

11 **CEQA Conclusion:** An estimated 27-61 acres of tidal freshwater emergent wetland natural
12 community in the study area would be subjected to more frequent inundation as a result of
13 implementing CM2 and CM5 under Alternative 1A. This community is of great value to aquatic and
14 terrestrial species in the study area. The periodic inundation would not result in a net permanent
15 reduction in the acreage or value of this community in the study area. Therefore, there would be a
16 less-than-significant impact on the tidal freshwater emergent wetland natural community.

17 **Impact BIO-8: Modification of Tidal Freshwater Emergent Wetland Natural Community from** 18 **Ongoing Operation, Maintenance and Management Activities**

19 Once the physical facilities associated with Alternative 1A are constructed and the stream flow
20 regime associated with changed water management is in effect, there would be new ongoing and
21 periodic actions associated with operation, maintenance and management of the BDCP facilities and
22 conservation lands that could affect tidal freshwater emergent wetland natural community in the
23 study area. The ongoing actions include the diversion of Sacramento River flows in the north Delta,
24 and reduced diversions from south Delta channels. These actions are associated with CM1 (see
25 Impact BIO-7 for effects associated with CM2). The periodic actions would involve access road and
26 conveyance facilities repair, vegetation management at the various water conveyance facilities and
27 habitat restoration sites (CM11), levee repair and replacement of levee armoring, channel dredging,
28 and habitat enhancement in accordance with natural community management plans. The potential
29 effects of these actions are described below.

- 30 • *Modified river flows upstream of and within the study area and reduced diversions from south*
31 *Delta channels.* Reduced diversions from the south Delta channels would not create a reduction
32 in tidal freshwater emergent wetland in the study area. However, the periodic changes in flows
33 in the Sacramento River, Feather River, and American River associated with modified reservoir
34 operations (Operational Scenario A), and the increased diversion of Sacramento River flows at
35 north Delta intakes associated with Alternative 1A would affect salinity, water temperature,
36 dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in these rivers and
37 Delta waterways. These changes are discussed in detail in Chapter 8, *Water Quality*. Potentially
38 substantial increases in electrical conductivity (salinity) are predicted for the west Delta and
39 Suisun Marsh as a result of these changed water operations. These salinity changes may alter the
40 plant composition of tidal freshwater emergent wetland along the lower Sacramento and San
41 Joaquin Rivers and west Delta islands. The severity and extent of these salinity changes would
42 be complicated by anticipated sea level rise and the effects of downstream tidal restoration over
43 the life of the Plan. There is the potential that some tidal freshwater marsh may become

1 brackish. These potential changes are not expected to result in a significant reduction in the
2 acreage and value of tidal freshwater emergent wetland natural community in the study area.

3 The increased diversion of Sacramento River flows in the north Delta would result in reductions
4 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The
5 reduction is estimated to be approximately 9% of the river's current sediment load for
6 Alternative 4, which has a north Delta diversion capacity of 9,000 cfs under Operational
7 Scenario H (see BDCP Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3 for a detailed analysis of
8 this issue). Alternative 1A, which would have a 15,000 cfs diversion capacity (Operational
9 Scenario A), would be expected to reduce the sediment load by approximately 15%, assuming
10 that most of the sediment would be removed during high river flow periods when north Delta
11 pumping would normally be running at or near intake capacity. This would contribute to a
12 decline in sediment reaching the Delta and Suisun Marsh that has been occurring over the past
13 50-plus years due to a gradual depletion of sediment from the upstream rivers. The depletion
14 has been caused by a variety of factors, including depletion of hydraulic mining sediment in
15 upstream areas, armoring of river channels and a cutoff of sediment due to dam construction on
16 the Sacramento River and its major tributaries (Wright and Schoellhamer 2004; Barnard et al.
17 2013).

18 Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on
19 tidal marsh, including tidal freshwater emergent wetland. Sediment trapped by the marsh
20 vegetation allows the emergent plants to maintain an appropriate water depth as water levels
21 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The BDCP
22 proponents have incorporated an environmental commitment (see Appendix 3B, Section
23 3B.2.18, *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*) into the
24 project that would lessen this potential effect. The Sacramento River water diverted at north
25 Delta intakes would pass through sedimentation basins before being pumped to water
26 conveyance structures. The commitment states that sediment collected in these basins would be
27 periodically removed and reused, to the greatest extent feasible, in the Plan Area for a number of
28 purposes, including marsh restoration, levee maintenance, subsidence reversal, flood response,
29 and borrow area fill. The portion of the sediment re-introduced to the Delta and estuary for
30 marsh restoration would remain available for marsh accretion. With this commitment to reuse
31 in the Plan Area, the removal of sediment at the north Delta intakes would not result in a net
32 reduction in the acreage and value of this special-status marsh community. The effect would not
33 be adverse (NEPA) and would be less than significant (CEQA).

- 34 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
35 conveyance facilities and levees associated with the BDCP actions have the potential to require
36 removal of adjacent vegetation and could entail earth and rock work in or adjacent to tidal
37 freshwater emergent wetland habitats. This activity could lead to increased soil erosion,
38 turbidity and runoff entering tidal aquatic habitats. These activities would be subject to normal
39 erosion, turbidity and runoff control management practices, including those developed as part
40 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
41 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within emergent
42 wetland habitats would require use of sediment and turbidity barriers, soil stabilization and
43 revegetation of disturbed surfaces. Proper implementation of these measures would avoid
44 permanent adverse effects on this community.

- 1 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
2 treatment, would be a periodic activity associated with the long-term maintenance of water
3 conveyance facilities and restoration sites (CM11). Use of herbicides to control nuisance
4 vegetation could pose a long-term hazard to tidal freshwater emergent wetland natural
5 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of
6 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or
7 direct discharge of herbicides to tidal aquatic areas being treated for invasive species removal.
8 Environmental commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan*
9 have been made part of the BDCP to reduce hazards to humans and the environment from use of
10 various chemicals during maintenance activities, including the use of herbicides. These
11 commitments are described in Appendix 3B, including the commitment to prepare and
12 implement spill prevention, containment, and countermeasure plans and stormwater pollution
13 prevention plans. Best management practices, including control of drift and runoff from treated
14 areas, and use of herbicides approved for use in aquatic environments would also reduce the
15 risk of affecting natural communities adjacent to water conveyance features and levees
16 associated with restoration activities.
- 17 • *Channel dredging.* Long-term operation of the Alternative 1A intakes on the Sacramento River
18 would include periodic dredging of sediments that might accumulate in front of intake screens.
19 The dredging would be done in waterways adjacent to tidal freshwater emergent wetlands and
20 would result in short-term increases in turbidity and disturbance of the substrate. These
21 conditions would not eliminate the community, but would diminish its value for special-status
22 and common species that rely on it for cover or foraging area. The individual species effects are
23 discussed later in this chapter.
- 24 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
25 communities within the Plan Area (CM11). For tidal freshwater emergent wetland community, a
26 management plan would be prepared that specifies actions to improve the value of the habitats
27 for covered species. Actions would include control of invasive nonnative plant and animal
28 species, fire management, restrictions on vector control and application of herbicides, and
29 maintenance of infrastructure that would allow for movement through the community. The
30 enhancement efforts would improve the long-term value of this community for both special-
31 status and common species.

32 The various operations and maintenance activities described above could alter acreage of tidal
33 freshwater emergent wetland natural community in the study area through changes in flow patterns
34 and resultant changes in water quality. Activities could also introduce sediment and herbicides that
35 would reduce the value of this community to common and sensitive plant and wildlife species. Other
36 periodic activities associated with the Plan, including management, protection and enhancement
37 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
38 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
39 community. While some of these activities could result in small changes in acreage, these changes
40 would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural Communities*
41 *Restoration*. The management actions associated with levee repair, periodic dredging and control of
42 invasive plant species would also result in a long-term benefit to the species associated with tidal
43 freshwater emergent wetland habitats by improving water movement.

1 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net
2 permanent reduction in the tidal freshwater emergent wetland natural community within the study
3 area. Therefore, there would be no adverse effect on this natural community.

4 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A,
5 including changed water operations in the upstream rivers, would have the potential to create
6 minor changes in total acreage of tidal freshwater emergent wetland natural community in the study
7 area, and could create temporary increases in turbidity and sedimentation. The activities could also
8 introduce herbicides periodically to control nonnative, invasive plants. Implementation of
9 environmental commitments and AMM2, AMM4, and AMM5 would minimize these impacts, and
10 other operations and maintenance activities, including management, protection and enhancement
11 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
12 *Communities Enhancement and Management*, would create positive effects, including improved
13 water movement in these habitats. Long-term restoration activities associated with *CM4 Tidal*
14 *Natural Communities Restoration* would greatly expand this natural community in the study area.
15 Ongoing operation, maintenance and management activities would not result in a net permanent
16 reduction in this sensitive natural community within the study area. Therefore, there would be a
17 less-than-significant impact on the tidal freshwater emergent wetland natural community.

18 **Valley/Foothill Riparian**

19 Construction, operation, maintenance and management associated with the conservation
20 components of Alternative 1A would have no long-term adverse effects on the habitats associated
21 with the valley/foothill riparian natural community. Initial development and construction of CM1,
22 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this
23 community (see Table 12-1A-4). Full implementation of Alternative 1A would also include the
24 following conservation actions over the term of the BDCP to benefit the valley/foothill riparian
25 natural community.

- 26 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000
27 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated
28 with CM7)
- 29 ● Protect 750 acres of existing valley/foothill riparian natural community in Conservation Zone 7
30 by year 10 (Objective VFRNC1.2, associated with CM3)
- 31 ● Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory
32 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated
33 with CM5 and CM7)
- 34 ● Maintain 500 acres of mature riparian forest in Conservation Zones 4 or 7 (Objective VFRNC2.3,
35 associated with CM3 and CM7)
- 36 ● Maintain 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion of the early-
37 to late-successional riparian vegetation (VFRNC2.2,) in large blocks with a minimum patch size
38 of 50 acres and minimum width of 330 feet (Objective VFRNC2.4, associated with CM3 and CM7)
- 39 ● Maintain or increase abundance and distribution of valley/foothill riparian natural community
40 vegetation alliances that are rare or uncommon as recognized by California Department of Fish
41 and Game (2010), such as button willow thickets alliance and blue elderberry stands alliance
42 (Objective VFRNC3.1)

1 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
 2 3.3 that would improve the value of valley/foothill riparian natural community for terrestrial
 3 species. As explained below, with the restoration and enhancement of these amounts of habitat, in
 4 addition to implementation of AMMs, impacts on this natural community would not be adverse for
 5 NEPA purposes and would be less than significant for CEQA purposes.

6 **Table 12-1A-4. Changes in Valley/Foothill Riparian Natural Community Associated with Alternative**
 7 **1A (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	58	58	28	28	0	0
CM2	89	89	88	88	51-92	0
CM4	298	552	0	0	0	0
CM5	0	43	0	35	0	266
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	445	742	116	151	51-92	266

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

8

9 **Impact BIO-9: Changes in Valley/Foothill Riparian Natural Community as a Result of**
 10 **Implementing BDCP Conservation Measures**

11 Construction, land grading and habitat restoration activities that would accompany the
 12 implementation of CM1, CM2, CM4, CM5, and CM6 would permanently eliminate an estimated 742
 13 acres and temporarily remove 151 acres of valley/foothill riparian natural community in the study
 14 area. These modifications represent less than 5% of the 17,966 acres of the community that is
 15 mapped in the study area. The majority of the permanent and temporary losses would happen
 16 during the first 10 years of Alternative 1A implementation, as water conveyance facilities are
 17 constructed and habitat restoration is initiated. Valley/foothill riparian protection (750 acres) and
 18 restoration (800 acres) would be initiated during the same period, which would begin to offset the
 19 losses, thereby making them not adverse under NEPA and less than significant under CEQA. By the
 20 end of the Plan period, 5,000 acres of this natural community would be restored. The BDCP
 21 beneficial effects analysis (BDCP Chapter 5, Section 5.4.5.2) indicates that implementation of
 22 Alternative 4 would restore or create 5,000 acres of riparian forest and scrub in Conservation Zones
 23 1, 2, 4, 5, 6, and 7, with at least 3,000 acres occurring on restored seasonally inundated floodplain.
 24 Alternative 4 would also protect 750 acres of existing valley/foothill riparian natural community in

1 Conservation Zone 7. These same conservation actions would occur with implementation of
2 Alternative 1A.

3 The individual effects of each relevant conservation measure are addressed below. A summary
4 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
5 conservation measure discussions.

- 6 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance
7 facilities would permanently remove 58 acres and temporarily remove 28 acres of
8 valley/foothill riparian natural community. Most of the permanent loss would be where Intakes
9 1–5 encroach on the Sacramento River’s east bank between Freeport and Courtland. The
10 riparian areas here are very small patches, some dominated by valley oak and others by
11 nonnative trees and scrub vegetation (see Terrestrial Biology Mapbook). Smaller areas
12 dominated by blackberry would be eliminated at the forebay site adjacent to Clifton Court
13 Forebay. There would be temporary losses where pipelines cross Snodgrass Slough and other
14 small waterways east of the Sacramento River, and where temporary work areas surround
15 intake sites. The riparian habitat in these areas is also composed of very small patches or
16 stringers of valley oak and scrub bordering waterways. These losses would take place during the
17 near-term construction period.
- 18 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of
19 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
20 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
21 Sacramento Weir improvements. All of these activities could involve excavation and grading in
22 valley/foothill riparian areas to improve passage of fish through the bypasses. Based on
23 hypothetical construction footprints, a total of 89 acres could be permanently lost and another
24 88 acres could be temporarily removed. Most of the riparian losses would occur at the north end
25 of Yolo Bypass where major fish passage improvements are planned. This vegetation is a mix of
26 valley oak, cottonwood, sycamore and willow trees. The riparian areas here are primarily small,
27 disconnected patches with moderate to low value as wildlife movement corridors. Most of these
28 patches lack structural complexity. Excavation to improve water movement in the Toe Drain and
29 in the Sacramento Weir would remove similar linear strips of vegetation. These losses would
30 occur primarily in the near-term timeframe.
- 31 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
32 footprints, implementation of CM4 would permanently inundate or remove 552 acres of
33 valley/foothill riparian community. The losses would be spread among most of the ROAs
34 established for tidal restoration (see Figure 12-1). No losses would occur from Suisun Marsh
35 restoration. These ROAs support a mix of riparian vegetation types, including valley oak stands,
36 extensive willow and cottonwood stringers along waterways, and areas of scrub vegetation
37 dominated by blackberry. These areas are considered of low to moderate habitat value (BDCP
38 Chapter 5, Section 5.4.5.1.1). The actual loss of riparian habitat to marsh restoration would be
39 expected to be smaller than predicted by use of the theoretical footprint. As marsh restoration
40 projects were identified and planned, sites could be selected that avoid riparian areas as much
41 as possible.
- 42 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
43 would permanently remove 43 acres and temporarily remove 35 acres of valley/foothill
44 riparian natural community. The construction-related losses would be considered a permanent
45 removal of the habitats directly affected. These losses would be expected to occur along the San

1 Joaquin River and other major waterways in CZ 7 (see Figure 12-1). This activity is scheduled to
2 start following construction of water conveyance facilities, which is expected to take 10 years.

- 3 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
4 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
5 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
6 activity would occur along waterway margins where riparian habitat stringers exist, including
7 levees and channel banks. The improvements would occur within the study area on sections of
8 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 9 ● *CM7 Riparian Natural Community Restoration*: The valley/foothill riparian natural community
10 would be restored primarily in association with the tidal (CM4) and floodplain (CM5)
11 restoration and channel margin enhancements. Following community-specific goals and
12 objectives in the Plan, a total of 5,000 acres of this community would be restored (Objective
13 VFRNC1.1) and 750 acres would be protected (Objective VFRNC1.2) over the life of the Plan.
14 Approximately 800 acres would be restored and the entire 750 acres would be protected during
15 the first 10 years of Alternative 1A implementation. Riparian restoration and protection would
16 be focused in CZs 4 and 7 (Objective VFRNC2.3), with a goal of adding a 500-acre portion of the
17 restoration in one or the other of these zones. A variety of successional stages would also be
18 sought to benefit the variety of sensitive plant and animal species that rely on this natural
19 community in the study area (Objective VFRNC2.4).

20 The following paragraphs summarize the combined effects discussed above and describe other
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
22 also included.

23 ***Near-Term Timeframe***

24 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would
25 affect the valley/foothill riparian natural community through CM1 construction losses (58 acres
26 permanent and 28 acres temporary) and the CM2 construction losses (89 acres permanent and 88
27 acres temporary). The natural community would be lost primarily along the eastern bank of the
28 Sacramento River at intake sites, along pipeline routes connecting these intakes to the forebay, and
29 in the northern Yolo Bypass. Approximately 298 acres of the inundation and construction-related
30 loss from CM4 would occur during the near-term throughout the ROAs mapped in Figure 12-1.

31 The construction losses of this special-status natural community would represent an adverse effect
32 if they were not offset by avoidance and minimization measures and protection/restoration actions
33 associated with BDCP conservation components. Loss of valley/foothill riparian natural community
34 would be considered a loss in acreage of a sensitive natural community, and could be considered a
35 loss of wetlands as defined by Section 404 of the CWA. As indicated above, most of the losses would
36 be in small patches or narrow strips along waterways with limited structural complexity. However,
37 the restoration of 800 acres and protection (including significant enhancement) of 750 acres of
38 valley/foothill riparian natural community as part of CM7 and CM3 during the first 10 years of
39 Alternative 1A implementation would minimize this near-term loss, avoiding an adverse effect. At
40 least 400 acres of the protection is planned for the first 5 years of Alternative 1A implementation.
41 The restoration areas would be large areas providing connectivity with existing riparian habitats
42 and would include a variety of trees and shrubs to produce structural complexity. Typical project-
43 level mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 561 acres of
44 protection and 561 acres of restoration would be needed to offset (i.e., mitigate) the 561 acres of

1 loss (the combination of permanent and temporary losses in the near-term listed in Table 12-1A-4).
2 The combination of the two approaches (protection and restoration) are designed to avoid a
3 temporal lag in the value of riparian habitat available to sensitive species.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
5 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
6 *Barge Operations Plan*, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM18*
7 *Swainson's Hawk*. All of these AMMs include elements that avoid or minimize the risk of affecting
8 habitats at work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since
9 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
10 of the Final EIR/EIS.

11 **Late Long-Term Timeframe**

12 Implementation of Alternative 1A as a whole would result in approximately 5% losses of
13 valley/foothill riparian community in the study area. These losses (742 acres of permanent and 151
14 acres of temporary loss) would be largely associated with construction of the water conveyance
15 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), inundation during tidal
16 marsh restoration (CM4), and setback of levees during floodplain expansion (CM5). Inundation
17 losses would occur during the course of Plan restoration activities at various tidal restoration sites
18 throughout the study area. By the end of the Plan timeframe, a total of 5,000 acres of this natural
19 community would be restored and 750 acres would be protected (CM7 and CM3, respectively). The
20 restoration would occur primarily in CZs 4 and 7, in the Cosumnes/Mokelumne and South Delta
21 ROAs (see Figure 12-1).

22 **NEPA Effects:** The restoration of 800 acres and protection (including significant enhancement) of
23 750 acres of valley/foothill riparian natural community as part of CM7 and CM3 during the first 10
24 years of BDCP implementation would minimize the near-term loss of this community, avoiding any
25 adverse effect. Because of the Plan's commitment to restoration of 5,000 acres and protection of 750
26 acres of valley/foothill riparian natural community during the course of the Plan, Alternative 1A
27 would not result in a net long-term reduction in the acreage of a sensitive natural community; the
28 effect would be beneficial.

29 **CEQA Conclusion:**

30 **Near-Term Timeframe**

31 Alternative 1A would result in the loss of approximately 561 acres of valley/foothill riparian natural
32 community due to construction of the water conveyance facilities (CM1) and fish passage
33 improvements (CM2), and inundation during tidal marsh restoration (CM4). The natural community
34 would be lost primarily along the Sacramento River at intake sites, along pipeline routes connecting
35 these intakes to the forebay, and within the northern section of the Yolo Bypass, while inundation
36 losses would occur at various tidal restoration sites throughout the study area. The construction
37 losses would be spread across a 10-year near-term timeframe. These losses would be minimized by
38 planned restoration of 800 acres (CM7) and protection (including significant enhancement) of 750
39 acres (CM3) of valley/foothill riparian natural community scheduled for the first 10 years of
40 Alternative 1A implementation. At least 400 acres of the protection is planned for the first 5 years of
41 Alternative 1A implementation. AMM1, AMM2, AMM6, AMM7, AMM10, and AMM18 would also be
42 implemented to minimize impacts. Because of these near-term restoration and protection activities
43 and AMMs, impacts would be less than significant. Typical project-level mitigation ratios (1:1 for

1 protection and 1:1 for restoration) would indicate that 561 acres of protection and 561 acres of
2 restoration would be needed to offset (i.e., mitigate) the 561 acres of loss. The combination of the
3 two approaches (protection and restoration) are designed to avoid a temporal lag in the value of
4 riparian habitat available to sensitive species. The restoration would be initiated at the beginning of
5 Alternative 1A implementation to minimize any time lag in the availability of this habitat to special-
6 status species, and would result in a net gain in acreage of this sensitive natural community.

7 **Late Long-Term Timeframe**

8 At the end of the Plan period, 893 acres of valley/foothill riparian natural community would be
9 permanently or temporarily removed by conservation actions, 5,000 acres would be restored and
10 750 acres would be protected. There would be no net permanent reduction in the acreage of this
11 sensitive natural community within the study area. Therefore, Alternative 1A would not have a
12 substantial adverse effect on this natural community; the impact on the valley/foothill riparian
13 natural community would be beneficial.

14 **Impact BIO-10: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 15 **Valley/Foothill Riparian Natural Community**

16 Two Alternative 1A conservation measures would modify the inundation/flooding regimes of both
17 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
18 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
19 of valley/foothill riparian natural community at scattered locations, while CM5 would expose this
20 community to additional flooding as channel margins are modified and levees are set back to
21 improve fish habitat along some of the major rivers and waterways of the study area.

- 22 ● *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1A
23 would result in an increase in the frequency, magnitude and duration of inundation of 51–92
24 acres of valley/foothill riparian natural community. The area more frequently inundated would
25 vary with the flows passed through the newly constructed notch in the Fremont Weir. The 51
26 acres would be created by a notch flow of 8,000 cfs and the 92 acres would be created by a notch
27 flow of 4,000 cfs. The methods used to estimate these inundation acreages are described in
28 BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. These increased flow
29 conditions would be expected to occur in no more than 30% of all years (see BDCP Chapter 5,
30 Section 5.4.1.2). The valley/foothill riparian community occurs throughout the bypass, including
31 a large acreage just below Fremont Weir in the north end of the bypass. There are other riparian
32 habitat areas on Liberty Island, and, to a lesser extent, along the eastern and western edges of
33 the bypass, including along the Tule Canal/Toe Drain, the west side channels and the
34 Sacramento Bypass. The anticipated change in management of flows in the Yolo Bypass includes
35 more frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in
36 some years, later releases into the bypass in spring months (April and May). The modification of
37 periodic inundation events would not adversely affect riparian habitats, as they have persisted
38 under similar high flows and extended inundation periods in the Yolo Bypass. The effects of this
39 inundation on wildlife and plant species are described in detail in later sections of this chapter.
- 40 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
41 increase in the frequency and duration of inundation of 266 acres of valley/foothill riparian
42 habitats. Specific locations for this restoration activity have not been identified, but they would
43 likely be focused in the south Delta area, along the major rivers and Delta channels in CZ 7 (see
44 Figure 12-1). The reconnection of riparian vegetation to periodic stream flooding events would

1 be beneficial to the ecological function of this natural community, especially in the germination
2 and establishment of native riparian plants as flood scour increases.

3 In summary, from 317 to 368 acres of valley/foothill riparian community in the study area would be
4 subjected to more frequent inundations a result of implementing two Alternative 1A conservation
5 measures (CM2 and CM5). The valley/foothill riparian community is conditioned to and benefits
6 from periodic inundation; therefore, periodic inundation would not result in a net permanent
7 reduction in the acreage of this community in the study area. The increased inundation could create
8 a beneficial effect on the community as it relates to germination and establishment of native riparian
9 plants.

10 **NEPA Effects:** Increasing periodic inundation of valley/foothill riparian natural community in the
11 Yolo Bypass and along south Delta waterways would have a beneficial effect on the community.

12 **CEQA Conclusion:** An estimated 316 to 367 acres of valley/foothill riparian community in the study
13 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5
14 under Alternative 1A. The valley/foothill riparian community is conditioned to and benefits from
15 periodic inundation; therefore, periodic inundation would not result in a net permanent reduction in
16 the acreage of this community in the study area. Increasing periodic inundation of valley/foothill
17 riparian natural community in the Yolo Bypass and along south Delta waterways would have a
18 beneficial impact on the community.

19 **Impact BIO-11: Modification of Valley/Foothill Riparian Natural Community from Ongoing**
20 **Operation, Maintenance and Management Activities**

21 Once the physical facilities associated with Alternative 1A are constructed and the stream flow
22 regime associated with changed water management is in effect, there would be new ongoing and
23 periodic actions associated with operation, maintenance and management of the BDCP facilities and
24 conservation lands that could affect valley/foothill riparian natural community in the study area.
25 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento
26 River flows in the north Delta, reduced diversions from south Delta channels, and recreational use of
27 reserve areas. These actions are associated with CM1 and CM11 (see Impact BIO-10 for effects
28 associated with CM2). The periodic actions would involve access road and conveyance facility
29 repair, vegetation management at the various water conveyance facilities and habitat restoration
30 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat
31 enhancement in accordance with natural community management plans. The potential effects of
32 these actions are described below.

- 33
- 34 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
35 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect
36 valley/foothill riparian natural community. The anticipated water levels over time with
37 Alternative 1A, as compared with No Action, would be slightly lower in the October to May
38 timeframe. The small changes in frequency of higher water levels in these lakes would not
39 substantially reduce the small patches of riparian vegetation that occupy the upper fringes of
40 the reservoir pools. Changes in releases that would influence downstream river flows are
discussed below.
 - 41 • *Modified river flows upstream of and within the study area and reduced diversions from south*
42 *Delta channels.* Changes in releases from reservoirs upstream of the study area and their
43 resultant changes in flows in the Sacramento, American and Feather Rivers (associated with

Operational Scenario A) would not be expected to result in the permanent reduction in acreage of valley/foothill riparian natural community along these waterways. There is no evidence that flow levels in the upstream rivers would change such that the acreage of this community would be reduced on a permanent basis. Riparian habitats along the rivers of the Sacramento Valley have historically been exposed to significant variations in river stage. Based on modeling conducted for the BDCP (see Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*), flow levels in these upstream rivers could be reduced by as much as 19% in the July to November time frame when compared to No Action, while flow levels in the February to May time frame could increase as much as 48% with implementation of Alternative 1A (Operational Scenario A). Similarly, increased diversions of Sacramento River flows in the north Delta would not be expected to result in a permanent reduction in valley/foothill riparian community downstream of these diversions, even though river flows are modeled to be reduced by 11–27% compared with No Action, during certain months and water-year type (see Section 11C.1 in Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*). Reduced diversions from the south Delta channels would not create a reduction in this natural community.

The periodic changes in flows in the Sacramento River, Feather River, and American River associated with modified reservoir operations, and the increased diversion of Sacramento River flows at north Delta intakes associated with Alternative 1A would affect salinity, water temperature, dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in these rivers and Delta waterways. These changes are discussed in detail in Chapter 8, *Water Quality*. Potentially substantial increases in electrical conductivity (salinity) are predicted for the west Delta and Suisun Marsh as a result of these changed water operations. These salinity changes may change the plant composition of riparian habitats along the lower Sacramento and San Joaquin Rivers and west Delta islands. The severity and extent of these salinity changes would be complicated by anticipated sea level rise and the effects of downstream tidal restoration over the life of the Plan. There is the potential that some valley/foothill riparian natural community may be degraded immediately adjacent to river channels. The riparian communities in the west Delta are dominated by willows, cottonwood and mixed brambles. These potential changes are not expected to result in a significant reduction in the acreage and value of valley/foothill riparian natural community in the study area.

- *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water conveyance facilities and levees associated with the BDCP actions have the potential to require removal of adjacent vegetation and could entail earth and rock work in valley/foothill riparian habitats. This activity could lead to increased soil erosion, turbidity and runoff entering these habitats. These activities would be subject to normal erosion, turbidity and runoff control management practices, including those developed as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within riparian habitats would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces (*AMM10 Restoration of Temporarily Affected Natural Communities*). Proper implementation of these measures would avoid permanent adverse effects on this community.
- *Vegetation management.* Vegetation management, in the form of physical removal and chemical treatment, would be a periodic activity associated with the long-term maintenance of water conveyance facilities and restoration sites. Vegetation management is also the principal activity associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to control nuisance vegetation could pose a long-term hazard to valley/foothill riparian natural

1 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of
 2 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or
 3 direct discharge of herbicides to riparian areas being treated for invasive species removal.
 4 Environmental commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan*
 5 have been made part of the BDCP to reduce hazards to humans and the environment from use of
 6 various chemicals during maintenance activities, including the use of herbicides. These
 7 commitments are described in Appendix 3B, including the commitment to prepare and
 8 implement spill prevention, containment, and countermeasure plans and stormwater pollution
 9 prevention plans. Best management practices, including control of drift and runoff from treated
 10 areas, and use of herbicides approved for use in terrestrial environments would also reduce the
 11 risk of affecting natural communities adjacent to water conveyance features and levees
 12 associated with restoration activities.

- 13 ● *Channel dredging.* Long-term operation of the Alternative 1A intakes on the Sacramento River
 14 would include periodic dredging of sediments that might accumulate in front of intake screens.
 15 The dredging could occur adjacent to valley/foothill riparian natural community. This activity
 16 should not adversely affect riparian plants as long as dredging equipment is kept out of riparian
 17 areas and dredge spoil is disposed of outside of riparian corridors.
- 18 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural
 19 communities within the Plan Area (CM11). For the valley/foothill riparian natural community, a
 20 management plan would be prepared that specifies actions to improve the value of the habitats
 21 for covered species. Actions would include control of invasive nonnative plant and animal
 22 species, fire management, restrictions on vector control and application of herbicides, and
 23 maintenance of infrastructure that would allow for movement through the community. The
 24 enhancement efforts would improve the long-term value of this community for both special-
 25 status and common species.
- 26 ● *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to
 27 valley/foothill riparian natural community in the reserve system. The activities could include
 28 wildlife and plant viewing and hiking. *CM11 Natural Communities Enhancement and*
 29 *Management* (BDCP Chapter 3, Section 3.4.11) describes this program and identifies applicable
 30 restrictions on recreation that might adversely affect riparian habitat. The BDCP also includes an
 31 avoidance and minimization measure (AMM37) that further dictates limits on recreation
 32 activities that might affect this natural community. Priority would be given to use of existing
 33 trails and roads, with some potential for new trails. Limited tree removal and limb trimming
 34 could also be involved.

35 The various operations and maintenance activities described above could alter acreage of
 36 valley/foothill riparian natural community in the study area through changes in flow patterns and
 37 resultant changes in water quality. Activities could also introduce sediment and herbicides that
 38 would reduce the value of this community to common and sensitive plant and wildlife species.
 39 Recreation activities could encroach on riparian areas and require occasional tree removal. Other
 40 periodic activities associated with the Plan, including management, protection and enhancement
 41 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
 42 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
 43 community. While some of these activities could result in small changes in acreage, these changes
 44 would be greatly offset by restoration and protection activities planned as part of *CM7 Riparian*
 45 *Natural Community Restoration* and *CM3 Natural Communities Protection and Restoration*, or
 46 minimized by implementation of AMM2, AMM4, AMM5, AMM10, AMM18 and AMM37. The

1 management actions associated with levee repair, periodic dredging and control of invasive plant
2 species would also result in a long-term benefit to the species associated with riparian habitats by
3 improving water movement in adjacent waterways and by eliminating competitive, invasive species
4 of plants.

5 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
6 implementation of Alternative 1A would not result in a net permanent reduction in valley/foothill
7 riparian natural community within the study area. Therefore, there would be no adverse effect on
8 the community.

9 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A would
10 have the potential to create minor changes in total acreage of valley/foothill riparian natural
11 community in the study area, and could create temporary increases in turbidity and sedimentation.
12 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
13 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10, AMM18, and
14 AMM37 would minimize these impacts; and other operations and maintenance activities, including
15 management, protection and enhancement actions associated with *CM3 Natural Communities*
16 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
17 create positive effects, including reduced competition from invasive, nonnative plants in these
18 habitats. Long-term restoration and protection activities associated with *CM7 Riparian Natural*
19 *Community Restoration* and *CM3 Natural Communities Protection and Restoration* would expand this
20 natural community in the study area. Ongoing operation, maintenance and management activities
21 would not result in a net permanent reduction in this sensitive natural community within the study
22 area. Therefore, there would be a less-than-significant impact on the valley/foothill riparian natural
23 community.

24 **Nontidal Perennial Aquatic**

25 Construction, operation, maintenance and management associated with the conservation
26 components of Alternative 1A would have no long-term adverse effects on the habitats associated
27 with the nontidal perennial aquatic natural community. Initial development and construction of
28 CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this
29 community (see Table 12-1A-5). Full implementation of Alternative 1A would also include the
30 following conservation actions over the term of the BDCP to benefit the nontidal perennial aquatic
31 natural community.

- 32 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
33 and nontidal freshwater perennial emergent wetland natural communities (Objective
34 NFEW/NPANC1.1, associated with CM10)

35 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
36 3.3 that would improve the value of nontidal perennial aquatic natural community for terrestrial
37 species. As explained below, with the restoration and enhancement of these amounts of habitat, in
38 addition to implementation of AMMs, impacts on this natural community would not be adverse for
39 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-5. Changes in Nontidal Perennial Aquatic Natural Community Associated with**
2 **Alternative 1A (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	12	12	9	9	0	0
CM2	24	24	12	12	50–77	0
CM4	34	189	0	0	0	0
CM5	0	28	0	16	0	25
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	70	253	21	37	50–77	25

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-12: Changes in Nontidal Perennial Aquatic Natural Community as a Result of**
5 **Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,
7 CM4, CM5, and CM6 would permanently eliminate an estimated 298 acres and temporarily remove
8 35 acres of nontidal perennial aquatic natural community in the study area. These modifications
9 represent approximately 6% of the 5,567 acres of the community that is mapped in the study area.
10 Approximately 40% (134 acres) of the permanent and temporary losses would occur during the first
11 10 years of Alternative 1A implementation, as water conveyance facilities are constructed and
12 habitat restoration is initiated. Natural communities restoration would add 400 acres (CM10) of
13 nontidal marsh during the same period, which would expand the area of that habitat and offset the
14 losses. The nontidal marsh restoration would include a mosaic of nontidal perennial aquatic and
15 nontidal freshwater perennial emergent wetland natural communities, as specified in Objective
16 NFEW/NPANC1.1. The BDCP beneficial effects analysis (BDCP Chapter 5, Section 5.4.6.2) indicates
17 that implementation of Alternative 4 would result in the restoration of 1,200 acres of nontidal
18 marsh, and that the restoration would occur in blocks that would be contiguous with the Plan’s
19 larger reserve system. The nontidal marsh would be restored in the vicinity of giant garter snake
20 subpopulations identified in the recovery plan for this species (U.S. Fish and Wildlife Service 1998).

21 The individual effects of each relevant conservation measure are addressed below. A summary
22 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
23 conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance
2 facilities would permanently remove 57 acres and temporarily remove 7 acres of nontidal
3 perennial aquatic community. Most of the permanent loss would occur along the north-south
4 transmission corridor in the central and southern Delta (see Terrestrial Biology Mapbook). Most
5 of the temporary loss would occur where temporary access roads would be constructed on
6 Mandeville and Bouldin Islands. These wetlands are small ponds, stringers and ditches adjacent
7 to farming roads. These losses would take place during the near-term construction period.
- 8 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
9 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
10 stilling basin improvements, west side channels modifications, Putah Creek realignment
11 activities, and Sacramento Weir and Tule Canal improvements. All of these activities could
12 involve excavation and grading in nontidal perennial aquatic areas to improve passage of fish
13 through the bypasses. Based on hypothetical construction footprints, a total of 24 acres could be
14 permanently lost and another 12 acres could be temporarily removed. This activity would occur
15 primarily in the near-term timeframe.
- 16 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
17 footprints, implementation of CM4 would permanently change to tidally influenced inundation
18 or remove 189 acres of nontidal perennial aquatic community. These losses would be expected
19 to occur primarily in the Cache Slough and Cosumnes/Mokelumne ROAs (see Figure 12-1). An
20 estimated 1,200 acres of nontidal marsh would be restored. Approximately 400 acres of the
21 restoration (CM10) would happen during the first 10 years of Alternative 1A implementation,
22 which would coincide with the timeframe of water conveyance facilities construction and early
23 restoration activities. The remaining restoration would be spread over the following 30 years.
24 Nontidal natural communities restoration is expected to be focused in CZs 2, 4 and/or 5
25 identified in Figure 12-1.
- 26 • *CM5 Seasonally Inundated Floodplain Restoration*: Based on theoretical footprints, floodplain
27 restoration levee construction would permanently remove 28 acres and temporarily remove 16
28 acres of nontidal perennial aquatic habitat. The construction-related losses would be considered
29 a permanent removal of the nontidal perennial aquatic habitats. It is expected that floodplain
30 restoration would be focused on the south part of the Plan Area, in CZ 7. Floodplain restoration
31 along the southern Delta rivers would improve connectivity for a variety of species that rely on
32 aquatic and riparian habitats. The regional and Plan Area landscape linkages along the San
33 Joaquin River, Middle River and Old River are included in Figure 12-2. This activity is scheduled
34 to start following construction of water conveyance facilities, which is expected to take 10 years.
- 35 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
36 of small amounts of nontidal perennial aquatic habitat along 20 miles of river and sloughs. The
37 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity
38 would be on the edges of tidal perennial aquatic habitat, including levees and channel banks.
39 Nontidal marsh adjacent to these tidal areas could be affected. Channel margin would be
40 enhanced within the study area on sections of the Sacramento, San Joaquin and Mokelumne
41 Rivers, and along Steamboat and Sutter Sloughs.
- 42 • *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal
43 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic
44 and nontidal freshwater perennial emergent natural communities. This marsh restoration
45 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and
46 would be accompanied by adjacent grassland restoration or protection.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
3 also included.

4 ***Near-Term Timeframe***

5 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would
6 affect the nontidal perennial aquatic community through CM1 construction losses (57 acres
7 permanent and 7 acres temporary) and the CM2 construction losses (24 acres permanent and 12
8 acres temporary). The natural community would be lost primarily at scattered locations along the
9 north-south transmission corridor and along access roads adjacent to the tunnel route in the central
10 Delta, and along the west side channels and channels associated with the Sacramento and Lisbon
11 Weirs in the Yolo Bypass. Approximately 34 acres of the inundation and construction-related losses
12 from CM4 would occur during the near-term throughout several of the ROAs mapped in Figure 12-1.

13 The construction losses of this special-status natural community would represent an adverse effect
14 if they were not offset by avoidance and minimization measures and restoration actions associated
15 with BDCP conservation components. Loss of nontidal perennial aquatic natural community would
16 be considered both a loss in acreage of a sensitive natural community and a loss of waters of the
17 United States as defined by Section 404 of the CWA. However, creating 400 acres of nontidal marsh
18 as part of CM10 during the first 10 years of Alternative 1A implementation would more than offset
19 this near-term loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for
20 restoration and 1:1 for protection) would indicate 134 acres of restoration and 134 acres of
21 protection would be needed to offset (i.e., mitigate) the 134 acres of loss. While the Plan does not
22 include protection of nontidal perennial aquatic habitat, it includes well in excess of the typical 1:1
23 restoration acreage (which includes protection in perpetuity), and therefore compensates for the
24 lack of protection.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
26 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
27 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
28 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
29 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
30 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

31 ***Late Long-Term Timeframe***

32 Implementation of Alternative 1A as a whole would result in relatively minor (6%) losses of
33 nontidal perennial aquatic community in the study area. These losses (298 acres of permanent and
34 35 acres of temporary loss) would be largely associated with construction of the water conveyance
35 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), change to tidally influenced
36 inundation during tidal marsh restoration (CM4), and floodplain restoration (CM5). The change to
37 tidally influenced inundation would occur during the course of the CM4 restoration activities at
38 various tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of
39 1,200 acres of nontidal marsh would be restored over a wide region of the study area, including
40 within the Cosumnes/Mokelumne, Cache Slough, and South Delta ROAs (see Figure 12-1).

41 ***NEPA Effects:*** During the first 10 years of implementing Alternative 1A, creating 400 acres of
42 nontidal marsh as part of CM10 would offset the construction-related and inundation losses of 134
43 acres of nontidal perennial aquatic natural community. There would be no adverse effect. During the

1 full duration of Plan implementation, Alternative 1A would not result in a net reduction in the
2 acreage of a sensitive natural community; there would be an expansion of nontidal marsh and the
3 effect would be beneficial.

4 ***CEQA Conclusion:***

5 ***Near-Term Timeframe***

6 Alternative 1A would result in the loss of approximately 134 acres of nontidal perennial aquatic
7 natural community due to construction of the water conveyance facilities (CM1) and fish passage
8 improvements (CM2), and change to tidally influenced inundation during tidal marsh restoration
9 (CM4). The natural community would be lost at scattered locations in the vicinity of the Sacramento
10 River intakes and pipelines, and along access roads adjacent to the tunnel route in the central Delta.
11 The losses would be spread across a 10-year near-term timeframe. These losses would be offset by
12 planned restoration of 400 acres of nontidal perennial aquatic natural community scheduled for the
13 first 10 years of Alternative 1A implementation (CM10). Also, AMM1, AMM2, AMM6, AMM7, and
14 AMM10 would be implemented to minimize impacts. Because of these offsetting near-term
15 restoration activities and AMMs, impacts would be less than significant. Typical project-level
16 mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 134 acres of
17 restoration and 134 acres of protection would be needed to offset (i.e., mitigate) the 134 acres of
18 loss. While the Plan does not include protection of nontidal perennial aquatic habitat, it includes
19 well in excess of the typical 1:1 restoration acreage (which includes protection in perpetuity), and
20 therefore compensates for the lack of protection. The restoration would be initiated at the beginning
21 of Alternative 1A implementation to minimize any time lag in the availability of this habitat to
22 special-status species, and would result in a net gain in acreage of this sensitive natural community.

23 ***Late Long-Term Timeframe***

24 At the end of the Plan period, 333 acres of the natural community would be removed and 1,200
25 acres of nontidal marsh would be restored. The nontidal marsh would consist of a mosaic of nontidal
26 perennial aquatic and nontidal freshwater emergent wetland natural communities. There would be
27 no net permanent reduction in the acreage of this sensitive natural community within the study
28 area. Therefore, Alternative 1A would not have a substantial adverse effect on this natural
29 community; the impact on the nontidal perennial aquatic natural community would be beneficial.

30 **Impact BIO-13: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
31 **Nontidal Perennial Aquatic Natural Community**

32 Two Alternative 1A conservation measures would modify the inundation/flooding regimes of both
33 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
34 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
35 of nontidal perennial aquatic natural community on small acreages, while CM5 would expose this
36 community to additional flooding as channel margins are modified and levees are set back to
37 improve fish habitat along some of the major rivers and waterways throughout the study area.

- 38 • *CM2 Yolo Bypass Fisheries Enhancement:* Operation of the Yolo Bypass under Alternative 1A
39 would result in an increase in the frequency, magnitude and duration of inundation of 50-77
40 acres of nontidal perennial aquatic natural community. The methods used to estimate these
41 inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*
42 *Wildlife, and Plants.* The area more frequently affected by inundation would vary with the flow

1 volume that would pass through the newly constructed notch in the Fremont Weir. The 50-acre
2 increase in inundation would be associated with a notch flow of 3,000 cubic feet per second
3 (cfs), and the 77-acre increase would result from a notch flow of 6,000 cfs. Plan-related
4 increases in flow through Fremont Weir would be expected in 30% of the years. This community
5 occurs in small stringers and patches throughout the bypass, including along the Tule Canal/Toe
6 Drain, the western channels north of Interstate 80, and below the Fremont and Sacramento
7 Weirs. The anticipated change in management of flows in the Yolo Bypass includes more
8 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some
9 years, later releases into the bypass in spring months (April and May). The modification of
10 periodic inundation events would not adversely affect the ecological function of this natural
11 community and would not substantially modify its value for special-status or common wildlife
12 species. Nontidal perennial aquatic habitats in the Yolo Bypass have developed under a long-
13 term regime of periodic inundation events. The extended inundation would be designed to
14 expand foraging and spawning habitat for Delta fishes. The effects of this inundation on wildlife
15 and plant species are described in detail in later sections of this chapter.

- 16 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
17 increase in the frequency and duration of inundation of an estimated 25 acres of nontidal
18 perennial aquatic habitat. Specific locations for this restoration activity have not been identified,
19 but they would likely be focused in the south Delta area, along the major rivers and Delta
20 channels. The reconnection of these wetlands to stream flooding events would be beneficial to
21 the ecological function of nontidal perennial aquatic habitats, especially as they relate to BDCP
22 target aquatic species. The periodic flooding may also encourage germination of nontidal marsh
23 vegetation.

24 In summary, 75-102 acres of nontidal perennial aquatic community in the study area would be
25 subjected to more frequent inundation as a result of implementing two Alternative 1A conservation
26 measures (CM2 and CM5). Nontidal perennial aquatic habitats in the Yolo Bypass have developed
27 under a long-term regime of periodic inundation events and inundation along expanded river
28 floodplains would be infrequent.

29 **NEPA Effects:** The increased inundation of nontidal perennial aquatic natural community in the Yolo
30 Bypass and along south Delta waterways would not reduce the acreage of this natural community
31 and could encourage germination of aquatic vegetation. This increased inundation would not be
32 adverse.

33 **CEQA Conclusion:** An estimated 75-102 acres of nontidal perennial aquatic community in the study
34 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5
35 under Alternative 1A. Nontidal perennial aquatic community would not be significantly impacted
36 because its habitats in the Yolo Bypass have developed under a long-term regime of periodic
37 inundation events and inundation along expanded river floodplains would be infrequent. The
38 periodic inundation would not result in a net permanent reduction in the acreage of this community
39 in the study area. Therefore, there would be no substantial adverse effect on the community. The
40 impact would be less than significant.

41 **Impact BIO-14: Modification of Nontidal Perennial Aquatic Natural Community from Ongoing** 42 **Operation, Maintenance and Management Activities**

43 Once the physical facilities associated with Alternative 1A are constructed and the stream flow
44 regime associated with changed water management is in effect, there would be new ongoing and

1 periodic actions associated with operation, maintenance and management of the BDCP facilities and
 2 conservation lands that could affect nontidal perennial aquatic natural community in the study area.
 3 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento
 4 River flows in the north Delta, and reduced diversions from south Delta channels. These actions
 5 would be associated with CM1 (see Impact BIO-13 for effects associated with CM2). The periodic
 6 actions would involve access road and conveyance facility repair, vegetation management at the
 7 various water conveyance facilities and habitat restoration sites (CM11), levee repair and
 8 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with
 9 natural community management plans. The potential effects of these actions are described below.

- 10 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
 11 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would affect
 12 nontidal perennial aquatic natural community, in the form of the reservoir pools. The
 13 Alternative 1A operations scheme would alter the surface elevations of these reservoir pools as
 14 described in Chapter 6, *Surface Water*. These fluctuations would occur within historic ranges
 15 and would not adversely affect the natural community. Changes in releases that would influence
 16 downstream river flows are discussed below.
- 17 • *Modified river flows upstream of and within the study area and reduced diversions from south*
 18 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
 19 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
 20 channels (associated with Operational Scenario A) would not result in the permanent reduction
 21 in acreage of the nontidal perennial aquatic natural community in the study area. Flow levels in
 22 the upstream rivers would not change such that the acreage of nontidal perennial aquatic
 23 community would be reduced on a permanent basis. Some minor increases and some decreases
 24 would be expected to occur along the major rivers during some seasons and in some water-year
 25 types, but there would be no permanent loss. Similarly, increased diversions of Sacramento
 26 River flows in the north Delta would not result in a permanent reduction in nontidal perennial
 27 aquatic community downstream of these diversions. Nontidal wetlands below the diversions are
 28 not directly connected to the rivers, as this reach of the river is tidally influenced. Reduced
 29 diversions from the south Delta channels would not create a reduction in this natural
 30 community.
- 31 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
 32 conveyance facilities and levees associated with the BDCP actions have the potential to require
 33 removal of adjacent vegetation and could entail earth and rock work in nontidal perennial
 34 aquatic habitats. This activity could lead to increased soil erosion, turbidity and runoff entering
 35 nontidal perennial aquatic habitats. These activities would be subject to normal erosion,
 36 turbidity and runoff control management practices, including those developed as part of *AMM2*
 37 *Construction Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment*
 38 *Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic habitats would
 39 require use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed
 40 surfaces. Proper implementation of these measures would avoid permanent adverse effects on
 41 this community.
- 42 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
 43 treatment, would be a periodic activity associated with the long-term maintenance of water
 44 conveyance facilities and restoration sites. Vegetation management is also the principal activity
 45 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to
 46 control nuisance vegetation could pose a long-term hazard to nontidal perennial aquatic natural

1 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of
2 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or
3 direct discharge of herbicides to nontidal perennial aquatic areas being treated for invasive
4 species removal. Environmental commitments and *AMM5 Spill Prevention, Containment, and*
5 *Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and the
6 environment from use of various chemicals during maintenance activities, including the use of
7 herbicides. These commitments are described in Appendix 3B, including the commitment to
8 prepare and implement spill prevention, containment, and countermeasure plans and
9 stormwater pollution prevention plans. Best management practices, including control of drift
10 and runoff from treated areas, and use of herbicides approved for use in aquatic environments
11 would also reduce the risk of affecting natural communities adjacent to water conveyance
12 features and levees associated with restoration activities.

13 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
14 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
15 The treatment activities would be conducted in concert with the California Department of
16 Boating and Waterways' invasive species removal program. Eliminating large stands of water
17 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
18 by removing cover for nonnative predators, improving water flow and removing barriers to
19 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
20 benefit terrestrial species that use tidal and nontidal perennial aquatic natural community for
21 movement corridors and for foraging. Vegetation management effects on individual species are
22 discussed in the species sections on following pages.

- 23 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
24 communities within the Plan Area (CM11). For nontidal perennial aquatic natural community, a
25 management plan would be prepared that specifies actions to improve the value of the habitats
26 for covered species. Actions would include control of invasive nonnative plant and animal
27 species, fire management, restrictions on vector control and application of herbicides, and
28 maintenance of infrastructure that would allow for movement through the community. The
29 enhancement efforts would improve the long-term value of this community for both special-
30 status and common species.

31 The various operations and maintenance activities described above could alter acreage of nontidal
32 perennial aquatic natural community in the study area through changes in flow patterns and
33 changes in periodic inundation of this community. Activities could also introduce sediment and
34 herbicides that would reduce the value of this community to common and sensitive plant and
35 wildlife species. Other periodic activities associated with the Plan, including management,
36 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
37 *Restoration* and *CM11 Natural Communities Enhancement and Management*), would be undertaken
38 to enhance the value of the community. While some of these activities could result in small changes
39 in acreage, these changes would be greatly offset by restoration activities planned as part of *CM4*
40 *Tidal Natural Communities Restoration* and protection actions associated with *CM3 Natural*
41 *Communities Protection and Restoration*. The management actions associated with levee repair and
42 control of invasive plant species would also result in a long-term benefit to the species associated
43 with nontidal perennial aquatic habitats by improving water movement.

1 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net
2 permanent reduction in nontidal perennial aquatic natural community within the study area.
3 Therefore, there would be no adverse effect on this community.

4 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A would
5 have the potential to create minor changes in total acreage of nontidal perennial aquatic natural
6 community in the study area, and could create temporary increases in turbidity and sedimentation.
7 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
8 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize
9 these impacts, and other operations and maintenance activities, including management, protection
10 and enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
11 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
12 improved water movement in these habitats. Long-term restoration activities associated with *CM10*
13 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*
14 *Protection and Restoration* would expand this natural community in the study area. Ongoing
15 operation, maintenance and management activities would not result in a net permanent reduction in
16 this sensitive natural community within the study area. Therefore, there would be a less-than-
17 significant impact.

18 **Nontidal Freshwater Perennial Emergent Wetland**

19 Construction, operation, maintenance and management associated with the conservation
20 components of the BDCP would have no long-term adverse effects on the habitats associated with
21 the nontidal freshwater perennial emergent wetland natural community. Initial development and
22 construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary
23 removal of this community (see Table 12-1A-6). Full implementation of Alternative 1A would also
24 include the following conservation actions over the term of the BDCP to benefit the nontidal
25 freshwater perennial emergent wetland natural community.

- 26 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
27 and nontidal freshwater perennial emergent wetland natural communities (Objective
28 NFEW/NPANC1.1, associated with CM10)
- 29 • Protect and manage 50 acres of occupied or recently occupied tricolored blackbird nesting
30 habitat located within 5 miles of high-value foraging habitat in Conservation Zones 1, 2, 8 or 11.
31 Nesting habitat will be managed to provide young, lush stands of bulrush/cattail emergent
32 vegetation (Objective TRBL1.1)

33 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
34 3.3 that would improve the value of nontidal freshwater perennial emergent wetland natural
35 community for terrestrial species. As explained below, with the restoration and enhancement of
36 these amounts of habitat, in addition to implementation of AMMs, impacts on this natural
37 community would not be adverse for NEPA purposes and would be less than significant for CEQA
38 purposes.

1 **Table 12-1A-6. Changes in Nontidal Freshwater Perennial Emergent Wetland Natural Community**
 2 **Associated with Alternative 1A (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	1	1	1	1	0	0
CM2	25	25	1	1	6-8	0
CM4	40	99	0	0	0	0
CM5	0	0	0	0	0	8
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	66	125	2	2	6-8	8

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-15: Changes in Nontidal Freshwater Perennial Emergent Wetland Natural**
 5 **Community as a Result of Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,
 7 CM4, and CM6 would permanently eliminate an estimated 126 acres and temporarily remove 6
 8 acres of nontidal freshwater perennial emergent wetland natural community in the study area.
 9 These modifications represent approximately 9% of the 1,509 acres of the community that is
 10 mapped in the study area. Approximately 55% (73 acres) of the permanent and temporary losses
 11 would happen during the first 10 years of Alternative 1A implementation, as water conveyance
 12 facilities are constructed and habitat restoration is initiated. Natural communities restoration would
 13 add 400 acres (CM10) and natural communities protection would protect 50 acres (CM3) of nontidal
 14 marsh during the same period, which would expand the area of that habitat and offset the losses.
 15 The nontidal marsh restoration would include a mosaic of nontidal perennial aquatic and nontidal
 16 freshwater perennial emergent wetland natural communities, as specified in BDCP Objective
 17 NFEW/NPANC1.1 (BDCP Chapter 3, Table 3.3-2). The nontidal marsh protection would be designed
 18 to support tricolored blackbird populations in the study area. The BDCP beneficial effects analysis
 19 (BDCP Chapter 5, Section 5.4.6.2) indicates that implementation of Alternative 4 would result in the
 20 restoration of 1,200 acres of nontidal marsh. The restoration would occur in blocks that would be
 21 contiguous with the alternative's larger reserve system. The nontidal marsh would be restored in
 22 the vicinity of giant garter snake subpopulations identified in the recovery plan for this species (U.S.
 23 Fish and Wildlife Service 1998). The same conservation efforts would be a part of implementing
 24 Alternative 1A.

1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 ● *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance
5 facilities would permanently remove 1 acre and temporarily remove 1 acre of tidal freshwater
6 perennial emergent wetland community. The permanent loss would occur at the southern
7 forebay construction site (see Terrestrial Biology Mapbook). The temporary loss would occur
8 where a temporary access road would be constructed on Bouldin Island. These wetlands are
9 extremely small and remote water bodies. These losses would take place during the near-term
10 construction period.
- 11 ● *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of
12 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
13 stilling basin improvements, west side channels and Tule Canal modifications, Putah Creek
14 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. Some of
15 these activities could involve excavation and grading in nontidal freshwater perennial emergent
16 wetland areas to improve passage of fish through the bypasses. Based on hypothetical
17 construction footprints, a total of 25 acres could be permanently lost and 1 acre could be
18 temporarily removed. These losses would most likely occur in the Tule Canal and west side
19 channels at the north end of the bypass. The habitat here includes narrow bands within these
20 side channels of the bypass and is isolated from other marsh or open water habitats. The narrow
21 bands are bordered by riparian habitats, primarily willows and cottonwoods. This activity
22 would occur in the near-term timeframe.
- 23 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
24 footprints, implementation of CM4 would permanently inundate or remove 99 acres of nontidal
25 freshwater perennial emergent wetland community. These losses would be expected to occur
26 primarily in the Cache Slough ROA (see Figure 12-1). An estimated 1,200 acres of nontidal
27 marsh would be restored (CM10) and 50 acres would be protected (CM3) during nontidal
28 habitat conservation actions. Approximately 400 acres of the restoration and 25 acres of the
29 protection would happen during the first 10 years of Alternative 1A implementation, which
30 would coincide with the timeframe of water conveyance facilities construction and early tidal
31 marsh restoration. The remaining restoration would be spread over the following 30 years.
32 Nontidal marsh natural communities restoration is expected to be focused in the vicinity of giant
33 garter snake populations in the eastern Delta and near the Yolo Bypass. *CM5 Seasonally
34 Inundated Floodplain Restoration*: Based on theoretical footprints, floodplain restoration levee
35 construction would not affect nontidal freshwater perennial emergent wetland natural
36 community.
- 37 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
38 of small amounts of nontidal freshwater perennial emergent wetland habitat along 20 miles of
39 river and sloughs. The extent of this loss cannot be quantified at this time, but the majority of the
40 enhancement activity would occur on the edges of tidal perennial aquatic habitat, including
41 levees and channel banks. Nontidal marsh adjacent to these tidal areas could be affected. The
42 improvements would occur within the study area on sections of the Sacramento, San Joaquin
43 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 44 ● *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal
45 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic

1 and nontidal freshwater perennial emergent natural communities. This marsh restoration
2 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and
3 would be accompanied by adjacent grassland restoration or protection.

4 The following paragraphs summarize the combined effects discussed above and describe other
5 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
6 also included.

7 ***Near-Term Timeframe***

8 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would
9 affect the nontidal freshwater perennial emergent wetland community through CM1 construction
10 losses (1 acre permanent and 1 acre temporary) and the CM2 construction losses (25 acres
11 permanent and 1 acre temporary). These losses would occur at the southern forebay, along
12 temporary access roads in the central Delta, and in the Yolo Bypass. Approximately 40 acres of the
13 inundation and construction-related losses from CM4 would occur in the near-term. These losses
14 would occur primarily in the Cache Slough ROA mapped in Figure 12-1.

15 The construction losses of this special-status natural community would represent an adverse effect
16 if they were not offset by avoidance and minimization measures and restoration actions associated
17 with BDCP conservation components. Loss of nontidal freshwater perennial emergent wetland
18 natural community would be considered both a loss in acreage of a sensitive natural community and
19 a loss of wetland as defined by Section 404 of the CWA. However, the combination of creating 400
20 acres and protecting 25 acres of nontidal perennial marsh as part of CM3 and CM10 during the first
21 10 years of Alternative 1A implementation would offset this near-term loss, avoiding any adverse
22 effect. Typical project-level mitigation ratios (1:1 for restoration and 1:1 for protection) would
23 indicate 68 acres of restoration and 68 acres of protection would be needed to offset (i.e., mitigate)
24 the 68 acres of loss. While the Plan includes just 25 acres of protection in the near-term, it includes
25 well in excess of the typical 1:1 restoration acreage (which includes protection in perpetuity), and
26 therefore compensates for the shortfall in protection.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
28 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
29 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
30 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
31 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
32 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

33 ***Late Long-Term Timeframe***

34 Implementation of Alternative 1A as a whole would result in small (8%) losses of nontidal
35 freshwater perennial emergent wetland community in the study area. These losses (125 acres of
36 permanent and 2 acres of temporary loss) would be largely associated with construction of the
37 water conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and
38 inundation during tidal marsh restoration (CM4). Inundation losses would occur during the course
39 of the CM4 restoration activities primarily at Cache Slough ROA. By the end of the Plan timeframe, a
40 total of 1,200 acres of nontidal marsh would be restored and 50 acres would be protected. The
41 restoration would occur near giant garter snake occupied habitat in the eastern Delta and near Yolo
42 Bypass, in CZs 2, 4 and 5, and the protection would occur in CZ 1, 2, 8 or 11 to provide nesting
43 habitat for tri-colored blackbird (see Figure 12-1).

1 **NEPA Effects:** In the near-term, the combination of creating 400 acres and protecting 25 acres of
2 nontidal perennial marsh as part of CM3 and CM10 would offset the near-term losses associated
3 with construction of CM1, CM2 and CM4 facilities, avoiding any adverse effect. With 1,200 acres of
4 nontidal marsh restoration (BDCP Objective NFEW/NPANC1.1) and 50 acres of protection (BDCP
5 Objective TRBL1.1) included with full implementation of the Plan, Alternative 1A would not result in
6 a net long-term reduction in the acreage of a sensitive natural community; the effect would be
7 beneficial.

8 **CEQA Conclusion:**

9 **Near-Term Timeframe**

10 Alternative 1A would result in the loss of approximately 28 acres of nontidal freshwater perennial
11 emergent wetland natural community due to construction of the water conveyance facilities (CM1)
12 and fish passage improvements (CM2). The construction losses would occur at the southern forebay,
13 along temporary access roads in the central Delta, and in the Yolo Bypass. Approximately 40 acres of
14 the inundation and construction-related losses from CM4 would occur in the near-term. These
15 losses would occur primarily in the Cache Slough ROA mapped in Figure 12-1. The losses would be
16 spread across a 10-year near-term timeframe. These losses would be offset by planned restoration
17 of 400 acres and protection of 25 acres of nontidal marsh scheduled for the first 10 years of
18 Alternative 1A implementation (CM3 and CM10). AMM1, AMM2, AMM6, AMM7, and AMM10 would
19 also be implemented to minimize impacts. Because of these offsetting near-term restoration
20 activities and AMMs, impacts would be less than significant. Typical project-level mitigation ratios
21 (1:1 for restoration and 1:1 for protection) would indicate that 68 acres of restoration and 68 acres
22 of protection would be needed to offset (i.e., mitigate) the 68 acres of loss. While the Plan includes
23 just 25 acres of protection in the near-term, it includes well in excess of the typical 1:1 restoration
24 acreage (which includes protection in perpetuity), and therefore compensates for the shortfall in
25 protection. The restoration and protection would be initiated at the beginning of Alternative 1A
26 implementation to minimize any time lag in the availability of this habitat to special-status species,
27 and would result in a net gain in acreage of this sensitive natural community.

28 **Late Long-Term Timeframe**

29 At the end of the Plan period, 127 acres of the natural community would be removed, 1,200 acres of
30 nontidal marsh would be restored (BDCP Objective NFEW/NPANC1.1), and 50 acres of nontidal
31 marsh would be protected (BDCP Objective TRBL1.1). There would be no net permanent reduction
32 in the acreage of this sensitive natural community within the study area. Therefore, Alternative 1A
33 would not have a substantial adverse effect on this natural community; the impact would be
34 beneficial.

35 **Impact BIO-16: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
36 **Nontidal Freshwater Perennial Emergent Wetland Natural Community**

37 Two Alternative 1A conservation measures would modify the inundation/flooding regimes of both
38 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
39 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
40 of nontidal freshwater perennial emergent wetland natural community on small acreages, while
41 CM5 would expose this community to additional flooding as channel margins are modified and
42 levees are set back to improve fish habitat along some of the major rivers and waterways
43 throughout the study area.

- 1 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1A
2 would result in an increase in the frequency and duration of inundation of 6-8 acres of nontidal
3 freshwater perennial emergent wetland natural community. The methods used to estimate
4 these inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*
5 *Wildlife, and Plants*. The area more frequently affected by inundation would vary with the flow
6 volume that would pass through the newly constructed notch in the Fremont Weir. The 6-acre
7 increase in inundation would be associated with a notch flow of 1,000 cfs, and the 8-acre
8 increase would result from a notch flow of 6,000 cfs. Plan-related increases in flow through
9 Fremont Weir would be expected in 30% of the years. This community occurs in small stringers
10 and isolated patches along the Tule Canal and western channel in the north end of the bypass.
11 These areas are not connected to other adjacent marsh and open water habitats; they are
12 surrounded by riparian habitat, scoured grassland and agricultural lands. The anticipated
13 change in management of flows in the Yolo Bypass includes more frequent releases in flows into
14 the bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the
15 bypass in spring months (April and May). The modification of periodic inundation events would
16 not adversely affect the ecological function of this natural community and would not
17 substantially modify its value for special-status or common wildlife species. Nontidal freshwater
18 perennial emergent wetland plant species in the Yolo Bypass have developed under a long-term
19 regime of periodic inundation events. The extended inundation would be designed to expand
20 foraging and spawning habitat for Delta fishes. The effects of this increased inundation on
21 terrestrial wildlife and plant species are described in detail in later sections of this chapter.
- 22 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
23 increase in the frequency and duration of inundation of an estimated 8 acres of nontidal
24 freshwater perennial emergent wetland habitat. Specific locations for this restoration activity
25 have not been identified, but they would likely be focused in the south Delta area, along the
26 major rivers and Delta channels. The reconnection of these wetlands to stream flooding events
27 would be beneficial to the ecological function of nontidal freshwater perennial emergent
28 wetland habitats, as they relate to BDCP target aquatic species. The added exposure to
29 inundation could also encourage germination of nontidal marsh plant species. Foraging activity
30 and refuge sites would be expanded into areas currently unavailable or infrequently available to
31 some aquatic species.

32 In summary, 14 to 16 acres of nontidal freshwater perennial emergent wetland community in the
33 study area would be subjected to more frequent inundation as a result of implementing two
34 Alternative 1A conservation measures (CM2 and CM5). This community would not be adversely
35 affected because its habitats in the Yolo Bypass have developed under a long-term regime of
36 periodic inundation events and inundation along expanded river floodplains would be infrequent.

37 ***NEPA Effects:*** The increased inundation of nontidal freshwater perennial emergent wetland natural
38 community in the Yolo Bypass and in the southern Delta would not reduce the acreage of this
39 natural community and could encourage germination of emergent wetland vegetation. The
40 increased inundation would not be an adverse effect.

41 ***CEQA Conclusion:*** An estimated 14-16 acres of nontidal freshwater perennial emergent wetland
42 community in the study area would be subjected to more frequent inundation as a result of
43 implementing CM2 and CM5 under Alternative 1A. This community would not be significantly
44 impacted because its habitats in the Yolo Bypass have developed under a long-term regime of
45 periodic inundation events and inundation along expanded river floodplains would be infrequent.

1 The periodic inundation would not result in a net permanent reduction in the acreage of this
2 community in the study area. Therefore, there would be no substantial adverse effect on the
3 community. The impact would be less than significant.

4 **Impact BIO-17: Modification of Nontidal Freshwater Perennial Emergent Wetland Natural** 5 **Community from Ongoing Operation, Maintenance and Management Activities**

6 Once the physical facilities associated with Alternative 1A are constructed and the stream flow
7 regime associated with changed water management is in effect, there would be new ongoing and
8 periodic actions associated with operation, maintenance and management of the BDCP facilities and
9 conservation lands that could affect nontidal freshwater perennial emergent wetland natural
10 community in the study area. The ongoing actions include modified operation of upstream
11 reservoirs, the diversion of Sacramento River flows in the north Delta, and reduced diversions from
12 south Delta channels. These actions are associated with CM1 (see Impact BIO-16 for effects
13 associated with CM2). The periodic actions would involve access road and conveyance facility
14 repair, vegetation management at the various water conveyance facilities and habitat restoration
15 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat
16 enhancement in accordance with natural community management plans. The potential effects of
17 these actions are described below.

- 18 ● *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
19 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect
20 nontidal freshwater perennial emergent wetland natural community. These reservoirs do not
21 support significant stands of freshwater emergent wetlands. Changes in releases that would
22 influence downstream river flows are discussed below.
- 23 ● *Modified river flows upstream of and within the study area and reduced diversions from south*
24 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
25 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
26 channels (associated with Operational Scenario A) would not result in the permanent reduction
27 in acreage of the nontidal freshwater perennial emergent wetland natural community in the
28 study area. The majority of this wetland type exists outside of the levees of the larger rivers and
29 would not be affected by flow changes in river or Delta channels. Similarly, increased diversions
30 of Sacramento River flows in the north Delta would not result in a permanent reduction in
31 nontidal freshwater perennial emergent wetland community downstream of these diversions.
32 Nontidal wetlands below the diversions are not directly connected to the rivers, as this reach of
33 the river is tidally influenced. Reduced diversions from the south Delta channels would not
34 create a reduction in this natural community.
- 35 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
36 conveyance facilities and levees associated with the BDCP actions have the potential to require
37 removal of adjacent vegetation and could entail earth and rock work in nontidal freshwater
38 perennial emergent wetland habitats. This activity could lead to increased soil erosion, turbidity
39 and runoff entering nontidal freshwater perennial habitats. These activities would be subject to
40 normal erosion, turbidity and runoff control management practices, including those developed
41 as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
42 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic
43 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation
44 of disturbed surfaces. Proper implementation of these measures would avoid permanent
45 adverse effects on this community.

- 1 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
2 treatment, would be a periodic activity associated with the long-term maintenance of water
3 conveyance facilities and restoration sites. Vegetation management is also the principal activity
4 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to
5 control nuisance vegetation could pose a long-term hazard to nontidal freshwater perennial
6 emergent wetland natural community at or adjacent to treated areas. The hazard could be
7 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
8 onto the natural community, or direct discharge of herbicides to nontidal perennial wetland
9 areas being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
10 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce
11 hazards to humans and the environment from use of various chemicals during maintenance
12 activities, including the use of herbicides. These commitments are described in Appendix 3B,
13 including the commitment to prepare and implement spill prevention, containment, and
14 countermeasure plans and stormwater pollution prevention plans. Best management practices,
15 including control of drift and runoff from treated areas, and use of herbicides approved for use
16 in aquatic environments would also reduce the risk of affecting natural communities adjacent to
17 water conveyance features and levees associated with restoration activities.

18 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
19 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
20 The treatment activities would be conducted in concert with the California Department of
21 Boating and Waterways' invasive species removal program. Eliminating large stands of water
22 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
23 by removing cover for nonnative predators, improving water flow and removing barriers to
24 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
25 benefit terrestrial species that use tidal and nontidal freshwater perennial emergent wetland
26 natural community for movement corridors and for foraging. Vegetation management effects on
27 individual species are discussed in the species sections on following pages.

- 28 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
29 communities within the Plan Area (CM11). For nontidal freshwater perennial emergent wetland
30 natural community, a management plan would be prepared that specifies actions to improve the
31 value of the habitats for covered species. Actions would include control of invasive nonnative
32 plant and animal species, fire management, restrictions on vector control and application of
33 herbicides, and maintenance of infrastructure that would allow for movement through the
34 community. The enhancement efforts would improve the long-term value of this community for
35 both special-status and common species.

36 The various operations and maintenance activities described above could alter acreage of nontidal
37 freshwater perennial emergent wetland natural community in the study area through changes in
38 flow patterns and changes in periodic inundation of this community. Activities could also introduce
39 sediment and herbicides that would reduce the value of this community to common and sensitive
40 plant and wildlife species. Other periodic activities associated with the Plan, including management,
41 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
42 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
43 enhance the value of the community. While some of these activities could result in small changes in
44 acreage, these changes would be greatly offset by restoration activities planned as part of *CM10*
45 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*
46 *Protection and Restoration*. The management actions associated with levee repair and control of

1 invasive plant species would also result in a long-term benefit to the species associated with
2 nontidal freshwater perennial emergent wetland habitats by improving water movement.

3 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
4 Alternative 1A would not result in a net permanent reduction in this sensitive natural community
5 within the study area. Therefore, there would be no adverse effect on the community.

6 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A would
7 have the potential to create minor changes in total acreage of nontidal freshwater perennial
8 emergent wetland natural community in the study area, and could create temporary increases in
9 turbidity and sedimentation. The activities could also introduce herbicides periodically to control
10 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and
11 AMM5 would minimize these impacts, and other operations and maintenance activities, including
12 management, protection and enhancement actions associated with *CM3 Natural Communities*
13 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
14 create positive effects, including improved water movement in and adjacent to these habitats. Long-
15 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and protection actions
16 associated with *CM3 Natural Communities Protection and Restoration* would expand this natural
17 community in the study area. Ongoing operation, maintenance and management activities would not
18 result in a net permanent reduction in this sensitive natural community within the study area.
19 Therefore, there would be a less-than-significant impact.

20 **Alkali Seasonal Wetland Complex**

21 Construction, operation, maintenance and management associated with the conservation
22 components of Alternative 1A would have no long-term adverse effects on the habitats associated
23 with the alkali seasonal wetland complex natural community. Initial development and construction
24 of CM2 and CM4 would result in permanent removal of this community (see Table 12-1A-7). Full
25 implementation of Alternative 1A would also include the following conservation actions over the
26 term of the BDCP to benefit the alkali seasonal wetland natural community.

- 27 • Protect 150 acres of alkali seasonal wetland in Conservation Zones 1, 8 and/or 11 among a
28 mosaic of protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with
29 CM3)
- 30 • Restore or create alkali seasonal wetlands in Conservation Zones 1, 8, and/or 11 to achieve no
31 net loss of wetted acres (up to 72 acres of alkali seasonal wetland complex restoration)
32 (Objective ASWNC1.2, associated with CM3 and CM9)
- 33 • Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali
34 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11)

35 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
36 3.3 that would improve the value of alkali seasonal wetland natural community for terrestrial
37 species. As explained below, with the protection, restoration, and enhancement of the amounts of
38 habitat listed in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural
39 community would not be adverse for NEPA purposes and would be less than significant for CEQA
40 purposes.

1 **Table 12-1A-7. Changes in Alkali Seasonal Wetland Complex Natural Community Associated with**
2 **Alternative 1A (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	0	0
CM2	45	45	0	0	264-744	0
CM4	13	27	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	58	72	0	0	264-744	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

3

4 **Impact BIO-18: Changes in Alkali Seasonal Wetland Complex Natural Community as a Result**
5 **of Implementing BDCP Conservation Measures**

6 Construction, land grading and habitat restoration activities that would accompany the
7 implementation of CM2 and CM4 would permanently eliminate an estimated 72 acres of alkali
8 seasonal wetland complex natural community in the study area. These modifications represent
9 approximately 2% of the 3,723 acres of the community that is mapped in the study area. Most of the
10 losses (58 acres or 80%) would occur during the first 10 years of Alternative 1A implementation, as
11 Yolo Bypass improvements and habitat restoration is initiated. Alkali seasonal wetland complex
12 protection (120 acres) and restoration (an estimated 58 acres, but determined by actual level of
13 effect) would be initiated during the same period, which would offset the. By the end of the Plan
14 period, 150 acres of this natural community would be protected and 72 acres would be restored.
15 The BDCP beneficial effects analysis for this community (BDCP Chapter 5, Section 5.4.7.2) states that
16 Alternative 4 would protect at least 150 acres of alkali seasonal wetland in Conservation Zones 1, 8,
17 or 11, in a mosaic of protected grasslands and vernal pool complex. This would protect currently
18 unprotected high-value alkali seasonal wetland complex in the Plan Area. The Alternative 1A
19 conservation measures would provide the same level of restoration and protection as Alternative 4.

20 The individual effects of each relevant conservation measure are addressed below. A summary
21 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
22 conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance
2 facilities would not affect alkali seasonal wetland complex natural community.

3 While there would be no direct effects from construction activity associated with CM1, there is
4 the potential that construction would lead to increased nitrogen deposition in alkali seasonal
5 wetland habitats in the vicinity of Clifton Court Forebay. A significant number of cars, trucks,
6 and land grading equipment involved in construction would emit small amounts of atmospheric
7 nitrogen from fuel combustion; this material could be deposited in sensitive alkali seasonal
8 wetland areas that are located west of the major construction areas at Clifton Court Forebay.
9 Nitrogen deposition can pose a risk of adding a fertilizer to nitrogen-limited soils and their
10 associated plants. Nonnative invasive species can be encouraged by the added nitrogen
11 available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related Nitrogen Deposition on*
12 *BDCP Natural Communities*, addresses this issue in detail. It has been concluded that this
13 potential deposition would pose a low risk of changing the alkali seasonal wetland complex in
14 the construction area because the construction would occur primarily downwind of the natural
15 community and the construction would contribute a negligible amount of nitrogen to regional
16 projected emissions. No adverse effect is expected.

- 17 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of
18 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
19 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
20 Sacramento Weir improvements. Realignment of Putah Creek could involve excavation and
21 grading in alkali seasonal wetland complex as a new channel is constructed. Based on
22 hypothetical construction footprints, a total of 45 acres could be permanently lost. This complex
23 is located immediately south of the existing Putah Creek channel within the bypass, and is a
24 relatively large, moderate to high value, contiguous expanse of this community. This loss would
25 occur in the near-term timeframe.

- 26 • *CM3 Natural Communities Protection and Restoration*: CM3 proposes to protect at least 150 acres
27 of alkali seasonal wetland complex in CZs 1, 8, and 11 (Objective ASWNC1.1). The protection
28 would occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented
29 natural landscapes supporting a diversity of native plant and wildlife species. These areas would
30 be both protected and enhanced to increase the cover of alkali seasonal wetland plants relative
31 to nonnative species.

- 32 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
33 footprints, implementation of CM4 would permanently inundate or remove 13 acres of alkali
34 seasonal wetland complex in the near-term and inundate or remove 27 acres by the end of the
35 Plan timeframe. The losses would be expected to occur in the Cache Slough and Suisun Marsh
36 ROAs established for tidal restoration (see Figure 12-1). The largest losses would likely occur in
37 the Lindsay Slough area and on the northern fringes of Suisun Marsh, north of the Potrero Hills.
38 These losses would not fragment the alkali seasonal wetland communities adjacent to these
39 sloughs because the losses would occur on the edges of the existing habitat.

- 40 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: BDCP CM9 includes both
41 vernal pool complex and alkali seasonal wetland complex restoration goals. The intent of the
42 conservation measure is to match the acreage of restoration with the actual acreage lost to other
43 conservation measures (primarily CM2 and CM4). The current estimate for alkali seasonal
44 wetland complex restoration is 58 acres in the near-term and a total of 72 acres by the end of
45 the BDCP's restoration period. The goal is for no net loss of this natural community, consistent

1 with BDCP Objective ASWNC1.2. Restoration in the Lindsay Slough area of the Cache Slough ROA
2 and the northern region of the Suisun Marsh ROA would be consistent with essential habitat
3 connectivity goals mapped in Figure 12-2 and described in Table 3.2-3 of BDCP Chapter 3.

4 The following paragraphs summarize the combined effects discussed above and describe other
5 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
6 also included.

7 ***Near-Term Timeframe***

8 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would
9 affect the alkali seasonal wetland complex natural community through CM2 construction losses (45
10 acres). These losses would occur in the Yolo Bypass south of Putah Creek. Approximately 13 acres of
11 the inundation and construction-related losses in habitat from CM4 would occur in the near-term.
12 These losses would occur primarily in the Cache Slough and Suisun Marsh ROAs mapped in Figure
13 12-1.

14 The construction losses of this special-status natural community would represent an adverse effect
15 if they were not offset by avoidance and minimization measures and restoration actions associated
16 with BDCP conservation components. Loss of alkali seasonal wetland complex natural community
17 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
18 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland
19 complex as part of CM3 and the restoration of up to 58 acres of this community as part of CM9
20 during the first 10 years of Alternative 1A implementation would offset this near-term loss, avoiding
21 any adverse effect. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration)
22 would indicate 116 acres of protection and 58 acres of restoration would be needed to offset (i.e.,
23 mitigate) the 58 acres of loss.

24 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
25 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
26 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*
27 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting
28 habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and
29 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
30 EIR/EIS.

31 ***Late Long-Term Timeframe***

32 Implementation of Alternative 1A as a whole would result in relatively minor (2%) losses of alkali
33 seasonal wetland natural community in the study area. These losses (72 acres) would be largely
34 associated with construction of Yolo Bypass fish improvements (CM2) and inundation during tidal
35 marsh restoration (CM4). Inundation losses would occur during the course of the Plan's restoration
36 activities, primarily in the Cache Slough and Suisun Marsh ROAs.

37 ***NEPA Effects:*** In the first 10 years of implementing Alternative 1A conservation measures, 120 acres
38 of alkali seasonal wetland complex would be protected as part of CM3 and up to 58 acres of this
39 community would be restored as part of CM9. These conservation actions would offset the near-
40 term loss of this community associated with CM2 and CM4, avoiding any adverse effect. By the end
41 of the Plan timeframe, Alternative 1A would protect a total of 150 acres of alkali seasonal wetland
42 natural community (CM3) and would restore up to 72 acres (CM9). The protection and restoration

1 would occur primarily in CZ 1, CZ 8 and/or CZ 11, in the Cache Slough, Suisun Marsh and Clifton
2 Court Forebay areas. Therefore, Alternative 1A would not have an adverse effect on the alkali
3 seasonal wetland complex natural community.

4 ***CEQA Conclusion:***

5 ***Near-Term Timeframe***

6 Alternative 1A would result in the permanent loss of approximately 58 acres of alkali seasonal
7 wetland complex natural community due to construction of fish passage improvements (CM2) and
8 inundation during tidal marsh restoration (CM4). The construction losses would occur primarily in
9 the area just south of Putah Creek in the Yolo Bypass, while inundation losses would occur in the
10 Cache Slough and Suisun Marsh ROAs. The losses would be spread across a 10-year near-term
11 timeframe.

12 The construction losses of this special-status natural community would represent an adverse effect
13 if they were not offset by avoidance and minimization measures and other actions associated with
14 BDCP conservation components. Loss of alkali seasonal wetland complex natural community would
15 be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
16 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland
17 complex as part of CM3 and the restoration of 58 acres of this community as part of CM9 during the
18 first 10 years of Alternative 1A implementation would offset this near-term loss, avoiding any
19 significant impact. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration)
20 would indicate 116 acres of protection and 58 acres of restoration would be needed to offset (i.e.,
21 mitigate) the 58 acres of loss. AMM1, AMM2, AMM3, AMM4, and AMM10 would also be implemented
22 to minimize impacts. Because of the offsetting protection and restoration activities and AMMs,
23 impacts would be less than significant.

24 ***Late Long-Term Timeframe***

25 At the end of the Plan period, 72 acres of alkali seasonal wetland complex natural community would
26 be permanently removed by conservation actions, 150 acres would be protected and up to 72 acres
27 would be restored. The restoration acres actually developed would depend on the number of acres
28 affected during Alternative 1A implementation. There would be no net permanent reduction in the
29 acreage of this natural community within the study area. Therefore, Alternative 1A would have a
30 less-than-significant impact on this natural community.

31 **Impact BIO-19: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
32 **Alkali Seasonal Wetland Complex Natural Community**

33 *CM2 Yolo Bypass Fisheries Enhancement* would modify the inundation/flooding regime of the Yolo
34 Bypass, a man-made waterway. CM2, which is designed to improve fish passage and shallow flooded
35 habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation of alkali seasonal
36 wetland complex natural community at scattered locations in the central and southern sections of
37 the bypass.

38 Operation of the Yolo Bypass under Alternative 1A would result in an increase in the frequency and
39 duration of inundation on an estimated 264–744 acres of alkali seasonal wetland complex natural
40 community. The methods used to estimate these inundation acreages are described in BDCP
41 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected
42 by inundation would vary with the flow volume that would pass through the newly constructed

1 notch in the Fremont Weir. The 264-acre increase in inundation would be associated with a notch
2 flow of 1,000 cubic feet per second (cfs), and the 744-acre increase would result from a notch flow of
3 4,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in 30% of the
4 years. The alkali seasonal wetland complex natural community occurs primarily in the central and
5 southern reaches of the bypass, south of Putah Creek. The stands in this location are relatively large,
6 with moderate to high value for associated plant and wildlife species. The anticipated change in
7 management of flows in the Yolo Bypass includes more frequent releases in flows into the bypass
8 from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in spring
9 months (April and May).

10 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with
11 Alternative 1A would not adversely affect alkali seasonal wetland complex habitats, as they have
12 persisted under similar high flows and extended flow periods. There is the potential for some
13 change in plant species composition as a result of longer inundation periods, but the natural
14 community would persist.

15 **CEQA Conclusion:** An estimated 264–744 acres of alkali seasonal wetland complex natural
16 community in the Yolo Bypass would be subjected to more frequent inundation as a result of
17 implementing CM2 under Alternative 1A. This natural community is conditioned to periodic
18 inundation; the slight increase in periodic inundation would not result in a net permanent reduction
19 in the acreage of this community in the study area, although some change in plant species
20 composition could occur. Increasing periodic inundation of alkali seasonal wetland complex natural
21 community in the Yolo Bypass would have a less-than-significant impact on this natural community.
22 The effects of this inundation on wildlife and plant species are described in detail in later sections of
23 this chapter.

24 **Impact BIO-20: Modification of Alkali Seasonal Wetland Complex Natural Community from** 25 **Ongoing Operation, Maintenance and Management Activities**

26 Once the physical facilities associated with Alternative 1A were constructed and the stream flow
27 regime associated with changed water management was in effect, there would be new ongoing and
28 periodic actions associated with operation, maintenance and management of the BDCP facilities and
29 conservation lands that could affect alkali seasonal wetland complex natural community in the study
30 area. The ongoing actions include the diversion of Sacramento River flows in the north Delta,
31 reduced diversions from south Delta channels and recreation in and adjacent to Plan reserves. These
32 actions are associated with CM1 and CM11 (see Impact BIO-19 for effects associated with CM2). The
33 periodic actions would involve access road and conveyance facility repair, vegetation management
34 at the various water conveyance facilities and habitat restoration sites (CM11), levee repair and
35 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with
36 natural community management plans. The potential effects of these actions are described below.

- 37 • *Modified river flows upstream of and within the study area and reduced diversions from south*
38 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
39 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
40 channels (associated with Operational Scenario A) would not affect alkali seasonal wetland
41 natural community. This natural community does not exist within or adjacent to the active
42 Sacramento River system channels and Delta waterways that would be affected by modified
43 flow levels.

- 1 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
2 conveyance facilities and levees associated with the BDCP actions have the potential to require
3 removal of adjacent vegetation and could entail earth and rock work in or adjacent to alkali
4 seasonal wetland complex habitats. This activity could lead to increased soil erosion and runoff
5 entering these habitats. These activities would be subject to normal erosion and runoff control
6 management practices, including those developed as part of *AMM2 Construction Best*
7 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
8 vegetation removal or earthwork adjacent to or within alkali seasonal wetland complex habitats
9 would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces
10 as required by *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper
11 implementation of these measures would avoid permanent adverse effects on this community.
- 12 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
13 treatment, would be a periodic activity associated with the long-term maintenance of water
14 conveyance facilities and restoration sites. Vegetation management is also the principal activity
15 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to
16 control nuisance vegetation could pose a long-term hazard to alkali seasonal wetland complex
17 natural community at or adjacent to treated areas. The hazard could be created by uncontrolled
18 drift of herbicides, uncontrolled runoff of contaminated stormwater onto the natural
19 community, or direct discharge of herbicides to alkali seasonal wetland complex areas being
20 treated for invasive species removal. Environmental commitments and *AMM5 Spill Prevention,*
21 *Containment, and Countermeasure Plan* have been made part of the BDCP to reduce hazards to
22 humans and the environment from use of various chemicals during maintenance activities,
23 including the use of herbicides. These commitments are described in Appendix 3B, including the
24 commitment to prepare and implement spill prevention, containment, and countermeasure
25 plans and stormwater pollution prevention plans. Best management practices, including control
26 of drift and runoff from treated areas, and use of herbicides approved for use in terrestrial
27 environments would also reduce the risk of affecting natural communities adjacent to water
28 conveyance features and levees associated with restoration activities.
- 29 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
30 communities within the Plan Area (CM11). For the alkali seasonal wetland complex natural
31 community, a management plan would be prepared that specifies actions to improve the value
32 of the habitats for covered species. Actions would include control of invasive nonnative plant
33 and animal species, fire management, restrictions on vector control and application of
34 herbicides, and maintenance of infrastructure that would allow for movement through the
35 community. The enhancement efforts would improve the long-term value of this community for
36 both special-status and common species.
- 37 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to alkali
38 seasonal wetland natural community in the reserve system. The activities could include wildlife
39 and plant viewing and hiking. *CM11 Natural Communities Enhancement and Management* (BDCP
40 Chapter 3, Section 3.4.11) describes this program and identifies applicable restrictions on
41 recreation that might adversely affect alkali seasonal wetland habitat. BDCP also includes an
42 avoidance and minimization measure (AMM37) that further dictates limits on recreation
43 activities that might affect this natural community. Most recreation would be docent-led wildlife
44 and botanical tours, using existing trails and roads in the vicinity of the reserves. No new trails
45 would be constructed.

1 The various operations and maintenance activities described above could alter acreage of alkali
2 seasonal wetland complex natural community in the study area. Activities could introduce sediment
3 and herbicides that would reduce the value of this community to common and sensitive plant and
4 wildlife species. Other periodic activities associated with the Plan, including management,
5 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
6 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
7 enhance the value of the community. While some of these activities could result in small changes in
8 acreage, these changes would be offset by protection and restoration activities planned as part of
9 *CM3 Natural Communities Protection and Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
10 *Wetland Complex Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, AMM10,
11 and AMM37. The management actions associated with control of invasive plant species would also
12 result in a long-term benefit to the species associated with alkali seasonal wetland complex habitats
13 by eliminating competitive, invasive species of plants.

14 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
15 Alternative 1A would not result in a net permanent reduction in this natural community within the
16 study area. Therefore, there would be no adverse effect on the community.

17 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A would
18 have the potential to create minor changes in total acreage of alkali seasonal wetland complex
19 natural community in the study area, and could create temporary increases sedimentation. The
20 activities could also introduce herbicides periodically to control nonnative, invasive plants.
21 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10 and AMM37
22 would minimize these impacts, and other operations and maintenance activities, including
23 management, protection and enhancement actions associated with *CM3 Natural Communities*
24 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management* would
25 create positive effects, including reduced competition from invasive, nonnative plants in these
26 habitats. Long-term restoration activities associated with *CM9 Vernal Pool and Alkali Seasonal*
27 *Wetland Complex Restoration* and protection actions associated with *CM3 Natural Communities*
28 *Protection and Restoration* would ensure that the acreage of this natural community would not
29 decrease in the study area. Ongoing operation, maintenance and management activities would not
30 result in a net permanent reduction in this natural community within the study area. Therefore,
31 there would be a less-than-significant impact.

32 **Vernal Pool Complex**

33 Construction, operation, maintenance and management associated with the Alternative 1A
34 conservation components would have no long-term adverse effects on the habitats associated with
35 the vernal pool complex natural community. Construction of CM1 and habitat restoration associated
36 with CM4 would result in permanent removal of 375 acres of this community (see Table 12-1A-8).
37 Full implementation of Alternative 1A would also include the following conservation actions over
38 the term of the BDCP to benefit the vernal pool complex natural community.

- 39 ● Protect at least 600 acres of existing vernal pool complex in Conservation Zones 1, 8, and 11,
40 primarily in core vernal pool recovery areas (Objective VPNC1.1, associated with CM3)
- 41 ● Restore vernal pool complex in Conservation Zones 1, 8, and/or 11 to achieve no net loss of
42 vernal pool acreage (up to 67 acres of vernal pool complex restoration, assuming that all
43 anticipated impacts [10 wetted acres] occur and that the restored vernal pool complex has 15%
44 density of vernal pools) (Objective VPNC1.2, associated with CM3 and CM9)

1 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
 2 3.3 that would improve the value of vernal pool complex natural community for terrestrial species.
 3 As explained below, with the protection, restoration and enhancement of the amounts of habitat
 4 listed in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural
 5 community would not be adverse for NEPA purposes and would be less than significant for CEQA
 6 purposes.

7 **Table 12-1A-8. Changes in Vernal Pool Complex Natural Community Associated with Alternative**
 8 **1A (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	3	3	0	0	0	0
CM2	0	0	0	0	0-4	0
CM4	201	372	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	204	375	0	0	0-4	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

9

10 **Impact BIO-21: Changes in Vernal Pool Complex Natural Community as a Result of**
 11 **Implementing BDCP Conservation Measures**

12 Construction, land grading and habitat restoration activities that would accompany the
 13 implementation of CM1 and CM4 could permanently eliminate an estimated 375 acres of vernal pool
 14 complex natural community in the study area. These acreages are based on the proposed location of
 15 the CM1 construction footprint and a theoretical footprint for CM4 tidal marsh restoration activities.
 16 The loss of this 375 acres would represent approximately 3% of the 12,133 acres of the community
 17 that is mapped in the study area. An estimated 204 acres of the loss could occur during the first 10
 18 years of Alternative 1A implementation, as the water conveyance facility is constructed and tidal
 19 marsh restoration is initiated. Vernal pool complex protection (400 acres) and restoration (an
 20 estimated 40 acres, with actual restoration based on level of effect) would be initiated during the
 21 first 10 years of Alternative 1A implementation to counteract the loss of habitat. By the end of the
 22 Plan period, 600 acres of this natural community would be protected and up to 67 acres would be
 23 restored. Because of the high sensitivity of this natural community and its shrinking presence in the
 24 Plan Area, avoidance and minimization measures have been built into the BDCP to eliminate the

1 majority of this potential loss. The BDCP beneficial effect analysis (BDCP Chapter 5, Section 5.4.8.2)
2 indicates that implementation of Alternative 4 would protect at least 600 acres of vernal pool
3 complex in Conservation Zones 1, 8, and 11 and additional vernal pool complex would be restored to
4 achieve no net loss of this community. The same conservation actions for vernal pool complex
5 natural community would be implemented for Alternative 1A.

6 The individual effects of the relevant conservation measure are addressed below. A summary
7 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
8 conservation measure discussions.

- 9 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance
10 facilities would directly affect 3 acres of vernal pool complex natural community. The
11 permanent loss would occur along the southern edge of Clifton Court Forebay, where the
12 forebay would be expanded to provide greater storage capacity (see Figure 12-1 and the
13 Terrestrial Biology Mapbook).

14 Because of the close proximity of construction activity to adjacent vernal pool complex, both
15 near Clifton Court Forebay and Stone Lakes National Wildlife Refuge, there is also the potential
16 for indirect loss of or damage to vernal pools from changes in pool hydrology or deposition of
17 construction-related sediment. These potential indirect effects are discussed in detail in the
18 vernal pool crustaceans impact analysis later in this chapter.

19 The construction activity associated with CM1 also has the potential to lead to increased
20 nitrogen deposition in vernal pool complex habitats in the vicinity of Clifton Court Forebay and
21 Stone Lakes National Wildlife Refuge. A significant number of cars, trucks, and land grading
22 equipment involved in construction would emit small amounts of atmospheric nitrogen from
23 fuel combustion; this material could be deposited in sensitive vernal pool areas that are located
24 west of the major construction areas at Clifton Court Forebay and east of the construction areas
25 adjacent to Stone Lakes NWR. Nitrogen deposition can pose a risk of adding a fertilizer to
26 nitrogen-limited soils and their associated plants. Nonnative invasive species can be encouraged
27 by the added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related
28 Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been
29 concluded that this potential deposition would pose a low risk of changing the vernal pool
30 complex in the construction areas because the construction would contribute a negligible
31 amount of nitrogen to regional projected emissions. Also, the construction at Clifton Court
32 Forebay would occur primarily downwind of the natural community. At Stone Lakes National
33 Wildlife Refuge, the USFWS refuge management undertakes active invasive species control,
34 including use of grazing. No adverse effect is expected.

- 35 • *CM3 Natural Communities Protection and Restoration*: CM3 proposes to protect at least 600 acres
36 of vernal pool complex in CZs 1, 8, and 11 (BDCP Objective VPNC1.1). The protection would
37 occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented
38 natural landscapes supporting a diversity of native plant and wildlife species. These areas would
39 be both protected and enhanced to increase the cover of vernal pool complex plants relative to
40 nonnative species.
- 41 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
42 footprints, implementation of CM4 tidal marsh restoration in CZs 1 and 11 (Cache Slough and
43 Suisun Marsh ROAs; see Figure 12-1) could permanently inundate or remove 201 acres of vernal
44 pool complex in the near-term timeframe. By the end of the Plan period, a total of 372 acres

1 could be affected. The principal areas likely to be affected include the Cache Slough drainage just
2 west of the Yolo Bypass and the Nurse Slough drainage just east of the Potrero Hills.

- 3 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: CM9 includes both vernal
4 pool complex and alkali seasonal wetland complex restoration goals. The current estimate for
5 vernal pool complex restoration is 40 acres in the near-term and a total of 67 acres by the end of
6 the BDCP's restoration period. This restoration conservation measure includes the "no net loss"
7 policy normally applied to this natural community (BDCP Objective VPNC1.2), and the intent is
8 that vernal pool complex restoration would occur prior to or concurrent with impacts (BDCP
9 Chapter 3, Section 3.4.4.27).

10 The following paragraphs summarize the combined effects discussed above and describe other
11 BDCP conservation actions that would offset or avoid these effects. NEPA and CEQA impact
12 conclusions are also included.

13 ***Near-Term Timeframe***

14 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would
15 affect 204 acres of vernal pool complex natural community through inundation or construction-
16 related losses in habitat from CM1 and CM4 activities. This loss would likely occur in the Cache
17 Slough or Suisun Marsh ROAs, and immediately adjacent to Clifton Court Forebay mapped in Figure
18 12-1.

19 The construction or inundation loss of this special-status natural community would represent an
20 adverse effect if it were not offset by avoidance and minimization measures and restoration actions
21 associated with BDCP conservation components. Loss of vernal pool complex natural community
22 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
23 defined by Section 404 of the CWA. However, the protection of 400 acres of vernal pool complex as
24 part of CM3 and the restoration of an estimated 40 acres of this community (with a commitment to
25 keep pace with actual losses) as part of CM9 during the first 10 years of Alternative 1A
26 implementation would partially offset this near-term loss. The Plan focuses this protection in the
27 core vernal pool areas identified in the USFWS vernal pool recovery plan (U.S. Fish and Wildlife
28 Service 2005). The core areas exist in CZ 1, CZ 8 and CZ 11 (see Figure 12-1). Typical project-level
29 mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 408 acres of protection
30 and 204 acres of restoration would be needed to offset (i.e., mitigate) the 204 acres of loss. Without
31 additional avoidance and minimization measures to reduce the potential effect, the proposed
32 protection and restoration would not meet the typical mitigation for vernal pool complex losses.

33 To avoid this adverse effect, the BDCP includes commitments to implement *AMM1 Worker*
34 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*
35 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM10 Restoration*
36 *of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM30*
37 *Transmission Line Design and Alignment Guidelines*. All of these AMMs include elements that avoid or
38 minimize the risk of affecting habitats at work areas. AMM12 limits the direct removal of vernal pool
39 crustacean habitat to no more than 10 wetted acres and the indirect effect to no more than 20
40 wetted acres through the life of the Plan. The 10 wetted acres is equivalent to approximately 67
41 acres of vernal pool complex natural community. BDCP Appendix 3.C describes the AMMs, which
42 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
43 *AMMs, and CMs*, of the Final EIR/EIS. With these AMMs in place, the BDCP would not adversely affect
44 vernal pool complex natural community in the near-term.

1 **Late Long-Term Timeframe**

2 The late long-term effect on vernal pool complex natural community would be 375 acres of
 3 permanent loss. The loss would be associated with the construction of CM1 facilities in the vicinity
 4 of Clifton Court Forebay and the ongoing restoration of tidal wetland in the Cache Slough and Suisun
 5 Marsh ROAs. However, 600 acres would be protected (CM3) and up to 67 acres would be restored
 6 (CM9) through the course of the Alternative 1A implementation. In addition, the avoidance and
 7 minimization measures listed above would reduce the actual loss of this community to no more than
 8 10 wetted acres of vernal pool crustacean habitat (an estimated 67 acres of vernal pool complex
 9 natural community) from direct activities and 20 acres of crustacean habitat from indirect effects.

10 **NEPA Effects:** The conservation measures associated with Alternative 1A include protection of 400
 11 acres (CM3) and restoration of an estimated 40 acres (CM9) of vernal pool complex in the near-term
 12 time frame. The Plan focuses the protection in the core vernal pool areas identified in the USFWS
 13 vernal pool recovery plan (U.S. Fish and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8 and
 14 CZ 11 (see Figure 12-1). In addition, Alternative 1A includes AMM12 which limits the removal of
 15 vernal pool crustacean habitat to no more than 10 wetted acres and the indirect effect to no more
 16 than 20 wetted acres through the life of the Plan. With this and other AMMs in place, the BDCP
 17 would not adversely affect vernal pool complex natural community in the near-term. With these
 18 conservation measures and AMMs in effect through the entire Plan period, Alternative 1A would not
 19 have an adverse effect on the vernal pool complex natural community in the long term.

20 **CEQA Conclusion:**

21 **Near-Term Timeframe**

22 During the 10-year near-term time frame, Alternative 1A could result in the loss of approximately
 23 204 acre of vernal pool complex natural community due to inundation during water conveyance
 24 facilities construction (CM1) and tidal marsh restoration (CM4). The losses would likely occur in the
 25 Cache Slough or Suisun Marsh ROAs, and immediately adjacent to Clifton Court Forebay. The
 26 construction and inundation-related loss of this special-status natural community would represent a
 27 significant impact if it were not offset by avoidance and minimization measures and other actions
 28 associated with BDCP conservation components. Loss of vernal pool complex natural community
 29 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
 30 defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex as part of
 31 CM3 and the restoration of an estimated 40 acres of this community (with a commitment to keep
 32 pace with actual losses) as part of CM9 during the first 10 years of Alternative 1A implementation
 33 would partially offset this near-term loss. Typical project-level mitigation ratios (2:1 for protection
 34 and 1:1 for restoration) would indicate 408 acres of protection and 204 acres of restoration would
 35 be needed to offset (i.e., mitigate) the 204 acres of loss. Without additional avoidance and
 36 minimization measures to reduce the potential impact, the proposed protection and restoration
 37 would not meet the typical mitigation for vernal pool complex losses. However, Alternative 1A also
 38 includes AMM1, AMM2, AMM3, AMM4, AMM10, AMM12 and AMM30 to minimize impacts. AMM12
 39 places a strict limit on the acres of wetted vernal pool crustacean habitat that can be lost to
 40 conservation actions (10 acres of direct and 20 acres of indirect loss; equivalent to approximately 67
 41 acres of direct loss and 134 acres of indirect loss of vernal pool complex, respectively). Because of
 42 the offsetting protection and restoration activities and implementation of the AMMs, impacts would
 43 be less than significant.

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, 375 acres of vernal pool complex natural community could be
3 permanently removed. Through CMs 3 and 9, 600 acres of vernal pool complex natural community
4 would be protected and up to 67 acres would be restored. In addition, AMM12 would limit the acres
5 of wetted vernal pool crustacean habitat loss to 10 acres from direct actions and 20 acres from
6 indirect actions. These wetted acres are equivalent to approximately 67 acres and 134 acres of
7 vernal pool complex, respectively. There would be no net permanent reduction in the acreage of this
8 natural community within the study area. Alternative 1A would have a less-than-significant impact
9 on this natural community.

10 **Impact BIO-22: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
11 **Vernal Pool Complex Natural Community**

12 *CM2 Yolo Bypass Fisheries Enhancement* would modify the inundation/flooding regime of the Yolo
13 Bypass, a man-made waterway. CM2, which is designed to improve fish passage and shallow flooded
14 habitat for Delta fishes in the Yolo Bypass, could increase periodic inundation of a small acreage of
15 vernal pool complex natural community in the southern section of the bypass, south of Putah Creek.

16 Operation of the Yolo Bypass under Alternative 1A would result in an increase in the frequency and
17 duration of inundation on an estimated 0–4 acres of vernal pool complex natural community. The
18 methods used to estimate this inundation acreage are described in BDCP Appendix 5.J, *Effects on*
19 *Natural Communities, Wildlife, and Plants*. The area more frequently affected by inundation would
20 vary with the flow volume that would pass through the newly constructed notch in the Fremont
21 Weir. The 4-acre increase in inundation would only occur at the highest modeled flow regime, 8,000
22 cfs. Plan-related increases in flow through Fremont Weir would be expected in 30% of the years.
23 The vernal pool complex natural community that would likely be affected occurs primarily in the
24 southern reaches of the bypass, south of Putah Creek. There are several relatively large, contiguous
25 areas of vernal pools on the western edge of the bypass in this area. The anticipated change in
26 management of flows in the Yolo Bypass includes more frequent releases in flows into the bypass
27 from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in spring
28 months (April and May).

29 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with
30 Alternative 1A water operations would not adversely affect vernal pool complex habitats, as they
31 have persisted under similar high flows and extended flow periods. There is the potential, however,
32 for some change in plant species composition as a result of longer inundation periods.

33 **CEQA Conclusion:** An estimated 0–4 acres of vernal pool complex natural community in the Yolo
34 Bypass would be subjected to more frequent inundation as a result of implementing CM2 under
35 Alternative 1A. This natural community is conditioned to periodic inundation; the slight increase in
36 periodic inundation would not result in a net permanent reduction in the acreage of this community
37 in the study area, although some change in plant species composition could occur. Increasing
38 periodic inundation of vernal pool complex natural community in the Yolo Bypass would have a less-
39 than-significant impact on the community.

1 **Impact BIO-23: Modification of Vernal Pool Complex Natural Community from Ongoing**
 2 **Operation, Maintenance and Management Activities**

3 Once the physical facilities associated with Alternative 1A are constructed and the stream flow
 4 regime associated with changed water management is in effect, there would be new ongoing and
 5 periodic actions associated with operation, maintenance and management of the BDCP facilities and
 6 conservation lands that could affect vernal pool complex natural community in the study area. The
 7 ongoing actions include the diversion of Sacramento River flows in the north Delta, reduced
 8 diversions from south Delta channels, and recreational activities in Plan reserves. These actions are
 9 associated with CM1 and CM11 (see Impact BIO-22 for effects associated with CM2). The periodic
 10 actions would involve access road and conveyance facility repair, vegetation management at the
 11 various water conveyance facilities and habitat restoration sites (CM11), levee repair and
 12 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with
 13 natural community management plans. The potential effects of these actions are described below.

- 14 ● *Modified river flows upstream of and within the study area and reduced diversions from south*
 15 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
 16 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
 17 channels (associated with Operational Scenario A) would not affect vernal pool complex natural
 18 community. This natural community does not exist within or adjacent to the major Sacramento
 19 River system and Delta waterways.
- 20 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
 21 conveyance facilities and levees associated with the BDCP actions have the potential to require
 22 removal of adjacent vegetation and could entail earth and rock work adjacent to vernal pool
 23 complex habitats. This activity could lead to increased soil erosion and runoff entering these
 24 habitats. These activities would be subject to normal erosion and runoff control management
 25 practices, including those developed as part of *AMM2 Construction Best Management Practices*
 26 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or
 27 earthwork adjacent to vernal pool complex habitats would require use of sediment barriers, soil
 28 stabilization and revegetation of disturbed surfaces as part of (*AMM10 Restoration of*
 29 *Temporarily Affected Natural Communities*). Proper implementation of these measures would
 30 avoid permanent adverse effects on this community.
- 31 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical
 32 treatment, would be a periodic activity associated with the long-term maintenance of water
 33 conveyance facilities and restoration sites. Vegetation management is also the principal activity
 34 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to
 35 control nuisance vegetation could pose a long-term hazard to vernal pool complex natural
 36 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of
 37 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or
 38 direct discharge of herbicides to vernal pool complex areas being treated for invasive species
 39 removal. Environmental commitments and *AMM5 Spill Prevention, Containment, and*
 40 *Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and the
 41 environment from use of various chemicals during maintenance activities, including the use of
 42 herbicides. These commitments are described in Appendix 3B, including the commitment to
 43 prepare and implement spill prevention, containment, and countermeasure plans and
 44 stormwater pollution prevention plans. Best management practices, including control of drift
 45 and runoff from treated areas, and use of herbicides approved for use in terrestrial or aquatic

1 environments would also reduce the risk of affecting natural communities adjacent to water
2 conveyance features and levees associated with restoration activities.

- 3 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
4 communities within the Plan Area (CM11). For the vernal pool complex natural community, a
5 management plan would be prepared that specifies actions to improve the value of the habitats
6 for covered species. Actions would include control of invasive nonnative plant and animal
7 species, fire management, restrictions on vector control and application of herbicides, and
8 maintenance of infrastructure that would allow for movement through the community. The
9 enhancement efforts would improve the long-term value of this community for both special-
10 status and common species.

- 11 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to vernal pool
12 complexes in the reserve system. The activities could include wildlife and plant viewing and
13 hiking. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section
14 3.4.11 describes this program and identifies applicable restrictions on recreation that might
15 adversely affect vernal pool habitat. BDCP also includes an avoidance and minimization measure
16 (AMM37) that further dictates limits on recreation activities that might affect vernal pools.
17 Recreational trails would be limited to existing trails and roads. New trail construction would be
18 prohibited within the vernal pool complex reserves. It is expected that most activities would be
19 docent-led tours of reserves, minimizing adverse effects.

20 The various operations and maintenance activities described above could alter acreage of vernal
21 pool complex natural community in the study area. Activities could introduce sediment and
22 herbicides that would reduce the value of this community to common and sensitive plant and
23 wildlife species. Other periodic activities associated with the Plan, including management,
24 protection and enhancement actions associated with *CM3 Natural Communities Protection and
25 Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
26 enhance the value of the community. While some of these activities could result in small changes in
27 acreage, these changes would be greatly offset by restoration activities planned as part of *CM9
28 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by implementation of
29 AMM2, AMM4, AMM5, AMM10, AMM12, AMM30 and AMM37. The management actions associated
30 with control of invasive plant species would also result in a long-term benefit to the species
31 associated with vernal pool complex habitats by eliminating competitive, invasive species of plants.

32 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
33 Alternative 1A would not result in a net permanent reduction in the vernal pool complex natural
34 community within the study area. Therefore, there would be no adverse effect on the community.

35 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A would
36 have the potential to create minor changes in total acreage of vernal pool complex natural
37 community in the study area, and could create temporary increases in sedimentation or damage
38 from recreational activity. The activities could also introduce herbicides periodically to control
39 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4,
40 AMM5, AMM10, AMM12, AMM30 and AMM37 would minimize these impacts, and other operations
41 and maintenance activities, including management, protection and enhancement actions associated
42 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities
43 Enhancement and Management*, would create positive effects, including reduced competition from
44 invasive, nonnative plants in these habitats. Long-term restoration activities associated with *CM9*

1 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and protection actions associated with
2 *CM3 Natural Communities Protection and Restoration* would ensure that the acreage of this natural
3 community would not decrease in the study area. Ongoing operation, maintenance and management
4 activities would not result in a net permanent reduction in this natural community within the study
5 area. Therefore, there would be a less-than-significant impact.

6 **Managed Wetland**

7 The conservation components of Alternative 1A would reduce the acreage of managed wetland
8 currently found in the study area. Initial development and construction of CM1, CM2, CM4, and CM6
9 would result in both permanent and temporary removal of this community (Table 12-1A-9). Full
10 implementation of Alternative 1A would also include the following conservation action over the
11 term of the BDCP to benefit the managed wetland natural community.

- 12 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
13 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3)
- 14 ● Create at least 320 acres of managed wetlands consisting of greater sandhill crane roosting
15 habitat in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in
16 Conservation Zones 3, 4, 5, or 6, with consideration of sea level rise and local seasonal flood
17 events (Objective GSHC1.3, associated with CM10).
- 18 ● Create two wetland complexes within the SLNWR refuge boundary. Each complex would consist
19 of at least three wetlands totaling 90 acres of greater sandhill crane roosting habitat. One of the
20 wetland complexes may be replaced by 180 acres of cultivated lands that are flooded following
21 harvest for crane roosting and foraging habitat (Objective GSHC1.4, associated with CM10).

22 In addition to this conservation action, creation of similar habitat values by restoring tidal brackish
23 emergent wetland and tidal freshwater emergent wetland as part of CM4 would further offset the
24 losses of managed wetland. The net effect would be a substantial decrease in the amount of
25 managed wetlands, but an increase in similar habitat value for special-status and common species as
26 the managed wetland is converted to tidal marsh. Impacts on this natural community would not be
27 adverse for NEPA purposes and would be less than significant for CEQA purposes. Refer to Impacts
28 BIO-178 through BIO-183 in the *Shorebirds and Waterfowl* discussion at the end of this section
29 (Section 12.3.3.2) for further consideration of the effects of removing managed wetland natural
30 community.

1 **Table 12-1A-9. Changes in Managed Wetland Associated with Alternative 1A (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	3	3	83	83	0	0
CM2	24	24	44	44	931–2,612	0
CM4	5,718	12,786	0	0	0	0
CM5	0	0	0	0	0	6
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	5,745	12,813	127	127	931–2,612	6

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

2

3 **Impact BIO-24: Changes in Managed Wetland Natural Community as a Result of Implementing**
4 **BDCP Conservation Measures**

5 Construction, land grading and habitat restoration activities that would accompany the
6 implementation of CM1, CM2, CM4, and CM6 would permanently eliminate an estimated 12,813
7 acres of managed wetland in the study area. This modification represents approximately 18% of the
8 70,798 acres of managed wetland that is mapped in the study area. This loss would occur through
9 the course of the BDCP restoration program, as construction activity and tidal marsh restoration
10 proceeds. Managed wetland protection (8,100 acres) and restoration (500 acres) would take place
11 over the same period, but would not replace the acreage lost. The BDCP beneficial effects analysis
12 for Alternative 4 (BDCP Chapter 5, Section 5.4.9.2) states that at least 8,100 acres of managed
13 wetlands would be protected, of which at least 1,500 acres would be located within the Grizzly
14 Island marsh complex, consistent with the U.S. Fish and Wildlife Service salt marsh harvest mouse
15 recovery plan. Although the primary purpose of the 1,500 acres of protection is to protect and
16 enhance habitat for the salt marsh harvest mouse, it is also expected to benefit the managed wetland
17 natural community and the diversity of species that use it, including migratory waterfowl and the
18 western pond turtle. These same conservation actions would be implemented with Alternative 1A.

19 The individual effects of the relevant conservation measure are addressed below. A summary
20 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
21 conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance
23 facilities would permanently remove 3 acres and temporarily remove 83 acres of managed

1 wetland community. The permanent loss would occur primarily on the southeastern side of
 2 Tyler Island, adjacent to the North Mokelumne River where a permanent access road to a tunnel
 3 shaft site would be constructed. Small permanent losses could also occur where transmission
 4 lines are constructed across Mandeville Island. A barge unloading facility, batch plant and tunnel
 5 work area would create temporary effects on southeastern Tyler Island, but the main temporary
 6 loss would occur immediately west of Stone Lakes National Wildlife Refuge, between Intakes 1
 7 and 2. A large spoil and borrow area is planned at this location (see Terrestrial Biology
 8 Mapbook). These losses would take place during the near-term construction period.

- 9 ● *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
 10 construction activities that could permanently or temporarily remove managed wetland,
 11 including west side channels modifications, Putah Creek realignment activities, Lisbon Weir
 12 modification and Sacramento Weir improvements. All of these activities could involve
 13 excavation and grading in managed wetland areas to improve passage of fish through the
 14 bypasses. Based on hypothetical construction footprints, a total of 24 acres could be
 15 permanently removed and 44 acres could be temporarily removed. This activity would occur
 16 primarily in the near-term timeframe.
- 17 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
 18 footprints, implementation of CM4 would permanently inundate or remove 12,813 acres of
 19 managed wetland community. These losses would be expected to occur primarily in the Suisun
 20 Marsh ROA, but could also occur in the Cache Slough and West Delta ROAs (see Figure 12-1).
 21 These acres of managed wetland would be converted to natural wetland, including large
 22 acreages of tidal brackish emergent wetland and tidal freshwater emergent wetland. These
 23 natural wetlands provide comparable or improved habitat for the special-status species that
 24 occupy managed wetland. The newly created tidal marsh would not create a barrier or result in
 25 fragmentation of managed wetland, as most species are capable of utilizing both communities.
 26 An estimated 500 acres of managed wetland would be restored and 8,100 acres would be
 27 enhanced and protected through *CM3 Natural Communities Protection and Restoration*, as
 28 established by BDCP Objective NWNC1.1. All of the restoration and 4,800 acres of the protection
 29 would happen during the first 10 years of Alternative 1A implementation, which would coincide
 30 with the timeframe of water conveyance facilities construction and early implementation of
 31 CM4. The remaining restoration would be spread over the following 30 years. Managed wetland
 32 restoration is expected to include 500 acres in CZs 3, 4, 5, and 6 to benefit sandhill crane, as
 33 stated in BDCP Objectives GSHC1.3 and GSHC1.4 (Figure 12-1). The enhancement and protection
 34 would be focused in Suisun Marsh, but could also occur in CZs with existing managed wetland
 35 (CZs 1, 2, 4, 5, 6, and 7).
- 36 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
 37 of small amounts of managed wetland habitat along 20 miles of river and sloughs. The extent of
 38 this loss cannot be quantified at this time, but the majority of the enhancement activity would
 39 occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.
 40 Managed wetland adjacent to these tidal areas could be affected. The improvements would
 41 occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers,
 42 and along Steamboat and Sutter Sloughs.

43 The following paragraphs summarize the combined effects discussed above and describe other
 44 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
 45 also included.

1 **Near-Term Timeframe**

2 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would
 3 permanently remove 5,745 acres and temporarily remove 127 acres of managed wetland through
 4 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. Three acres
 5 of the permanent loss and 83 acres of the temporary loss would be associated with construction of
 6 the water conveyance facilities (CM1). These near-term losses would occur in various locations, but
 7 the majority of the near-term loss would occur immediately east of Stone Lakes National Wildlife
 8 Refuge for spoil and borrow activity, and in Suisun Marsh and the lower Yolo Bypass as tidal marsh
 9 is restored.

10 The construction or inundation loss of this special-status natural community would represent an
 11 adverse effect if it were not offset by other conservation actions. Loss of managed wetland natural
 12 community would be considered both a loss in acreage of a sensitive natural community and
 13 potentially a loss of wetland as defined by Section 404 of the CWA. Many managed wetland areas are
 14 interspersed with small natural wetlands that would be regulated under Section 404. The
 15 restoration of 500 acres and protection and enhancement of 4,800 acres of managed wetland as part
 16 of CM3 and CM10 during the first 10 years of Alternative 1A implementation would fully offset the
 17 losses associated with CM1, but would only partially offset the total near-term loss. Typical project-
 18 level mitigation ratios (1:1 for protection) would indicate 86 acres of protection would be needed to
 19 offset the 86 acres of loss associated with CM1; a total of 5,872 acres of protection would be needed
 20 to offset (i.e., mitigate) the 5,872 acres of permanent and temporary loss from all near-term actions.
 21 The combined protection and restoration proposed for managed wetland in the near-term would
 22 fall 572 acres short of full replacement. However, the CM4 marsh restoration activities that would be
 23 creating this loss would be simultaneously creating 2,000 acres of tidal brackish emergent wetland
 24 and 8,850 acres of tidal freshwater emergent wetland in place of the managed wetland in the near-
 25 term. This acreage would significantly exceed the number of acres of managed wetlands lost.
 26 Mitigation measures would also be implemented to reduce the effects of managed wetland loss on
 27 waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the Yolo/Delta basins (Mitigation
 28 Measure 179b) if the protection and enhancement actions of CM3 and CM10 were not sufficient to
 29 replace the value of managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial*
 30 *Biology Effects* discussion later in this section.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*
 34 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting
 35 habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and
 36 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
 37 EIR/EIS.

38 In spite of the managed wetland protection, restoration and avoidance measures contained in
 39 Alternative 1A, there would be a net reduction in the acreage of this special-status natural
 40 community in the near-term. This would be an adverse effect when judged by the significance
 41 criteria listed earlier in this chapter. However, the conversion of these managed habitats to natural
 42 tidal wetland types that support similar ecological functions (2,000 acres of tidal brackish emergent
 43 wetland and 8,850 acres of tidal freshwater emergent wetland) would offset this adverse effect.
 44 Also, there are other conservation actions contained in the BDCP (CM3 and CM11) that would
 45 improve management and enhance existing habitat values, further offsetting the effects of managed

1 wetland loss on covered and noncovered special-status terrestrial species and on common species
2 that rely on this natural community for some life phase. As a result, there would be no adverse
3 effect.

4 ***Late Long-Term Timeframe***

5 At the end of the Plan period, 12,813 acres of managed wetland natural community would be
6 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would
7 be restored. There would be a net permanent reduction in the acreage of this special-status natural
8 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal
9 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this
10 managed wetland.

11 ***NEPA Effects:*** During the near-term timeframe, Alternative 1A would permanently remove 5,745
12 acres and temporarily remove 127 acres of managed wetland through inundation or construction-
13 related losses in habitat from CM1, CM2, and CM4 activities. Through the course of Plan
14 implementation, Alternative 1A would result in a permanent loss of 12,813 acres of managed
15 wetland within the study area; however, it would also protect and enhance 8,100 acres and restore
16 500 acres of this habitat. In addition, Alternative 1A would restore 6,000 acres of tidal brackish
17 emergent wetland and 24,000 acres of tidal freshwater emergent wetland that support similar
18 ecological functions to those of managed wetland. Therefore, there would be no adverse effect on
19 managed wetland natural community.

20 ***CEQA Conclusion:***

21 ***Near-Term Timeframe***

22 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would
23 permanently remove 5,745 acres and temporarily remove 127 acres of managed wetland through
24 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. Eighty-six
25 acres of this loss (including temporary and permanent effects) would be associated with
26 construction of the water conveyance facilities (CM1). These losses would occur in various locations,
27 but the majority of the near-term loss would occur immediately east of Stone Lake National Wildlife
28 Refuge from borrow and spoil activity, and in Suisun Marsh and the lower Yolo Bypass as tidal
29 marsh is restored.

30 The construction or inundation loss of this special-status natural community would represent a
31 significant impact if it were not offset by other conservation actions. Loss of managed wetland
32 natural community would be considered both a loss in acreage of a sensitive natural community and
33 potentially a loss of wetland as defined by Section 404 of the CWA. The restoration of 500 acres and
34 protection and enhancement of 4,800 acres of managed wetland as part of CM3 and CM10 during
35 the first 10 years of Alternative 1A implementation would fully offset the losses associated with
36 CM1, but would only partially offset the total near-term loss. Typical project-level mitigation ratios
37 (1:1 for protection) would indicate 86 acres of protection would be needed to offset the 86 acres of
38 loss associated with CM1; a total of 5,872 acres of protection would be needed to offset (i.e.,
39 mitigate) the 5,872 acres of permanent and temporary loss from all near-term actions. The
40 combined protection and restoration proposed for managed wetland in the near-term would fall
41 572 acres short of full replacement. However, the CM4 marsh restoration activities that would be
42 creating this loss would be simultaneously creating 2,000 acres of tidal brackish emergent wetland
43 and 8,850 acres of tidal freshwater emergent wetland in place of the managed wetland in the near-

1 term. This acreage would significantly exceed the number of acres of managed wetland lost.
2 Mitigation measures would also be implemented to reduce the effects of managed wetland loss on
3 waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the Yolo/Delta basins (Mitigation
4 Measure 179b) if the protection and enhancement actions of CM3 and CM10 were not sufficient to
5 replace the value of managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial*
6 *Biology Effects* discussion later in this section.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*
10 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting
11 habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and
12 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
13 EIR/EIS.

14 In spite of the managed wetland protection, restoration and avoidance measures contained in
15 Alternative 1A, there would be a net reduction in the acreage of this special-status natural
16 community in the near-term. This would be a significant impact when judged by the significance
17 criteria listed earlier in this chapter. However, the conversion of these managed habitats to natural
18 tidal wetland types that support similar ecological functions (2,000 acres of tidal brackish emergent
19 wetland and 8,850 acres of tidal freshwater emergent wetland) would eliminate this significant
20 impact. Also, there are other conservation actions contained in the BDCP (CM3 and CM11) that
21 would improve management and enhance existing habitat values, further offsetting the impacts of
22 managed wetland loss on covered and noncovered special-status terrestrial species and on common
23 species that rely on this natural community for some life phase. As a result, there would be a less-
24 than-significant impact.

25 **Late Long-Term Timeframe**

26 At the end of the Plan period, 12,813 acres of managed wetland natural community would be
27 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would
28 be restored. There would be a net permanent reduction in the acreage of this special-status natural
29 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal
30 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this
31 managed wetland. Because these natural wetlands support similar ecological functions to those of
32 managed wetland, there would be a less-than-significant impact.

33 **Impact BIO-25: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 34 **Managed Wetland Natural Community**

35 Two Alternative 1A conservation measures would modify the inundation/flooding regimes of both
36 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
37 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
38 of managed wetland on wildlife management areas and duck clubs scattered up and down the
39 central and southern bypass. CM5 would expose this community to additional flooding as channel
40 margins are modified and levees are set back to improve fish habitat along some of the major rivers
41 and waterways in the south Delta.

- 42 ● *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1A
43 would result in an increase in the frequency and duration of inundation of 931-2,612 acres of

1 managed wetland natural community. The methods used to estimate these inundation acreages
 2 are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The
 3 area more frequently affected by inundation would vary with the flow volume that would pass
 4 through the newly constructed notch in the Fremont Weir. The 931-acre increase in inundation
 5 would be associated with a notch flow of 8,000 cubic feet per second (cfs), and the 2,612-acre
 6 increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow through
 7 Fremont Weir would be expected in 30% of the years. Based on the theoretical modeling that
 8 has been completed to-date, the largest acreages would be associated with the Sacramento
 9 Bypass Wildlife Area, the Yolo Bypass Wildlife Area, and private managed wetlands south of
 10 Putah Creek. The anticipated change in management of flows in the Yolo Bypass includes more
 11 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some
 12 years, later releases into the bypass in spring months (April and May). With larger flows, the
 13 water depth may also increase over Existing Conditions. While the managed wetlands of the
 14 Yolo Bypass are conditioned to periodic inundation events, the more frequent and extended
 15 inundation periods may make it more difficult to actively manage the areas for maximum food
 16 production for certain species (waterfowl primarily) and may alter the plant assemblages in
 17 some years. The effects of the periodic inundation on birds and other terrestrial species are
 18 discussed later in this chapter. The additional inundation would not be expected to reduce the
 19 acreage of managed wetland on a permanent basis. The extended inundation would be designed
 20 to expand foraging and spawning habitat for Delta fishes.

- 21 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
 22 increase in the frequency, magnitude and duration of inundation of an estimated 6 acres of
 23 managed wetland. Specific locations for this restoration activity have not been identified, but
 24 they would likely be focused in the south Delta area, along the major rivers and Delta channels.
 25 The connection of these wetlands to stream flooding events would be beneficial to the ecological
 26 function of managed wetlands, especially as they relate to BDCP target aquatic species. Foraging
 27 activity and refuge sites would be expanded into areas currently unavailable or infrequently
 28 available to some aquatic species. The more frequent flooding would periodically interfere with
 29 management activities associated with terrestrial species (primarily waterfowl) and may result
 30 in changes in plant composition and management strategies over time.

31 In summary, 937–2618 acres of managed wetland community in the study area would be subjected
 32 to more frequent inundation as a result of implementing two Alternative 1A conservation measures
 33 (CM2 and CM5).

34 **NEPA Effects:** Managed wetland community would not be adversely affected because much of the
 35 acreage affected is conditioned to periodic inundation. The more frequent inundation could create
 36 management problems associated with certain species, especially waterfowl, and result in changes
 37 over time in plant species composition. The total acreage of managed wetland would not be
 38 expected to change permanently as a result of periodic inundation.

39 **CEQA Conclusion:** An estimated 937–2,618 acres of managed wetland community in the study area
 40 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under
 41 Alternative 1A. Managed wetland community would not be significantly impacted because periodic
 42 inundation is already experienced by most of the land that would be affected. There could be
 43 increased management problems and a long-term shift in plant species composition. The periodic
 44 inundation would not be expected to result in a net permanent reduction in the acreage of this

1 community in the study area. Therefore, there would be a less-than-significant impact on the
2 community.

3 **Impact BIO-26: Modification of Managed Wetland Natural Community from Ongoing** 4 **Operation, Maintenance and Management Activities**

5 Once the physical facilities associated with Alternative 1A are constructed and the stream flow
6 regime associated with changed water management is in effect, there would be new ongoing and
7 periodic actions associated with operation, maintenance and management of the BDCP facilities and
8 conservation lands that could affect managed wetland natural community in the study area. The
9 ongoing actions include the diversion of Sacramento River flows in the north Delta, reduced
10 diversions from south Delta channels, and recreational use of reserve areas. These actions are
11 associated with CM1 and CM11 (see the above impact discussion for effects associated with CM2).
12 The periodic actions would involve access road and conveyance facility repair, vegetation
13 management at the various water conveyance facilities and habitat restoration sites (CM11), levee
14 repair and replacement of levee armoring, channel dredging, and habitat enhancement in
15 accordance with natural community management plans. The potential effects of these actions are
16 described below.

- 17 ● *Modified river flows upstream of and within the study area and reduced diversions from south*
18 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
19 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
20 channels (associated with Operational Scenario A) would not result in the reduction in acreage
21 of the managed wetland natural community in the study area. Flow levels in the upstream rivers
22 would not change to the degree that water levels in adjacent managed wetlands would be
23 altered. Similarly, increased diversions of Sacramento River flows in the north Delta would not
24 result in a permanent reduction in the managed wetland community downstream of these
25 diversions. The majority of the managed wetlands below the diversions is not directly connected
26 to the rivers. Reduced diversions from the south Delta channels would not create a reduction in
27 this natural community.
- 28 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
29 conveyance facilities and levees associated with the BDCP actions have the potential to require
30 removal of adjacent vegetation and could entail earth and rock work in managed wetland
31 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering
32 managed wetlands. These activities would be subject to normal erosion, turbidity and runoff
33 control management practices, including those developed as part of *AMM2 Construction Best*
34 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
35 vegetation removal or earthwork adjacent to or within managed wetland habitats would require
36 use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces.
37 Proper implementation of these measures would avoid permanent adverse effects on this
38 community.
- 39 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical
40 treatment, would be a periodic activity associated with the long-term maintenance of water
41 conveyance facilities and restoration sites. Vegetation management is also the principal activity
42 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to
43 control nuisance vegetation could pose a long-term hazard to managed wetland natural
44 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of
45 herbicides, uncontrolled runoff of contaminated stormwater onto the community, or direct

1 discharge of herbicides to managed wetland areas being treated for invasive species removal.
2 Environmental commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan*
3 have been made part of the BDCP to reduce hazards to humans and the environment from use of
4 various chemicals during maintenance activities, including the use of herbicides. These
5 commitments are described in Appendix 3B, including the commitment to prepare and
6 implement spill prevention, containment, and countermeasure plans and stormwater pollution
7 prevention plans. Best management practices, including control of drift and runoff from treated
8 areas, and use of herbicides approved for use in aquatic and terrestrial environments would also
9 reduce the risk of affecting natural communities adjacent to water conveyance features and
10 levees associated with restoration activities.

11 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
12 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
13 The treatment activities would be conducted in concert with the California Department of
14 Boating and Waterways' invasive species removal program. Eliminating large stands of water
15 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
16 by removing cover for nonnative predators, improving water flow and removing barriers to
17 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
18 benefit terrestrial species that use managed wetland natural community for movement
19 corridors and for foraging. Vegetation management effects on individual species are discussed in
20 the species sections on following pages.

- 21 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural
22 communities within the Plan Area (CM11). For the managed wetland natural community, a
23 management plan would be prepared that specifies actions to improve the value of the habitats
24 for covered species. Actions would include control of invasive nonnative plant and animal
25 species, fire management, restrictions on vector control and application of herbicides, and
26 maintenance of infrastructure that would allow for movement through the community. The
27 enhancement efforts would improve the long-term value of this community for both special-
28 status and common species.
- 29 ● *Recreation.* The BDCP would allow hunting, fishing and hiking in managed wetland reserve
30 areas. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section
31 3.4.11) describes this program and identifies applicable restrictions on recreation that might
32 adversely affect managed wetland habitat. BDCP also includes an avoidance and minimization
33 measure (AMM37) that further dictates limits on recreation activities that might affect this
34 natural community. Hunting would be the dominant activity in fall and winter months, while
35 fishing and hiking would be allowed in non-hunting months.

36 The various operations and maintenance activities described above could alter acreage of managed
37 wetland natural community in the study area through facilities maintenance, vegetation
38 management, and recreation. Activities could also introduce sediment and herbicides that would
39 reduce the value of this community to common and sensitive plant and wildlife species. Other
40 periodic activities associated with the Plan, including management, protection and enhancement
41 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
42 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
43 community. While some of these activities could result in small changes in acreage, these changes
44 would be offset by restoration activities planned as part of *CM10 Nontidal Marsh Restoration* and
45 protection and restoration actions associated with *CM3 Natural Communities Protection and*
46 *Restoration*. Recreation activity effects would be minimized by AMM37 (see Appendix 3B,

1 *Environmental Commitments, AMMs, and CMs*). The management actions associated with levee repair
2 and control of invasive plant species would also result in a long-term benefit to the species
3 associated with managed wetland habitats by improving water movement.

4 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
5 Alternative 1A would not result in a net permanent reduction in acreage of managed seasonal
6 wetland natural community within the study area. Therefore, there would be no adverse effect on
7 this natural community.

8 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A would
9 have the potential to create minor changes in total acreage of managed wetland natural community
10 in the study area, and could create temporary increases in turbidity and sedimentation. The
11 activities could also introduce herbicides periodically to control nonnative, invasive plants. Hunting
12 could intermittently reduce the availability of this community to special-status and common wildlife
13 species. Implementation of environmental commitments and AMM2, AMM4, AMM5, and AMM37
14 would minimize these impacts, and other operations and maintenance activities, including
15 management, protection and enhancement actions associated with *CM3 Natural Communities*
16 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
17 create positive effects, including improved water movement in and adjacent to these habitats. Long-
18 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and *CM4 Tidal Natural*
19 *Communities Restoration*, and protection and restoration actions associated with *CM3 Natural*
20 *Communities Protection and Restoration* would greatly expand the ecological functions of this natural
21 community in the study area. Ongoing operation, maintenance and management activities would not
22 result in a net permanent reduction in this sensitive natural community within the study area.
23 Therefore, there would be a less-than-significant impact on the natural community.

24 **Other Natural Seasonal Wetland**

25 The other natural seasonal wetlands natural community encompasses all the remaining natural (not
26 managed) seasonal wetland communities other than vernal pools and alkali seasonal wetlands.
27 These areas mapped by CDFW (Hickson and Keeler-Wolf 2007) and ICF biologists (the western area
28 of additional analysis; see Figure 12-1) consist of seasonally ponded, flooded, or saturated soils
29 dominated by grasses, sedges, or rushes. The largest segments of this community in the study area
30 are located along the Cosumnes River northeast of Thornton, and in the western extension of the
31 study area northwest of Rio Vista. Most of the smaller mapped areas are located in the Suisun Marsh
32 ROA on the western edge of the Montezuma Hills and in the interior of the Potrero Hills. There are
33 also other natural seasonal wetlands mapped along Old River and Middle River in CZ 7 (Figure 12-
34 1). The only Alternative 1A conservation component that would potentially affect this natural
35 community is the seasonally inundated floodplain restoration conservation measure (CM5) (see
36 Table 12-1A-10).

1 **Table 12-1A-10. Changes in Other Natural Seasonal Wetland Associated with Alternative 1A**
2 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0	0
CM4	0	0	0	0	0	0
CM5	0	0	0	0	0	2
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	0	0	0	0	0	2

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

3

4 **Impact BIO-27: Modification of Other Natural Seasonal Wetland Natural Community as a**
5 **Result of Implementing BDCP Conservation Measures**

6 Based on theoretical footprints for this activity, *CM5 Seasonally Inundated Floodplain Restoration*
7 could expose 2 acres of other natural seasonal wetland community to additional flooding as channel
8 margins are modified and levees are set back to improve fish habitat along some of the major rivers
9 and waterways throughout the study area. Specific locations for this restoration activity have not
10 been identified, but they would likely be focused in the south Delta area, along the major rivers and
11 Delta channels, including the channels of Old River and Middle River. Small patches of other natural
12 seasonal wetland natural community are mapped along these waterways. The exposure of these
13 seasonal wetlands to increased but infrequent episodes of stream flooding would not alter their
14 ecological function or species composition. Their value to special-status and common plants and
15 wildlife in the study area would not be affected. The effects of this inundation on wildlife and plant
16 species are described in detail in later sections of this chapter.

17 **NEPA Effects:** Alternative 1A conservation actions would not adversely affect other natural seasonal
18 wetland natural community because the small increase in periodic flooding of up to 2 acres would
19 not alter its function or general species makeup.

20 **CEQA Conclusion:** An estimated 2 acres of other natural seasonal wetland community in the study
21 area would be subjected to more frequent inundation from flood flows as a result of implementing
22 CM5 under Alternative 1A. This community would not be significantly impacted because a small
23 increase in periodic flooding would not alter its ecological function or species composition. The

1 periodic inundation would not result in a net permanent reduction in the acreage of this community
2 in the study area. Therefore, there would be no substantial adverse effect on the community. The
3 impact would be less than significant.

4 **Impact BIO-28: Modification of Other Natural Seasonal Wetland Natural Community from**
5 **Ongoing Operation, Maintenance and Management Activities**

6 Once the physical facilities associated with Alternative 1A are constructed and the stream flow
7 regime associated with changed water management is in effect, there would be new ongoing and
8 periodic actions associated with operation, maintenance and management of the BDCP facilities and
9 conservation lands that could affect other natural seasonal wetland natural community in the study
10 area. The ongoing actions include the diversion of Sacramento River flows in the north Delta, and
11 reduced diversions from south Delta channels. These actions are associated with CM1. The periodic
12 actions would involve access road and conveyance facility repair, vegetation management at the
13 various water conveyance facilities and habitat restoration sites (CM11), levee repair and
14 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with
15 natural community management plans. The potential effects of these actions are described below.

- 16 • *Modified river flows upstream of and within the study area and reduced diversions from south*
17 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
18 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
19 channels (associated with Operational Scenario A) would not affect other natural seasonal
20 wetland natural community. The small areas mapped in the study area are not in or adjacent to
21 streams that would experience changes in water levels as a result of these operations.
- 22 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
23 conveyance facilities and levees associated with the BDCP actions have the potential to require
24 removal of adjacent vegetation and could entail earth and rock work in other natural seasonal
25 wetland habitats. This activity could lead to increased soil erosion and runoff entering these
26 habitats. These activities would be subject to normal erosion and runoff control management
27 practices, including those developed as part of *AMM2 Construction Best Management Practices*
28 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or
29 earthwork adjacent to or within other natural seasonal wetland habitats would require use of
30 sediment barriers, soil stabilization and revegetation of disturbed surfaces (*AMM10 Restoration*
31 *of Temporarily Affected Natural Communities*). Proper implementation of these measures would
32 avoid permanent adverse effects on this community.
- 33 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
34 treatment, would be a periodic activity associated with the long-term maintenance of water
35 conveyance facilities and restoration sites. Vegetation management is also the principal activity
36 associated with *CM11 Natural Communities Enhancement and Restoration*. Use of herbicides to
37 control nuisance vegetation could pose a long-term hazard to the other natural seasonal wetland
38 natural community at or adjacent to treated areas. The hazard could be created by uncontrolled
39 drift of herbicides, uncontrolled runoff of contaminated stormwater onto the natural
40 community, or direct discharge of herbicides to wetland areas being treated for invasive species
41 removal. Environmental commitments and *AMM5 Spill Prevention, Containment, and*
42 *Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and the
43 environment from use of various chemicals during maintenance activities, including the use of
44 herbicides. These commitments are described in Appendix 3B, including the commitment to
45 prepare and implement spill prevention, containment, and countermeasure plans and

1 stormwater pollution prevention plans. Best management practices, including control of drift
2 and runoff from treated areas, and use of herbicides approved for use in terrestrial or aquatic
3 environments would also reduce the risk of affecting natural communities adjacent to water
4 conveyance features and levees associated with restoration activities.

- 5 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
6 communities within the Plan Area (CM11). For the other natural seasonal wetland natural
7 community, a management plan would be prepared that specifies actions to improve the value
8 of the habitats for covered species. Actions would include control of invasive nonnative plant
9 and animal species, fire management, restrictions on vector control and application of
10 herbicides, and maintenance of infrastructure that would allow for movement through the
11 community. The enhancement efforts would improve the long-term value of this community for
12 both special-status and common species.

13 The various operations and maintenance activities described above could alter acreage of other
14 natural seasonal wetland natural community in the study area. Activities could introduce sediment
15 and herbicides that would reduce the value of this community to common and sensitive plant and
16 wildlife species. Other periodic activities associated with the Plan, including management,
17 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
18 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
19 enhance the value of the community. While some of these activities could result in small changes in
20 acreage, these changes would be minor when compared with the restoration activities planned as
21 part of *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by
22 implementation of AMM2, AMM4, AMM5, and AMM10. The vernal pool complex conservation
23 measure includes restoration of 139 acres of seasonal wetlands with similar ecological values as the
24 other natural seasonal wetland community. The management actions associated with control of
25 invasive plant species would also result in a long-term benefit to the species associated with other
26 natural seasonal wetland habitats by eliminating competitive, invasive species of plants.

27 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
28 Alternative 1A would not result in a net permanent reduction in this natural community within the
29 study area. Therefore, there would be no adverse effect on the community.

30 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A would
31 have the potential to create minor changes in total acreage of other natural seasonal wetland natural
32 community in the study area, and could create temporary increases in sedimentation. The activities
33 could also introduce herbicides periodically to control nonnative, invasive plants. Implementation of
34 environmental commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts,
35 and other operations and maintenance activities, including management, protection and
36 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
37 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
38 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration
39 activities associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and
40 protection actions associated with *CM3 Natural Communities Protection and Restoration* would
41 ensure that the ecological values provided by this small natural community would not decrease in
42 the study area. Ongoing operation, maintenance and management activities would not result in a net
43 permanent reduction in this natural community within the study area. Therefore, there would be a
44 less-than-significant impact.

1 **Grassland**

2 Construction, operation, maintenance and management associated with the conservation
3 components of Alternative 1A would have no long-term adverse effects on the habitats associated
4 with the grassland natural community. Initial development and construction of CM1, CM2, CM4,
5 CM5, CM6, CM7, CM11 and CM18 would result in both permanent and temporary removal of this
6 community (see Table 12-1A-11). Full implementation of Alternative 1A would also include the
7 following conservation actions over the term of the BDCP to benefit the grassland natural
8 community.

- 9 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in Conservation
10 Zone 1, at least 1,000 acres protected in Conservation Zone 8, and at least 2,000 acres protected
11 in Conservation Zone 11 (Objective GNC1.1, associated with CM3)
- 12 ● Restore at least 2,000 acres of grasslands to connect fragmented patches of protected grassland
13 and to provide upland habitat adjacent to riparian, tidal, and nontidal natural communities for
14 wildlife foraging and upland refugia (Objective GNC1.2, associated with CM3 and CM8)
- 15 ● Of the at least 8,000 acres of grassland protected and at least 2,000 acres of grassland restored,
16 protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide
17 at least 200 feet of adjacent grasslands beyond the sea level rise accommodation (Objective
18 GNC1.4, associated with CM3 and CM8)

19 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
20 3.3 that would improve the value of grassland natural community for terrestrial species. As
21 explained below, with the protection, restoration and enhancement of the amounts of habitat listed
22 in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural community
23 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-11. Changes in Grassland Natural Community Associated with Alternative 1A (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	315	315	262	262	0	0
CM2	388	388	239	239	385-1,277	0
CM4	448	1,122	0	0	0	0
CM5	0	51	0	34	0	514
CM6	Unk.	Unk.	Unk.	Unk.	0	0
CM7	4	410	0	0	0	0
CM11	13	50	0	0	0	0
CM18	35	35	0	0	0	0
TOTAL IMPACTS	1,203	2,371	501	535	385-1,277	514

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

2

3 **Impact BIO-29: Changes in Grassland Natural Community as a Result of Implementing BDCP**
4 **Conservation Measures**

5 Construction, land grading and habitat restoration activities that would accompany the
6 implementation of CM1, CM2, CM4, CM5, CM6, CM7, CM11 and CM18 would permanently eliminate
7 an estimated 2,371 acres and temporarily remove 535 acres of grassland natural community in the
8 study area. These modifications represent approximately 4% of the 78,047 acres of the community
9 that is mapped in the study area. Approximately 60% of the permanent and temporary losses would
10 occur during the first 10 years of Alternative 1A implementation, as water conveyance facilities are
11 constructed and habitat restoration is initiated. Grassland protection (2,000 acres), restoration
12 (1,140 acres) and enhancement would be initiated during the same period. By the end of the Plan
13 period, 2,000 acres of this natural community would be restored and 8,000 acres would be
14 protected. The BDCP beneficial effects analysis for grassland (BDCP Chapter 5, Section 5.4.11.2)
15 indicates that at least 8,000 acres of grasslands would be protected in Conservation Zones 1, 2, 4, 5,
16 7, 8, and 11, and 2,000 acres of grassland would be restored. Grassland protection and restoration
17 would improve connectivity among habitat areas in and adjacent to the Plan Area, improve genetic
18 interchange among native species' populations, and contribute to the long-term conservation of
19 grassland-associated covered species. These same conservation activities would occur through
20 implementation of Alternative 1A.

1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1A water conveyance
5 facilities would permanently remove 315 acres and temporarily remove 262 acres of grassland
6 natural community. Most of the permanent loss would occur where Intakes 1–5 encroach on the
7 Sacramento River’s east bank between Freeport and Courtland, at various locations along the
8 north-south transmission line corridor, and at the southern forebay adjacent to Clifton Court
9 Forebay. The ruderal and herbaceous grassland areas along the Sacramento River are very
10 narrow bands adjacent to the road and the levee that borders the river (see Terrestrial Biology
11 Mapbook). The grassland lost at the southern forebay and the adjacent spoils storage area is
12 composed of larger stands of ruderal and herbaceous vegetation and California annual
13 grassland. A smaller acreage of permanent loss would occur at an RTM storage site on Andrus
14 Island, and at the northern forebay just west of Stone Lake. The temporary losses would be
15 associated with construction of the pump stations along the Sacramento River, pipelines
16 connecting the intakes with the northern forebay, and work associated with barge offloading
17 facility construction. The temporary pipeline construction losses would be located in the vicinity
18 of Hood and along Snodgrass Slough. The temporary barge unloading facility impacts would
19 occur along Middle River at Bacon Island, and along North Victoria Canal between Woodward
20 and Victoria Islands. These losses would take place during the near-term construction period.
- 21 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
22 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
23 stilling basin improvements, Putah Creek realignment activities, Toe Drain/Tule Canal and
24 Lisbon Weir modification and Sacramento Weir improvements. All of these activities could
25 involve excavation and grading in grassland areas to improve passage of fish through the
26 bypasses. Based on hypothetical construction footprints, a total of 388 acres could be
27 permanently lost and another 239 acres could be temporarily removed. Most of the grassland
28 losses would occur at the north end of the bypass below Fremont Weir where a large expanse of
29 grassland is present, along the Toe Drain/Tule Canal, and along the west side channels. These
30 grasslands are composed primarily of upland annual grassland and forbs. Some of this grassland
31 removal along the side channels of the bypass could pose barriers to grassland species moving
32 within the bypass. These losses would occur primarily in the near-term timeframe.
- 33 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
34 footprints, implementation of CM4 would permanently inundate or remove 448 acres of
35 grassland in the near-term and inundate or remove 1,122 acres of grassland by the end of the
36 Plan timeframe. The losses would occur in a number of ROAs established for tidal restoration
37 (see Figure 12-1). The largest losses would likely occur in the vicinity of Cache Slough, on
38 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
39 bands adjacent to waterways in the South Delta ROA. Most of this grassland is ruderal and
40 herbaceous vegetation with low habitat value; some of the larger patches of grassland in the
41 Cache Slough ROA are annual grassland with higher values.
- 42 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
43 would permanently remove 51 acres and temporarily remove 34 acres of grassland natural
44 community. The construction-related losses would be considered a permanent removal of the
45 habitats directly affected. These losses would be expected to occur along the San Joaquin River
46 and other major waterways in CZ 7 (see Figure 12-1). The grassland in this area is primarily

1 composed of narrow bands and small patches of ruderal herbaceous grasses and forbs. This
2 activity is scheduled to start following construction of water conveyance facilities, which is
3 expected to take 10 years.

- 4 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
5 removal of small amounts of grassland natural community along 20 miles of river and sloughs.
6 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
7 activity would occur along waterway margins where grassland habitat stringers exist, including
8 along levees and channel banks. The improvements would occur within the study area on
9 sections of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter
10 Sloughs.
- 11 ● *CM7 Riparian Natural Community Restoration*; Riparian natural community restoration would
12 occur in a variety of settings in the Plan Area, with an emphasis on improving connectivity of
13 existing riparian areas and stream/river corridors, to benefit the movement and interchange of
14 special-status and common species that use these areas. Large tracts would be restored in
15 concert with floodplain restoration (CM5), while narrower bands would be developed as part of
16 channel margin enhancement (CM6) and tidal marsh restoration (CM4). In the process of
17 expanding woody riparian habitat, existing nonnative grassland would be removed. While
18 specific locations for these restoration activities have not been fully developed, use of
19 theoretical footprints for this activity indicate that up to 410 acres of grassland could be lost
20 through the course of Alternative 1A implementation. A majority of this activity would occur in
21 the South Delta and Cosumnes/Mokelumne ROAs (see Figure 12-1).
- 22 ● *CM8 Grassland Natural Community Restoration*: The grassland natural community would be
23 restored primarily on the fringes of the Delta, where upland areas merge with Delta wetland and
24 agricultural lands. Restoration would focus on CZs 1, 8, and 11, as proposed by BDCP Objective
25 GNC1.1 (Figure 12-1), with a goal of improving habitat connectivity and increasing the diversity
26 of grassland species (Objective GNC1.2). Some of the planned 2,000 acres of restoration would
27 occur around existing populations of giant garter snake in the east Delta and the Yolo Bypass
28 area.
- 29 ● *CM11 Natural Communities Enhancement and Management*: Natural communities enhancement
30 and management would include a wide range of activities designed to improve habitat
31 conditions in restored and protected lands associated with the BDCP. This measure also
32 promotes sound use of pesticides, vector control activities, invasive species control and fire
33 management in preserve areas. To improve the public's ability to participate in recreational
34 activities in and adjacent to restored and protected habitats, a system of trails is proposed. The
35 location and extent of this system are not yet known, so the analysis of this activity is
36 programmatic. At the current level of planning, it is assumed that the trail system would be
37 located entirely in grassland habitats and would include up to 50 acres of habitat loss.
- 38 ● *CM18. Conservation Hatcheries*: The BDCP includes a proposal to design and construct a
39 conservation hatchery to maintain populations of delta smelt and longfin smelt. The location of
40 this facility is not yet firmly established, but for planning purposes it has been assumed that it
41 would be constructed in the vicinity of Rio Vista and would be located in grassland habitat. The
42 grassland in the Rio Vista area includes both California annual grassland and ruderal herbaceous
43 grasses and forbs. The current estimate of the land needed for this facility is 35 acres.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
3 also included.

4 ***Near-Term Timeframe***

5 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1A would
6 affect the grassland natural community through CM1 construction losses (315 acres permanent and
7 262 acres temporary), CM2 construction losses (388 acres permanent and 239 acres temporary),
8 CM11 recreational trail construction (13 acres permanent), CM18 fish hatchery construction (35
9 acres permanent), and CM7 riparian habitat restoration (4 acres permanent). These losses would
10 occur primarily along the eastern bank of the Sacramento River at intake sites, along pipeline routes
11 connecting these intakes to the northern forebay, at various locations along the north-south
12 transmission line corridor, at the southern forebay, at currently unspecified sites for hatchery and
13 recreational trail construction and riparian restoration, in the northern Yolo Bypass, and along the
14 east and west channels within the Yolo Bypass. Approximately 488 acres of the inundation and
15 construction-related losses in habitat from CM4 would occur in the near-term. These losses would
16 occur throughout the ROAs mapped in Figure 12-1.

17 The construction losses of this natural community would not represent an adverse effect based on
18 the significance criteria used for this chapter because grassland is not considered a special-status or
19 sensitive natural community. Most Central Valley grasslands are dominated by nonnative annual
20 grasses and herbs. However, the importance of grassland as a habitat that supports life stages of
21 numerous special-status plants and wildlife is well documented (see BDCP Chapter 3, *Conservation*
22 *Strategy*). The significance of losses in grassland habitat is, therefore, discussed in more detail in
23 species analyses later in this chapter. The combination of restoring 1,140 acres (CM8) and
24 protecting 2,000 acres (CM3) of grassland natural community during the first 10 years of
25 Alternative 1A implementation, and the commitment to restore temporarily affected grassland (501
26 acres) to its pre-project condition within 1 year of completing construction as required by *AMM10*
27 *Restoration of Temporarily Affected Natural Communities*, would offset this near-term loss, avoiding
28 any loss in the value of this habitat for special-status species. The restoration of grassland would
29 include protection in perpetuity, and the protected and restored habitat would be managed and
30 enhanced to benefit special-status and common wildlife species (CM3 and CM11). Typical project-
31 level mitigation ratios (2:1 for protection) would indicate that 3,408 acres of protection would be
32 needed to offset (i.e., mitigate) the 1,704 acres of combined temporary and permanent loss. The
33 combination of restoration and protection, along with the enhancement and management associated
34 with CM3 and CM11 and the restoration of temporarily affected habitat (AMM10) contained in the
35 BDCP is designed to avoid a temporal lag in the value of grassland habitat available to sensitive
36 species.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
38 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
39 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
40 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
41 disposal sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which
42 are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 Implementation of Alternative 1A as a whole would result in less than 4% losses of grassland
 3 natural community in the study area. These losses (2,371 acres of permanent and 535 acres of
 4 temporary loss) would be largely associated with construction of the water conveyance facilities
 5 (CM1), construction of Yolo Bypass fish improvements (CM2), inundation during tidal marsh
 6 restoration (CM4), and riparian habitat restoration (CM7). Inundation losses would occur through
 7 the course of BDCP restoration activities at various tidal restoration sites throughout the study area.

8 **NEPA Effects:** By the end of the Plan timeframe, a total of 2,000 acres of this natural community
 9 would be restored (CM8) and 8,000 acres would be protected (CM3). The restoration would occur
 10 primarily in CZ 1, CZ 8, and CZ 11, in the Cache Slough, Suisun Marsh and Clifton Court Forebay
 11 areas. Temporarily affected grassland would also be restored following construction activity. The
 12 2,000 acres of restoration associated with CM8, and the restoration of temporarily affected
 13 grassland required by AMM10 (535 acres for Alternative 1A) would not totally replace the grassland
 14 acres lost through the Plan timeframe (2,856 acres). There would be a permanent loss of 321 acres
 15 of grassland in the study area. However, the combination of restoration, protection and
 16 enhancement of grassland associated with Alternative 1A would improve the habitat value of this
 17 community in the study area; there would not be an adverse effect on the grassland natural
 18 community.

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Alternative 1A would result in the loss of approximately 1,704 acres of grassland natural community
 22 due to construction of the water conveyance facilities (CM1), fish passage improvements (CM2),
 23 inundation during tidal marsh restoration (CM4), recreational trail construction (CM11), riparian
 24 habitat restoration (CM7), and fish hatchery construction (CM18). This total includes both
 25 permanent and temporary near-term losses listed in Table 12-1A-11. The construction losses would
 26 occur primarily along the Sacramento River at intake sites, along pipeline routes connecting these
 27 intakes to the northern forebay, at the southern forebay, at currently unspecified sites for hatchery
 28 and recreational trail construction and riparian restoration, and within the northern section of the
 29 Yolo Bypass, while inundation losses would occur at various tidal restoration sites throughout the
 30 study area. The construction losses would be spread across a 10-year near-term timeframe.

31 The construction losses of this natural community would not represent a significant impact based
 32 on the significance criteria used for this chapter because grassland is not considered a special-status
 33 or sensitive natural community. Nonetheless, these losses would be offset by planned restoration of
 34 1,140 acres, and protection of 2,000 acres of grassland natural community scheduled for the first 10
 35 years of Alternative 1A implementation, and the restoration of temporarily affected grassland (501
 36 acres for Alternative 1A) as dictated by AMM10. Also, AMM1, AMM2, AMM6, and AMM7 would be
 37 implemented to minimize impacts. Because of these offsetting near-term restoration and protection
 38 activities and AMMs, impacts would be less than significant. Typical project-level mitigation ratios
 39 (2:1 for protection) would indicate that 3,408 acres of protection would be needed to offset (i.e.,
 40 mitigate) the 1,704 acres of loss. The combination of two approaches (protection and restoration)
 41 contained in the BDCP conservation measures and avoidance and minimization measures are
 42 designed to avoid a temporal lag in the value of grassland habitat available to special-status species.
 43 The protection and restoration would be initiated at the beginning of Alternative 1A implementation
 44 to minimize any time lag in the availability of this habitat to special-status species.

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, 2,906 acres of grassland natural community would be permanently or
3 temporarily removed by conservation actions, 2,000 acres would be restored and 8,000 acres would
4 be protected. Temporarily affected areas would also be restored (535 acres for Alternative 1A).
5 While there would be a net permanent reduction in the acreage of this natural community within
6 the study area (total loss of 321 acres), there would be an increase in the value of grassland for
7 special-status and common species in the study area through the combination of conservation
8 actions (CM3 and CM8) and avoidance and minimization measures (AMM1, AMM2, AMM6, AMM7,
9 and AMM10). Therefore, Alternative 1A would have a less-than-significant impact on this natural
10 community.

11 **Impact BIO-30: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
12 **Grassland Natural Community**

13 Two Alternative 1A conservation measures would modify the inundation/flooding regimes of both
14 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
15 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
16 of grassland natural community at scattered locations, while CM5 would expose this community to
17 additional flooding as channel margins are modified and levees are set back to improve fish habitat
18 along some of the major rivers and waterways of the study area.

- 19 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1A
20 would result in an increase in the frequency, magnitude and duration of inundation of 385–
21 1,277 acres of grassland natural community. The methods used to estimate this inundation
22 acreage are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*.
23 The area more frequently affected by inundation would vary with the flow volume that would
24 pass through the newly constructed notch in the Fremont Weir. The 385-acre increase in
25 inundation would occur at the 1,000 cfs flow regime, while the 1,277-acre increase would occur
26 at the 4,000 cfs flow regime. Plan-related increases in flow through Fremont Weir would be
27 expected in 30% of the years. The grassland community occurs throughout the bypass, including
28 a large acreage just below Fremont Weir in the north end of the bypass, in stringers along the
29 internal waterways of the bypass and in larger patches in the lower bypass. The anticipated
30 change in management of flows in the Yolo Bypass includes more frequent releases in flows into
31 the bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the
32 bypass in spring months (April and May). The modification of periodic inundation events would
33 not adversely affect grassland habitats, as they have persisted under similar high flows and
34 extended inundation periods. There is the potential for some change in grass species
35 composition as a result of longer inundation periods. The effects of this inundation on wildlife
36 and plant species are described in detail in later sections of this chapter.
- 37 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
38 increase in the frequency and duration of inundation of 514 acres of grassland habitats. Specific
39 locations for this restoration activity have not been identified, but they would likely be focused
40 in the south Delta area, along the major rivers and Delta channels in CZ 7 (see Figure 12-1). The
41 increase in periodic stream flooding events would not adversely affect the habitat values and
42 functions of grassland natural community.

1 In summary, 899–1,791 acres of grassland natural community in the study area would be subjected
2 to more frequent inundation as a result of implementing two Alternative 1A conservation measures
3 (CM2 and CM5).

4 **NEPA Effects:** The grassland community in the Yolo Bypass and along river floodplains in the south
5 Delta are conditioned to periodic inundation; therefore, periodic inundation would not result in a
6 net permanent reduction in the acreage of this community in the study area. Increasing periodic
7 inundation of grassland natural community in the Yolo Bypass and along south Delta waterways
8 would not constitute an adverse effect.

9 **CEQA Conclusion:** An estimated 899–1,791 acres of grassland natural community in the study area
10 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under
11 Alternative 1A. The grassland natural community is conditioned to periodic inundation; therefore,
12 periodic inundation would not result in a net permanent reduction in the acreage of this community
13 in the study area. Increasing periodic inundation of grassland natural community in the Yolo Bypass
14 and along south Delta waterways would have a less-than-significant impact on the community.

15 **Impact BIO-31: Modification of Grassland Natural Community from Ongoing Operation,** 16 **Maintenance and Management Activities**

17 Once the physical facilities associated with Alternative 1A are constructed and the stream flow
18 regime associated with changed water management is in effect, there would be new ongoing and
19 periodic actions associated with operation, maintenance and management of the BDCP facilities and
20 conservation lands that could affect grassland natural community in the study area. The ongoing
21 actions include changes in releases from upstream reservoirs, the diversion of Sacramento River
22 flows in the north Delta, and reduced diversions from south Delta channels. These actions are
23 associated with CM1 (see Impact BIO-30 for effects associated with CM2). The periodic actions
24 would involve access road and conveyance facility repair, vegetation management at the various
25 water conveyance facilities and habitat restoration sites (CM11), levee repair and replacement of
26 levee armoring, channel dredging, and habitat enhancement in accordance with natural community
27 management plans. The potential effects of these actions are described below.

- 28 • *Modified river flows upstream of and within the study area and reduced diversions from south*
29 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
30 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
31 channels (associated with Operational Scenario A) would not result in the permanent reduction
32 in acreage of grassland natural community in the study area. Flow levels in the upstream rivers
33 would not change such that the acreage of this community would be reduced on a permanent
34 basis. The grassland along rivers upstream of planned north Delta diversions is primarily
35 ruderal vegetation on levee banks and is dependent on winter and spring rains for germination
36 and growth rather than on river levels. Similarly, increased diversions of Sacramento River
37 flows in the north Delta would not result in a permanent reduction in grassland natural
38 community downstream of these diversions. The reductions in flows below the intakes would
39 occur primarily in the wet months when the existing nonnative annual grasslands along river
40 levees are dormant, and like upstream grassland, this community is dependent on winter and
41 spring rains for germination and growth in the winter and spring months, not on river stage.
42 Anticipated small changes in river salinity in the west Delta and Suisun Marsh would not create
43 a substantial change in grassland acreage in these areas. Reduced diversions from the south
44 Delta channels would not create a reduction in this natural community.

- 1 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
2 conveyance facilities and levees associated with the BDCP actions have the potential to require
3 removal of adjacent vegetation and could entail earth and rock work in grassland habitats. This
4 activity could lead to increased soil erosion and runoff entering these habitats. These activities
5 would be subject to normal erosion and runoff control management practices, including those
6 developed as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4*
7 *Erosion and Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within
8 grassland habitats would require use of sediment barriers, soil stabilization and revegetation of
9 disturbed surfaces (*AMM10 Restoration of Temporarily Affected Natural Communities*). Proper
10 implementation of these measures would avoid permanent adverse effects on this community.
- 11 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
12 treatment, would be a periodic activity associated with the long-term maintenance of water
13 conveyance facilities and restoration sites. Vegetation management is also the principal activity
14 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to
15 control nuisance vegetation could pose a long-term hazard to grassland natural community at or
16 adjacent to treated areas. The hazard could be created by uncontrolled drift of herbicides,
17 uncontrolled runoff of contaminated stormwater onto the natural community, or direct
18 discharge of herbicides to grassland areas being treated for invasive species removal.
19 Environmental commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan*
20 have been made part of the BDCP to reduce hazards to humans and the environment from use of
21 various chemicals during maintenance activities, including the use of herbicides. These
22 commitments are described in Appendix 3B, including the commitment to prepare and
23 implement spill prevention, containment, and countermeasure plans and stormwater pollution
24 prevention plans. Best management practices, including control of drift and runoff from treated
25 areas, and use of herbicides approved for use in terrestrial environments would also reduce the
26 risk of affecting natural communities adjacent to water conveyance features and levees
27 associated with restoration activities.
- 28 • *Channel dredging.* Long-term operation of the Alternative 1A intakes on the Sacramento River
29 would include periodic dredging of sediments that might accumulate in front of intake screens.
30 The dredging could occur adjacent to grassland natural community. This activity should not
31 permanently reduce the acreage of grassland natural community because it is periodic in
32 nature; the grassland in the vicinity of the proposed intakes is ruderal grasses and herbs with
33 low habitat value.
- 34 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
35 communities within the Plan Area (CM11). For the grassland natural community, a management
36 plan would be prepared that specifies actions to improve the value of the habitats for covered
37 species. Actions would include control of invasive nonnative plant and animal species, fire
38 management, restrictions on vector control and application of herbicides, and maintenance of
39 infrastructure that would allow for movement through the community. The enhancement efforts
40 would improve the long-term value of this community for both special-status and common
41 species.

42 The various operations and maintenance activities described above could alter acreage of grassland
43 natural community in the study area through changes in flow patterns and changes in periodic
44 inundation of this community. Activities could also introduce sediment and herbicides that would
45 reduce the value of this community to common and sensitive plant and wildlife species. Other
46 periodic activities associated with the Plan, including management, protection and enhancement

1 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
2 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
3 community. While some of these activities could result in small changes in acreage, these changes
4 would be greatly offset by restoration activities planned as part of *CM8 Grassland Natural*
5 *Community Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, and AMM10. The
6 management actions associated with levee repair, periodic dredging and control of invasive plant
7 species would also result in a long-term benefit to the species associated with grassland habitats by
8 improving water movement in adjacent waterways and by eliminating competitive, invasive species
9 of plants.

10 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
11 Alternative 1A would not result in a net permanent reduction in grassland natural community
12 within the study area. Therefore, there would be no adverse effect on this natural community.

13 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1A would
14 have the potential to create minor changes in total acreage of grassland natural community in the
15 study area, and could create temporary increases sedimentation. The activities could also introduce
16 herbicides periodically to control nonnative, invasive plants. Implementation of environmental
17 commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts, and other
18 operations and maintenance activities, including management, protection and enhancement actions
19 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
20 *Communities Enhancement and Management*, would create positive effects, including reduced
21 competition from invasive, nonnative plants in these habitats. Long-term restoration activities
22 associated with *CM8 Grassland Natural Community Restoration* and protection actions associated
23 with *CM3 Natural Communities Protection and Restoration* would increase the value of this natural
24 community in the study area. Ongoing operation, maintenance and management activities would not
25 result in a net permanent reduction in this natural community within the study area. Therefore,
26 there would be a less-than-significant impact.

27 **Inland Dune Scrub**

28 The inland dune scrub natural community is composed of vegetated, stabilized sand dunes
29 associated with river and estuarine systems. In the study area, the inland dune scrub community
30 includes approximately 20 acres of remnants of low-lying ancient stabilized dunes related to the
31 Antioch Dunes formation located near the town of Antioch (CZ 10; see Figure 12-1). While this
32 community is within the BDCP Plan Area, none of the Alternative 1A conservation measures or
33 covered actions are expected to affect it.

34 **Cultivated Lands**

35 Cultivated lands is the major land-cover type in the study area (487,106 acres; see Table 12-1). The
36 Delta, the Yolo Bypass, and the Cache Slough drainage are dominated by various types of agricultural
37 activities, with crop production the dominant element (see Figure 12-1). Major crops and cover
38 types in agricultural production include grain and hay crops (wheat, oats and barley), field crops
39 (corn, beans and safflower), truck crops (tomatoes, asparagus and melons), pasture (alfalfa, native
40 and nonnative pasture), rice, orchards, and vineyards. Tables 12-2 and 12-3 list special-status plant
41 and wildlife species supported by cultivated lands.

1 The effects of Alternative 1A on cultivated lands are discussed from various perspectives in this
 2 document. Chapter 14, *Agricultural Resources*, includes a detailed analysis of cropland conversion as
 3 it relates to agricultural productivity. Many of the discussions of individual terrestrial plant and
 4 wildlife species later in this chapter also focus on the relevance of cultivated land loss. Because
 5 cultivated lands is not a natural community and because the effects of its loss are captured in the
 6 individual species analyses below, there is no separate analysis of this land cover type presented
 7 here. Table 14-8 in Chapter 14 provides a comparison of important farmland losses that would
 8 result from construction of CM1 water conveyance facilities for each alternative, and Table 14A-1 in
 9 Appendix 14A, *Individual Crop Effects as a Result of BDCP Water Conveyance Facility Construction*,
 10 provides a similar comparison for losses of individual crops. Table 12-ES-1 in this chapter's
 11 Summary of Effects identifies the total cultivated land loss for all project alternatives. For
 12 Alternative 1A, the total loss (temporary and permanent) is estimated to be 58,369 acres. The
 13 majority of the permanent loss would be associated with habitat restoration activities, including
 14 Yolo Bypass fisheries enhancement (CM2; 629 acres), tidal marsh restoration (CM4; 39,565 acres),
 15 floodplain restoration (CM5; 2,087 acres), riparian natural community restoration (CM7; 960 acres),
 16 grassland restoration (CM8; 2,000 acres) and nontidal marsh restoration (CM10; 1,950 acres).
 17 Construction of the tunnel and associated water conveyance facilities (CM1) would permanently
 18 remove 3,836 acres of cultivated land.

19 **Developed Lands**

20 Additional lands in the study area that were not designated with a natural community type have
 21 been characterized here as developed lands (90,660 acres). Developed lands include lands with
 22 residential, industrial, and urban land uses, as well as landscaped areas, riprap, road surfaces and
 23 other transportation facilities. Developed lands support some common plant and wildlife species,
 24 whose abundance and species richness vary with the intensity of development. One special-status
 25 species, the giant garter snake, is closely associated with a small element of developed lands;
 26 specifically, embankments and levees near water that are covered with riprap. As with cultivated
 27 lands, no effort has been made to analyze the effects of BDCP covered actions on this land cover
 28 type. It is not a natural community. The effects of its conversion are discussed in Chapter 13, *Land*
 29 *Use*. Where the loss of developed lands may affect individual special-status species or common
 30 species, the impact analysis is contained in that species discussion.

31 **Wildlife Species**

32 **Vernal Pool Crustaceans**

33 This section describes the effects of Alternative 1A, including water conveyance facilities
 34 construction and implementation of other conservation components, on vernal pool crustaceans
 35 (California linderiella, Conservancy fairy shrimp, longhorn fairy shrimp, midvalley fairy shrimp,
 36 vernal pool fairy shrimp, and vernal pool tadpole shrimp). The habitat model used to assess effects
 37 for the vernal pool crustaceans consists of: vernal pool complex, which consists of vernal pools and
 38 uplands that display characteristic vernal pool and swale visual signatures that have not been
 39 significantly affected by agricultural or development practices; alkali seasonal wetlands in CZ 8; and
 40 degraded vernal pool complex, which consists of low-value ephemeral habitat ranging from areas
 41 with vernal pool and swale visual signatures that display clear evidence of significant disturbance
 42 due to plowing, disking, or leveling to areas with clearly artificial basins such as shallow agricultural
 43 ditches, depressions in fallow fields, and areas of compacted soils in pastures. For the purpose of the
 44 effects analysis, vernal pool complex is categorized as high-value for vernal pool crustaceans and

1 degraded vernal pool complex is categorized as low-value for these species. Alkali seasonal wetlands
2 in CZ 8 were included in the model as high-value habitat for vernal pool crustaceans. Also included
3 as low-value habitat for vernal pool crustaceans are areas along the eastern boundary of CZ 11 that
4 are mapped as vernal pool complex because they flood seasonally and support typical vernal pool
5 plants. These areas do not include topographic depressions that are characteristic of vernal pool
6 crustacean habitat and, thus, are considered to have a lower value for the species.

7 Construction and restoration associated with Alternative 1A conservation measures would result in
8 permanent losses (see Table 12-1A-12) and indirect conversions of vernal pool crustacean modeled
9 habitat. The majority of the losses would take place over an extended period of time as tidal marsh is
10 restored in the Plan Area. Full implementation of Alternative 1A would also include the following
11 conservation actions over the term of the BDCP to benefit vernal pool crustaceans (BDCP Chapter 3,
12 *Conservation Strategy*).

- 13 • Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool
14 recovery areas (Objective VPNC1.1, associated with CM3).
- 15 • Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool
16 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective
17 VPNC1.2, associated with CM9).
- 18 • Increase size and connectivity of protected vernal pool complexes in plan area and increase
19 connectivity with complexes outside the Plan Area (Objective VPNC1.3)
- 20 • Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective
21 VPNC1.4)
- 22 • Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for
23 supporting and sustaining vernal pool species (Objective VPNC2.1)
- 24 • Protect one currently unprotected occurrence of conservancy fairy shrimp (Objective VPC1.1)

25 As explained below, with the restoration or protection of these amounts of habitat, in addition to
26 AMMs to minimize potential effects, impacts on vernal pool crustaceans would not be adverse for
27 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-12. Changes in Vernal Pool Crustacean Modeled Habitat Associated with Alternative**
2 **1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	1	1	0	0	NA	NA
	Low-value	2	2	0	0	NA	NA
Total Impacts CM1		3	3	0	0	NA	NA
CM2-CM18	High-value	0	0	0	0	0-4	0
	Low-value	201	372	0	0	0	0
Total Impacts CM2-CM18		201	372	0	0	0-4	0
TOTAL IMPACTS		204	375	0	0	0-4	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-32: Loss or Conversion of Habitat for and Direct Mortality of Vernal Pool**
5 **Crustaceans**

6 Alternative 1A conservation measures would result in the direct, permanent loss of up to 375 acres
7 of modeled vernal pool crustacean habitat from conveyance facilities construction (CM1) and tidal
8 restoration (CM4). In addition, the conservation measures could result in the indirect conversion
9 due to hydrologic changes of an additional 142 acres of vernal pool crustacean habitat (91 acres of
10 high-value habitat and 51 acres of low-value habitat) from conveyance facilities construction (CM1)
11 and based on the hypothetical footprints for tidal restoration (CM4). Construction of the water
12 conveyance facilities and restoration activities may result in the modification of hardpan and
13 changes to the perched water table, which could lead to alterations in the rate, extent, and duration
14 of inundation of nearby vernal pool crustacean habitat. USFWS typically considers construction
15 within 250 feet of vernal pool crustacean habitat to constitute a possible conversion of crustacean
16 habitat unless more detailed information is provided to further refine the limits of any such effects.
17 For the purposes of this analysis, the 250-foot buffer was applied to the water conveyance facilities
18 work areas where surface and subsurface disturbance activities would take place and to restoration
19 hypothetical footprints. Habitat enhancement and management activities (CM11), which include
20 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.

1 Alternative 1A would also result in impacts on critical habitat for Conservancy fairy shrimp (248
2 acres), vernal pool fairy shrimp (270 acres), and vernal pool tadpole shrimp (270 acres). The
3 hypothetical tidal restoration (CM4) footprints in CZ 11 account for all of the effects on critical
4 habitat for these species. *AMM12 Vernal Pool Crustaceans* would ensure that there would be no
5 adverse modification of the primary constituent elements of critical habitat for these species.

6 Because the estimates of habitat loss resulting from tidal inundation are based on projections of
7 where restoration may occur, actual effects are expected to be lower because sites will be selected
8 and restoration projects designed to minimize or avoid effects on the covered vernal pool
9 crustaceans. As specified in the *AMM12 Vernal Pool Crustaceans* and *CM9 Vernal Pool and Alkali*
10 *Seasonal Wetland Complex Restoration*, the BDCP Implementation Office would ensure that tidal
11 restoration projects and other covered activities will be designed such that no more than a total of
12 10 wetted acres of vernal pool crustacean habitat are permanently lost. AMM12 would also ensure
13 that no more than 20 wetted acres of vernal pool crustacean habitat are indirectly affected by
14 alterations to hydrology resulting from adjacent BDCP covered activities, in particular tidal
15 restoration. The term *wetted acres* refers to an area that would be defined by the three parameter
16 wetland delineation method used by the U.S. Army Corps of Engineers to determine the limits of a
17 wetland, which includes an evaluation of wetland soil, vegetation, and hydrology characteristics.
18 This acreage differs from vernal pool complex acreages in that a vernal pool complex is comprised of
19 individual wetlands (vernal pools) and those upland areas that are in between and surrounding
20 them, which provide the supporting hydrology (surface runoff and groundwater input), organic and
21 nutrient inputs, and refuge for the terrestrial phase of some vernal pool species.

22 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the
23 individual conservation measure discussions.

- 24 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
25 result in the permanent loss of 3 acres of vernal pool crustacean habitat, composed of 1 acre of
26 high-value and 2 acres of low-value habitat (Table 12-1A-12). In addition, conveyance facility
27 construction could result in the indirect conversion of 8 acres of modeled vernal pool crustacean
28 habitat in the vicinity of Clifton Court Forebay. The affected area consists of 2 acres of high-value
29 and 6 acres low-value habitat. There are no records of listed vernal pool crustaceans at these
30 locations but there are records for vernal pool fairy shrimp and midvalley fairy shrimp in the
31 vicinity of these areas (California Department of Fish and Wildlife 2013).
- 32 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
33 in the permanent loss of approximately 372 acres of low-value vernal pool crustacean habitat,
34 which consists of degraded vernal pool complex. The BDCP describes degraded vernal pool
35 complex as areas of low-value ephemeral habitat ranging from areas with vernal pool and swale
36 visual signatures that display clear evidence of significant disturbance due to plowing, disking,
37 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions
38 in fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or
39 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery
40 found that these habitats appear to generally have low densities. However, areas mapped as
41 degraded vernal pool complex may still provide habitat for vernal pool crustaceans as evidenced
42 by records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella
43 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Wildlife
44 2013). Helm (1998) notes that many vernal pool crustaceans can occur in degraded vernal pool
45 habitats and artificial habitats. In CZs 2 and 4, there are several records of covered vernal pool

1 crustaceans occurring outside of modeled habitat in areas that appear to be road side ditches. So
2 though degraded vernal pool complexes may not represent botanically diverse vernal pools they
3 still can provide habitat for vernal pool crustaceans and thus the loss of 372 acres of degraded
4 vernal pool complex may result in the loss of occupied vernal pool crustacean habitat. In
5 addition, tidal restoration could result in the indirect conversion of 135 acres of vernal pool
6 crustacean habitat, which consist of 90 acres of high-value and 45 acres of low-value habitat.
7 The hypothetical restoration footprints overlap with a CNDDDB record for vernal pool fairy
8 shrimp near the current edge of Suisun Marsh. Tidal natural community restoration under
9 Alternative 1A would also result in impacts on critical habitat for Conservancy fairy shrimp (248
10 acres), vernal pool tadpole shrimp (270 acres), and vernal pool fairy shrimp (270 acres). *AMM12*
11 *Vernal Pool Crustaceans* would ensure that there would be no adverse modification of the
12 primary constituent elements of critical habitat for these species.

- 13 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,
14 restoration and creation of vernal pools to achieve no net loss and the protection of 600 acres of
15 vernal pool complex would benefit vernal pool crustaceans (Table 12-1A-12). A variety of
16 habitat management actions included in CM11 that are designed to enhance wildlife values in
17 BDCP-protected habitats may result in localized ground disturbances that could temporarily
18 affect vernal pool crustacean habitat. Ground-disturbing activities, such as removal of nonnative
19 vegetation and road and other infrastructure maintenance, are expected to have minor effects
20 on vernal pool crustacean habitat and are expected to result in overall improvements to and
21 maintenance of vernal pool crustacean habitat values over the term of the BDCP. Human
22 presence for recreation activities could result in the injury, mortality of, and/or degradation of
23 habitat for vernal pool crustaceans through trampling pool edges, increased turbidity,
24 unauthorized collection, and introduction of trash. These effects cannot be quantified, but are
25 expected to be minimal and would be avoided and minimized by the AMMs listed below.

26 The following paragraphs summarize the combined effects discussed above and describe other
27 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
28 also included. Table 12-1A-13 was prepared to further analyze Alternative 1A effects on vernal pool
29 crustaceans using wetted acres of vernal pools in order to compare the effects of this alternative
30 with the effect limits established in BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*,
31 which are measured in wetted acres of vernal pools. Wetted acres were estimated by using the
32 BDCP's assumption that restored vernal pool complexes would have a 15% density of vernal pools
33 (i.e., of 100 acres of vernal pool complex 15 acres would constitute vernal pools and the remaining
34 85 acres supporting uplands). Based on an informal evaluation of aerial photographs of the Plan
35 Area it is likely that the actual densities within the Plan Area are approximately 10%, but the 15%
36 density value was chosen as a conservative estimate for determining effects.

1 **Table 12-1A-13. Estimated Effects on Wetted Vernal Pool Crustacean Habitat under Alternative 1A**
2 **(acres)**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit ^a		5	10	10	20
Alternative 1A Impact ^b	CM1	0.5	0.5	1.2	1.2
	CM4 ^c	30.2	55.8	11.0	20.3
Total		30.7	56.3	12.2	21.5

^a Because roughly half of the impacts occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

^b These acreages were generated by assuming that the modeled habitat identified in Table 12-1A-12 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.

^c These impacts are based on the hypothetical restoration footprints and will likely be lower based on the BDCP's commitment to minimize and avoid effects on vernal pool crustacean habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term values would be.

3

4 ***Near-Term Timeframe***

5 Because the water conveyance facility construction (CM1) is being evaluated at the project level, the
6 near-term BDCP conservation strategy has been evaluated to determine whether it would provide
7 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
8 effects of such conveyance facility construction would not be adverse under NEPA and would be less
9 than significant under CEQA. Table 12-1A-12 above lists the impacts on modeled vernal pool
10 crustacean habitat that is based on the natural community mapping done within the study area. The
11 impacts from tidal natural communities restoration (CM4) are based on hypothetical footprints and
12 do not reflect actual impacts on vernal pool crustacean habitat considering the BDCP's commitment
13 to design restoration projects to minimize or avoid effects on covered vernal pool crustaceans. As
14 seen in Table 12-1A-13, the effects of CM1 alone would be well within the near-term limits. As seen
15 in Table 12-1A-13, Alternative 1A would not meet the Plan's near-term biological goals and
16 objectives for direct loss and indirect conversion unless near-term tidal restoration projects are
17 designed to ensure that they do not exceed these impact limits.

18 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
19 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are
20 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.5
21 wetted acre of vernal pool crustacean habitat (or 3 acres of complex using the 15% density) should
22 be restored and 3.4 acres (or 23 acres of complex) protected to mitigate the CM1 direct and indirect
23 effects on vernal pool crustacean habitat. Assuming that the BDCP would apply the impact limits
24 presented in Table 12-1A-13, impacts on wetted vernal pool crustacean habitat resulting from tidal
25 restoration in the near-term could not exceed 4.5 wetted acres direct and 8.8 wetted acres indirect.
26 The impacts based on the hypothetical tidal restoration footprints would exceed these limits. When
27 and if these limits are met, the BDCP would need to restore up to 5 wetted acres (33 acres of
28 complex) and protect up to 30 wetted acres (200 acres of complex) in the near-term to offset the
29 effects of CM1 and CM4.

1 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
2 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
3 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
4 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
5 restoration would be determined during implementation based on the following criteria.

- 6 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to
7 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly
8 affected (1:1 ratio).
- 9 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
10 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
11 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

12 The species-specific biological goals and objectives would also inform the near-term protection and
13 restoration efforts. These Plan goals represent performance standards for considering the
14 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
15 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean
16 habitat.

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
18 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
20 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
21 *Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM37 Recreation*. All of these AMMs
22 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
23 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
24 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

25 ***Late Long-Term Timeframe***

26 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
27 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
28 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-1A-13, the effects of CM1 alone
29 would be well within the near-term limits but overall Alternative 1A would not meet the Plan's late
30 long-term biological goals and objectives for direct and indirect effects unless tidal restoration
31 projects are designed to ensure that that they do not exceed these impact limits.

32 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in
33 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
34 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
35 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
36 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection
37 and restoration would be achieved using the criteria presented above as well as by following these
38 other specific biological goals and objectives.

- 39 • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 40 • Protecting the range of inundation characteristics that are currently represented by vernal pool
41 throughout the Plan Area (Objective VPNC1.4)

- 1 • Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective
2 VPC1.1)

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
4 and protection actions discussed above, as well as the restoration and protection of alkali seasonal
5 wetlands that could overlap with the species model, could result in the restoration of 51 acres and
6 the protection of 608 acres of modeled habitat for vernal pool crustaceans.

7 **NEPA Effects:** The near-term loss of vernal pool crustacean habitat under Alternative 1A would not
8 be adverse because the BDCP has committed to avoiding and minimizing effects from tidal
9 restoration and to restoring and protecting an acreage that meets or exceeds the typical mitigation
10 ratios described above. In the absence of other conservation actions, the modification of vernal pool
11 crustacean habitat and potential mortality of special-status species resulting from Alternative 1A in
12 the late long-term would represent an adverse effect. However, the BDCP has committed to impact
13 limits for vernal pool crustacean habitat and to habitat protection, restoration, management, and
14 enhancement associated with CM3, CM9, and CM11. This habitat protection, restoration,
15 management and enhancement would be guided by species-specific goals and objectives and by
16 AMM1-AMM6, AMM10, AMM12, and AMM37, which would be in place throughout the time period
17 of construction. Considering these commitments, losses and conversion of vernal pool crustacean
18 habitat under Alternative 1A would not be an adverse effect.

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Because the water conveyance facility construction (CM1) is being evaluated at the project level, the
22 near-term Alternative 1A conservation strategy has been evaluated to determine whether it would
23 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
24 the impacts of construction would be less than significant. Table 12-1A-12 above lists the impacts on
25 modeled vernal pool crustacean habitat that is based on the natural community mapping done
26 within the study area. The impacts from tidal natural communities restoration (CM4) are based on
27 hypothetical footprints and do not reflect actual impacts on vernal pool crustacean habitat
28 considering the BDCP's commitment to design restoration projects to minimize or avoid effects on
29 covered vernal pool crustaceans. As seen in Table 12-1A-13, the effects of CM1 alone would be well
30 within the near-term limits. As seen in Table 12-1A-13, Alternative 1A would not meet the Plan's
31 near-term biological goals and objectives for direct and indirect effects unless near-term tidal
32 restoration projects are designed to ensure that they do not exceed these impact limits.

33 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
34 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are
35 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.5
36 wetted acre of vernal pool crustacean habitat (or 3 acres of vernal pool complex using the 15%
37 density) should be restored and 3.4 acres (or 23 acres of vernal pool complex) protected to mitigate
38 the CM1 direct and indirect effects on vernal pool crustacean habitat. Assuming that the BDCP would
39 apply the impact limits presented in Table 12-1A-13, impacts on wetted vernal pools resulting from
40 tidal restoration in the near-term could not exceed 4.5 wetted acres direct and 8.8 wetted acres
41 indirect. The impacts based on the hypothetical tidal restoration footprints would exceed these
42 limits. When and if these limits are met, the BDCP would need to restore up to 5 wetted acres (33
43 acres of vernal pool complex) and protect up to 30 wetted acres (200 acres of vernal pool complex)
44 in the near-term to offset the effects of CM1 and CM4.

1 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
2 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
3 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
4 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
5 restoration will be determined during implementation based on the following criteria.

- 6 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to
7 impacts, then 1.0 wetted acre of vernal pools will be restored for each wetted acre directly
8 affected (1:1 ratio).
- 9 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
10 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
11 acres of vernal pools will be restored for each wetted acre directly affected (1.5:1 ratio).

12 The species-specific biological goals and objectives would also inform the near-term protection and
13 restoration efforts. These Plan goals represent performance standards for considering the
14 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
15 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean
16 habitat.

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
18 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
20 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
21 *Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM37 Recreation*. All of these AMMs
22 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
23 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
24 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

25 The natural community restoration and protection activities are expected to be concluded in the
26 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts on
27 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with
28 the AMMs and biological goals and objectives, are more than sufficient to support the conclusion
29 that the near-term effects of Alternative 1A would be less than significant under CEQA.

30 **Late Long-Term Timeframe**

31 Based on modeled habitat, the study area supports approximately 11,040 acres of vernal pool. The
32 BDCP states that covered activities would not result in more than 10 wetted acres of direct loss and
33 no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-term
34 (see Objective VPNC1.2 and AMM12). As seen in Table 12-1A-13, the effects of CM1 alone would be
35 well within the near-term limits but overall Alternative 1A would not meet the Plan's late long-term
36 biological goals and objectives for direct and indirect effects unless tidal restoration projects are
37 designed to ensure that they do not exceed these impact limits.

38 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in
39 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
40 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
41 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
42 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection

1 and restoration would be achieved using the criteria presented above as well as by following these
2 other specific biological goals and objectives.

- 3 • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3).
- 4 • Protecting the range of inundation characteristics that are currently represented by vernal pool
5 throughout the Plan Area (Objective VPNC1.4).
- 6 • Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective
7 VPC1.1).

8 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
9 and protection actions discussed above, as well as the restoration and protection of alkali seasonal
10 wetlands that could overlap with the species model, could result in the restoration of 51 acres and
11 the protection of 608 acres of modeled habitat for vernal pool crustaceans.

12 In the absence of other conservation actions, the effects on vernal pool crustacean habitat from
13 Alternative 1A would represent an adverse effect as a result of habitat modification of a special-
14 status species and potential for direct mortality. However, the BDCP has committed to impact limits
15 for vernal pool crustacean habitat and to the habitat protection, restoration, management, and
16 enhancement associated with CM3, CM9, and CM11. These conservation activities would be guided
17 by species-specific goals and objectives, and by AMM1–AMM6, AMM10, AMM12, and AMM37, which
18 would be in place throughout the time period of construction. Considering these commitments,
19 Alternative 1A over the term of the BDCP would not result in a substantial adverse effect through
20 habitat modifications and would not substantially reduce the number or restrict the range of vernal
21 pool crustaceans. Therefore, Alternative 1A would have a less-than-significant impact on vernal pool
22 crustaceans.

23 **Impact BIO-33: Indirect Effects of Plan Implementation on Vernal Pool Crustaceans**

24 Construction and maintenance activities associated with water conveyance facilities, and restoration
25 actions could indirectly affect vernal pool crustaceans and their habitat in the vicinity of
26 construction and restoration areas, and maintenance activities. These potential effects would be
27 minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would be in effect
28 throughout the Plan's construction phase.

29 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly
30 affect vernal pool crustaceans and their habitat in the vicinity of construction areas. Ground-
31 disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment could
32 result in the inadvertent release of sediment and hazardous substances into this habitat. These
33 potential effects would be avoided and minimized through AMM1–AMM6, which would be in effect
34 throughout the Plan's construction phase. Vernal pool crustaceans and their habitat could be
35 periodically indirectly affected by maintenance activities at water conveyance facilities.

36 Embankment maintenance activities around Clifton Court Forebay could result in the inadvertent
37 discharge of sediments and hazardous materials into vernal pool crustacean habitat that occurs
38 along the southern and western boundaries of the forebays. These potential effects would be
39 avoided and minimized through AMM1–AMM6, which would be in effect throughout the term of the
40 Plan. The indirect effects of Alternative 1A implementation would not be adverse

41 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance
42 facilities, and restoration actions could indirectly impact vernal pool crustaceans and their habitat in

1 the vicinity of construction and restoration areas, and maintenance activities. These potential
2 impacts would be minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would
3 be in effect throughout the Plan’s construction phase. The indirect impacts of Alternative 1A would
4 be less than significant.

5 **Impact BIO-34: Periodic Effects of Inundation of Vernal Pool Crustacean Habitat as a Result of**
6 **Implementation of Conservation Components**

7 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect 0
8 to 4 acres of modeled vernal pool crustacean habitat (Table 12-1A-12). There would be no periodic
9 effects from *CM5 Seasonally Inundated Floodplain Restoration*

10 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the
11 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,
12 periodic inundation could affect vernal pool crustaceans occupying areas ranging from 0 acres of
13 habitat during most notch flows, to an estimated 4 acres during a notch flow of 6,000 cubic feet per
14 second. BDCP-associated inundation of areas that would not otherwise have been inundated is
15 expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop
16 the remaining 70% of all years, and during those years notch operations will not typically affect the
17 maximum extent of inundation. In more than half of all years under Existing Conditions, an area
18 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass
19 flooding is expected to have a minimal effect on vernal pool crustaceans and would thus not be
20 adverse under NEPA.

21 **CEQA Conclusion:** Alternative 1A would periodically inundate a maximum of 4 acres of vernal pool
22 crustacean habitat during the maximum flows over the Fremont Weir. The periodic inundation is
23 not anticipated to result in a conversion of vernal pool crustacean habitat into different wetland
24 habitat. BDCP-associated inundation of areas that would not otherwise have been inundated is
25 expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop
26 the remaining 70% of all years, and during those years notch operations will not typically affect the
27 maximum extent of inundation. In more than half of all years under Existing Conditions, an area
28 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass
29 flooding is expected to have a minimal effect on vernal pool crustaceans and would thus result in
30 less-than-significant impacts on the species.

31 **Valley Elderberry Longhorn Beetle**

32 This section describes the effects of Alternative 1A, including water conveyance facilities
33 construction and implementation of other conservation measures, on the valley elderberry longhorn
34 beetle. That habitat model used to assess the effects for valley elderberry longhorn beetle is based
35 on riparian habitat and nonriparian habitat (vernal pool complexes and grasslands within 200 feet
36 of channels). Construction and restoration associated with Alternative 1A conservation measures
37 would result in both temporary and permanent losses of valley elderberry longhorn beetle modeled
38 habitat as indicated in Table 12-1A-14. The majority of the losses would take place over an extended
39 period of time as the restoration conservation measures are being implemented. In addition, an
40 estimated 21 elderberry shrubs could be impacted by Alternative 1A conveyance alignment (CM1).
41 Full implementation of Alternative 1A would also include the following conservation actions over
42 the term of the BDCP to benefit valley elderberry longhorn beetle (BDCP Chapter 3, *Conservation*
43 *Strategy*).

- 1 • Mitigate impacts on elderberry shrubs consistent with USFWS conservation guidelines for the
- 2 species (Objective VELB1.1).
- 3 • Site elderberry longhorn beetle habitat restoration adjacent to occupied habitat (Objective
- 4 VELB1.2).
- 5 • Restore 5,000 acres of valley/foothill riparian (Objective VFRNC1.1, associated with CM7).
- 6 • Protect 750 acres of valley/foothill riparian (Objective VFRNC1.2, associated with CM3).
- 7 • Maintain or increase the abundance and distribution of rare or uncommon vegetation alliances,
- 8 such as *Sambuca nigra* (blue elderberry stands) alliance (Objective VFRNC3.1, associated with
- 9 CM7 and CM11).

10 As explained below, with the restoration or protection of these amounts of habitat, impacts on valley
 11 elderberry longhorn beetle would not be adverse for NEPA purposes and would be less than
 12 significant for CEQA purposes.

13 **Table 12-1A-14. Changes in Valley Elderberry Longhorn Beetle Modeled Habitat Associated with**
 14 **Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	58	58	28	28	NA	NA
	Non-riparian	192	192	73	73	NA	NA
Total Impacts CM1		250	250	101	101		
CM2–CM18	Riparian	381	678	76	111	44–80	266
	Non-riparian	142	311	94	108	103–244	287
Total Impacts CM2–CM18		523	989	170	219	161–325	553
TOTAL IMPACTS		773	1,240	271	320	161–325	553

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

15

16 **Impact BIO-35: Loss of Valley Elderberry Longhorn Beetle Habitat**

17 Alternative 1A conservation measures would result in the permanent and temporary loss combined
 18 of up to 1,560 acres of modeled valley elderberry longhorn beetle habitat (875 acres of riparian
 19 habitat and 685 acres of nonriparian habitat), and an estimated 21 elderberry shrubs from CM1,
 20 which represent potential habitat for the species (Table 12-1A-14). Due to the limitation of the
 21 habitat suitability model, all of these effects are assumed to be a large overestimate of the true effect

1 on potential valley elderberry longhorn beetle habitat. Conservation measures that would result in
 2 these losses are conveyance facilities and transmission line construction, and establishment and use
 3 of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat
 4 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management
 5 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could
 6 result in local adverse habitat effects. In addition, maintenance activities associated with the long-
 7 term operation of the water conveyance facilities and other BDCP physical facilities could degrade
 8 or eliminate valley elderberry longhorn beetle habitat. Timely implementation of the near-term
 9 habitat protection and restoration contained in the Plan and implementation of AMMs committed to
 10 in the Plan would result in no adverse effects under NEPA and less-than-significant impacts under
 11 CEQA. Each of these activities is described below.

- 12 ● *CM1 Water Facilities and Operation:* Construction of Alternative 1A conveyance facilities would
 13 result in the permanent and temporary combined loss of approximately 351 acres of modeled
 14 valley elderberry longhorn beetle habitat, composed of 86 acres of riparian habitat and 265
 15 acres of nonriparian habitat (Table 12-1A-14). In addition, an estimated 21 shrubs could be
 16 potentially removed as a result of conveyance facility construction. The exact number of shrubs
 17 to be impacted will be determined during pre-construction surveys of the footprints of the
 18 conveyance facility and associated work areas. Most of these impacts are associated with the
 19 intake and forebay construction in the north delta. There are no records of valley elderberry
 20 longhorn beetle within these impact areas. The portion of the above impacts that result from
 21 temporary habitat loss includes 101 acres of modeled valley elderberry longhorn beetle habitat
 22 (28 acres riparian and 73 acres nonriparian habitat). Elderberry shrubs could be affected from
 23 ground-disturbing activities associated with conveyance construction footprints, temporary
 24 access roads, and staging areas.
- 25 ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries
 26 improvements in the Yolo Bypass would result in the permanent and temporary removal of
 27 approximately 295 acres of modeled valley elderberry longhorn beetle habitat, composed of 159
 28 acres of riparian habitat and 135 acres of nonriparian habitat. Approximately 125 acres of
 29 permanent impacts (83 acres of riparian and 41 acres of nonriparian) would mostly occur at the
 30 north end of the Yolo Bypass from Fremont Weir improvements. The 224 acres of temporary
 31 impacts (76 acres of riparian and 94 acres of nonriparian) would mostly be from work on the
 32 Fremont Weir, the Sacramento Weir, and levees along the Bypass. Elderberry shrubs could be
 33 affected from ground-disturbing activities associated with the re-contouring of surface
 34 topography, excavation or modification of channels, levee modification, and removal of riprap
 35 and other protections from channel banks.
- 36 ● *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration would result
 37 in the permanent loss of approximately 813 acres of modeled valley elderberry longhorn beetle
 38 habitat, composed of 552 acres of riparian and 260 acres of nonriparian habitat. The majority of
 39 these impacts would be associated with tidal restoration in the Delta and only 42 acres of these
 40 impacts (all nonriparian) would be from tidal restoration in Suisun Marsh. Elderberry shrubs
 41 could be affected from ground-disturbing activities associated with the re-contouring of surface
 42 topography, excavation or modification of channels, type conversion from riparian and
 43 grasslands to tidal habitat, levee removal and modification, and removal of riprap and other
 44 protections from channel banks.

- 1 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
2 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
3 approximately 101 acres of valley elderberry longhorn beetle habitat, composed of 78 acres of
4 riparian and 23 acres of nonriparian. Approximately half of these impacts (52 acres) would be
5 permanent impacts from levee construction and the other half (49 acres) would be temporary
6 impacts associated with the levee construction. There is one record of valley elderberry
7 longhorn beetle occurring in CZ 7 just west of Middle River on Union Island. This record and
8 other elderberry shrubs could be affected from ground-disturbing activities associated with the
9 re-contouring of surface topography, excavation or modification of channels, levee removal and
10 modification, and removal of riprap and other protections from channel banks.
- 11 • *CM11 Natural Communities Enhancement and Management*: Activities associated with natural
12 communities enhancement and management, such as grazing practices and ground disturbance
13 or herbicide use in the control of nonnative vegetation, intended to maintain and improve
14 habitat functions of BDCP protected habitats for covered species could result in loss of
15 elderberry shrubs and the potential for injury or mortality to beetles. These effects cannot be
16 quantified, but are expected to be minimal and would be avoided and minimized by the AMMs
17 discussed below.
- 18 • *Operations and maintenance*: Post construction operation and maintenance of the above-ground
19 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
20 disturbances that could affect valley elderberry beetle. Maintenance activities would include
21 vegetation management, levee and structure repair, and re-grading of roads and permanent
22 work areas could potentially affect elderberry shrubs occupied by the species. These effects,
23 however, would be reduced by AMMs described below.

24 The following paragraphs summarize the combined effects discussed above and describe other
25 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
26 also included.

27 ***Near-Term Timeframe***

28 Because the water conveyance facility construction (CM1) is being evaluated at the project level, the
29 near-term BDCP conservation strategy has been evaluated to determine whether it would provide
30 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
31 effects of construction would not be adverse under NEPA and would be less than significant under
32 CEQA. Alternative 1A would result in permanent and temporary impacts on 1,044 acres of modeled
33 habitat (543 acres of riparian and 501 acres of nonriparian) for valley elderberry longhorn beetle in
34 the study area in the near-term. These effects would result from the construction of the water
35 conveyance facilities (CM1, 86 acres of riparian and 265 acres of nonriparian), and implementing
36 other conservation measures (Yolo Bypass fisheries improvements [CM2] and tidal restoration
37 [CM4], 693 acres of modeled habitat). The other conservation measures account for 457 of the 521
38 acres (88%) of impacts on riparian habitat. Based on limited DWR survey data of the Conveyance
39 Planning Area (see Appendix 12C), an estimated 21 elderberry shrubs would be impacted in the
40 near-term by CM1 (see Section 12.3.2.3 for a discussion on the methods used to make this estimate).

41 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
42 CM1 and that are identified as habitat for valley elderberry longhorn beetle in Chapter 3 of the BDCP
43 would be 1:1 for restoration and 1:1 for protection for riparian habitat. Using these typical ratios
44 would indicate that 86 acres of the riparian habitat should be restored/created and 86 acres of

1 existing riparian should be protected to mitigate the CM1 losses of valley elderberry longhorn beetle
 2 habitat. The near-term effects of other conservation actions would require 457 acres of riparian
 3 restoration and 457 acres of riparian protection using the same typical NEPA and CEQA ratios (1:1
 4 for restoration and 1:1 for protection).

5 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800
 6 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same
 7 timeframe as the construction and early restoration losses, thereby minimizing adverse effects on
 8 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB 1.1 and 1.2, which call for
 9 implementing the USFWS (U.S. Fish and Wildlife Service 1999a) conservation guidelines for valley
 10 elderberry longhorn beetle (transplanting elderberry shrubs and planting elderberry seedlings and
 11 associated natives) and siting elderberry restoration within drainages immediately adjacent to or in
 12 the vicinity of sites confirmed to be occupied by valley elderberry longhorn beetle. These objectives
 13 would be met through the implementation of CM7 *Riparian Natural Community Restoration*. CM7
 14 *Riparian Natural Community Restoration* specifically calls for the planting of elderberry shrubs in in
 15 large, contiguous clusters with a mosaic of associated natives as part of riparian restoration
 16 consistent with USFWS conservation guidelines (U.S. Fish and Wildlife Service 1999a). These Plan
 17 goals represent performance standards for considering the effectiveness of restoration actions. The
 18 acres of protection and restoration contained in the near-term Plan goals and the additional species
 19 specific measures within CM7 satisfy the typical mitigation that would be applied to the project-level
 20 effects of CM1, as well as mitigating the near-term effects of the other conservation measures.

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 22 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 23 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
 24 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM15 Valley Elderberry Longhorn*
 25 *Beetle*. AMM15 requires surveys for elderberry shrubs within 100 feet of any ground disturbing
 26 activities and the implementation avoidance and minimize measures for any shrubs that are
 27 identified within this 100-foot buffer, and transplanting shrubs that can't be avoided. All of these
 28 AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to
 29 work areas and RTM storage sites. BDCP Appendix 3.C describes the AMMs, which have since been
 30 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
 31 the Final EIR/EIS.

32 ***Late Long-Term Timeframe***

33 Based on modeled habitat, the study area supports approximately 34,456 acres of modeled habitat
 34 (17,786 acres of riparian and 16,670 acres of nonriparian) for valley elderberry longhorn beetle.
 35 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 1,560
 36 acres of modeled valley elderberry longhorn beetle habitat (875 acres of riparian habitat and 685
 37 acres of nonriparian habitat) during the term of the Plan (5% of the modeled habitat in the study
 38 area). The locations of these losses are described above in the analyses of individual conservation
 39 measures. These loses would not fragment any known populations of valley elderberry longhorn
 40 beetle. The Plan includes a commitment to protect 750 acres of riparian habitat (VRFNC1.2) and
 41 restoring/creating 5,000 acres of riparian habitat in the Plan Area (VFRNC1.1). According to
 42 Objective VELB1.2, the restoration of elderberry longhorn beetle habitat would occur adjacent to
 43 occupied habitat, which would provide connectivity between occupied and restored habitats and
 44 improve the species' ability to disperse within and outside the Plan Area. Other factors relevant to
 45 effects on valley elderberry longhorn beetle are listed below.

- 1 ● Habitat loss is widely dispersed throughout the study area and will not be concentrated in any
2 one location.
- 3 ● There would be a temporal loss of riparian habitat during the near-term evaluation period
4 because most of the affected riparian vegetation would be removed during the near-term
5 timeframe, while large quantities of riparian habitat would not be restored until the early and
6 late long-term timeframes. Effects on valley elderberry longhorn beetle of this temporal loss of
7 riparian vegetation are expected to be minimal because much of the riparian habitat in the Plan
8 Area is not known to be currently occupied by the species, because all elderberry shrubs that
9 are suitable for transplantation will be moved to conservation areas in the Plan Area, and
10 because most of the affected community is composed of small patches of riparian scrub and
11 herbaceous vegetation that are fragmented and distributed across the agricultural landscape of
12 the Plan Area and thus are likely to provide no or low-value habitat for the beetle.
- 13 ● Temporarily disturbed areas would be restored within 1 year following completion of
14 construction and management activities. Under AMM10, a restoration and monitoring plan
15 would be developed prior to initiating any construction-related activities associated with the
16 conservation measures or other covered activities that would result in temporary effects on
17 natural communities.

18 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
19 and protection actions discussed above, as well as other actions that overlap with the nonriparian
20 portions of the species model, could result in the restoration of 4,857 acres (riparian) and the
21 protection of 2,363 acres (729 acres of riparian and 1,634 acres of nonriparian channels and
22 grassland) of modeled habitat for valley elderberry longhorn beetle.

23 **NEPA Effects:** The near-term loss of valley elderberry longhorn beetle habitat under Alternative 1A
24 would not be an adverse effect because the BDCP has committed to restoring and protecting an
25 acreage that exceeds the typical mitigation ratios described above in addition to avoiding impacts on
26 shrubs and transplanting those that can't be avoided. In the absence of other conservation actions,
27 the losses of valley elderberry longhorn beetle habitat and potential for direct mortality of special-
28 status species associated with Alternative 1A in the late long-term would represent an adverse
29 effect. However, with habitat protection and restoration associated with CM7, guided by species-
30 specific goals and objectives and by AMM1-AMM6, AMM10, and AMM15, which would be in place
31 during all project activities, the effects of Alternative 1A as a whole on valley elderberry longhorn
32 beetle would not be adverse under NEPA.

33 **CEQA Conclusion:**

34 **Near-Term Timeframe**

35 Because the water conveyance facility construction (CM1) is being evaluated at the project level, the
36 near-term BDCP conservation strategy has been evaluated to determine whether it would provide
37 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
38 impacts of construction would be less than significant. Alternative 1A would result in permanent
39 and temporary impacts on 1,044 acres of modeled habitat (543 acres of riparian and 501 acres of
40 nonriparian) for valley elderberry longhorn beetle in the study area in the near-term. These impacts
41 would result from the construction of the water conveyance facilities (CM1, 86 acres of riparian and
42 265 acres of nonriparian), and implementing other conservation measures (Yolo Bypass fisheries
43 improvements [CM2] and tidal restoration [CM4], 693 acres of modeled habitat). Based on limited

1 DWR survey data of the Conveyance Planning Area, an estimated 21 elderberry shrubs would be
2 impacted by CM1.

3 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
4 CM1 and that are identified in the biological goals and objectives for valley elderberry longhorn
5 beetle in Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection for riparian
6 habitat. Using these typical ratios would indicate that 86 acres of the riparian habitat should be
7 restored/created and 86 acres of existing riparian should be protected to mitigate the CM1 losses of
8 valley elderberry longhorn beetle habitat. The near-term effects of other conservation actions would
9 require 0457 acres of riparian restoration and 457 acres of riparian protection using the same
10 typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

11 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800
12 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same
13 timeframe as the construction and early restoration losses, thereby minimizing adverse effects on
14 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB 1.1 and 1.2, which call for
15 implementing the USFWS (U.S. Fish and Wildlife Service 1999a) conservation guidelines for valley
16 elderberry longhorn beetle (transplanting elderberry shrubs and planting elderberry seedlings and
17 associated natives) and siting elderberry restoration within drainages immediately adjacent to or in
18 the vicinity of sites confirmed to be occupied by valley elderberry longhorn beetle. These objectives
19 would be met through the implementation of *CM7 Riparian Natural Community Restoration*. *CM7*
20 specifically calls for the planting of elderberry shrubs in in large, contiguous clusters with a mosaic
21 of associated natives as part of riparian restoration consistent with USFWS conservation guidelines
22 (U.S. Fish and Wildlife Service 1999a).

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
26 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM15 Valley Elderberry Longhorn*
27 *Beetle*. *AMM15* would require surveys for elderberry shrubs within 100 feet of any ground
28 disturbing activities and the implementation avoidance and minimize measures for any shrubs that
29 are identified within this 100-foot buffer, and transplanting shrubs that can't be avoided. All of these
30 AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to
31 work areas and RTM storage sites. BDCP Appendix 3.C describes the AMMs, which have since been
32 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
33 the Final EIR/EIS.

34 The natural community restoration and protection activities are expected to be concluded in the
35 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts to
36 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with
37 the AMMs, are more than sufficient to support the conclusion that the near-term effects of
38 Alternative 1A would be less than significant under CEQA.

39 ***Late Long-Term Timeframe***

40 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 1,560
41 acres of modeled valley elderberry longhorn beetle habitat (875 acres of riparian habitat and 685
42 acres of nonriparian habitat) during the term of the Plan (5% of the modeled habitat in the study
43 area). The locations of these losses are described above in the analyses of individual conservation
44 measures. These losses would not fragment any known populations of valley elderberry longhorn

1 beetle. The Plan includes a commitment to protect 750 acres of riparian habitat (VFRNC1.2) and
2 restore or create 5,000 acres of riparian habitat in the Plan Area (VFRNC1.1). According to Objective
3 VELB1.2, the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied
4 habitat, which would provide connectivity between occupied and restored habitats and improve the
5 species ability to disperse within and outside the Plan Area. The BDCP also includes a number of
6 AMMs (AMM1–AMM6, AMM10, and AMM15) directed at minimizing or avoiding potential impacts
7 on valley elderberry longhorn beetle. The large acreages of conservation would adequately
8 compensate for the modeled habitats lost to construction and restoration activities.

9 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
10 and protection actions discussed above, as well as other actions that overlap with the nonriparian
11 portions of the species model, could result in the restoration of 4,857 acres (riparian) and the
12 protection of 2,363 acres (729 acres of riparian and 1,634 acres of nonriparian channels and
13 grassland) of modeled habitat for valley elderberry longhorn beetle.

14 Considering these protection and restoration provisions, which would provide acreages of new or
15 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction
16 and restoration activities, implementation of Alternative 1A as a whole would not result in a
17 substantial adverse effect through habitat modifications and would not substantially reduce the
18 number or restrict the range of the species. Therefore, the alternative would have a less-than-
19 significant impact on valley elderberry longhorn beetle.

20 **Impact BIO-36: Indirect Effects on Valley Elderberry Longhorn Beetle and its Habitat**

21 Construction activities associated with water conveyance facilities, conservation components, and
22 ongoing habitat enhancement, as well as operation and maintenance of above-ground water
23 conveyance facilities, including the transmission facilities, could result in ongoing periodic
24 postconstruction disturbances with localized impacts on valley elderberry longhorn beetle over the
25 term of the BDCP. Construction related effects could result from ground-disturbing activities,
26 stockpiling of soils, and maintenance and refueling of heavy equipment could result in dust and the
27 inadvertent release of hazardous substances in areas where elderberry shrubs occur. A GIS analysis
28 (see Section 12.3.2.3 for a discussion on the methods used to make this estimate) estimates that
29 approximately 37 shrubs could be indirectly affected by conveyance facilities construction (CM1).
30 Restoration activities could result in excavation or modification of channels, type conversion from
31 riparian and grasslands to tidal habitat, levee removal and modification, and removal of riprap and
32 other protections from channel banks that occur within 100 feet of an elderberry shrubs. These
33 potential effects would be minimized or avoided through AMM1–AMM6, AMM10, and AMM15,
34 which would be in effect throughout the Plan's construction phase.

35 **NEPA Effects:** The indirect effects on valley elderberry longhorn beetle as a result of implementing
36 Alternative 1A conservation actions would not have an adverse effect on valley elderberry longhorn
37 beetle.

38 **CEQA Conclusion:** Ground-disturbing activities, stockpiling of soils, and the potential release of dust
39 and hazardous substances would accompany construction of the water conveyance facilities. An
40 estimated 37 shrubs could be indirectly affected by conveyance facilities construction (CM1). In
41 addition, ground-disturbing activities associated with the re-contouring of surface topography,
42 excavation or modification of channels, type conversion from riparian and grasslands to tidal
43 habitat, levee removal and modification, and removal of riprap and other protections from channel
44 banks could indirectly affected elderberry shrubs that occur within 100 feet of these restoration

1 activities. With the implementation of AMM1–AMM6, AMM10, and AMM15 as part of Alternative 1A
2 construction, operation, and maintenance, the BDCP would avoid the potential for substantial
3 adverse indirect effects on valley elderberry longhorn beetle in that the Plan would not result in a
4 substantial reduction in numbers or a restriction in the range of valley elderberry longhorn beetle.
5 Therefore, the indirect effects under this alternative would have a less-than-significant impact on
6 valley elderberry longhorn beetle.

7 **Impact BIO-37: Periodic Effects of Inundation of Valley Elderberry Longhorn Beetle Habitat**
8 **as a Result of Implementation of Conservation Components**

9 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
10 161 to 325 acres of modeled valley elderberry longhorn beetle habitat (Table 12-1A-14).

11 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 553 acres of modeled
12 valley elderberry longhorn beetle habitat (Table 12-1A-14).

13 It is unknown at this time how much of the modeled habitat that will be inundated as a result of CM2
14 and CM5 actually contains elderberry shrubs. Elderberry shrubs have been found to be intolerant of
15 long periods of inundation and there is evidence that they die very quickly after even short periods
16 of flooding (River Partners 2008). During monitoring of a restoration project at the San Joaquin
17 River National Wildlife Refuge, River Partners found that nearly all (99 to 100%) of the four year old
18 elderberry shrubs in restoration plots died after 15-17 weeks of inundation and they noted in
19 general that the shrubs died very quickly after even short periods of flooding (River Partners 2008).
20 Talley et al (2006) in their report assisting the USFWS 5-year review of the species, note that
21 elderberry shrubs respond negatively to saturated soil conditions and that they can only tolerate
22 temporary root crown inundation. Therefore, in the areas that would be periodically inundated by
23 the implementation of CM2 it is likely that there are few, if any, mature shrubs in these areas
24 because under current conditions they would be inundated in about 50% of all years for
25 approximately 7 weeks. The areas affected by CM5 are not currently inundated and thus elderberry
26 shrubs could be present in these areas.

27 The periodic effects on modeled habitat for valley elderberry longhorn beetle associated with
28 implementing Alternative 1A could adversely affect valley elderberry longhorn beetle habitat
29 (elderberry shrubs) and make modeled habitat there unsuitable for future elderberry
30 establishment. Based on the information presented above, the current conditions in those areas that
31 would be periodically inundated in Yolo Bypass (CM2) are not likely very suitable for elderberry
32 shrubs and, thus, CM2 would likely have minimal effects, if any, on the species. The modeled habitat
33 that would be periodically inundated from the implementation of CM5 could result in adverse effects
34 on valley elderberry longhorn beetle.

35 **NEPA Effects:** Periodic effects of the inundation of valley elderberry longhorn beetle habitat as a
36 result of implementing Alternative 1A conservation actions would not be adverse when taking into
37 consideration CM7 habitat protection and restoration. This habitat protection and restoration would
38 be guided by species-specific goals and objectives, and by AMM1–AMM6, AMM10, and AMM15,
39 which would be in place throughout the time period that periodic effects would occur.

40 **CEQA Conclusion:** Alternative 1A (CM2 and CM5) would have periodic impacts on modeled valley
41 elderberry longhorn beetle habitat. The periodic inundation of between 161 and 325 acres (CM2)
42 and 553 acres (CM5) of modeled habitat could result in the death of elderberry shrubs that may
43 occur there and thus potentially impact valley elderberry longhorn beetle. The Plan includes the

1 restoration of 5,000 acres of riparian habitat, and the protection of 750 acres riparian habitat (CM7)
2 would include areas for elderberry restoration and protection. The BDCP also includes AMM1–
3 AMM6, AMM10, and AMM15, which would minimize and avoid impacts on valley elderberry
4 longhorn beetle prior to Yolo Bypass fisheries enhancement and floodplain restoration activities.
5 AMM15, which includes measure for following the USFWS conservation guidelines for valley
6 elderberry longhorn beetle (U.S. Fish and Wildlife Service 1999a), would be used to identify shrubs
7 for transplanting to conservation areas that otherwise could be adversely affected by periodic
8 inundation in Yolo Bypass and floodplain restoration areas. These conservation actions would
9 compensate for the periodic impacts on valley elderberry longhorn beetle.

10 Considering these protection and restoration provisions and avoidance and minimization measures,
11 implementation of Alternative 1A as a whole would not result in a substantial adverse effect through
12 habitat modifications and would not substantially reduce the number or restrict the range of the
13 species. Therefore, periodic effects of inundation resulting from Alternative 1A would have a less-
14 than-significant impact on valley elderberry longhorn beetle.

15 **Nonlisted Vernal Pool Invertebrates**

16 This section describes the effects of Alternative 1A, including water conveyance facilities
17 construction and implementation of other conservation components, on other, vernal pool
18 invertebrates that are not covered by the Plan (Blennosperma vernal pool andrenid bee, hairy water
19 flea, Ricksecker’s water scavenger beetle, curved-foot hygrotus beetle, molestan blister beetle).
20 Little is known about the range of these species so it is assumed that they have potential to occur in
21 the same areas described by the vernal pool crustacean modeled habitat. That habitat model
22 consists of: vernal pool complex, which consists of vernal pools and uplands that display
23 characteristic vernal pool and swale visual signatures that have not been significantly affected by
24 agricultural or development practices; alkali seasonal wetlands in CZ 8; and degraded vernal pool
25 complex, which consists of low-value ephemeral habitat ranging from areas with vernal pool and
26 swale visual signatures that display clear evidence of significant disturbance due to plowing, disking,
27 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in
28 fallow fields, and areas of compacted soils in pastures. For the purpose of the effects analysis, vernal
29 pool complex is categorized as high-value and degraded vernal pool complex is categorized as low-
30 value for these species. Alkali seasonal wetlands in CZ 8 were also included as high-value habitat for
31 vernal pool crustaceans in the model. Also included as low-value for vernal pool habitat are areas
32 along the eastern boundary of CZ 11 that are mapped as vernal pool complex because they flood
33 seasonally and support typical vernal pool plants. These areas do not include topographic
34 depressions that are characteristic of vernal pools and, thus, are considered to have a lower value
35 for the species.

36 Construction and restoration associated with Alternative 1A conservation measures would result in
37 permanent losses of habitat for nonlisted vernal pool invertebrates as indicated in Table 12-1A-15
38 and indirect conversions of vernal pool habitat. The majority of the losses would take place over an
39 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of
40 Alternative 1A also include the following conservation actions over the term of the BDCP that would
41 benefit nonlisted vernal pool invertebrates (BDCP Chapter 3, *Conservation Strategy*).

- 42 • Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool
43 recovery areas (ObjectiveVPNC1.1, associated with CM3).

- 1 • Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool
2 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective
3 VPNC1.2, associated with CM9).
- 4 • Increase size and connectivity of protected vernal pool complexes in plan area and increase
5 connectivity with complexes outside the Plan Area (ObjectiveVPNC1.3).
- 6 • Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective
7 VPNC1.4).
- 8 • Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for
9 supporting and sustaining vernal pool species (Objective VPNC2.1).

10 As explained below, with the restoration or protection of these amounts of habitat, impacts on
11 nonlisted vernal pool invertebrates would not be adverse for NEPA purposes and would be less-than
12 significant for CEQA purposes.

13 **Table 12-1A-15. Changes in Other Nonlisted Vernal Pool Invertebrate Habitat Associated with**
14 **Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	1	1	0	0	NA	NA
	Low-value	2	2	0	0	NA	NA
Total Impacts CM1		3	3	0	0	NA	NA
CM2–CM18	High-value	0	0	0	0	0–4	0
	Low-value	201	372	0	0	0	0
Total Impacts CM2–CM18		201	372	0	0	0–4	0
TOTAL IMPACTS		201	375	0	0	0–4	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

15

16 **Impact BIO-38: Loss or Conversion of Habitat for and Direct Mortality of Nonlisted Vernal**
17 **Pool Invertebrates**

18 Alternative 1A conservation measures would result in the permanent loss of up to 375 acres of
19 vernal pool habitat from conveyance facilities construction (CM1) and tidal restoration (CM4). In
20 addition, the conservation measures could result in the indirect conversion of an additional 142
21 acres of vernal pool habitat (91 acres of high-value habitat and 51 acres of low-value habitat) from

1 conveyance facilities construction (CM1) and based on the hypothetical footprints for tidal
2 restoration (CM4). Construction of the water conveyance facilities and restoration activities may
3 result in the modification of hardpan and changes to the perched water table, which could lead to
4 alterations in the rate, extent, and duration of inundation of nearby vernal pool habitat. USFWS
5 typically considers construction within 250 feet of vernal pools to constitute an indirect effect unless
6 more detailed information is provided to further refine the limits of any such effects. For the
7 purposes of this analysis, the 250-foot buffer was applied to the water conveyance facilities work
8 areas where surface and subsurface disturbance activities would take place and to restoration
9 hypothetical footprints. Habitat enhancement and management activities (CM11), which include
10 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.

11 Because the estimates of habitat loss resulting from tidal inundation are based on projections of
12 where restoration may occur, actual effects are expected to be lower because sites will be selected
13 and restoration projects designed to minimize or avoid effects on the vernal pools. As specified in
14 the BDCP, the BDCP Implementation Office would ensure that tidal restoration projects and other
15 covered activities would be designed such that no more than a total of 10 wetted acres of vernal
16 pools are permanently lost. *AMM12 Vernal Pool Crustaceans* would ensure that no more than 20
17 wetted acres of vernal pools are indirectly affected by BDCP covered activities.

18 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the
19 individual conservation measure discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
21 result in the permanent loss of 3 acres of nonlisted vernal pool invertebrate habitat, composed
22 of 1 acre of high-value and 2 acres of low-value habitat (Table 12-1A-15). In addition,
23 conveyance facility construction could result in the indirect conversion of 8 acres of modeled
24 habitat in the vicinity of Clifton Court Forebay. The affected area consists of 2 acres of high-value
25 and 6 acres low-value habitat. There are no records of these nonlisted vernal pool invertebrates
26 within the impact footprint (California Department of Fish and Wildlife 2013).
- 27 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
28 in the permanent loss of approximately 372 acres of low-value vernal pool habitat, which
29 consists of degraded vernal pool complex. The BDCP describes degraded vernal pool complex as
30 areas of low-value ephemeral habitat ranging from areas with vernal pool and swale visual
31 signatures that display clear evidence of significant disturbance due to plowing, disking, or
32 leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in
33 fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or
34 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery
35 found that these habitats appear to generally have low densities. However, areas mapped as
36 degraded vernal pool complex may still provide habitat for vernal pool species as evidenced by
37 records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella
38 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Wildlife
39 2013). So though degraded vernal pool complexes may not represent botanically diverse vernal
40 pools they still can provide habitat for vernal pool invertebrates and thus the loss of 372 acres of
41 degraded vernal pool complex may result in the loss of occupied vernal pool invertebrate
42 habitat. In addition, tidal restoration could result in the indirect conversion of 135 acres of
43 vernal pool habitat, which consist of 90 acres of high-value and 45 acres of low-value habitat. No
44 records of nonlisted vernal pool invertebrates would be directly impacted.

- 1 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,
2 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of
3 vernal pool complex would benefit vernal pool invertebrates (Table 12-1A-15). A variety of
4 habitat management actions included in CM11 that are designed to enhance wildlife values in
5 BDCP-protected habitats may result in localized ground disturbances that could temporarily
6 affect vernal pool invertebrate habitat. Ground-disturbing activities, such as removal of
7 nonnative vegetation and road and other infrastructure maintenance, are expected to have
8 minor effects on vernal pool invertebrate habitat and are expected to result in overall
9 improvements to and maintenance of vernal pool habitat values over the term of the BDCP.
10 These effects cannot be quantified, but are expected to be minimal and would be avoided and
11 minimized by the AMMs listed below.

12 The following paragraphs summarize the combined effects discussed above and describe other
13 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
14 also included. Table 12-1A-16 was prepared to further analyze Alternative 1A effects on nonlisted
15 vernal pool invertebrates using wetted acres of vernal pools in order to compare to the effects of
16 this alternative with the effect limits established in BDCP Chapter 3, Section 3.3, *Biological Goals and*
17 *Objectives*, which are measured in wetted acres of vernal pools. Wetted acres were estimated by
18 using the BDCP’s assumption that vernal pool complexes support a 15% density of vernal pools.

19 **Table 12-1A-16. Estimated Effects on Wetted Nonlisted Vernal Pool Invertebrate Habitat under**
20 **Alternative 1A (acres)**

		Direct		Indirect	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit ^a		5	10	10	20
Alternative 1A Impact ^b	CM1	0.5	0.5	1.2	1.2
	CM4 ^c	30.2	55.8	11.0	20.3
Total		30.7	56.3	12.2	21.52

^a Because roughly half of the impacts occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

^b These acreages were generated by assuming that the modeled habitat identified in Table 12-1A-15 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.

^c These impacts are based on the hypothetical restoration footprints and will likely be lower based on the BDCP’s commitment to minimize and avoid effects on vernal pool habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term values would be.

21

22 ***Near-Term Timeframe***

23 Because the water conveyance facility construction (CM1) is being evaluated at the project level, the
24 near-term BDCP conservation strategy has been evaluated to determine whether it would provide
25 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
26 effects of construction would not be adverse under NEPA and would be less than significant under
27 CEQA. Table 12-1A-15 above lists the impacts on nonlisted vernal pool invertebrate habitat that is
28 based on the natural community mapping done within the study area. The impacts from tidal
29 natural communities restoration (CM4) are based on hypothetical footprints and do not reflect

1 actual impacts on vernal pool habitat considering the BDCP's commitment to design restoration
2 projects to minimize or avoid effects on vernal pools (see AMM12). As seen in Table 12-1A-16, the
3 effects of CM1 alone would be well within the near-term limits. As seen in Table 12-1A-16,
4 Alternative 1A would not meet the Plan's near-term biological goals and objectives for direct and
5 indirect effects unless near-term tidal restoration projects are designed to ensure that they do not
6 exceed these impact limits.

7 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
8 would be 1:1 for restoration and 2:1 for protection. Typically, indirect impacts are mitigated by
9 protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.5 wetted acre
10 of vernal pool (or 3 acres of vernal pool complex using the 15% density) should be restored and 3.4
11 acres protected (or 23 acres of vernal pool complex) protected to mitigate the CM1 indirect effects
12 on vernal pool habitat. Assuming that the BDCP would apply the impact limits presented in Table
13 12-1A-16, impacts on wetted vernal pools resulting from tidal restoration in the near-term could not
14 exceed 4.5 wetted acres direct and 8.8 wetted acres indirect. The impacts based on the hypothetical
15 tidal restoration footprints would exceed these limits. When and if these limits are met, the BDCP
16 would need to restore up to 5 wetted acres (33 acres of vernal pool complex) and protect up to 30
17 wetted acres (200 acres of vernal pool complex) in the near-term to offset the effects of CM1 and
18 CM4.

19 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
20 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
21 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
22 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
23 restoration will be determined during implementation based on the following criteria.

- 24 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to
25 impacts, then 1.0 wetted acre of vernal pools will be restored for each wetted acre directly
26 affected (1:1 ratio).
- 27 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
28 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
29 acres of vernal pools will be restored for each wetted acre directly affected (1.5:1 ratio).

30 The species-specific biological goals and objectives would also inform the near-term protection and
31 restoration efforts. These Plan goals represent performance standards for considering the
32 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
33 term Plan goals would keep pace with the loss of habitat and effects on nonlisted vernal pool
34 invertebrate habitat.

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
36 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
37 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
38 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
39 *Natural Communities*, and *AMM37 Recreation*. *AMM12 Vernal Pool Crustaceans*, though developed for
40 vernal pool crustaceans, includes measures to avoid and minimize direct and indirect effects on
41 vernal pools and would thus be applicable to nonlisted vernal pool invertebrates as well. All of these
42 AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to
43 work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
44 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
3 and no more than 20 wetted acres of indirect effects on vernal pools by the late long-term (see
4 Objective VPNC1.2 and AMM12). As seen in Table 12-1A-16, the effects of CM1 alone would be well
5 within the near-term limits but overall Alternative 1A would not meet the Plan's late long-term
6 biological goals and objectives for direct and indirect effects unless tidal restoration projects are
7 designed to ensure that that they do not exceed these impact limits.

8 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in
9 Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective VPNC1.1) by
10 protecting at least 2 wetted acres of vernal pools protected for each wetted acre directly or
11 indirectly affected. The Plan also includes a commitment to restore or create vernal pools such that
12 the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection and
13 restoration would be achieved using the criteria presented above as well as by following these other
14 specific biological goals and objectives.

- 15 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3).
- 16 ● Protecting the range of inundation characteristics that are currently represented by vernal pool
17 throughout the Plan Area (Objective VPNC1.4).

18 **NEPA Effects:** The near-term loss of nonlisted vernal pool species habitat under Alternative 1A
19 would not be adverse because the BDCP has committed to avoiding and minimizing effects resulting
20 from tidal restoration and to restoring and protecting an acreage that meets or exceeds the typical
21 mitigation ratios described above. In the absence of other conservation actions, the modification of
22 vernal pool habitat and potential mortality of special-status species resulting from Alternative 1A in
23 the late long-term would represent an adverse effect. However, the BDCP has committed to impact
24 limits for vernal pool habitat and to habitat protection, restoration, management, and enhancement
25 associated with CM3, CM9, and CM11. This habitat protection, restoration, management and
26 enhancement would be guided by goals and objectives and by AMM1–AMM6, AMM10, AMM12, and
27 AMM37, which would be in place throughout the time period of construction. Considering these
28 commitments, losses and conversion of nonlisted vernal pool species habitat and potential mortality
29 under Alternative 1A would not be adverse effect.

30 **CEQA Conclusion:**

31 **Near-Term Timeframe**

32 Because the water conveyance facility construction (CM1) is being evaluated at the project level, the
33 near-term BDCP conservation strategy has been evaluated to determine whether it would provide
34 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
35 effects of such conveyance facility construction would not be adverse under NEPA and would be less
36 than significant under CEQA. Table 12-1A-15 above lists the impacts on vernal pool habitat that is
37 based on the natural community mapping done within the study area. The impacts from tidal
38 natural communities restoration (CM4) are based on hypothetical footprints and do not reflect
39 actual impacts on vernal pool habitat considering the BDCP's commitment to design restoration
40 projects to minimize or avoid effects on vernal pools. As seen in Table 12-1A-16, the effects of CM1
41 alone would be well within the near-term limits. The BDCP states that covered activities would not
42 result in more than 5 wetted acres of direct loss and no more than 10 wetted acres of indirect effects
43 on vernal pools in the near-term. As seen in Table 12-1A-16, Alternative 1A would not meet the

1 Plan's near-term biological goals and objectives for direct and indirect effects unless near-term tidal
2 restoration projects are designed to ensure that they do not exceed these impact limits.

3 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
4 would be 1:1 for restoration and 2:1 for protection. Typically, indirect impacts are mitigated by
5 protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.5 wetted acre
6 of vernal pool (or 3 acres of vernal pool complex using the 15% density) should be restored and 3.4
7 acres (or 23 acres of vernal pool complex) protected to mitigate the CM1 direct and indirect effects
8 on nonlisted vernal pool invertebrate habitat. Assuming that the BDCP would apply the impact
9 limits presented in Table 12-1A-16, impacts on wetted vernal pools resulting from tidal restoration
10 in the near-term could not exceed 4.5 wetted acres direct and 8.8 wetted acres indirect. The impacts
11 based on the hypothetical tidal restoration footprints would exceed these limits. When and if these
12 limits are met, the BDCP would need to restore up to 5 wetted acres (33 acres of vernal pool
13 complex) and protect up to 30 wetted acres (200 acres of vernal pool complex) in the near-term to
14 offset the effects of CM1 and CM4.

15 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex see Table
16 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal pools for
17 each wetted acre directly or indirectly affected. The BDCP has also committed to restoring/creating
18 vernal pools such that there is no net loss of vernal pool acreage. The amount of restoration will be
19 determined during implementation based on the following criteria.

- 20 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to
21 impacts, then 1.0 wetted acre of vernal pools will be restored for each wetted acre directly
22 affected (1:1 ratio).
- 23 ● If restoration takes place concurrent with impacts (i.e., restoration construction is
24 completed, but restored habitat has not met all success criteria, prior to impacts occurring),
25 then 1.5 wetted acres of vernal pools will be restored for each wetted acre directly affected
26 (1.5:1 ratio).

27 The species-specific biological goals and objectives would also inform the near-term protection and
28 restoration efforts. These Plan goals represent performance standards for considering the
29 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
30 term Plan goals would keep pace with the loss of habitat and effects on nonlisted vernal pool
31 invertebrates.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
36 *Natural Communities*, and *AMM37 Recreation*. *AMM12 Vernal Pool Crustaceans*, though developed for
37 vernal pool crustaceans, includes measures to avoid and minimize direct and indirect effects on
38 vernal pools and would thus be applicable to nonlisted vernal pool invertebrates as well. All of these
39 AMMs include elements that avoid or minimize the risk of the BDCP affecting habitats and species
40 adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and
41 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
42 EIR/EIS.

1 The natural community restoration and protection activities are expected to be concluded in the
2 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts on
3 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with
4 the AMMs and biological goals and objectives, are more than sufficient to support the conclusion
5 that the near-term effects of Alternative 1A would be less than significant under CEQA.

6 ***Late Long-Term Timeframe***

7 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
8 and no more than 20 wetted acres of indirect effects on vernal pools by the late long-term (see
9 Objective VPNC1.2 and AMM12). As seen in Table 12-1A-16, the effects of CM1 alone would be well
10 within the near-term limits but overall Alternative 1A would not meet the Plan's late long-term
11 biological goals and objectives for direct and indirect effects unless tidal restoration projects are
12 designed to ensure that they do not exceed these impact limits.

13 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in
14 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
15 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
16 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
17 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection
18 and restoration would be achieved using the criteria presented above as well as by following the
19 other specific biological goals and objectives, which include:

- 20 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 21 ● Protecting the range of inundation characteristics that are currently represented by vernal pool
22 throughout the Plan Area (Objective VPNC1.4)

23 In the absence of other conservation actions, the effects on nonlisted vernal pool invertebrate
24 habitat from Alternative 1A would represent an adverse effect as a result of habitat modification of a
25 special-status species and potential for direct mortality. However, the BDCP has committed to
26 impact limits for vernal pool habitat and to the habitat protection, restoration, management, and
27 enhancement associated with CM3, CM9, and CM11. These conservation activities would be guided
28 by species-specific goals and objectives and by AMM1-AMM6, AMM10, AMM12, and AMM37, which
29 would be in place throughout the time period of construction. Considering these commitments,
30 Alternative 1A over the term of the BDCP would not result in a substantial adverse effect through
31 habitat modifications and would not substantially reduce the number or restrict the range of
32 nonlisted vernal pool invertebrates. Therefore, Alternative 1A would have a less-than-significant
33 impact on nonlisted vernal pool invertebrates.

34 **Impact BIO-39: Indirect Effects of Plan Implementation on Nonlisted Vernal Pool** 35 **Invertebrates**

36 Construction and maintenance activities associated with water conveyance facilities, and restoration
37 actions could indirectly affect nonlisted vernal pool invertebrates and their habitat in the vicinity of
38 construction and restoration areas, and maintenance activities. These potential effects would be
39 minimized or avoided through AMM1-AMM6 and AMM10, which would be in effect throughout the
40 Plan's construction phase.

1 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly
2 affect nonlisted vernal pool invertebrates and their habitat in the vicinity of construction areas.
3 Ground-disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment
4 could result in the inadvertent release of sediment and hazardous substances into this habitat.
5 These potential effects would be avoided and minimized through AMM1–AMM6, which would be in
6 effect throughout the Plan’s construction phase. Nonlisted vernal pool invertebrates and their
7 habitat could be periodically indirectly affected by maintenance activities at water conveyance
8 facilities. Embankment maintenance activities around Clifton Court Forebays could result in the
9 inadvertent discharge of sediments and hazardous materials into vernal pool habitat that occurs
10 along the southern and western boundaries of the forebays. These potential effects would be
11 avoided and minimized through AMM1–AMM6, which would be in effect throughout the term of the
12 Plan. The indirect effects of Alternative 1A implementation would not be adverse under NEPA.

13 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance
14 facilities, and restoration actions could indirectly impact nonlisted vernal pool invertebrates and
15 their habitat in the vicinity of construction and restoration areas, and maintenance activities. These
16 potential impacts would be minimized or avoided through AMM1–AMM6, AMM10, and AMM12,
17 which would be in effect throughout the Plan’s construction phase. Therefore, the indirect effects of
18 Alternative 1A would have a less-than-significant impact on vernal pool invertebrates.

19 **Impact BIO-40: Periodic Effects of Inundation of Nonlisted Vernal Pool Invertebrates’ Habitat**
20 **as a Result of Implementation of Conservation Components**

21 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect 0
22 to 4 acres of modeled habitat for nonlisted vernal pool invertebrates (Table 12-1A-15). There would
23 be no periodic effects from *CM5 Seasonally Inundated Floodplain Restoration*.

24 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the
25 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,
26 periodic inundation could affect nonlisted vernal pool invertebrates occupying areas ranging from 0
27 acres of habitat during most notch flows, to an estimated 4 acres during a notch flow of 6,000 cubic
28 feet per second. BDCP-associated inundation of areas that would not otherwise have been inundated
29 is expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop
30 the remaining 70% of all years, and during those years notch operations will not typically affect the
31 maximum extent of inundation. In more than half of all years under Existing Conditions, an area
32 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass
33 flooding is expected to have a minimal effect on nonlisted vernal pool invertebrates and would thus
34 not be adverse under NEPA.

35 **CEQA Conclusion:** Alternative 1A would periodically inundate a maximum of 4 acres of nonlisted
36 vernal pool invertebrates’ habitat during the maximum flows over the Fremont Weir. The periodic
37 inundation is not anticipated to result in a conversion of nonlisted vernal pool invertebrates’ habitat
38 into different wetland habitat. BDCP-associated inundation of areas that would not otherwise have
39 been inundated is expected to occur in no more than 30% of all years, because Fremont Weir is
40 expected to overtop the remaining 70% of all years, and during those years notch operations will
41 not typically affect the maximum extent of inundation. In more than half of all years under Existing
42 Conditions, an area greater than the BDCP-related inundation area already inundates in the bypass.
43 Yolo Bypass flooding is expected to have a minimal effect on nonlisted vernal pool invertebrates and
44 would thus result in less-than-significant impacts on the species.

1 **Sacramento and Antioch Dunes Anthicid Beetles**

2 This section describes the effects of Alternative 1A, including water conveyance facilities
3 construction and implementation of other conservation components, on Sacramento and Antioch
4 Dunes anthicid beetles. Potential habitat in the study area includes the inland dune scrub habitat at
5 Antioch Dunes NWR, sand bars along the Sacramento and San Joaquin Rivers, and sandy dredge
6 spoil piles (California Department of Fish and Game 2006c, 2006d).

7 The construction, and operations and maintenance of the water conveyance facilities under
8 Alternative 1A would not likely affect Sacramento and Antioch Dunes anthicid beetles. The
9 construction of the water conveyance structure and associated infrastructure would generally avoid
10 affects to channel margins where sand bars are likely to form. Conveyance facilities construction
11 would not affect inland dune scrub habitat at Antioch Dunes NWR. No dredge spoil areas that could
12 potentially be occupied by Sacramento anthicid beetle were identified within conveyance facilities
13 footprints during a review of Google Earth imagery. Also, a review of the locations of the Alternative
14 1A water intake facilities on aerial imagery did not reveal any sandbars along the channel margins.
15 These portions of the Sacramento River have steep, riprap lined channel banks that are likely not
16 conducive to the formation of sandbars.

17 Implementation of BDCP restoration based conservation measures could affect habitat for
18 Sacramento and Antioch Dunes anthicid beetles. Both species are known to utilize interior sand
19 dunes and sandbar habitat. The only interior sand dune habitat within the Plan Area is at Antioch
20 Dunes, which would not be impacted by the Alternative 1A conservation measures. Both species are
21 known to occur along the Sacramento River and San Joaquin Rivers. The implementation of BDCP
22 restoration actions, and other covered activities could affect habitat for Sacramento and Antioch
23 Dunes anthicid beetles along channels throughout the Plan Area; however the extent of these
24 habitats in the Plan Area is unknown because these areas were not identified at the scale of mapping
25 done within the study area. Because of current and historic channel modifications (channel
26 straightening and dredging) and levee construction throughout the Delta, sandbar habitat is likely
27 very limited and restricted to channel margins. The implementation of *CM4 Tidal Natural*
28 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM6 Channel Margin*
29 *Enhancement* could impact sandbar habitat along the river channels and possibly sandy, dredge
30 piles on Delta islands.

31 Over the term of the BDCP, Alternative 1A would likely result in beneficial effects on Sacramento
32 and Antioch Dunes anthicid beetles. The following Alternative 1A objectives would generally
33 increase opportunities for the formation of sandbars in the Plan Area.

- 34
- 35 ● Restore 10,000 acres of seasonally inundated floodplain (Objective L2.11, associated with CM5).
 - 36 ● Enhance 20 miles of channel margin habitat (Objective L2.12, associated with CM6).
 - 37 ● Restore 5,000 acres of riparian habitat, with at least 3,000 acres occurring on restored
seasonally inundated floodplain. (VFRNC1.1, associated with CM7).

38 These measures will improve shoreline conditions by creating benches along levees, shallow habitat
39 along margins and in floodplains, and increasing shoreline vegetation, all of which will likely
40 contribute to the formation of sandbars along Delta river channels where these measures will be
41 implemented. Increasing the structural diversity of Delta river channel margins and floodplains will
42 create opportunities for sand to be deposited and for sandbars to subsequently form. As explained

1 below, potential impacts on Sacramento and Antioch Dunes anthicid beetle would not be adverse for
2 NEPA purposes and would be less than significant for CEQA purposes.

3 **Table 12-1A-17. Changes in Sacramento and Antioch Dunes Anthicid Beetle Habitat Associated**
4 **with Alternative 1A (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2–CM18	0	0	0	0	0	0
	0	0	0	0	0	0
Total Impacts CM2–CM18	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

5

6 **Impact BIO-41: Loss or Conversion of Habitat for and Direct Mortality of Sacramento and**
7 **Antioch Dunes Anthicid Beetles**

8 Implementation of Alternative 1A conservation measures could affect Sacramento and Antioch
9 Dunes anthicid beetles and their habitat. As mentioned above, the extent of this habitat in the study
10 area is unknown but it is assumed that sand bars likely occur along to some degree along the
11 Sacramento and San Joaquin Rivers and that some islands in the Delta may contain sandy dredge
12 spoil piles. A review of Google Earth imagery of the north Delta did identify three general areas that
13 appear to have accumulations of sandy soils (with some vegetation), possibly from dredge disposal,
14 are Decker Island, the western portion of Bradford Island, and the southwestern tip of Grand Island.
15 A review of aerial photographs in the south Delta did identify sandbar habitat along the San Joaquin
16 River from the southern end of the Plan Area downstream to an area just west of Lathrop. An
17 additional area along Paradise Cut was identified just north of I-5. Conservation measures that could
18 result in impacts on Sacramento and Antioch Dunes anthicid beetles are tidal natural communities
19 restoration (CM4), seasonally inundated floodplain restoration (CM5), and channel margin
20 enhancement (CM6). In addition, maintenance activities associated with the long-term operation of
21 the water conveyance facilities and other BDCP physical facilities could degrade or eliminate habitat
22 for Sacramento and Antioch Dunes anthicid beetles. Each of these individual activities is described

1 below. A summary statement of the combined impacts and NEPA and CEQA conclusions follows the
2 individual conservation measure discussions.

- 3 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration could impact
4 the areas of sandy soils identified from aerial photographs on Decker Island, the western
5 portion of Bradford Island, and on the southwestern tip of Grand Island because these areas fall
6 within the West Delta Restoration Opportunity Area (ROA). The West Delta ROA has been
7 identified in the BDCP (BDCP Chapter 3, *Conservation Strategy*, Section 3.4.4) as providing
8 opportunities for creating subtidal aquatic and tidal marsh habitats. The methods and
9 techniques identified in BDCP Chapter 3, Section 3.4.4.3.3 that may be used for tidal restoration
10 include the recontouring of lands so that they have elevations suitable for the establishment of
11 marsh plains and the eventual breaching of levees. There are three CNDDDB records of
12 Sacramento anthonid beetle (just north of Rio Vista, one just south of Rio Vista along the west
13 shore of the Sacramento River, and one on Grand Island) and one CNDDDB record of Antioch
14 Dunes anthonid beetle (just north of Rio Vista) that fall within the West Delta ROA (California
15 Department of Fish and Wildlife 2013). Tidal restoration actions in the West Delta ROA may
16 eliminate potential habitat and impact occupied habitat of both Sacramento and Antioch Dunes
17 anthonid beetles.
- 18 • *CM5 Seasonally Inundated Floodplain Restoration*: Seasonally inundated floodplain restoration
19 could impact areas with sandbars that were identified in a review of aerial photographs. The
20 sandbars identified along the San Joaquin River and Paradise Cut are within the conceptual
21 corridors (Corridors 1a, 1b, 2a, and 4) identified in Figure 3.4-20 of the BDCP. There are four
22 CNDDDB records for Sacramento anthonid beetle in the conceptual corridor along the San Joaquin
23 River (California Department of Fish and Wildlife 2013). Floodplain restoration actions in these
24 conceptual corridors could impact potential habitat for both these species and occupied habitat
25 of Sacramento anthonid beetle.
- 26 • *CM6 Channel Margin Enhancement*: Channel margin enhancement could result in impacts on 20
27 miles of channel margin that could contain sandbars.

28 The following paragraphs summarize the combined effects discussed above and describe other
29 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
30 also included.

31 The BDCP could result in substantial affects to Sacramento and Antioch Dunes anthonid beetle
32 because all of the habitat identifiable from aerial photo review falls within either the West Delta
33 ROA, which is being considered for tidal restoration (CM4), or within three of the conceptual
34 corridors being considered for floodplain restoration (CM5). Furthermore, all seven of the records
35 for Sacramento anthonid beetle within the study area fall within areas being considered for
36 restoration (CM4 and CM5), which represent over half of the extant records for this species range
37 wide (7 of 13), and the only extant record for Antioch Dunes anthonid beetle, which represent one of
38 five extant records range wide, falls within the West Delta ROA that is just north of Rio Vista. These
39 occurrences could be affected by restoration if these areas are choses as restoration projects.
40 However, over the term of the BDCP, implementation of conservation components would likely
41 benefit Sacramento and Antioch Dunes anthonid beetles. Under Alternative 1A, CM5, CM6, and CM7
42 would generally contribute to the formation of sandbar habitat in the Plan Area. These measures
43 would improve shoreline conditions by creating benches along levees (CM6), creating shallow
44 margin and floodplain habitat (CM5), and increasing shoreline vegetation (CM7), all of which would
45 likely contribute to the formation of sandbars along Delta river channels where these measures

1 would be implemented. Increasing the structural diversity of Delta river channel margins would
2 create areas of slow water that would allow for sand to be deposited and for sandbars to
3 subsequently form. There are three other factors relevant to effects on Sacramento and Antioch
4 Dunes anthicid beetle.

- 5 • The actual extent of suitable and occupied habitat for these species in the plan is unknown.
- 6 • The sandbar habitat occupied by Sacramento anthicid beetle along the San Joaquin River would
7 likely not be directly impacted where floodplain restoration occurs because the physical
8 disturbance would be to adjacent levees and agricultural areas. Though these actions would
9 change hydrologic conditions that could overtime remove the existing sandbars, the expanded
10 floodplain would create conditions suitable for the formation of new and possibly larger
11 sandbars.
- 12 • Floodplain restoration would be phased over a period of 30 years so that not all sandbar habitat
13 within these areas would be affected at once. Furthermore, as floodplain restoration is being
14 implemented new sandbar habitat would likely be forming prior and/or concurrent with future
15 floodplain restoration projects that may affect sandbar habitat on the San Joaquin River and/or
16 Paradise Cut.

17 **NEPA Effects:** The potential impacts on Sacramento and Antioch Dunes anthicid beetle associated
18 with Alternative 1A as a whole would represent an adverse effect as a result of habitat modification
19 of a special-status species and potential for direct mortality in the absence of other conservation
20 actions. However, with implementation of restoration associated with CM5, CM6, and CM7, which
21 would be phased throughout the time period when the impacts would be occurring, the effects of
22 Alternative 1A as a whole on Sacramento and Antioch Dunes anthicid beetles would not be adverse
23 under NEPA.

24 **CEQA Conclusion:** Alternative 1A would impact Sacramento and Antioch Dunes anthicid beetles'
25 habitat and could impact seven occurrences of Sacramento anthicid beetle and one occurrence of
26 Antioch Dunes anthicid beetle. However, over the term of the BDCP, implementation of conservation
27 components would likely benefit Sacramento and Antioch Dunes anthicid beetles. BDCP
28 conservation components, particularly CM5, CM6, and CM7, would generally contribute to the
29 formation of sandbar habitat in the Plan Area. Floodplain restoration (CM5) would be phased over a
30 period of 30 years so that not all sandbar habitat within these areas would be affected at once.
31 Furthermore, as floodplain restoration is being implemented, new sandbar habitat will likely be
32 forming prior to or concurrent with future floodplain restoration projects that may affect sandbar
33 habitat on the San Joaquin River or Paradise Cut.

34 Considering that floodplain restoration (CM5), channel margin enhancement (CM6), and riparian
35 habitat restoration (CM7) would contribute to the replacement of and possible expansion of sandbar
36 habitat in the Delta and would be phased throughout the time period when the impacts would be
37 occurring, the implementation of Alternative 1A as a whole would not result in a substantial adverse
38 effect though habitat modification and would not substantially reduce the number or restrict the
39 range of these species. Therefore, the alternative would have a less-than significant impact on
40 Sacramento and Antioch Dunes anthicid beetle.

41 **Delta Green Ground Beetle**

42 This section describes the effects of Alternative 1A on delta green ground beetle. Suitable habitat in
43 the study area would be vernal pool complexes and annual grasslands in the general Jepson Prairie

1 area. The construction, and operations and maintenance of the water conveyance facilities under
 2 Alternative 1A would not affect delta green ground beetle because the facilities and construction
 3 area are outside the known range of the species. Implementation of Alternative 1A could affect delta
 4 green ground beetle through the protection of grasslands and vernal pool complex (CM3) in the
 5 vicinity of Jepson Prairie and the subsequent implementation of habitat enhancement and
 6 management actions and recreational trail construction (CM11) in these areas. In addition, tidal
 7 natural communities restoration (CM4) and vernal pool and alkali seasonal wetland complex
 8 restoration (CM9) could result in potential impacts on delta green ground beetle and its habitat. Full
 9 implementation of Alternative 1A would likely result in beneficial effects on delta green ground
 10 beetle through the following conservation actions.

- 11 • Protect 2,000 acres of grassland in CZ 1 (Objective GNC1.1, associated with CM3).
- 12 • Protect 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective VPNC1.1, associated with
 13 CM3).
- 14 • Restore up to 67 acres of vernal pool complex in CZs 1, 8, and/or 11 (Objective VPNC1.2,
 15 associated with CM9).

16 These areas could contain currently occupied habitat for delta green ground beetle and/or create
 17 conditions suitable for eventual range expansion. As explained below, potential impacts on delta
 18 green ground beetle would be adverse for NEPA purposes and would be significant for CEQA
 19 purposes. Mitigation Measure BIO-42, *Avoid Impacts on Delta Green Ground Beetle and its Habitat*,
 20 would reduce the effects under NEPA and reduce the impacts to a less-than-significant level under
 21 CEQA.

22 **Table 12-1A-18. Changes in Delta Green Ground Beetle Habitat Associated with Alternative 1A**
 23 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2-CM18	0	0	0	0	0	0
	0	0	0	0	0	0
Total Impacts CM2-CM18	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-42: Loss or Conversion of Habitat for and Direct Mortality of Delta Green Ground**
 2 **Beetle**

3 Alternative 1A conservation measures could result in the conversion of habitat and/or direct
 4 mortality to delta green ground beetle. Conservation measures that could affect delta green ground
 5 beetle include tidal natural communities habitat restoration (CM4), vernal pool and alkali seasonal
 6 wetland complex restoration (CM9), and habitat enhancement and management activities (CM11) in
 7 CZ 1. CZ 1 is the only portion of the Plan Area that contains occupied and potential habitat for delta
 8 green ground beetle. The range of the delta green ground beetle is currently believed to be generally
 9 bound by Travis Air Force Base to the west, Highway 113 to the east, Hay Road to the north, and
 10 Creed Road to the south (Arnold and Kavanaugh 2007; U.S. Fish and Wildlife Service 2009a). Further
 11 discussion of this potential effect is provided below, and NEPA and CEQA conclusions follow.

- 12 • *CM4 Tidal Natural Communities Restoration:* Tidal restoration in the Cache Slough ROA could
 13 result in the loss of delta green ground beetle habitat if restoration is planned in areas known to
 14 be or potentially occupied by the species. CM4 identifies 5,000 acres of freshwater tidal natural
 15 communities restoration in the Cache Slough ROA and Lindsey Slough and Calhoun Cut have
 16 been identified as areas suitable for restoration. Lindsey Slough is just east of Jepson Prairie, and
 17 Calhoun Cut, which is off of Lindsey Slough (see Figure 12-1), goes into the general Jepson
 18 Prairie area and is adjacent to areas of potential habitat for delta green ground beetle. The tidal
 19 restoration methods and techniques identified in CM4 include excavating channels; modifying
 20 ditches, cuts, and levees to encourage tidal circulation; and scalping higher elevation areas to
 21 create marsh plains. These disturbances could affect delta green ground beetle through habitat
 22 modification, either directly or indirectly through hydrologic modifications, and/or result in
 23 direct mortality to the species. No CNDDDB records for delta green ground beetle are intersected
 24 by the hypothetical tidal restoration footprints being used by the BDCP.
- 25 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration:* Vernal pool restoration may
 26 occur in CZ 1 and could result in disturbance to delta green ground beetle habitat if restoration
 27 is planned in areas known to be or potentially occupied by the species. These restoration
 28 activities would most likely take place in areas that were historically vernal pool complexes that
 29 have since been highly degraded, but which are suitable for vernal pool restoration. These areas
 30 would not likely provide habitat for delta green ground beetle but if these activities do take
 31 place in areas more suitable than disturbances could result in direct mortality to the species but
 32 ultimately would expand habitat available to the species.
- 33 • *CM11 Natural Communities Enhancement and Management:* As described in *CM3 Natural*
 34 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in
 35 CZ 1 and a portion of the 600 acres of protection and possibly some of the up to 10 wetted acres
 36 of vernal pool restoration could also occur in CZ 1. Potential effects from CM11 could include
 37 direct mortality to larvae and adults from the implementation of grassland management
 38 techniques, which may include livestock grazing, prescribed burning, and mowing. In addition to
 39 these grassland and vernal pool complex management actions, CM11 also includes guidelines
 40 and techniques for invasive plant control, which may include manual control (hand-pulling and
 41 digging), mechanical control (large equipment), and chemical control, though some of these
 42 methods would be restricted in areas where rare plants occur or in critical habitat for vernal
 43 pool species. The creation of new recreation trails as part of CM11 will result in impacts on 15.5
 44 acres of grasslands within CZ 1, which could affect delta green ground beetle if present.

1 **NEPA Effects:** The protection of 2,000 acres of grassland in CZ 1 (CM3) and the protection of 600
2 acres of vernal pool complex and up to 10 wetted acres of vernal pool complex restoration, some of
3 which could occur in CZ 1 (CM3 and CM9), could benefit delta green ground beetle if these areas
4 occur within the range of the species. Tidal natural communities restoration (CM4), vernal pool and
5 alkali seasonal wetland complex restoration (CM9), and recreational trail construction and
6 subsequent enhancement and management actions (CM11) could impact delta green ground beetle.
7 The management of these grasslands and vernal pool complexes according to *CM11 Natural*
8 *Communities Enhancement and Management* and the construction of recreational trails in CZ 1 have
9 a potential to affect this species. AMM37 would ensure that new trails in vernal pool complexes
10 would be sited at least 250 feet from wetland features, or closer if site specific information indicates
11 that local watershed surrounding a vernal pool is not adversely affected. Direct mortality or the
12 effects on delta green ground beetle habitat would be an adverse effect under Alternative 1A.
13 Mitigation Measure BIO-42, *Avoid Impacts on Delta Green Ground Beetle and its Habitat*, would be
14 available to address this effect.

15 **CEQA Conclusion:** The implementation of grassland protection (CM3), tidal natural communities
16 restoration (CM4), vernal pool and alkali seasonal wetland complex restoration (CM9), and
17 recreational trail construction and subsequent enhancement and management actions (CM11) could
18 impact delta green ground beetle. Tidal restoration projects around Calhoun Cut and possible
19 Lindsey Slough could affect habitat and result in direct mortality to the species from excavating
20 channels; modifying ditches, cuts, and levees to encourage tidal circulation; and scalping higher
21 elevation areas to create marsh plains. Potential impacts from CM11 could include direct mortality
22 of larvae and adults resulting from the implementation of recreation trail construction in 15.5 acres
23 of grassland in CZ 1 and from grassland management techniques, which may include livestock
24 grazing, prescribed burning, and mowing. AMM37 would ensure that new trails in vernal pool
25 complexes are sited at least 250 feet from wetland features, or closer if site specific information
26 indicates that local watershed surrounding a vernal pool is not adversely affected. CM11 also
27 includes guidelines and techniques for invasive plant control, which may include manual control
28 (hand-pulling and digging), mechanical control (large equipment), and chemical control, though
29 some of these methods would be restricted in areas where rare plants occur and in critical habitat
30 for vernal pool species. These actions could result in adverse effects through habitat modification
31 and a possible reduction in the number of the species or restrict its range, and, therefore, would
32 result in significant impacts on delta green ground beetle. Implementation of Mitigation Measure
33 BIO-42 would reduce these impacts to a less-than-significant level.

34 **Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat**

35 As part of the design and development of management plans for conservation areas in the area
36 of Jepson Prairie, BDCP proponents will implement the following measures to avoid effects on
37 delta green ground beetle.

- 38 • If habitat restoration or protection is planned for the lands adjacent to Calhoun Cut and
39 noncultivated lands on the western side of Lindsey Slough, these areas will be evaluated by a
40 USFWS approved biologist for potential delta green ground beetle habitat (large playa pools,
41 or other similar aquatic features, with low growing vegetation or bare soils around the
42 perimeter). The biologist will have previous experience with identifying suitable habitat
43 requirements for delta green ground beetle.

- 1 • Any suitable habitat identified by the biologist (with previous experience with delta green
2 ground beetle) within the species current range will be considered potentially occupied and
3 all ground disturbing covered activities in these areas will be avoided, which for the Plan
4 Area is generally the area west of State Route 113.
- 5 • Any other areas identified as suitable habitat outside of the current range of the species will
6 be surveyed by a biologist with previous experience in surveying for and identifying delta
7 green ground beetle. No ground disturbing activities will occur in areas identified as
8 occupied by delta green ground beetle.
- 9 • Based on the results of the habitat evaluations and surveys, site-specific restoration and
10 management plans will be developed so that they don't conflict with the recovery goals for
11 delta green ground beetle in the USFWS's 2005 *Recovery Plan for Vernal Pool Ecosystems of*
12 *California and Southern Oregon* (U.S. Fish and Wildlife Service 2005). Plans will include
13 measures to protect and manage for delta green ground beetle so that they continue to
14 support existing populations or allow for future colonization.

15 **Callippe Silverspot Butterfly**

16 Suitable habitats for callippe silverspot butterfly are typically in areas influenced by coastal fog with
17 hilltops that support the specie's host-plant, Johnny jump-ups. Preferred nectar flowers used by
18 adults include thistles, blessed milk thistle, and coyote wild mint. Other native nectar sources
19 include hairy false goldenaster, coast buckwheat, mourning bride, and California buckeye. The
20 construction, and operations and maintenance of the water conveyance facilities under Alternative
21 1A would not result in impacts on callippe silverspot butterfly or its habitat. If Cordelia Hills and
22 Potrero Hills are identified for grassland protection opportunities as part of *CM3 Natural*
23 *Communities Protection and Restoration* and the subsequent implementation of *CM11 Natural*
24 *Communities Enhancement and Management*, could affect callippe silverspot butterfly. Callippe
25 silverspot butterfly has been documented in the western most portion of the Plan Area (CZ 11) in
26 the Cordelia Hills (Solano County Water Agency 2009). Potential habitat for the species (grassy hills
27 with *Viola pedunculata*) is present in the Potrero Hills, but it has not been observed there (EDAW
28 2005; California Department of Fish and Wildlife 2013). Though has been identified as potential
29 area for grassland restoration in *CM8 Grassland Natural Community Restoration*, the primary goal
30 there is to restore small patches of grassland to connect to Jepson Prairie and/or the restoration of
31 upland grasses adjacent to tidal brackish emergent wetland in Suisun Marsh, both of which would
32 not be areas suitable for callippe silverspot butterfly. The full implementation of Alternative 1A
33 would protect up to 2,000 acres of grassland in CZ 11 (Objective GNC1.1, associated with CM3),
34 some of which may contain habitat for callippe silverspot butterfly. As explained below, potential
35 impacts on callippe silverspot would be adverse for NEPA purposes and would be significant for
36 CEQA purposes. Implementation of Mitigation Measure BIO-43, *Avoid and Minimize Loss of Callippe*
37 *Silverspot Butterfly Habitat*, would reduce the effects under NEPA and reduce the impacts to a less-
38 than-significant level under CEQA.

1 **Table 12-1A-19. Changes in Callippe Silverspot Butterfly Habitat Associated with Alternative 1A**
2 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2-CM18	0	0	0	0	0	0
	0	0	0	0	0	0
Total Impacts CM2-CM18	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-43: Loss or Conversion of Habitat for and Direct Mortality of Callippe Silverspot**
5 **Butterfly**

6 Alternative 1A conservation measures could result in the conversion of habitat and/or direct
7 mortality to callippe silverspot butterfly. Only one conservation measure was identified as
8 potentially affecting callippe silverspot butterfly, *CM11 Natural Communities Enhancement and*
9 *Management*, which could result in the disturbance of callippe silverspot butterfly habitat if such
10 areas are acquired as part of grassland protection under *CM3 Natural Communities Protection and*
11 *Restoration*. Further discussion of this potential effect is provided below and NEPA and CEQA
12 conclusions follow.

13 As described in *CM3 Natural Communities Protection and Restoration*, up to 2,000 acres of grasslands
14 would be protected in CZ 11 under CM11. If areas chosen for protection include Cordelia Hills or
15 Potrero Hills, where there is known and potential habitat, respectively, then grassland enhancement
16 and management actions could affect the callippe silverspot butterfly. Potential effects resulting
17 from CM11 could include the loss of larval host and nectar sources and direct mortality to larvae and
18 adults from the installation of artificial nesting burrows and structures and the implementation of
19 grassland management techniques, which may include livestock grazing, prescribed burning, and
20 mowing. In addition to these grassland management actions, CM11 also includes guidelines and
21 techniques for invasive plant control, which may include manual control (hand-pulling and digging),
22 mechanical control (large equipment), and chemical control. Several of the preferred nectar sources

1 are thistles, some of which have been identified by the California Invasive Plant Council as having
2 limited to moderate ecological impacts (California Invasive Plant Council 2006).

3 **NEPA Effects:** The protection of 2,000 acres of grassland within could benefit callippe silverspot
4 butterfly if these protected areas include occupied and potential habitat on the hill tops in Cordelia
5 Hills and Potrero Hills. The management of these grasslands according to *CM11 Natural*
6 *Communities Enhancement and Management* has potential to adversely affect this species. Direct
7 mortality or the removal of larval host plants and nectar sources for adults would be an adverse
8 effect under NEPA. Mitigation Measure BIO-43, *Avoid and Minimize Loss of Callippe Silverspot*
9 *Butterfly Habitat*, would be available to address this effect.

10 **CEQA Conclusion:** If grasslands within the Cordelia Hills and Potrero Hills are protected as part of
11 *CM3 Natural Communities Protection and Restoration* then the subsequent management of these
12 grasslands according to *CM11 Natural Communities Enhancement and Management* has the potential
13 to affect this species. Potential impacts from CM11 could include the loss of larval host and nectar
14 sources and direct mortality of larvae and adults resulting from the installation of artificial nesting
15 burrows and structures and the implementation of grassland management techniques, which may
16 include livestock grazing, prescribed burning, and mowing. In addition to these grassland
17 management actions, CM11 also includes guidelines and techniques for invasive plant control that
18 may include manual control (hand-pulling and digging), mechanical control (large equipment), and
19 chemical control, which could result in direct and indirect effects on larval host plants and nectar
20 plants. These actions could result in adverse effects through habitat modification and a possible
21 reduction in the number of the species or restrict its range and would, therefore, result in significant
22 impact on the species. However, over the term of BDCP, callippe silverspot butterfly could benefit
23 from the protection of occupied and potential habitat for the species. In addition, the
24 implementation of Mitigation Measure BIO-43 would reduce the potential impact of habitat loss or
25 conversion on callippe silverspot butterfly to a less-than-significant level.

26 **Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly**
27 **Habitat**

28 As part of the development of site-specific management plans on protected grasslands in the
29 Cordelia Hills and/or Potrero Hills, BDCP proponents will implement the following measures to
30 avoid and minimize the loss of callippe silverspot habitat.

- 31
- 32 • Hilltops in Cordelia Hills and Potrero Hills will be surveyed for callippe silverspot larval host
33 plants (Johnny jump-ups) by a biologist familiar with identifying this plant species. These
34 surveys should occur during the plant's blooming period (typically early January through
35 April)
 - 36 • If larval host plants are present, then presence/absence surveys for callippe silverspot
37 butterfly larvae will be conducted according to the most recent USFWS approved survey
38 methods by a biologist with previous experience in surveying for and identifying callippe
39 larvae and/or signs of larval presence. These surveys should be conducted prior to the adult
40 flight season, which usually starts in mid-May.
 - 41 • If larvae are detected then no further surveys are necessary. If larvae are not detected then
42 surveys for adults will be conducted by a biologist familiar with surveying for and
43 identifying callippe silverspot. Surveys typically start in mid-May and continue weekly for 8
to 10 weeks.

- If callippe silverspot butterflies are detected, then the site-specific management plans will be written to include measures to protect and manage for larval host plants and nectar sources so that they continue to support existing populations and/or allow for future colonization. Mapping of both larval host plants and nectar sources will be incorporated into the management plans.

California Red-Legged Frog

Modeled California red-legged frog habitat in the study area is restricted to freshwater aquatic and grassland habitat, and immediately adjacent cultivated lands along the study area's southwestern edge in CZ 7, CZ 8, CZ 9, and CZ 11. Pools in perennial and seasonal streams and stock ponds provide potential aquatic habitat for this species. While stock ponds are underrepresented as a modeled habitat, none is expected to be affected by BDCP actions. Construction and restoration associated with Alternative 1A conservation measures would result in both temporary and permanent losses of California red-legged frog modeled habitat as indicated in Table 12-1A-20. Factors considered in assessing the value of affected habitat for the California red-legged frog, to the extent that information is available, are presence of limiting habitat (aquatic breeding habitat), known occurrences and clusters of occurrences, proximity of the affected habitat to existing protected lands, and the overall degraded or fragmented nature of the habitat. The study area represents the extreme eastern edge of the species' coastal range, and species' occurrences are reported only from CZ 8 and CZ 11. Full implementation of Alternative 1A would also include the following biological objectives over the term of the BDCP to benefit the California red-legged frog (BDCP Chapter 3, *Conservation Strategy*).

- Increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of nonnative species (Objective L2.6, associated with CM11, CM13, and CM20).
- Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- Protect stock ponds and other aquatic features within protected grasslands to provide aquatic breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with CM3)
- Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with CM11).
- Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and duration and suitable composition of vegetative cover to support breeding for covered amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

As explained below, with the restoration and protection of these amounts of habitat, in addition to implementation of AMMs, impacts on California red-legged frog would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-20. Changes in California Red-Legged Frog Modeled Habitat Associated with**
2 **Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic	1	1	0	0	NA	NA
	Upland	5	5	153	153	NA	NA
Total Impacts CM1		6	6	153	153		
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	8	24	0	0	0	0
Total Impacts CM2-CM18		8	24	0	0	0	0
TOTAL IMPACTS		14	30	153	153	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-44: Loss or Conversion of Habitat for and Direct Mortality of California Red-**
5 **Legged Frog**

6 Alternative 1A conservation measures would result in the permanent and temporary loss combined
7 of up to 1 acre of modeled aquatic habitat and 182 acres of modeled upland habitat for California
8 red-legged frog (Table 12-1A-20). There are no California red-legged frog occurrences that overlap
9 with the Plan footprint. Conservation measures that would result in these losses are conveyance
10 facilities and transmission line construction (CM1) and recreational facility construction for CM11.
11 Construction activities associated with the water conveyance facilities and recreational facilities,
12 including operation of construction equipment, could result in temporary effects on, as well as
13 injury and mortality of, California red-legged frogs. In addition, natural enhancement and
14 management activities (CM11), which include ground disturbance or removal of nonnative
15 vegetation, could result in local adverse habitat effects. In addition, maintenance activities
16 associated with the long-term operation of the water conveyance facilities and other BDCP physical
17 facilities could degrade or eliminate California red-legged frog habitat and could result in injury and
18 mortality of California red-legged frogs. Each of these individual activities is described below. A
19 summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the
20 individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A, including transmission line
22 construction, would result in the permanent loss of up to 1 acre of aquatic habitat and 5 acres of
23 upland habitat for California red-legged frog in CZ 8 (Table 12-1A-20). Permanent effects would
24 be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension and

1 installation of cross culverts, installation of structural hardscape, and installation and relocation
2 of utilities. Construction-related effects would temporarily disturb 153 acres of upland habitat
3 for the California red-legged frog (Table 12-1A-20). Surveys have not found any evidence that
4 the species is using this habitat (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
5 *EIR/EIS Environmental Data Report*).

- 6 • *CM11 Natural Communities Enhancement and Management*: An estimated 24 acres of upland
7 cover and dispersal habitat for the California red-legged frog would be removed as a result of
8 constructing trails and associated recreational facilities. Passive recreation in the reserve
9 system could result in trampling and disturbance of egg masses in water bodies, degradation of
10 water quality through erosion and sedimentation, and trampling of sites adjacent to upland
11 habitat used for cover and movement. *AMM37 Recreation* requires protection of water bodies
12 from recreational activities and requires trail setbacks from wetlands. With these restrictions,
13 recreation-related effects on California red-legged frog are expected to be minimal.

14 In addition, activities associated with natural communities enhancement and management in
15 protected California red-legged frog habitat, such as ground disturbance or herbicide use to
16 control nonnative vegetation, could result in local adverse habitat effects on, and injury or
17 mortality of, California red-legged frogs. These effects would be avoided and minimized with
18 implementation of the AMMs listed below. Herbicides would only be used in California red-
19 legged frog habitat in accordance with the written recommendation of a licensed, registered
20 pest control advisor and in conformance with label precautions and federal, state, and local
21 regulations in a manner that avoids or minimizes harm to the California red-legged frog.

- 22 • *Critical habitat*: Several conservation measures would be implemented in California red-legged
23 frog habitat and designated critical habitat in CZ 8 and CZ 11. Approximately 2,460 acres of
24 designated critical habitat for the California red-legged frog overlaps with the study area along
25 the western edge of CZ 11 in critical habitat unit SOL-1. An additional 862 acres of designated
26 critical habitat is also present along the western edge of CZ 8 in critical habitat unit ALA-2.
27 Conservation actions to protect and enhance grassland habitat for covered species, including
28 California red-legged frog, in CZ 8 could include acquisition and enhancement of designated
29 critical habitat for the California red-legged frog and California tiger salamander. Any habitat
30 enhancement actions for these species in designated critical habitat are expected to enhance the
31 value of any affected designated critical habitat for conservation of California red-legged frog.
32 These actions would result in an overall benefit to California red-legged frog within the study
33 area through protection and management of grasslands with associated intermittent stream
34 habitat and through restoration of vernal pool complex habitat and its associated grassland
35 habitat.

- 36 • *Operations and maintenance*: Ongoing water conveyance facilities operation and maintenance is
37 expected to have little if any adverse effect on the California red-legged frog. Postconstruction
38 operation and maintenance of the above-ground water conveyance facilities could result in
39 ongoing but periodic postconstruction disturbances that could affect California red-legged frog
40 use of the surrounding habitat. Operation of maintenance equipment, including vehicle use
41 along transmission corridors in CZ 8, could also result in injury or mortality of California red-
42 legged frogs if present in work sites. Implementation conservation actions and AMM1–AMM6,
43 AMM10, AMM14, and AMM37, would reduce these effects.

- 44 • *Injury and direct mortality*: Construction activities associated with the water conveyance
45 facilities, vernal pool complex restoration, and habitat and management enhancement-related

1 activities, including operation of construction equipment, could result in injury or mortality of
2 California red-legged frogs. Breeding, foraging, dispersal, and overwintering behavior may be
3 altered during construction activities, resulting in injury or mortality of California red-legged
4 frog. Frogs occupying burrows could be trapped and crushed during ground-disturbing
5 activities. Degradation and loss of estivation habitat is also anticipated to result from the
6 removal of vegetative cover and collapsing of burrows. Injury or mortality would be avoided and
7 minimized through implementation of seasonal constraints and preconstruction surveys in
8 suitable habitat, collapsing unoccupied burrows, and relocating frogs outside of the construction
9 area as described in AMM1–AMM6, AMM10, AMM14, and AMM37.

10 The following paragraphs summarize the combined effects discussed above and describe other
11 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
12 also included.

13 ***Near-Term Timeframe***

14 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
15 the near-term BDCP conservation strategy has been evaluated to determine whether it would
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
17 effects of conveyance facilities construction would not be adverse under NEPA.

18 Alternative 1A would permanently remove approximately 1 acre of aquatic habitat and 166 acres of
19 upland terrestrial cover habitat for California red-legged frog. The effects would result from
20 construction of the water conveyance facilities (CM1, 158 acres) and recreational facilities (CM11, 8
21 acres).

22 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
23 and that are identified in the biological goals and objectives for California red-legged frog in BDCP
24 Chapter 3 would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and 2:1 for
25 protection of grassland habitats. Using these ratios would indicate that 1 acre of aquatic habitat
26 should be restored, 1 acre of aquatic habitat should be protected, and 332 acres of grassland should
27 be protected for California red-legged frog to mitigate the near-term losses.

28 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area
29 (Table 3-4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8, west of Byron
30 Highway, would benefit California red-legged frog by providing habitat in the portion of the Plan
31 Area with the highest long-term conservation value for the species based on known species
32 occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with Objective
33 GNC1.3, ponds and other aquatic features within the grasslands would be protected to provide
34 aquatic habitat for this species, and surrounding grassland would provide dispersal and aestivation
35 habitat, which would compensate for the loss of 1 acre of aquatic habitat. In addition, aquatic
36 features in grasslands would be maintained and enhanced to provide suitable inundation depth and
37 duration to support breeding habitat for covered amphibians (Objective GNC2.5).

38 These conservation actions would occur in the same timeframe as the construction losses, thereby
39 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives
40 represent performance standards for considering the effectiveness of CM3 protection and
41 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
42 and the additional detail in the biological objectives for California red-legged frog satisfy the typical

1 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-
2 term effects of the other conservation measures.

3 The plan also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*
4 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
5 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM10 Restoration of Temporarily Affected*
7 *Natural Communities, AMM14 California Red-Legged Frog, and AMM37 Recreation.* These AMMs
8 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
9 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
10 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
11 EIR/EIS.

12 **Late Long-Term Timeframe**

13 The habitat model indicates that the study area supports approximately 159 acres of aquatic and
14 7,766 acres of upland habitat for California red-legged frog. Alternative 1A as a whole would result
15 in the permanent loss of and temporary effects on 1 acre of aquatic habitat and 182 acres of upland
16 habitat for California red-legged frog for the term of the plan (less than 1% of the total aquatic
17 habitat in the study area and 1% of the total upland habitat in the study area). The 1 acre of aquatic
18 habitat that would be permanently lost is not known to be used for breeding. Most of the California
19 red-legged frog upland habitat that would be removed consists of naturalized grassland or
20 cultivated land in a highly disturbed or modified setting on lands immediately adjacent to Clifton
21 Court Forebay. The removed upland cover and dispersal habitat is within 0.5 mile of a cluster of
22 known California red-legged frog occurrences to the west. However, this habitat consists mostly of
23 cultivated lands and small patches of grasslands, and past and current surveys in this area have not
24 found any evidence that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta*
25 *Conservation Plan EIR/EIS Environmental Data Report*).

26 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
27 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would
28 benefit the California red-legged frog by providing habitat in the portion of the study area with the
29 highest long-term conservation value for the species based on known species occurrences and large,
30 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other
31 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,
32 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in
33 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation
34 depth and duration and suitable composition of vegetative cover to support breeding California red-
35 legged frogs (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and other
36 measures would be implemented as described in CM11 to promote growth of aquatic vegetation
37 with appropriate cover characteristics favorable to California red-legged frogs. Lands protected in
38 CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP* and the
39 extensive Los Vaqueros Watershed lands, including grassland areas supporting this species. This
40 objective would ensure that California red-legged frog upland and associated aquatic habitats would
41 be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat within
42 and adjacent to the Plan Area.

43 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
44 and protection actions discussed above, as well as the restoration of tidal freshwater emergent

1 wetland, grassland, valley/foothill riparian, and vernal pool complex that could overlap with the
2 species model, would result in the restoration of 16 acres of aquatic and 351 acres of upland
3 modeled habitat for California red-legged frog. In addition, protection of managed wetland,
4 grassland, valley/foothill riparian, and vernal pool complex could overlap with the species model
5 and would result in the protection of 3 acres of aquatic and 1,047 acres of upland California red-
6 legged frog modeled habitat.

7 **NEPA Effects:** In the near-term, the loss of California red-legged frog habitat under Alternative 1A
8 would be not be adverse because the BDCP has committed to protecting and restoring the acreage
9 required to meet the typical mitigation ratios described above. In the late long-term, the losses of
10 California red-legged frog aquatic and upland habitat associated with Alternative 1A, in the absence
11 of other conservation actions, would represent an adverse effect as a result of habitat modification
12 and potential direct mortality of a special-status species. However, with habitat protection and
13 restoration associated with the conservation components, guided by landscape-scale goals and
14 objectives and by AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative 1A as a
15 whole on California red-legged frog would not be adverse.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
19 the near-term BDCP conservation strategy has been evaluated to determine whether it would
20 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
21 impact of conveyance facilities construction would be less than significant.

22 Alternative 1A would permanently remove approximately 1 acre of aquatic habitat and 166 acres of
23 upland terrestrial cover habitat for California red-legged frog. The effects would result from
24 construction of the water conveyance facilities (CM1, 158 acres) and recreational facilities (CM11, 8
25 acres).

26 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
27 and that are identified in the biological goals and objectives for California's red-legged frog in
28 Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and
29 2:1 for protection of grassland habitats. Using these ratios would indicate that 1 acre of aquatic
30 habitat should be restored, 1 acre of aquatic habitat should be protected, and 332 acres of grassland
31 should be protected for California red-legged frog to mitigate the near-term losses.

32 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area
33 (Table 3-4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8, west of Byron
34 Highway, would benefit California red-legged frog by providing habitat in the portion of the Plan
35 Area with the highest long-term conservation value for the species based on known species
36 occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with Objective
37 GNC1.3, ponds and other aquatic features within the grasslands would be protected to provide
38 aquatic habitat for this species, and surrounding grassland would provide dispersal and aestivation
39 habitat which would compensate for the loss of 1 acre of aquatic habitat. In addition, aquatic
40 features in grasslands would be maintained and enhanced to provide suitable inundation depth and
41 duration to support breeding habitat for covered amphibians (Objective GNC2.5).

42 These conservation actions would occur in the same timeframe as the construction losses, thereby
43 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives

1 represent performance standards for considering the effectiveness of CM3 protection and
2 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
3 and the additional detail in the biological objectives for California red-legged frog satisfy the typical
4 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-
5 term effects of the other conservation measures.

6 The BDCP also contains commitments to implement AMM1–AMM6, AMM10, AMM14, and AMM37.
7 These AMMs include elements that avoid or minimize the risk of affecting individuals and species
8 habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since been
9 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
10 the Final EIR/EIS.

11 These commitments are more than sufficient to support the conclusion that the near-term effects of
12 Alternative 1A on California red-legged frog would be less than significant under CEQA, because the
13 number of acres required to meet the typical ratios described above would be only 1 acre of aquatic
14 habitat restored, 1 acre of aquatic habitat protected, and 332 acres of upland communities
15 protected.

16 **Late Long-Term Timeframe**

17 The habitat model indicates that the study area supports approximately 159 acres of aquatic 7,766
18 acres of upland habitat for California red-legged frog. Alternative 1A as a whole would result in the
19 permanent loss of and temporary effects on 1 acre of aquatic habitat and 182 acres of upland habitat
20 for California red-legged frog for the term of the plan (less than 1% of the total aquatic habitat in the
21 study area and 1% of the total upland habitat in the study area). The 1 acre of aquatic habitat that
22 would be permanently lost is not known to be used for breeding. Most of the California red-legged
23 frog upland habitat that would be removed consists of naturalized grassland or cultivated land in a
24 highly disturbed or modified setting on lands immediately adjacent to Clifton Court Forebay. The
25 removed upland cover and dispersal habitat is within 0.5 mile of a cluster of known California red-
26 legged frog occurrences to the west. However, this habitat consists mostly of cultivated lands and
27 small patches of grasslands, and past and current surveys in this area have not found any evidence
28 that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*
29 *Environmental Data Report*).

30 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
31 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would
32 benefit the California red-legged frog by providing habitat in the portion of the study area with the
33 highest long-term conservation value for the species based on known species occurrences and large,
34 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other
35 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,
36 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in
37 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation
38 depth and duration and suitable composition of vegetative cover to support breeding California red-
39 legged frogs (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and other
40 measures would be implemented as described in CM11 to promote growth of aquatic vegetation
41 with appropriate cover characteristics favorable to California red-legged frogs. Lands protected in
42 CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP* and the
43 extensive Los Vaqueros Watershed lands, including grassland areas supporting this species. This
44 objective would ensure that California red-legged frog upland and associated aquatic habitats would

1 be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat within
2 and adjacent to the Plan Area.

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
4 and protection actions discussed above, as well as the restoration of tidal freshwater emergent
5 wetland, grassland, valley/foothill riparian, and vernal pool complex that could overlap with the
6 species model, would result in the restoration of 16 acres of aquatic and 351 acres of upland
7 modeled habitat for California red-legged frog. In addition, protection of managed wetland,
8 grassland, valley/foothill riparian, and vernal pool complex could overlap with the species model
9 and would result in the protection of 3 acres of aquatic and 1,047 acres of upland California red-
10 legged frog modeled habitat.

11 In the absence of other conservation actions, the losses of California red-legged frog aquatic and
12 upland habitat associated with Alternative 1A would represent an adverse effect as a result of
13 habitat modification and potential direct mortality of a special-status species. However, with habitat
14 protection and restoration associated with the conservation components, guided by landscape-scale
15 goals and objectives and AMM1-6, AMM10, AMM14, and AMM37, the effects of Alternative 1A would
16 have a less-than-significant impact on California red-legged frog.

17 **Impact BIO-45: Indirect Effects of Plan Implementation on California Red-Legged Frog**

18 Noise and visual disturbance including artificial nighttime lighting outside the project footprint but
19 within 500 feet of construction activities are indirect effects that could temporarily affect the use of
20 California red-legged frog habitat, all of which is upland cover and dispersal habitat. The areas that
21 would be affected are near Clifton Court Forebay, and no California red-legged frogs were detected
22 during recent surveys conducted in this area (*Appendix 12C, 2009 to 2011 Bay Delta Conservation*
23 *Plan EIR/EIS Environmental Data Report*).

24 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment
25 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability
26 of California red-legged frog habitat downstream of the construction area by filling in pools and
27 smothering eggs. Accidental spills of toxic fluids also could result in the subsequent loss of California
28 red-legged frog if these materials enter the aquatic system. Hydrocarbon and heavy metal pollutants
29 associated with roadside runoff also have the potential to enter the aquatic system, affecting water
30 quality and California red-legged frog.

31 **NEPA Effects:** Implementation of AMM1-AMM6, AMM10, AMM14, and AMM37 as part of
32 implementing Alternative 1A would avoid the potential for adverse effects on California red-legged
33 frogs, either indirectly or through habitat modifications. These AMMs would also avoid and
34 minimize effects that could substantially reduce the number of California red-legged frogs or restrict
35 the species' range. Therefore, the indirect effects of Alternative 1A would not have an adverse effect
36 on California red-legged frog.

37 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance, as well
38 as construction-related noise and visual disturbances including artificial nighttime lighting, could
39 impact California red-legged frog in aquatic and upland habitats. The use of mechanical equipment
40 during construction could cause the accidental release of petroleum or other contaminants that
41 could impact California red-legged frog or its prey. The inadvertent discharge of sediment or
42 excessive dust adjacent to California red-legged frog habitat could also have a negative impact on the
43 species or its prey. With implementation of AMM1-AMM6, AMM10, AMM14, and AMM37,

1 construction, operation, and maintenance under Alternative 1A would avoid the potential for
2 substantial adverse effects on California red-legged frog, either indirectly or through habitat
3 modifications, and would not result in a substantial reduction in numbers or a restriction in the
4 range of California red-legged frogs. The indirect effects of Alternative 1A would have a less-than-
5 significant impact on California red-legged frogs.

6 **California Tiger Salamander**

7 Modeled California tiger salamander habitat in the study area contains two habitat types: terrestrial
8 cover and aestivation habitat, and aquatic breeding habitat and is restricted to CZ 1, CZ 2, CZ 4, CZ 5,
9 CZ 7, CZ 8, and CZ 11 (Figure 12-14). Modeled terrestrial cover and aestivation habitat contains all
10 grassland types and alkali seasonal wetland with a minimum patch size of 100 acres and within a
11 geographic area defined by species records and areas most likely to support the species. Patches of
12 grassland that were below the 100-acre minimum patch size but were contiguous with grasslands
13 outside of the study area boundary were included. Modeled aquatic breeding habitat for the
14 California tiger salamander includes vernal pools and seasonal and perennial ponds.

15 Alternative 1A is expected to result in the temporary and permanent removal of upland habitat that
16 California tiger salamander uses for cover and dispersal (Table 12-1A-21). Potential aquatic habitat
17 for this species would not be affected. While stock ponds are underrepresented as a modeled
18 habitat, none is expected to be affected by BDCP actions. Full implementation of Alternative 1A
19 would also include the following biological objectives over the term of the BDCP to benefit the
20 California tiger salamander (BDCP Chapter 3, *Conservation Strategy*).

- 21 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
22 between existing conservation lands (Objective L1.6, associated with CM3).
- 23 ● Increase native species diversity and relative cover of native plant species, and reduce the
24 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 25 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to
26 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
27 associated with CM3, CM8, and CM11).
- 28 ● Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
29 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 30 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali
31 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).
- 32 ● Increase burrow availability for burrow-dependent species in grasslands surrounding alkali
33 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective
34 ASWNC2.3, associated with CM11).
- 35 ● Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and/or CZ 11, primarily in core
36 vernal pool recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of*
37 *California and Southern Oregon* (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,
38 associated with CM3).
- 39 ● Restore vernal pool complex in CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool
40 acreage (up to 67 acres of vernal pool complex restoration, assuming that all anticipated
41 impacts [10 wetted acres] occur and that the restored vernal pool complex has 15% density of
42 vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).

- 1 • Increase the size and connectivity of protected vernal pool complex within the Plan Area and
2 increase connectivity with protected vernal pool complex adjacent to the Plan Area (Objective
3 VPNC1.3, associated with CM3).
- 4 • Protect the range of inundation characteristics that are currently represented by vernal pools
5 throughout the Plan Area (Objective VPNC1.4, associated with CM3).
- 6 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 7 • Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective
8 GNC1.2, associated with CM3 and CM8).
- 9 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic
10 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with
11 CM3).
- 12 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
13 CM11).
- 14 • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and
15 duration and suitable composition of vegetative cover to support breeding for covered
16 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

17 As explained below, with the restoration or protection of these amounts of habitat, in addition to the
18 implementation of AMMs, impacts on California tiger salamander would not be adverse for NEPA
19 purposes and would be less than significant for CEQA purposes.

20 **Table 12-1A-21. Changes in California Tiger Salamander Modeled Habitat Associated with Alternative**
21 **1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic	0	0	0	0	NA	NA
	Upland	5	5	158	158	NA	NA
Total Impacts CM1		5	5	158	158		
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	292	634	0	0	191-639	0
Total Impacts CM2-CM18		292	634	0	0	191-639	0
TOTAL IMPACTS		297	639	158	158	191-639	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-46: Loss or Conversion of Habitat for and Direct Mortality of California Tiger**
2 **Salamander**

3 Alternative 1A conservation measures would result in the permanent and temporary loss combined
4 of up to 797 acres of modeled upland habitat for California tiger salamander (Table 12-1A-21).
5 There are no California tiger salamander occurrences that overlap with the Plan footprint.
6 Conservation measures that would result in these losses are conveyance facilities and transmission
7 line construction, and establishment and use of RTM, borrow, and spoil areas (CM1), Fremont
8 Weir/Yolo Bypass improvements (CM2), tidal natural communities restoration (CM4), construction
9 of recreational facilities (CM11), and construction of a conservation fish hatchery (CM18). Habitat
10 enhancement and management activities (CM11), which include ground disturbance or removal of
11 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities
12 associated with the long-term operation of the water conveyance facilities and other BDCP physical
13 facilities could degrade or eliminate California tiger salamander habitat. Each of these individual
14 activities is described below. A summary statement of the combined impacts and NEPA effects and a
15 CEQA conclusion follow the individual conservation measure discussions.

- 16 • *CM1 Water Facilities and Operation:* Construction of Alternative 1A conveyance facilities,
17 including transmission lines, would result in the permanent loss of 5 acres of upland habitat for
18 California tiger salamander habitat, primarily in CZ 8 (Table 12-1A-21). Permanent effects
19 would be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension
20 and installation of cross culverts, installation of structural hardscape, and installation and
21 relocation of utilities. Construction-related effects would temporarily disturb 158 acres of
22 upland habitat for the California tiger salamander (Table 12-1A-21). The area that would be
23 affected by conveyance facilities construction is south of Clifton Court Forebay, where modeled
24 California tiger salamander habitat is of relatively low value in that it consists of fragmented
25 patches of primarily terrestrial habitat surrounded by actively cultivated lands. The highest
26 concentration of California tiger salamander occurrences are in CZ 8 and are west of the
27 conveyance facilities alignment, while lands to the east consist primarily of actively cultivated
28 lands that are not suitable for the species. Habitat loss in this area is not expected to contribute
29 to habitat fragmentation or impede important California tiger salamander dispersal.
- 30 • *CM2 Yolo Bypass Fisheries Enhancement:* Improvements in the Yolo Bypass would result in the
31 permanent removal of approximately 42 acres of terrestrial cover and aestivation habitat for the
32 California tiger salamander in the late-longterm. The modeled habitat in the Yolo Bypass is of
33 low potential for California tiger salamander: There have been no observations of California
34 tiger salamander in this area based on the results of a number of surveys for vernal pool
35 invertebrates and plants and the bypass lacks vernal pool complexes with large, deep pools or
36 large grassland areas with stock ponds and similar aquatic features that hold water long enough
37 to provide potential breeding habitat for this species.
- 38 • *CM4 Tidal Natural Communities Restoration:* This activity would result in the permanent
39 removal of approximately 517 acres of terrestrial cover and aestivation habitat in the study area
40 in the late longterm. Tidal restoration in the Cache Slough area would result in habitat loss along
41 the edges of Lindsey Slough and Duck Slough, and adjacent to cultivated land along the eastern
42 edge of a block of modeled habitat. The modeled aquatic breeding habitat nearby the
43 hypothetical tidal restoration footprint is of relatively high value, consisting of vernal pool
44 complex along Lindsey Slough within the Jepson Prairie area in and near open space. The Jepson
45 Prairie area includes numerous California tiger salamander CNDDDB recorded occurrences and
46 overlaps with Critical Habitat Unit 2, Jepson Prairie Unit, for this species, however, the

1 hypothetical tidal restoration footprint does not overlap with critical habitat or recorded
2 occurrences in this area. The tidal restoration at Lindsey Slough along the northeastern edge of
3 the Jepson Prairie block of habitat and would not contribute to fragmentation. Because the
4 estimates of habitat loss resulting from tidal inundation are based on projections of where
5 restoration may occur, actual effects are expected to be lower because of the ability to select
6 sites that minimize effects on California tiger salamander.

- 7 ● *CM11 Natural Communities Enhancement and Management*: An estimated 40 acres of terrestrial
8 cover and aestivation habitat for the California tiger salamander would be removed as a result of
9 constructing trails and associated recreational facilities. Passive recreation in the reserve
10 system could result in trampling and disturbance of eggs and larvae in water bodies,
11 degradation of water quality through erosion and sedimentation, and trampling of sites adjacent
12 to upland habitat used for cover and movement. However, *AMM37 Recreation* requires
13 protection of water bodies from recreational activities and requires trail setbacks from
14 wetlands. With these restrictions, recreation-related effects on California tiger salamander are
15 expected to be minimal.

16 Habitat enhancement- and management-related activities in protected California tiger
17 salamander habitats would result in overall improvements to and maintenance of California
18 tiger salamander habitat values over the term of the BDCP. At least 1,000 acres of grassland
19 habitat and some unknown acres of vernal pool complex habitat in CZ 8 are expected to benefit
20 the California tiger salamander through protection of existing upland cover and dispersal
21 habitat from potential loss or degradation that otherwise could happen with future changes in
22 existing land use.

23 Activities associated with natural communities enhancement and management over the term of
24 the BDCP in protected California tiger salamander habitat, such as ground disturbance or
25 herbicide use to control nonnative vegetation, could result in local adverse habitat effects and
26 injury or mortality of California tiger salamander and disturbance effects if individuals are
27 present in work sites. Implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 would
28 reduce these effects. Herbicides would only be used in California tiger salamander habitat in
29 accordance with the written recommendation of a licensed, registered Pest Control Advisor and
30 in conformance with label precautions and federal, state, and local regulations in a manner that
31 avoids or minimizes harm to the California tiger salamander.

- 32 ● *CM18 Conservation Hatcheries*: This activity could result in the permanent removal of
33 approximately 35 acres of terrestrial cover and aestivation habitat for California tiger
34 salamander in the Yolo Bypass area (CZ 2). The specifications and operations of this facility have
35 not been developed, although the facility is expected to be constructed near Rio Vista on
36 cultivated lands in low-value habitat for the species.
- 37 ● *Critical habitat*: Approximately 1,781 acres of designated Critical Habitat Unit 2, Jepson Prairie
38 Unit, for California tiger salamander overlap the study area in CZ 1. While this area is located
39 within the Cache Slough Complex, it is not expected to be affected by BDCP tidal habitat
40 restoration actions. Tidal habitat would be restored approximately 2 miles east of SR 113, with
41 some restoration taking place along the Barker and Lindsey Slough channels west to
42 approximately SR 113 and a small amount (0.4 acre) taking place along the Lindsey Slough
43 Channel west of SR 113 into Critical Habitat Unit 2.
- 44 ● *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have
45 little if any adverse effect on the California tiger salamander. Postconstruction operation and

1 maintenance of the above-ground water conveyance facilities could result in ongoing but
2 periodic disturbances that could affect California tiger salamander use of the surrounding
3 habitat. Operation of maintenance equipment, including vehicle use along transmission
4 corridors in CZ 8, could also result in injury or mortality of California tiger salamanders if
5 present in work sites. These effects, however, would be minimized with implementation of the
6 California tiger salamander measures described in AMM1–AMM6, AMM10, AMM13, and
7 AMM37.

- 8 • Injury and direct mortality: Construction activities associated with the water conveyance
9 facilities, vernal pool complex restoration, and habitat and management enhancement-related
10 activities, including operation of construction equipment, could result in injury or mortality of
11 California tiger salamanders. Foraging, dispersal, and overwintering behavior may be altered
12 during construction activities, resulting in injury or mortality of California tiger salamander if
13 the species is present. Salamanders occupying burrows could be trapped and crushed during
14 ground-disturbing activities. Degradation and loss of estivation habitat is also anticipated to
15 result from the removal of vegetative cover and collapsing of burrows. Injury or mortality would
16 be avoided and minimized through implementation of seasonal constraints and preconstruction
17 surveys in suitable habitat, collapsing unoccupied burrows, and relocating salamanders outside
18 of the construction area as described in AMM1–AMM6, AMM10, AMM13, and AMM37.

19 The following paragraphs summarize the combined effects discussed above and describe other
20 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are
21 also included.

22 ***Near-Term Timeframe***

23 Because the water conveyance facilities construction is being evaluated at the project level, the near-
24 term BDCP conservation strategy has been evaluated to determine whether it would provide
25 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
26 construction effects would not be adverse under NEPA.

27 Alternative 1A would permanently remove approximately 455 acres of upland terrestrial cover
28 habitat for California tiger salamander. The effects would result from construction of the water
29 conveyance facilities (CM1, 163 acres), Yolo Bypass improvements (CM2, 42 acres), tidal habitat
30 restoration (CM4, 203 acres), recreational facilities (CM11, 12 acres) and construction of
31 conservation hatcheries (CM18, 35 acres).

32 Typical NEPA project-level mitigation ratios of 2:1 for protected grassland habitats would indicate
33 that 910 acres of grassland should be protected in the near-term for California tiger salamander to
34 mitigate the near-term losses.

35 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective
36 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic habitat
37 (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective GNC1.1).
38 The landscape-scale goals and objectives would inform the near-term protection and restoration
39 efforts. The natural community restoration and protection activities are expected to be concluded
40 during the first 10 years of plan implementation, which is close enough in time to the occurrence of
41 impacts to constitute adequate mitigation for NEPA purposes. These commitments are more than
42 sufficient to support the conclusion that the near-term effects of Alternative 1A would be not be

1 adverse under NEPA, because the number of acres required to meet the typical ratios described
2 above would be only 910 acres of upland communities protected.

3 In addition, the plan contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
7 *Natural Communities*, *AMM13 California Tiger Salamander*, and *AMM37 Recreation*. These AMMs
8 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
9 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
10 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
11 EIR/EIS.

12 **Late Long-Term Timeframe**

13 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and
14 29,459 acres of upland habitat for California tiger salamander. Alternative 1A as a whole would
15 result in the permanent loss of and temporary effects on 797 acres of upland habitat for California
16 tiger salamander for the term of the plan (less than 3% of the total upland habitat in the study area).
17 The location of these losses is described above in the discussions of CM1, CM2, CM4, CM11, and
18 CM18.

19 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
20 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would
21 benefit the California tiger salamander by providing habitat in the portion of the study area with the
22 highest long-term conservation value for the species based on known species occurrences and large,
23 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other
24 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,
25 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in
26 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation
27 depth and duration and suitable composition of vegetative cover to support breeding California tiger
28 salamanders (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and
29 other measures would be implemented as described in CM11 to promote growth of aquatic
30 vegetation with appropriate cover characteristics favorable to California tiger salamanders. Lands
31 protected in CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP*
32 and the extensive Los Vaqueros Watershed lands, including grassland areas supporting this species.
33 This objective would ensure that California tiger salamander upland and associated aquatic habitats
34 would be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat
35 within and adjacent to the Plan Area.

36 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
37 and protection actions discussed above, as well as the restoration of alkali seasonal wetland
38 complex, vernal pool complex, and grassland that could overlap with the species model, would result
39 in the restoration of 88 acres of aquatic and 598 acres of upland modeled habitat for California tiger
40 salamander. In addition, protection of alkali seasonal wetland complex, vernal pool complex, and
41 grassland that could overlap with the species model, would result in the protection of 750 acres of
42 aquatic and 5,000 acres of upland California tiger salamander modeled habitat.

1 **NEPA Effects:** In the near-term, the loss of California tiger salamander habitat under Alternative 1A
2 would be not be adverse because the BDCP has committed to protecting the acreage required to
3 meet the typical mitigation ratios described above. In the late long-term, the losses of California tiger
4 salamander upland habitat associated with Alternative 1A, in the absence of other conservation
5 actions, would represent an adverse effect as a result of habitat modification and potential direct
6 mortality of a special-status species. However, with habitat protection and restoration associated
7 with the conservation components, guided by landscape-scale goals and objectives and by AMM1–
8 AMM6, AMM10, AMM13, and AMM37, the effects of Alternative 1A as a whole on California tiger
9 salamander would not be adverse.

10 **CEQA Conclusion:**

11 **Near-Term Timeframe**

12 Because the water conveyance facilities construction is being evaluated at the project level, the near-
13 term BDCP conservation strategy has been evaluated to determine whether it would provide
14 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
15 construction impacts would be less than significant.

16 Alternative 1A would permanently remove approximately 455 acres of upland terrestrial cover
17 habitat for California tiger salamander. The effects would result from construction of the water
18 conveyance facilities (CM1, 163 acres), Yolo Bypass improvements (CM2, 42 acres), tidal habitat
19 restoration (CM4, 203 acres), recreational facilities (CM11, 12 acres) and construction of
20 conservation hatcheries (CM18, 35 acres).

21 Typical CEQA project-level mitigation ratios of 2:1 for protected grassland habitats would indicate
22 that 910 acres of grassland should be protected in the near-term for California tiger salamander to
23 mitigate the near-term losses.

24 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective
25 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic habitat
26 (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective GNC1.1).
27 The landscape-scale goals and objectives would inform the near-term protection and restoration
28 efforts. The natural community restoration and protection activities are expected to be concluded
29 during the first 10 years of Plan implementation, which is close enough in time to the occurrence of
30 impacts to constitute adequate mitigation for CEQA purposes.

31 In addition, the plan contains commitments to implement AMM1–6, AMM10, AMM13, and AMM37
32 which include elements that avoid or minimize the risk of affecting habitats and species adjacent to
33 work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been
34 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
35 the Final EIR/EIS. These commitments are more than sufficient to support the conclusion that the
36 near-term impacts of Alternative 1A on California tiger salamander would be less than significant
37 under CEQA, because the number of acres required to meet the typical ratios described above would
38 be only 910 acres of upland communities protected.

39 **Late Long-Term Timeframe**

40 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and
41 29,459 acres of upland habitat for California tiger salamander. Alternative 1A as a whole would
42 result in the permanent loss of and temporary effects on 797 acres of upland habitat for California

1 tiger salamander for the term of the plan (less than 3% of the total upland habitat in the study area).
2 The location of these losses is described above in the discussions of CM1, CM2, CM4, CM11, and
3 CM18.

4 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
5 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would
6 benefit the California tiger salamander by providing habitat in the portion of the study area with the
7 highest long-term conservation value for the species based on known species occurrences and large,
8 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other
9 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,
10 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in
11 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation
12 depth and duration and suitable composition of vegetative cover to support breeding California tiger
13 salamanders (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and
14 other measures would be implemented as described in CM11 to promote growth of aquatic
15 vegetation with appropriate cover characteristics favorable to California tiger salamanders. Lands
16 protected in CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP*
17 and the extensive Los Vaqueros Watershed lands, including grassland areas supporting this species.
18 This objective would ensure that California tiger salamander upland and associated aquatic habitats
19 would be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat
20 within and adjacent to the Plan Area.

21 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
22 and protection actions discussed above, as well as the restoration of alkali seasonal wetland
23 complex, vernal pool complex, and grassland that could overlap with the species model, would result
24 in the restoration of 88 acres of aquatic and 598 acres of upland modeled habitat for California tiger
25 salamander. In addition, protection of alkali seasonal wetland complex, vernal pool complex, and
26 grassland that could overlap with the species model, would result in the protection of 750 acres of
27 aquatic and 5,000 acres of upland California tiger salamander modeled habitat.

28 In the absence of other conservation actions, the losses of California tiger salamander upland habitat
29 associated with Alternative 1A would represent an adverse effect as a result of habitat modification
30 and potential direct mortality of a special-status species. However, with habitat protection and
31 restoration associated with the conservation components, guided by landscape-scale goals and
32 objectives and by AMM1-AMM6, AMM10, AMM13, and AMM37, which would be in place throughout
33 the construction phase, the impacts of Alternative 1A as a whole on California tiger salamander
34 would not be significant under CEQA.

35 **Impact BIO-47: Indirect Effects of Plan Implementation on California Tiger Salamander**

36 Indirect effects could occur outside of the construction footprint but within 500 feet of California
37 tiger salamander habitat. Activities associated with conservation component construction and
38 ongoing habitat enhancement, as well as operation and maintenance of above-ground water
39 conveyance facilities, including the transmission facilities, could result in ongoing but periodic
40 postconstruction disturbances with localized effects on California tiger salamander and its habitat,
41 and temporary noise and visual disturbances, including artificial night lighting at a worksite, over
42 the term of the BDCP. Most of the areas indirectly affected are associated with the construction of
43 Byron Forebay and its borrow and spoil areas in CZ 8.

1 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment
2 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability
3 of California tiger salamander habitat downstream of the construction area by filling in pools and
4 smothering eggs. Accidental spills of toxic fluids into the aquatic system could result in the
5 subsequent loss of California tiger salamander habitat. Hydrocarbon and heavy metal pollutants
6 associated with roadside runoff also have the potential to enter the aquatic system, affecting water
7 quality and California tiger salamander.

8 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 under Alternative 1A
9 would avoid or minimize the potential for substantial adverse effects on California tiger
10 salamanders, either indirectly or through habitat modifications. These AMMs would also avoid and
11 minimize effects that could substantially reduce the number of California tiger salamanders or
12 restrict the species’ range. Therefore, the indirect effects of Alternative 1A would not have an
13 adverse effect on California tiger salamander.

14 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
15 as construction-related noise and visual disturbances, including artificial night lighting at a worksite,
16 could impact California tiger salamander in aquatic and upland habitats. The use of mechanical
17 equipment during construction could cause the accidental release of petroleum or other
18 contaminants that could impact California tiger salamander or its prey. The inadvertent discharge of
19 sediment or excessive dust adjacent to California tiger salamander habitat could also have a negative
20 impact on the species or its prey. With implementation of AMM1–AMM6, AMM10, AMM13, and
21 AMM37 as part of Alternative 1A, the BDCP would avoid the potential for substantial adverse effects
22 on California tiger salamander, either indirectly or through habitat modifications, and would not
23 result in a substantial reduction in numbers or a restriction in the range of California tiger
24 salamanders. The indirect effects of Alternative 1A would have a less-than-significant impact on
25 California tiger salamander.

26 **Impact BIO-48: Periodic Effects of Inundation of California Tiger Salamander Habitat as a** 27 **Result of Implementation of Conservation Components**

28 *CM2 Yolo Bypass Fisheries Enhancement* is the only conservation measure expected to result in
29 periodic inundation of California tiger salamander habitat. Periodic inundation could affect from an
30 estimated 191 acres of terrestrial habitat during a notch flow of 1,000 cfs, to an estimated 639 acres
31 of terrestrial habitat during a notch flow of 4,000 cfs in CZ 1 (Table 12-1A-21). This effect would
32 only occur during an estimated maximum of 30% of years, in areas that are already inundated in
33 more than half of all years; therefore, these areas are expected to provide only marginal terrestrial
34 habitat for the California tiger salamander under existing conditions. No aquatic breeding habitat
35 would be affected (Table 12-1A-21); the modeled habitat in the Yolo Bypass, in the vicinity of
36 terrestrial habitat is of low value in that there are no California tiger salamander records in this area
37 and the bypass lacks vernal pool complexes with large, deep pools, or large grassland areas with
38 stock ponds and similar aquatic features that provide the habitat of highest value for this species.
39 Therefore, the terrestrial habitat to be affected has a small likelihood of supporting California tiger
40 salamanders, and Yolo Bypass operations are expected to have a minimal effect on the species, if
41 any.

42 **NEPA Effects:** The effects of periodic inundation from Alternative 1A would not have an adverse
43 effect on California tiger salamander.

1 **CEQA Conclusion:** Flooding of the Yolo Bypass from Fremont Weir operations would periodically
2 increase the frequency and duration of inundation of 191–639 acres of terrestrial habitat for
3 California tiger salamander. Because this area is considered low-value habitat and there are no
4 California tiger salamander records in the area, and because of the lack of suitable breeding habitat
5 in this area, the effects of periodic inundation of California tiger salamander habitat from Alternative
6 1A would have a less-than-significant impact.

7 **Giant Garter Snake**

8 This section describes the effects of Alternative 1A, including water conveyance facilities
9 construction and implementation of other conservation components, on the giant garter snake. The
10 habitat model used to assess effects for the giant garter snake is based on aquatic habitat and upland
11 habitat. Modeled aquatic habitat is composed of tidal perennial aquatic (except in Suisun Marsh),
12 tidal freshwater perennial emergent wetland, nontidal freshwater emergent wetland, and nontidal
13 perennial aquatic natural communities; rice fields; and artificial canals and ditches. Modeled upland
14 habitat is composed of all nonwetland and nonaquatic natural communities within 200 feet of
15 modeled aquatic habitat features (primarily grassland and cropland). The modeled upland habitat is
16 ranked as high-, moderate-, or low-value based on giant garter snake associations between
17 vegetation and cover types (U.S. Fish and Wildlife Service 2012) and historical and recent
18 occurrence records (Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental
19 Data Report), and presence of features necessary to fulfill the species' life cycle requirements.
20 Modeled habitat is expressed in acres for aquatic and upland habitats, and in miles for linear
21 movement corridors in aquatic habitat. Other factors considered in assessing the value of affected
22 habitat for the giant garter snake, to the extent that information is available, are proximity to
23 conserved lands and recorded occurrences of the species, proximity to giant garter snake
24 subpopulations (Yolo Basin/Willow Slough and Coldani Marsh/White Slough) in the study area that
25 are identified in the draft recovery plan for this species (U.S. Fish and Wildlife Service 1999b), and
26 contribution to connectivity between giant garter snake subpopulations.

27 Construction and restoration associated with Alternative 1A conservation measures would result in
28 both temporary and permanent losses of giant garter snake modeled habitat as indicated in Table
29 12-1A-22. Full implementation of Alternative 1A would also include the following biological
30 objectives over the term of the BDCP to benefit the giant garter snake (BDCP Chapter 3, *Conservation*
31 *Strategy*).

- 32 • Increase native species diversity and relative cover of native plant species, and reduce the
33 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 34 • Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of
35 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective
36 TFEWNC1.1, associated with CM3 and CM4).
- 37 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
38 and nontidal freshwater emergent wetland natural communities, with suitable habitat
39 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,
40 associated with CM3 and CM10).
- 41 • Protect 48,625 acres of cultivated lands that provide suitable habitat for covered and other
42 native wildlife species (Objective CLNC1.1, associated with CM3 and CM11).

- 1 • Target cultivated land conservation to provide connectivity between other conservation lands
2 (Objective CLNC1.2, associated with CM3).
- 3 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
4 lands that occur in cultivated lands within the reserve system, including isolated valley oak
5 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
6 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
7 with CM3 and CM11).
- 8 • Of the at least 1,200 acres of nontidal marsh created under (Objective NFEW/NPANC1.1), create
9 600 acres of aquatic habitat giant garter snake aquatic habitat that is connected to the 1,500
10 acres of rice land or equivalent-value habitat described below in Objective GGS1.4 (Objective
11 GGS1.1, associated with CM3, CM4, and CM10).
- 12 • Of the 8,000 acres of grassland protected under Objective GNC1.1 and 2,000 acres restored
13 under Objective GNC1.2, create or protect 200 acres of high-value upland giant garter snake
14 habitat adjacent to the at least 600 acres of nontidal perennial habitat being restored and/or
15 created in CZ 4 and/or CZ 5 (Objective GGS1.2, associated with CM3 and CM8).
- 16 • Protect giant garter snakes on restored and protected nontidal marsh and adjacent uplands
17 (Objectives GGS1.1 and GGS1.2) from incidental injury or mortality by establishing 200-foot
18 buffers between protected giant garter snake habitat and roads (other than those roads
19 primarily used to support adjacent cultivated lands and levees). Establish giant garter snake
20 reserves at least 2,500 feet from urban areas or areas zoned for urban development (Objective
21 GGS1.3, associated with CM3).
- 22 • Create connections from the White Slough population to other areas in the giant garter snake's
23 historical range in the Stone Lakes vicinity by protecting, restoring, and/or creating at least
24 1,500 acres of rice land or equivalent-value habitat (e.g., perennial wetland) for the giant garter
25 snake in CZ 4 and/or CZ 5. Any portion of the 1,500 acres may consist of tidal freshwater
26 emergent wetland and may overlap with the 24,000 acres of tidally restored freshwater
27 emergent wetland if it meets specific giant garter snake habitat criteria described in CM4. Up to
28 500 (33%) of the 1,500 acres may consist of suitable uplands adjacent to protected or restored
29 aquatic habitat (Objective GGS1.4, associated with CM3 and CM4).
- 30 • Of the at least 1,200 acres of nontidal marsh created under Objective NFEW/NPANC1.1, create
31 600 acres of connected aquatic giant garter snake habitat outside the Yolo Bypass in CZ 2
32 (Objective GGS2.1, associated with CM3 and CM10).
- 33 • Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres restored
34 under Objective GNC1.2, create or protect 200 acres of high-value upland habitat adjacent to the
35 600 acres of nontidal marsh created in CZ 2 outside of Yolo Bypass (GGS2.1) (Objective GGS2.2,
36 associated with CM3 and CM8).
- 37 • To expand upon and buffer the newly restored/created nontidal perennial habitat in CZ 2,
38 protect 700 acres of cultivated lands, with 500 acres consisting of rice land and the remainder
39 consisting of compatible cultivated land that can support giant garter snakes. The cultivated
40 lands may be a subset of lands protected for the cultivated lands natural community and other
41 covered species (Objective GGS2.3, associated with CM3).
- 42 • Protect giant garter snakes on created nontidal marsh (Objective GGS2.1) and created or
43 protected adjacent uplands (Objective GGS2.2) from incidental injury or mortality by

1 establishing 200-foot buffers between protected giant garter snake habitat and roads, and
 2 establishing giant garter snake reserves at least 2,500 feet from urban areas or areas zoned for
 3 urban development (Objective GGS2.4, associated with CM3).

- 4 • Protect, restore, and/or create 2,740 acres of rice land or equivalent-value habitat (e.g.,
 5 perennial wetland) for the giant garter snake in CZ 1, CZ 2, CZ 4, or CZ 5. Up to 500 acres may
 6 consist of tidal freshwater emergent wetland and may overlap with the at least 5,000 acres of
 7 tidally restored freshwater emergent wetland in the Cache Slough ROA if this portion meets
 8 giant garter snake habitat criteria specified in CM4. Up to 1,700 acres may consist of rice fields
 9 in the Yolo Bypass if this portion meets the criteria specified in CM3, *Reserve Design*
 10 *Requirements by Species*. Any remaining acreage will consist of rice land or equivalent-value
 11 habitat outside the Yolo Bypass. Up to 915 (33%) of the 2,740 acres may consist of suitable
 12 uplands adjacent to protected or restored aquatic habitat (Objective GGS3.1, associated with
 13 CM3, CM4, and CM10).

14 As explained below, with the restoration or protection of these amounts of habitat, in addition to the
 15 implementation of AMMs, impacts on giant garter snake would not be adverse for NEPA purposes
 16 and would be less than significant for CEQA purposes.

17 **Table 12-1A-22. Changes in Giant Garter Snake Modeled Habitat Associated with Alternative 1A^a**

Conservation Measure ^b	Habitat Type ^c	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT ^d	CM2	CM5
CM1	Aquatic (acres)	52	52	36	36	NA	NA
	Upland (acres)	392	392	182	182	NA	NA
	Aquatic (miles)	18	18	8	8	NA	NA
Total Impacts CM1 (acres)		444	444	218	218		
CM2-CM18	Aquatic (acres)	179	498	15	38	NA	69
	Upland (acres)	1,467	2,443	219	261	582-1,402	606
	Aquatic (miles)	49	189	9	10	0	NA
Total Impacts CM2-CM18 (acres)		1,646	2,941	234	299	582-1,402	675
TOTAL IMPACTS CM1-CM18 (acres)		2,090	3,385	452	517	582-1,402	675

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c Aquatic acres represent tidal and nontidal habitat combined, and upland acres represent low-, moderate-, and high-value acreages combined.

^d LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^e Periodic effects were estimated for the late long-term only. CM2 periodic impacts on upland habitats only are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-49: Loss or Conversion of Habitat for and Direct Mortality of Giant Garter Snake

Alternative 1A conservation measures would result in the permanent and temporary loss combined of up to 624 acres of modeled aquatic habitat (tidal and nontidal combined), up to 3,278 acres of modeled upland habitat, and up to 225 miles of channels providing aquatic movement habitat for the giant garter snake (Table 12-1A-22). There is one giant garter snake occurrence that overlaps with the Plan footprint. Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of RTM (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), and construction of a conservation fish hatchery (CM18). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate giant garter snake habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure discussions.

- *CM1 Water Facilities and Operation:* Construction of Alternative 1A conveyance facilities would result in the permanent loss of approximately 444 acres of modeled giant garter snake habitat, composed of 52 acres of aquatic habitat and 392 acres of upland habitat (Table 12-1A-22). The 392 acres of upland habitat that would be removed for the construction of the conveyance facilities consists of 73 acres of high-, 292 acres of moderate-, and 27 acres of low-value habitat. In addition, approximately 18 miles of channels providing giant garter snake movement habitat would be removed as a result of conveyance facilities construction. Development of the water conveyance facilities would also result in the temporary removal of up to 36 acres of giant garter snake aquatic habitat and up to 162 acres of adjacent upland habitat in areas near construction in CZ 5 and CZ 6 (see Table 12-1A-22 and Terrestrial Biology Map Book). In addition, approximately 8 miles of channels providing giant garter snake movement habitat would be temporarily removed as a result of conveyance facilities construction. Most of the habitat to be lost is in CZ 6 on Mandeville Island. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations. Water facilities construction and operation is expected to have low to moderate potential for adverse effects on giant garter snake aquatic habitat on Mandeville Island because it is not located near or between populations identified in the draft recovery plan.
- *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries improvements in the Yolo Bypass would result in the permanent and temporary removal of approximately 83 acres of aquatic habitat and 458 acres of upland habitat for the giant garter snake in the late long-term. Approximately 14 miles (less than 1% of total miles in Plan Area) of channels providing giant garter snake habitat for movements would be removed as a result of Fremont Weir/Yolo Bypass Improvements. Most of this habitat removal would occur at the north end of the Yolo Bypass, near Fremont Weir. Construction is expected to have adverse effects on giant garter snake aquatic habitat in the Yolo Bypass area because it is near the Yolo Basin/Willow Slough population. The upland habitat that would be removed is composed of 336 acres of high-value, 121 acres of moderate-value, and 1 acre of low-value habitat.

In addition to habitat loss from construction related activities in Yolo Bypass, late season flooding in the bypass may result in loss of rice habitat (considered aquatic habitat for giant garter snake) by precluding the preparation and planting of rice fields. The methods for estimating loss of rice in the bypass and results are provided in BDCP Appendix 5J, Attachment

1 5J.E, *Estimation of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo*
2 *Bypass*. This analysis concludes that the estimated loss of rice is 1,662 acres which was
3 considered to occur late long-term.

- 4 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
5 in the permanent loss of approximately 395 acres of aquatic habitat and 2,123 acres of upland
6 habitat for the giant garter snake to tidal marsh in the late long-term. The upland habitat
7 affected by tidal inundation includes 594 acres of high-value, 1,375 acres of moderate-value, and
8 154 acres of low-value habitat. In addition, approximately 138 miles of channels providing giant
9 garter snake movement habitat would be removed as a result of tidal natural communities
10 restoration.

11 Most of the effects of tidal natural communities restoration would occur in the Cache Slough and
12 Yolo Bypass areas (CZ 1 and CZ 2). This aquatic habitat is of low to moderate value: it is in and
13 near Category 1 open space but is not near any giant garter snake occurrences and is not near or
14 between giant garter snake subpopulations identified in the draft recovery plan. Tidal natural
15 communities restoration is expected to have little to no adverse effects on giant garter snake
16 aquatic or upland habitat in the Cache Slough ROA. There are no giant garter snake occurrences
17 in this area, which is already tidally influenced so it has limited value for the giant garter snake
18 (giant garter snakes may occur in tidally muted areas but are not likely to use aquatic areas with
19 a strong tidal influence).

- 20 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
21 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
22 approximately 60 acres of aquatic habitat and 89 acres of upland habitat for giant garter snake.
23 The upland habitat to be removed is composed of 51 acres of moderate-value and 38 acres of
24 low-value upland habitat. Approximately 2 miles of channels providing giant garter snake
25 movement habitat would be removed as a result of floodplain restoration. Seasonally inundated
26 floodplain restoration is expected to have little to no adverse effects on giant garter snake
27 aquatic habitat because the site is not located near or between giant garter snake populations
28 identified in the draft recovery plan. As with CM4, the estimates of the effect of seasonal
29 floodplain levee construction and inundation are based on projections of where restoration may
30 occur. Actual effects are expected to be lower because sites would be selected to minimize
31 effects on giant garter snake habitat.

- 32 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
33 actions included in CM11 that are designed to enhance wildlife values in BDCP-protected
34 habitats may result in localized ground disturbances that could temporarily remove small
35 amounts of giant garter snake habitat. Ground-disturbing activities, such as removal of
36 nonnative vegetation and road and other infrastructure maintenance, are expected to have
37 minor effects on available giant garter snake habitat and are expected to result in overall
38 improvements to and maintenance of giant garter snake habitat values over the term of the
39 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
40 and minimized by the applicable AMMs.

41 Passive recreation in the reserve system could result in human disturbance of giant garter
42 snakes basking in upland areas and compaction of upland burrow sites used for brumation.
43 However, *AMM37 Recreation*, described in Appendix 3B, *Environmental Commitments, AMMs,*
44 *and CMs*, requires setbacks for trails in giant garter snake habitat. With this measure in place,
45 recreation related effects on giant garter snake are expected to be minimal.

- 1 • *CM18 Conservation Hatcheries*: Construction for conservation hatcheries could result in the
2 permanent removal of 35 acres of moderate-value upland habitat for the giant garter snake in
3 the Yolo Bypass area (CZ 2).
- 4 • Operations and maintenance: Postconstruction operation and maintenance of the above-ground
5 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
6 disturbances that could affect giant garter snake use of the surrounding habitat in the Yolo
7 Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, CZ 7,
8 and CZ 8). Maintenance activities would include vegetation management, levee and structure
9 repair, and regrading of roads and permanent work areas. These effects, however, would be
10 reduced by AMMs and conservation actions as described below. Injury and direct mortality:
11 Construction vehicle activity may cause injury or mortality of the giant garter snake. If snakes
12 reside where activities take place (most likely in the vicinity of the two subpopulations: Yolo
13 Basin/Willow Slough [CZ 2] and the Coldani Marsh/White Slough [CZ 4]), the operation of
14 equipment for land clearing, construction, conveyance facilities operation and maintenance, and
15 habitat restoration, enhancement, and management could result in injury or mortality of giant
16 garter snakes. This risk is highest from late fall through early spring, when the snakes are
17 dormant. Increased vehicular traffic associated with BDCP actions could contribute to a higher
18 incidence of road kill. However, preconstruction surveys would be implemented after the
19 project planning phase and prior to any ground-disturbing activity. Any disturbance to suitable
20 aquatic and upland sites in or near the project footprint would be avoided to the extent feasible,
21 and the loss of aquatic habitat and grassland vegetation would be minimized through
22 adjustments to project design, as practicable. Construction monitoring and other measures
23 would be implemented to avoid and minimize injury or mortality of this species during
24 construction, as described in *AMM16 Giant Garter Snake*.

25 The following paragraphs summarize the combined effects discussed above and describe other
26 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
27 also included.

28 ***Near-Term Timeframe***

29 Because the water conveyance facilities construction is being evaluated at the project level, the near-
30 term BDCP conservation strategy has been evaluated to determine whether it would provide
31 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
32 construction would not be adverse under NEPA.

33 Alternative 1A would permanently and temporarily remove 282 acres of aquatic habitat and 2,260
34 acres of upland habitat for giant garter snake in the study area during the near-term. These effects
35 would result from the construction of the water conveyance facilities (CM1, 88 acres of aquatic and
36 574 acres of upland habitat), from Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic
37 and 458 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres
38 of upland habitat), and from Conservation Hatcheries (CM18, 35 acres of upland habitat). The
39 aquatic habitat losses would occur in tidal and nontidal wetland natural communities and rice fields.
40 The upland habitat losses would occur in cropland and grassland communities. In addition,
41 approximately 84 miles of channels (irrigation and drainage canals) providing giant garter snake
42 movement habitat would be removed. The habitat model likely overestimates the relative value of
43 irrigation and drainage canals in the vicinity of White Slough and south due to its proximity to
44 records that likely represent single displaced snakes, not viable populations.

1 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
2 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the
3 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection
4 of upland habitats. Using these ratios would indicate that 282 acres of aquatic habitat should be
5 restored, 282 acres of aquatic habitat should be protected, and 4,520 acres of upland habitat should
6 be protected for giant garter snake to mitigate the near-term losses.

7 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to
8 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to
9 be protected and restored in the near-term specifically for the giant garter snake total 3,900 acres
10 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least
11 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value) in CZ 2, CZ 4, and CZ 5.
12 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900
13 acres under Objective GGS3.1) would be restored or protected to create connections from the
14 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.
15 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected
16 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected
17 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in
18 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage
19 ditches located in cultivated lands and suitable for giant garter snake movement would be
20 maintained and protected within the reserve system, which would include isolated valley oak trees,
21 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water
22 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

23 These habitat protection and restoration measures would benefit the giant garter snake and the
24 plan's species-specific biological goals and objectives would inform the near-term protection and
25 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and
26 providing connectivity between protected areas, is considered the most effective approach to giant
27 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
28 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and
29 are identified as important for the recovery of the species in the draft recovery plan for the species
30 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat
31 would focus on these two important subpopulations.

32 The species-specific biological goals and objectives would inform the near-term protection and
33 restoration efforts. The natural community restoration and protection activities are expected to be
34 concluded during the first 10 years of Plan implementation, which is close enough in time to the
35 occurrence of impacts to constitute adequate mitigation for NEPA purposes. These commitments are
36 more than sufficient to support the conclusion that the near-term effects of Alternative 1A would be
37 not be adverse under NEPA, because the number of acres required to meet the typical ratios
38 described above would be only 282 acres of aquatic communities restored and 4,520 acres of upland
39 communities protected.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
41 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
42 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
43 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
44 *Restoration of Temporarily Affected Natural Communities*, *AMM16 Giant Garter Snake*, and *AMM37*
45 *Recreation*. All of these AMMs include elements that avoid or minimize the risk of BDCP activities

1 affecting habitats and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes
2 the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
3 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

4 **Late Long-Term Timeframe**

5 The habitat model indicates that the study area supports approximately 31,281 acres of aquatic and
6 53,285 acres of upland habitat for giant garter snake. Alternative 1A as a whole would result in the
7 permanent loss of and temporary effects on 624 acres of aquatic habitat and to 3,278 acres of
8 upland habitat for giant garter snake during the term of the plan (2% of the total aquatic habitat in
9 the study area and 6% of the total upland habitat in the study area). The locations of these losses are
10 described above in the analyses of individual conservation measures.

11 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands
12 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of
13 grasslands in the study area. Lands to be protected and restored specifically for the giant garter
14 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated
15 lands including at least 500 acres of rice) in CZ 2, and acres of rice or habitat of equivalent value) in
16 CZ 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under
17 Objective GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create
18 connections from the Coldani Marsh/White Slough population to other areas in the giant garter
19 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value would
20 be protected and restored for the giant garter snake under Objective GGS3.1 to achieve a 1:1 ratio of
21 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice
22 lost due to late season flooding in Yolo Bypass as a result of CM2) (Objective GGS3.1). In addition to
23 the 6,540 acres of high value habitat targeted specifically for giant garter snake, the protection and
24 restoration of other natural communities is expected to provide additional restoration of 4,430
25 acres and protection of 3,733 acres of garter snake habitat.

26 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter
27 snake by providing connectivity and maintaining irrigation and drainage channels that provide
28 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake
29 movement habitat on the protected cultivated lands is proportional to the modeled habitat on
30 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support
31 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by
32 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

33 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the
34 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter
35 snake. Protecting and expanding existing giant garter snake subpopulations, and providing
36 connectivity between protected areas, is considered the most effective approach to giant garter
37 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
38 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area
39 and are identified as important for the recovery of the species in the draft recovery plan for the
40 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake
41 habitat would focus on these two important subpopulations.

42 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
43 and protection actions discussed above, as well as the restoration of managed wetland, nontidal
44 freshwater perennial emergent wetland, nontidal perennial aquatic, tidal freshwater emergent

1 wetland, alkali seasonal wetland, grassland, and vernal pool complex that could overlap with the
2 species model, would result in the restoration of 3,450 acres of aquatic and 980 acres of upland
3 modeled habitat for giant garter snake. In addition, protection of cultivated land, grassland, alkali
4 seasonal wetland, and vernal pool complex could overlap with the species model and would result in
5 the protection of 1,547 acres of aquatic and 2,185 acres of upland giant garter snake modeled
6 habitat.

7 **NEPA Effects:** In the near-term, the loss of giant garter snake habitat under Alternative 1A would not
8 be adverse because the BDCP has committed to protecting and restoring the acreage required to
9 meet the typical mitigation ratios described above. In the late long-term, the losses of giant garter
10 snake associated with Alternative 1A, in the absence of other conservation actions, would represent
11 an adverse effect as a result of habitat modification and potential direct mortality of a special-status
12 species. However, with habitat protection and restoration associated with the conservation
13 components, guided by landscape-scale goals and objectives and by AMM1–AMM7, AMM10, AMM16,
14 and AMM37, the effects of Alternative 1A as a whole on giant garter snake would not be adverse.

15 **CEQA Conclusion:**

16 **Near-Term Timeframe**

17 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
18 the near-term BDCP conservation strategy has been evaluated to determine whether it would
19 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
20 effects of construction would be less than significant under CEQA.

21 Alternative 1A would permanently and temporarily remove 282 acres of aquatic habitat and 2,260
22 acres of upland habitat for giant garter snake in the study area during the near-term. These effects
23 would result from the construction of the water conveyance facilities (CM1, 88 acres of aquatic and
24 574 acres of upland habitat), from Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic
25 and 458 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres
26 of upland habitat), and from Conservation Hatcheries (CM18, 35 acres of upland habitat). The
27 aquatic habitat losses would occur in tidal and nontidal wetland natural communities and rice fields.
28 The upland habitat losses would occur in cropland and grassland communities. In addition,
29 approximately 84 miles of irrigation and drainage channels providing giant garter snake movement
30 habitat would be removed. The habitat model likely overestimates the relative value of irrigation
31 and drainage canals in the vicinity of White Slough and south due to its proximity to records that
32 likely represent single displaced snakes, not viable populations.

33 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
34 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the
35 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection
36 of upland habitats. Using these ratios would indicate that 282 acres of aquatic habitat should be
37 restored, 282 acres of aquatic habitat should be protected, and 4,520 acres of upland habitat should
38 be protected for giant garter snake to mitigate the near-term losses.

39 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to
40 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to
41 be protected and restored in the near term specifically for the giant garter snake total 3,900 acres
42 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least
43 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value) in CZ 2, CZ 4, and CZ 5.
44 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900

1 acres under Objective GGS3.1) would be restored or protected to create connections from the
2 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.
3 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected
4 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected
5 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in
6 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage
7 ditches located in cultivated lands and suitable for giant garter snake movement would be
8 maintained and protected within the reserve system, which would include isolated valley oak trees,
9 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water
10 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

11 These habitat protection and restoration measures would benefit the giant garter snake and the
12 plan's species-specific biological goals and objectives would inform the near-term protection and
13 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and
14 providing connectivity between protected areas, is considered the most effective approach to giant
15 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
16 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and
17 are identified as important for the recovery of the species in the draft recovery plan for the species
18 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat
19 would focus on these two important subpopulations.

20 The natural community restoration and protection activities are expected to be concluded during
21 the first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts
22 to constitute adequate mitigation for CEQA purposes. These commitments are more than sufficient
23 to support the conclusion that the near-term effects of Alternative 1A would be less than significant
24 under CEQA, because the number of acres required to meet the typical ratios described above would
25 be only 282 acres of aquatic communities restored, 282 acres of aquatic communities protected, and
26 4,520 acres of upland communities protected.

27 The Plan also includes commitments to implement AMM1-AMM7, AMM10, AMM16, and AMM37. All
28 of these AMMs include elements that avoid or minimize the risk of BDCP activities affecting habitats
29 and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
30 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
31 *AMMs, and CMs*, of the Final EIR/EIS.

32 ***Late Long-Term Timeframe***

33 The habitat model indicates that the study area supports approximately 31,281 acres of aquatic and
34 53,285 acres of upland habitat for giant garter snake. Alternative 1A as a whole would result in the
35 permanent loss of and temporary effects on 624 acres of aquatic habitat and to 3,278 acres of
36 upland habitat for giant garter snake during the term of the plan (2% of the total aquatic habitat in
37 the study area and 6% of the total upland habitat in the study area). The locations of these losses are
38 described above in the analyses of individual conservation measures.

39 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands
40 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of
41 grasslands in the study area. Lands to be protected and restored specifically for the giant garter
42 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated
43 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value) in
44 CZ 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under

1 Objective GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create
2 connections from the Coldani Marsh/White Slough population to other areas in the giant garter
3 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value would
4 be protected and restored for the giant garter snake under Objective GGS3.1 to achieve a 1:1 ratio of
5 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice
6 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of
7 high value habitat targeted specifically for giant garter snake, the protection and restoration of other
8 natural communities is expected to provide additional restoration of 4,430 acres and protection of
9 3,733 acres of garter snake habitat.

10 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter
11 snake by providing connectivity and maintaining irrigation and drainage channels that provide
12 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake
13 movement habitat on the protected cultivated lands is proportional to the modeled habitat on
14 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support
15 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by
16 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

17 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the
18 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter
19 snake. Protecting and expanding existing giant garter snake subpopulations, and providing
20 connectivity between protected areas, is considered the most effective approach to giant garter
21 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
22 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area
23 and are identified as important for the recovery of the species in the draft recovery plan for the
24 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake
25 habitat would focus on these two important subpopulations.

26 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
27 and protection actions discussed above, as well as the restoration of managed wetland, nontidal
28 freshwater perennial emergent wetland, nontidal perennial aquatic, tidal freshwater emergent
29 wetland, alkali seasonal wetland, grassland, and vernal pool complex that could overlap with the
30 species model, would result in the restoration of 3,450 acres of aquatic and 980 acres of upland
31 modeled habitat for giant garter snake. In addition, protection of cultivated land, grassland, alkali
32 seasonal wetland, and vernal pool complex could overlap with the species model and would result in
33 the protection of 1,547 acres of aquatic and 2,185 acres of upland giant garter snake modeled
34 habitat. The BDCP also includes AMM1-AMM7, AMM10, AMM16, and AMM37, all of which are
35 directed at minimizing or avoiding potential impacts on adjacent habitats during construction and
36 operation of the conservation measures.

37 Considering Alternative 1A's protection and restoration provisions, which would provide acreages
38 of new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to
39 construction and restoration activities, implementation of Alternative 1A as a whole would not
40 result in a substantial adverse effect through habitat modifications and would not substantially
41 reduce the number or restrict the range of the giant garter snake. Therefore, the loss of giant garter
42 snake habitat and potential mortality of snakes would have a less-than-significant impact on giant
43 garter snake under CEQA.

1 **Impact BIO-50: Indirect Effects of Plan Implementation on Giant Garter Snake**

2 Construction activities outside the project footprint but within 200 feet of construction associated
3 with water conveyance facilities, conservation components and ongoing habitat enhancement, as
4 well as operation and maintenance of above-ground water conveyance facilities, including the
5 transmission facilities, could result in ongoing periodic postconstruction disturbances with localized
6 effects on giant garter snake habitat, and temporary noise and visual disturbances over the term of
7 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM7, AMM10,
8 AMM16, and 37, which would be in effect throughout the plan’s construction phase.

9 The use of mechanical equipment during water conveyance facilities construction could cause the
10 accidental release of petroleum or other contaminants that could affect giant garter snake or its
11 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to giant garter snake
12 habitat could also have a negative effect on the species or its prey. AMM1-AMM6 would minimize
13 the likelihood of such spills occurring and would ensure measures are in place to prevent runoff
14 from the construction area and potential effects of sediment or dust on giant garter snake or its
15 prey.

16 Covered activities have the potential to exacerbate bioaccumulation of mercury in covered species
17 that feed on aquatic species, including giant garter snake. The operational impacts of new flows
18 under CM1 were analyzed to assess potential effects on mercury concentration and bioavailability.
19 Results indicated that changes in total mercury levels in water and fish tissues due to future
20 operational conditions were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and
21 5D.4-5).

22 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to
23 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
24 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
25 floodplains. Thus, BDCP restoration activities that create newly inundated areas could increase
26 bioavailability of mercury. Increased methylmercury associated with natural community and
27 floodplain restoration may indirectly affect giant garter snake, which feeds on small fishes, tadpoles,
28 and small frogs, especially introduced species, such as small bullfrogs (*Rana catesbeiana*) and their
29 larvae, carp, and mosquitofish. In general, the highest methylation rates are associated with high
30 tidal marshes that experience intermittent wetting and drying and associated anoxic conditions
31 (Alpers et al. 2008). Along with avoidance and minimization measures and adaptive management
32 and monitoring, *CM12 Methylmercury Management* is expected to reduce the amount of
33 methylmercury resulting from the restoration of natural communities and floodplains.

34 Extant populations of giant garter snake within the study area are known only from the upper Yolo
35 Basin and at the Coldani Marsh/White Slough area. Davis et al. (2007) found mercury
36 concentrations in fish at White Slough (and the Central Delta in general) to be relatively low
37 compared to other areas of the Delta. No restoration activities involving flooding (and subsequent
38 methylation of mercury) are planned within the known range of the Coldani Marsh/White Slough
39 giant garter snake population. Effects on giant garter snake from increased methylmercury
40 exposures is more likely in the Yolo Basin, where some of the highest concentrations of mercury and
41 methylmercury have been documented (Foe et al. 2008). Effects from exposure to methylmercury
42 may include decreased predator avoidance, reduced success in prey capture, difficulty in shedding,
43 and reduced ability to move between shelter and foraging or thermoregulation areas (Wylie et al.
44 2009). Planned floodplain restoration activities in the Yolo Basin are expected to seasonally increase

1 methylmercury production, although production would be minimized by *CM12 Methylmercury*
2 *Mitigation*, Further, the periods of production and increased exposure to methylmercury do not
3 overlap with giant garter snake seasonal activity periods. This seasonal trend should help to
4 decrease risk to the giant garter snake, although snakes could prey on individuals that have been
5 exposed to methylmercury during the previous season.

6 The potential mobilization or creation of methylmercury within the study area varies with site-
7 specific conditions and will need to be assessed at the project level. Measures described in *CM12*
8 *Methylmercury Management* include provisions for project-specific Mercury Management Plans.
9 Along with avoidance and minimization measures and adaptive management and monitoring, *CM12*
10 is expected to reduce the effects of methylmercury resulting from BDCP natural communities and
11 floodplain restoration on giant garter snake.

12 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1A
13 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or
14 through habitat modifications. These AMMs would also avoid and minimize effects that could
15 substantially reduce the number of giant garter snakes or restrict the species' range. Therefore, the
16 indirect effects of Alternative 1A would not have an adverse effect on giant garter snake.

17 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
18 as construction-related noise and visual disturbances could impact giant garter snake in aquatic and
19 upland habitats. The use of mechanical equipment during construction could cause the accidental
20 release of petroleum or other contaminants that could impact giant garter snake or its prey. The
21 inadvertent discharge of sediment or excessive dust adjacent to giant garter snake habitat could also
22 have a negative impact on the species or its prey. With implementation of AMM1-AMM7, AMM10,
23 AMM16, and 37 as part of Alternative 1A construction, operation and maintenance, the BDCP would
24 avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or through
25 habitat modifications. Alternative 1A would not result in a substantial reduction in numbers or a
26 restriction in the range of giant garter snakes. Therefore, the indirect effects of Alternative 1A would
27 have a less-than-significant impact on giant garter snakes.

28 Giant garter snake could experience indirect effects from increased exposure to methylmercury as a
29 result of tidal habitat restoration (*CM4*). With implementation of *CM12*, the potential indirect effects
30 of methylmercury would not result in a substantial reduction in numbers or a restriction in the
31 range of giant garter snakes, and, therefore, would have a less-than-significant impact on giant
32 garter snakes.

33 **Impact BIO-50a: Loss of Connectivity among Giant Garter Snakes in the Coldani Marsh/White** 34 **Slough Subpopulation, Stone Lakes National Wildlife Refuge, and the Delta**

35 Implementation of Alternative 1A would not introduce a substantial barrier to the movement among
36 giant garter snakes in the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife
37 Refuge, and the Delta in the study area.

38 **NEPA Effects:** Alternative 1A would not adversely affect connectivity among giant garter snakes in
39 the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife Refuge, and the Delta
40 in the study area.

41 **CEQA Conclusion:** Alternative 1A would have a less-than-significant impact on connectivity between
42 giant garter snakes in the study area.

1 **Impact BIO-51: Periodic Effects of Inundation of Giant Garter Snake Habitat as a Result of**
2 **Implementation of Conservation Components**

3 *CM2 Yolo Bypass Fisheries Enhancement:* The proposed changes in Fremont Weir operations will
4 occur intermittently from as early as mid-November through as late as mid-May. The core
5 operations will occur during the winter/spring period, which corresponds mostly with the giant
6 garter snake's inactive season. During this time, snakes are overwintering underground. Giant garter
7 snakes that occur in the bypass during the active season could potentially overwinter in the bypass
8 during the inactive season: these snakes may be vulnerable to inundation of the bypass and could be
9 drowned or displaced from overwintering sites. However, most typically, Fremont Weir "notch"
10 operations will occur on the shoulders of time periods in which the Sacramento River rises enough
11 for Fremont Weir to overtop passively, without the proposed project. Project-associated inundation
12 of areas that would not otherwise have been inundated is expected to occur in no more than 30% of
13 all years, since Fremont Weir is expected to overtop the remaining estimated 70% of all years, and
14 during those years notch operations would not typically affect the maximum extent of inundation.
15 Currently, in more than half of all years, an area greater than the area that would be inundated as a
16 result of covered activities is already inundated during the snake's inactive season (Kirkland pers.
17 comm.). Duration of inundation may also be an important factor determining effects on
18 overwintering giant garter snakes. Radiotelemetry studies have revealed giant garter snakes
19 surviving in burrows that had been inundated for 2 to 3 weeks, but it is unknown what duration of
20 inundation the snakes can survive while overwintering in their burrows.

21 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, provides the method used to
22 estimate periodic inundation effects in the Yolo Bypass. Based on this method, periodic inundation
23 could affect giant garter snakes overwintering in upland areas ranging from an estimated 582 acres
24 of upland habitat during notch flow of 1,000 cfs to an estimated 1,402 acres during a 4,000-cfs notch
25 flow. The 4,000-cfs notch flow would affect an estimated 888 acres of high value habitat and 514
26 acres of moderate value habitat.

27 As noted above under the discussion of habitat loss from construction-related activities in Yolo
28 Bypass, late season flooding in the bypass may result in loss of rice habitat (considered aquatic
29 habitat for giant garter snake) by precluding the preparation and planting of a maximum of 1,662
30 acres of rice fields (BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter*
31 *Snake Summer Foraging Habitat in the Yolo Bypass*). This analysis concludes that the estimated loss
32 of rice is 1,662 acres which was considered to occur late long-term. Restoration and protection of
33 2,740 acres of rice land or habitat of equivalent value for the giant garter snake would achieve a 1:1
34 ratio of habitat conserved to habitat affected (habitat affected includes uplands periodically flooded
35 and rice lost due to late season flooding in Yolo Bypass) as a result of CM2.

36 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 606 acres of upland
37 habitat for the giant garter snake in the south Delta (CZ 7). The upland habitat to be inundated
38 contains 432 acres of moderate-value and 174 acres of low-value habitat. The area between existing
39 levees would be breached and the newly constructed setback levees will be inundated through
40 seasonal flooding. The restored floodplain will include a range of elevations from low-lying areas
41 that flood frequently (e.g., every 1 to 2 years) to high-elevation areas that flood infrequently (e.g.,
42 every 10 years or more). There are no records of giant garter snakes in the vicinity of where
43 floodplain restoration is expected to occur.

1 Based on modeled habitat for the giant garter snake, the study area supports approximately 53,285
2 acres of upland habitat for giant garter snake. Approximately 2,008 acres of giant garter snake
3 upland habitat (4% of total upland habitat in the study area) may be adversely affected by periodic
4 flooding as a consequence of floodplain restoration and the operation of the Fremont Weir.

5 **NEPA Effects:** Periodic effects on upland habitat for giant garter snake associated with
6 implementing Alternative 1A are not expected to result in substantial adverse effects on giant garter
7 snakes, either directly or through habitat modifications, as it would not result in a substantial
8 reduction in numbers or a restriction in the range of giant garter snakes. Therefore, Alternative 1A
9 would not adversely affect the species.

10 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in
11 various parts of the study area would periodically affect a total of approximately 2,008 acres of
12 upland habitat for giant garter snake. The inundation could affect overwintering snakes. Project-
13 associated inundation of areas that would not otherwise have been inundated is expected to occur in
14 no more than 30% of all years, since Fremont Weir is expected to overtop the remaining estimated
15 70% of all years, and during those years notch operations would not typically affect the maximum
16 extent of inundation. Currently, in more than half of all years, an area greater than the area that
17 would be inundated as a result of covered activities is already inundated during the snake's inactive
18 season (Kirkland pers. comm.). Therefore, increased inundation in the Yolo Bypass as a result of
19 BDCP is expected to have a minimal effect on the Yolo Basin/Willow Slough population.
20 Implementing Alternative 1A, including AMM1-AMM7, AMM10, and AMM16, would not be expected
21 to result in substantial adverse effects on giant garter snakes, either directly or through habitat
22 modifications, because it would not result in a substantial reduction in numbers or a restriction in
23 the range of giant garter snakes. Periodic inundation under Alternative 1A would have a less-than-
24 significant impact on the species.

25 **Western Pond Turtle**

26 The habitat model used to assess effects on the western pond turtle is based on aquatic and upland
27 nesting and overwintering habitat. Further details regarding the habitat model, including
28 assumptions on which the model is based, are provided in BDCP Appendix 2.A, Section 2A.30,
29 *Western Pond Turtle*. The model quantified two types of upland nesting and overwintering habitat,
30 including upland habitat in natural communities as well as upland in agricultural areas adjacent to
31 aquatic habitats. Both of these upland habitat types are combined for this analysis. Factors
32 considered in assessing the value of affected aquatic habitat are natural community type and
33 availability of adjacent nesting and overwintering habitat. The highest value aquatic habitat types in
34 the study area consist of nontidal freshwater perennial emergent wetlands and ponds adjacent to
35 suitable nesting and overwintering habitat (Patterson pers. comm.). Less detail is provided on
36 effects on dispersal habitat because, although dispersal habitat is important for maintaining and
37 increasing distribution and genetic diversity, turtles have been known to travel over many different
38 land cover types; therefore, this habitat type is not considered limiting. The value of dispersal
39 habitat depends less on the habitat type itself than on the proximity of that habitat type to high-
40 value aquatic and nesting and overwintering habitat.

41 Construction and restoration associated with Alternative 1A conservation measures would result in
42 both temporary and permanent losses of western pond turtle modeled habitat, as indicated in Table
43 12-1A-23. The majority of these losses would take place over an extended period of time as tidal
44 marsh is restored in the study area. Full implementation of Alternative 1A would also include the

1 following biological objectives over the term of the BDCP to benefit the western pond turtle (BDCP
2 Chapter 3, *Conservation Strategy*).

- 3 • Protect or restore 142,200 acres of high-value natural communities and covered species
4 habitats (Objective L1.1, associated with CM3).
- 5 • Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
6 accommodate sea level rise. Minimum restoration targets for tidal natural communities in
7 each ROA are 7,000 acres in Suisun Marsh ROA, 5,000 acres in Cache Slough ROA, 1,500 acres in
8 Cosumnes/Mokelumne ROA, 2,100 acres in West Delta ROA, and 5,000 acres in South Delta ROA
9 (Objective L1.3, associated with CM2, CM3, and CM4).
- 10 • Within the 65,000 acres of tidal natural communities and transitional uplands (Objective L1.3),
11 include sufficient transitional uplands along the fringes of restored brackish and freshwater
12 tidal emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow
13 for the future upslope establishment of tidal emergent wetland communities (Objective L1.7,
14 associated with CM3, CM4, and CM8).
- 15 • Allow floods to promote fluvial processes, such that bare mineral soils are available for natural
16 recolonization of vegetation, desirable natural community vegetation is regenerated, and
17 structural diversity is promoted, or implement management actions that mimic those natural
18 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 19 • Allow lateral river channel migration (Objective L2.2, associated with CM3 and CM5).
- 20 • Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of
21 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective
22 TFEWNC1.1, associated with CM3 and CM4).
- 23 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
24 and nontidal freshwater emergent wetland natural communities, with suitable habitat
25 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,
26 associated with CM3 and CM10).
- 27 • Protect and enhance 8,100 acres of managed wetland, 1,500 acres of which are in the Grizzly
28 Island Marsh Complex (Objective MWNC1.1, associated with CM3 and CM11).
- 29 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 30 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic
31 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with
32 CM3).
- 33 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
34 lands that occur in cultivated lands within the reserve system, including isolated valley oak
35 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
36 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
37 with CM3 and CM11).

38 As explained below, with the restoration and protection of these amounts of habitat, in addition to
39 implementation of AMMs, impacts on western pond turtle would not be adverse for NEPA purposes
40 and would be less than significant for CEQA purposes.

1 **Table 12-1A-23. Changes in Western Pond Turtle Modeled Habitat Associated with Alternative 1A^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic (acres)	49	49	79	79	NA	NA
	Upland ^e (acres)	161	161	58	58	NA	NA
	Aquatic (miles)	11	11	5	5		
Total Impacts CM1 (acres)		210	210	137	137		
CM2–CM18	Aquatic (acres)	82	114	23	44	NA	NA
	Upland (acres)	414	1,028	119	136	283-798	331
	Aquatic (miles)	25	109	3	4		
Total Impacts CM2–CM18 (acres)		496	1,142	142	180	283-798	331
TOTAL IMPACTS CM1–CM18 (acres)		706	1,352	279	317		479

- ^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.
- ^b See discussion below for a description of applicable CMs.
- ^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.
- ^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.
- ^e Upland acres represent upland nesting and overwintering habitat acreages combined for both natural communities and agricultural lands adjacent to aquatic habitats.

NT = near-term
LLT = late long-term
NA = not applicable

2

3 **Impact BIO-52: Loss or Conversion of Habitat for and Direct Mortality of Western Pond Turtle**

4 Alternative 1A conservation measures would result in the permanent and temporary loss of up to
5 286 acres of aquatic habitat and 1,383 acres of upland nesting and overwintering habitat (Table 12-
6 1A-23). There are 6 western pond turtle occurrences that overlap with the CM1 footprint and a
7 number of additional occurrences in the vicinity (Figure 12-16). Activities that would result in the
8 temporary and permanent loss of western pond turtle modeled habitat are conveyance facilities and
9 transmission line construction, and establishment and use of RTM, borrow, and spoils areas (CM1),
10 Yolo Bypass improvements (CM2), tidal habitat restoration (CM4) and seasonally inundated
11 floodplain restoration (CM5), and riparian restoration (CM7). Habitat enhancement and
12 management activities (CM11), such as ground disturbance or removal of nonnative vegetation,
13 could result in local adverse habitat effects. In addition, maintenance activities associated with the
14 long-term operation of the water conveyance facilities and other BDCP physical facilities could
15 degrade or eliminate western pond turtle habitat. The activity accounting for most (80%) of the
16 habitat loss or conversion would be *CM4 Tidal Natural Communities Restoration*. Each of these
17 individual activities is described below. A summary statement of the combined impacts and NEPA
18 effects and a CEQA conclusion follow the individual conservation measure discussions.

1 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
2 result in the permanent loss of approximately 49 acres of aquatic habitat and 161 acres of
3 upland nesting and overwintering habitat for the western pond turtle in the study area (Table
4 12-1A-23). Development of the water conveyance facilities would also result in the temporary
5 removal of up to 79 acres of aquatic habitat and 58 acres of nesting and overwintering habitat
6 for the western pond turtle in the study area (see Table 12-1A-23). Approximately 11 miles of
7 channels providing western pond turtle movement habitat would be removed as a result of
8 floodplain restoration and 5 miles would be temporarily disturbed. There are six western pond
9 turtle occurrences that overlap with the CM1 footprint in CZ 2 around Clifton Court Forebay and
10 in CZ 5 scattered throughout the Delta. The majority of the permanent loss of aquatic habitat
11 and nesting and overwintering habitat would be near Clifton Court Forebay in CZ 8. Refer to the
12 Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations. The
13 aquatic habitat in the Clifton Court Forebay area is considered to be of reasonably high-value
14 because it consists of agricultural ditches in or near known species occurrences. The nesting and
15 overwintering and dispersal habitat that would be lost consists primarily of cultivated lands
16 with some small portion of ruderal grassland habitat. Except for remnant, uncultivated patches,
17 the cultivated lands are not suitable for nesting and overwintering unless left fallow.
18 Construction of the water conveyance facilities would also affect dispersal habitat, which is
19 primarily cultivated lands. While there are western pond turtle occurrences scattered
20 throughout CZ 3, CZ 4, CZ 5, and CZ 6, this effect is widely dispersed because of the long, linear
21 nature of the pipeline footprint.

22 • *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the
23 permanent and temporary removal of approximately 60 acres of aquatic habitat and 249 acres
24 of upland nesting and overwintering habitat for the western pond turtle. Approximately 4 miles
25 of channels providing western pond turtle movement habitat would be permanently or
26 temporarily removed as a result of Yolo Bypass improvements. Although there are no CNDDB
27 occurrences for western pond turtle in the Yolo Bypass, the species is known to be present in
28 the Yolo Bypass Wildlife Area (California Department of Fish and Wildlife 2013).

29 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
30 in the conversion of approximately 45 acres of aquatic habitat and 872 acres of upland nesting
31 and overwintering habitat for western pond turtle to tidal marsh. Approximately 106 miles of
32 channels providing western pond turtle movement habitat would be removed as a result of
33 restoration. Tidal habitat restoration is expected to change existing salinity and flow conditions
34 rather than lead to complete loss of aquatic habitat. Restoration of tidal flow where habitat
35 consists of the calm waters of managed freshwater ponds and wetlands could have an adverse
36 effect on the western pond turtle. Tidal restoration outside Suisun Marsh is likely to create
37 suitable, slow-moving freshwater slough and marsh habitat.

38 Although the aquatic habitat model includes all tidal perennial aquatic, tidal brackish emergent
39 wetland, and managed wetland as habitat most of the Suisun Marsh pond turtle observations
40 have been in the interior drainage ditches or near water control structures not hydrologically
41 connected to Suisun Marsh (Patterson pers. comm.). While the model does not include an
42 aquatic class type called *drainage ditches* and therefore an effect on this habitat type cannot be
43 calculated, it is likely that this general type of habitat accounts for a very small portion of the
44 total modeled aquatic effects; almost certainly less than 5%, or less than 287 acres of the
45 modeled aquatic habitat affected by tidal restoration. The suitable nesting and overwintering
46 habitat that would be affected in the interior of Suisun Marsh is limited, because the levees likely

1 function as the primary nesting and overwintering habitat. The nesting and overwintering
2 habitat of highest value to be affected is on the fringe of the marsh where the aquatic habitat is
3 adjacent to undeveloped grassland habitat.

4 The habitat affected in the interior Delta (West Delta and South Delta) is of low value, consisting
5 of levees and intensively farmed cultivated lands, while the Cache Slough and Cosumnes-
6 Mokelumne ROAs are less intensively farmed and have higher-value habitat for the turtle.
7 Because the estimates of the effect of tidal inundation are based on projections of where
8 restoration may occur, actual effects are expected to be lower because sites would be selected to
9 minimize effects on western pond turtle habitat (see AMM17 in Appendix 3B, *Environmental*
10 *Commitments, AMMs, and CMs*).

- 11 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
12 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
13 approximately 53 acres of aquatic habitat 33 acres of upland habitat for western pond turtle.
14 Approximately 3 miles of channels providing western pond turtle movement habitat would be
15 removed or temporarily disturbed as a result of floodplain restoration. Although there are no
16 CNDDDB occurrences of the western pond turtle in the areas where floodplain restoration is
17 likely to occur, the species is known to occur along the San Joaquin River to the south in the San
18 Joaquin River National Wildlife Refuge. As with CM4, the estimates of the effect of seasonal
19 floodplain levee construction and inundation are based on projections of where restoration may
20 occur. Actual effects are expected to be lower because sites would be selected to minimize
21 effects on western pond turtle habitat.
- 22 • *CM7 Riparian Natural Community Restoration*: Riparian restoration that is part of tidal natural
23 communities restoration in CZ 1 and CZ 2, would result in the permanent removal of 10 acres of
24 upland nesting and overwintering habitat for western pond turtle.
- 25 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
26 actions included in CM11 that are designed to enhance wildlife values in BDCP protected
27 habitats may result in localized ground disturbances that could temporarily remove small
28 amounts of western pond turtle habitat. Ground-disturbing activities, such as removal of
29 nonnative vegetation and road and other infrastructure maintenance, are expected to have
30 minor adverse effects on available western pond turtle habitat and are expected to result in
31 overall improvements to and maintenance of western pond turtle habitat values over the term
32 of the BDCP. In addition, effects would be avoided and minimized by the AMMs listed below.
33 Management of the 6,600 acres of managed wetlands to be protected for waterfowl and
34 shorebirds is not expected to result in overall adverse effects for the western pond turtle.
35 Management actions that would improve wetland quality and diversity on managed wetlands
36 include control and eradication of invasive plants; maintenance of a diversity of vegetation types
37 and elevations, including upland areas to provide flood refugia; water management and leaching
38 to reduce salinity; and enhancement of water management infrastructure (improvements to
39 enhance drainage capacity, levee maintenance). These management actions could potentially
40 benefit the western pond turtle. The 6,600 acres of protected managed wetlands would be
41 monitored and adaptively managed to ensure that management options are implemented to
42 avoid adverse effects on the western pond turtle.
- 43 • *Operations and maintenance*: Ongoing maintenance of BDCP facilities is expected to have little if
44 any adverse effect on the western pond turtle. Postconstruction operation and maintenance of
45 the above-ground water conveyance facilities and restoration infrastructure could result in

1 ongoing but periodic disturbances that could affect western pond turtle use where there is
2 suitable habitat in the study area. Maintenance activities would include vegetation management,
3 levee and structure repair, and regrading of roads and permanent work areas. These effects,
4 however, would be minimized by AMMs and conservation actions described below.

- 5 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
6 western pond turtles. If turtles reside where conservation measures are implemented (most
7 likely in the vicinity of aquatic habitats in the study area), the operation of equipment for land
8 clearing, construction, conveyance facilities operation and maintenance, and habitat restoration,
9 enhancement, and management could result in injury or mortality of western pond turtles.
10 However, to avoid injury or mortality, preconstruction surveys would be conducted in suitable
11 aquatic or upland habitat for the western pond turtle, and turtles found would be relocated
12 outside the construction areas, as required by the AMMs listed below.

13 The following paragraphs summarize the combined effects discussed above and describe other
14 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
15 also included.

16 ***Near-Term Timeframe***

17 Because the water conveyance facilities construction is being evaluated at the project level, the near-
18 term BDCP conservation strategy has been evaluated to determine whether it would provide
19 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
20 construction would not be adverse under NEPA.

21 Alternative 1A would temporarily and permanently remove 233 acres of aquatic habitat and 752
22 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These
23 effects would result from water conveyance facilities construction (CM1, 128 acres of aquatic and
24 219 acres of upland habitat), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of
25 upland habitat), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland habitat),
26 and riparian restoration (CM7, 4 acres of upland habitat). All effects for seasonally inundated habitat
27 restoration (CM5) would occur in the late-longterm.

28 Typical project-level mitigation ratios for those natural communities that would be affected and that
29 are identified in the biological goals and objectives for western pond turtle in Chapter 3 of the BDCP
30 would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection of
31 upland habitats. Using these ratios would indicate that 233 acres of aquatic habitat should be
32 restored, 233 acres of aquatic habitat should be protected, and 1,504 acres of upland habitat should
33 be protected for western pond turtle to mitigate the near-term losses.

34 The conservation strategy for western pond turtle involves restoration and protection of aquatic
35 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
36 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
37 addressed at the landscape and natural community levels. The BDCP has committed to near-term
38 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,
39 Objective NFEW/NPANC1.1, Objective MWNC1.1) and up to 2,000 acres of upland habitat (Objective
40 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun
41 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in
42 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,

1 undisturbed grassland. Additionally, basking platforms would be installed as needed in restored
2 freshwater marsh to benefit the western pond turtle.

3 The natural community restoration and protection activities would be concluded in the first 10
4 years of Plan implementation, which is close enough in time to the impacts of construction to
5 constitute adequate mitigation. Because the number of acres required to meet the typical ratios
6 described above would be only 233 acres of aquatic communities protected and restored and 1,504
7 acres of upland communities protected, the 24,350 acres of aquatic and 2,000 acres of upland
8 habitats restored or created in the near-term Plan goals, and the additional detail in the biological
9 goals for western pond turtle, are more than sufficient to support the conclusion that the near-term
10 impacts of habitat loss and direct mortality under Alternative 1A on western pond turtles would not
11 be adverse.

12 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
16 *Natural Communities*, and *AMM17 Western Pond Turtle*. These AMMs include elements that would
17 avoid or minimize the risk of affecting habitats and species adjacent to work areas and storage sites.
18 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in
19 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

20 **Late Long-Term Timeframe**

21 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and
22 28,864 acres of upland habitat for western pond turtle. Alternative 1A would remove 286 acres of
23 aquatic habitat and 1,383 acres of upland nesting and overwintering habitat for western pond turtle
24 in the late long-term.

25 Implementation of Alternative 1A as a whole would increase the extent and distribution of high-
26 value aquatic and upland nesting and overwintering habitat for western pond turtle in the study
27 area. While the extent of dispersal habitat is expected to be reduced by approximately 9%, this
28 habitat is abundant in the study area (composed primarily of cultivated lands), is not believed to be
29 a factor limiting the turtle, and would be replaced with higher-value habitats for western pond
30 turtle.

31 The conservation strategy for western pond turtle involves restoration and protection of aquatic
32 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
33 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
34 addressed at the landscape and natural community levels. The BDCP has committed to late long-
35 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective
36 L1.3, Objective NFEW/NPANC1.1, Objective MWNC1.1) and up to 8,000 acres of upland habitat
37 (Objective GNC1.1). In addition, the protection and management of existing managed wetland
38 habitat in Suisun Marsh may increase the value of aquatic habitat. The most beneficial restoration
39 would occur in freshwater emergent wetland consisting of slow-moving slough and marsh adjacent
40 to protected, undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands
41 that are preserved and managed as part of the 48,625 acres of protected cultivated lands described
42 above for giant garter snake are also expected to benefit the species. Additionally, basking platforms
43 will be installed as needed in restored freshwater marsh to benefit the western pond turtle.

1 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and
2 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow
3 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species
4 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to
5 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat
6 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle
7 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident
8 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the
9 rabbit.

10 The study area represents only a small portion of the range of the western pond turtle in California
11 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and
12 temporary loss or conversion of habitat for the western pond turtle, and other effects described
13 above, are not expected to result in an adverse effect on the long-term survival and recovery of
14 western pond turtle because for the following reasons.

- 15 • The study area represents a small portion of the species' entire range.
- 16 • Only 1% of the habitat in the study area would be removed or converted.

17 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
18 and protection actions discussed above, as well as the restoration of managed wetland, nontidal
19 freshwater perennial emergent wetland, nontidal perennial aquatic, tidal brackish emergent
20 wetland, tidal freshwater emergent wetland, grassland, valley foothill riparian, that could overlap
21 with the species model, would result in the restoration of 29,738 acres of aquatic and 1,421 acres of
22 upland modeled habitat for western pond turtle. In addition, protection of cultivated land, managed
23 wetland, grassland, and valley/foothill riparian could overlap with the species model and would
24 result in the protection of 1,281 acres of aquatic and 4,993 acres of upland western pond turtle
25 modeled habitat.

26 **NEPA Effects:** In the near-term, the loss of western pond turtle habitat under Alternative 1A would
27 not be adverse because the BDCP has committed to protecting and restoring the acreage required to
28 meet the typical mitigation ratios described above. In the late long-term, the losses of western pond
29 turtle habitat associated with Alternative 1A, in the absence of other conservation actions, would
30 represent an adverse effect as a result of habitat modification and potential direct mortality of a
31 special-status species. However, with habitat protection and restoration associated with the
32 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,
33 AMM10, and AMM17, the effects of Alternative 1A as a whole on western pond turtle would not be
34 adverse.

35 **CEQA Conclusion:**

36 **Near-Term Timeframe**

37 Because *CM1 Water Facilities and Operation* construction is being evaluated at the project level, the
38 near-term BDCP conservation strategy has been evaluated to determine whether it would provide
39 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
40 construction would be less than significant under CEQA.

41 Alternative 1A would temporarily and permanently remove 233 acres of aquatic habitat and 752
42 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These

1 effects would result from water conveyance facilities construction (CM1, 128 acres of aquatic and
2 219 acres of upland habitat), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of
3 upland habitat), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland habitat,
4 and riparian restoration (CM7, 4 acres of upland habitat). All effects for seasonally inundated habitat
5 restoration (CM5) would occur in the late-longterm.

6 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
7 and that are identified in the biological goals and objectives for western pond turtle in Chapter 3 of
8 the BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for
9 protection of upland habitats. Using these ratios would indicate that 233 acres of aquatic habitat
10 should be restored, 233 acres of aquatic habitat should be protected, and 1,504 acres of upland
11 habitat should be protected for western pond turtle to mitigate the near-term losses.

12 The conservation strategy for western pond turtle involves restoration and protection of aquatic
13 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
14 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
15 addressed at the landscape and natural community levels. The BDCP has committed to near-term
16 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,
17 Objective NFEW/NPANC1.1, Objective MWNC1.1) and up to 2,000 acres of upland habitat (Objective
18 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun
19 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in
20 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,
21 undisturbed grassland. Additionally, basking platforms would be installed as needed in restored
22 freshwater marsh to benefit the western pond turtle.

23 The natural community restoration and protection activities would be concluded in the first 10
24 years of Plan implementation, which is close enough in time to the impacts of construction to
25 constitute adequate mitigation for CEQA purposes. Because the number of acres required to meet
26 the typical ratios described above would be only 233 acres of aquatic communities protected and
27 restored and 1,504 acres of upland communities protected, the 24,350 acres of aquatic and 2,000
28 acres of upland habitats restored or created in the near-term Plan goals, and the additional detail in
29 the biological goals for western pond turtle, are more than sufficient to support the conclusion that
30 the near-term impacts of habitat loss and direct mortality under Alternative 1A on western pond
31 turtles would be less than significant.

32 In addition, the plan also contains commitments to implement AMM1–AMM6, AMM10, and AMM17
33 which include elements that would avoid or minimize the risk of directly and indirectly affecting
34 habitats and species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which
35 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
36 *AMMs, and CMs*, of the Final EIR/EIS.

37 **Late Long-Term Timeframe**

38 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and
39 28,864 acres of upland habitat for western pond turtle. Alternative 1A would remove 286 acres of
40 aquatic habitat and 1,383 acres of upland nesting and overwintering habitat for western pond turtle
41 in the late long-term.

42 Implementation of Alternative 1A as a whole would increase the extent and distribution of high-
43 value aquatic and upland nesting and overwintering habitat for western pond turtle in the study

1 area. While the extent of dispersal habitat is expected to be reduced by approximately 9%, this
2 habitat is abundant in the study area (composed primarily of cultivated lands), is not believed to be
3 a factor limiting the turtle, and would be replaced with higher-value habitats for western pond
4 turtle.

5 The conservation strategy for western pond turtle involves restoration and protection of aquatic
6 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
7 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
8 addressed at the landscape and natural community levels. The BDCP has committed to late long-
9 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective
10 L1.3, Objective NFEW/NPANC1.1, Objective MWNC1.1) and up to 8,000 acres of upland habitat
11 (Objective GNC1.1). In addition, the protection and management of existing managed wetland
12 habitat in Suisun Marsh may increase the value of aquatic habitat. The most beneficial restoration
13 would occur in freshwater emergent wetland consisting of slow-moving slough and marsh adjacent
14 to protected, undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands
15 that are preserved and managed as part of the 48,625 acres of protected cultivated lands described
16 above for giant garter snake are also expected to benefit the species. Additionally, basking platforms
17 will be installed as needed in restored freshwater marsh to benefit the western pond turtle.

18 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and
19 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow
20 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species
21 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to
22 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat
23 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle
24 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident
25 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the
26 rabbit.

27 The study area represents only a small portion of the range of the western pond turtle in California
28 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and
29 temporary loss or conversion of habitat for the western pond turtle, and other effects described
30 above, are not expected to result in an adverse effect on the long-term survival and recovery of
31 western pond turtle because for the following reasons.

- 32 ● The study area represents a small portion of the species' entire range.
- 33 ● Only 1% of the habitat in the study area would be removed or converted.

34 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
35 and protection actions discussed above, as well as the restoration of managed wetland, nontidal
36 freshwater perennial emergent wetland, nontidal perennial aquatic, tidal brackish emergent
37 wetland, tidal freshwater emergent wetland, grassland, valley foothill riparian, that could overlap
38 with the species model, would result in the restoration of 29,738 acres of aquatic and 1,421 acres of
39 upland modeled habitat for western pond turtle. In addition, protection of cultivated land, managed
40 wetland, grassland, and valley/foothill riparian could overlap with the species model and would
41 result in the protection of 1,281 acres of aquatic and 4,993 acres of upland western pond turtle
42 modeled habitat.

43 The loss of western pond turtle habitat associated with Alternative 1A as a whole would represent
44 an adverse effect as a result of special-status species habitat modification and the potential direct

1 mortality of turtles. However, considering the habitat restoration and protection associated with the
2 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,
3 AMM10, and AMM17, which would be in place throughout the construction phase, the loss of habitat
4 and potential mortality would not have an adverse effect on western pond turtle. Therefore, the loss
5 of western pond turtle habitat and potential mortality of turtles resulting from Alternative 1A would
6 have a less-than-significant impact on western pond turtle.

7 **Impact BIO-53: Indirect Effects of Plan Implementation on Western Pond Turtle**

8 Indirect effects on western pond turtle within 200 feet of construction activities could temporarily
9 affect the use of aquatic habitat and upland nesting, overwintering, and dispersal habitat for the
10 western pond turtle. Construction activities outside the construction footprint but within 200 feet of
11 water conveyance facilities, conservation components and ongoing habitat enhancement, as well as
12 operation and maintenance of above-ground water conveyance facilities, including the transmission
13 facilities, could result in ongoing periodic postconstruction disturbances with localized impacts on
14 western pond turtle habitat, and temporary noise and visual disturbances over the term of the
15 BDCP.

16 The use of mechanical equipment during water conveyance facilities construction could cause the
17 accidental release of petroleum or other contaminants that could affect western pond turtle or its
18 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond
19 turtle aquatic habitat could also have a negative effect on the species or its prey. AMM1–AMM6, and
20 AMM10 would minimize the likelihood of such spills and would ensure measures are in place to
21 prevent runoff from the construction area and potential effects of sediment or dust on western pond
22 turtle or its prey.

23 Water operations would affect salinity gradients in Suisun Marsh. This effect mechanism cannot be
24 disaggregated from tidal natural community restoration in Suisun Marsh. It is expected that the
25 salinity of water in Suisun Marsh will generally increase as a result of water operations and
26 operation of salinity control gates to mimic a more natural water flow. Results of modeling for full
27 implementation of the BDCP show salinity to double by the late long-term compared with current
28 conditions during late fall and winter months. Changes in salinity would not be uniform across
29 Suisun Marsh, as salinity would likely be more pronounced in some tidal channels and sloughs than
30 others, and most of the salinity increase would occur during the fall and winter. Western pond
31 turtles are primarily a freshwater species, although they can also be found in brackish marsh, and
32 could respond negatively to increased salinity in Suisun Marsh. However, most of the Suisun Marsh
33 pond turtle observations have been in the interior drainage ditches or near water control structures
34 not connected to tidal channels and sloughs in Suisun Marsh which is where increases in salinity
35 would occur. Therefore, the potential effects associated with changes in salinity are not expected to
36 adversely affect western pond turtles

37 **NEPA Effects:** With implementation of AMM1–AMM6, AMM10, and AMM17, Alternative 1A would
38 avoid the potential for substantial adverse effects on western pond turtles, either directly or through
39 habitat modifications. These AMMs would also avoid and minimize effects that could substantially
40 reduce the number of western pond turtles or restrict the species range. Therefore, the indirect
41 effects of Alternative 1A would not have an adverse effect on western pond turtle.

42 **CEQA Conclusion:** Indirect effects resulting from conservation measure operations and maintenance
43 as well as construction-related noise and visual disturbances could impact western pond turtle in
44 aquatic and upland habitats. The use of mechanical equipment during construction could cause the

1 accidental release of petroleum or other contaminants that could affect western pond turtle or its
 2 prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond turtle
 3 habitat could also have a negative effect on the species or its prey. Changes in water salinity would
 4 have a less-than-significant impact on western pond turtles because most of the salinity increases
 5 would occur in areas not used extensively by western pond turtles. With implementation of AMM1–
 6 AMM6, AMM10, and AMM17 as part of Alternative 1A construction, operation, and maintenance, the
 7 BDCP would avoid the potential for substantial adverse effects on western pond turtles, either
 8 indirectly or through habitat modifications, and would not result in a substantial reduction in
 9 numbers or a restriction in the range of western pond turtles. The indirect effects of Alternative 1A
 10 would have a less-than-significant impact on western pond turtles.

11 **Impact BIO-54: Periodic Effects of Inundation of Western Pond Turtle Habitat as a Result of**
 12 **Implementation of Conservation Components**

13 *CM2 Yolo Bypass Fisheries Enhancement* would result in periodic inundation that could affect
 14 western pond turtle and its upland habitat. BDCP Appendix 5.J, *Effects on Natural Communities,*
 15 *Wildlife, and Plants*, provides the method used to estimate periodic inundation effects in the Yolo
 16 Bypass. Based on this method, periodic inundation could affect from an estimated 283 acres of
 17 habitat during 1,000 cfs notch flow to an estimated 798 acres of habitat during 4,000 cfs notch flow.
 18 This effect would occur during an estimated maximum of 30% of years, in areas that are already
 19 inundated in more than half of all years; therefore, these areas are expected to provide only
 20 marginal overwintering habitat for the western pond turtle under Existing Conditions. Furthermore,
 21 Yolo Bypass inundation is not expected to affect nesting western pond turtles because operations
 22 would not occur during the nesting season (approximately May through October). Therefore, Yolo
 23 Bypass operations are expect to have a minimal effect, if any, on western pond turtles in the Yolo
 24 Bypass.

25 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 331 acres of upland
 26 habitat for the western pond turtle in the south Delta (CZ 7). Seasonal flooding in restored
 27 floodplains is not expected to adversely affect aquatic and dispersal habitat, because these habitat
 28 functions are expected to remain in the seasonally inundated floodplains. Floodplains are not
 29 expected to be inundated during the nesting season, however, turtle hatchlings may overwinter in
 30 the nest and could be affected by flooding. Restored floodplains would transition for areas that flood
 31 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more);
 32 adverse effects on turtle hatchlings are most likely at the lower elevations of the restored floodplain,
 33 where frequent flooding occurs.

34 **NEPA Effects:** Periodic effects on upland habitat for western pond turtle from CM2 and CM5
 35 associated with implementing Alternative 1A are not expected to result in substantial adverse
 36 effects either directly or through habitat modifications, as it would not result in a substantial
 37 reduction in numbers or a restriction in the range of western pond turtles. Therefore, Alternative 1A
 38 would not adversely affect the species.

39 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in
 40 various parts of the study area would periodically affect 283-798 acres from CM2 and approximately
 41 331 acres from CM5 of upland habitat for western pond turtle These acreages represent only 1% of
 42 the total upland western pond turtle habitat in the study area. Most of the increase in inundation
 43 would occur in the winter and early spring months, when western pond turtles may be in the water
 44 or overwintering and occupying upland habitats. Therefore, implementing Alternative 1A, including

1 AMM1–AMM6, AMM10, and AMM17, would not be expected to result in substantial adverse effects
2 on western pond turtle, either directly or through habitat modifications, because it would not result
3 in a substantial reduction in numbers or a restriction in the range of western pond turtles. Periodic
4 effects of inundation under Alternative 1A would have a less-than-significant impact on the species.

5 **Silvery Legless Lizard, San Joaquin Coachwhip, and Blainville’s Horned Lizard**

6 This section describes the effects of Alternative 1A on the silvery legless lizard, San Joaquin
7 coachwhip, and Blainville’s horned lizard (special-status reptiles). The habitat types used to assess
8 effects on silvery legless lizard are limited to inland sand dunes near Antioch (CZ 9 and CZ 10),
9 which would not be affected by construction or restoration activities. This species is not discussed
10 any further.

11 The habitat types used to assess effects on the San Joaquin coachwhip are alkali seasonal wetland
12 complex, grassland, and inland dune scrub west of Byron Highway (CZ 7) and west of Old River and
13 West Canal (CZ 8). The habitat types used to assess effects on the Blainville’s horned lizard are the
14 same as those for the coachwhip in CZ 7 and CZ 8. There is also potential habitat for the horned
15 lizard to occur in grassland habitat around Stone Lake (CZ 4) Although the expected range for San
16 Joaquin coachwhip and Blainville’s horned lizard extends into the study area, there are no records
17 for either of these species within the study area (California Department of Fish and Wildlife 2013).
18 In addition, historic museum records show that Blainville’s horned lizard occurrences could have
19 been extirpated within the study area (Jennings and Hayes 1994).

20 Alternative 1A is expected to result in the temporary and permanent removal of habitat that special-
21 status reptiles uses for cover and dispersal (Table 12-1A-24). BDCP actions that could affect this
22 habitat are limited to construction and maintenance of the water conveyance facilities in the vicinity
23 of Clifton Court Forebay, and grassland restoration, protection and management. Full
24 implementation of Alternative 1A would also include the following biological objectives over the
25 term of the BDCP that would also benefit special-status reptiles (BDCP Chapter 3, *Conservation*
26 *Strategy*).

- 27 • Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
28 between existing conservation lands (Objective L1.6, associated with CM3).
- 29 • Increase native species diversity and relative cover of native plant species, and reduce the
30 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 31 • Protect and improve habitat linkages that allow native terrestrial species to move between
32 protected habitats within and adjacent to the Plan Area (Objective L3.1, associated with CM3,
33 CM8, and CM11).
- 34 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 35 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland
36 (Objective GNC1.2, associated with CM3 and CM8).

37 As explained below, with the restoration or protection of these amounts of habitat, in addition to
38 implementation of AMMs, impacts on special-status reptiles would not be adverse for NEPA
39 purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-24. Changes in Special-Status Reptile Habitat Associated with Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Grassland	171	171	167	167	NA	NA
Total Impacts CM1		171	171	167	167	NA	NA
CM2–CM18	Grassland	0	0	0	0	0	0
Total Impacts CM2–CM18		0	0	0	0	0	0
TOTAL IMPACTS		171	171	167	167	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-55: Loss or Conversion of Habitat for and Direct Mortality of Special-Status**
4 **Reptiles**

5 Alternative 1A conservation measures would result in a total loss of 338 acres of potential habitat
6 for special-status reptiles (Table 12-1A-24). Water conveyance facilities and transmission line
7 construction, including establishment and use of borrow and spoil areas, (CM1) would cause the loss
8 of special-status reptile habitat. In addition, habitat enhancement and management activities
9 (CM11), such as ground disturbance or removal of nonnative vegetation, could result in local
10 adverse habitat effects for special-status reptiles. For purposes of this analysis, the acres of total
11 effect are considered the same for both San Joaquin coachwhip and Blainville's horned lizard, even
12 though this assumption would result in slightly more acres of permanent effect on the San Joaquin
13 coachwhip resulting from water conveyance facilities activities in CZ 4, where San Joaquin
14 coachwhip does not occur.

15 In addition to habitat loss and conversion, construction activities, such as grading, the movement of
16 construction vehicles or heavy equipment, and the installation of water conveyance facilities
17 components and new transmission lines, may result in the direct mortality, injury, or harassment of
18 special-status reptiles, including the potential crushing of individuals and disruption of essential
19 behaviors. Construction of access roads could fragment suitable habitat, potentially impede upland
20 movements in some areas, and increase the risk of road mortality. Construction activities related to
21 conservation components could have similar affects. Each of these individual activities is described
22 below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion
23 follow the individual conservation measure discussions.

- 24 • *CM1 Water Facilities and Operation*: Development of the conveyance facilities would result in the
25 permanent loss of approximately 171 acres of habitat for special-status reptiles in the vicinity of

1 Clifton Court Forebay. Construction-related effects would temporarily disturb 167 acres of
2 suitable habitat for special-status reptiles in the study area.

- 3 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
4 actions included in *CM11* that are designed to enhance wildlife values in BDCP-protected
5 habitats may result in localized ground disturbances that could temporarily remove small
6 amounts of special-status reptile habitat. Ground-disturbing activities, such as removal of
7 nonnative vegetation and road and other infrastructure maintenance, are expected to have
8 minor adverse effects on available special-status reptile habitat and are expected to result in
9 overall improvements to and maintenance of species habitat values over the term of the BDCP.
10 These effects cannot be quantified, but are expected to be minimal and would be reduced
11 through implementation of Mitigation Measure BIO-55, *Conduct Preconstruction Surveys for*
12 *Noncovered Special-Status Reptiles and Implement Applicable AMMs*.
- 13 • Operations and maintenance: Ongoing facilities operation and maintenance is expected to have
14 little if any adverse effect on special-status reptiles. Postconstruction operation and
15 maintenance of the above-ground water conveyance facilities could result in ongoing but
16 periodic disturbances that could affect special-status reptiles' use of suitable habitat in the study
17 area. These effects, however, would be minimized with implementation of Mitigation Measure
18 BIO-55.
- 19 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
20 special-status reptiles. The operation of equipment for land clearing, construction, operation
21 and maintenance, and restoration, enhancement, and management activities could result in
22 injury or mortality. This risk is highest from late fall through early spring, when special-status
23 reptiles are not as active. However, the risk of crushing Blainville's horned lizard would not
24 necessarily be lower during the active season, because the species uses crypsis to hide from
25 predators and would be hard to spot from a moving vehicle. Seasonal risk reduction may be
26 more appropriate for the coachwhip, but there is still a risk of crushing the horned lizard during
27 the active season. In addition, both species would not be active under conditions of extreme
28 temperatures and could be taking cover in burrows or crevices or under structures such as
29 rocks or logs (Morey 2000). They could also burrow beneath the soil and be crushed by vehicles.
30 *P. blainvillii* may only be active during the early morning and evening hours in the summer
31 (Morey 2000). Increased vehicular traffic associated with BDCP actions could contribute to a
32 higher incidence of road kill. However, conducting construction during the late-spring through
33 early fall periods when feasible, and when temperatures are 67–100 degrees F, and
34 implementation of Mitigation Measure BIO-55 would avoid and minimize injury or mortality of
35 special-status reptiles during construction.

36 The following paragraphs summarize the combined effects discussed above and describe other
37 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
38 also included.

39 ***Near-Term Timeframe***

40 Because the water conveyance facilities construction is being evaluated at the project level, the near-
41 term BDCP conservation strategy has been evaluated to determine whether it would provide
42 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
43 construction effects would not be adverse under NEPA.

1 Alternative 1A would remove 338 acres of grassland habitat for special-status reptiles from CM1.
2 The typical NEPA mitigation ratio (2:1 for protection) for this natural community would indicate
3 that 676 acres should be protected in the near-term to offset CM1 losses.

4 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection
5 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all
6 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and
7 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

8 Considering the BDCP conservation strategy and the implementation of Mitigation Measure BIO-55.
9 to avoid and minimize injury or mortality of special-status reptiles during construction, the
10 permanent and temporary loss of special-status reptile habitat and the potential mortality of either
11 species from Alternative 1A would not be an adverse effect.

12 ***Late Long-Term Timeframe***

13 Alternative 1A as a whole would result in the permanent loss of 338 acres of habitat for special-
14 status reptiles over the life of the plan.

15 Effects of water conveyance facilities construction would be offset through the plan's long-term
16 commitment to protect up to 8,000 acres of grassland, and grassland associated with alkali seasonal
17 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the study area
18 (Objective GNC1.1 and GNC1.2). Grassland protection would focus in particular on acquiring the
19 largest remaining contiguous patches of unprotected grassland habitat, which are located south of
20 SR 4 in CZ 8 (BDCP Appendix 2.A, *Covered Species Accounts*). This area connects to more than 620
21 acres of existing habitat that is protected under the East Contra Costa County HCP/NCCP.

22 Other effects would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*
23 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable AMMs*. The
24 plan as a whole is expected to benefit special-status reptiles that could be present by protecting
25 potential habitat from loss or degradation that otherwise could occur with future changes in existing
26 land use. To the extent that grassland habitat is restored in CZ 8, restoration would remove
27 unsuitable special-status reptile habitat, such as cultivated land, and replace it with high-value
28 cover, foraging, and dispersal habitat. The overall effect would be beneficial because the Alternative
29 1A would result in a net increase in acreage of grassland habitat in the Plan Area.

30 BDCP's commitment to protect the largest remaining contiguous habitat patches (including
31 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in
32 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities
33 construction.

34 ***NEPA Effects:*** In the near-term and late long-term, the loss of special-status reptile habitat under
35 Alternative 1A would be not be adverse because the BDCP has committed to protecting the acreage
36 required to meet the typical mitigation ratios described above and because of the implementation of
37 Mitigation Measure BIO-55 and applicable AMMs.

38 ***CEQA Conclusion:***

39 ***Near-Term Timeframe***

40 Because the water conveyance facilities construction is being evaluated at the project level, the near-
41 term BDCP conservation strategy has been evaluated to determine whether it would provide

1 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
2 construction effects would be less than significant under CEQA.

3 Alternative 1A would remove 338 acres of grassland habitat for special-status reptiles from CM1.
4 The typical NEPA mitigation ratio (2:1 for protection) for this natural community would indicate
5 that 676 acres should be protected in the near-term to offset CM1 losses.

6 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection
7 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all
8 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and
9 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

10 The natural community restoration and protection activities are expected to be concluded during
11 the first 10 years of Plan implementation, which would be close enough to the timing of construction
12 impacts to constitute mitigation for CEQA purposes. Considering the BDCP conservation strategy
13 and the implementation of Mitigation Measure BIO-55, *Conduct Preconstruction Surveys for*
14 *Noncovered Special-Status Reptiles and Implement Applicable AMMs*, the permanent and temporary
15 loss of special-status reptile habitat and the potential mortality of either species would be less than
16 significant.

17 ***Late Long-Term Timeframe***

18 Alternative 1A as a whole would result in the permanent loss of 338 acres of habitat for special-
19 status reptiles over the life of the plan.

20 Effects of water conveyance facilities construction would be offset through the plan's long-term
21 commitment to protect up to 8,000 acres of grassland, and grassland associated with alkali seasonal
22 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the study area
23 (Objective GNC1.1 and GNC1.2). Grassland protection would focus in particular on acquiring the
24 largest remaining contiguous patches of unprotected grassland habitat, which are located south of
25 SR 4 in CZ 8 (Objective GNC1.1). This area connects to more than 620 acres of existing habitat that is
26 protected under the East Contra Costa County HCP/NCCP.

27 Other effects would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*
28 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable AMMs*. The
29 plan as a whole is expected to benefit special-status reptiles that could be present by protecting
30 potential habitat from loss or degradation that otherwise could occur with future changes in existing
31 land use. To the extent that grassland habitat is restored in CZ 8, restoration would remove
32 unsuitable special-status reptile habitat, such as cultivated land, and replace it with high-value
33 cover, foraging, and dispersal habitat. The overall effect would be beneficial because the Alternative
34 1A would result in a net increase in acreage of grassland habitat in the Plan Area.

35 BDCP's commitment to protect the largest remaining contiguous habitat patches (including
36 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in
37 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities
38 construction. Considering the BDCP conservation strategy and the implementation of Mitigation
39 Measure BIO-55, the permanent and temporary loss of special-status reptile habitat and the
40 potential mortality of either species would be less than significant.

1 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**
2 **Status Reptiles and Implement Applicable AMMs**

3 DWR will retain a qualified biologist to conduct a habitat assessment in construction and
4 restoration areas that are relatively undisturbed or have a moderate to high potential to support
5 non-covered special-status reptiles (Blainville's horned lizard and San Joaquin coachwhip) in CZ
6 4, CZ 7, and CZ 8. The qualified biologist will survey for noncovered special-status reptiles in
7 areas of suitable habitat concurrent with the preconstruction surveys for covered species in CZ
8 4, CZ 7, and CZ 8. If special-status reptiles are found in work areas, the biologist will first attempt
9 to allow these species to move out of the work area on their own but if conditions do not allow
10 this, individuals will be captured by the biologist and relocated to the nearest suitable habitat
11 outside of the work area as determined in consultation with CDFW. To the extent feasible, work
12 in areas of suitable habitat for Blainville's horned lizard and San Joaquin coachwhip should not
13 be conducted during periods of cold and hot temperatures (below 67 degrees F and above 100
14 degrees F), because both species would be relatively inactive during these periods and could be
15 taking cover in loose soil, in burrows or crevices, or under structures such as rocks or logs
16 (Morey 2000). This would reduce the impact of being crushed by vehicles and equipment.

17 In addition, AMMs, specifically *AMM1 Worker Awareness Training*, *AMM2 Construction Best*
18 *Management Practices and Monitoring*, and *AMM6 Disposal and Reuse of Spoils*, will be
19 implemented for all noncovered special-status reptiles adversely affected by the BDCP to avoid,
20 minimize, or compensate for impacts.

21 **Impact BIO-56: Indirect Effects of Plan Implementation on Special-Status Reptile Species**

22 Construction activities associated with water conveyance facilities, conservation components and
23 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
24 conveyance facilities, including the transmission facilities, could result in ongoing periodic
25 postconstruction disturbances and noise with localized effects on special-status reptiles and their
26 habitat over the term of the BDCP. In addition, construction activities could indirectly affect special-
27 status reptiles if construction resulted in the introduction of invasive weeds that create vegetative
28 cover that is too dense for the species to navigate. Construction vehicles and equipment can
29 transport in their tires and various parts under the vehicles invasive weed seeds and vegetative
30 parts from other regions to construction sites, resulting in habitat degradation. These effects would
31 be reduced through implementation of *AMM10 Restoration of Temporarily Affected Natural*
32 *Communities*.

33 Water conveyance facilities operations and maintenance activities would include vegetation and
34 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
35 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance
36 activities are not expected to remove special-status reptile habitat, operation of equipment could
37 disturb small areas of vegetation around maintained structures and could result in injury or
38 mortality of individual special-status reptiles, if present.

39 **NEPA Effects:** Implementation of the Mitigation Measure BIO-55 and AMM10 would avoid the
40 potential for substantial adverse effects on these species, either indirectly or through habitat
41 modifications. The mitigation measures would also avoid and minimize effects that could
42 substantially reduce the number of special-status reptiles, or restrict either species' range.
43 Therefore, with implementation of Mitigation Measure BIO-55 and AMM10, the indirect effects of
44 Alternative 1A on special-status reptiles would not be adverse under NEPA.

1 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
2 as construction-related noise and visual disturbances could impact special-status reptiles. In
3 addition, construction activities could indirectly affect special-status reptiles if construction resulted
4 in the introduction of invasive weeds that create vegetative cover that is too dense for the species to
5 navigate. Water conveyance facilities operations and maintenance activities, such as vegetation and
6 weed control, and road maintenance, are not expected to remove special-status reptile habitat, but
7 operation of equipment could disturb small areas of vegetation around maintained structures and
8 could result in injury or mortality of individual special-status reptiles, if present.

9 With implementation of Mitigation Measure BIO-55 and AMM10 as part of Alternative 1A
10 construction, operation, and maintenance, the BDCP would avoid the potential for significant effects
11 on special-status reptile species, either indirectly or through habitat modifications, and would not
12 result in a substantial reduction in numbers or a restriction in the range of either species. With
13 implementation of Mitigation Measure BIO-55 and AMM10, the indirect effects of Alternative 1A
14 would have a less-than-significant impact on special-status reptiles.

15 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**
16 **Status Reptiles and Implement Applicable AMMs**

17 See description of Mitigation Measure BIO-55 under Impact BIO-55.

18 **California Black Rail**

19 This section describes the effects of Alternative 1A, including water conveyance facilities
20 construction and implementation of other conservation components, on the California black rail.
21 The habitat model used to assess effects on the California black rail is based on primary breeding
22 habitat and secondary habitat. Primary (breeding) habitat for this species within the Delta consists
23 of all *Schoenoplectus* and *Typha*-dominated tidal and nontidal freshwater emergent wetland in
24 patches greater than 0.55 acre (essentially, instream islands of the San Joaquin River and its
25 tributaries and White Slough Wildlife Area). In Suisun Marsh, primary habitat consists of all
26 *Schoenoplectus* and *Typha*-dominated, and *Salicornia*-dominated patches greater than 0.55 acre,
27 with the exception that all low marsh habitats dominated by *Schoenoplectus acutus* and *S.*
28 *californicus* and all managed wetlands, in general, are considered secondary habitat with lesser
29 ecological value. Upland transitional zones, providing refugia during high tides, within 150 feet of
30 the tidal wetland edge were also included as secondary habitat. Secondary habitats generally
31 provide only a few ecological functions such as foraging (low marsh and managed wetlands) or
32 extreme high tide refuge (upland transition zones), while primary habitats provide multiple
33 functions, including breeding, effective predator cover, and valuable foraging opportunities.

34 Construction and restoration associated with Alternative 1A conservation measures would result in
35 both temporary and permanent losses of California black rail modeled habitat, as indicated in Table
36 12-1A-25. Full implementation of Alternative 1A would also include the following conservation
37 actions over the term of the BDCP to benefit the California black rail (BDCP Chapter 3, Section 3.3,
38 *Biological Goals and Objectives*).

- 39 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11, including at
40 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
41 with CM4).
- 42 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
43 and/or 7 (Objective TFEWNC1.1, associated with CM4).

- Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- Create 1,700 acres of black rail habitat between restored tidal freshwater emergent wetlands and transitional uplands to provide upland refugia (Objective CBR1.1, associated with CM4).
- Create topographic heterogeneity in restored tidal brackish and freshwater emergent wetlands (Objectives TBEWNC1.4 and TFEWNC2.2, associated with CM4).
- Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland natural community within the reserve system (Objective TBEWNC2.1, associated with CM11).

As explained below, with the restoration and protection of these amounts of habitat, in addition to natural community enhancement and management commitments (including CM12 *Methylmercury Management*), AMM1–AMM7, AMM38 *California Black Rail*, and AMM27 *Selenium Management*, impacts on the California black rail would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1A-25. Changes in California Black Rail Modeled Habitat Associated with Alternative 1A (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	3	3	1	1	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		3	3	1	1	NA	NA
CM2–CM18	Primary	76	84	0	0	0	0
	Secondary	986	3,044	0	0	0	0
Total Impacts CM2–CM18		1,062	3,128	0	0	0	0
TOTAL IMPACTS		1,065	3,131	1	1	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-57: Loss or Conversion of Habitat for and Direct Mortality of California Black Rail

Alternative 1A conservation measures would result in the combined permanent and temporary loss of up to 88 acres of modeled primary habitat, and up to 3,044 acres of modeled secondary habitat for California black rail (Table 12-1A-25). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1) and tidal habitat restoration (CM4). Habitat enhancement and management

1 activities (CM11) activities, which include ground disturbance or removal of nonnative vegetation,
2 could result in local adverse habitat effects. In addition, maintenance activities associated with the
3 long-term operation of the water conveyance facilities and other BDCP physical facilities could
4 degrade or eliminate California black rail habitat. Each of these individual activities is described
5 below. A summary statement of the combined NEPA effects, and a CEQA conclusion follow the
6 individual conservation measure discussions.

- 7 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
8 result in the combined permanent and temporary loss of up to 4 acres of modeled California
9 black rail habitat, composed of 1 acre of primary, and 3 acres of secondary habitat (Table 12-1A-
10 25). Of the 4 acres of modeled habitat that would be removed, 1 acre would be a temporary loss
11 of primary habitat. Activities that would impact modeled habitat consist of tunnel construction,
12 temporary access roads, and construction of transmission lines in the central Delta in CZ 5
13 (between Bouldin and Venice Islands), CZ 6 (east of Bacon Island), and CZ 8 (at the north end of
14 Coney Island). The construction footprint for CM1 does not overlap with any California black rail
15 occurrences. The implementation of *AMM38 California Black Rail* would minimize the effects of
16 construction on adjacent rails if present in the area (see Appendix 3B, *Environmental*
17 *Commitments, AMMs, and CMs*). Refer to the Terrestrial Biology Map Book for a detailed view of
18 Alternative 1A construction locations.
- 19 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction or channel modification from fish passage
20 improvements associated with the Yolo Bypass would result in the permanent removal of
21 approximately 5 acres of primary California black rail habitat in CZ 2. The loss is expected to
22 occur during the first 10 years of Alternative 1A implementation.
- 23 • *CM4 Tidal Natural Communities Restoration*: California black rail modeled habitat would be
24 affected by tidal marsh restoration. Some California black rail modeled habitat would be
25 permanently lost such that it no longer serves as habitat, while other modeled habitat would
26 change value through conversion from one habitat type to another. Tidal habitat restoration site
27 preparation and inundation would result in the permanent loss of 79 acres of primary habitat
28 and 3,044 acres of secondary habitat for California black rail. Of the 79 acres of primary habitat
29 lost, an estimated 76 acres would be converted to low marsh, or secondary habitat, for the
30 species due to increased water elevations.

31 The majority of the effects of tidal natural communities restoration would occur in Suisun Marsh
32 (CZ 11). Much of the natural wetland habitat that would be removed occurs in isolated patches
33 and would be replaced by larger continuous areas of tidal wetlands that are expected to support
34 higher habitat functions for the rail than the impacted wetlands. As described in the BDCP,
35 restoration of up to 24,000 acres of tidal freshwater emergent wetland in the Delta and at least
36 6,000 acres of tidal brackish emergent wetland natural communities in CZ 11 by the late long-
37 term would benefit California black rail. The primary habitat for the species in the Delta consists
38 of inchannel islands, which are in areas that are most vulnerable to the effects of sea level rise in
39 the study area. Tidal restoration under CM4 would ensure that land is protected adjacent to
40 current habitat in the delta with the consideration of sea level rise. Tidal restoration projects
41 would include an ecotone between wetlands and transitional uplands which would provide
42 upland refugia for the species.

43 The tidal natural communities restoration would be phased through the course of the BDCP
44 restoration program to allow for recovery of some areas before the initiation of restoration
45 actions in other areas. However, California black rails have a greater use of mature tidal marshes

1 and, therefore, it would be years before the newly restored marshes provided suitable habitat
2 for the species. In the long-term, tidal natural communities restoration is expected to have little
3 to no adverse effects on California black rail habitat because the habitat removed would be
4 replaced by a greater acreage of high-value tidal wetland and, thus, is expected to provide a
5 benefit for California black rail.

- 6 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
7 actions contained in *CM11 Natural Communities Enhancement and Management* that are
8 designed to enhance wildlife values in restored and protected tidal wetland habitats may result
9 in localized ground disturbances that could temporarily remove small amounts of California
10 black rail habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
11 road and other infrastructure maintenance activities, are expected to have minor adverse effects
12 on available California black rail habitat and are expected to result in overall improvements and
13 maintenance of California black rail habitat values over the term of the BDCP. Noise and visual
14 disturbances during implementation of habitat management actions could also result in
15 temporary disturbances that affect California black rail use of the surrounding habitat. These
16 effects cannot be quantified, but would be avoided and minimized by the AMMs listed below.
17 Additional actions under CM11 include the control of nonnative predators to reduce nest
18 predation as needed.
- 19 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
20 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
21 disturbances that could affect California black rail use of the surrounding habitat in Suisun and
22 the central Delta. Maintenance activities would include vegetation management, levee and
23 structure repair, and re-grading of roads and permanent work areas. These effects, however,
24 would be reduced by AMMs and conservation actions as described below.
- 25 • *Injury and Direct Mortality*: Construction vehicle activity may cause injury or mortality to
26 California black rail. If rails are present adjacent to covered activities, the operation of
27 equipment for land clearing, construction, conveyance facilities operation and maintenance, and
28 habitat restoration, enhancement, and management could result in injury or mortality of
29 California black rail. Increased vehicular traffic associated with BDCP actions could contribute to
30 a higher incidence of road kill. However, conducting construction outside of the breeding season
31 where feasible (reducing the risk of impacting active nests), construction monitoring, and other
32 measures would be implemented to avoid and minimize injury or mortality of the species during
33 construction, as required by AMM1–AMM7 and *AMM38 California Black Rail*.

34 The following paragraphs summarize the combined effects discussed above and describe other
35 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
36 included.

37 ***Near-Term Timeframe***

38 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
39 the near-term BDCP conservation strategy has been evaluated to determine whether it would
40 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
41 effects of construction would not be adverse under NEPA. With Alternative 1A implementation,
42 there would be a loss of 1,066 acres of modeled habitat for California black rail in the study area in
43 the near-term. These effects would result from the construction of the water conveyance facilities
44 (CM1, 4 acres of primary habitat), and implementing other conservation measures (CM2 Yolo

1 Bypass Fisheries Enhancement and CM4 Tidal Natural Communities Restoration–76 acres of
2 primary habitat, 986 acres of secondary habitat).

3 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
4 be affected and that are identified in the biological goals and objectives for California black rail in
5 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such
6 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.
7 Using this ratio would indicate that 4 acres of tidal natural communities should be restored/created
8 to compensate for the CM1 losses of California black rail habitat. The near-term effects of other
9 conservation actions would remove 1,062 acres of tidal natural communities, therefore requiring
10 1,062 acres of tidal natural communities restoration using the same typical NEPA and CEQA ratio
11 (1:1 for restoration).

12 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
13 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in
14 the Plan Area (Table 3-4 in Chapter 3). These conservation actions are all associated with CM4 and
15 would occur in the same timeframe as the construction and early restoration losses, thereby
16 avoiding adverse effects of habitat loss on California black rail. The tidal brackish emergent wetland
17 would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the Suisun
18 Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex (Objective
19 TBEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and the tidal freshwater emergent wetland
20 would be restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition,
21 tidal brackish and tidal freshwater emergent wetlands would be restored in a way that creates
22 topographic heterogeneity and in areas that increase connectivity among protected lands
23 (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of managed wetland
24 protected and enhanced in CZ 11 would benefit the California black rail through the enhancement of
25 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists
26 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-
27 American bulrush plant associations (Objective MWNC1.1). These Plan objectives represent
28 performance standards for considering the effectiveness of CM4 restoration actions. The acres of
29 restoration and protection contained in the near-term Plan goals and the additional detail in the
30 biological objectives for California black rail satisfy the typical mitigation that would be applied to
31 the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation
32 measures.

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *Reusable Tunnel Material*, *AMM7 Barge*
37 *Operations Plan*, and *AMM38 California Black Rail*. All of these AMMs include elements that would
38 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas. BDCP
39 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
40 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

41 **Late Long-Term Timeframe**

42 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary
43 habitat for California black rail. Alternative 1A as a whole would result in the permanent loss of and
44 temporary effects on 88 acres of primary habitat and 3,044 acres of secondary habitat for California

1 black rail during the term of the Plan (1% of the total primary habitat in the study area and 17% of
 2 the total secondary habitat in the study area). The locations of these losses are described above in
 3 the analyses of individual conservation measures. The Plan includes conservation commitments
 4 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000 acres of tidal
 5 brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres of tidal
 6 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). These tidal
 7 wetlands would be restored as a mosaic of large, interconnected and biologically diverse patches,
 8 and at least 1,500 acres of restored marsh would consist of middle-and high-marsh vegetation with
 9 dense, tall stands of pickleweed and bulrush cover serving as primary habitat for California black
 10 rail in Suisun Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for
 11 California black rail would be created between the restored tidal freshwater emergent wetlands and
 12 transitional uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and
 13 CBR1.1). Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of
 14 *CM3 Natural Communities Protection and Restoration* would benefit the California black rail through
 15 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
 16 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
 17 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional
 18 pressures on the species such as loss of habitat from invasive species and mortality from nest
 19 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes
 20 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more
 21 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11
 22 (TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if
 23 necessary through *CM11 Natural Communities Enhancement and Management*.

24 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
 25 and protection actions discussed above would result in the restoration of 3,579 acres of primary
 26 habitat and 12,115 acres of secondary habitat for California black rail and the protection of 275
 27 acres of secondary habitat for the species.

28 **NEPA Effects:** The loss of California black rail habitat and potential direct mortality of this special-
 29 status species under Alternative 1A would represent an adverse effect in the absence of other
 30 conservation actions. However, with habitat protection and restoration associated with CM4, guided
 31 by the biological objectives for the species and by *AMM1 Worker Awareness Training, AMM2*
 32 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
 33 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 34 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM38*
 35 *California Black Rail*, which would be in place during all project activities, the effects of Alternative
 36 1A as a whole on California black rail would not be adverse under NEPA.

37 **CEQA Conclusion:**

38 **Near-Term Timeframe**

39 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 40 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 41 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 42 effects of construction would be less than significant under CEQA. With Alternative 1A
 43 implementation, there would be a loss of 1,066 acres of modeled habitat for California black rail in
 44 the study area in the near-term. These effects would result from the construction of the water

1 conveyance facilities (CM1, 4 acres of primary habitat), and implementing other conservation
2 measures (CM2 Yolo Bypass Fisheries Enhancement and CM4 Tidal Natural Communities
3 Restoration—76 acres of primary habitat, 986 acres of secondary habitat).

4 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
5 be affected and that are identified in the biological goals and objectives for California black rail in
6 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such
7 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.
8 Using this ratio would indicate that 4 acres of tidal natural communities should be restored/created
9 to mitigate the CM1 losses of California black rail habitat. The near-term effects of other
10 conservation actions would remove 1,062 acres of tidal natural communities, therefore requiring
11 1,062 acres of tidal natural communities restoration using the same typical NEPA and CEQA ratio
12 (1:1 for restoration).

13 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
14 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in
15 the Plan Area (Table 3-4 in Chapter 3). These conservation actions are all associated with CM4 and
16 would occur in the same timeframe as the construction and early restoration losses, thereby
17 avoiding adverse effects of habitat loss on California black rail. The tidal brackish emergent wetland
18 would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the Suisun
19 Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex (Objective
20 TBEWNC1.1) and the tidal freshwater emergent wetland would be restored in CZ 1, CZ 2, CZ 4, CZ 5,
21 CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition, tidal brackish and tidal freshwater emergent
22 wetlands would be restored in a way that creates topographic heterogeneity and in areas that
23 increase connectivity among protected lands (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of
24 the 4,800 acres of managed wetland protected and enhanced in CZ 11 would benefit the California
25 black rail through the enhancement of degraded areas (such as areas of bare ground or marsh where
26 the predominant vegetation consists of invasive species such as perennial pepperweed) to
27 vegetation such as pickleweed-alkali heath-American bulrush plant associations (Objective
28 MWNC1.1). These Plan objectives represent performance standards for considering the
29 effectiveness of CM4 restoration actions.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM38*
34 *California Black Rail*. All of these AMMs include elements that would avoid or minimize the risk of
35 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
36 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
37 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

38 The natural community restoration and protection activities would be concluded in the first 10
39 years of Plan implementation, which is close enough in time to the occurrence of impacts to
40 constitute adequate mitigation for CEQA purposes. In addition, *AMM38 California Black Rail* and
41 *AMM1–AMM7* would avoid and minimize potential impacts on the species from construction-related
42 habitat loss and noise and disturbance. The 10,850 acres of tidal brackish and tidal freshwater
43 emergent wetland restoration and the 4,100 acres of managed wetland protection and enhancement
44 contained in the near-term Plan goals, and the additional detail in the biological objectives for

1 California black rail, are more than sufficient to support the conclusion that the near-term impacts of
2 habitat loss and direct mortality under Alternative 1A would be less than significant under CEQA.

3 **Late Long-Term Timeframe**

4 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary
5 habitat for California black rail. Alternative 1A as a whole would result in the permanent loss of and
6 temporary effects on 88 acres of primary habitat and 3,044 acres of secondary habitat for California
7 black rail during the term of the Plan (1% of the total primary habitat in the study area and 17% of
8 the total secondary habitat in the study area). The locations of these losses are described above in
9 the analyses of individual conservation measures. The Plan includes conservation commitments
10 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000 acres of tidal
11 brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres of tidal
12 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (TFEWNC1.1). These tidal wetlands would
13 be restored as a mosaic of large, interconnected and biologically diverse patches and much of the
14 restored marsh would consist of middle-and high-marsh vegetation with dense, tall stands of
15 pickleweed and bulrush cover, serving as primary habitat for California black rail in Suisun Marsh
16 (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for California black rail
17 would be created between the restored tidal freshwater emergent wetlands and transitional
18 uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and CBR1.1).
19 Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of *CM3*
20 *Natural Communities Protection and Restoration* would benefit the California black rail through the
21 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
22 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
23 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional
24 pressures on the species such as loss of habitat from invasive species and mortality from nest
25 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes
26 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more
27 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11
28 (TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if
29 necessary through *CM11 Natural Communities Enhancement and Management*.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM38*
34 *California Black Rail*. All of these AMMs include elements that would avoid or minimize the risk of
35 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
36 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
37 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

38 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
39 and protection actions discussed above would result in the restoration of 3,579 acres of primary
40 habitat and 12,115 acres of secondary habitat for California black rail and the protection of 275
41 acres of secondary habitat for the species.

42 Considering Alternative 1A's protection and restoration provisions, which would provide acreages
43 of new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to
44 construction and restoration activities, loss of habitat or direct mortality through implementation of

1 Alternative 1A would not result in a substantial adverse effect through habitat modifications and
2 would not substantially reduce the number or restrict the range of the species. Therefore, the
3 alternative would have a less-than-significant impact on California black rail.

4 **Impact BIO-58: Effects on California Black Rail Associated with Electrical Transmission** 5 **Facilities**

6 New transmission lines would increase the risk for bird-power line strikes, which could result in
7 injury or mortality of California black rail. A variety of rail species is known to suffer mortality from
8 transmission line collision, likely associated with migration and flights between foraging areas
9 (Eddleman et al. 1994). Due to their wing shape and body size, rails have low to moderate flight
10 maneuverability (Bevanger 1998), increasing susceptibility to collision mortality. However, there
11 are relatively few records of California black rail collisions with overhead wires. California black
12 rails exhibit daytime site fidelity and a lack of long-distance night migration, two factors which are
13 associated with low collision risk in avian species (Eddleman et al. 1994). California black rail
14 movements in the Plan Area are likely short, seasonal, and at low altitudes, typically less than 16 feet
15 (5 meters) (Eddleman et al 1994). However, although the species may have low to moderate flight
16 maneuverability, the bird's behavior (e.g., sedentary, nonmigratory, ground-nesting and foraging,
17 solitary, no flocking, secretive) reduces potential exposure to overhead wires and vulnerability to
18 collision mortality (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at*
19 *Proposed BDCP Powerlines*). Marking transmission lines with flight diverters that make the lines
20 more visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
21 1995). For example, Yee (2008) estimated that marking devices in the Central Valley could reduce
22 avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new project transmission
23 lines would be fitted with flight diverters which would eliminate any potential for mortality of
24 California black rail individuals from powerline collisions.

25 Transmission line poles and towers also provide perching substrate for raptors, which are predators
26 on California black rail. Although there is potential for transmission lines constructed in the Delta to
27 increase perching opportunities for raptors and result in increased predation pressure on local
28 black rails, little is currently known about the seasonal movements of black rails or the potential for
29 increased predation on rails near power poles. Therefore, because of the limited area over which
30 poles would be installed relative to the amount of California black rail habitat in the Delta, it is
31 assumed that the increase in predation risk on California black rail from an increase in raptor
32 perching opportunities would be negligible.

33 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
34 adverse effect because the risk of bird strike is considered to be minimal based on the species' flight
35 behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike
36 diverters on all new powerlines and select existing powerlines, which would minimize the risk of
37 bird strike for California black rails in the Delta. The increase in predation risk on California black
38 rail from an increase in raptor perching opportunities is considered negligible because of the limited
39 area over which poles would be installed relative to the amount of California black rail habitat in the
40 Delta. Therefore, the construction and operation of new transmission lines would not result in an
41 adverse effect on California black rail.

42 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
43 significant impact on California black rail because the risk of bird strike is considered to be minimal
44 based on the species' flight behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the

1 commitment to place bird strike diverters on all new powerlines, which would minimize the risk of
2 bird strike for California black rails in the Delta. The increase in predation risk on California black
3 rail from an increase in raptor perching opportunities is considered negligible because of the limited
4 area over which poles would be installed relative to the amount of California black rail habitat in the
5 Delta. Therefore, the construction and operation of new transmission lines under Alternative 1A
6 would result in a less-than-significant impact on California black rail.

7 **Impact BIO-59: Indirect Effects of Plan Implementation on California Black Rail**

8 **Indirect construction-related effects:** Both primary and secondary habitat for California black rail
9 within the vicinity of proposed construction areas could be indirectly affected by construction
10 activities. Indirect effects associated with construction include noise, dust, and visual disturbance
11 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
12 footprint but within 500 feet from the construction edge. Construction noise above background
13 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
14 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
15 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
16 the extent to which these noise levels could affect California black rail. The use of mechanical
17 equipment during water conveyance facilities construction could cause the accidental release of
18 petroleum or other contaminants that could affect California black rail in the surrounding habitat.
19 The inadvertent discharge of sediment or excessive dust adjacent to California black rail habitat
20 could also affect the species.

21 If construction occurs during the nesting season, these indirect effects could result in the loss or
22 abandonment of nests, and mortality of any eggs and/or nestlings. However, there is a commitment
23 in AMM38 (as described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*) that
24 preconstruction surveys of potential breeding habitat would be conducted within 700 feet of project
25 activities, and a 500-foot no-disturbance buffer would be established around any territorial call-
26 centers during the breeding season. In addition, construction would be avoided altogether if
27 breeding territories cannot be accurately delimited.

28 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients
29 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would
30 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh
31 would generally increase as a result of water operations and operations of salinity-control gates to
32 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland
33 plant communities tolerant of more brackish environments, which should be beneficial to California
34 black rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

35 **Methylmercury Exposure:**

36 The modeled primary habitat for California black rail includes tidal brackish emergent wetland and
37 tidal freshwater emergent wetland in Suisun Marsh and the Delta west of Sherman Island, and
38 instream islands and White Slough Wildlife Area in the central Delta. Black rails typically occur in
39 the high marsh zone near the upper limit of tidal flooding in salt and brackish habitats. Low marsh,
40 managed wetlands, and the upland fringe are considered secondary habitat. California black rails are
41 a top predator in the benthic food chain; they nest and forage in dense vegetation and prey on
42 isopods, insects and arthropods from the surface of mud and vegetation. They also consume insects
43 and seeds from bulrushes (*Schoenoplectus* spp.) and cattails (*Typha* spp.) (Eddleman et al. 1994).

1 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
2 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
3 species would overestimate the effects on Black rail. Organisms feeding within pelagic-based (algal)
4 foodwebs have been found to have higher concentrations of methylmercury than those in benthic or
5 epibenthic foodwebs; this has been attributed to food chain length and dietary segregation
6 (Grimaldo et al. 2009). Modeled effects of mercury concentrations from changes in water operations
7 under CM1 on largemouth bass did not differ substantially from existing conditions; therefore,
8 results also indicate that black rail mercury tissue concentrations would not measurably increase as
9 a result of CM1 implementation.

10 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
11 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
12 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
13 mercury. In general, the highest methylation rates are associated with high tidal marshes (primary
14 black rail habitat) that experience intermittent wetting and drying and associated anoxic conditions
15 (Alpers et al. 2008); however, the majority of the overlap between restoration areas and black rail
16 habitat is within Suisun Marsh, where conversion of managed wetlands to tidal wetlands is expected
17 to result in an overall reduction in mercury methylation. Mercury is generally elevated throughout
18 the Delta, and restoration of the lower potential areas in total may result in generalized, very low
19 level increases of mercury. Given that some species have elevated mercury tissue levels pre-BDCP,
20 these low level increases could result in some level of effects. CM12, described below, would be
21 implemented to address this risk of low level increases in methylmercury which could add to the
22 current elevated tissue concentrations.

23 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
24 into the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific
25 evaluation for each restoration project. If a project is identified where there is a high potential for
26 methylmercury production that could not be fully addressed through restoration design and
27 adaptive management, alternate restoration areas would be considered. CM12 would be
28 implemented in coordination with other similar efforts to address mercury in the Delta, and
29 specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
30 would include the following actions.

- 31 • Assess pre-restoration conditions to determine the risk that the project could result in increased
32 mercury methylation and bioavailability
- 33 • Define design elements that minimize conditions conducive to generation of methylmercury in
34 restored areas.
- 35 • Define adaptive management strategies that can be implemented to monitor and minimize
36 actual postrestoration creation and mobilization of methylmercury.

37 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
38 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
39 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
40 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
41 2009). The effect of selenium toxicity differs widely between species and also between age and sex
42 classes within a species. In addition, the effect of selenium on a species can be confounded by
43 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
44 2009).

1 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 2 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 3 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 4 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 5 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 6 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 7 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 8 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 9 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 10 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
 11 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 12 levels of selenium have a higher risk of selenium toxicity.

13 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 14 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 15 exacerbate bioaccumulation of selenium in avian species, including California black rail. Marsh (tidal
 16 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
 17 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP
 18 restoration activities that create newly inundated areas could increase bioavailability of selenium
 19 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
 20 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
 21 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
 22 increases in selenium concentrations in water in the Delta under any alternative. However, it is
 23 difficult to determine whether the effects of potential increases in selenium bioavailability
 24 associated with restoration-related conservation measures (CM4–CM5) would lead to adverse
 25 effects on California black rail.

26 Because of the uncertainty that exists at this programmatic level of review, there could be a
 27 substantial effect on California black rail from increases in selenium associated with restoration
 28 activities. This effect would be addressed through the implementation of *AMM27, Selenium*
 29 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
 30 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
 31 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
 32 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
 33 separately for each restoration effort as part of design and implementation. This avoidance and
 34 minimization measure would be implemented as part of the tidal habitat restoration design
 35 schedule.

36 **NEPA Effects:** Noise and visual disturbances related to construction-related activities from
 37 conservation measures could disturb California black rail habitat adjacent to work sites. Potential
 38 adverse effects of noise and visual disturbances on California black rail would be minimized with
 39 *AMM38 California Black Rail*. AMM1–AMM7, including *AMM2 Construction Best Management*
 40 *Practices and Monitoring*, would minimize the likelihood of spills from occurring and ensure that
 41 measures were in place to prevent runoff from the construction area and to avoid negative effects of
 42 dust on the species.

43 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
 44 habitat restoration are expected to increase water salinity in Suisun Marsh, which would be
 45 expected to establish tidal marsh similar to historic conditions.

1 Changes in water operations under CM1 would not be expected to result in increased mercury
2 bioavailability or exposures to Delta foodwebs. Restoration actions that would create high and low
3 tidal marsh, which is black rail habitat, could provide biogeochemical conditions for methylation of
4 mercury in the newly inundated soils. There is potential for increased exposure of the foodwebs to
5 methylmercury in these areas, with the level of exposure dependent on the amounts of mercury
6 available in the soils and the biogeochemical conditions. However, the planned ROAs do not overlap
7 with the areas of highest mercury concentrations, which are in the in Yolo Bypass. Also, the
8 conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected to reduce the
9 overall production of methylmercury, resulting in a net benefit to species. Implementation of CM12,
10 which contains measures to assess the amount of mercury before project development, followed by
11 appropriate design and adaptation management, would minimize the potential for increased
12 methylmercury exposure, and would result in no adverse effect on the species.

13 Tidal habitat restoration could result in increased exposure of California black rail to selenium. This
14 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
15 would provide specific tidal habitat restoration design elements to reduce the potential for
16 bioaccumulation of selenium and its bioavailability in tidal habitats.

17 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities and other
18 conservation measures could disturb primary and secondary California black rail habitat adjacent to
19 work sites. *AMM38 California Black Rail* would avoid and minimize impacts on California black rail
20 from noise and visual disturbance. The use of mechanical equipment during water conveyance
21 facilities construction could cause the accidental release of petroleum or other contaminants that
22 could affect California black rail in the surrounding habitat. The inadvertent discharge of sediment
23 or excessive dust adjacent to California black rail habitat could also affect the species. These impacts
24 on California black rail would be less than significant with the incorporation of AMM1–AMM7,
25 including *AMM2 Construction Best Management Practices and Monitoring*, into the BDCP.

26 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
27 habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity gradient
28 changes should have a beneficial impact on California black rail through the establishment of tidal
29 marsh similar to historic conditions.

30 Tidal habitat restoration could result in increased exposure of California black rail to selenium. This
31 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
32 would provide specific tidal habitat restoration design elements to reduce the potential for
33 bioaccumulation of selenium and its bioavailability in tidal habitats. With implementation of
34 *AMM27*, potential for increased selenium exposure would result in no adverse effect on the species.

35 Changes in water operations under CM1 would not be expected to result in increased mercury
36 bioavailability or exposures to Delta foodwebs. Restoration actions that would create high and low
37 tidal marsh, which is black rail habitat, could provide biogeochemical conditions for methylation of
38 mercury in the newly inundated soils. There is potential for increased exposure of the foodwebs to
39 methylmercury in these areas, with the level of exposure dependent on the amounts of mercury
40 available in the soils and the biogeochemical conditions. However, the planned ROAs do not overlap
41 with the areas of highest mercury concentrations, which are in the in Yolo Bypass. Also, the
42 conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected to reduce the
43 overall production of methylmercury, resulting in a net benefit to species. Implementation of CM12,
44 which contains measures to assess the amount of mercury before project development, followed by

1 appropriate design and adaptation management, would minimize the potential for increased
2 methylmercury exposure, and would result in no adverse effect on the species.

3 With these measures in place, indirect effects of plan implementation would not result in a
4 substantial adverse effect on the species through habitat modification or potential mortality of a
5 special-status species. Therefore, the indirect effects of Alternative 1A implementation would have a
6 less-than-significant impact on California black rail. No mitigation would be required.

7 **Impact BIO-60: Fragmentation of California Black Rail Habitat as a Result of Conservation** 8 **Component Implementation**

9 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create
10 temporary barriers to California black rail movements. Grading, filling, contouring and other initial
11 ground-disturbing activities could remove habitat along movement corridors used by individuals
12 and could temporarily reduce access to adjacent habitat areas. The temporary adverse effects of
13 fragmentation of tidal brackish emergent wetland habitat for California black rail or restoration
14 activities resulting in barriers to movement would be minimized through sequencing of *CM4 Tidal*
15 *Natural Community Restoration* activities. The tidal natural communities restoration would be
16 phased through the course of the BDCP restoration program to allow for recovery of some areas
17 before restoration actions are initiated in other areas. In addition, *AMM38 California Black Rail*
18 would avoid and minimize effects on California black rail.

19 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to
20 movement would not represent an adverse effect on California black rail as a result of habitat
21 modification of a special-status species because *CM4 Tidal Natural Communities Restoration* would
22 be phased to allow for the recovery of some areas before restoration actions are initiated in other
23 areas. In addition, *AMM38 California Black Rail* would avoid and minimize effects on California black
24 rail.

25 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to
26 movement would represent a less-than-significant impact on California black rail as a result of
27 habitat modification of a special-status species because *CM4 Tidal Natural Communities Restoration*
28 would be phased to allow for the recovery of some areas before restoration actions are initiated in
29 other areas. In addition, *AMM38 California Black Rail* would avoid and minimize impacts on
30 California black rail.

31 **Impact BIO-61: Periodic Effects of Inundation of California Black Rail Habitat as a Result of** 32 **Implementation of Conservation Components**

33 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would not result in the
34 periodic inundation of modeled habitat for California black rail. There are no records for California
35 black rails in the Yolo Bypass, although the species is highly secretive and the extent to which the
36 area has been surveyed for California black rails is unknown. Therefore, there is potential for the
37 species to occur in the Yolo Bypass. In addition, rails may occur in the bypass after restoration
38 activities are completed. However, periodic inundation would not result in permanent habitat loss
39 and would not prevent use of the bypass by current or future rail populations.

40 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,
41 construction of setback levees could result in increased magnitude, frequency and duration of
42 periodic inundation by up to 6 acres of modeled California black rail habitat in CZ 7. The risk of

1 changes in inundation frequency, magnitude, and duration through CM2 and CM5 affecting
2 California black rail are considered to be low, and would not be expected to result in adverse effects
3 on the species.

4 **NEPA Effects:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*
5 *Seasonally Inundated Floodplain Restoration* would not represent an adverse effect on California
6 black rail as a result of habitat modification of a special-status species because periodic inundation
7 would not result in permanent habitat loss and would not prevent use of the bypass by current or
8 future rail populations. The risk of changes in inundation frequency and duration through CM2 and
9 CM5 affecting California black rail is considered to be low.

10 **CEQA Conclusion:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*
11 *Seasonally Inundated Floodplain Restoration* would represent a less-than-significant impact on
12 California black rail because periodic inundation would not result in permanent habitat loss and
13 would not prevent use of the bypass by current or future rail populations. The risk of changes in
14 inundation frequency and duration as a result of CM2 and CM5 affecting California black rail is
15 considered to be low.

16 **California Clapper Rail**

17 This section describes the effects of Alternative 1A, including water conveyance facilities
18 construction and implementation of other conservation components, on California clapper rail.
19 California clapper rail habitat includes mostly middle marsh habitat with select emergent wetland
20 plant alliances. Secondary habitats generally provide only a few ecological functions such as foraging
21 (low marsh) or high-tide refuge (upland transition zones), while primary habitats provide multiple
22 functions including breeding, effective predator cover, and forage. Further details regarding the
23 habitat model, including assumptions on which the model is based, are provided in BDCP Appendix
24 2.A, *Covered Species Accounts*.

25 Construction and restoration associated with Alternative 1A conservation measures would result in
26 both temporary and permanent losses of California clapper rail modeled habitat as indicated in
27 Table 12-1A-26. Full implementation of Alternative 1A would also include the following
28 conservation actions over the term of the BDCP to benefit the California clapper rail (BDCP Chapter
29 3, Section 3.3, *Biological Goals and Objectives*).

- 30 • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at
31 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
32 with CM4).

33 As explained below, with the restoration and protection of these amounts of habitat, in addition to
34 natural community enhancement and management commitments (including *CM12 Methylmercury*
35 *Management*) and implementation of AMM1–AMM7, *AMM38 California Black Rail*, and *AMM27*
36 *Selenium Management*, impacts on the California clapper rail would not be adverse for NEPA
37 purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-26. Changes in California Clapper Rail Modeled Habitat Associated with Alternative**
2 **1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2-CM18	Primary	26	27	0	0	NA	NA
	Secondary	50	50	0	0	NA	NA
Total Impacts CM2-CM18		76	77	0	0	NA	NA
TOTAL IMPACTS		76	77	0	0	NA	NA

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3 **Impact BIO-62: Loss or Conversion of Habitat for and Direct Mortality of California Clapper**
4 **Rail**

5 Alternative 1A conservation measures would result in the total loss or conversion of up to 35 acres
6 of modeled California clapper rail habitat consisting of 27 acres of primary habitat and 8 acres of
7 secondary habitat (Table 12-1A-26). The conservation measure that would result in these losses is
8 tidal natural communities restoration (CM4). The conservation measure that would result in these
9 losses is tidal natural communities restoration (CM4). Habitat enhancement and management
10 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could also
11 result in local adverse habitat effects. Each of these individual activities is described below. A
12 summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the
13 individual conservation measure discussions.

- 14 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would convert
15 approximately 35 acres of modeled California clapper rail habitat, primarily in CZ 11. The tidal
16 marsh restoration action would not result in the permanent loss of any California clapper rail
17 habitat in the Plan Area. However, approximately 27 acres of primary habitat would be
18 converted to secondary low marsh habitat and 8 acres of secondary habitat would be converted
19 to middle or high marsh. Full implementation of CM4 would restore or create at least
20 6,000 acres of tidal brackish emergent wetland in CZ 11. Tidal wetlands would be restored as a
21 mosaic of large, interconnected, and biologically diverse patches that supported a natural
22 gradient extending from subtidal to the upland fringe. Much of the restored tidal brackish
23 emergent wetland would meet the primary habitat requirements of the California clapper rail,
24 including development of mid- and high-marsh vegetation with dense, tall stands of pickleweed

1 cover. Restoration would be sequenced and spaced in a manner that minimizes any temporary,
2 initial loss of habitat and habitat fragmentation.

- 3 ● *CM11 Natural Communities Enhancement and Management*: Because the entire California
4 clapper rail population is restricted to the San Francisco Bay Area estuary, BDCP enhancement
5 and restoration actions would be expected to benefit the species by creating the potential for
6 extending its abundance and distribution in Suisun Marsh. Occupied California clapper rail
7 habitat would be monitored to determine if there is a need for predator control actions. If
8 implemented, nonnative predators would be controlled as needed to reduce nest predation and
9 to help maintain species abundance. A variety of habitat management actions included in *CM11*
10 *Natural Communities Enhancement and Management* that are designed to enhance wildlife
11 values in restored and protected tidal wetland habitats could result in localized ground
12 disturbances that could temporarily remove small amounts of California clapper rail habitat.
13 Ground-disturbing activities, such as removal of nonnative vegetation and road and other
14 infrastructure maintenance activities, would be expected to have minor adverse effects on
15 available California clapper rail habitat. These potential effects are currently not quantifiable,
16 but would be minimized with implementation *AMM19 California Clapper Rail* (see Appendix 3B,
17 *Environmental Commitments, AMMs, and CMs*).
- 18 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration
19 infrastructure could result in ongoing but periodic disturbances that could affect California
20 clapper rail use of the surrounding habitat in Suisun. Maintenance activities could include
21 vegetation management, and levee repair. These effects, however, would be reduced by AMMs
22 and conservation actions as described below.
- 23 ● *Injury and Direct Mortality*: Construction vehicle activity may cause injury or mortality to
24 California black rail. If rails are present adjacent to covered activities, the operation of
25 equipment for land clearing, and habitat restoration, enhancement, and management could
26 result in injury or mortality of California clapper rail. Operation of construction equipment could
27 result in injury or mortality of California clapper rails. Risk would be greatest to eggs and
28 nestlings susceptible to land clearing activities, nest abandonment, or increased exposure to the
29 elements or to predators. Injury to adults and fledged juveniles is less likely as these individuals
30 are expected to avoid contact with construction equipment. However, nest sites would be
31 avoided during the nesting season as required by AMM1–AMM7 and *AMM19 California Clapper*
32 *Rail*.

33 The following paragraphs summarize the combined effects discussed above and describe other
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
35 included.

36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would
39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
40 effects of construction would not be adverse under NEPA. There would be no impacts resulting from
41 the construction of the water conveyance facilities (CM1). However, there would be a loss of 76
42 acres of modeled habitat for California clapper rail in the study area in the near-term. These effects
43 would result from implementing *CM4 Tidal Natural Communities Restoration* (26 acres of primary
44 and 50 acres of secondary habitat).

1 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
 2 CM4 and that are identified in the biological goals and objectives for California clapper rail in
 3 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
 4 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be
 5 restored/created to compensate for the CM4 losses of California clapper rail habitat.

6 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
 7 wetland in the Plan Area (Table 3-4 in Chapter 3). These conservation actions are associated with
 8 CM4 and would occur in the same timeframe as the early restoration losses, thereby avoiding
 9 adverse effects on California clapper rail. The tidal brackish emergent wetland would be restored in
 10 CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough
 11 Marsh Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1) and
 12 would be restored in a way that creates topographic heterogeneity and in areas that increase
 13 connectivity among protected lands (Objectives TBEWNC1.4). These biological goals and objectives
 14 would inform the near-term restoration efforts and represent performance standards for
 15 considering the effectiveness of restoration actions. These Plan objectives represent performance
 16 standards for considering the effectiveness of CM4 restoration actions. The acres of restoration
 17 contained in the near-term Plan goals satisfy the typical mitigation that would be applied to the
 18 near-term effects of tidal restoration.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
 23 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
 24 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
 25 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
 26 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

27 ***Late Long-Term Timeframe***

28 The habitat model indicates that the study area supports approximately 296 acres of primary and
 29 6,420 acres of secondary habitat for California clapper rail. Alternative 1A as a whole would result in
 30 the permanent loss of and temporary effects on 27 acres of primary habitat and 50 acres of
 31 secondary habitat for California clapper rail during the term of the Plan (9% of the total primary
 32 habitat in the study area and less than 1% of the total secondary habitat in the study area). The
 33 locations of these losses are described above in the analyses of individual conservation measures.
 34 The Plan includes a commitments through *CM4 Tidal Natural Communities Restoration* to restore or
 35 create at least 6,000 acres of tidal brackish emergent wetlands for California clapper rail in Suisun
 36 Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would be restored as a mosaic of large,
 37 interconnected and biologically diverse patches and at least 1,500 acres of the restored marsh
 38 would consist of middle-and high-marsh vegetation, serving as primary habitat for California
 39 clapper rail in Suisun Marsh (Objectives TBEWNC1.1 and TBEWNC1.2). Additional pressures on the
 40 species such as loss of habitat from invasive species and mortality from nest predators would also
 41 be addressed through the BDCP. Perennial pepperweed, which outcompetes suitable clapper rail
 42 habitat (such as pickleweed) would be reduced to no more than 10% cover in the tidal brackish
 43 emergent wetland natural community within CZ 11 (TBEWNC2.1). In addition, nonnative predators
 44 would be controlled to reduce nest predation if necessary through *CM11 Natural Communities*
 45 *Enhancement and Management*.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
2 and protection actions discussed above, would result in the restoration of 1,500 acres of primary
3 habitat and 4,500 acres of secondary habitat for California clapper rail.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
8 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
9 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
10 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
11 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

12 **NEPA Effects:** In the absence of other conservation actions, the loss of California clapper rail habitat
13 associated with Alternative 1A would represent an adverse effect as a result of habitat modification
14 of a special-status species and potential for direct mortality. However, with habitat protection and
15 restoration associated with CM4, guided by biological goals and objectives and *AMM1 Worker*
16 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*
17 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*
18 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge*
19 *Operations Plan*, and *AMM19 California Clapper Rail*, which would be in place during all project
20 activities, the effects of Alternative 1A as a whole on California clapper rail would not be adverse
21 under NEPA.

22 **CEQA Conclusion:**

23 **Near-Term Timeframe**

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
27 effects of construction would be less than significant under CEQA. There would be no impacts
28 resulting from the construction of the water conveyance facilities (CM1). However, there would be a
29 loss of 76 acres of modeled habitat for California clapper rail in the study area in the near-term from
30 the implementation of *CM4 Tidal Natural Communities Restoration* (26 acres of primary and 50 acres
31 of secondary habitat).

32 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
33 CM4 and that are identified in the biological goals and objectives for California clapper rail in
34 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
35 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be
36 restored/created to mitigate the CM4 losses of California clapper rail habitat.

37 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
38 wetland in the study area. These conservation actions are associated with CM4 and would occur in
39 the same timeframe as the early restoration losses, thereby avoiding adverse effects on California
40 clapper rail. The tidal brackish emergent wetland would be restored in CZ 11 among the Western
41 Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse
42 Slough/Denverton Marsh complex (Objective TBEWNC1.1) and would be restored in a way that

1 creates topographic heterogeneity and in areas that increase connectivity among protected lands
2 (Objectives TBEWNC1.4).

3 These biological goals and objectives would inform the near-term restoration efforts and represent
4 performance standards for considering the effectiveness of restoration actions. These Plan
5 objectives represent performance standards for considering the effectiveness of CM4 restoration
6 actions.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
11 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
12 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
13 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
14 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

15 The natural community restoration and protection activities would be concluded in the first 10
16 years of Plan implementation, which is close enough in time to the occurrence of restoration impacts
17 to constitute adequate mitigation for CEQA purposes. In addition, *AMM19 California Clapper Rail* and
18 *AMM1–AMM7* would avoid and minimize potential impacts on the species from construction-related
19 habitat loss and noise and disturbance. Because the number of acres required to meet the typical
20 mitigation ratio described above would be only 76 acres of restored tidal natural communities, the
21 2,000 acres of tidal brackish emergent wetland restoration contained in the near-term Plan goals,
22 and the additional detail in the biological objectives for California clapper rail, are more than
23 sufficient to support the conclusion that the near-term impacts of habitat loss and direct mortality
24 under Alternative 1A would be less than significant under CEQA.

25 ***Late Long-Term Timeframe***

26 The habitat model indicates that the study area supports approximately 296 acres of primary and
27 6,420 acres of secondary habitat for California clapper rail. Alternative 1A as a whole would result in
28 the permanent loss of and temporary effects on 27 acres of primary habitat and 8 acres of secondary
29 habitat for California clapper rail during the term of the Plan (9% of the total primary habitat in the
30 study area and less than 1% of the total secondary habitat in the study area). The locations of these
31 losses are described above in the analyses of individual conservation measures. The Plan includes a
32 commitment to restore or create at least 6,000 acres of tidal brackish emergent wetlands for
33 California clapper rail in Suisun Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would
34 be restored as a mosaic of large, interconnected and biologically diverse patches and much of the
35 restored marsh would consist of middle-and high-marsh vegetation with dense, tall stands of
36 pickleweed, serving as primary habitat for clapper rail in Suisun Marsh (Objective TBEWNC1.1).
37 Additional pressures on the species such as loss of habitat from invasive species and mortality from
38 nest predators would also be addressed through the BDCP. Perennial pepperweed, which
39 outcompetes suitable clapper rail habitat (such as pickleweed) would be reduced to no more than
40 10% cover in the tidal brackish emergent wetland natural community within CZ 11 (TBEWNC2.1).
41 In addition, nonnative predators would be controlled to reduce nest predation if necessary through
42 *CM11 Natural Communities Enhancement and Management*.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
2 and protection actions discussed above, would result in the restoration of 1,500 acres of primary
3 habitat and 4,500 acres of secondary habitat for California clapper rail.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
8 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
9 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
10 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
11 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

12 Considering Alternative 1A's protection and restoration provisions, which would provide acreages
13 of new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to
14 construction and restoration activities, loss of habitat and direct mortality through implementation
15 of Alternative 1A would not result in a substantial adverse effect through habitat modifications and
16 would not substantially reduce the number or restrict the range of the species. Therefore, the
17 alternative would have a less-than-significant impact on California clapper rail.

18 **Impact BIO-63: Indirect Effects of Plan Implementation on California Clapper Rail**

19 **Indirect construction-related effects:** California clapper rail habitat within the vicinity of
20 proposed restoration areas could be indirectly affected by construction activities. Indirect effects
21 associated with construction include noise, dust, and visual disturbance caused by grading, filling,
22 contouring, and other ground-disturbing operations outside the project footprint but within 500
23 feet from the construction edge. Construction noise above background noise levels (greater than 50
24 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,
25 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
26 *Crane*, Table 4), although there are no available data to determine the extent to which these noise
27 levels could affect California clapper rail. The use of mechanical equipment during construction-
28 related restoration activities could cause the accidental release of petroleum or other contaminants
29 that could affect clapper rail in the surrounding habitat. The inadvertent discharge of sediment or
30 excessive dust adjacent to California clapper rail habitat could also affect the species. If construction
31 occurs during the nesting season, these indirect effects could result in the loss or abandonment of
32 nests, and mortality of any eggs and/or nestlings. However, there is a commitment in *AMM19*
33 *California Clapper Rail* (as described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*)
34 that preconstruction surveys of potential breeding habitat would be conducted within 500 feet of
35 project activities, and a 500-foot no-disturbance buffer would be established around any territorial
36 call-centers during the breeding season. In addition, construction would be avoided altogether if
37 breeding territories cannot be accurately delimited.

38 Preconstruction surveys conducted under *AMM19 California Clapper Rail* would ensure
39 construction-related noise and visual disturbances would not have an adverse effect on California
40 clapper rail. *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and*
41 *Monitoring*, would minimize the likelihood of such spills from occurring and ensure measures were
42 in place to prevent runoff from the construction area and to avoid negative effects of dust on the
43 species. Therefore, with the implementation of *AMM1-AMM7* and *AMM19 California Clapper Rail*,
44 there would be no adverse effect on California clapper rail.

1 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients
2 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would
3 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh
4 would generally increase as a result of water operations and operations of salinity-control gates to
5 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland
6 plant communities tolerant of more brackish environments, which would be beneficial to California
7 clapper rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

8 **Methylmercury Exposure:** California clapper rail modeled habitat includes primarily middle marsh
9 habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is also used if it is
10 of high value, and low marsh provides foraging habitat for the species. California clapper rails are a
11 top predator in the benthic food chain; they forage by probing their beaks into the mud (Zemba and
12 Fancher 1988) and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects
13 (Eddleman and Conway 1998).

14 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
15 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
16 species would overestimate the effects on California clapper rail. Organisms feeding within pelagic-
17 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
18 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
19 segregation (Grimaldo et al. 2009).

20 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
21 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
22 Thus, Alternative 1A restoration activities that create newly inundated areas could increase
23 bioavailability of mercury. Concentrations of methylmercury known to be toxic to bird embryos
24 have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003);
25 however, currently, it is unknown how much of the sediment-derived methylmercury enters the
26 food chain in Suisun Marsh or what tissue concentrations are actually harmful to the California
27 clapper rail. In general, the highest methylation rates are associated with high tidal marshes that
28 experience intermittent wetting and drying and associated anoxic conditions (Alpers et al. 2008). In
29 Suisun Marsh, the conversion of managed wetlands to tidal wetlands is expected to result in an
30 overall reduction in mercury methylation. Because of the complex and very site-specific factors that
31 determine if mercury becomes mobilized into the foodweb, *CM12 Methylmercury Management* is
32 included to provide for site-specific evaluation for each restoration project. If a project is identified
33 where there is a high potential for methylmercury production that could not be fully addressed
34 through restoration design and adaptive management, alternate restoration areas would be
35 considered. CM12 would be implemented in coordination with other similar efforts to address
36 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
37 conservation measure would include the following actions.

- 38 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
39 mercury methylation and bioavailability
- 40 ● Define design elements that minimize conditions conducive to generation of methylmercury in
41 restored areas.
- 42 ● Define adaptive management strategies that can be implemented to monitor and minimize
43 actual postrestoration creation and mobilization of methylmercury.

1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 5 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 6 classes within a species. In addition, the effect of selenium on a species can be confounded by
 7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 8 2009).

9 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
 10 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
 11 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
 12 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
 13 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
 14 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
 15 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
 16 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
 17 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
 18 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
 19 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
 20 have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 22 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 23 exacerbate bioaccumulation of selenium in avian species, including California clapper rail. Marsh
 24 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
 25 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
 26 Alternative 1A restoration activities that create newly inundated areas could increase bioavailability
 27 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
 28 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
 29 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
 30 increases in selenium concentrations in water in the Delta under any alternative. However, it is
 31 difficult to determine whether the effects of potential increases in selenium bioavailability
 32 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
 33 effects on California clapper rail.

34 Because of the uncertainty that exists at this programmatic level of review, there could be a
 35 substantial effect on California clapper rail from increases in selenium associated with restoration
 36 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
 37 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
 38 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
 39 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
 40 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
 41 separately for each restoration effort as part of design and implementation. This avoidance and
 42 minimization measure would be implemented as part of the tidal habitat restoration design
 43 schedule.

44 **NEPA Effects:** Noise and visual disturbances related to construction-related activities from
 45 conservation measures could disturb California clapper rail habitat adjacent to work sites. Potential

1 effects of noise and visual disturbances on California clapper rail would be minimized with *AMM19*
2 *California Clapper Rail*. *AMM1–AMM7*, including *AMM2 Construction Best Management Practices and*
3 *Monitoring*, would minimize the likelihood of spills from occurring and ensure that measures were
4 in place to prevent runoff from the construction area and to avoid negative effects of dust on the
5 species.

6 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
7 habitat restoration are expected to increase water salinity in Suisun Marsh, which would be
8 expected to establish tidal marsh similar to historic conditions.

9 Tidal habitat restoration could result in increased exposure of California clapper rail to selenium.
10 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
11 would provide specific tidal habitat restoration design elements to reduce the potential for
12 bioaccumulation of selenium and its bioavailability in tidal habitats.

13 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
14 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
15 the California clapper rail foodweb to methylmercury in these areas, with the level of exposure
16 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
17 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
18 to reduce the overall production of methylmercury, resulting in a net benefit to the species.
19 Implementation of *CM12*, which contains measures to assess the amount of mercury before project
20 development, followed by appropriate design and adaptation management, would minimize the
21 potential for increased methylmercury exposure, and would result in no adverse effect on the
22 species.

23 The indirect effects associated with noise and visual disturbances, potential spills of hazardous
24 material, changes in salinity, and increased exposure to selenium from Alternative 1A
25 implementation would not have an adverse effect on California clapper rail.

26 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities from
27 conservation measures could disturb approximately 542 acres of California clapper rail habitat
28 adjacent to work sites. *AMM19 California Clapper Rail* would avoid and minimize impacts on
29 California clapper rail from noise and visual disturbance. The use of mechanical equipment during
30 restoration activities could cause the accidental release of petroleum or other contaminants or the
31 inadvertent discharge of sediment or excessive dust adjacent to California clapper rail habitat, which
32 could also affect the species. These impacts on California clapper rail would be less than significant
33 with the incorporation of *AMM1–AMM7* into the BDCP.

34 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
35 habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity gradient
36 changes should have a beneficial impact on California clapper rail through the establishment of tidal
37 marsh similar to historic conditions.

38 Tidal habitat restoration could result in increased exposure of California clapper rail to selenium.
39 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
40 would provide specific tidal habitat restoration design elements to reduce the potential for
41 bioaccumulation of selenium and its bioavailability in tidal habitats.

42 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
43 methylation of mercury in the newly inundated soils. There is potential for increased exposure of

1 the California clapper rail foodweb to methylmercury in these areas, with the level of exposure
2 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
3 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
4 to reduce the overall production of methylmercury, resulting in a net benefit to the species.
5 Implementation of CM12, which contains measures to assess the amount of mercury before project
6 development, followed by appropriate design and adaptation management, would minimize the
7 potential for increased methylmercury exposure, and would result in no adverse effect on the
8 species.

9 With these measures in place, indirect effects of Alternative 1A implementation would not result in a
10 substantial adverse effect on the species through habitat modification or potential mortality of a
11 special-status species. Therefore, the indirect effects of Alternative 1A implementation would have a
12 less-than-significant impact on California clapper rail.

13 **Impact BIO-64: Effects on California Clapper Rail Associated with Electrical Transmission** 14 **Facilities**

15 Isolated patches of suitable California clapper rail habitat may occur in the Plan Area as far east as
16 (but not including) Sherman Island. Home range and territory of the California clapper rail is not
17 known, but in locations outside of California, clapper rail territory ranges from 0.3 acre to 8 acres
18 (0.1 to 3.2 hectares) (Rush et al. 2012), indicating that known occurrences are not likely to intersect
19 with the proposed lines (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*
20 *BDCP Transmission Lines*). The location of the current population and suitable habitat for the species
21 make collision with the proposed transmission lines highly unlikely.

22 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse
23 effect on California clapper rail because the location of the current population and suitable habitat
24 for the species would make collision with the proposed transmission lines highly unlikely.

25 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
26 significant impact on California clapper rail because the location of the current population and
27 suitable habitat for the species would make collision with the proposed transmission lines highly
28 unlikely.

29 **Impact BIO-65: Fragmentation of California Clapper Rail Habitat as a Result of Conservation** 30 **Component Implementation**

31 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create
32 temporary barriers to movements of California clapper rail. Grading, filling, contouring and other
33 initial ground-disturbing activities could remove habitat along movement corridors used by
34 individuals and, thus, temporarily reduce access to adjacent habitat areas. The temporary adverse
35 effects of fragmentation of tidal brackish emergent wetland habitat for California clapper rail or
36 restoration activities resulting in barriers to movement would be minimized through sequencing of
37 restoration activities to minimize effects of temporary habitat loss. The tidal natural communities
38 restoration would be phased through the course of the BDCP restoration program to allow for
39 recovery of some areas before restoration actions are initiated in other areas. In addition, *AMM19*
40 *California Clapper Rail* would avoid and minimize effects on California clapper rail. Therefore,
41 California clapper rail habitat fragmentation would not have an adverse effect on the species.

1 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to
2 movement would not represent an adverse effect on California clapper rail as a result of special-
3 status species habitat modification because *CM4 Tidal Natural Communities Restoration* would be
4 phased to allow for the recovery of some areas before restoration actions are initiated in other
5 areas. In addition, *AMM19 California Clapper Rail* would avoid and minimize effects on California
6 clapper rail.

7 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to
8 movement would represent a less-than-significant impact on California clapper rail as a result of
9 special status species habitat modification because Tidal Natural Communities Restoration (CM4)
10 would be phased to allow for the recovery of some areas before initiating restoration actions in
11 other areas. In addition, *AMM19 California Clapper Rail* would avoid and minimize
12 effects on California clapper rail.

13 **California Least Tern**

14 This section describe the effects of Alternative 1A, including water conveyance facilities
15 construction and implementation of other conservation components on California least tern.
16 California least tern modeled habitat identifies foraging habitat as all tidal perennial aquatic natural
17 community in the study area. Breeding habitat is not included in the model because most of the
18 natural shoreline in the study area that historically provided nesting sites has been modified or
19 removed.

20 Construction and restoration associated with Alternative 1A conservation measures would result in
21 both temporary and permanent losses of California least tern modeled habitat as indicated in Table
22 12-1A-27. Full implementation of Alternative 1A would also include the following conservation
23 actions over the term of the BDCP to benefit California least tern (BDCP Chapter 3, Section 3.3,
24 *Biological Goals and Objectives*).

- 25 ● Restore and protect at least 65,000 acres of tidal natural communities and transitional uplands
26 to accommodate sea level rise (Objective L1.3, associated with CM4).
- 27 ● Within the at least 65,000 acres of tidal natural communities and transitional uplands, restore or
28 create tidal perennial aquatic natural community as necessary when creating tidal emergent
29 wetland (Objective TPANC1.1, associated with CM4).
- 30 ● Control invasive aquatic vegetation that adversely affects native fish habitat (Objective
31 TPANC2.1, associated with CM13).

32 Least terns currently nest on artificial fill adjacent to tidal perennial aquatic habitat in the vicinity of
33 Suisun Marsh and west Delta, and additional nesting could occur at the edge of tidal perennial
34 waters whenever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy
35 or gravelly substrates with sparse vegetation).

36 As explained below, with the restoration and protection of tidal perennial aquatic foraging habitat,
37 in addition to natural community enhancement and management commitments (including CM12
38 *Methylmercury Management*) and implementation of AMM1–AMM7, *AMM27 Selenium Management*,
39 and mitigation to avoid impacts on terns should they nest in the study area, impacts on the
40 California least tern would not be adverse for NEPA purposes and would be less than significant for
41 CEQA purposes.

1 **Table 12-1A-27. Changes in California Least Tern Modeled Habitat Associated with Alternative 1A**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Foraging	48	48	133	133	NA	NA
Total Impacts CM1		48	48	133	133	NA	NA
CM2–CM18	Foraging	38	46	11	16	NA	NA
Total Impacts CM2–CM18		38	46	11	16	NA	NA
TOTAL IMPACTS		86	94	144	149	NA	NA

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3
4 **Impact BIO-66: Loss or Conversion of Habitat for and Direct Mortality of California Least Tern**

5 Alternative 1A conservation measures would result in the combined permanent and temporary loss
6 of up to 243 acres (94 acres of permanent loss, 149 acres of temporary loss) of modeled foraging
7 habitat for California least tern (Table 22-1A-27). The conservation measures that would result in
8 these losses are construction of water conveyance facilities and operation (CM1), Yolo Bypass
9 improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5). Habitat
10 enhancement and management activities (CM11), which would include ground disturbance or
11 removal of nonnative vegetation, could also result in local adverse habitat effects. In addition,
12 maintenance activities associated with the long-term operation of the water conveyance facilities
13 and other BDCP physical facilities could degrade or eliminate California least tern foraging habitat.
14 Each of these individual activities is described below. A summary statement of the combined
15 impacts, NEPA effects, and a CEQA conclusion follow the individual conservation measure
16 discussions.

- 17 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
18 result in the combined permanent and temporary loss of up to 181 acres of modeled California
19 least tern aquatic foraging habitat (Table 22-1A-27). Of the 181 acres of modeled habitat that
20 would be removed for the construction of the conveyance facilities, 48 acres would be a
21 temporary loss. Most of the permanent loss would occur where Intakes 1–5 encroach on the
22 Sacramento River's east bank between Freeport and Courtland. The temporary effects on
23 California least tern foraging habitat would occur at numerous locations, including in the
24 Sacramento River at Intakes 1–5, and at temporary barge unloading facilities established along
25 the tunnel route. The CM1 footprint does not overlap with any California least tern occurrences.
26 Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect*
27 *Effects on Colonies Will Be Minimized*, (described below) would require preconstruction surveys

1 and the establishment of no-disturbance buffers and would be available to address potential
2 effects on terns were they to nest in the vicinity of the construction footprint. Refer to the
3 Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations.
4 Impacts from CM1 would occur within the first 10 years of Alternative 1A implementation.

- 5 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancement
6 (CM2) would result in the permanent loss of 8 acres and the temporary loss of 11 acres of
7 modeled aquatic foraging habitat for California least tern in CZ 2. The loss is expected to occur
8 during the first 10 years of Alternative 1A implementation.
- 9 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration actions would result in the
10 permanent loss of 36 acres of modeled aquatic foraging habitat for California least tern. An
11 estimated 65,000 acres of tidal wetlands would be restored during tidal habitat restoration,
12 consistent with BDCP Objective L1.3. Of these acres, an estimated 27,000 acres of tidal perennial
13 aquatic would be restored, based on modeling conducted by ESAPWA (refer to Table 5 in BDCP
14 Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). This restoration is consistent with
15 BDCP Objective TPANC1.1. Tidal perennial aquatic restoration would be expected to
16 substantially increase the primary productivity of fish, increasing the prey base for California
17 least tern. Approximately 3,400 acres of the restoration would happen during the first 10 years
18 of BDCP implementation, which would coincide with the timeframe of water conveyance
19 facilities construction. The remaining restoration would be phased over the following 30 years.
20 Some of the restoration would occur in the lower Yolo Bypass, but restoration would also be
21 spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.
- 22 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
23 seasonally inundated floodplain would result in the permanent loss of 2 acres and the
24 temporary loss of 5 acres of modeled aquatic foraging habitat for California least tern. This
25 activity is scheduled to start following construction of water conveyance facilities, which is
26 expected to take 10 years. Specific locations for the floodplain restoration have not been
27 identified, but it is expected that much of the activity would occur in the south Delta along the
28 major rivers.
- 29 • *CM11 Natural Communities Enhancement and Management*: Noise and visual disturbances
30 during implementation of habitat management actions could result in temporary disturbances
31 that affect California least tern use of the surrounding habitat. These effects cannot be
32 quantified, but are expected to be minimal because few management activities would be
33 implemented in aquatic habitat and because terns are not expected to nest on protected lands.
34 Surveys would be conducted prior to ground disturbance in any areas that have suitable nesting
35 substrate for California least tern (flat, unvegetated areas near aquatic foraging habitat) and
36 injury mortality and noise and visual disturbance of nesting terns would be avoided and
37 minimized by the AMMs and Mitigation Measure BIO-66, *California Least Tern Nesting Colonies
38 Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*.
- 39 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
40 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
41 post construction disturbances, localized impacts on California least tern foraging habitat, and
42 temporary noise and disturbances over the term of the BDCP. Maintenance activities would
43 include vegetation management, levee and structure repair, and re-grading of roads and
44 permanent work areas which could be adjacent to California least tern foraging habitat. These
45 effects, however, would be reduced by AMMs described below.

1 Injury and Direct Mortality: California least terns currently nest in the vicinity of potential
2 restoration sites in Suisun Marsh and west Delta area (CZ 10 and CZ 11). New nesting colonies
3 could establish if suitable nesting habitat is created during restoration activities (e.g., placement
4 of unvegetated fill to raise surface elevations prior to breaching levees during restoration
5 efforts). If nesting occurs where covered activities are undertaken, the operation of equipment
6 for land clearing, construction, conveyance facilities operation and maintenance, and habitat
7 restoration, enhancement, and management could result in injury or mortality of California least
8 tern. Risk of injury or disturbance would be greatest to eggs and nestlings susceptible to land-
9 clearing activities, abandonment of nests and nesting colonies, or increased exposure to the
10 elements or to predators. Injury to adults or fledged juveniles is less likely as these individuals
11 would be expected to avoid contact with construction equipment. However, injury or mortality
12 would be avoided through planning and preconstruction surveys to identify nesting colonies,
13 the design of projects to avoid locations with least tern colonies, and the provision for 500-foot
14 buffers as required by Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be*
15 *Avoided and Indirect Effects on Colonies Will Be Minimized.*

16 The following paragraphs summarize the combined effects discussed above, describe other BDCP
17 conservation actions that offset or avoid these effects. NEPA and CEQA conclusions area also
18 included.

19 ***Near-Term Timeframe***

20 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
21 the near-term BDCP conservation strategy has been evaluated to determine whether it would
22 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
23 the effects of construction would not be adverse under NEPA. With Alternative 1A implementation,
24 there would be a loss of 230 acres of modeled foraging habitat for California least tern in the study
25 area in the near-term. These effects would result from the construction of the water conveyance
26 facilities (CM1, 181 acres), and implementing other conservation measures (Yolo Bypass fisheries
27 improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled foraging habitat
28 impacts would occur in tidal perennial aquatic natural communities.

29 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
30 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would
31 indicate that 230 acres of the tidal perennial aquatic natural community should be restored/created
32 to compensate for the CM1 losses of California least tern foraging habitat. The near-term effects of
33 other conservation actions would remove 49 acres of tidal perennial aquatic habitat, and therefore
34 require 49 acres of tidal perennial aquatic natural community restoration using the same typical
35 NEPA and CEQA ratio (1:1 for restoration).

36 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities
37 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3). This
38 conservation action would result in the creation of approximately 3,400 acres of high-value tidal
39 perennial aquatic natural community, based on modeling conducted by ESAPWA (refer to Table 5 in
40 BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*) (Tidal perennial aquatic restoration
41 would occur in the same timeframe as the construction and early restoration losses, thereby
42 avoiding adverse effects on California least tern from loss of foraging habitat).

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
44 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
3 *these AMMs include elements that would avoid or minimize the risk of affecting individuals and*
4 *species habitats at or adjacent to work areas and storage sites. BDCP Appendix 3.C describes the*
5 *AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental**
6 *Commitments, AMMs, and CMs, of the Final EIR/EIS.*

7 The California least tern is not a species that is covered under the BDCP. Although nesting by
8 California least tern is not expected to occur, restoration sites could attract individuals wherever
9 disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly
10 substrates with sparse vegetation). If nesting were to occur, construction activities could have an
11 adverse effect on California least tern. Mitigation Measure BIO-66, *California Least Tern Nesting*
12 *Colonies Shall be Avoided and Indirect Effects on Colonies will be Minimized*, would be available to
13 address this potential effect on nesting California least terns.

14 **Late Long-Term Timeframe**

15 The habitat model indicates that the study area supports approximately 86,263 acres of foraging
16 habitat for California least tern. Alternative 1A as a whole would result in the permanent loss of and
17 temporary effects on 243 acres of foraging habitat during the term of the Plan (less than 1% of the
18 total habitat in the study area). The locations of these losses are described above in the analyses of
19 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*
20 *Natural Communities Restoration* would restore an estimated 27,000 acres of high quality tidal
21 perennial aquatic natural community would be restored (estimated from Table 5 in BDCP Appendix
22 3.B, *BDCP Tidal Habitat Evolution Assessment*). The restoration would occur over a wide region of
23 the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South
24 Delta ROAs (see Figure 12-1).

25 **NEPA Effects:** The loss of California least tern foraging habitat and potential direct mortality
26 associated with Alternative 1A would represent an adverse effect in the absence of other
27 conservation actions. Although nesting by California least tern is not expected to occur in the study
28 area, restoration sites could attract individuals wherever disturbed or where artificial sites mimic
29 habitat conditions sought for nesting (i.e., sandy or gravelly substrates with sparse vegetation). If
30 nesting were to occur, construction activities could have an adverse effect on California least tern.
31 Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect*
32 *Effects on Colonies*, would be available to address this potential effect on nesting California least
33 terns. With habitat restoration associated with CM4, and with implementation of *AMM1 Worker*
34 *Awareness Training, AMM2 Construction Best Management Practices and Monitoring, AMM3*
35 *Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill*
36 *Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7*
37 *Barge Operations Plan*, which would be in place during all project activities, the effects of Alternative
38 1A as a whole on California least tern would not be adverse under NEPA.

39 **CEQA Conclusion:**

40 **Near-Term Timeframe**

41 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
42 the near-term BDCP conservation strategy has been evaluated to determine whether it would
43 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that

1 the effects of construction would be less than significant under CEQA. With Alternative 1A
2 implementation, there would be a loss of 230 acres of modeled foraging habitat for California least
3 tern in the study area in the near-term. These effects would result from the construction of the
4 water conveyance facilities (CM1, 181 acres), and implementing other conservation measures (Yolo
5 Bypass fisheries improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled
6 foraging habitat impacts would occur in tidal perennial aquatic natural communities.

7 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
8 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would
9 indicate that 230 acres of the tidal perennial aquatic natural community should be restored/created
10 to compensate for the CM1 losses of California least tern foraging habitat. The near-term effects of
11 other conservation actions would remove 49 acres of tidal perennial aquatic habitat, and therefore
12 require 49 acres of tidal perennial aquatic natural community restoration using the same typical
13 NEPA and CEQA ratio (1:1 for restoration).

14 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities
15 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3).
16 Modeling conducted by ESA PWA indicates that this conservation action would result in the creation
17 of approximately 3,400 acres of high-value tidal perennial aquatic natural community (refer to Table
18 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). Tidal perennial aquatic
19 restoration would occur in the same timeframe as the construction and early restoration losses,
20 thereby avoiding adverse effects on California least tern.

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
22 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
23 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
24 *Countermeasure Plan, AMM6 Spoils, Reusable Tunnel Material, and AMM7 Barge Operations Plan*. All
25 of these AMMs include elements that would avoid or minimize the risk of affecting individuals and
26 species habitats at or adjacent to work areas and storage sites. BDCP Appendix 3.C describes the
27 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
28 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

29 Although nesting by California least tern is not expected to occur, restoration sites could attract
30 individuals wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e.,
31 sandy or gravelly substrates with sparse vegetation). If nesting were to occur, construction activities
32 could have an adverse effect on California least tern. Mitigation Measure BIO-66, *California Least*
33 *Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies will be Minimized*, would
34 reduce this impact on nesting California least terns to a less-than-significant level.

35 The natural community restoration and protection activities would be concluded in the first 10
36 years of Plan implementation, which is close enough in time to the occurrence of impacts to
37 constitute adequate mitigation for CEQA purposes. In addition, AMM1-AMM7 and Mitigation
38 Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on*
39 *Colonies will be Minimized*, would avoid and minimize potential impacts on the species from
40 construction-related habitat loss and noise and disturbance. Because the number of acres required
41 to meet the typical mitigation ratio described above would be only 230 acres of restored tidal
42 perennial aquatic habitat, the 3,400 acres of tidal perennial aquatic restoration estimated in the
43 near-term, are more than sufficient to support the conclusion that the near-term impacts of habitat
44 loss and direct mortality under Alternative 1A would be less than significant under CEQA.

1 **Late Long-Term Timeframe**

2 The habitat model indicates that the study area supports approximately 86,263 acres of foraging
3 habitat for California least tern. Alternative 1A as a whole would result in the permanent loss of and
4 temporary effects on 243 acres of foraging habitat during the term of the Plan (less than 1% of the
5 total habitat in the study area). The locations of these losses are described above in the analyses of
6 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*
7 *Natural Communities Restoration* to restore an estimated 27,000 acres of high-value tidal perennial
8 aquatic natural community (estimated from Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat*
9 *Evolution Assessment*). The restoration would occur over a wide region of the study area, including
10 within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure
11 12-1).

12 In the absence of other conservation actions, the loss of California least tern foraging habitat and
13 potential direct mortality associated with Alternative 1A would represent an adverse effect as a
14 result of habitat modification of a special-status species and potential for direct mortality. Although
15 nesting by California least tern is not expected to occur, restoration sites could attract individuals
16 wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or
17 gravelly substrates with sparse vegetation). If nesting were to occur, construction activities could
18 have a significant impact on California least tern. The loss of California least tern foraging habitat
19 and potential direct mortality associated with Alternative 1A would represent a significant impact in
20 the absence of other conservation actions.

21 However, with habitat restoration associated with CM4, and with implementation of *AMM1 Worker*
22 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*
23 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*
24 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge*
25 *Operations Plan*, and Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be*
26 *Avoided and Indirect Effects on Colonies Will Be Minimized*, the loss of habitat or mortality under this
27 alternative would have a less-than-significant impact on California least tern.

28 **Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and**
29 **Indirect Effects on Colonies Will Be Minimized**

30 If suitable nesting habitat for California least tern (flat unvegetated areas near aquatic foraging
31 habitat) is identified during planning level surveys, DWR will ensure that a qualified biologist
32 with experience observing the species and its nests conducts at least three preconstruction
33 surveys for this species during the nesting season. DWR will design projects to avoid the loss of
34 California least tern nesting colonies. No construction will take place within 500 feet of
35 California least tern nests during the nesting season (April 15 to August 15 or as determined
36 through surveys). Only inspection, maintenance, research, or monitoring activities may be
37 performed during the least tern breeding season in areas within or adjacent to least tern
38 breeding habitat with USFWS and CDFW approval under the supervision of a qualified biologist.

39 **Impact BIO-67: Indirect Effects of Plan Implementation on California Least Tern**

40 **Indirect construction-and operation-related effects:** Indirect effects associated with
41 construction that could affect California least tern include noise, dust, and visual disturbance caused
42 by grading, filling, contouring, and other ground-disturbing operations outside the project footprint
43 but within 500 feet from the construction edge. Construction noise above background noise levels

1 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
2 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
3 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
4 which these noise levels could affect California least tern. The use of mechanical equipment during
5 water conveyance facilities construction could cause the accidental release of petroleum or other
6 contaminants that could affect California least tern or their prey species in the surrounding habitat.
7 The inadvertent discharge of sediment or excessive dust adjacent to foraging habitat could also
8 affect the species. Noise and visual disturbance is not expected to have an adverse effect on
9 California least tern foraging behavior. As described in Mitigation Measure BIO-66, *California Least*
10 *Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, if least tern
11 nests were found during planning or preconstruction surveys, no construction would take place
12 within 500 feet of active nests. In addition, AMM1–AMM7, including construction best management
13 practices, would minimize the likelihood of spills from occurring or excessive dust being created
14 during construction. Should a spill occur, implementation of these AMMs would greatly reduce the
15 likelihood of individuals being affected.

16 **Methylmercury Exposure:** Covered activities have the potential to exacerbate the bioaccumulation
17 of mercury in the California least tern. The operational impacts of new flows under CM1 were
18 analyzed using a DSM-2 based model to assess potential effects on mercury concentration and
19 bioavailability. Largemouth bass were used as a surrogate species for this analysis and results would
20 be expected to be similar or lower for the California least tern. Results indicated that changes in total
21 mercury levels in water and large mouth bass tissues were insignificant (see BDCP Appendix 5.D,
22 Tables 5D.4-3, 5D.4-4, and 5D.4-5).

23 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to
24 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
25 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
26 flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase
27 bioavailability of mercury. Increased methylmercury associated with natural community and
28 floodplain restoration may indirectly affect California least tern, via uptake through consumption of
29 prey (as described in the BDCP Appendix 5.D, *Contaminants*).

30 Schwarzbach and Adelsbach (2003) investigated mercury exposure in 15 species of birds inhabiting
31 the Bay-Delta ecosystem. Among the species studied, the highest concentrations of mercury were
32 found in the eggs of piscivorous birds (terns and cormorants) that bioaccumulate mercury from
33 their fish prey. The very highest concentrations were found in Caspian and Forster's terns, especially
34 those inhabiting South San Francisco Bay. Based on three California least tern eggs collected from
35 Alameda Naval Air Station in the San Francisco Central Bay, concentrations in California least tern
36 eggs were a third (0.3 ppm) those of the eggs of the other two terns. Because of the small sample
37 size, there is a high degree of uncertainty regarding the levels of mercury that may be present in
38 California least tern eggs. If the mercury levels measured at Alameda Naval Air Station are
39 representative of the population in the San Francisco Bay, they would not be expected to result in
40 adverse effects on tern hatchlings. Hatching and fledging success were not reduced in common tern
41 eggs in Germany with mercury concentrations of 6.7 ppm (Hothem and Powell 2000).

42 Mercury is generally elevated throughout the Delta, and restoration of the lower potential areas in
43 total may result in generalized, very low level increases of mercury. Given that some species have
44 elevated mercury tissue levels pre-BDCP, these low level increases could result in some level of

1 effects. CM12, described below, would be implemented to address this risk of low level increases in
2 methylmercury which could add to the current elevated tissue concentrations.

- 3 • Assess pre-restoration conditions to determine the risk that the project could result in increased
4 mercury methylation and bioavailability
- 5 • Define design elements that minimize conditions conducive to generation of methylmercury in
6 restored areas.
- 7 • Define adaptive management strategies that can be implemented to monitor and minimize
8 actual postrestoration creation and mobilization of methylmercury.

9 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
10 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
11 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
12 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
13 2009). The effect of selenium toxicity differs widely between species and also between age and sex
14 classes within a species. In addition, the effect of selenium on a species can be confounded by
15 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
16 2009).

17 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
18 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
19 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
20 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
21 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
22 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
23 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
24 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
25 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
26 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
27 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
28 levels of selenium have a higher risk of selenium toxicity.

29 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
30 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
31 exacerbate bioaccumulation of selenium in avian species, including California least tern. Marsh (tidal
32 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
33 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP
34 restoration activities that create newly inundated areas could increase bioavailability of selenium
35 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
36 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
37 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
38 increases in selenium concentrations in water in the Delta under any alternative. However, it is
39 difficult to determine whether the effects of potential increases in selenium bioavailability
40 associated with restoration-related conservation measures (CM4–CM5) would lead to adverse
41 effects on California least tern.

42 Because of the uncertainty that exists at this programmatic level of review, there could be a
43 substantial effect on California least tern from increases in selenium associated with restoration
44 activities. This effect would be addressed through the implementation of *AMM27 Selenium*

1 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
2 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
3 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
4 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
5 separately for each restoration effort as part of design and implementation. This avoidance and
6 minimization measure would be implemented as part of the tidal habitat restoration design
7 schedule.

8 **NEPA Effects:** Noise and visual disturbances within 500 feet of construction-related activities from
9 the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation
10 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*
11 *Colonies Will Be Minimized*, would be available to address this potential adverse effect. AMM1–
12 AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would minimize
13 the likelihood of spills from occurring and ensure that measures were in place to prevent runoff
14 from the construction area and to avoid negative effects of dust on the species.

15 Tidal habitat restoration could result in increased exposure of California least tern to selenium. This
16 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
17 would provide specific tidal habitat restoration design elements to reduce the potential for
18 bioaccumulation of selenium and its bioavailability in tidal habitats.

19 Changes in water operations under CM1 would not be expected to result in increased mercury
20 bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased
21 exposure of California least tern to methylmercury. There is potential for increased exposure of the
22 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
23 mercury available in the soils and the biogeochemical conditions. However, it is unknown what
24 concentrations of methylmercury are harmful to the species, and the potential for increased
25 exposure varies substantially within the study area. Implementation of CM12, which contains
26 measures to assess the amount of mercury before project development, followed by appropriate
27 design and adaptation management, would minimize the potential for increased methylmercury
28 exposure, and would result in no adverse effect on the species.

29 **CEQA Conclusion:** Noise and visual disturbances within 500 feet of construction-related activities
30 from the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation
31 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*
32 *Colonies Will Be Minimized*, would avoid this potential adverse effect.

33 AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would
34 minimize the likelihood of spills from occurring and ensure that measures were in place to prevent
35 runoff from the construction area and to avoid negative effects of dust on the species.

36 Tidal habitat restoration could result in increased exposure of California least tern to selenium. This
37 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
38 would provide specific tidal habitat restoration design elements to reduce the potential for
39 bioaccumulation of selenium and its bioavailability in tidal habitats.

40 Changes in water operations under CM1 would not be expected to result in increased mercury
41 bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased
42 exposure of California least tern to methylmercury. There is potential for increased exposure of the
43 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of

1 mercury available in the soils and the biogeochemical conditions. However, it is unknown what
2 concentrations of methylmercury are harmful to the species, and the potential for increased
3 exposure varies substantially within the study area. Implementation of CM12, which contains
4 measures to assess the amount of mercury before project development, followed by appropriate
5 design and adaptation management, would minimize the potential for increased methylmercury
6 exposure, and would result in no adverse effect on the species.

7 With AMM1–AMM7, AMM12, AMM27, and CM12 in place, in addition to the implementation of
8 Mitigation Measure BIO-66, the indirect effects of plan implementation would not result in a
9 substantial adverse effect on the species through habitat modification or potential mortality of a
10 special-status species. Therefore, the indirect effects of Alternative 1A implementation would have a
11 less-than-significant impact on California least tern.

12 **Mitigation Measure BIO-66, California Least Tern Nesting Colonies Shall Be Avoided and**
13 **Indirect Effects on Colonies Will Be Minimized**

14 See Mitigation Measure BIO-66 under Impact BIO-66.

15 **Impact BIO-68: Effects on California Least Tern Associated with Electrical Transmission**
16 **Facilities**

17 The risk of mortality of California least tern from the construction of new transmission lines is
18 considered to be minimal based on tern flight behaviors and its unlikely use of habitats near the
19 transmission line corridors. Terns exhibit low wing loading and high aspect-ratio wings and as a
20 result can maneuver relatively quickly around an obstacle such as a transmission line. Their wing
21 structure and design allows for rapid flight and quick, evasive actions (see BDCP Appendix 5.J,
22 Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). Marking
23 transmission lines with flight diverters that make the lines more visible to birds has been shown to
24 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
25 marking devices in the Central Valley could reduce avian mortality by 60%. All new project
26 transmission lines would be fitted with flight diverters. Bird flight diverters would make
27 transmission lines highly visible to California least terns and would substantially reduce the
28 potential for powerline collisions.

29 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
30 adverse effect on California least tern as a result of direct mortality of a special-status species
31 because terns are uncommon in the vicinity of proposed transmission lines and because the
32 probability of bird-powerline strikes is highly unlikely due to tern flight behaviors. All new
33 transmission lines constructed for the project would be fitted with bird diverters, which have been
34 shown to reduce avian mortality by 60%. By implementing *AMM20 Greater Sandhill Crane*, the
35 construction and operation of transmission lines would not result in an adverse effect on California
36 least tern.

37 **CEQA Conclusion:** The construction and presence of new transmission lines would represent a less-
38 than-significant impact on California least tern as a result of direct mortality of a special-status
39 species because terns are uncommon in the vicinity of proposed transmission lines and because the
40 probability of bird-powerline strikes is highly unlikely due to tern flight behaviors. All new
41 transmission lines constructed for the project would be fitted with bird diverters, which have been
42 shown to reduce avian mortality by 60%. By implementing *AMM20 Greater Sandhill Crane*, the

1 construction and operation of transmission lines would result in a less-than-significant impact on
2 California least tern.

3 **Greater Sandhill Crane**

4 This section describes the effects of Alternative 1A, including water conveyance facilities
5 construction and implementation of other conservation components, on greater sandhill crane.
6 Greater sandhill cranes in the study area are almost entirely dependent on privately owned
7 agricultural lands for foraging. Long-term sustainability of the species is thus dependent on
8 providing a matrix of compatible crop types that afford suitable foraging habitat and maintaining
9 compatible agricultural practices, while sustaining and increasing the extent of other essential
10 habitat elements such as night roosting habitat. The habitat model for greater sandhill crane
11 includes “roosting and foraging” and “foraging” habitat. These habitat types include certain
12 agricultural types, specific grassland types, irrigated pastures and hay crops, managed seasonal
13 wetland, and other natural seasonal wetland. Roosting and foraging habitat includes known,
14 traditional roost sites that also provide foraging habitat (BDCP Appendix 2.A *Covered Species*
15 *Accounts*). Both temporary and permanent roost sites were identified for greater Sandhill crane.
16 Permanent roosting and foraging sites are those used regularly, year after year, while temporary
17 roosting and foraging sites are those used in some years. Factors included in assessing the loss of
18 foraging habitat for the greater sandhill crane includes the relative habitat value of specific crop or
19 land cover types, and proximity to known roost sites. Foraging habitat for greater sandhill crane
20 included crop types and natural communities up to 4 miles from known roost sites, within the
21 boundary of the winter crane use area (BDCP Appendix 2A, *Covered Species Accounts*).

22 Construction and restoration associated with Alternative 1A conservation measures would result in
23 both temporary and permanent losses of foraging and roosting habitat for greater sandhill crane as
24 indicated in Table 12-1A-28. Full implementation of Alternative 1A would also include the following
25 conservation actions over the term of the BDCP to benefit the greater sandhill crane (BDCP Chapter
26 3, Section 3.3, *Biological Goals and Objectives*).

- 27 • Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at
28 least 80% maintained in very high-value types in any given year. This protected habitat will be
29 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
30 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
31 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective
32 GSHC1.1, associated with CM3).
- 33 • To create additional high-value greater sandhill crane winter foraging habitat, 10% of the
34 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or
35 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be
36 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
37 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
38 habitat loss (Objective GSHC1.2, associated with CM3).
- 39 • Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the
40 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise
41 and local seasonal flood events. The wetlands will be located within 2 miles of existing
42 permanent roost sites and protected in association with other protected natural community
43 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide
44 buffers around the wetlands (Objective GSHC1.3, associated with CM3).

- 1 • Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge
2 project boundary. The complexes will be no more than 2 miles apart and will help provide
3 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each
4 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane
5 roosting habitat, and will be protected in association with other protected natural community
6 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,
7 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be
8 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
9 support roosting cranes and provide highest-value foraging habitat, provided such substitution
10 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for
11 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
- 12 • Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost
13 sites. The habitat will consist of active cornfields that are flooded following harvest to support
14 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least
15 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will
16 be sited with consideration of the location of roosting habitat and will be in place prior to
17 roosting habitat loss (Objective GSCH1.5, associated with CM3).
- 18 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
19 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 20 • Target cultivated land conservation to provide connectivity between other conservation lands
21 (Objective CLNC1.2, associated with CM3).
- 22 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
23 lands that occur in cultivated lands within the reserve system, including, water conveyance
24 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

25 As explained below, with the restoration and protection of these amounts of habitat, in addition to
26 natural community enhancement and management commitments (including *CM12 Methylmercury*
27 *Management*) and implementation of *AMM1–AMM7*, *AMM20 Greater Sandhill Crane*, *AMM27*
28 *Selenium Management*, and *AMM30 Transmission Line Design and Alignment Guidelines*, impacts on
29 the greater sandhill crane would not be adverse for NEPA purposes and would be less than
30 significant for CEQA purposes.

1 **Table 12-1A-28. Changes in Greater Sandhill Crane Modeled Habitat Associated with Alternative 1A**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Roosting and Foraging - Permanent	2	2	1	1	NA	NA
	Roosting and Foraging - Temporary	319	319	89	89	NA	NA
	Foraging	1,650	1,650	902	902	NA	NA
Total Impacts CM1		1,972	1,972	992	992		
CM2–CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	2,776	4,367	0	0	0	0
Total Impacts CM2–CM18		2,776	4,408	0	0	0	0
Total Roosting/Foraging - Permanent		2	2	1	1	0	0
Total Roosting/Foraging - Temporary		319	360	89	89		
Total Foraging		4,426	6,017	902	902	0	0
TOTAL IMPACTS		4,748	6,380	992	992	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-69: Loss or Conversion of Habitat for and Direct Mortality of Greater Sandhill**
5 **Crane**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss
7 of up to 452 acres of modeled roosting and foraging habitat for greater sandhill crane (362 acres of
8 permanent loss and 90 acres of temporary loss) and 6,919 acres of foraging habitat for greater
9 sandhill crane (6,017 of permanent loss, 902 acres of temporary loss, Table 12-1A-28). Conservation
10 measures that would result in these losses are conveyance facilities and transmission line
11 construction, and establishment and use of borrow and spoil areas (CM1), Tidal Natural
12 Communities Restoration (CM4), Grassland Natural Community Restoration (CM8), Nontidal Marsh
13 Natural Community Restoration (CM10), and Natural Communities Enhancement and Management
14 (CM11). The majority of habitat loss would result from water conveyance facility construction and
15 conversion of habitat to tidal natural communities through CM4. Habitat enhancement and
16 management activities through CM11, which include ground disturbance or removal of nonnative

1 vegetation, could also result in local adverse habitat effects. In addition, maintenance activities
2 associated with the long-term operation of the water conveyance facilities and other BDCP physical
3 facilities could degrade or eliminate greater sandhill crane modeled habitat. Each of these individual
4 activities is described below. A summary statement of the combined impacts, NEPA effects and a
5 CEQA conclusion follow the individual conservation measure discussions.

- 6 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities as they
7 are currently designed would result in the combined permanent loss of up to 2,964 acres of
8 modeled greater sandhill crane habitat. This would consist of the permanent removal of 2 acres
9 of permanent roosting and foraging habitat, 319 acres of temporary roosting and foraging
10 habitat, and 1,650 acres of foraging habitat. Foraging habitat that would be permanently
11 impacted by CM1 would consist of 648 acres of very high-value, 1 acres of high-value, and 735
12 acres of medium-value foraging habitat (Table 12-1A-29). In addition, 1 acre of permanent
13 roosting and foraging habitat, 89 acres of temporary roosting and foraging habitat, and 902
14 acres of foraging habitat would be temporarily removed (Table 12-1A-28). The temporarily
15 removed habitat would consist primarily of cultivated lands and it would be restored within 1
16 year following construction. However, it would not necessarily be restored to its original
17 topography and it could be restored as grasslands in the place of cultivated lands. CM1 activities
18 that would result in temporary impacts would include temporary access roads, borrow and spoil
19 sites, and work areas for construction.

20 The permanent roosting and foraging habitat that would be permanently removed is located on
21 the south end of Staten Island and the loss would be from the installation of a permanent
22 transmission line. The temporary roost site on Tyler Island would be permanently impacted by a
23 RTM storage area, a tunnel shaft, and a permanent transmission line and temporarily impacted
24 by a concrete batch plant, fuel station, temporary work area, and temporary transmission line.
25 Staten Island is among the most significant crane use areas in the Delta (Littlefield and Ivey
26 2000) and construction on or adjacent to Staten Island would be adverse in the absence of other
27 conservation measures. Temporary roosts on Bouldin Island, Venice Island, and Bacon Island
28 would also be impacted by the proposed footprint for temporary and permanent transmission
29 lines.

30 Approximately 288 acres of the Tyler Island temporary roost site in addition to 406 acres of the
31 permanent loss of foraging habitat would result from the storage of reusable tunnel material.
32 This material would likely be moved to other sites for use in levee build-up and restoration, and
33 the affected area would likely eventually be restored. While this effect is categorized as
34 permanent because there is no assurance that the material would eventually be moved, the
35 effect would likely be temporary. The actual footprint of the storage areas required for reusable
36 tunnel material is flexible, and the actual acreage of habitat affected by this activity could be
37 reduced based on the height of the storage piles in addition to other considerations. The
38 implementation of *AMM6 Disposal and Reuse of Spoils* would require that the areas used for
39 reusable tunnel material storage be minimized in crane foraging habitat and completely avoid
40 crane roost sites.

41 The implementation of *AMM20 Greater Sandhill Crane* would require that all CM1 activities be
42 designed to avoid direct loss of crane roost sites. Avoidance of crane roost sites would be
43 accomplished either by siting activities outside of identified roost sites or by relocating the roost site
44 if it consisted of cultivated lands (roost sites consisting of wetlands would not be subject to re-
45 location). Relocated roost sites would be established prior to construction activities affecting the
46 original roost site (as described in *AMM20 Greater Sandhill Crane*, in Appendix 3B, *Environmental*

1 *Commitments, AMMs, and CMs*). Therefore, there would be no loss of crane roosting and foraging
 2 habitat as a result of water conveyance facility construction once the facilities were fully designed.
 3 The potential for injury and direct mortality from electrical transmission facilities is addressed
 4 below under Impact BIO-70. The transmission line alignment under Alternative 1A is not fully
 5 designed and the final transmission line design would be determined in coordination with USFWS,
 6 CDFW, and a qualified crane biologist to achieve a performance standard of no net increase in bird
 7 strike hazard to greater sandhill cranes in the Plan Area (*AMM20 Greater Sandhill Crane*).

8 Other CM1 impacts on greater sandhill crane foraging habitat would occur from construction of
 9 Intakes 1–5, associated work areas and potential borrow and spoil sites, tunnel shafts, and tunnel
 10 work areas, barge unloading facilities, transmission line footprints, and concrete batch plants.
 11 Approximately 910 acres of the permanent impact on foraging habitat would occur from the
 12 construction of the intermediate forebay west of the Stone Lakes National Wildlife Refuge. The
 13 intermediate forebay would be located within 500 feet of traditional sandhill crane roosting and
 14 foraging habitat, which could cause cranes to abandon these roost sites. The indirect effects of noise
 15 and visual disturbance from construction and operation of CM1 water conveyance facilities is
 16 discussed under Impact BIO-71. Refer to the Terrestrial Biology Map Book for a detailed view of
 17 Alternative 1A construction locations.

18 **Table 12-1A-29. Total Amount of Permanently Affected Greater Sandhill Crane Foraging Habitat**

Foraging Habitat Value Class	Land Cover Type	Acres Affected by CM1 permanent (temporary)	Acres Affected by CM2–CM18 permanent (temporary)
Very high	Corn, rice	648 (230)	1,155 (0)
High	Wheat, managed wetlands,	1 (75)	489 (0)
Medium	Alfalfa and alfalfa mixtures, irrigated mixed pasture, irrigated native pasture, irrigated pasture, irrigated other pasture, grain and hay crops, miscellaneous grain and hay, mixed grain and hay, nonirrigated mixed grain and hay, other grain crops, sudan, miscellaneous grasses, grassland, alkali seasonal wetlands, vernal pool complex	735 (329)	1,403 (0)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry), native vegetation	257 (342)	1,320 (0)
Total		1,650(976)	4,367

- 19
- 20 • *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration
 21 footprint, this activity would result in the permanent loss or conversion of approximately 2,754
 22 acres of greater sandhill crane habitat, consisting of 41 acres of temporary roosting and foraging

1 habitat and 2,713 acres of foraging habitat. Lost foraging habitat from CM4 would consist of 716
 2 acres of very high-value, 304 acres of high value, 873 acres of medium-value, and 821 acres of
 3 low-value foraging habitat This loss would occur in the Cosumnes-Mokelumne River and West
 4 Delta ROAs. Tidal wetland restoration in CZ 4 could occur between the high crane use areas of
 5 the central Delta and the Cosumnes River Preserve. However, the conversion of grasslands and
 6 cultivated lands to tidal wetlands would not prohibit crane movement or reduce use of these
 7 areas. In CZ 5, loss of modeled habitat would occur along the western edge of the greater
 8 sandhill crane winter use area and therefore would not result in fragmentation of traditional
 9 crane habitats. Therefore fragmentation of habitat from tidal restoration activities would be
 10 expected to be minimal. Approximately 1,951 acres of foraging habitat would be impacted
 11 within the first 10 years of Alternative 1A implementation.

12 ● *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands that
 13 provide foraging habitat for greater sandhill crane would be converted to grassland by the late
 14 long-term timeframe. No roosting/foraging habitat would be impacted by grassland restoration
 15 activities. The restored grasslands would continue to provide foraging habitat value for the
 16 greater sandhill crane. Approximately 257 acres would be impacted within the first 10 years of
 17 Plan implementation.

18 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent
 19 conversion of approximately 1,350 acres of modeled foraging habitat for the greater sandhill
 20 crane. A portion of the restored nontidal marsh would be expected to continue to provide
 21 roosting and foraging habitat value for the greater sandhill crane. However, some of this
 22 restored marsh would be unsuitable as it would lack emergent vegetation and consist of open
 23 water that would be too deep to provide suitable roosting or foraging habitat. Approximately
 24 567 acres of habitat would be converted to nontidal marsh within the first 10 years of
 25 Alternative 1A implementation.

26 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
 27 actions included in CM11 that are designed to enhance wildlife values in restored or protected
 28 habitats could result in localized ground disturbances that could temporarily remove small
 29 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
 30 vegetation and road and other infrastructure maintenance activities, would be expected to have
 31 minor adverse effects on available habitat and would be expected to result in overall
 32 improvements to and maintenance of habitat values over the term of the BDCP. The potential for
 33 these activities to result in direct mortality of greater sandhill crane would be minimized with
 34 the implementation of *AMM20 Greater Sandhill Crane*. CM11 would also include the construction
 35 of recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP
 36 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead
 37 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
 38 disturbed areas when and where possible. If new ground disturbance was necessary, greater
 39 sandhill crane habitat would be avoided, with the exception of a permanent loss of 4 acres of
 40 grassland foraging habitat (1 acre of which would be impacted within the first 10 years of
 41 Alternative 1A implementation).

42 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
 43 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
 44 disturbances that could affect greater sandhill crane use of the surrounding habitat.
 45 Maintenance activities would include vegetation management, levee and structure repair, and
 46 re-grading of roads and permanent work areas. These effects, could be adverse as sandhill

1 cranes are sensitive to disturbance. However, potential impacts would be reduced by AMMs, and
2 conservation actions as described below.

- 3 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
4 direct mortality of greater sandhill crane if they were present in the Plan Area, because they
5 would be expected to avoid contact with construction and other equipment. Potential effects
6 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.
7 The potential for injury and direct mortality from electrical transmission facilities is discussed
8 below under Impact BIO-70.

9 The following paragraphs summarize the combined effects discussed above and describe other
10 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
11 included.

12 ***Near-Term Timeframe***

13 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
14 the near-term BDCP conservation strategy has been evaluated to determine whether it would
15 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
16 effects of construction would not be adverse under NEPA. Based on current design footprints, the
17 Plan would remove 411 acres roosting and foraging habitat (321 acres of permanent loss, 90 acres
18 of temporary loss) in the study area in the near-term. These effects would result from the
19 construction of the water conveyance facilities (CM1). In addition, 6,069 acres of foraging habitat
20 would be removed or converted in the near-term (CM1, 3,294 acres; *CM4 Tidal Natural Communities*
21 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural Communities*
22 *Enhancement and Management*—2,776 acres). Of these near-term acres of foraging habitat impact,
23 3,953 acres would be moderate- to very high-value habitat (CM1, 2,018 acres, CM4-11, 1,935 acres).

24 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
25 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in
26 Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1
27 protection of high- to very high-value foraging habitat for loss of moderate- to very high-value
28 foraging habitat. Using these ratios would indicate that 411 acres of greater roosting habitat should
29 be restored/created and 411 acres should be protected to compensate for the CM1 losses of greater
30 sandhill crane roosting and foraging habitat. In addition, 2,018 acres of high- to very high-value
31 foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane moderate-
32 to very high-value foraging habitat. The near-term effects of other conservation actions would
33 remove 1,927 acres of moderate- to very high-value foraging habitat, and therefore require 1,935
34 acres of protection of high- to very high-value foraging habitat using the same typical NEPA and
35 CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1
36 protection for the loss of foraging habitat).

37 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane
38 roost sites were directly impacted by CM1 covered activities (including transmission lines and their
39 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
40 result of water conveyance facility construction once the facilities were fully designed, which would
41 avoid the CM1 impact on 53 acres of roosting and foraging habitat once the project design is final.
42 Indirect effects of construction-related noise and visual disturbance are discussed below under
43 Impact BIO-71.

1 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
 2 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These
 3 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as
 4 the construction and early restoration losses. Up to 95 acres of roosting habitat would be created
 5 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
 6 active cornfields that are flooded following harvest to support roosting cranes and also provide the
 7 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
 8 locations throughout the Greater Sandhill Crane Winter Use Area, and would be in place prior to
 9 roosting habitat loss. Of the 500 acres of managed wetlands to be created for roosting habitat, 320
 10 acres would be created in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter
 11 Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3). Restoration sites would be identified with
 12 consideration of sea level rise and local seasonal flood events. These wetlands would be created
 13 within 2 miles of existing permanent roost sites and protected in association with other protected
 14 natural community types at a ratio of 2:1 upland to wetland habitat to provide buffers that will
 15 protect cranes from the types of disturbances that would otherwise result from adjacent roads and
 16 developed areas (e.g., roads, noise, visual disturbance, lighting). The remaining 180 acres of crane
 17 roosting habitat would be constructed within the Stone Lakes NWR project boundary (BDCP
 18 Chapter 3, Figure 3.3-6) and would be designed to provide connectivity between the Stone Lakes
 19 and Cosumnes greater sandhill crane populations (Objective GSHC1.4). The large patch sizes of
 20 these wetland complexes would provide additional conservation to address the threats of vineyard
 21 conversion, urbanization to the east, and sea level rise to the west of greater sandhill crane
 22 wintering habitat.

23 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
 24 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
 25 BIO-69a, *Compensate for the Loss of Medium- to Very High-Value Greater Sandhill Crane Foraging*
 26 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the
 27 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were
 28 compensated for with appropriate crop types and natural communities.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 33 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 34 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 35 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 36 of the Final EIR/EIS.

37 **Late Long-Term Timeframe**

38 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676
 39 acres of foraging habitat for greater sandhill crane. Alternative 1A as a whole would result in the
 40 permanent loss of and temporary effects on 462 acres of roosting and foraging habitat (2% of the
 41 total habitat in the study area) and 6,919 acres of foraging habitat (4% of the total habitat in the
 42 study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost by
 43 the late long-term timeframe would consist of 5,065 acres of medium- to very high-value foraging
 44 habitat. The locations of these losses are described above in the analyses of individual conservation
 45 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites

1 were directly affected by water conveyance facilities including transmission lines and associated
2 footprints. In addition, temporarily removed habitat would be restored within 1 year following
3 construction. However, it would not necessarily be restored to its original topography and it could
4 result in the conversion of cultivated lands to grasslands.

5 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
6 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
7 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
8 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
9 GSHC1.1).

10 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
11 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
12 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
13 and local seasonal flood events. These wetlands would be created within 2 miles of existing
14 permanent roost sites and protected in association with other protected natural community types at
15 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
16 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
17 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
18 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and
19 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
20 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
21 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. One
22 of the 90-acre wetland complexes created under this objective could be replaced by 180 acres of
23 cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting cranes and
24 provide highest-value foraging habitat, provided such substitution is consistent with the long-term
25 conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The large
26 patch sizes of these wetland complexes would provide additional conservation to address the
27 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
28 sandhill crane wintering habitat.

29 To compensate for near-term impacts on crane roosting and foraging habitat, 95 acres of roosting
30 habitat would be created within 2 miles of existing permanent roost sites (Objective GSHC1.5).
31 These roosts would consist of active cornfields that are flooded following harvest to support
32 roosting cranes and also provide the highest-value foraging habitat for the species. Individual fields
33 would be at least 40 acres could shift locations throughout the Greater Sandhill Crane Winter Use
34 Area, but would be sited with consideration of the location of roosting habitat loss and would be in
35 place prior to roosting habitat loss.

36 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
37 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
38 types in any given year (Objective GSHC1.1). To create additional high-value foraging habitat in the
39 study area, 10% of these acres of protected foraging habitat would result from the conversion of
40 low-value or nonhabitat areas to high- or very high-value habitat (Objective GSHC1.2). These acres
41 of protected foraging habitat would be located within 2 miles of known roosting sites in CZs 3, 4, 5,
42 and/or 6 and would consider sea level rise and local seasonal flood events, greater Sandhill crane
43 population levels, and the location of foraging habitat loss. The patch size of these protected lands
44 would be at least 160 acres (Objectives GSHC1.1 and GSHC1.2). Because agricultural habitat values
45 change over time based largely on economically driven agricultural practices, protecting crane

1 habitat would provide enhanced stability to agricultural habitat value within the crane use area that
2 does not currently exist.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
7 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
8 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
9 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
10 of the Final EIR/EIS.

11 Considering habitat protection, restoration, management, and enhancement would be guided by
12 performance standards, and the aforementioned AMMs, which would be in place throughout the
13 period of construction, greater sandhill crane habitat losses and conversions under Alternative 1A
14 would not be an adverse effect under NEPA.

15 **CEQA Conclusion:**

16 **Near-Term Timeframe**

17 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
18 the near-term BDCP conservation strategy has been evaluated to determine whether it would
19 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
20 effects of construction would be less than significant under CEQA. Based on current design
21 footprints, the Plan would remove 411 acres roosting and foraging habitat (321 acres of permanent
22 loss, 90 acres of temporary loss) in the study area in the near-term. These effects would result from
23 the construction of the water conveyance facilities (CM1). In addition, 6,069 acres of foraging habitat
24 would be removed or converted in the near-term (CM1, 3,294 acres; *CM4 Tidal Natural Communities*
25 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural Communities*
26 *Enhancement and Management*—2,776 acres). Of these near-term acres of foraging habitat impact,
27 3,953 acres would be moderate- to very high-value habitat (CM1, 2,018 acres, CM4-11, 1,935 acres).

28 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
29 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in
30 Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1
31 protection of high- to very high-value foraging habitat for loss of moderate- to very high-value
32 foraging habitat. Using these ratios would indicate that 411 acres of greater roosting habitat should
33 be restored/created and 411 acres should be protected to compensate for the CM1 losses of greater
34 sandhill crane roosting and foraging habitat. In addition, 2,018 acres of high- to very high-value
35 foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane moderate-
36 to very high-value foraging habitat. The near-term effects of other conservation actions would
37 remove 1,935 acres of moderate- to very high-value foraging habitat, and therefore require 1,935
38 acres of protection of high- to very high-value foraging habitat using the same typical NEPA and
39 CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1
40 protection for the loss of foraging habitat).

41 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane
42 roost sites were directly impacted by CM1 covered activities (including transmission lines and their
43 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a

1 result of water conveyance facility construction once the facilities were fully designed, which would
2 avoid the CM1 impact on 53 acres of roosting and foraging habitat once the project design is final.
3 Indirect effects of construction-related noise and visual disturbance are discussed below under
4 Impact BIO-71.

5 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
6 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These
7 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as
8 the construction and early restoration losses. Up to 95 acres of roosting habitat would be created
9 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
10 active cornfields that are flooded following harvest to support roosting cranes and also provide the
11 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
12 locations throughout the Greater Sandhill Crane Winter Use Area, and would be in place prior to
13 roosting habitat loss. Of the 500 acres of managed wetlands to be created for roosting habitat, 320
14 acres would be created in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter
15 Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3). Restoration sites would be identified with
16 consideration of sea level rise and local seasonal flood events. These wetlands would be created
17 within 2 miles of existing permanent roost sites and protected in association with other protected
18 natural community types at a ratio of 2:1 upland to wetland habitat to provide buffers that will
19 protect cranes from the types of disturbances that would otherwise result from adjacent roads and
20 developed areas (e.g., roads, noise, visual disturbance, lighting). The remaining 180 acres of crane
21 roosting habitat would be constructed within the Stone Lakes NWR project boundary (BDCP
22 Chapter 3, Figure 3.3-6) and would be designed to provide connectivity between the Stone Lakes
23 and Cosumnes greater sandhill crane populations (Objective GSHC1.4). The large patch sizes of
24 these wetland complexes would provide additional conservation to address the threats of vineyard
25 conversion, urbanization to the east, and sea level rise to the west of greater sandhill crane
26 wintering habitat.

27 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
28 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
29 BIO-69a would be available to guide the near-term protection of cultivated lands to ensure that the
30 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were
31 compensated for with appropriate crop types and natural communities.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
36 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
37 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
38 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
39 of the Final EIR/EIS.

40 **Late Long-Term Timeframe**

41 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676
42 acres of foraging habitat for greater sandhill crane. Alternative 1A as a whole would result in the
43 permanent loss of and temporary effects on 462 acres of roosting and foraging habitat (2% of the
44 total habitat in the study area) and 6,919 acres of foraging habitat (4% of the total habitat in the

1 study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost by
2 the late long-term timeframe would consist of 5,065 acres of medium- to very high-value foraging
3 habitat. The locations of these losses are described above in the analyses of individual conservation
4 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites
5 were directly affected by water conveyance facilities including transmission lines and associated
6 footprints. In addition, temporarily removed habitat would be restored within 1 year following
7 construction. However, it would not necessarily be restored to its original topography and it could
8 result in the conversion of cultivated lands to grasslands.

9 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
10 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
11 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
12 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
13 GSHC1.1).

14 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
15 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
16 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
17 and local seasonal flood events. These wetlands would be created within 2 miles of existing
18 permanent roost sites and protected in association with other protected natural community types at
19 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
20 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
21 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
22 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and
23 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
24 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
25 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. One
26 of the 90-acre wetland complexes created under this objective could be replaced by 180 acres of
27 cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting cranes and
28 provide highest-value foraging habitat, provided such substitution is consistent with the long-term
29 conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The large
30 patch sizes of these wetland complexes would provide additional conservation to address the
31 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
32 sandhill crane wintering habitat.

33 To compensate for near-term impacts on crane roosting and foraging habitat, 95 acres of roosting
34 habitat would be created within 2 miles of existing permanent roost sites (Objective GSHC1.5).
35 These roosts would consist of active cornfields that are flooded following harvest to support
36 roosting cranes and also provide the highest-value foraging habitat for the species. Individual fields
37 would be at least 40 acres could shift locations throughout the Greater Sandhill Crane Winter Use
38 Area, but would be sited with consideration of the location of roosting habitat loss and would be in
39 place prior to roosting habitat loss.

40 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
41 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
42 types in any given year (Objective GSHC1.1). To create additional high-value foraging habitat in the
43 study area, 10% of these acres of protected foraging habitat would result from the conversion of
44 low-value or nonhabitat areas to high- or very high-value habitat (Objective GSHC1.2). These acres
45 of protected foraging habitat would be located within 2 miles of known roosting sites in CZs 3, 4, 5,

1 and/or 6 and would consider sea level rise and local seasonal flood events, greater Sandhill crane
2 population levels, and the location of foraging habitat loss. The patch size of these protected lands
3 would be at least 160 acres (Objectives GSHC1.1 and GSHC1.2). Because agricultural habitat values
4 change over time based largely on economically driven agricultural practices, protecting crane
5 habitat would provide enhanced stability to agricultural habitat value within the crane use area that
6 does not currently exist.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
11 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
12 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
13 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
14 of the Final EIR/EIS.

15 In the absence of other conservation actions, the effects on greater sandhill crane habitat from
16 Alternative 1A would represent an adverse effect as a result of habitat modification of a special-
17 status species and potential for direct mortality. Considering Alternative 1A's protection and
18 restoration provisions, in addition to Mitigation Measure BIO-69a, which would compensate for the
19 loss of medium- to very high-value foraging habitat at a ratio of 1:1 prior to or concurrent with
20 impacts, loss of habitat and direct mortality through implementation of Alternative 1A would not
21 result in a substantial adverse effect through habitat modifications and would not substantially
22 reduce the number or restrict the range of the species. Therefore, Alternative 1A would have a less-
23 than-significant impact on greater sandhill crane.

24 **Mitigation Measure BIO-69a: Compensate for the loss of Medium to Very High-Value** 25 **Greater Sandhill Crane Foraging Habitat**

26 DWR will compensate for the loss of greater sandhill crane medium- to very high-value foraging
27 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan
28 Area. Compensation must occur prior to or concurrent within the impacts to minimize the
29 effects of habitat loss. The crop types and natural communities that are included in foraging
30 habitat value categories are listed in Table 12-1A-29. Foraging habitat conservation must occur
31 within the greater sandhill crane winter use area and the location of protected habitat or
32 conservation easements must be preapproved by USFWS and CDFW.

33 **Impact BIO-70: Effects on Greater Sandhill Crane Associated with Electrical Transmission** 34 **Facilities**

35 Greater sandhill cranes are susceptible to collision with power lines and other structures during
36 periods of inclement weather and low visibility (Avian Power Line Interaction Committee 1994,
37 Brown and Drewien 1995, Manville 2005). There are extensive existing transmission and
38 distribution lines in the sandhill crane winter use area. These include a network of distribution lines
39 that are between 11- and 22-kV. In addition, there are two 115-kV lines that cross the study area,
40 one that overlaps with the greater sandhill crane winter use area between Antioch and I-5 east of
41 Hood, and one that crosses the northern tip of the crane winter use area north of Clarksburg. There
42 are 69-kv lines within the study area that parallel Twin Cities Road, Herzog Road, Lambert Road,
43 and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes NWR. At the south end of the

1 winter use area, there are three 230-kV transmission lines that follow I-5, and then cut southwest
2 through Holt, and two 500-kV lines cross the southwestern corner of the winter use area. Because
3 lines cross over or surround sandhill crane roost sites in the study area, this existing network of
4 power lines in the study area currently poses a collision and electrocution risk for sandhill cranes.

5 Both permanent and temporary electrical transmission lines would be constructed to supply
6 construction and operational power to Alternative 1A facilities. The potential for birdstrikes could
7 also be exacerbated by construction-related effects, especially in low-visibility conditions. The
8 potential mortality of greater sandhill crane in the area of the proposed transmission lines under
9 Alternative 1A was estimated using collision mortality rates by Brown and Drewien (1995) and an
10 estimate of potential crossings along the proposed lines (methods are described in BDCP Appendix
11 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). This analysis
12 concluded that mortality risk could be substantially reduced by marking new transmission lines to
13 increase their visibility to sandhill cranes.

14 Typically, higher-voltage (230- kV) lines vary in height from 90 to 110 feet, while subtransmission
15 (69-kV) lines vary from 50 to 70 feet (Avian Power Line Interaction Committee 2006). The
16 Alternative 1A alignment would require the installation of approximately 52 miles of permanent
17 transmission line (43 miles of 230-kV lines and 9 miles of 69-kV lines) extending north and south
18 through much of the crane use area. The temporary transmission lines would total approximately 48
19 miles (25 miles of 69-kV line and 23 miles of 12-kV line). Temporary lines would be removed after
20 construction of the water conveyance facilities, within 10 years. Staten Island is one of the most
21 important wintering sites for greater sandhill cranes in the Delta, and the proposed permanent and
22 temporary transmission lines that would be constructed on Tyler Island and Staten Island would
23 have the potential to substantially affect greater sandhill cranes.

24 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
25 transmission line alignment, such as co-locating transmission lines when it would minimize effects
26 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. After the
27 Draft EIR/EIS was issued in December 2013, additional avoidance features were added to *AMM20*
28 *Greater Sandhill Crane*. *AMM20 Greater Sandhill Crane* requires that Alternative 1A meets the
29 performance standard of no mortality of greater sandhill crane associated with the new facilities.
30 This would be achieved by implementing one or any combination of the following: 1) siting new
31 transmission lines in lower bird strike risk zones; 2) removing, relocating or undergrounding
32 existing lines where feasible; 3) using natural gas generators in lieu of installing transmission lines
33 in high-risk zones of the greater sandhill crane winter use area; 4) undergrounding new lines in
34 high-risk zones of the greater sandhill crane winter use area; 5) permanently installing flight
35 diverters on existing lines over lengths equal to or greater than the length of the new transmission
36 lines in the crane winter use area; 6) for areas outside of the Stone Lakes NWR project boundary,
37 shifting locations of flooded areas that provide crane roosts to lower risk areas. These measures are
38 described in detail in *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental Commitments,*
39 *AMMs, and CMs*.

40 The implementation of the measures described above under *AMM20 Greater Sandhill Crane* would
41 substantially reduce the potential for crane collisions with transmission lines. Potential measures
42 that would eliminate this risk include using natural gas generators in lieu of transmission lines or
43 undergrounding new lines in high-risk zones in the greater sandhill crane winter use area. Marking
44 transmission lines with flight diverters that make the lines more visible to birds has been shown to
45 reduce the incidence of bird mortality, including for sandhill cranes (Brown and Drewien 1995). Yee

1 (2008) estimated that marking devices in the Central Valley could reduce avian mortality by 60%.
2 All new transmission lines would be fitted with flight diverters. The installation of flight diverters on
3 existing permanent lines would be prioritized in the highest risk zones for greater sandhill crane (as
4 described in BDCP Appendix 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*)
5 and diverters would be installed in a configuration that research indicates would reduce bird strike
6 risk by at least 60%. The length of existing line to be fitted with bird strike diverters would be equal
7 to the length of new transmission lines constructed for the project, in an area with the same or
8 higher greater sandhill crane strike risk to provide a net benefit to the species. For optimum results,
9 the recommended spacing distance for bird flight diverters is 15 to 16.5 feet (4.5 to 5 meters) (Avian
10 Power Line Interaction Committee 1994). Placing diverters on existing lines would be expected to
11 reduce existing mortality in the Plan Area and, therefore, result in a net benefit to the greater
12 sandhill crane population because these flight diverters would be maintained in perpetuity.

13 **NEPA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
14 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
15 current proposed transmission line alignment under Alternative 1A is not fully designed, and line
16 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the
17 final transmission line alignment avoided crane roost sites and achieve the performance standard of
18 no mortality of greater sandhill crane associated with the new facilities. *AMM30 Transmission Line*
19 *Design and Alignment Guidelines* would require design features for the transmission line alignment,
20 such as co-locating transmission lines when it would minimize effects on sandhill cranes, to avoid
21 impacts on sensitive habitats to the maximum extent feasible. All new transmission lines
22 constructed for the project would be fitted with bird diverters, which have been shown to reduce
23 avian mortality by 60%. By incorporating *AMM30 Transmission Line Design and Alignment Guidelines*
24 and one or a combination of the measures to greatly reduce the risk of bird strike described in
25 *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines under
26 Alternative 1A would not result in an adverse effect on greater sandhill crane.

27 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
28 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
29 current proposed transmission line alignment under Alternative 1A is not fully designed, and line
30 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the
31 final transmission line alignment avoided crane roost sites and achieve the performance standard of
32 no mortality of greater sandhill crane associated with the new facilities. *AMM30 Transmission Line*
33 *Design and Alignment Guidelines* would require design features for the transmission line alignment,
34 such as co-locating transmission lines when it would minimize effects on sandhill cranes, to avoid
35 impacts on sensitive habitats to the maximum extent feasible. All new transmission lines
36 constructed for the project would be fitted with bird diverters, which have been shown to reduce
37 avian mortality by 60%. By incorporating *AMM30 Transmission Line Design and Alignment Guidelines*
38 and one or a combination of the measures to greatly reduce the risk of bird strike described in
39 *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines under
40 Alternative 1A would have a less-than-significant impact on greater sandhill crane.

41 **Impact BIO-71: Indirect Effects of Plan Implementation on Greater Sandhill Crane**

42 **Indirect construction-and operation-related effects:** Sandhill cranes are sensitive to disturbance.
43 Noise and visual disturbances from the construction of water conveyance facilities and other
44 conservation measures could reduce greater sandhill crane use of modeled habitat adjacent to work
45 areas. Indirect effects associated with construction include noise, dust, and visual disturbance

1 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
 2 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the
 3 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise
 4 and visual disturbances that could affect greater sandhill crane use of surrounding habitat. These
 5 effects could result from periodic vehicle use along the conveyance corridor, inspection and
 6 maintenance of aboveground facilities, and similar activities. These potential effects would be
 7 minimized with implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3B,
 8 *Environmental Commitments, AMMs, and CMs*.

9 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would
 10 result from the construction of the Alternative 1A water conveyance facilities on greater sandhill
 11 crane (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
 12 *Conveyance Facility on Sandhill Crane*). The analysis addressed the potential noise effects on cranes,
 13 and concluded that as much as 6,508-18,284 acres of crane habitat could potentially be affected by
 14 general construction noise above baseline level (50–60 dBA). This would include 107–814 acres of
 15 permanent crane roosting habitat, 761–2,063 acres of temporary crane roosting habitat, and 5,640–
 16 15,407 acres of crane foraging habitat. In addition, 86–730 acres of permanent crane roosting
 17 habitat, 252–1,118 acres of temporary crane roosting habitat, and 778–4,957 acres of crane foraging
 18 habitat could be affected by noise from pile driving that would be above baseline level (50–60dBA,
 19 Table 12-1A-30). The analysis was conducted based on the assumption that there would be direct
 20 line-of-sight from sandhill crane habitat areas to the construction site, and, therefore, provides a
 21 worst-case estimate of effects. In many areas the existing levees would partially or completely block
 22 the line-of-sight and would function as effective noise barriers, substantially reducing noise
 23 transmission. However, there is insufficient data to assess the effects that increased noise levels
 24 would have on sandhill crane behavior.

25 **Table 12-1A-30. Greater Sandhill Crane Habitat Affected By General Construction and Pile Driving**
 26 **Noise Under Alternative 1A (acres)**

Habitat Type	General Construction		Pile Driving	
	Above 60 dBA	Above 50 dBA	Above 60 dBA	Above 50 dBA
Permanent Roosting	107	814	86	730
Temporary Roosting	761	2,063	252	1,118
Foraging	5,640	15,407	778	4,957
Total Habitat	6,508	18,284	1,116	6,805

dBA = A-weighted decibel

27
 28 Evening and nighttime construction activities would require the use of extremely bright lights.
 29 Nighttime construction could also result in headlights flashing into roost sites when construction
 30 vehicles are turning onto or off of construction access routes. Proposed surge towers would require
 31 the use of safety lights that would alert low-flying aircraft to the presence of these structures
 32 because of their height. Little data is available on the effects of impact of artificial lighting on
 33 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes
 34 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP
 35 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to
 36 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting

1 include a reduction in the cranes' quality of nocturnal rest, and effects on their sense of photo-period
2 which might cause them to shift their physiology towards earlier migration and breeding (BDCP
3 Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes' overall
4 fitness and reproductive success (which could in turn have population-level impacts). A change in
5 photo-period interpretation could also cause cranes to fly out earlier from roost sites to forage and
6 might increase their risk of power line collisions if they were to leave roosts before dawn (BDCP
7 Chapter 5, *Effects Analysis*).

8 The effects of noise and visual disturbance on greater sandhill crane would be minimized through
9 the implementation of *AMM20 Greater Sandhill Crane* (Appendix 3B, *Environmental Commitments*,
10 *AMMs*, and *CMs*). Activities within 0.75 mile of crane roosting habitat would reduce construction
11 noise during night time hours (from one hour before sunset to one hour after sunrise) such that
12 construction noise levels do not exceed 50 dBA L_{eq} (1 hour) at the nearest temporary or permanent
13 roosts during periods when the roost sites are available (flooded). In addition, the area of crane
14 foraging habitat that would be affected during the day (from one hour after sunrise to one hour
15 before sunset) by construction noise exceeding 50 dBA L_{eq} (1 hour) would also be minimized.
16 Unavoidable noise related effects would be compensated for by the enhancement of 0.1 acre of
17 foraging habitat for every acre indirectly affected within the 50 dBA L_{eq} (1 hour) construction noise
18 contour. With these measures in place, indirect effects of noise and visual disturbance from
19 construction activities are not expected to reduce the greater sandhill crane population in the study
20 area.

21 The use of mechanical equipment during water conveyance facilities construction could cause the
22 accidental release of petroleum or other contaminants that could affect greater sandhill crane in the
23 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to greater
24 sandhill crane habitat could also affect the species. AMM1–AMM7, including *AMM2 Construction Best*
25 *Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that
26 measures were in place to prevent runoff from the construction area and negative effects of dust on
27 foraging habitat.

28 **Methylmercury Exposure:**

29 Largemouth bass was used as a surrogate species for analysis (Appendix 11F, *Substantive BDCP*
30 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
31 species would overestimate the effects on greater sandhill crane. Organisms feeding within pelagic-
32 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
33 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
34 segregation (Grimaldo et al. 2009). Therefore, potential indirect effects of increased mercury
35 exposure is likely low for greater sandhill cranes because they primarily forage on cultivated crops.
36 Modeled effects of mercury concentrations from changes in water operations under CM1 on
37 largemouth bass did not differ substantially from existing conditions; therefore, results also indicate
38 that greater sandhill crane tissue concentrations would not measurably increase as a result of CM1
39 implementation.

40 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
41 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
42 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
43 mercury. Increased methylmercury associated with natural community and floodplain restoration
44 may indirectly affect greater sandhill crane via uptake in lower trophic levels (see BDCP Appendix

1 5.D, *Contaminants*). Mercury is generally elevated throughout the Delta, and restoration of the lower
2 potential areas in total may result in generalized, very low level increases of mercury. Given that
3 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in
4 some level of effects.

5 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
6 into the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific
7 evaluation for each restoration project. If a project is identified where there is a high potential for
8 methylmercury production that could not be fully addressed through restoration design and
9 adaptive management, alternate restoration areas would be considered. CM12 would be
10 implemented in coordination with other similar efforts to address mercury in the Delta, and
11 specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
12 would include the following actions.

- 13 • Assess pre-restoration conditions to determine the risk that the project could result in increased
14 mercury methylation and bioavailability
- 15 • Define design elements that minimize conditions conducive to generation of methylmercury in
16 restored areas.
- 17 • Define adaptive management strategies that can be implemented to monitor and minimize
18 actual postrestoration creation and mobilization of methylmercury.

19 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
20 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
21 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
22 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
23 2009). The effect of selenium toxicity differs widely between species and also between age and sex
24 classes within a species. In addition, the effect of selenium on a species can be confounded by
25 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
26 2009).

27 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
28 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
29 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
30 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
31 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
32 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
33 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
34 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
35 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
36 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
37 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
38 levels of selenium have a higher risk of selenium toxicity.

39 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
40 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
41 exacerbate bioaccumulation of selenium in avian species, including greater sandhill crane. Marsh
42 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
43 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
44 BDCP restoration activities that create newly inundated areas could increase bioavailability of

1 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
2 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
3 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
4 long-term increases in selenium concentrations in water in the Delta under any alternative.
5 However, it is difficult to determine whether the effects of potential increases in selenium
6 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to
7 adverse effects on greater sandhill crane.

8 Because of the uncertainty that exists at this programmatic level of review, there could be a
9 substantial effect on greater sandhill crane from increases in selenium associated with restoration
10 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
11 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
12 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
13 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
14 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
15 separately for each restoration effort as part of design and implementation. This avoidance and
16 minimization measure would be implemented as part of the tidal habitat restoration design
17 schedule.

18 **NEPA Effects:** Crane habitat could potentially be affected by general construction noise above
19 baseline level (50–60 dBA). Construction in certain areas would take place 7 days a week and 24
20 hours a day, and evening and nighttime construction activities would require the use of extremely
21 bright lights, which could adversely affect roosting cranes by impacting their sense of photo-period
22 and by exposing them to predators. Effects of noise and visual disturbance could substantially alter
23 the suitability of habitat for greater sandhill crane. *AMM20 Greater Sandhill Crane* would include
24 requirements (described above) to minimize the effects of noise and visual disturbance on greater
25 sandhill cranes and to mitigate for affected habitat.

26 Tidal habitat restoration could result in increased exposure of greater sandhill crane to selenium,
27 which could result in the potential mortality of a special-status species. This effect would be
28 addressed through the implementation of *AMM27 Selenium Management*, which would provide
29 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
30 selenium and its bioavailability in tidal habitats.

31 The implementation of tidal natural communities restoration or floodplain restoration could result
32 in increased exposure of greater sandhill crane to methylmercury. The potential indirect effects of
33 increased mercury exposure is likely low for greater sandhill cranes because they primarily forage
34 on cultivated crops. Implementation of CM12 which contains measures to assess the amount of
35 mercury before project development, followed by appropriate design and adaptation management,
36 would minimize the potential for increased methylmercury exposure, and would result in no
37 adverse effect on the species.

38 **CEQA Conclusion:** Crane habitat could be affected by general construction noise and pile driving
39 above baseline level (50–60 dBA). Construction in certain areas would take place 7 days a week and
40 24 hours a day and evening and nighttime construction activities would require the use of extremely
41 bright lights, which could adversely affect roosting cranes by impacting their sense of photo-period
42 and by exposing them to predators. Effects of noise and visual disturbance could substantially alter
43 the suitability of habitat for greater sandhill crane. This would be a significant impact. *AMM20*

1 *Greater Sandhill Crane* would include requirements (described above) to minimize the effects of
2 noise and visual disturbance on greater sandhill cranes and to mitigate impacts on affected habitat.

3 Tidal habitat restoration could result in increased exposure of greater sandhill crane to selenium.
4 which could result in the potential mortality of a special-status species. This would be a significant
5 impact. This effect would be addressed through the implementation of *AMM27 Selenium*
6 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
7 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

8 Methylmercury tissue concentrations in greater sandhill cranes would not be expected to
9 measurably increase as a result of water operations under CM1 compared with the No Action
10 Alternative. The implementation of tidal natural communities restoration or floodplain restoration
11 could result in increased exposure of greater sandhill crane to methylmercury. This would be a
12 significant impact. The potential indirect effects of increased mercury exposure is likely low for
13 greater sandhill cranes because they primarily forage on cultivated crops. Implementation of CM12,
14 which contains measures to assess the amount of mercury before project development, followed by
15 appropriate design and adaptation management, would minimize the potential for increased
16 methylmercury exposure, and would result in no adverse effect on the species.

17 With AMM1–AMM7, AMM20, AMM27, and CM12 in place, the indirect effects of plan implementation
18 under Alternative 1A would not substantially reduce the number or restrict the range of greater
19 sandhill cranes. Therefore, the indirect effects of Alternative 1A implementation would have a less-
20 than-significant impact on greater sandhill crane.

21 **Lesser Sandhill Crane**

22 This section describes the effects of Alternative 1A, including water conveyance facilities
23 construction and implementation of other conservation components, on lesser sandhill crane. Lesser
24 sandhill cranes in the study area are almost entirely dependent on privately owned agricultural
25 lands for foraging. Long-term sustainability of the lesser sandhill crane is thus dependent on
26 providing a matrix of compatible crop types that afford suitable foraging habitat and maintaining
27 compatible agricultural practices, while sustaining and increasing the extent of other essential
28 habitat elements such as night roosting habitat. The habitat model for lesser sandhill crane includes
29 “roosting and foraging” and “foraging” habitat. These habitat types include suitable foraging and
30 roosting habitat in the study area as certain agricultural types, specific grassland types, irrigated
31 pastures and hay crops, managed seasonal wetland, and other natural seasonal wetland. Roosting
32 and foraging habitat includes traditional roost sites that are known to be used by sandhill cranes
33 (both greater and lesser) and also provide foraging habitat. Detail regarding the roosting and
34 foraging modeled habitat for both subspecies of sandhill crane is included in the BDCP (BDCP
35 Appendix 2.A *Covered Species Accounts*). Both temporary and permanent roost sites were identified
36 for sandhill cranes. Permanent roosting and foraging sites are those used regularly, year after year,
37 while temporary roosting and foraging sites are those used in some years. Factors included in
38 assessing the loss of foraging habitat for the lesser sandhill crane considers the relative habitat value
39 of specific crop or land cover types. Although both the greater and the lesser Sandhill crane use
40 similar crop or land cover types, these provide different values of foraging habitat for the two
41 subspecies based on proportional use of these habitats. Lesser sandhill cranes are less traditional
42 than greater sandhill cranes and are more likely to move between different roost site complexes and
43 different wintering regions (Ivey pers. comm.) The wintering range is ten times larger than the
44 greater sandhill crane and their average foraging flight radius from roost sites is twice that of

1 greater sandhill cranes. Because of this higher mobility, lesser sandhill cranes are more flexible in
2 their use of foraging areas than the greater sandhill crane.

3 Construction and restoration associated with Alternative 1A conservation measures would result in
4 both temporary and permanent losses of foraging and roosting habitat for lesser sandhill crane as
5 indicated in Table 12-1A-31. Full implementation of Alternative 1A would include the following
6 conservation actions over the term of the BDCP for the greater sandhill crane (BDCP Chapter 3,
7 Section 3.3, *Biological Goals and Objectives*) that would also benefit the lesser sandhill crane.

- 8 • Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at
9 least 80% maintained in very high-value types in any given year. This protected habitat will be
10 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
11 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
12 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective
13 GSHC1.1, associated with CM3).
- 14 • To create additional high-value greater sandhill crane winter foraging habitat, 10% of the
15 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or
16 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be
17 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
18 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
19 habitat loss (Objective GSHC1.2, associated with CM3).
- 20 • Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the
21 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise
22 and local seasonal flood events. The wetlands will be located within 2 miles of existing
23 permanent roost sites and protected in association with other protected natural community
24 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide
25 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 26 • Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge
27 project boundary. The complexes will be no more than 2 miles apart and will help provide
28 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each
29 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane
30 roosting habitat, and will be protected in association with other protected natural community
31 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,
32 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be
33 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
34 support roosting cranes and provide highest-value foraging habitat, provided such substitution
35 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for
36 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
- 37 • Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost
38 sites. The habitat will consist of active cornfields that are flooded following harvest to support
39 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least
40 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will
41 be sited with consideration of the location of roosting habitat loss and will be in place prior to
42 roosting habitat loss (Objective GSHC1.5, associated with CM3).
- 43 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
44 other native wildlife species (Objective CLNC1.1, associated with CM3).

- 1 • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
- 2 cultivated lands as Swainson’s hawk foraging habitat with at least 50% in very high-value
- 3 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 4 • Target cultivated land conservation to provide connectivity between other conservation lands
- 5 (Objective CLNC1.2, associated with CM3).
- 6 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
- 7 lands that occur in cultivated lands within the reserve system, including, water conveyance
- 8 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

9 As explained below, with the restoration and protection of these amounts of habitat, in addition to
 10 natural community enhancement and management commitments (including CM12 *Methylmercury*
 11 *Management*) and implementation of AMM1–AMM7, *AMM20 Greater Sandhill Crane*, *AMM27*
 12 *Selenium Management*, and *AMM30 Transmission Line Design and Alignment Guidelines*, impacts on
 13 the lesser sandhill crane would be less than significant for CEQA purposes.

14 **Table 12-1A-31. Changes in Lesser Sandhill Crane Modeled Habitat Associated with Alternative 1A**
 15 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Roosting and Foraging - Permanent	2	2	1	1	NA	NA
	Roosting and Foraging - Temporary	319	319	89	89	NA	NA
	Foraging	2,225	2,225	1,069	1,069	NA	NA
Total Impacts CM1		2,546	2,546	1,159	1,159		
CM2–CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	3,610	12,131	2	4	0	0
Total Impacts CM2–CM18		3,610	12,172	2	4	0	0
Total Roosting and Foraging - Permanent		2	2	1	1	0	0
Total Roosting and Foraging - Temporary		319	360	89	89		
Total Foraging		5,835	14,356	1,071	1,073		
TOTAL IMPACTS		6,156	14,718	1,161	1,163	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-72: Loss or Conversion of Habitat for and Direct Mortality of Lesser Sandhill**
2 **Crane**

3 Alternative 1A conservation measures would result in the combined permanent and temporary loss
4 of up to 452 acres of modeled roosting and foraging habitat (362 acres of permanent loss and 90
5 acres of temporary loss) and 15,426 acres of foraging habitat (14,356 acres of permanent loss and
6 1,073 acres of temporary loss) for lesser sandhill crane (Table 12-1A-31). Conservation measures
7 that would result in these losses are conveyance facilities and transmission line construction, and
8 establishment and use of borrow and spoil areas (CM1), Yolo Bypass Fisheries Improvements
9 (CM2), Tidal Natural Communities Restoration (CM4), Grassland Natural Community Restoration
10 (CM8), Nontidal Marsh Natural Community Restoration (CM10), and Natural Communities
11 Enhancement and Management (CM11). The majority of habitat loss would result from water
12 conveyance facility construction and conversion of habitat to tidal natural communities through
13 CM4. Habitat enhancement and management activities through CM11, which include ground
14 disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. In
15 addition, maintenance activities associated with the long-term operation of the water conveyance
16 facilities and other BDCP physical facilities could degrade or eliminate lesser sandhill crane modeled
17 habitat. Each of these individual activities is described below. A summary statement of the combined
18 impacts, NEPA effects and a CEQA conclusion follow the individual conservation measure
19 discussions.

- 20 • *CM1 Water Facilities and Operation:* Construction of Alternative 1A conveyance facilities as they
21 are currently designed would result in the combined permanent and temporary loss of up to
22 2,964 acres of modeled lesser sandhill crane habitat. This would consist of the permanent
23 removal of 2 acres of permanent roosting and foraging habitat, 319 acres of temporary roosting
24 and foraging habitat, and 2,225 acres of foraging habitat. Foraging habitat that would be
25 permanently impacted by CM1 would consist of 1,320 acres of very high-value, 51 acres of high-
26 value, and 384 acres of medium-value foraging habitat (Table 12-1A-32). In addition, 1 acre of
27 permanent roosting and foraging habitat, 89 acres of temporary roosting and foraging habitat,
28 and 1,069 acres of foraging habitat would be temporarily removed (Table 12-1A-31). The
29 temporarily removed habitat would consist primarily of cultivated lands and it would be
30 restored within 1 year following construction. However, it would not necessarily be restored to
31 its original topography and it could be restored as grasslands in the place of cultivated lands.
32 CM1 activities that would result in temporary impacts would include temporary access roads,
33 borrow and spoil sites, and work areas for construction.

34 The permanent roosting and foraging habitat that would be permanently removed is located on
35 the south end of Staten Island and the loss would be from the installation of a permanent
36 transmission line. The temporary roost site on Tyler Island would be permanently impacted by a
37 RTM storage area, a tunnel shaft, and a permanent transmission line and temporarily impacted
38 by a concrete batch plant, fuel station, temporary work area, and temporary transmission line.
39 Staten Island is among the most significant crane use areas in the Delta (Littlefield and Ivey
40 2000) and construction on or adjacent to Staten Island would be adverse in the absence of other
41 conservation measures. Temporary roosts on Bouldin Island, Venice Island, and Bacon Island
42 would also be impacted by the proposed footprint for temporary and permanent transmission
43 lines.

44 Approximately 288 acres of the Tyler Island temporary roost site in addition to 406 acres of the
45 permanent loss of foraging habitat would result from the storage of reusable tunnel material.
46 This material would likely be moved to other sites for use in levee build-up and restoration, and

1 the affected area would likely eventually be restored. While this effect is categorized as
2 permanent because there is no assurance that the material would eventually be moved, the
3 effect would likely be temporary. The actual footprint of the storage areas required for reusable
4 tunnel material is flexible, and the actual acreage of habitat affected by this activity could be
5 reduced based on the height of the storage piles in addition to other considerations. The
6 implementation of *AMM6 Disposal and Reuse of Spoils* would require that the areas used for
7 reusable tunnel material storage be minimized in crane foraging habitat and completely avoid
8 crane roost sites.

9 The implementation of *AMM20 Greater Sandhill Crane* would require that all CM1 activities be
10 designed to avoid direct loss of crane roost sites. Avoidance of crane roost sites would be
11 accomplished either by siting activities outside of identified roost sites or by relocating the roost
12 site if it consisted of cultivated lands (roost sites consisting of wetlands would not be subject to
13 re-location). Relocated roost sites would be established prior to construction activities affecting
14 the original roost site (as described in *AMM20 Greater Sandhill Crane* in Appendix 3B,
15 *Environmental Commitments, AMMs, and CMs*). Therefore there would be no loss of crane
16 roosting and foraging habitat as a result of water conveyance facility construction once the
17 facilities were fully designed. The potential for injury and direct mortality from electrical
18 transmission facilities is addressed below under Impact BIO-73. The transmission line
19 alignment under Alternative 1A is not fully designed and the final transmission line design
20 would be determined in coordination with USFWS, CDFW, and a qualified crane biologist to
21 achieve a performance standard of no net increase in bird strike hazard to greater sandhill
22 cranes in the Plan Area (*AMM20 Greater Sandhill Crane*). This performance standard would
23 similarly protect lesser sandhill cranes from transmission line impacts.

24 Other CM1 impacts on lesser sandhill crane foraging habitat would occur from construction of
25 Intakes 1-5, associated work areas and potential borrow and spoil sites, tunnel shafts, and
26 tunnel work areas, barge unloading facilities, transmission line footprints, and concrete batch
27 plants. Approximately 910 acres of the permanent impact on foraging habitat would occur from
28 the construction of the intermediate forebay west of the Stone Lakes National Wildlife Refuge.
29 The intermediate forebay would be located within 500 feet of traditional sandhill crane roosting
30 and foraging habitat, which could cause cranes to abandon these roost sites. The indirect effects
31 of noise and visual disturbance from construction and operation of CM1 water conveyance
32 facilities is discussed under Impact BIO-74. Refer to the Terrestrial Biology Map Book for a
33 detailed view of Alternative 1A construction locations. Impacts from CM1 would occur within
34 the first 10 years of Plan implementation.

1 **Table 12-1A-32. Total Amount of Lesser Sandhill Crane Foraging Habitat Affected by Habitat Value**

Foraging Habitat Value Class	Land Cover Type	CM1 Permanent (Temporary)	CM2-CM18 Permanent (Temporary)
Very high	Corn, alfalfa and alfalfa mixtures	1,320 (348)	4,083 (0)
High	Mixed pasture, native pasture, other pasture, irrigated pasture, native vegetation, rice	51 (146)	2,058 (0)
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, non-irrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, wheat, other grain crops, managed wetlands	384 (354)	2,220 (2)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	456 (196)	3,745 (2)
None	Vineyards, orchards	14 (26)	23 (0)

2

3 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction under CM2 would result in a permanent
4 loss of 267 acres and a temporary loss of 2 acres of lesser sandhill crane foraging habitat in CZ 2.
5 Lesser sandhill crane use in this area is less common than in the central Delta. Construction
6 impacts from CM2 would occur within the first 10 years of Plan implementation.

7 • *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration
8 footprint, this activity would result in the permanent loss or conversion of approximately
9 10,248 acres of lesser sandhill crane habitat, consisting of 41 acres of temporary roosting and
10 foraging habitat and 10,207 acres of foraging habitat. Loss of foraging habitat from CM4 would
11 consist of 3,642 acres of very high-value, 1,529 acres of high-value, 2,040 acres of medium-
12 value, and 2,983 acres of low-value foraging habitat (Table 12-1A-32). Habitat loss would
13 primarily occur in the Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland
14 restoration in CZ 4 could occur between the high crane use areas of the central Delta and the
15 Cosumnes River Preserve. However, the conversion of grasslands and cultivated lands to tidal
16 wetlands would not prohibit crane movement or reduce use of these areas. Lesser sandhill
17 cranes are less traditional than greater sandhill cranes and would be more adaptable to changes
18 in land use. Approximately 2,516 acres of foraging habitat would be removed within the first 10
19 years of Plan implementation.

20 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees would result in
21 the loss of 2 acres of low-value lesser sandhill crane foraging habitat (1 acre of permanent loss, 1
22 acres of temporary loss). This impact would occur after the first 10 years of Plan
23 implementation.

- 1 ● *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands
2 (foraging habitat) would be converted to grassland. No roosting/foraging habitat would be
3 impacted by grassland restoration activities. The restored grasslands would continue to provide
4 foraging habitat value for the lesser sandhill crane. Approximately 257 acres would be impacted
5 within the first 10 years of plan implementation.
- 6 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent
7 conversion of approximately 1,350 acres of modeled foraging habitat for the lesser sandhill
8 crane. A portion of the restored nontidal marsh would be expected to continue to provide
9 roosting and foraging habitat value for the lesser sandhill crane. However, some of this restored
10 marsh would be unsuitable as it would lack emergent vegetation and consist of open water that
11 would be too deep to provide suitable roosting or foraging habitat. Approximately 567 acres of
12 habitat would be converted to nontidal marsh within the first 10 years of Plan implementation.
- 13 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
14 actions included in *CM11* that are designed to enhance wildlife values in restored or protected
15 habitats could result in localized ground disturbances that could temporarily remove small
16 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
17 vegetation and road and other infrastructure maintenance activities, would be expected to have
18 minor adverse effects on available habitat and would be expected to result in overall
19 improvements to and maintenance of habitat values over the term of the BDCP. The potential for
20 these activities to result in direct mortality of lesser sandhill crane would be minimized with the
21 implementation of *AMM20 Greater Sandhill Crane*. *CM11* would also include the construction of
22 recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP
23 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead
24 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
25 disturbed areas when and where possible. If new ground disturbance was necessary, sandhill
26 crane habitat would be avoided, with the exception of a permanent loss of 4 acres of grassland
27 foraging habitat (1 acre of which would be impacted within the first 10 years of plan
28 implementation).
- 29 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
30 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
31 disturbances that could affect lesser sandhill crane use of the surrounding habitat. Maintenance
32 activities would include vegetation management, levee and structure repair, and re-grading of
33 roads and permanent work areas. These effects, could be adverse as sandhill cranes are
34 sensitive to disturbance. However, potential impacts would be reduced by AMMs, and
35 conservation actions as described below.
- 36 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
37 direct mortality of lesser sandhill crane if they were present in the study area, because they
38 would be expected to avoid contact with construction and other equipment. Potential effects
39 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.
40 Injury and mortality from electrical transmission facilities are described below under Impact
41 BIO-73.

42 The following paragraphs summarize the combined effects discussed above and describe other
43 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
44 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
5 effects of construction would not be adverse under NEPA. Based on current design footprints, the
6 Plan would remove 411 acres roosting and foraging habitat (321 acres of permanent loss, 90 acres
7 of temporary loss) in the study area in the near-term. These effects would result from the
8 construction of the water conveyance facilities (CM1). In addition, 6,906 acres of foraging habitat
9 would be removed or converted in the near-term (CM1, 3,294 acres; *CM2 Yolo Bypass Fisheries*
10 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*
11 *Restoration*, and *CM11 Natural Communities Enhancement and Management*—3,612 acres). Of these
12 near-term acres of foraging habitat impacted, 5,109 acres would be medium- to very high-value
13 habitat (CM1, 2,602 acres, CM2-11, 2,507 acres).

14 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
15 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging
16 habitat. Using these ratios would indicate that 411 acres of lesser sandhill crane roosting habitat
17 should be restored/created and 411 acres should be protected to compensate for the CM1 losses of
18 lesser sandhill crane roosting and foraging habitat. In addition, 2,602 acres of high- to very high-
19 value foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane
20 medium- to very high-value foraging habitat. The near-term effects of other conservation actions
21 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require
22 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA
23 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1
24 protection for the loss of foraging habitat).

25 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost
26 sites were directly impacted by CM1 covered activities (including transmission lines and their
27 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
28 result of water conveyance facility construction once the facilities were fully designed, which would
29 avoid the CM1 impact on 411 acres of roosting and foraging habitat once the project design is final.
30 Indirect effects of construction-related noise and visual disturbance are discussed below under
31 Impact BIO-74.

32 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
33 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These
34 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as
35 the construction and early restoration losses.

36 The BDCP also includes the following objectives for the greater sandhill crane which would also
37 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
38 winter use areas.

39 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
40 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
41 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
42 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
43 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting
44 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed

1 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of
 2 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).
 3 Restoration sites would be identified with consideration of sea level rise and local seasonal flood
 4 events. These wetlands would be created within 2 miles of existing permanent roost sites and
 5 protected in association with other protected natural community types at a ratio of 2:1 upland to
 6 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would
 7 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,
 8 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone
 9 Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be designed to provide
 10 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Objective
 11 GSHC1.4). The large patch sizes of these wetland complexes would provide additional conservation
 12 to address the threats of vineyard conversion, urbanization to the east, and sea level rise to the west
 13 of greater sandhill crane wintering habitat.

14 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
 15 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
 16 *BIO-72, Compensate for the Loss of Medium- to Very High-Value Lesser Sandhill Crane Foraging*
 17 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the
 18 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were
 19 compensated for with appropriate crop types and natural communities.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 24 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 25 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 26 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 27 of the Final EIR/EIS.

28 ***Late Long-Term Timeframe***

29 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475
 30 acres of foraging habitat for lesser sandhill crane. Alternative 1A as a whole would result in the
 31 permanent loss of and temporary effects on 452 acres of roosting and foraging habitat (2% of the
 32 total habitat in the study area) and 15,426 acres of foraging habitat (6% of the total habitat in the
 33 study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by the
 34 late long-term timeframe would consist of 10,965 acres of medium- to very high-value foraging
 35 habitat. The locations of these losses are described above in the analyses of individual conservation
 36 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites
 37 were directly affected by water conveyance facilities including transmission lines and associated
 38 footprints. In addition, temporarily removed habitat would be restored within 1 year following
 39 construction. However, it would not necessarily be restored to its original topography and it could
 40 result in the conversion of cultivated lands to grasslands.

41 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 42 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
 43 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
 44 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective

1 GSHC1.1). These croptypes would also provide high- to very high-value habitat for the lesser
2 sandhill crane.

3 The BDCP also includes the following objectives for the greater sandhill crane which would also
4 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
5 winter use areas.

6 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
7 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
8 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
9 and local seasonal flood events. These wetlands would be created within 2 miles of existing
10 permanent roost sites and protected in association with other protected natural community types at
11 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
12 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
13 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
14 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and
15 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
16 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
17 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The
18 large patch sizes of these wetland complexes would provide additional conservation to address the
19 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
20 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
21 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
22 active cornfields that are flooded following harvest to support roosting cranes and also provide the
23 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
24 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with
25 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat
26 loss.

27 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
28 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
29 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
30 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
31 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
32 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives
33 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
34 economically driven agricultural practices, protecting crane habitat would provide enhanced
35 stability to agricultural habitat value within the crane use area that does not currently exist.
36 Although lesser sandhill cranes are less traditional in their use of roost sites in the Delta, these
37 objectives for the greater sandhill crane would also benefit the lesser sandhill crane.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
41 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
42 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
43 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
44 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
45 of the Final EIR/EIS.

1 **NEPA Effects:** The loss of lesser sandhill crane habitat and potential for direct mortality of this
2 special status species under Alternative 1A would represent an adverse effect in the absence of
3 other conservation actions. However, with habitat protection and restoration associated with *CM3*
4 *Natural Communities Protection and Restoration* and *CM10 Nontidal Marsh Restoration*, guided by
5 biological goals and objectives for the species and by *AMM1–AMM7*, *AMM20 Greater Sandhill Crane*,
6 which would be in place during all project activities, and Mitigation Measure BIO-72, which would
7 be available to compensate for loss of medium- to very high-value foraging habitat, the effects of
8 habitat loss and potential mortality on lesser sandhill crane would not be adverse under NEPA.

9 **CEQA Conclusion:**

10 **Near-Term Timeframe**

11 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
12 the near-term BDCP conservation strategy has been evaluated to determine whether it would
13 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
14 effects of construction would be less than significant under CEQA. Based on current design
15 footprints, the Plan would remove 411 acres roosting and foraging habitat (321 acres of permanent
16 loss, 90 acres of temporary loss) in the study area in the near-term. These effects would result from
17 the construction of the water conveyance facilities (CM1). In addition, 6,906 acres of foraging habitat
18 would be removed or converted in the near-term (CM1, 3,294 acres; *CM2 Yolo Bypass Fisheries*
19 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*
20 *Restoration*, and *CM11 Natural Communities Enhancement and Management—3,612 acres*). Of these
21 near-term acres of foraging habitat impacted, 5,109 acres would be medium- to very high-value
22 habitat (CM1, 2,602 acres, CM2-11, 2,507 acres).

23 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
24 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging
25 habitat. Using these ratios would indicate that 411 acres of lesser sandhill crane roosting habitat
26 should be restored/created and 411 acres should be protected to compensate for the CM1 losses of
27 lesser sandhill crane roosting and foraging habitat. In addition, 2,602 acres of high- to very high-
28 value foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane
29 medium- to very high-value foraging habitat. The near-term effects of other conservation actions
30 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require
31 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA
32 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1
33 protection for the loss of foraging habitat).

34 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost
35 sites were directly impacted by CM1 covered activities (including transmission lines and their
36 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
37 result of water conveyance facility construction once the facilities were fully designed, which would
38 avoid the CM1 impact on 411 acres of roosting and foraging habitat once the project design is final.
39 Indirect effects of construction-related noise and visual disturbance are discussed below under
40 Impact BIO-74.

41 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
42 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These
43 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as
44 the construction and early restoration losses.

1 The BDCP also includes the following objectives for the greater sandhill crane which would also
2 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
3 winter use areas.

4 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
5 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
6 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
7 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
8 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting
9 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed
10 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of
11 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).
12 Restoration sites would be identified with consideration of sea level rise and local seasonal flood
13 events. These wetlands would be created within 2 miles of existing permanent roost sites and
14 protected in association with other protected natural community types at a ratio of 2:1 upland to
15 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would
16 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,
17 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone
18 Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be designed to provide
19 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Objective
20 GSHC1.4). The large patch sizes of these wetland complexes would provide additional conservation
21 to address the threats of vineyard conversion, urbanization to the east, and sea level rise to the west
22 of greater sandhill crane wintering habitat.

23 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
24 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
25 BIO-72 would be available to guide the near-term protection of cultivated lands to ensure that the
26 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were
27 compensated for with appropriate crop types and natural communities.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
32 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
33 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
34 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
35 of the Final EIR/EIS.

36 ***Late Long-Term Timeframe***

37 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475
38 acres of foraging habitat for lesser sandhill crane. Alternative 1A as a whole would result in the
39 permanent loss of and temporary effects on 452 acres of roosting and foraging habitat (2% of the
40 total habitat in the study area) and 15,426 acres of foraging habitat (6% of the total habitat in the
41 study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by the
42 late long-term timeframe would consist of 10,965 acres of medium- to very high-value foraging
43 habitat. The locations of these losses are described above in the analyses of individual conservation
44 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites

1 were directly affected by water conveyance facilities including transmission lines and associated
2 footprints. In addition, temporarily removed habitat would be restored within 1 year following
3 construction. However, it would not necessarily be restored to its original topography and it could
4 result in the conversion of cultivated lands to grasslands.

5 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
6 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
7 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
8 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
9 GSHC1.1). These croptypes would also provide high- to very high-value habitat for the lesser
10 sandhill crane.

11 The BDCP also includes the following objectives for the greater sandhill crane which would also
12 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
13 winter use areas.

14 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
15 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
16 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
17 and local seasonal flood events. These wetlands would be created within 2 miles of existing
18 permanent roost sites and protected in association with other protected natural community types at
19 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
20 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
21 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
22 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and
23 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
24 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
25 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The
26 large patch sizes of these wetland complexes would provide additional conservation to address the
27 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
28 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
29 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
30 active cornfields that are flooded following harvest to support roosting cranes and also provide the
31 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
32 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with
33 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat
34 loss.

35 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
36 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
37 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
38 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
39 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
40 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives
41 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
42 economically driven agricultural practices, protecting crane habitat would provide enhanced
43 stability to agricultural habitat value within the crane use area that does not currently exist. The
44 acres of foraging habitat conservation under Objective GSHC1.1 would not be sufficient to
45 compensate for the habitat losses of lesser sandhill crane foraging habitat by the late long-term

1 timeframe. The implementation of Mitigation Measure BIO-72, would require that of the 48,625
2 acres of cultivated lands protected by the late long-term timeframe, sufficient acres were conserved
3 in suitable crop types for lesser sandhill cranes.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
5 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
6 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
7 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
8 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
9 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
10 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs,*
11 of the Final EIR/EIS.

12 Considering Alternative 1A's protection and restoration provisions, in addition to Mitigation
13 Measure BIO-72, which would compensate for the loss of medium- to very high-value foraging
14 habitat at a ratio of 1:1, loss of habitat or direct mortality through implementation of Alternative 1A
15 would not result in a substantial adverse effect through habitat modifications and would not
16 substantially reduce the number or restrict the range of the species. Therefore, the alternative
17 would have a less-than-significant impact on lesser sandhill crane.

18 **Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value** 19 **Lesser Sandhill Crane Foraging Habitat**

20 DWR must compensate for the loss of lesser sandhill crane medium- to very high-value foraging
21 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan
22 Area. Compensation must occur prior to or concurrent with the impacts to minimize the effects
23 of habitat loss. The crop types and natural communities that are included in foraging value
24 categories are listed in Table 12-1A-32. Foraging habitat conservation must occur within 10
25 kilometers of traditional sandhill crane roost sites and the location of protected habitat or
26 conservation easements must be preapproved by CDFW.

27 **Impact BIO-73: Effects on Lesser Sandhill Crane Associated with Electrical Transmission** 28 **Facilities**

29 Sandhill cranes are susceptible to collision with power lines and other structures during periods of
30 inclement weather and low visibility (Avian Power Line Interaction Committee 1994, Brown and
31 Drewien 1995, Manville 2005). There are extensive existing transmission and distribution lines in
32 the sandhill crane winter use area. These include a network of distribution lines that are 11- to 22-
33 kV. In addition, there are two 115-kV lines that cross the study area, one that overlaps with the
34 greater sandhill crane winter use area between Antioch and I-5 east of Hood, and one that crosses
35 the northern tip of the crane winter use area north of Clarksburg. There are 69-kV lines within the
36 study area that parallel Twin Cities Road, Herzog Road, Lambert Road, and the Southern Pacific
37 Dredge Cut in the vicinity of Stone Lakes NWR. At the south end of the winter use area, there are
38 three 230-kV transmission lines that follow I-5, and then cut southwest through Holt, and two 500-
39 kV lines cross the southwestern corner of the winter use area. Because lines cross over or surround
40 sandhill crane roost sites, this existing network of power lines in the study area currently poses a
41 collision and electrocution risk for sandhill cranes.

42 Both permanent and temporary electrical transmission lines would be constructed to supply
43 construction and operational power to Alternative 1A facilities. The potential for birdstrikes could

1 also be exacerbated by construction-related effects, especially in low-visibility conditions. The
 2 potential mortality of greater sandhill crane in the area of the proposed transmission lines under
 3 Alternative 1A was estimated using collision mortality rates by Brown and Drewien (1995) and an
 4 estimate of potential crossings along the proposed lines (methods are described in BDCP Appendix
 5 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). This analysis
 6 concluded that mortality risk could be substantially reduced by marking new transmission lines to
 7 increase their visibility to sandhill cranes. Mortality risk would be similarly reduced for lesser
 8 sandhill cranes by marking new transmission lines.

9 Typically, higher-voltage (230-kV) lines vary in height from 90 to 110 feet, while subtransmission
 10 (69-kV) lines vary from 50 to 70 feet (Avian Power Line Interaction Committee 2006). The
 11 Alternative 1A alignment would require the installation of approximately 52 miles of permanent
 12 transmission line (43 miles of 230-kV lines and 9 miles of 69-kV lines) extending north and south,
 13 through much of the crane use area. The temporary transmission lines would total approximately 48
 14 miles (25 miles of 69-kV line and 23 miles of 12-kV line). Temporary lines would be removed after
 15 construction of the water conveyance facilities, within 10 years. Staten Island is one of the most
 16 important wintering sites for greater sandhill cranes in the Delta, and the proposed permanent and
 17 temporary transmission lines that would be constructed on Tyler Island and Staten Island would
 18 have the potential to substantially affect both greater and lesser sandhill cranes.

19 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
 20 transmission line alignment, such as co-locating transmission lines when it would minimize effects
 21 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. After the
 22 Draft EIR/EIS was issued in December 2013, additional avoidance features were added to *AMM20*
 23 *Greater Sandhill Crane*. *AMM20 Greater Sandhill Crane* requires that Alternative 1A meets the
 24 performance standard of no mortality of greater sandhill crane associated with the new facilities.
 25 This would be achieved by implementing one or any combination of the following: 1) siting new
 26 transmission lines in lower bird strike risk zones; 2) removing, relocating or undergrounding
 27 existing lines where feasible; 3) using natural gas generators in lieu of installing transmission lines
 28 in high-risk zones of the greater sandhill crane winter use area; 4) undergrounding new lines in
 29 high-risk zones of the greater sandhill crane winter use area; 5) permanently installing flight
 30 diverters on existing lines over lengths equal to or greater than the length of the new transmission
 31 lines in the crane winter use area; 6) for areas outside of the Stone Lakes NWR project boundary,
 32 shifting locations of flooded areas that provide crane roosts to lower risk areas. These measures are
 33 described in detail in *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental Commitments,*
 34 *AMMs, and CMs*.

35 The implementation of the measures described above under *AMM20 Greater Sandhill Crane* would
 36 substantially reduce the potential for lesser sandhill crane collisions with transmission lines.
 37 Potential measures that would eliminate this risk include using natural gas generators in lieu of
 38 transmission lines or undergrounding new lines in high-risk zones in the greater sandhill crane
 39 winter use area. Marking transmission lines with flight diverters that make the lines more visible to
 40 birds has been shown to reduce the incidence of bird mortality, including for sandhill cranes (Brown
 41 and Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce
 42 avian mortality by 60%. All new transmission lines would be fitted with flight diverters. The
 43 installation of flight diverters on existing permanent lines would be prioritized in the highest risk
 44 zones for greater sandhill crane (as described in BDCP Appendix 5J.C, *Analysis of Potential Bird*
 45 *Collisions at Proposed BDCP Powerlines*) and diverters would be installed in a configuration that
 46 research indicates would reduce bird strike risk by at least 60%. The length of existing line to be

1 fitted with bird strike diverters would be equal to the length of new transmission lines constructed
2 for the project, in an area with the same or higher greater sandhill crane strike risk to provide a net
3 benefit to the species. For optimum results, the recommended spacing distance for bird flight
4 diverters is 15 to 16.5 feet (4.5 to 5 meters) (Avian Power Line Interaction Committee 1994).
5 Placing diverters on existing lines would be expected to reduce existing lesser and greater sandhill
6 crane mortality in the Plan Area and, therefore, result in a net benefit to the lesser sandhill crane
7 population because these flight diverters would be maintained in perpetuity.

8 **NEPA Effects:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
9 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
10 current proposed transmission line alignment under Alternative 1A is not fully designed, and line
11 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the
12 final transmission line alignment avoided crane roost sites and achieve the performance standard of
13 no mortality of greater sandhill crane associated with the new facilities which would also benefit the
14 lesser sandhill crane. *AMM30 Transmission Line Design and Alignment Guidelines* would require
15 design features for the transmission line alignment, such as co-locating transmission lines when it
16 would minimize effects on sandhill cranes, to avoid impacts on sensitive habitats to the maximum
17 extent feasible. All new transmission lines constructed as a result of the project would be fitted with
18 bird diverters, which have been shown to reduce avian mortality by 60%. By incorporating *AMM30*
19 *Transmission Line Design and Alignment Guidelines* and one or a combination of the measures to
20 greatly reduce the risk of bird strike described in *AMM20 Greater Sandhill Crane*, the construction
21 and operation of transmission lines under Alternative 1A would not result in an adverse effect on
22 lesser sandhill crane.

23 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
24 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
25 current proposed transmission line alignment under Alternative 1A is not fully designed, and line
26 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the
27 final transmission line alignment avoided crane roost sites and achieve the performance standard of
28 no mortality of greater sandhill crane associated with the new facilities which would also benefit
29 lesser sandhill crane. *AMM30 Transmission Line Design and Alignment Guidelines* would require
30 design features for the transmission line alignment, such as co-locating transmission lines when it
31 would minimize effects on sandhill cranes, to avoid impacts on sensitive habitats to the maximum
32 extent feasible. All new transmission lines constructed as a result of the project would be fitted with
33 bird diverters, which have been shown to reduce avian mortality by 60%. By incorporating *AMM30*
34 *Transmission Line Design and Alignment Guidelines* and one or a combination of the measures to
35 greatly reduce the risk of bird strike described in *AMM20 Greater Sandhill Crane*, the construction
36 and operation of transmission lines under Alternative 1A would would have a less-than-significant
37 impact on lesser sandhill crane.

38 **Impact BIO-74: Indirect Effects of Plan Implementation on Lesser Sandhill Crane**

39 **Indirect construction-and operation-related effects:** Sandhill cranes are sensitive to disturbance.
40 Noise and visual disturbances from the construction of water conveyance facilities and other
41 conservation measures could reduce lesser sandhill crane use of modeled habitat adjacent to work
42 areas. Indirect effects associated with construction include noise, dust, and visual disturbance
43 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
44 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the
45 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise

1 and visual disturbances that could affect lesser sandhill crane use of surrounding habitat. These
 2 effects could result from periodic vehicle use along the conveyance corridor, inspection and
 3 maintenance of aboveground facilities, and similar activities. These potential effects would be
 4 minimized with implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3B,
 5 *Environmental Commitments, AMMs, and CMs*.

6 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would
 7 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill
 8 crane (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
 9 *Conveyance Facility on Sandhill Crane*). The same methods were employed to addresses the potential
 10 noise effects on cranes from Alternative 1A and to determine that as much as 6,508–18,284 acres of
 11 crane habitat could be affected by general construction noise above baseline level (50–60 dBA). This
 12 would include 107–814 acres of permanent crane roosting habitat, 761–2,063 acres of temporary
 13 crane roosting habitat, and 5,640–15,407 acres of crane foraging habitat. In addition, 86–730 acres
 14 of permanent crane roosting habitat, 252–1,118 acres of temporary crane roosting habitat, and 778–
 15 4,957 acres of crane foraging habitat could be affected by noise from pile driving that would be
 16 above baseline level (50–60dBA, Table 12-1A-30 under Impact-BIO-71). The analysis was conducted
 17 based on the assumption that there would be direct line-of-sight from sandhill crane habitat areas to
 18 the construction site, and, therefore, provides a worst-case estimate of effects. In many areas the
 19 existing levees would partially or completely block the line-of-sight and would function as effective
 20 noise barriers, substantially reducing noise transmission. However, there is insufficient data to
 21 assess the effects that increased noise levels would have on sandhill crane behavior. Similar
 22 acreages of lesser sandhill crane habitat would be expected to be indirectly affected. However, lesser
 23 sandhill cranes are less traditional in their winter roost sites and may be more likely to travel away
 24 from disturbed areas to roost and forage in more suitable habitat.

25 Evening and nighttime construction activities would require the use of extremely bright lights.
 26 Nighttime construction could also result in headlights flashing into roost sites when construction
 27 vehicles are turning onto or off of construction access routes. Proposed surge towers would require
 28 the use of safety lights that would alert low-flying aircraft to the presence of these structures
 29 because of their height. Little data is available on the effects of impact of artificial lighting on
 30 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes
 31 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP
 32 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to
 33 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting
 34 include a reduction in the cranes’ quality of nocturnal rest, and effects on their “sense of photo-
 35 period which might cause them to shift their physiology towards earlier migration and breeding.”
 36 (BDCP Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes’
 37 overall fitness and reproductive success (which could in turn have population-level impacts). A
 38 change in photo-period interpretation could also cause cranes to fly out earlier from roost sites to
 39 forage and might increase their risk of power line collisions if they were to leave roosts before dawn
 40 (BDCP Chapter 5, *Effects Analysis*).

41 The effects of noise and visual disturbance on lesser sandhill crane would be minimized through the
 42 implementation of AMM20 (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*).
 43 Activities within 0.75 mile of crane roosting habitat would reduce construction noise during night
 44 time hours (from one hour before sunset to one hour after sunrise) such that construction noise
 45 levels do not exceed 50 dBA L_{eq} (1 hour) at the nearest temporary or permanent roosts during
 46 periods when the roost sites are available (flooded). In addition, the area of crane foraging habitat

1 that would be affected during the day (from one hour after sunrise to one hour before sunset) by
2 construction noise exceeding 50 dBA L_{eq} (1 hour) would also be minimized. Unavoidable noise
3 related effects would be compensated for by the enhancement of 0.1 acre of foraging habitat for
4 every acre indirectly affected within the 50 dBA L_{eq} (1 hour) construction noise contour. With these
5 measures in place, indirect effects of noise and visual disturbance from construction activities are
6 not expected to reduce the lesser sandhill crane population in the study area.

7 The use of mechanical equipment during water conveyance facilities construction could cause the
8 accidental release of petroleum or other contaminants that could affect lesser sandhill cranes in the
9 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to lesser
10 sandhill crane habitat could also affect the subspecies. AMM1–AMM7, including *AMM2 Construction*
11 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure
12 that measures were in place to prevent runoff from the construction area and negative effects of
13 dust on foraging habitat.

14 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
15 mercury in lesser sandhill cranes. Largemouth bass was used as a surrogate species for analysis
16 (Appendix 11F, *Substantive BDCP Revisions*). Results of the quantitative modeling of mercury effects
17 on largemouth bass as a surrogate species would overestimate the effects on lesser sandhill crane as
18 they primarily forage on cultivated crops and invertebrates. Organisms feeding within pelagic-based
19 (algal) foodwebs have been found to have higher concentrations of methylmercury than those in
20 benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
21 segregation (Grimaldo et al. 2009). Modeled effects of mercury concentrations from changes in
22 water operations under CM1 on largemouth bass did not differ substantially from existing
23 conditions; therefore, results also indicate that lesser sandhill crane tissue concentrations would not
24 measurably increase as a result of CM1 implementation.

25 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
26 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
27 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
28 mercury. Increased methylmercury associated with natural community and floodplain restoration
29 may indirectly affect lesser sandhill crane via uptake in lower trophic levels (BDCP Appendix 5.D,
30 *Contaminants*). Mercury is generally elevated throughout the Delta, and restoration of the lower
31 potential areas in total may result in generalized, very low level increases of mercury. Given that
32 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in
33 some level of effects.

34 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
35 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
36 each restoration project. If a project is identified where there is a high potential for methylmercury
37 production that could not be fully addressed through restoration design and adaptive management,
38 alternate restoration areas would be considered. CM12 would be implemented in coordination with
39 other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury
40 Monitoring and Analysis Section. This conservation measure would include the following actions.

- 41 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
42 mercury methylation and bioavailability
- 43 ● Define design elements that minimize conditions conducive to generation of methylmercury in
44 restored areas.

- 1 • Define adaptive management strategies that can be implemented to monitor and minimize
2 actual postrestoration creation and mobilization of methylmercury.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex
8 classes within a species. In addition, the effect of selenium on a species can be confounded by
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
10 2009).

11 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
12 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
13 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
14 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
15 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
16 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
17 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
18 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
19 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
20 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
21 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
22 levels of selenium have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
24 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
25 exacerbate bioaccumulation of selenium in avian species, including the lesser sandhill crane. Marsh
26 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
27 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
28 BDCP restoration activities that create newly inundated areas could increase bioavailability of
29 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
30 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
31 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
32 long-term increases in selenium concentrations in water in the Delta under any alternative.
33 However, it is difficult to determine whether the effects of potential increases in selenium
34 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to
35 adverse effects on lesser sandhill crane.

36 Because of the uncertainty that exists at this programmatic level of review, there could be a
37 substantial effect on lesser sandhill crane from increases in selenium associated with restoration
38 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
39 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
40 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
41 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
42 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
43 separately for each restoration effort as part of design and implementation. This avoidance and
44 minimization measure would be implemented as part of the tidal habitat restoration design
45 schedule.

1 **NEPA Effects:** Crane habitat could be affected by general construction noise and pile driving above
2 baseline level (50–60 dBA). However, lesser sandhill cranes are less traditional in their winter roost
3 sites than greater sandhill cranes and may be more likely to travel away from disturbed areas to
4 roost in more suitable habitat. Construction in certain areas would take place 7 days a week and 24
5 hours a day and evening and nighttime construction activities would require the use of extremely
6 bright lights, which could adversely affect roosting cranes by impacting their sense of photo-period
7 and by exposing them to predators. Effects of noise and visual disturbance could substantially alter
8 the suitability of habitat for lesser sandhill crane. *AMM20 Greater Sandhill Crane*, which would
9 include requirements (described above) to minimize the effects of noise and visual disturbance on
10 sandhill cranes and to mitigate effects on affected habitat.

11 Tidal habitat restoration could result in increased exposure of lesser sandhill crane to selenium
12 which could result in the mortality of a special-status species. This effect would be addressed
13 through the implementation of *AMM27 Selenium Management*, which would provide specific tidal
14 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its
15 bioavailability in tidal habitats.

16 The implementation of tidal natural communities restoration or floodplain restoration could result
17 in increased exposure of lesser sandhill crane to methylmercury. The potential indirect effects of
18 increased mercury exposure is likely low for lesser sandhill crane because they primarily forage on
19 cultivated crops and associated invertebrates. Implementation of CM12, which contains measures to
20 assess the amount of mercury before project development, followed by appropriate design and
21 adaptation management, would minimize the potential for increased methylmercury exposure, and
22 would result in no adverse effect on the species.

23 **CEQA Conclusion:** Crane habitat could be affected by general construction noise and pile driving
24 above baseline level (50–60 dBA). However, lesser sandhill cranes are less traditional in their winter
25 roost sites and may be more likely to travel away from disturbed areas to roost in more suitable
26 habitat. Construction in certain areas would take place 7 days a week and 24 hours a day and
27 evening and nighttime construction activities would require the use of extremely bright lights,
28 which could adversely affect roosting cranes by impacting their sense of photo-period and by
29 exposing them to predators. Effects of noise and visual disturbance could substantially alter the
30 suitability of habitat for lesser sandhill crane. This would be a significant impact. With *AMM20*
31 *Greater Sandhill Crane* in place, which would include requirements (described above) to minimize
32 the effects of noise and visual disturbance on sandhill cranes and to mitigate for affected habitat,
33 there would not be an adverse effect on lesser sandhill crane.

34 Tidal habitat restoration could result in increased exposure of lesser sandhill crane to selenium,
35 which could result in the potential mortality of a special-status species. This would be a significant
36 impact. This effect would be addressed through the implementation of *AMM27 Selenium*
37 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
38 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

39 Methylmercury tissue concentrations in lesser sandhill crane would not be expected to measurably
40 increase as a result of water operations under CM1 compared with the No Action Alternative. The
41 implementation of tidal natural communities restoration or floodplain restoration could result in
42 increased exposure of lesser sandhill crane to methylmercury. This would be a significant impact.
43 The potential indirect effects of increased mercury exposure is likely low for lesser sandhill cranes
44 because they primarily forage on cultivated crops and associated invertebrates. Implementation of

1 CM12, which contains measures to assess the amount of mercury before project development,
2 followed by appropriate design and adaptation management, would minimize the potential for
3 increased methylmercury exposure, and would result in no adverse effect on lesser sandhill crane.

4 With AMM1–AMM7, AMM20, AMM27, and CM12 in place, the indirect effects of plan implementation
5 under Alternative 1A would not substantially reduce the number or restrict the range of lesser
6 sandhill cranes. Therefore, the indirect effects of Alternative 1A implementation would have a less-
7 than-significant impact on lesser sandhill crane.

8 **Least Bell’s Vireo and Yellow Warbler**

9 This section describes the effects of Alternative 1A, including water conveyance facilities
10 construction and implementation of other conservation components, on the least Bell’s vireo and
11 yellow warbler. Least Bell’s vireo and yellow warbler modeled habitat identifies suitable nesting and
12 migratory habitat as those plant alliances from the valley/foothill riparian modeled habitat that
13 contain a dense shrub component, including all willow-dominated alliances.

14 Construction and restoration associated with Alternative 1A conservation measures would result in
15 both temporary and permanent losses of least Bell’s vireo and yellow warbler modeled habitat as
16 indicated in Table 12-1A-33. Full implementation of Alternative 1A would also include the following
17 conservation actions over the term of the BDCP to benefit least Bell’s vireo and yellow warbler
18 (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 19 • Restore or create at least 5,000 acres of valley/foothill riparian natural community with at least
20 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
21 associated with CM7).
- 22 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
23 10 (Objective VFRNC1.2, associated with CM7).
- 24 • Maintain and enhance structural heterogeneity (Objective VFRNC2.1, associated with CM7).
- 25 • Maintain at least 1,000 acres of early- to mid-successional vegetation (Objective VFRNC2.2,
26 associated with CM7).
- 27 • Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,
28 associated with CM3 and CM7).
- 29 • Maintain the at least 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion
30 of the early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a
31 minimum patch size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4,
32 associated with CM3 and CM7).

33 As explained below, with the restoration and protection of these amounts of habitat, in addition to
34 natural community enhancement and management commitments and implementation of AMM1–
35 AMM7, AMM22 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell’s Vireo*, *Western Yellow-Billed*
36 *Cuckoo*, and mitigation to minimize potential effects, impacts on least Bell’s vireo and yellow warbler
37 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-33. Changes in Least Bell’s Vireo and Yellow Warbler Modeled Habitat Associated**
2 **with Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Migratory and breeding	30	30	17	17	NA	NA
Total Impacts CM1		30	30	17	17	NA	NA
CM2–CM18	Migratory and breeding	382	656	88	109	48–85	148
Total Impacts CM2–CM18		382	656	88	109	48–85	148
TOTAL IMPACTS		412	686	105	126	48–85	148

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-75: Loss or Conversion of Habitat for and Direct Mortality of Least Bell’s Vireo**
5 **and Yellow Warbler**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss
7 of up to 812 acres of modeled habitat (686 acres of permanent loss and 126 acres of temporary loss)
8 for least Bell’s vireo and yellow warbler (Table 12-1A-33). Conservation measures that would result
9 in these losses are conveyance facilities and transmission line construction, and establishment and
10 use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2),
11 tidal natural communities restoration (CM4), and seasonally inundated floodplain restoration
12 (CM5). Habitat enhancement and management activities (CM11) which include ground disturbance
13 or removal of nonnative vegetation, could result in local adverse habitat effects. In addition,
14 maintenance activities associated with the long-term operation of the water conveyance facilities
15 and other BDCP physical facilities could degrade or eliminate least Bell’s vireo and yellow warbler
16 habitat. Each of these individual activities is described below. A summary statement of the combined
17 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure
18 discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
20 result in the combined permanent and temporary loss of up to 47 acres of modeled least Bell’s
21 vireo and yellow warbler habitat (Table 12-1A-33). Of the 47 acres of modeled habitat that
22 would be removed for the construction of the conveyance facilities, 30 acres would be a
23 permanent loss and 17 acres would be a temporary loss of habitat. Activities that would impact
24 modeled habitat consist of tunnel, forebay, and intake construction, temporary access roads, and

1 construction of transmission lines. Most of the permanent loss would occur where Intakes 1–5
 2 impact the Sacramento River’s east bank between Freeport and Courtland. The riparian areas
 3 here are very small patches, some dominated by valley oak and others by nonnative trees.
 4 Temporary losses would occur where pipelines cross Snodgrass Slough and other small
 5 waterways east of the Sacramento River, and where temporary work areas surround intake
 6 sites. The riparian habitat in these areas is also composed of very small patches or stringers
 7 bordering waterways, which are composed of valley oak and scrub vegetation. Impacts from
 8 CM1 would occur in the central delta in CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8.

9 Temporarily affected areas would be restored as riparian habitat within 1 year following
 10 completion of construction activities as described in *AMM10 Restoration of Temporarily Affected*
 11 *Natural Communities*. Although the effects are considered temporary, the restored riparian
 12 habitat would require at least 4 years for ecological succession to occur and for restored
 13 riparian habitat to functionally replace habitat that has been affected. However, restored
 14 riparian vegetation can have the habitat structure to support breeding vireos within 3 to 5
 15 years, particularly if the restored vegetation is adjacent to established riparian areas (Kus
 16 2002), and similar habitat would be suitable for yellow warbler. The majority of the riparian
 17 vegetation to be temporarily removed is early- to mid-successional; therefore, the replaced
 18 riparian vegetation would be expected to have structural components comparable to the
 19 temporarily removed vegetation within the first 5 to 10 years after the initial restoration
 20 activities are complete. There are no occurrences of least Bell’s vireo or yellow warbler that
 21 intersect with the CM1 footprint. Refer to the Terrestrial Biology Map Book for a detailed view of
 22 Alternative 1A construction locations. Impacts from CM1 would occur within the first 10 years
 23 of Alternative 1A implementation.

- 24 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancements
 25 (CM2) would permanently remove approximately 83 acres and temporarily remove 88 acres of
 26 modeled least Bell’s vireo and yellow warbler habitat in the Yolo Bypass in CZ 2. The loss is
 27 expected to occur during the first 10 years of Alternative 1A implementation.
- 28 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 29 inundation would permanently remove an estimated 545 acres of modeled least Bell’s vireo and
 30 yellow warbler habitat.
- 31 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 32 seasonally inundated floodplain would permanently remove approximately 28 acres and
 33 temporarily remove 21 acres of modeled least Bell’s vireo and yellow warbler habitat. Based on
 34 the riparian habitat restoration assumptions, a minimum of 3,000 acres of valley/foothill
 35 riparian habitat would be restored as a component of seasonally inundated floodplain
 36 restoration actions.

37 The actual number of acres of valley/foothill riparian habitat that CM4 and CM5 would restore
 38 may differ from these estimates, depending on how closely the actual outcome of tidal habitat
 39 restoration approximates the assumed outcome. However, riparian restoration from CM4 and
 40 CM5 would increase the extent of least Bell’s vireo and yellow warbler habitat within the Plan
 41 Area once the restored riparian vegetation has developed habitat functions for these species.

- 42 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
 43 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
 44 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
 45 activity would occur along waterway margins where riparian habitat stringers exist, including

1 levees and channel banks. The improvements would occur within the study area on sections of
2 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

- 3 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
4 activities that could be implemented in protected least Bell's vireo and yellow warbler habitats
5 are expected to maintain and improve the functions of the habitat over the term of the BDCP.
6 Least Bell's vireo and yellow warbler would be expected to benefit from the increase in
7 protected habitat, which would maintain conditions favorable for future species establishment
8 in the Plan Area. If least Bell's vireo and yellow warbler established breeding populations in
9 restored riparian habitats in the Plan Area, occupied habitat would be monitored to determine if
10 there were a need to implement controls on brood parasites (brown-headed cowbird) or nest
11 predators. If implemented, these actions would be expected to benefit the least Bell's vireo and
12 yellow warbler by removing a potential stressor that could, if not addressed, adversely affect the
13 stability of newly established populations.

14 Habitat management- and enhancement-related activities could disturb least Bell's vireo and
15 yellow warbler nests. If either species were to nest in the vicinity of a worksite, equipment
16 operation could destroy nests, and noise and visual disturbances could lead to their
17 abandonment, resulting in mortality of eggs and nestlings. The potential for these activities to
18 result in direct mortality of least Bell's vireo or yellow warbler would be minimized with the
19 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
20 *Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
21 *Surveys and Avoid Disturbance of Nesting Birds*.

- 22 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
23 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
24 disturbance that could affect least Bell's vireo and yellow warbler use of the surrounding
25 habitat. Maintenance activities would include vegetation management, levee and structure
26 repair, and re-grading of roads and permanent work areas. These effects, however, would be
27 reduced by AMMs and conservation actions as described below.
- 28 • *Injury and Direct Mortality*: Although least Bell's vireo nesting has not been confirmed in the
29 Plan Area, recent occurrences in the Yolo Bypass and at the San Joaquin River National Wildlife
30 Refuge suggest that the reestablishment of a breeding population is a possibility over the
31 duration of the BDCP. construction-related activities would not be expected to result in direct
32 mortality of least Bell's vireo or yellow warbler if present in the study area because adults and
33 fledged young would be expected to avoid contact with construction and other equipment. If
34 either species were to nest in the construction area, equipment operation, noise and visual
35 disturbances could destroy nests or lead to their abandonment, resulting in mortality of eggs
36 and nestlings. These effects would be avoided and minimized with the implementation of
37 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
38 *Cuckoo*. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
39 *Disturbance of Nesting Birds*, would be available to address potential effects on nesting yellow
40 warblers.

41 The following paragraphs summarize the combined effects discussed above and describe other
42 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
43 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
5 effects of construction would not be adverse under NEPA. The Plan would remove 517 acres of
6 modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-term. These
7 effects would result from the construction of the water conveyance facilities (CM1, 47 acres of
8 habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements
9 [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5], 470 acres of
10 habitat).

11 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
12 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter
13 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby
14 successional valley/foothill riparian habitat. Using these ratios would indicate that 47 acres of
15 valley/foothill riparian habitat should be restored/created and 47 acres should be protected to
16 compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects
17 of other conservation actions would remove 470 acres of modeled habitat, and therefore require
18 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using
19 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

20 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
21 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These
22 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as
23 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
24 least Bell's vireo and yellow warbler. The majority of the riparian restoration acres would occur in
25 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill
26 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation
27 Strategy*). This restoration would provide the large contiguous patches needed for suitable least
28 Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for riparian
29 restoration also include the restoration, maintenance and enhancement of structural heterogeneity
30 with adequate vertical and horizontal overlap among vegetation components and over adjacent
31 riverine channels, freshwater emergent wetlands, and grasslands (Objective VFRNC2.1). These Plan
32 objectives represent performance standards for considering the effectiveness of CM7 restoration
33 and CM3 protection actions. The acres of protection contained in the near-term Plan goals and the
34 additional detail in the biological objectives for least Bell's vireo satisfy the typical mitigation ratios
35 that would be applied to the project-level effects of CM1, as well as mitigate the near-term effects of
36 the other conservation measures. The restored riparian habitat could require 5 years to several
37 decades, for ecological succession to occur and for restored riparian habitat to functionally replace
38 habitat that has been affected. However, because the modeled habitat impacted largely consists of
39 small patches of blackberry, willow, and riparian scrub, and because least Bell's vireo and yellow
40 warbler are not known to be established breeders in the study area, BDCP actions would not be
41 expected to have an adverse population-level effect on either species.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2
43 Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention
44 Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and
45 Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, AMM10*

1 *Restoration of Temporarily Affected Natural Communities, and AMM22 Suisun Song Sparrow, Yellow-*
 2 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements
 3 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
 4 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
 5 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
 6 EIR/EIS. The yellow warbler is not a species that is covered under the BDCP. Although
 7 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest
 8 in the study area over the course of the BDCP), in order to have a less than adverse effect on
 9 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
 10 yellow warbler nests were detected and avoided. Mitigation Measure BIO-75 would be available to
 11 address potential effects on nesting yellow warblers.

12 ***Late Long-Term Timeframe***

13 The habitat model indicates that the study area supports approximately 14,850 acres of modeled
 14 habitat for least Bell's vireo and yellow warbler. Alternative 1A as a whole would result in the
 15 permanent loss of and temporary effects on 812 acres of habitat for these species during the term of
 16 the Plan (7% of the total habitat in the study area). These losses would occur from the construction
 17 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4*
 18 *Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The
 19 locations of these losses would be in fragmented riparian habitat throughout the study area.

20 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
 21 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
 22 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
 23 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
 24 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
 25 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives
 26 in the Plan for riparian restoration also include the maintenance and enhancement of structural
 27 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for
 28 the least Bell's vireo and yellow warbler.

29 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
 30 and protection actions discussed above could result in the restoration of 1,000 acres and the
 31 protection of 593 acres of habitat for the least Bell's vireo, which would also be suitable habitat for
 32 the yellow warbler.

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
 34 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
 35 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 36 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, AMM10*
 37 *Restoration of Temporarily Affected Natural Communities, and AMM22 Suisun Song Sparrow, Yellow-*
 38 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements
 39 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
 40 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
 41 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
 42 EIR/EIS.

43 ***NEPA Effects:*** The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality
 44 of these special-status species under Alternative 1A would represent an adverse effect in the

1 absence of other conservation actions. However, these species are not established breeders in the
 2 study area and impacts would likely be limited to loss of migratory habitat. In addition, with habitat
 3 protection and restoration associated with CM3 and CM7, guided by biological goals and objectives
 4 and by *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and*
 5 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan,*
 6 *AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils,*
 7 *AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural Communities,* and
 8 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,*
 9 which would be in place during all project activities, the effects of habitat loss and potential
 10 mortality on least Bell's vireo, and the effect of habitat loss on yellow warbler under Alternative 1A
 11 would not be adverse under NEPA. The yellow warbler is not a species that is covered under the
 12 BDCP and the potential for mortality would be adverse without preconstruction surveys to ensure
 13 that nests are detected and avoided. Mitigation Measure BIO-75 would be available to address this
 14 effect.

15 ***CEQA Conclusion:***

16 ***Near-Term Timeframe***

17 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 18 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 19 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
 20 the impacts of construction would be less than significant under CEQA. The Plan would remove 517
 21 acres of modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-term.
 22 These effects would result from the construction of the water conveyance facilities (CM1, 47 acres of
 23 habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements
 24 [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5], 470 acres of
 25 habitat).

26 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
 27 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter
 28 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby
 29 successional valley/foothill riparian habitat. Using these ratios would indicate that 47 acres of
 30 valley/foothill riparian habitat should be restored/created and 47 acres should be protected to
 31 mitigate the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects of
 32 other conservation actions would remove 470 acres of tidal natural communities, and therefore
 33 require 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill
 34 riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

35 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
 36 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These
 37 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as
 38 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
 39 least Bell's vireo and yellow warbler. The majority of the riparian restoration acres would occur in
 40 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill
 41 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*
 42 *Strategy*). This restoration would provide the large contiguous patches needed for suitable least
 43 Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for riparian
 44 restoration also include the restoration, maintenance and enhancement of structural heterogeneity

1 with adequate vertical and horizontal overlap among vegetation components and over adjacent
 2 riverine channels, freshwater emergent wetlands, and grasslands (Objective VFRNC2.1). These Plan
 3 objectives represent performance standards for considering the effectiveness of CM7 restoration
 4 and CM3 protection actions. biological goals and objectives would inform the near-term protection
 5 and restoration efforts and represent performance standards for considering the effectiveness of
 6 restoration actions. The acres of protection contained in the near-term Plan goals and the additional
 7 detail in the biological objectives for least Bell's vireo satisfy the typical mitigation ratios that would
 8 be applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other
 9 conservation measures. The restored riparian habitat could require 5 years to several decades, for
 10 ecological succession to occur and for restored riparian habitat to functionally replace habitat that
 11 has been affected. However, because the modeled habitat impacted largely consists of small patches
 12 of blackberry, willow, and riparian scrub, and because least Bell's vireo and yellow warbler are not
 13 known to be established breeders in the study area, BDCP actions would not be expected to have an
 14 adverse population-level effect on either species.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
 19 *Restoration of Temporarily Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-*
 20 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements
 21 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
 22 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
 23 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
 24 EIR/EIS. The yellow warbler is not a species that is covered under the BDCP. Although
 25 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest
 26 in the Plan Area over the course of the BDCP), in order to avoid an adverse effect on individuals,
 27 preconstruction surveys for noncovered avian species would be required to ensure that yellow
 28 warbler nests are detected and avoided. Mitigation Measure BIO-75 would reduce the potential
 29 impact on nesting yellow warblers to a less-than-significant impact, should they become established
 30 in the Plan Area. Considering the conservation actions described above, and AMM1–AMM7, AMM 22,
 31 and Mitigation Measure BIO-75, Alternative 1A over the term of the BDCP would not result in a
 32 substantial adverse effect through habitat modifications and would not substantially reduce the
 33 number or restrict the range of either species. Therefore, Alternative 1A would have a less-than-
 34 significant impact on least Bell's vireo and yellow warbler.

35 ***Late Long-Term Timeframe***

36 The habitat model indicates that the study area supports approximately 14,850 acres of modeled
 37 habitat for least Bell's vireo and yellow warbler. Alternative 1A as a whole would result in the
 38 permanent loss of and temporary effects on 812 acres of habitat for these species during the term of
 39 the Plan (7% of the total habitat in the study area). These losses would occur from the construction
 40 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4*
 41 *Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The
 42 locations of these losses would be in fragmented riparian habitat throughout the study area.

43 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
 44 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
 45 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored

1 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
2 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
3 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives
4 in the Plan for riparian restoration also include the maintenance and enhancement of structural
5 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for
6 the least Bell's vireo and yellow warbler. The restored riparian habitat could require 5 years to
7 several decades, for ecological succession to occur and for restored riparian habitat to functionally
8 replace habitat that has been affected. Therefore, there would be a time-lag before the restored
9 habitat would benefit either species. However, neither species are established breeders in the study
10 area and impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow
11 warbler.

12 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
13 and protection actions discussed above could result in the restoration of 1,000 acres and the
14 protection of 593 acres of habitat for the least Bell's vireo, which would also be suitable habitat for
15 the yellow warbler.

16 The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality of these
17 special-status species under Alternative 1A would represent an adverse effect in the absence of
18 other conservation actions. However, neither species are established breeders in the study area and
19 impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow warbler.
20 In addition, with habitat protection and restoration associated with CM3 and CM7, guided by
21 biological goals and objectives and by *AMM1 Worker Awareness Training*, *AMM2 Construction Best
22 Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion
23 and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6
24 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10 Restoration of Temporarily
25 Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's
26 Vireo, Western Yellow-Billed Cuckoo*, which would be in place during all project activities, the effects
27 of habitat loss and potential mortality on least Bell's vireo under Alternative 1A would be less than
28 significant. The yellow warbler is not a species that is covered under the BDCP. Although
29 preconstruction surveys for least Bell's vireo may also detect nesting yellow warblers, in order to
30 have a less-than-significant impact on individuals, preconstruction surveys for noncovered avian
31 species would be required to ensure that yellow warbler nests are detected and avoided. Mitigation
32 Measure BIO-75 would reduce this potential impact on nesting yellow warblers, if present in the
33 study area, to a less-than-significant level.

34 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
35 **Disturbance of Nesting Birds**

36 To reduce impacts on nesting birds, DWR will implement the measures listed below prior to
37 construction and operations and maintenance activities.

- 38
- 39 • To the maximum extent feasible, vegetation removal and trimming will be scheduled during
40 the nonbreeding season of birds (September 1–January 31). If vegetation removal cannot be
41 removed in accordance with this timeframe, preconstruction/preactivity surveys for nesting
42 birds and additional protective measures will be implemented as described below.
 - 43 • A qualified wildlife biologist with knowledge of the relevant species will conduct nesting
44 surveys before the start of construction. A minimum of three separate surveys will be
conducted within 30 days prior to construction, with the last survey within 3 days prior to

1 construction. Surveys will include a search of all suitable nesting habitat in the construction
2 area. In addition, a 500-foot radius around the construction area, where accessible, will be
3 surveyed for nesting raptors and species of special concern (except the Modesto song
4 sparrow), and an area within 50 feet of construction will be surveyed for other non-special
5 status nesting birds or birds protected by the MBTA. If no active nests are detected during
6 these surveys, no additional measures are required.

- 7 • If active nests are found in the survey area, no-disturbance buffers will be established
8 around the nest sites to avoid disturbance or destruction of the nest site until the end of the
9 breeding season (approximately September 1) or until a qualified wildlife biologist
10 determines that the young have fledged and moved out of the project area (this date varies
11 by species). A qualified wildlife biologist will monitor construction activities in the vicinity
12 of the nests to ensure that construction activities do not affect nest success. The extent of the
13 buffers will be determined by DWR biologists in consultation with USFWS and CDFW and
14 will depend on the level of noise or construction disturbance, line-of-sight between the nest
15 and the disturbance, ambient levels of noise and other disturbances, and other
16 topographical or artificial barriers. Suitable buffer distances may vary between species.

17 **Impact BIO-76: Fragmentation of Least Bell's Vireo and Yellow Warbler Habitat**

18 Grading, filling, contouring, and other initial ground-disturbing operations may temporarily
19 fragment modeled least Bell's vireo and yellow warbler habitat. This could temporarily reduce the
20 affected habitat's extent and functions, including exposure to cowbird parasitism, a nest parasite of
21 both species. Preconstruction surveys under *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
22 *Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, Conduct
23 Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would identify any
24 nesting pairs and the potential for habitat fragmentation to affect either species. If a nesting *pair* of
25 either species were detected where fragmentation has occurred, nests would be monitored for edge
26 effects or other effects caused by the disturbance. The habitat would be adaptively managed to avoid
27 or minimize impacts (e.g., cowbird control) under CM11, which includes the control of nonnative
28 predators through habitat manipulation techniques or trapping to reduce nest predation.

29 **NEPA Effects:** Because there are only two recent occurrences of least Bell's vireo within the Plan
30 Area, and no occurrences of yellow warbler breeding in the Plan Area, habitat fragmentation
31 resulting from ground-disturbing operations is not expected to affect either species. If nesting pairs
32 of either species were detected where fragmentation has occurred, nests would be monitored for
33 edge effects or other effects caused by the disturbance. The habitat would be adaptively managed to
34 avoid or minimize impacts (e.g., cowbird control) under CM11. Therefore, habitat fragmentation as a
35 result of Alternative 1A would not have an adverse effect on least Bell's vireo or yellow warbler.

36 **CEQA Conclusion:** Because there are only two recent occurrences of least Bell's vireo within the Plan
37 Area, and no occurrences of yellow warbler breeding in the Plan Area, habitat fragmentation
38 resulting from ground-disturbing operations would not be expected to substantially modify habitat
39 or result in the direct mortality of special status species. If nesting pairs of either species were
40 detected where fragmentation has occurred, nests would be monitored for edge effects or other
41 effects caused by the disturbance. The habitat would be adaptively managed to avoid or minimize
42 impacts (e.g., cowbird control) under CM11. Therefore, habitat fragmentation as a result of
43 Alternative 1A would have a less-than-significant impact on least Bell's vireo and yellow warbler.

1 **Impact BIO-77: Effects on Least Bell's Vireo and Yellow Warbler Associated with Electrical**
 2 **Transmission Facilities**

3 Both least Bell's vireo and yellow warbler typically occur in early to mid-successional riparian
 4 habitat, which is used to meet all of its life requisites. Least Bell's vireo are rarely observed in open
 5 habitats away from riparian vegetation. Neither species form flocks and individuals generally
 6 remain at or below the riparian canopy, below the height of proposed transmission lines (see BDCP
 7 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). The
 8 behavior and habitat requirements of least Bell's vireo and yellow warbler make collision with the
 9 proposed transmission lines unlikely. *AMM30 Transmission Line Design and Alignment Guidelines*,
 10 would ensure that the transmission lines, poles, and towers are designed to avoid sensitive
 11 terrestrial habitats (including riparian) to the maximum extent feasible, which would minimize the
 12 potential for collision. Marking transmission lines with flight diverters that make the lines more
 13 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
 14 1995). For example, Yee (2008) estimated that marking devices in the Central Valley could reduce
 15 avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new project transmission
 16 lines would be fitted with flight diverters which would substantially reduce any potential for
 17 mortality of least Bell's vireo or yellow warbler individuals from powerline collisions.

18 **NEPA Effects:** Installation and presence of new transmission lines would not result in an adverse
 19 effect on least Bell's vireo or yellow warbler because the probability of bird-powerline strikes is
 20 unlikely due to the behavior and habitat requirements of these species. *AMM30 Transmission Line*
 21 *Design and Alignment Guidelines* would avoid impacts on riparian habitat to the maximum extent
 22 feasible, which would minimize the potential for collision. *AMM20 Greater Sandhill Crane* contains
 23 the commitment to place bird strike diverters on all new powerlines, which would substantially
 24 reduce the risk of mortality from bird strike for least Bell's vireo and yellow warbler from the
 25 project. Therefore, the construction and operation of new transmission lines would not result in an
 26 adverse effect on least Bell's vireo or yellow warbler.

27 **CEQA Conclusion:** Installation and presence of new transmission lines would result in less-than-
 28 significant impact on least Bell's vireo or yellow warbler because the probability of bird-powerline
 29 strikes is unlikely due to the behavior and habitat requirements of these species. *AMM30*
 30 *Transmission Line Design and Alignment Guidelines* would avoid impacts on riparian habitat to the
 31 maximum extent feasible, which would minimize the potential for collision. *AMM20 Greater Sandhill*
 32 *Crane* contains the commitment to place bird strike diverters on all new powerlines, which would
 33 substantially reduce the risk of mortality from bird strike for least Bell's vireo and yellow warbler
 34 from the project. Therefore, the construction and operation of new transmission lines would result
 35 in a less-than-significant impact on least Bell's vireo or yellow warbler.

36 **Impact BIO-78: Indirect Effects of Plan Implementation on Least Bell's Vireo and Yellow**
 37 **Warbler**

38 **Indirect Construction- and Operation-Related Effects:** If least Bell's vireo or yellow warbler were
 39 to nest in or adjacent to work areas, construction and subsequent maintenance-related noise and
 40 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
 41 functions of suitable nesting habitat for these species. Construction noise above background noise
 42 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
 43 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
 44 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine

1 the extent to which these noise levels could affect least Bell's vireo or yellow warbler. *AMM22 Suisun*
 2 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would reduce
 3 the potential for adverse effects of construction-related activities on survival and productivity of
 4 nesting least Bell's vireo and a 500 foot no-disturbance buffer would be established around the
 5 active nest. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
 6 *Disturbance of Nesting Birds*, would be available to reduce the potential for adverse effects of
 7 construction-related activities on nesting yellow warbler. The use of mechanical equipment during
 8 water conveyance facilities construction could cause the accidental release of petroleum or other
 9 contaminants that could affect least Bell's vireo and yellow warbler in the surrounding habitat. The
 10 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an
 11 adverse effect on these species. *AMM2 Construction Best Management Practices and Monitoring*
 12 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff
 13 from the construction area and negative effects of dust on active nests.

14 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
 15 mercury in avian species, including the least Bell's vireo and yellow warbler. Marsh (tidal and
 16 nontidal) and floodplain restoration have the potential to increase exposure to methylmercury.
 17 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
 18 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains
 19 (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas could
 20 increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of
 21 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of
 22 uncertainty with respect to species-specific effects. Increased methylmercury associated with
 23 natural community and floodplain restoration could indirectly affect least Bell's vireo and yellow
 24 warbler, via uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

25 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
 26 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
 27 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
 28 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
 29 adaptive management as described in CM12 would be available to address the uncertainty of
 30 methylmercury levels in restored tidal marsh and potential impacts on least Bell's vireo and yellow
 31 warbler.

32 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 33 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 34 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 35 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 36 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 37 classes within a species. In addition, the effect of selenium on a species can be confounded by
 38 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 39 2009).

40 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
 41 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the trophic level
 42 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
 43 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
 44 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
 45 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies

1 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
2 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
3 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
4 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
5 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
6 have a higher risk of selenium toxicity.

7 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
8 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
9 exacerbate bioaccumulation of selenium in avian species, including least Bell's vireo and yellow
10 warbler, and floodplain restoration has the potential to mobilize selenium and, therefore, to increase
11 avian exposure from ingestion of prey items with elevated selenium levels. Thus, Alternative 1A
12 restoration activities that create newly inundated areas could increase bioavailability of selenium
13 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
14 concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to Existing
15 Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases
16 in selenium concentrations in water in the Delta under any alternative. However, it is difficult to
17 determine whether the effects of potential increases in selenium bioavailability associated with
18 restoration-related conservation measures (CM4 and CM5) would lead to adverse effects on least
19 Bell's vireo and yellow warbler.

20 Because of the uncertainty that exists at this programmatic level of review, there could be a
21 substantial effect on least Bell's vireo and yellow warbler from increases in selenium associated with
22 restoration activities. This effect would be addressed through the implementation of *AMM27*
23 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
24 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
25 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
26 selenium management to reduce selenium concentrations and/or bioaccumulation would be
27 evaluated separately for each restoration effort as part of design and implementation. This
28 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
29 design schedule.

30 **NEPA Effects:** Impacts of noise, the potential for hazardous spills, increased dust and sedimentation,
31 and operations and maintenance of the water conveyance facilities on least Bell's vireo would not be
32 adverse with the implementation of *AMM1-AMM7*, and *AMM22 Suisun Song Sparrow, Yellow-*
33 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure *BIO-75, Conduct*
34 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
35 address potential effects on nesting yellow warblers.

36 Tidal habitat restoration could result in increased exposure of least Bell's vireo and yellow warbler
37 to selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
38 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
39 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

40 The implementation of tidal natural communities restoration or floodplain restoration could result
41 in increased exposure of least Bell's vireo or yellow warbler to methylmercury, should they begin to
42 nest in the study area. However, it is unknown what concentrations of methylmercury are harmful
43 to these species. Site-specific restoration plans that address the creation and mobilization of
44 mercury, as well as monitoring and adaptive management as described in *CM12 Methylmercury*

1 *Management*, would be available to address the uncertainty of methylmercury levels in restored
2 tidal marsh and potential effects of methylmercury on least Bell's vireo and yellow warbler.

3 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
4 operations and maintenance of the water conveyance facilities would have a less-than-significant
5 impact on least Bell's vireo and yellow warbler with the implementation of *AMM2 Construction Best*
6 *Management Practices and Monitoring*, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least*
7 *Bell's Vireo*, *Western Yellow-Billed Cuckoo*, and Mitigation Measure BIO-75, *Conduct Preconstruction*
8 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*.

9 Tidal habitat restoration could result in increased exposure of least Bell's vireo and yellow warbler
10 to selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
11 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
12 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. With
13 implementation of AMM27, potential increased selenium exposure would result in no adverse effect
14 on the species.

15 The implementation of tidal natural communities restoration or floodplain restoration could result
16 in increased exposure of least Bell's vireo or yellow warbler to methylmercury, should they begin to
17 nest in the study area. However, it is unknown what concentrations of methylmercury are harmful
18 to these species. Sites-specific restoration plans that address the creation and mobilization of
19 mercury, as well as monitoring and adaptive management as described in *CM12 Methylmercury*
20 *Management*, would be available to address the uncertainty of methylmercury levels in restored
21 tidal marsh and potential impacts on least Bell's vireo and yellow warbler.

22 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
23 **Disturbance of Nesting Birds**

24 See Mitigation Measure BIO-75 under Impact BIO-75.

25 **Impact BIO-79: Periodic Effects of Inundation of Least Bell's Vireo and Yellow Warbler**
26 **Habitat as a Result of Implementation of Conservation Components**

27 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
28 duration of inundation of approximately 48-85 acres of modeled least Bell's vireo and yellow
29 warbler habitat in CZ 2. No adverse effects of increased inundation frequency on least Bell's vireo,
30 yellow warbler, or their habitat would be expected, because riparian vegetation supporting habitat
31 has persisted under the existing Yolo Bypass flooding regime and changes to frequency and
32 inundation would be within the tolerance of these vegetation types.

33 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,
34 construction of setback levees could result in periodic inundation of up to 148 acres of modeled
35 least Bell's vireo and yellow warbler habitat in CZ 7. Inundation of restored floodplains would not be
36 expected to affect least Bell's vireo, yellow warbler, or their habitat because the breeding period is
37 outside the period when floodplains would likely be inundated. Additionally, periodic inundation of
38 floodplains would be expected to restore a more natural flood regime in support of riparian
39 vegetation types that support least Bell's vireo and yellow warbler habitat. The overall effect of
40 seasonal inundation in existing riparian natural communities would be beneficial, because,
41 historically, flooding was the main natural disturbance regulating ecological processes in riparian
42 areas, and flooding promotes the germination and establishment of many native riparian plants.

1 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85 acres
2 (CM2) and 148 acres (CM5) of modeled habitat for least Bell’s vireo and yellow warbler. However,
3 periodic inundation would not result in an adverse effect on least Bell’s vireo or yellow warbler
4 because inundation would occur primarily during the nonbreeding season and would promote a
5 more natural flood regime in support of habitat for these species.

6 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85
7 acres (CM2) and 148 acres (CM5) of modeled habitat for least Bell’s vireo and yellow warbler.
8 However, periodic inundation would have a less-than-significant impact on least Bell’s vireo or
9 yellow warbler because inundation would occur during the nonbreeding season and would not be
10 expected to adversely modify habitat or result in direct mortality of either species. Flooding
11 promotes the germination and establishment of many native riparian plants. Therefore, the overall
12 impact of seasonal inundation in existing riparian natural communities would be beneficial for least
13 Bell’s vireo and yellow warbler.

14 **Suisun Song Sparrow and Saltmarsh Common Yellowthroat**

15 This section describes the effects of Alternative 1A on Suisun song sparrow and saltmarsh common
16 yellowthroat. The habitat model used to assess effects for these species is based on primary
17 breeding habitat and secondary habitat. Suisun song sparrow primary breeding habitat consists of
18 all *Salicornia*-dominated tidal brackish emergent wetland and all *Typha*-, *Scirpus*-, and *Juncus*-
19 dominated tidal freshwater emergent wetland in the Plan Area west of Sherman Island, with the
20 exception that *Scirpus acutus* and *S. californicus* plant communities (low marsh) and all of the plant
21 communities listed below that occur in managed wetlands were classified as secondary habitat.
22 Upland transitional zones, providing refugia during high tides, within 150 feet of the wetland edge
23 were also included as secondary habitat. Secondary habitats generally provide only a few ecological
24 functions such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland
25 transition zones), while primary habitats provide multiple functions, including breeding, effective
26 predator cover, and valuable forage. Construction and restoration associated with Alternative 1A
27 conservation measures would result in both temporary and permanent losses of Suisun song
28 sparrow and saltmarsh common yellowthroat modeled habitat as indicated in Table 12-1A-34. The
29 majority of the losses would take place over an extended period of time as tidal marsh is restored in
30 the study area. Full implementation of Alternative 1A would also include the following conservation
31 actions over the term of the BDCP to benefit the Suisun song sparrow (BDCP Chapter 3, Section 3.3,
32 *Biological Goals and Objectives*).

- 33 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at
34 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
35 with CM4).
- 36 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
37 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3)
- 38 ● Protect at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area
39 (Objective GNC1.4, associated with CM3)

40 As explained below, with the restoration and protection of these amounts of habitat, in addition to
41 natural community enhancement and management commitments (including *CM12 Methylmercury*
42 *Management*) and implementation of AMM1–AMM7, *AMM22 Suisun Song Sparrow, Yellow-Breasted*
43 *Chat, Least Bell’s Vireo, Western Yellow-Billed Cuckoo*, and mitigation to minimize potential effects,

1 impacts on Suisun song sparrow and saltmarsh common yellowthroat would not be adverse for
2 NEPA purposes and would be less than significant for CEQA purposes.

3 **Table 12-1A-34. Changes in Suisun Song Sparrow Saltmarsh Common Yellowthroat Modeled**
4 **Habitat Associated with Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
CM2–CM18	Primary	54	55	0	0	0	0
	Secondary	1,098	3,633	0	0	0	0
Total Impacts CM2–CM18		1,152	3,688	0	0	0	0
TOTAL IMPACTS		1,152	3,688	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

5

6 **Impact BIO-80: Loss or Conversion of Habitat for and Direct Mortality of Suisun Song Sparrow**
7 **and Saltmarsh Common Yellowthroat**

8 Alternative 1A conservation measures would result in the permanent loss of up to 3,688 acres of
9 Suisun song sparrow and saltmarsh common yellowthroat habitat, which would include the
10 conversion of 55 acres of primary habitat to secondary low marsh, and the conversion of 123 acres
11 of secondary habitat to middle or high marsh (Table 12-1A-34). The only conservation measure that
12 would affect modeled habitat for Suisun song sparrow and saltmarsh common yellowthroat is *CM4*
13 *Tidal Natural Communities Restoration*. Habitat enhancement and management activities (CM11),
14 which include ground disturbance or removal of nonnative vegetation, could also result in local
15 adverse habitat effects. Each of these individual activities is described below. A summary statement
16 of the combined impacts and NEPA effects, and a CEQA conclusion follow the individual
17 conservation measure discussions.

- 18 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would
19 permanently remove approximately 3,510 acres of modeled secondary Suisun song sparrow and
20 saltmarsh common yellowthroat habitat from CZ 11 (Table 12-1A-34). In addition, 55 acres of
21 primary habitat would be converted to secondary low marsh, and 123 acres of secondary
22 habitat would be converted to middle or high marsh. Most areas proposed for removal would be
23 managed wetlands that serve as relatively marginal habitat for Suisun song sparrow and
24 saltmarsh common yellowthroat, which primarily use brackish tidal wetlands. Approximately

1 2% of primary habitat for these species would be converted to foraging habitat. Full
2 implementation of CM4 would restore or create at least 6,000 acres of tidal brackish emergent
3 wetland natural community in CZ 11, which would be expected to support Suisun song sparrow
4 and saltmarsh common yellowthroat habitat. It is expected that restoring tidal wetland
5 communities that are self-sustaining and not reliant on ongoing management actions necessary
6 to maintain the existing managed wetland habitats would better ensure the long-term viability
7 of these populations. Furthermore, effects of tidal habitat restoration on sparrow and
8 yellowthroat abundance and distribution would be monitored, and the restoration of tidal
9 habitat would be sequenced and located in a manner that minimizes effects on occupied habitats
10 until functional habitats were restored (see BDCP Chapter 3, Section 3.4.5, *CM4 Tidal Natural*
11 *Communities Restoration*, and Section 3.6, *Adaptive Management and Monitoring Program*).

- 12 ● *CM11 Natural Communities Enhancement and Management*: Control of nonnative Suisun song
13 sparrow and saltmarsh common yellowthroat predators, if deemed necessary, would be
14 expected to reduce predation loss of nests and, consequently, increase and maintain the
15 abundance of Suisun song sparrow and saltmarsh common yellowthroat in restored tidal
16 habitats over the term of the BDCP. Habitat management- and enhancement-related activities
17 could disturb Suisun song sparrow or saltmarsh common yellowthroat nests if they are located
18 near work sites. The potential for these activities to have an adverse effect on Suisun song
19 sparrow would be avoided and minimized through *AMM22 Suisun Song Sparrow, Yellow-*
20 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure
21 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,
22 would be available to address these effects on saltmarsh common yellowthroat. A variety of
23 *CM11 Natural Communities Enhancement and Management* habitat management actions that are
24 designed to enhance wildlife values in restored and protected tidal wetland habitats may result
25 in localized ground disturbances that could temporarily remove small amounts of Suisun song
26 sparrow and saltmarsh common yellowthroat habitat in CZ 11. Ground-disturbing activities,
27 such as removal of nonnative vegetation and road and other infrastructure maintenance
28 activities, are expected to have minor adverse effects on available species' habitat.
- 29 ● Operations and Maintenance: Postconstruction operation and maintenance of the restoration
30 infrastructure could result in ongoing but periodic disturbances that could affect Suisun song
31 sparrow and saltmarsh common yellowthroat use of the surrounding habitat in Suisun.
32 Maintenance activities could include vegetation management, and levee repair. These effects,
33 however, would be reduced by AMMs and conservation actions as described below.
- 34 ● Construction-related activities could result in nest destruction or disturbance resulting in
35 mortality of eggs and nestlings if restoration activities took place within the nesting period for
36 these species. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
37 *Yellow-Billed Cuckoo* would minimize these effects on Suisun song sparrow. Mitigation Measure
38 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,
39 would be available to address these effects on saltmarsh common yellowthroat. Grading, filling,
40 contouring, and other initial ground-disturbing operations during restoration activities could
41 temporarily fragment existing modeled tidal brackish emergent wetland habitat for Suisun song
42 sparrow and saltmarsh common yellowthroat which could temporarily reduce the extent and
43 functions of the affected habitat. These temporary effects would be minimized through
44 sequencing of restoration activities and through *AMM22 Suisun Song Sparrow, Yellow-Breasted*
45 *Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
3 included.

4 ***Near-Term Timeframe***

5 Under Alternative 1A, there would be no impacts resulting from the construction of the water
6 conveyance facilities (CM1). However, there would be a permanent loss of 1,040 acres of modeled
7 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in
8 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging
9 habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would
10 provide primary nesting habitat for these species. Although there would be a temporal lag in these
11 conversions, there would be no net loss of primary habitat in the near-term. These effects would
12 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun
13 Marsh in CZ 11.

14 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
15 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in
16 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
17 Using this ratio would indicate that 1,097 acres of tidal brackish emergent wetland should be
18 restored/created to compensate for the near-term losses of Suisun song sparrow and saltmarsh
19 common yellowthroat habitat.

20 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent
21 wetland and 4,800 acres of managed wetland in the Plan Area. These conservation actions are
22 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early
23 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and
24 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11
25 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh
26 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in BDCP Chapter
27 3, *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and
28 in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the
29 4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh
30 common yellowthroat through the enhancement of degraded areas to provide dense native
31 vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal
32 wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.
33 Larger and more interconnected patches of suitable habitat would be expected to reduce the effects
34 of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would
35 be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
36 Restoration would be sequenced over the term of the Plan and occur in a manner that would
37 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and
38 protection contained in the near-term Plan goals, and the incorporation of the additional measures
39 in the biological goals and objectives (BDCP Chapter 3) would be sufficient to mitigate the near-term
40 effects of tidal restoration.

41 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
42 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
43 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
44 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*

1 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
2 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
3 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
4 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
5 of the Final EIR/EIS. The saltmarsh common yellowthroat is not a species that is covered under the
6 BDCP. Although preconstruction surveys for Suisun song sparrow would likely also detect nesting
7 saltmarsh common yellowthroat, in order to avoid adverse effects on individuals, preconstruction
8 surveys for noncovered avian species would be required to ensure that saltmarsh common
9 yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would be available to
10 address the effect of construction activities on nesting saltmarsh common yellowthroat.

11 **Late Long-Term Timeframe**

12 The habitat model indicates that the study area supports approximately 3,722 acres of primary and
13 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.
14 Alternative 1A as a whole would result in the permanent loss of 3,688 acres of habitat (15% of the
15 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*
16 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary
17 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

18 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or
19 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)
20 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse
21 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh
22 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for
23 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,
24 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to
25 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This
26 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise
27 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be
28 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more
29 interconnected patches of suitable habitat would be expected to reduce the effects of habitat
30 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be
31 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
32 Restoration would be sequenced over the term of the Plan and occur in a manner that would
33 minimize any temporary, initial loss and fragmentation of habitat.

34 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
35 and protection actions discussed above could result in the restoration of 1,500 acres of primary
36 habitat and 4,500 acres of secondary habitat in addition to the protection of 384 acres of secondary
37 habitat for Suisun song sparrow, which would also benefit the saltmarsh common yellowthroat.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
39 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
40 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
41 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
42 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
43 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
44 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,

1 which have since been updated and which are provided in Appendix 3B, *Environmental*
2 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

3 **NEPA Effects:** The loss of Suisun song sparrow and saltmarsh common yellowthroat habitat and
4 potential direct mortality of these special-status species under Alternative 1A would represent an
5 adverse effect in the absence of other conservation actions. However, with habitat protection and
6 restoration associated with CM4, with the management and enhancement actions (CM11), and with
7 the incorporation of the additional measures in the biological goals and objectives, and AMM1–
8 AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*
9 *Billed Cuckoo*, which would be in place during all project activities, the effects of habitat loss and
10 potential mortality on Suisun song sparrow under Alternative 1A would not be adverse. The
11 saltmarsh common yellowthroat is not a species that is covered under the BDCP. Although
12 preconstruction surveys for Suisun song sparrow would likely also detect nesting saltmarsh
13 common yellowthroat, in order for the BDCP to avoid adverse effects on individuals, preconstruction
14 surveys for noncovered avian species would be required to ensure that saltmarsh common
15 yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would be available to
16 address this effect.

17 **CEQA Conclusion:**

18 ***Near-Term Timeframe***

19 Under Alternative 1A, there would be no impacts resulting from the construction of the water
20 conveyance facilities (CM1). However, there would be a permanent loss of 1,040 acres of modeled
21 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in
22 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging
23 habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would
24 provide primary nesting habitat for these species. Although there would be a temporal lag in these
25 conversions, there would be no net loss of primary habitat in the near-term. These effects would
26 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun
27 Marsh in CZ 11.

28 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
29 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in
30 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
31 Using this ratio would indicate that 1,097 acres of tidal brackish emergent wetland should be
32 restored/created to mitigate the near-term losses of Suisun song sparrow and saltmarsh common
33 yellowthroat habitat.

34 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent
35 wetland and 4,800 acres of managed wetland in the Plan Area. These conservation actions are
36 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early
37 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and
38 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11
39 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh
40 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in BDCP Chapter
41 3, *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and
42 in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the
43 4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh
44 common yellowthroat through the enhancement of degraded areas to provide dense native

1 vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal
2 wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.
3 Larger and more interconnected patches of suitable habitat would be expected to reduce the effects
4 of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would
5 be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
6 Restoration would be sequenced over the term of the Plan and occur in a manner that would
7 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and
8 protection contained in the near-term Plan goals, and the incorporation of the additional measures
9 in the biological goals and objectives (BDCP Chapter 3) would be sufficient to mitigate the near-term
10 effects of tidal restoration.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
15 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
16 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
17 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
18 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
19 of the Final EIR/EIS. The saltmarsh common yellowthroat is not a species that is covered under the
20 BDCP. Although preconstruction surveys for Suisun song sparrow would likely also detect nesting
21 saltmarsh common yellowthroat, in order to avoid adverse effects on individuals, preconstruction
22 surveys for noncovered avian species would be required to ensure that saltmarsh common
23 yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would reduce the potential
24 effect of construction activities on nesting saltmarsh common yellowthroat to less than significant.

25 Because the number of acres required to meet the typical mitigation ratio described above would be
26 only 3,590 acres of restored/created tidal natural communities, the 6,000 acres of tidal brackish and
27 tidal freshwater emergent wetland restoration and the 4,100 acres of managed wetland protection
28 and enhancement contained in the near-term Plan goals, and the additional detail in the biological
29 objectives for Suisun song sparrow, are more than sufficient to support the conclusion that the near-
30 term impacts of habitat loss and direct mortality of Suisun song sparrow or saltmarsh common
31 yellowthroat under Alternative 1A would be less than significant under CEQA.

32 **Late Long-Term Timeframe**

33 The habitat model indicates that the study area supports approximately 3,722 acres of primary and
34 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.
35 Alternative 1A as a whole would result in the permanent loss of 3,688 acres of habitat (15% of the
36 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*
37 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary
38 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

39 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or
40 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)
41 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse
42 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh
43 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for
44 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,

1 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to
2 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This
3 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise
4 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be
5 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more
6 interconnected patches of suitable habitat would be expected to reduce the effects of habitat
7 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be
8 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
9 Restoration would be sequenced over the term of the Plan and occur in a manner that would
10 minimize any temporary, initial loss and fragmentation of habitat.

11 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
12 and protection actions discussed above could result in the restoration of 1,500 acres of primary
13 habitat and 4,500 acres of secondary habitat in addition to the protection of 384 acres of secondary
14 habitat for Suisun song sparrow, which would also benefit the saltmarsh common yellowthroat.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
19 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
20 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
21 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
22 which have since been updated and which are provided in Appendix 3B, *Environmental*
23 *Commitments, AMMs, and CMs*, of the Final EIR/EIS. The saltmarsh common yellowthroat is not a
24 covered species under the BDCP. Although preconstruction surveys for Suisun song sparrow may
25 detect nesting saltmarsh common yellowthroat, for the BDCP to have a less-than-significant impact
26 on individuals, preconstruction surveys for noncovered avian species would be required to ensure
27 that saltmarsh common yellowthroat nests are detected and avoided. Mitigation Measure BIO-75
28 would reduce this potential impact on nesting saltmarsh common yellowthroat to a less-than-
29 significant level.

30 Considering these restoration provisions, which would replace low-value secondary habitat with
31 high-value tidal brackish emergent habitat, including both foraging and primary habitat, and provide
32 upland refugia for Suisun song sparrow and saltmarsh common yellowthroat, the acreages of
33 restoration would be sufficient to compensate for habitats lost to construction and restoration
34 activities. Loss of habitat or direct mortality through implementation of Alternative 1A, with the
35 implementation of AMM1-AMM7, AMM22, and Mitigation Measure BIO-75, *Conduct Preconstruction*
36 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would not result in a substantial adverse
37 effect through habitat modifications and would not substantially reduce the number or restrict the
38 range of the species. Therefore, the loss of habitat or potential mortality under this alternative
39 would have a less-than-significant impact on Suisun song sparrow and saltmarsh common
40 yellowthroat.

41 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
42 **Disturbance of Nesting Birds**

43 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-81: Indirect Effects of Plan Implementation on Suisun Song Sparrow and**
2 **Saltmarsh Common Yellowthroat**

3 **Indirect construction-related effects:** If Suisun song sparrow or saltmarsh common yellowthroat
4 were to nest in or adjacent to work areas, construction and subsequent maintenance-related noise
5 and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
6 functions of suitable nesting habitat for these species. Suisun song sparrow and saltmarsh common
7 yellowthroat habitat adjacent to restoration work areas could be affected by such disturbances,
8 which could temporarily result in diminished use of habitat. Construction noise above background
9 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
10 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
11 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
12 the extent to which these noise levels could affect either species. If construction occurred during the
13 nesting season, these indirect effects could result in the loss or abandonment of nests and mortality
14 of any eggs and/or nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*
15 *Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
16 *Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse effects of
17 construction-related activities on survival and productivity of Suisun song sparrow and saltmarsh
18 common yellowthroat by requiring preconstruction surveys and, if nests are present, the
19 establishment of a no-disturbance buffer within 250 feet of a nest site. The use of mechanical
20 equipment during water conveyance facilities construction could cause the accidental release of
21 petroleum or other contaminants that could affect species in the surrounding habitat. The
22 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an
23 adverse effect on Suisun song sparrow and saltmarsh common yellowthroat. *AMM2 Construction*
24 *Best Management Practices and Monitoring* would minimize the likelihood of such spills and ensure
25 that measures are in place to prevent runoff from the construction area and any adverse effects of
26 dust on active nests.

27 **Salinity:** Water conveyance facilities operations would have an effect on salinity gradients in Suisun
28 Marsh; however, these effects cannot be reasonably disaggregated from effects resulting from tidal
29 habitat restoration. It is expected that the salinity of water in Suisun Marsh would generally increase
30 as a result of water conveyance facilities operations and operations of salinity control gates to mimic
31 a more natural water flow. This would likely encourage the establishment of tidal wetland plant
32 communities tolerant of more saline environments, which should have a beneficial effect on Suisun
33 song sparrow and saltmarsh common yellowthroat because their historical natural Suisun Marsh
34 habitat is brackish tidal marsh. However, the degree to which salinity changes in all tidal channels
35 and sloughs in and around Suisun Marsh would be highly variable.

36 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
37 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
38 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
39 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
40 newly inundated areas could increase bioavailability of mercury. Although tidal habitat restoration
41 might increase methylation of mercury export to other habitats, restoration is unlikely to
42 significantly increase the exposure of methylmercury to Suisun song sparrow or saltmarsh common
43 yellowthroat, as they currently reside in tidal marshes where elevated methylmercury levels exist.
44 Robinson et al. (2011) found toxic levels of methylmercury levels in song sparrow populations from
45 southern San Francisco Bay, although populations near Suisun Marsh (i.e., San Pablo and Simas
46 Creeks) were much lower. The potential mobilization or creation of methylmercury within the study

1 area varies with site-specific conditions and would need to be assessed at the project level. The
2 Suisun Marsh Plan anticipates that restored tidal wetlands would generate less methylmercury than
3 the existing managed wetlands to be restored (Bureau of Reclamation et al. 2010).

4 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
5 into the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
6 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
7 project-specific basis, where high potential for methylmercury production is identified that
8 restoration design and adaptive management cannot fully address while also meeting restoration
9 objectives, alternate restoration areas will be considered. CM12 would be implemented in
10 coordination with other similar efforts to address mercury in the Delta, and specifically with the
11 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
12 following actions.

- 13 • Assess pre-restoration conditions to determine the risk that the project could result in increased
14 mercury methylation and bioavailability
- 15 • Define design elements that minimize conditions conducive to generation of methylmercury in
16 restored areas.
- 17 • Define adaptive management strategies that can be implemented to monitor and minimize
18 actual postrestoration creation and mobilization of methylmercury.

19 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
20 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
21 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
22 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
23 2009). The effect of selenium toxicity differs widely between species and also between age and sex
24 classes within a species. In addition, the effect of selenium on a species can be confounded by
25 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
26 2009).

27 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
28 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the trophic level
29 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
30 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
31 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
32 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
33 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
34 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
35 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
36 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
37 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
38 have a higher risk of selenium toxicity.

39 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
40 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
41 exacerbate bioaccumulation of selenium in avian species, including Suisun song sparrow and
42 saltmarsh common yellowthroat, and floodplain restoration has the potential to mobilize selenium
43 and, therefore, to increase avian exposure from ingestion of prey items with elevated selenium
44 levels. Thus, Alternative 1A restoration activities that create newly inundated areas could increase

1 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).
2 Changes in selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that,
3 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
4 long-term increases in selenium concentrations in water in the Delta under any alternative.
5 However, it is difficult to determine whether the effects of potential increases in selenium
6 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
7 lead to adverse effects on Suisun song sparrow and saltmarsh common yellowthroat.

8 Because of the uncertainty that exists at this programmatic level of review, there could be a
9 substantial effect on Suisun song sparrow and saltmarsh common yellowthroat from increases in
10 selenium associated with restoration activities. This effect would be addressed through the
11 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
12 restoration design elements to reduce the potential for bioaccumulation of selenium and its
13 bioavailability in tidal habitats (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*).
14 Furthermore, the effectiveness of selenium management to reduce selenium concentrations and/or
15 bioaccumulation would be evaluated separately for each restoration effort as part of design and
16 implementation. This avoidance and minimization measure would be implemented as part of the
17 tidal habitat restoration design schedule.

18 **NEPA Effects:** Noise and visual disturbances would not have an adverse effect on Suisun song
19 sparrow with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
20 *Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
21 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address potential effects
22 of noise and visual disturbance on saltmarsh common yellowthroat. AMM1–AMM7, including *AMM2*
23 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of spills, and
24 ensure that measures were in place to prevent runoff from the construction area and to avoid
25 negative effects of dust on the species.

26 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
27 habitat restoration would be expected to increase water salinity in Suisun Marsh, which would be
28 expected to establish tidal marsh similar to historic conditions.

29 Tidal habitat restoration is unlikely to have a substantial impact on Suisun song sparrow and
30 saltmarsh common yellowthroat through increased exposure to methylmercury, as these species
31 currently reside in tidal marshes where elevated methylmercury levels exist. However, it is
32 unknown what concentrations of methylmercury are harmful to the species and the potential for
33 increased exposure varies substantially within the study area. Implementation of CM12 which
34 contains measures to assess the amount of mercury before project development, followed by
35 appropriate design and adaptation management, would minimize the potential for increased
36 methylmercury exposure, and would result in no adverse effect on Suisun song sparrow and
37 saltmarsh common yellowthroat.

38 Tidal habitat restoration could result in increased exposure of Suisun song sparrow and saltmarsh
39 common yellowthroat to selenium. This effect would be addressed through the implementation of
40 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
41 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
42 habitats.

43 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
44 sedimentation, and operations and maintenance of the water conveyance facilities would be less

1 than significant with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
2 *Least Bell's Vireo, Western Yellow-Billed Cuckoo,* Mitigation Measure BIO-75, *Conduct Preconstruction*
3 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds,* and *AMM2 Construction Best*
4 *Management Practices and Monitoring.* Changes in salinity gradients would be expected to have a
5 beneficial impact on Suisun song sparrow and saltmarsh common yellowthroat through the
6 establishment of tidal marsh similar to historic conditions.

7 Tidal habitat restoration could result in increased exposure of Suisun song sparrow and saltmarsh
8 common yellowthroat to selenium. This effect would be addressed through the implementation of
9 *AMM27 Selenium Management,* which would provide specific tidal habitat restoration design
10 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
11 habitats. With implementation of AMM27, potential increased selenium exposure would result in no
12 adverse effect on these species.

13 The implementation of tidal natural communities restoration (CM4) is unlikely to significantly
14 increase the exposure of methylmercury to Suisun song sparrow or saltmarsh common
15 yellowthroat, as they currently reside in tidal marshes where elevated methylmercury levels exist.
16 However, it is unknown what concentrations of methylmercury are harmful to these species.
17 Implementation of CM12 which contains measures to assess the amount of mercury before project
18 development, followed by appropriate design and adaptation management, would minimize the
19 potential for increased methylmercury exposure, and would result in no adverse effect on Suisun
20 song sparrow and saltmarsh common yellowthroat. With these additional avoidance and
21 minimization measures, Mitigation Measure BIO-75, and *CM12 Methylmercury Management,* indirect
22 effects of Plan implementation would have a less-than-significant impact on Suisun song sparrow
23 and saltmarsh common yellowthroat.

24 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
25 **Disturbance of Nesting Birds**

26 See Mitigation Measure BIO-75 under Impact BIO-75.

27 **Impact BIO-82: Effects on Suisun Song Sparrow and Saltmarsh Common Yellowthroat**
28 **Associated with Electrical Transmission Facilities**

29 The range of the Suisun song sparrow extends eastward into the Plan Area to approximately Kimball
30 Island. There are several reported occurrences from Kimball Island, Browns Island, and in the
31 Suisun Marsh in the western portion of the Plan Area. The easternmost range of the saltmarsh
32 common yellowthroat also ends in Suisun Marsh. These species ranges, along with areas of suitable
33 habitat, are far from the proposed transmission line routes (BDCP Appendix 5.J, Attachment 5J.C,
34 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Location of the current
35 populations, species ranges, and suitable habitat in the plan area make collision with the proposed
36 transmission lines highly unlikely. Therefore the construction and presence of new transmission
37 lines would not have an adverse effect on Suisun song sparrow and saltmarsh common
38 yellowthroat.

39 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse
40 effect on Suisun song sparrow and saltmarsh common yellowthroat because the location of the
41 current populations, species ranges, and suitable habitat for the species make collision with the
42 proposed transmission lines highly unlikely.

1 **CEQA Conclusion:** The construction and presence of new transmission lines would not be expected
2 to have an adverse effect on Suisun song sparrow and saltmarsh common yellowthroat because the
3 location of the current populations, species ranges, and suitable habitat for the species make
4 collision with the proposed transmission lines highly unlikely. Therefore, the construction and
5 presence of new transmission lines under Alternative 1A would have a less-than-significant impact
6 on Suisun song sparrow and saltmarsh common yellowthroat.

7 **Swainson's Hawk**

8 This section describes the effects of Alternative 1A, including water conveyance facilities
9 construction and implementation of other conservation components, on Swainson's hawk. The
10 habitat model used to assess impacts on Swainson's hawk includes plant alliances and land cover
11 types associated with Swainson's hawk nesting and foraging habitat. Construction and restoration
12 associated with Alternative 1A conservation measures would result in both temporary and
13 permanent losses of Swainson's hawk modeled habitat as indicated in Table 12-1A-35. The majority
14 of the losses would take place over an extended period of time as tidal marsh is restored in the study
15 area. Although protection and restoration for the loss of nesting and foraging habitat would be
16 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)
17 for restored habitats to replace the functions of habitat lost. This time lag between impacts and
18 restoration of habitat function would be minimized through specific requirements of *AMM18*
19 *Swainson's Hawk*, including transplanting mature trees in the near-term time period. Full
20 implementation of Alternative 1A would also include the following conservation actions over the
21 term of the BDCP to benefit the Swainson's hawk (BDCP Chapter 3, Section 3.3, *Biological Goals and*
22 *Objectives*).

- 23 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
24 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
25 associated with CM7)
- 26 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
27 10 (Objective VFRNC1.2, associated with CM3).
- 28 ● Plant and maintain native trees along roadsides and field borders within protected cultivated
29 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 30 ● Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey
31 populations throughout protected cultivated lands (Objective SH2.2, associated with CM3).
- 32 ● Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,
33 VPNC2.5, and GNC2.4, associated with CM11).
- 34 ● Conserve at least 1 acre of Swainson's hawk foraging habitat for each acre of lost foraging
35 habitat (Objective SH1.1, associated with CM3).
- 36 ● Protect at least 42,275 acres of cultivated lands as Swainson's hawk foraging habitat with at
37 least 50% in very high-value habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated
38 with CM3).
- 39 ● Of the at least 42,275 acres of cultivated lands protected as Swainson's hawk foraging habitat
40 under Objective SH1.2, up to 1,500 acres can occur in CZs 5 and 6, and must have land surface
41 elevations greater than -1 foot NAVD88 (Objective SH1.3, associated with CM3).

- 1 • Protect at least 10,750 acres of grassland, vernal pool, and alkali seasonal wetland as Swainson’s
2 hawk foraging habitat (Objective SH1.4, associated with CM3).
- 3 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
4 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 5 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
6 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
7 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
8 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

9 As explained below, with the restoration or protection of these amounts of habitat, in addition to
10 management activities that would enhance these natural communities for the species and
11 implementation of AMM1–AMM7, and *AMM18 Swainson’s Hawk*, impacts on Swainson’s hawk would
12 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

13 **Table 12-1A-35. Changes in Swainson’s Hawk Modeled Habitat Associated with Alternative 1A**
14 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	18	18	16	16	NA	NA
	Foraging	3,295	3,295	1,429	1,429	NA	NA
Total Impacts CM1		3,313	3,313	1,445	1,445	NA	NA
CM2–CM18	Nesting	252	412	54	85	41–70	189
	Foraging	8,903	48,511	504	1,540	3,025–6,635	8,008
Total Impacts CM2–CM18		9,155	48,923	558	1,625	3,066–6,705	8,197
Total Nesting		270	430	70	101	41–70	189
Total Foraging		12,198	51,806	1,949	2,985	3,025–6,635	8,008
TOTAL IMPACTS		12,468	52,236	2,019	3,070	3,066–6,705	8,197

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

15

16 **Impact BIO-83: Loss or Conversion of Habitat for and Direct Mortality of Swainson’s Hawk**

17 Alternative 1A conservation measures would result in the combined permanent and temporary loss
18 of up to 55,322 acres of modeled habitat (531 acres of nesting habitat and 54,791 acres of foraging
19 habitat) for Swainson’s hawk (Table 12-1A-35). Conservation measures that would result in these

1 losses are conveyance facilities and transmission line construction, and establishment and use of
 2 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration
 3 (CM4), floodplain restoration (CM5), riparian restoration, (CM7), grassland restoration (CM8),
 4 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of
 5 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which
 6 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.
 7 In addition, maintenance activities associated with the long-term operation of the water conveyance
 8 facilities and other BDCP physical facilities could affect Swainson’s hawk modeled habitat. Each of
 9 these individual activities is described below. A summary statement of the combined impacts and
 10 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 11 • *CM1 Water Facilities and Operation:* Construction of Alternative 1A water conveyance facilities
 12 would result in the combined permanent and temporary loss of up to 34 acres of Swainson’s
 13 hawk nesting habitat (18 acres of permanent loss and 16 acres of temporary loss). In addition,
 14 4,740 acres of foraging habitat would be removed (3,295 acres of permanent loss, 1,445 acres of
 15 temporary loss). Activities that would impact modeled Swainson’s hawk habitat consist of
 16 tunnel, forebay, and intake construction, temporary access roads, and construction of
 17 transmission lines. Most of the permanent loss would occur where Intakes 1–5 impact the
 18 Sacramento River’s east bank between Freeport and Courtland. The riparian areas here are very
 19 small patches, some dominated by valley oak and others by nonnative trees. Temporary losses
 20 would occur where pipelines cross Snodgrass Slough and other small waterways east of the
 21 Sacramento River, and where temporary work areas surround intake sites. The riparian habitat
 22 in these areas is also composed of very small patches or stringers bordering waterways, which
 23 are composed of valley oak and scrub vegetation. There are at least 17 occurrences of nesting
 24 Swainson’s hawk that overlap with the construction footprint of CM1, primarily from the
 25 construction footprint of the permanent and temporary transmission lines, intake 5 and other
 26 intake work areas. The implementation of *AMM18 Swainson’s Hawk*, would require
 27 preconstruction surveys and the establishment of no-disturbance buffers and would minimize
 28 potential effects on nesting Swainson’s hawks present within or adjacent to construction areas.
 29 Permanent foraging habitat impacts from CM1 would include 914 acres of very high-value
 30 foraging habitat (alfalfa; Table 12-1A-36). Impacts from CM1 would occur in the central Delta in
 31 CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8. Refer to the Terrestrial Biology Map Book for a detailed view of
 32 Alternative 1A construction locations. Impacts from CM1 would occur within the first 10 years
 33 of Plan implementation.

34 **Table 12-1A-36. Acres of Impacted Swainson’s Hawk Foraging Habitat by Value Classes**

Foraging Habitat Value Class	Cultivated Land and Other Land Cover Types	CM1 Permanent (temporary)	CM2–CM18 Permanent (temporary)
Very high	Alfalfa hay	914 (131)	13,898 (432)
Moderate	Irrigated pasture, other hay crops, tomatoes, grain crops (wheat, barley, oats), fallow fields	459 (393)	15,136 (477)
Low	Other irrigated field and truck crops, dry pasture, grasslands, alkali seasonal wetlands, vernal pool complex, sudan	735 (418)	10,535 (349)
Very low	Safflower, sunflower, corn, grain sorghum, managed wetlands	1,187 (488)	8,943 (281)

- 1 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
2 would result in the combined permanent and temporary loss of up to 133 acres of nesting
3 habitat (79 acres of permanent loss, 54 acres of temporary loss) in the Yolo Bypass in CZ 2. In
4 addition, 1,500 acres of foraging habitat would be removed (996 acres of permanent loss, 554
5 acres of temporary loss). Activities through CM2 could involve excavation and grading in
6 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
7 riparian losses would occur at the north end of Yolo Bypass where major fish passage
8 improvements are planned. Excavation to improve water movement in the Toe Drain and in the
9 Sacramento Weir would also remove Swainson's hawk habitat. The loss is expected to occur
10 during the first 10 years of Alternative 1A implementation.
- 11 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
12 inundation would permanently remove an estimated 295 acres of Swainson's hawk nesting
13 habitat and 37,359 acres of foraging habitat. The majority of the acres lost would consist of
14 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity
15 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,
16 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
17 directly impact and fragment grassland just north of Rio Vista in and around French and
18 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
19 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
20 the northern fringes of Suisun Marsh. Impacts on foraging habitat from CM4 would consist of
21 10,757 acres of very high-value (alfalfa), 11,706 acres of moderate-value, and 7,973 acres of
22 low-value habitat (See Table 12-1A-36 for land cover types classified by habitat value). Because
23 the species is highly mobile and wide-ranging, habitat fragmentation is not expected to reduce
24 the use of remaining cultivated lands or preclude access to surrounding lands. However, the
25 conversion of cultivated lands to tidal wetlands over fairly broad areas within the tidal
26 restoration footprints could result in the removal or abandonment of nesting territories that
27 occur within or adjacent to the restoration areas. Trees would not be actively removed but tree
28 mortality would be expected over time as areas became tidally inundated. Depending on the
29 extent and value of remaining habitat, this could reduce the local nesting population. There are
30 at least 27 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for
31 CM4, suggesting that numerous nest sites could be directly affected by inundation from tidal
32 restoration activities.
- 33 • *CM5 Seasonally Inundated Floodplain Restoration* Construction of setback levees to restore
34 seasonally inundated floodplain and riparian restoration actions would remove approximately
35 69 acres of Swainson's hawk nesting habitat (38 acres of permanent loss, 31 acres of temporary
36 loss) and 2,856 acres of foraging habitat (1,820 acres of permanent loss, 1,036 acres of
37 temporary loss). These losses would be expected after the first 10 years of Alternative 1A
38 implementation along the San Joaquin River and other major waterways in CZ 7.
- 39 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
40 approximately 953 acres of Swainson's hawk foraging habitat as part of tidal restoration and
41 3,991 acres as part of seasonal floodplain restoration through CM7. There are at least 27
42 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for CM7.
- 43 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
44 implemented on agricultural lands and would result in the conversion of 1,849 acres of
45 Swainson's hawk agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,

1 and 11. If agricultural lands supporting higher value foraging habitat than the restored
2 grassland were removed, there would be a loss of Swainson's hawk foraging habitat value.

- 3 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would
4 result in the permanent removal of 1,440 acres of Swainson's hawk foraging habitat in CZ 2 and
5 CZ 4. Small patches of riparian vegetation that support Swainson's hawk nesting habitat may
6 develop along the margins of restored nontidal marsh if appropriate site conditions are present.
- 7 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
8 enhancement-related activities could disturb Swainson's hawk nests if they were present near
9 work sites. A variety of habitat management actions that are designed to enhance wildlife values
10 in BDCP-protected habitats may result in localized ground disturbances that could temporarily
11 remove small amounts of Swainson's hawk habitat and reduce the functions of habitat until
12 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
13 and road and other infrastructure maintenance, are expected to have minor effects on available
14 Swainson's hawk habitat and are expected to result in overall improvements to and
15 maintenance of habitat values over the term of the BDCP. These effects cannot be quantified, but
16 are expected to be minimal and would be avoided and minimized by the AMMs listed below.
17 CM11 would also include the construction of recreational-related facilities including trails,
18 interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal*
19 *Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms,
20 etc. would be placed on existing, disturbed areas when and where possible. However,
21 approximately 50 acres of Swainson's hawk grassland foraging habitat would be lost from the
22 construction of trails and facilities.
- 23 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
24 Swainson's hawk foraging habitat for the development of a delta and longfin smelt conservation
25 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.
26 Permanent and temporary nesting habitat losses from the above conservation measures, would
27 primarily consist of small, fragmented riparian stands. Temporarily affected nesting habitat
28 would be restored as riparian habitat within 1 year following completion of construction
29 activities. The restored riparian habitat would require 1 to several decades to functionally
30 replace habitat that has been affected and for trees to attain sufficient size and structure suitable
31 for nesting by Swainson's hawks. *AMM18 Swainson's Hawk* contains actions described below to
32 reduce the effect of temporal loss of nesting habitat, including the transplanting of mature trees
33 and planting of trees near high-value foraging habitat. The functions of cultivated lands and
34 grassland communities that provide foraging habitat for Swainson's hawk would be restored
35 relatively quickly.
- 36 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
37 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
38 disturbances that could affect Swainson's hawk use of the surrounding habitat. Maintenance
39 activities would include vegetation management, levee and structure repair, and re-grading of
40 roads and permanent work areas. These effects, however, would be reduced by AMM1-AMM7
41 and *AMM18 Swainson's Hawk* in addition to conservation actions as described below.
- 42 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
43 direct mortality of adult or fledged Swainson's hawk if they were present in the Plan Area,
44 because they would be expected to avoid contact with construction and other equipment.
45 However, if Swainson's hawk were to nest in the construction area, construction-related

1 activities, including equipment operation, noise and visual disturbances could affect nests or
2 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects
3 would be avoided and minimized with the incorporation of *AMM18 Swainson's Hawk* into the
4 BDCP.

5 The following paragraphs summarize the combined effects discussed above and describe other
6 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
7 included.

8 ***Near-Term Timeframe***

9 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
10 the near-term BDCP conservation strategy has been evaluated to determine whether it would
11 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
12 the effect of construction would not be adverse under NEPA. The Plan would remove 340 acres (270
13 permanent, 70 temporary) of Swainson's hawk nesting habitat in the study area in the near-term.
14 These effects would result from the construction of the water conveyance facilities (CM1, 34 acres),
15 and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal*
16 *Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7*
17 *Riparian Natural Community Restoration*—306 acres). In addition, 14,147 acres of Swainson's hawk
18 foraging habitat would be removed or converted in the near-term (CM1, 4,740 acres; *CM2 Yolo*
19 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5, Seasonally*
20 *Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland*
21 *Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*,
22 *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—
23 9,407 acres).

24 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and
25 those that are identified in the biological goals and objectives for Swainson's hawk in Chapter 3 of
26 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
27 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 34
28 acres of nesting habitat should be restored/created and 34 acres should be protected to compensate
29 for the CM1 losses of Swainson's hawk nesting habitat. In addition, 4,740 acres of foraging habitat
30 should be protected to mitigate the CM1 losses of Swainson's hawk foraging habitat. The near-term
31 effects of other conservation actions would remove 306 acres of modeled nesting habitat, and
32 therefore require 306 acres of restoration and 306 acres of protection of nesting habitat. Similarly,
33 the near-term effects of other conservation actions would remove 9,407 acres of modeled foraging
34 habitat, and therefore require 9,407 acres of protection of foraging habitat using the same typical
35 NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting habitat; 1:1
36 protection for the loss of foraging habitat).

37 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
38 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
39 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
40 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
41 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3). These
42 conservation actions are associated with CM3, CM5, CM7, and CM8, and would occur in the same
43 timeframe as the construction and early restoration losses.

1 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
2 system with extensive wide bands or large patches of valley/foothill riparian natural community
3 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
4 restoration would expand the patches of existing riparian forest in order to support nesting habitat
5 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be
6 increased by planting and maintaining native trees along roadsides and field borders within
7 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small
8 but essential nesting habitat for Swainson's hawk associated with cultivated lands would also be
9 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
10 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

11 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
12 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
13 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
14 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
15 would provide foraging habitat for Swainson's hawk and reduce the effects of current levels of
16 habitat fragmentation. Small mammal populations would also be increased on protected lands,
17 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
18 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through
19 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within
20 protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other
21 uncultivated areas would also be protected and maintained as part of the cultivated lands reserve
22 system which would provide additional foraging habitat and a source of rodent prey that could
23 recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including
24 upland grassland components) that dry during the spring would also serve as foraging habitat for
25 Swainson's hawks as prey species recolonize the fields (Objective MWNC1.1). These biological goals
26 and objectives would inform the near-term protection and restoration efforts and represent
27 performance standards for considering the effectiveness of restoration actions. At least 15,400 acres
28 of cultivated lands that provide habitat for covered and other native wildlife species would be
29 protected in the near-term time period (Objective CLNC1.1). A minimum of 87% of cultivated lands
30 protected by the late long-term time period would be in very high- and high-value crop types for
31 Swainson's hawk (Objective SH1.2). This biological objective provides an estimate for the
32 proportion of cultivated lands protected in the near-term time period which would provide high-
33 value habitat for Swainson's hawk. The acres of restoration and protection contained in the near-
34 term Plan goals and the additional detail in the biological objectives satisfy the typical mitigation
35 that would be applied to the project-level effects of CM1 on Swainson's hawk foraging habitat, as
36 well as mitigate the near-term effects of the other conservation measures.

37 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
38 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
39 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian
40 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
41 require one to several decades to functionally replace habitat that has been affected and for trees to
42 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between
43 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk
44 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting
45 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
46 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat

1 would further reduce this limited resource and could reduce or restrict the number of active
2 Swainson's hawk nests within the Plan Area until restored riparian habitat is sufficiently developed.

3 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
4 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
5 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
6 within the 125-acre block are removed. These mature trees would be supplemented with additional
7 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
8 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
9 addition, at least 5 trees (five gallon container size) would be planted within the BDCP reserve
10 system for every tree removed by construction during the near-term period that was suitable for
11 nesting by Swainson's hawks (20 feet or taller). A variety of native tree species would be planted to
12 provide trees with differing growth rates, maturation, and life span. Trees would be planted within
13 the BDCP reserve system in areas that support high-value Swainson's hawk foraging habitat to
14 increase nest sites, or within riparian plantings as a component of the riparian restoration (CM5,
15 CM7) where they are in close proximity to suitable foraging habitat. Replacement trees that were
16 incorporated into the riparian restoration would not be clustered in a single region of the study
17 area, but would be distributed throughout the lands protected as foraging habitat for Swainson's
18 hawk. Swainson's hawk foraging habitat would be protected within 3 miles of a known Swainson's
19 hawk nest tree and within 50 miles of the project footprint on land not subject to threat of seasonal
20 flooding, construction disturbances, or other conditions that would reduce the foraging value of the
21 land. Further details of AMM18 are provided in Appendix 3B, *Environmental Commitments, AMMs,*
22 *and CMs*, of the Final EIR/EIS. With this program in place, Alternative 1A would not have a
23 substantial adverse effect on Swainson's hawk in the near-term timeframe, either through direct
24 mortality or through habitat modifications.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
26 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
27 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
28 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
29 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
30 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
31 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and*
32 *CMs*, of the Final EIR/EIS.

33 ***Late Long-Term Timeframe***

34 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of
35 modeled foraging habitat for Swainson's hawk. Alternative 1A as a whole would result in the
36 permanent loss of and temporary effects on 531 acres of potential nesting habitat (5% of the
37 potential nesting habitat in the study area) and 54,791 acres of foraging habitat (12% of the foraging
38 habitat in the study area).

39 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
40 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Communities*
41 *Restoration, and CM8 Grassland Natural Communities Restoration,* to restore or create at least 5,000
42 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000
43 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool
44 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed

1 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
2 species (Table 3-4 in Chapter 3).

3 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
4 system with extensive wide bands or large patches of valley/foothill riparian natural community
5 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
6 restoration would expand the patches of existing riparian forest in order to support nesting habitat
7 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be
8 increased by planting and maintaining native trees along roadsides and field borders within
9 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but
10 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be
11 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
12 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

13 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
14 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
15 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
16 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
17 would provide foraging habitat for Swainson's hawk and reduce the effects of current levels of
18 habitat fragmentation. Small mammal populations would also be increased on protected lands,
19 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
20 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through
21 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within
22 protected cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated
23 areas would also be protected and maintained as part of the cultivated lands reserve system which
24 would provide additional foraging habitat and a source of rodent prey that could recolonize
25 cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including upland
26 grassland components) that dry during the spring would also serve as foraging habitat for
27 Swainson's hawks as prey species recolonize the fields (Objective MWNC1.1). These biological goals
28 and objectives would inform the near-term protection and restoration efforts and represent
29 performance standards for considering the effectiveness of restoration actions. Foraging habitat
30 would be conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands
31 that provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of
32 which would be in very high-value habitat production in CZs 1-4, 7-9, and 11 (Objective SH1.2).

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
37 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
38 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
39 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
40 of the Final EIR/EIS.

41 **NEPA Effects:** The loss of Swainson's hawk habitat and potential for direct mortality of this special-
42 status species under Alternative 1A would represent an adverse effect in the absence of other
43 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,
44 CM9, and CM11, guided by biological goals and objectives and by AMM1-AMM7 and *AMM18*

1 *Swainson's Hawk*, which would be in place during all project activities, the effects of habitat loss and
2 potential mortality on Swainson's hawk under Alternative 1A would not be adverse under NEPA.

3 **CEQA Conclusion:**

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
7 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
8 the effect of construction would be less than significant under CEQA. The Plan would remove 340
9 acres (270 permanent, 70 temporary) of Swainson's hawk nesting habitat in the study area in the
10 near-term. These effects would result from the construction of the water conveyance facilities (CM1,
11 34 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,
12 *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and
13 *CM7 Riparian Natural Community Restoration*—306 acres). In addition, 14,147 acres of Swainson's
14 hawk foraging habitat would be removed or converted in the near-term (CM1, 4,740 acres; *CM2 Yolo*
15 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5, Seasonally*
16 *Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland*
17 *Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*,
18 *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—
19 9,407 acres).

20 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and
21 those that are identified in the biological goals and objectives for Swainson's hawk in Chapter 3 of
22 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
23 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 34
24 acres of nesting habitat should be restored/created and 34 acres should be protected to mitigate the
25 CM1 losses of Swainson's hawk nesting habitat. In addition, 4,740 acres of foraging habitat should be
26 protected to mitigate the CM1 losses of Swainson's hawk foraging habitat. The near-term effects of
27 other conservation actions would remove 306 acres of modeled nesting habitat, and therefore
28 require 306 acres of restoration and 306 acres of protection of nesting habitat. Similarly, the near-
29 term effects of other conservation actions would remove 9,407 acres of modeled foraging habitat,
30 and therefore require 9,407 acres of protection of foraging habitat using the same typical NEPA and
31 CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting habitat; 1:1 protection for the
32 loss of foraging habitat).

33 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
34 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
35 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
36 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
37 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3). These
38 conservation actions are associated with CM3, CM5, CM7, and CM8, and would occur in the same
39 timeframe as the construction and early restoration losses.

40 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
41 system with extensive wide bands or large patches of valley/foothill riparian natural community
42 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
43 restoration would expand the patches of existing riparian forest in order to support nesting habitat
44 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be

1 increased by planting and maintaining native trees along roadsides and field borders within
 2 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small
 3 but essential nesting habitat for Swainson’s hawk associated with cultivated lands would also be
 4 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
 5 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

6 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 7 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
 8 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
 9 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
 10 would provide foraging habitat for Swainson’s hawk and reduce the effects of current levels of
 11 habitat fragmentation. Small mammal populations would also be increased on protected lands,
 12 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
 13 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through
 14 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within
 15 protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other
 16 uncultivated areas would also be protected and maintained as part of the cultivated lands reserve
 17 system which would provide additional foraging habitat and a source of rodent prey that could
 18 recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including
 19 upland grassland components) that dry during the spring would also serve as foraging habitat for
 20 Swainson’s hawks as prey species recolonize the fields (Objective MWNC1.1). These biological goals
 21 and objectives would inform the near-term protection and restoration efforts and represent
 22 performance standards for considering the effectiveness of restoration actions. At least 15,400 acres
 23 of cultivated lands that provide habitat for covered and other native wildlife species would be
 24 protected in the near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands
 25 protected by the late long-term time period would be in very high- and high-value crop types for
 26 Swainson’s hawk (Objective SH1.2). This biological objective provides an estimate for the
 27 proportion of cultivated lands protected in the near-term time period which would provide high-
 28 value habitat for Swainson’s hawk. The acres of restoration and protection contained in the near-
 29 term Plan goals and the additional detail in the biological objectives satisfy the typical mitigation
 30 that would be applied to the project-level effects of CM1 on Swainson’s hawk foraging habitat, as
 31 well as mitigate the near-term effects of the other conservation measures.

32 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
 33 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
 34 other near-term impacts on Swainson’s hawk nesting habitat. The 800 acres of restored riparian
 35 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
 36 require one to several decades to functionally replace habitat that has been affected and for trees to
 37 attain sufficient size and structure suitable for nesting by Swainson’s hawks. This time lag between
 38 the removal and restoration of nesting habitat could have a substantial impact on Swainson’s hawk
 39 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting
 40 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
 41 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat
 42 would further reduce this limited resource and could reduce or restrict the number of active
 43 Swainson’s hawk within the Plan Area until restored riparian habitat is sufficiently developed.

44 *AMM18 Swainson’s Hawk* would implement a program to plant large mature trees, including
 45 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson’s hawk
 46 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)

1 within the 125-acre block are removed. These mature trees would be supplemented with additional
2 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
3 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
4 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
5 system for every tree removed by construction during the near-term period that was suitable for
6 nesting by Swainson's hawks (20 feet or taller). A variety of native tree species would be planted to
7 provide trees with differing growth rates, maturation, and life span. Trees would be planted within
8 the BDCP reserve system in areas that support high-value foraging habitat to increase nest sites, or
9 within riparian plantings as a component of riparian restoration (CM5, CM7) where they are in close
10 proximity to suitable foraging habitat. Replacement trees that are incorporated into the riparian
11 restoration would not be clustered in a single region of the Plan Area, but would be distributed
12 throughout the lands protected as foraging habitat for Swainson's hawk.

13 Swainson's hawk foraging habitat would be protected within 3 miles of removed known Swainson's
14 hawk nest tree and within 50 miles of the project footprint on land not subject to threat of seasonal
15 flooding, construction disturbances, or other conditions that would reduce the foraging value of the
16 land. Further details of AMM18 are provided in Appendix 3B, *Environmental Commitments, AMMs,*
17 *and CMs*, of the Final EIR/EIS. With this program in place, Alternative 1A would not have a
18 substantial adverse effect on Swainson's hawk in the near-term timeframe, either through direct
19 mortality or through habitat modifications.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
21 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
22 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
23 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
24 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
25 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
26 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
27 of the Final EIR/EIS.

28 **Late Long-Term Timeframe**

29 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of
30 modeled foraging habitat for Swainson's hawk. Alternative 1A as a whole would result in the
31 permanent loss of and temporary effects on 531 acres of potential nesting habitat (5% of the
32 potential nesting habitat in the study area) and 54,791 acres of foraging habitat (12% of the foraging
33 habitat in the study area).

34 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
35 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community*
36 *Restoration, and CM8 Grassland Natural Communities Restoration* to restore or create at least 5,000
37 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000
38 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool
39 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed
40 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
41 species (Table 3-4 in Chapter 3).

42 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
43 system with extensive wide bands or large patches of valley/foothill riparian natural community
44 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian

1 restoration would expand the patches of existing riparian forest in order to support nesting habitat
2 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be
3 increased by planting and maintaining native trees along roadsides and field borders within
4 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but
5 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be
6 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
7 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

8 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
9 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
10 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
11 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
12 would provide foraging habitat for Swainson's hawk and reduce the effects of current levels of
13 habitat fragmentation. Small mammal populations would also be increased on protected lands,
14 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
15 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through
16 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within
17 protected cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated
18 areas would also be protected and maintained as part of the cultivated lands reserve system which
19 would provide additional foraging habitat and a source of rodent prey that could recolonize
20 cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including upland
21 grassland components) that dry during the spring would also serve as foraging habitat for
22 Swainson's hawks as prey species recolonize the fields (Objective MWNC1.1). These biological goals
23 and objectives would inform the near-term protection and restoration efforts and represent
24 performance standards for considering the effectiveness of restoration actions. Foraging habitat
25 would be conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands
26 that provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of
27 which would be in very high-value habitat production in CZs 1-4, 7- 9, and 11 (Objective SH1.2).

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
32 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
33 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
34 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
35 of the Final EIR/EIS.

36 Considering Alternative 1A's protection and restoration provisions, which would provide acreages
37 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of
38 restoring riparian and foraging habitats lost to construction and restoration activities, and
39 implementation of AMM1-AMM7 and *AMM18 Swainson's Hawk*, the loss of habitat or direct
40 mortality through implementation of Alternative 1A would not result in a substantial adverse effect
41 through habitat modifications and would not substantially reduce the number or restrict the range
42 of the species. Therefore, the loss of habitat or potential mortality under this alternative would have
43 a less-than-significant impact on Swainson's hawk.

1 **Impact BIO-84: Effects on Swainson’s Hawk Associated with Electrical Transmission Facilities**

2 New transmission lines would increase the risk that Swainson’s hawks could be subject to power
3 line strikes, which could result in injury or mortality of Swainson’s hawks. This species would be at
4 low risk of bird strike mortality based on factors assessed in the bird strike vulnerability analysis
5 (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).
6 Factors analyzed include the height of the new transmission lines and the flight behavior of the
7 species. The existing network of transmission lines in the Plan Area currently poses the same small
8 risk for Swainson’s hawk, and any incremental risk associated with the new power line corridors
9 would also be expected to be low. Marking transmission lines with flight diverters that make the
10 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
11 Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian
12 mortality by 60%. All new project transmission lines would be fitted with flight diverters. Bird flight
13 diverters would make transmission lines highly visible to Swainson’s hawks and would further
14 reduce any potential for powerline collisions.

15 **NEPA Effects:** New transmission lines would minimally increase the risk for Swainson’s hawk power
16 line strikes. All new transmission lines constructed as a result of the project would be fitted with
17 bird diverters, which have been shown to reduce avian mortality by 60%. By implementing *AMM20*
18 *Greater Sandhill Crane*, the construction and operation of transmission lines would not result in an
19 adverse effect on Swainson’s hawk.

20 **CEQA Conclusion:** New transmission lines would minimally increase the risk for Swainson’s hawk
21 power line strikes. All new transmission lines constructed as a result of the project would be fitted
22 with bird diverters, which have been shown to reduce avian mortality by 60%. By implementing
23 *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines would result in
24 a less-than-significant impact on Swainson’s hawk.

25 **Impact BIO-85: Indirect Effects of Plan Implementation on Swainson’s Hawk**

26 Noise and visual disturbances from the construction of water conveyance facilities and other
27 conservation measures could reduce Swainson’s hawk use of modeled habitat adjacent to work
28 areas. Construction noise above background noise levels (greater than 50 dBA) could extend 1,900
29 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*
30 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there
31 are no available data to determine the extent to which these noise levels could affect Swainson’s
32 hawk. Moreover, operation and maintenance of the water conveyance facilities, including the
33 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could
34 affect Swainson’s hawk use of the surrounding habitat. These construction activities would include
35 water conveyance construction, tidal restoration activities, floodplain restoration, and Fremont
36 Weir/Yolo Bypass Enhancements. Swainson’s hawks are seasonally abundant across much of the
37 study area wherever adequate nest trees occur within a cultivated landscape that supports suitable
38 foraging habitat. There would be a potential for noise and visual disturbances associated with BDCP
39 actions to temporarily displace Swainson’s hawks and temporarily reduce the use of suitable habitat
40 adjacent to construction areas. These adverse effects would be minimized with the implementation
41 of *AMM18 Swainson’s Hawk*.

1 The use of mechanical equipment during water conveyance facilities construction could cause the
2 accidental release of petroleum or other contaminants that could affect Swainson's hawk foraging in
3 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
4 suitable habitat could also have an adverse effect on these species. *AMM2 Construction Best*
5 *Management Practices and Monitoring* would minimize the likelihood of such spills and ensure that
6 measures are in place to prevent runoff from the construction area and negative effects of dust on
7 habitat.

8 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
9 could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover, operation
10 and maintenance of the water conveyance facilities, including the transmission facilities, could result
11 in ongoing but periodic postconstruction disturbances that could affect Swainson's hawk use of the
12 surrounding habitat. The effects of noise, the potential for hazardous spills, increased dust and
13 sedimentation, and operations and maintenance of the water conveyance facilities would not have
14 an adverse effect on Swainson's hawk with the implementation of AMM1-AMM7, AMM10, and
15 *AMM18 Swainson's Hawk*.

16 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
17 facilities could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover,
18 operation and maintenance of the water conveyance facilities, including the transmission facilities,
19 could result in ongoing but periodic postconstruction disturbances that could affect Swainson's
20 hawk use of the surrounding habitat. The effects of noise, the potential for hazardous spills,
21 increased dust and sedimentation, and operations and maintenance of the water conveyance
22 facilities would result in a less-than-significant impact on Swainson's hawk with the implementation
23 of AMM1-AMM7, AMM10, and *AMM18 Swainson's Hawk*.

24 **Impact BIO-86: Periodic Effects of Inundation of Swainson's Hawk Nesting and Foraging** 25 **Habitat as a Result of Implementation of Conservation Components**

26 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
27 *Enhancement*) would increase the frequency and duration of inundation on approximately 3,066-
28 6,706 acres of modeled Swainson's hawk habitat (consisting of approximately 41-70 acres of
29 nesting habitat and 3,025-6,635 acres of foraging habitat; Table 12-1A-34). However, project-
30 associated inundation of areas that would not otherwise have been inundated would be expected to
31 occur in no more than 30% of all years, since Fremont Weir is expected to overtop the remaining
32 estimated 70% of all years, and during those years notch operations would not typically affect the
33 maximum extent of inundation. In more than half of all years under Existing Conditions, an area
34 greater than the project-related inundation area already inundates in the bypass. Therefore, habitat
35 conditions in the bypass would not be expected to change substantially as a result of Yolo Bypass
36 operations. However, increased duration of inundation during years of Fremont Weir operation,
37 may delay the period for which foraging habitat is available to Swainson's hawks by up to several
38 weeks.

39 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
40 *Restoration*, could result in the periodic inundation of up to approximately 8,197 acres of modeled
41 Swainson's hawk habitat (Table 12-1A-35), consisting of 189 acres of nesting and 8,008 acres of
42 foraging habitat. Floodplain restoration would be expected to restore a more natural flood regime
43 and sustain riparian vegetation types that support regeneration of Swainson's hawk nesting habitat.
44 The restored floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years)

1 to areas that flood infrequently (e.g., every 10 years or more). Foraging habitat that is inundated
2 after Swainson's hawks arrive in the Central Valley in mid-March could result in a periodic loss of
3 available foraging habitat due to the reduction in available prey. Inundated habitats would be
4 expected to recover following draw-down and provide suitable foraging conditions until the
5 following inundation period. Thus, this is considered a periodic and short term effect that is unlikely
6 to affect Swainson's hawk distribution and abundance, or foraging use of the study area.

7 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
8 sites because trees in which nest sites are situated already withstand floods, the increase in
9 inundation frequency and duration is expected to remain within the range of tolerance of riparian
10 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically
11 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.
12 This would be considered a short-term effect that would not result in an adverse effect on
13 Swainson's hawk.

14 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
15 nest sites because trees in which nest sites are situated already withstand floods, the increase in
16 inundation frequency and duration is expected to remain within the range of tolerance of riparian
17 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically
18 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.
19 This would be considered a short-term effect that would not have a significant impact on Swainson's
20 hawk.

21 **Tricolored Blackbird**

22 This section describes the effects of Alternative 1A, including water conveyance facilities
23 construction and implementation of other conservation components, on tricolored blackbird. The
24 habitat model used to assess effects for tricolored blackbird is based on breeding habitat and
25 nonbreeding habitat. Although nesting colonies have been documented along the fringe of Suisun
26 Marsh, in the Yolo Bypass and along the southwestern perimeter of the Plan Area, breeding colonies
27 are uncommon in the Plan Area. Modeled breeding habitat includes bulrush/cattail wetlands and
28 shrub communities that may provide suitable nesting substrate, and adjacent high-value foraging
29 areas that occur within 5 miles of nesting colonies documented in the Plan Area. The foraging
30 component includes cultivated lands and noncultivated land cover types known to support
31 abundant insect populations such as grasslands, pasturelands (including alfalfa), natural seasonal
32 wetlands, and sunflower croplands. The Delta is recognized as a major wintering area for tricolored
33 blackbird (Hamilton 2004, Beedy 2008). Modeled nonbreeding habitat includes emergent wetlands
34 and shrub stands that provide suitable roosting habitat, as well as cultivated lands and
35 noncultivated lands that provide foods sought by tricolored blackbirds during the winter. Outside of
36 the breeding season, tricolored blackbirds are primarily granivores that forage opportunistically
37 across the Plan Area in grasslands, pasturelands, croplands, dairies, and livestock feed lots. Factors
38 considered in assessing the value of affected habitat for the tricolored blackbird, include patch size,
39 suitability of vegetation, and proximity to recorded occurrences.

40 Construction and restoration associated with Alternative 1A conservation measures would result in
41 both temporary and permanent losses of tricolored blackbird modeled habitat as indicated in Table
42 12-1A-37. Full implementation of Alternative 1A would also include the following conservation
43 actions over the term of the BDCP to benefit the tricolored blackbird (BDCP Chapter 3, Section 3.3,
44 *Biological Goals and Objectives*).

- 1 • Protect and manage at least 50 acres of occupied or recently occupied (within the last 15 years)
2 tricolored blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs
3 1, 2, 8, or 11. (TRBL1.1).
- 4 • Protect at least 26,300 acres of moderate-, high-, or very high-value cultivated lands as
5 nonbreeding foraging habitat, 50% of which is of high or very high value (TRBL1.2).
- 6 • Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat within 5 miles
7 of occupied or recently occupied (within the last 15 years) tricolored blackbird nesting habitat
8 in CZs 1, 2, 3, 4, 7, 8, or 11. At least 1,000 acres of which will be within 5 miles of the at least 50
9 acres of nesting habitat protected under Objective TRBL1.1 (Objective TRBL1.3).
- 10 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
11 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
12 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
13 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 14 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
15 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
16 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 17 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 18 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
19 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 20 • Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,
21 VPNC2.5, and GNC2.4, associated with CM11).

22 As explained below, with the restoration or protection of these amounts of habitat, in addition to
23 management activities that would enhance these natural communities for the species and
24 implementation of AMM1–AMM7 and AMM21 *Tricolored Blackbird*, impacts on tricolored blackbird
25 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-1A-37. Changes in Tricolored Blackbird Modeled Habitat Associated with Alternative 1A (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d		
		NT	LLT	NT	LLT	CM2	CM5	
CM1	Breeding	Nesting	9	9	3	3	NA	NA
		Foraging - cultivated	695	695	344	344	NA	NA
		Foraging - noncultivated	214	214	186	186	NA	NA
	Nonbreeding	Roosting	23	23	9	9	NA	NA
		Foraging - cultivated	1,847	1,847	533	533	NA	NA
		Foraging - noncultivated	102	102	77	77	NA	NA
Total Impacts CM1								
CM2-CM18	Breeding	Nesting	13	72	75	77	11-26	30
		Foraging - cultivated	1,657	9,525	84	359	1,837-2,598	2,124
		Foraging noncultivated	704	1,991	155	184	600-1,689	355
	Nonbreeding	Roosting	570	1,642	0	1	0-4	29
		Foraging - cultivated	3,747	23,955	54	420	222-1,057	2,506
		Foraging - noncultivated	459	1,341	0	3	42-191	158
Total Impacts CM2-CM18		7,150	38,566	368	1,044	2,711	5,766	
Total Breeding		3,292	12,506	847	1,153	2,447-4,312	2,509	
Total Nonbreeding		6,748	28,910	673	1,043	263-1,252	2,694	
TOTAL IMPACTS		10,040	41,416	1,520	2,196	2,711	5,766	

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

Impact BIO-87: Loss or Conversion of Habitat for and Direct Mortality of Tricolored Blackbird

Alternative 1A conservation measures would result in the combined permanent and temporary loss of up to 43,612 acres of modeled habitat (13,659 acres of breeding habitat and up to 29,953 acres of nonbreeding habitat) for tricolored blackbird (Table 12-1A-37). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate tricolored blackbird habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure discussions.

- CM1 Water Facilities and Operation:* Construction of Alternative 1A conveyance facilities would result in the permanent loss of 918 acres of tricolored blackbird breeding habitat (9 acres nesting habitat, 695 acres of cultivated lands, and 214 acres of noncultivated lands suitable for foraging) and 1,972 acres of nonbreeding habitat (23 acres roosting habitat, 1,847 acres of cultivated lands, and 102 acres of noncultivated lands suitable for foraging (Table 12-1A-37). Approximately 831 of the acres permanently impacted would be lost as reusable tunnel material storage areas, which would likely be moved to other sites for use in levee build-up and restoration, and the affected area would likely be restored. While this effect is categorized as permanent because there is no assurance that the material would eventually be moved, the effect would likely be temporary.

In addition, CM1 would result in the temporary removal of 533 acres of breeding habitat (3 acres nesting habitat, 344 acres of cultivated lands, and 186 acres of noncultivated lands suitable for foraging) and 619 acres of nonbreeding habitat (9 acres roosting habitat, 533 acres of cultivated lands, and 77 acres of noncultivated lands suitable for foraging, Table 12-1A-37).

Most of the habitat that would be lost is located in the central Delta, from CZs 3-6 and CZ 8. There are no occurrences of tricolored blackbird that overlap with the construction footprint for CM1. However, records exist throughout the study area. The implementation of *AMM21 Tricolored Blackbird*, would require pre-construction surveys and the establishment of no-disturbance buffers and would minimize potential effects on nesting tricolored blackbirds (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations. Construction of CM1 would occur within the first 10 years of Alternative 1A implementation.

- CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries improvements in the Yolo Bypass would permanent loss of 595 acres of tricolored blackbird breeding habitat (13 acres nesting habitat, 477 acres of cultivated lands, and 105 acres of noncultivated lands suitable for foraging) and 8 acres of nonbreeding habitat (consisting entirely of roosting habitat). In addition, CM2 construction would result in the temporary removal of 314 acres of breeding habitat (75 acres nesting habitat, 84 acres of cultivated lands, and 155 acres of noncultivated lands suitable for foraging) and 54 acres of nonbreeding habitat (consisting entirely of cultivated lands). The loss is expected to occur during the first 10 years of Alternative 1A implementation.

- 1 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
2 in the inundation of approximately 3,937 acres of tricolored blackbird breeding habitat (21
3 acres of nesting, 2,814 acres of cultivated lands, and 1,102 acres of noncultivated lands suitable
4 for foraging) and 10,794 acres of nonbreeding habitat (1,633 acres of roosting, 18,489 acres of
5 cultivated lands, and 672 acres of noncultivated lands suitable for foraging). An estimated
6 13,692 acres of the 28,424 acres to be permanently lost would be expected to convert to tidal
7 emergent wetland communities that could provide nonbreeding season roosting habitat for
8 tricolored blackbirds, depending on future vegetation density and composition. Conversion
9 would result in the loss of an estimated 4,316 acres of tricolored blackbird breeding habitat (34
10 acres of nesting habitat; plus 3,635 acres of cultivated lands and 647 acres of noncultivated
11 habitats suitable for foraging) and 9,375 acres of nonbreeding habitat (8,716 acres of cultivated
12 lands and 659 acres of noncultivated habitats suitable for foraging). These habitat losses and
13 conversions would occur in CZs 1, 2, 4, 5, 6, 7, 8, and 11. Although considered to be a permanent
14 loss, due to the uncertainty of the quantity of restored suitable habitat, any areas that develop
15 into riparian scrub-shrub could provide suitable nesting and roosting habitat for tricolored
16 blackbird.
- 17 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction and riparian restoration
18 associated with floodplain restoration in the south Delta (CZ 7) would result in the permanent
19 removal of up to 554 acres of tricolored blackbird breeding habitat (4 acres of nesting habitat,
20 503 acres of cultivated lands, and 47 acres of noncultivated habitats suitable for foraging) and
21 656 acres of nonbreeding habitat (1 acre of roosting habitat, 652 acres of cultivated lands, and 3
22 acres of noncultivated habitats suitable for foraging) in CZ 7. Patches of riparian scrub
23 associated with the restoration of approximately 1,000 acres of valley/foothill riparian habitat
24 managed as early- to mid-successional habitats (as a component of CM5) could provide suitable
25 nesting, roosting or foraging habitat for tricolored blackbird once these restored habitats have
26 developed habitat functions for the species.
- 27 ● *CM8 Grassland Natural Communities Restoration*: Restoration of grassland would result in the
28 permanent removal of 1,521 acres of tricolored breeding habitat and 210 acres of nonbreeding
29 habitat. Grassland restoration would be implemented on cultivated lands and would therefore
30 result in the conversion of tricolored blackbird cultivated foraging habitat to high-value
31 grassland foraging habitat in CZs 2, 4, and 5.
- 32 ● *CM10 Nontidal Marsh Restoration*: Marsh restoration activities would result in the permanent
33 removal or conversion of approximately 568 acres of tricolored blackbird breeding habitat and
34 945 acres of nonbreeding habitat (all cultivated lands suitable for foraging). About two-thirds of
35 the restored nontidal marsh would be open water, and the remainder would support emergent
36 wetland vegetation that could provide low-value roosting habitat for tricolored blackbird
37 depending on vegetation density and composition.
- 38 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
39 actions that are designed to enhance wildlife values in BDCP-protected habitats could result in
40 localized ground disturbances that could temporarily remove small amounts of tricolored
41 blackbird habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
42 road and other infrastructure maintenance, would be expected to have minor effects on
43 available tricolored blackbird habitat and are expected to result in overall improvements to and
44 maintenance of tricolored blackbird habitat values over the term of the BDCP. These effects
45 cannot be quantified, but are expected to be minimal and would be avoided and minimized by
46 the AMMs listed below. CM11 would also include the construction of recreational-related

1 facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities*
2 *and Associated Federal Actions*). Trailhead facilities, signs, staging areas, picnic areas, bathrooms,
3 etc. would be placed on existing, disturbed areas when and where possible. However,
4 approximately 43.5 acres of breeding habitat and 6.5 acres of nonbreeding habitat (all grassland
5 suitable for foraging) would be lost as a result of construction of trails and facilities. Impacts
6 from recreational-related facilities that would occur within the first 10 years of Plan
7 implementation would include a loss of 13 acres of breeding habitat.

- 8 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
9 tricolored blackbird grassland foraging habitat in CZ 1.
- 10 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
11 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
12 disturbances that could affect tricolored blackbird use of the surrounding habitat in or adjacent
13 to work areas. Maintenance activities would include vegetation management, levee and
14 structure repair, and re-grading of roads and permanent work areas. These effects, however,
15 would be reduced by AMMs and conservation actions as described below.
- 16 ● *Injury and Direct Mortality*: Operation of construction equipment may cause injury to or
17 mortality of tricolored blackbirds. Risk would be greatest to eggs and nestlings susceptible to
18 land clearing activities, nest abandonment, or increased exposure to the elements or to
19 predators. Injury to or mortality of adults and fledged juveniles would not be expected as
20 individuals would be expected to avoid contact with construction equipment. Construction
21 activities could temporarily fragment existing tricolored blackbird habitat during grading, filling,
22 contouring, and other initial ground-disturbing operations that could temporarily reduce the
23 extent and functions supported by the affected habitat. To the maximum extent practicable,
24 construction activity will be avoided up to 1,300 feet, but not less than a minimum of 250 feet,
25 from an active tricolored blackbird nesting colony. If monitoring determines an activity is
26 adversely affecting a nesting colony, construction will be modified, as practicable, by either
27 delaying construction until the colony site is abandoned or until the end of the breeding season,
28 whichever occurs first, by temporarily relocating staging areas, or temporarily rerouting access
29 to the construction site. Construction and restoration projects would also be designed, in
30 consultation with CDFW, to avoid construction activity within at least 300 feet from occupied
31 active tricolored blackbird roosting habitat. These measures to avoid injury or mortality of
32 nesting and roosting tricolored blackbirds are described in *AMM21 Tricolored Blackbird* (see
33 Appendix 3B, *Environmental Commitments, AMMs, and CMs*).

34 The following paragraphs summarize the combined effects discussed above and describe other
35 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
36 included.

37 ***Near-Term Timeframe***

38 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
39 the near-term BDCP conservation strategy has been evaluated to determine whether it would
40 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
41 effects of construction would not be adverse under NEPA. The Plan would remove 4,139 acres of
42 breeding habitat (100 acres of nesting, 1,207 acres of cultivated lands, and 1,259 acres of
43 noncultivated lands suitable for foraging) and 7,421 acres of nonbreeding habitat (602 acres of
44 roosting, 4,867 acres of cultivated lands, and 638 acres of noncultivated lands suitable for foraging)

1 for tricolored blackbird in the study area in the near-term. These effects would result from the
2 construction of the water conveyance facilities (CM1, 1,451 acres of breeding, 2,591 acres of
3 nonbreeding), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries*
4 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5 *Seasonally Inundated Floodplain*
5 *Restoration*, and CM7 *Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres
6 of nonbreeding).

7 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and
8 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of
9 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1
10 protection for the loss of cultivated lands.

11 Using these ratios would indicate that the compensation for loss or conversion of tricolored
12 blackbird habitat from CM1 would require 12 acres of restoration and 12 acres of protection of
13 nesting habitat, 32 acres of restoration and 32 acres of protection of roosting habitat, 1,158 acres of
14 protection of noncultivated lands that provide foraging habitat, 1,039 acres of protection of
15 cultivated lands suitable for foraging during the breeding season, and 1,066 acres of cultivated lands
16 that provide foraging habitat during the nonbreeding season. The near-term effects of other
17 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting
18 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that
19 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the
20 nonbreeding season. Compensation for these losses from other conservation measures would
21 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of
22 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of
23 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands
24 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide
25 foraging habitat during the nonbreeding season. using the same typical NEPA and CEQA ratios.

26 Total compensation for near-term loss or conversion of tricolored blackbird required using the
27 typical ratios above would be 100 acres of restoration and 100 acres of protection for nesting
28 habitat, 602 acres of restoration and 602 acres of protection for roosting habitat, 2,277 acres of
29 protection of noncultivated foraging habitat, 2,780 acres of protection for cultivated lands that
30 provide foraging habitat during the breeding season, and 4,867 acres of cultivated lands that
31 provide foraging habitat during the nonbreeding season.

32 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750
33 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres
34 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool
35 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of
36 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,
37 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater
38 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3).
39 These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and would occur in
40 the same timeframe as the construction and early restoration losses. Some proportion of these
41 natural communities provide suitable habitat for tricolored blackbird as described below.

42 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding
43 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent
44 wetland, in close association with highly productive foraging areas that support abundant insect

1 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some
 2 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs
 3 1, 2, 8, or 11 (see Table 12-1A-38 for foraging habitat values) and would be actively managed to
 4 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical
 5 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*
 6 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the
 7 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,
 8 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored
 9 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of
 10 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section
 11 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands
 12 restored in the near-term, approximately 64 acres of valley foothill riparian and 198 acres of
 13 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

14 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal
 15 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,
 16 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial*
 17 *Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the
 18 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140
 19 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley
 20 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated
 21 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of
 22 valley/foothill riparian, 720 acres managed wetland).

23 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 24 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
 25 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a
 26 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The
 27 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would
 28 provide improved foraging opportunities for tricolored blackbirds during both the breeding and
 29 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high
 30 reproductive success in tricolored blackbirds. These natural communities are known to support
 31 large insect populations, a vital food resource for successful rearing and fledging of young. Those
 32 conservation lands that lie within a few miles of active nesting colonies would provide high-value
 33 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*
 34 *Enhancement and Management*, insect prey populations would be increased on protected lands,
 35 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,
 36 and GNC2.4).

37 Cultivated lands that provide habitat for covered and other native wildlife species would provide
 38 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term
 39 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total
 40 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-
 41 term. Assuming that lands would be protected proportional to the conservation objectives for
 42 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat
 43 consisting of cultivated lands would be protected in the near-term. These lands would be protected
 44 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,
 45 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late
 46 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in

1 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very
2 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of
3 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the
4 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential
5 habitats for species including tricolored blackbird would also be protected that occur within the
6 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,
7 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for
8 tricolored blackbird (Objective CLNC1.3).

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
13 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
14 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
15 been updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and
16 CMs, of the Final EIR/EIS.

17 The acres of protection and restoration contained in the near-term Plan goals, in addition to the
18 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to
19 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the
20 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands
21 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the
22 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for
23 by this acreage and temporary impacts on grassland would be restored to preproject conditions
24 (including revegetation with native vegetation if within 1 year of completion of construction under
25 *AMM2 Construction Best Management Practices and Monitoring*. With the enhancement of grasslands
26 described above, and the restoration of temporary habitat impacts, this difference between
27 impacted and conserved grassland acreages in the near-term time period would not result in an
28 adverse effect on tricolored blackbird.

1 **Table 12-1A-38. Tricolored Blackbird Foraging Habitat Value Classes**

Foraging Habitat Value Class	Agricultural Crop Type/Habitats	
	Breeding Season ^a Foraging Habitat	Nonbreeding Season Foraging Habitat
Very high	Native pasture, nonirrigated native pasture, annual grasslands, vernal pool grasslands, alkali grasslands	Livestock feed lots
High	Sunflower, alfalfa and mixed alfalfa, mixed pasture, induced high water table native pasture, nonirrigated mixed pasture, dairies	Corn, sunflower, millet, alfalfa and mixed alfalfa, mixed pasture, native pasture, induced high water table native pasture, nonirrigated native pasture, rice, dairies, annual grasslands, vernal pool grasslands, alkali grasslands
Moderate	Miscellaneous grass pasture, fallow lands cropped within 3 years, new lands prepped for crop production, livestock feed lots, organic rice	Miscellaneous grass pasture, nonirrigated mixed pasture, fallow lands cropped within 3 years, new lands prepped for crop production
Low	Mixed grain and hay crops, farmsteads, non-irrigated mixed grain and hay, rice	Wheat, oats, mixed grain and hay, farmsteads, unirrigated mixed grain and hay, and non-irrigated misc. grain and hay

^a Generally March through August; occasional breeding in fall (September through November).

2 **Late Long-Term Timeframe**

3 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093
 4 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for
 5 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled
 6 breeding habitat available, the study area does not currently support many nesting tricolored
 7 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo
 8 Bypass, and along the southwestern perimeter of the study area (BDCP Chapter 5, *Effects Analysis*).
 9 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 13,659
 10 acres of breeding habitat and 29,953 acres of nonbreeding habitat for tricolored blackbird during
 11 the term of the Plan (8% of the total breeding habitat in the study area and 8% of the total
 12 nonbreeding habitat in the study area). The locations of these losses are described above in the
 13 analyses of individual conservation measures.

14 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 15 *Restoration, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*
 16 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Communities*
 17 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
 18 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
 19 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
 20 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that
 21 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3). In addition,

22 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or
 23 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored
 24 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11
 25 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-
 26 1A-38. To ensure that natural community conservation benefits tricolored blackbird, the Plan
 27 further specifies that cultivated lands protected for tricolored blackbird retain residual wetland,

1 grassland patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting,
2 foraging or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of
3 moderate-, high-, or very high-value cultivated lands would be conserved and managed as
4 nonbreeding foraging habitat, 50% of which would be of high- or very high-value (Objective
5 TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very high breeding foraging
6 habitat would be conserved within 5 miles of occupied or recently occupied (within the last 15
7 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of
8 the loss of breeding and nonbreeding habitat would be to cultivated lands that are abundant
9 throughout the study area, so the loss is not expected to adversely affect the population in the study
10 area.

11 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6.12.2) estimates that the
12 restoration and protection actions discussed above could result in the protection of an estimated
13 46,566 acres of tricolored blackbird habitat (16,476 acres breeding habitat and 31,090 acres
14 nonbreeding habitat) and restoration of 31,001 acres of tricolored blackbird habitat (2,190 acres
15 breeding habitat and 28,811 acres nonbreeding habitat).

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
20 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
21 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
22 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
23 of the Final EIR/EIS.

24 **NEPA Effects:** The losses of tricolored blackbird habitat and potential for direct mortality of a
25 special-status species under Alternative 1A would represent an adverse effect in the absence of
26 other conservation actions. However, with habitat protection and restoration associated with CM3,
27 CM4, CM5, CM7, CM8, and CM11, guided by species-specific goals and objectives, and by AMM1–
28 AMM7 and *AMM21 Tricolored Blackbird*, which would be in place during all project activities, the
29 effects of habitat loss and potential mortality on tricolored blackbird would not be adverse under
30 Alternative 1A.

31 **CEQA Conclusion:**

32 **Near-Term Timeframe**

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
36 effects of construction would be less than significant under CEQA. The Plan would remove 4,139
37 acres of breeding habitat (100 acres of nesting, 1,207 acres of cultivated lands, and 1,259 acres of
38 noncultivated lands suitable for foraging) and 7,421 acres of nonbreeding habitat (602 acres of
39 roosting, 4,867 acres of cultivated lands, and 638 acres of noncultivated lands suitable for foraging)
40 for tricolored blackbird in the study area in the near-term. These effects would result from the
41 construction of the water conveyance facilities (CM1, 1,451 acres of breeding, 2,591 acres of
42 nonbreeding habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
43 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*

1 *Restoration, and CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres
2 of nonbreeding habitat).

3 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and
4 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of
5 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1
6 protection for the loss of cultivated lands.

7 Using these ratios would indicate that the compensation for loss or conversion of tricolored
8 blackbird habitat from CM1 would require 12 acres of restoration and 12 acres of protection of
9 nesting habitat, 32 acres of restoration and 32 acres of protection of roosting habitat, 1,158 acres of
10 protection of noncultivated lands that provide foraging habitat, 1,039 acres of protection of
11 cultivated lands suitable for foraging during the breeding season, and 1,066 acres of cultivated lands
12 that provide foraging habitat during the nonbreeding season. The near-term effects of other
13 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting
14 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that
15 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the
16 nonbreeding season. Compensation for these losses from other conservation measures would
17 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of
18 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of
19 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands
20 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide
21 foraging habitat during the nonbreeding season. using the same typical NEPA and CEQA ratios.

22 Total compensation for near-term loss or conversion of tricolored blackbird required using the
23 typical ratios above would be 100 acres of restoration and 100 acres of protection for nesting
24 habitat, 602 acres of restoration and 602 acres of protection for roosting habitat, 2,277 acres of
25 protection of noncultivated foraging habitat, 2,780 acres of protection for cultivated lands that
26 provide foraging habitat during the breeding season, and 4,867 acres of cultivated lands that
27 provide foraging habitat during the nonbreeding season.

28 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750
29 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres
30 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool
31 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of
32 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,
33 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater
34 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3).
35 These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and would occur in
36 the same timeframe as the construction and early restoration losses. Some proportion of these
37 natural communities provide suitable habitat for tricolored blackbird as described below.

38 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding
39 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent
40 wetland, in close association with highly productive foraging areas that support abundant insect
41 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some
42 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs
43 1, 2, 8, or 11 (see Table 12-1A-38 for foraging habitat values) and would be actively managed to
44 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical

1 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*
2 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the
3 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,
4 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored
5 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of
6 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section
7 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands
8 restored in the near-term, approximately 64 acres of valley foothill riparian and 198 acres of
9 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

10 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal
11 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,
12 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial*
13 *Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the
14 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140
15 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley
16 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated
17 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of
18 valley/foothill riparian, 720 acres managed wetland).

19 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
20 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
21 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a
22 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The
23 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would
24 provide improved foraging opportunities for tricolored blackbirds during both the breeding and
25 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high
26 reproductive success in tricolored blackbirds. These natural communities are known to support
27 large insect populations, a vital food resource for successful rearing and fledging of young. Those
28 conservation lands that lie within a few miles of active nesting colonies would provide high-value
29 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*
30 *Enhancement and Management*, insect prey populations would be increased on protected lands,
31 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,
32 and GNC2.4).

33 Cultivated lands that provide habitat for covered and other native wildlife species would provide
34 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term
35 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total
36 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-
37 term. Assuming that lands would be protected proportional to the conservation objectives for
38 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat
39 consisting of cultivated lands would be protected in the near-term. These lands would be protected
40 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,
41 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late
42 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in
43 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very
44 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of
45 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the
46 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential

1 habitats for species including tricolored blackbird would also be protected that occur within the
 2 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,
 3 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for
 4 tricolored blackbird (Objective CLNC1.3).

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 6 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 7 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 8 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 9 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 10 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 11 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 12 of the Final EIR/EIS.

13 The acres of protection and restoration contained in the near-term Plan goals, in addition to the
 14 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to
 15 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the
 16 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands
 17 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the
 18 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for
 19 by this acreage and temporary impacts on grassland would be restored to preproject conditions
 20 (including revegetation with native vegetation if within 1 year of completion of construction under
 21 *AMM2 Construction Best Management Practices and Monitoring*). With the enhancement of
 22 grasslands described above, and the restoration of temporary habitat impacts, this difference
 23 between impacted and conserved grassland acreages in the near-term time period would not result
 24 in a significant impact on tricolored blackbird.

25 ***Late Long-Term Timeframe***

26 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093
 27 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for
 28 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled
 29 breeding habitat available, the study area does not currently support many nesting tricolored
 30 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo
 31 Bypass, and along the southwestern perimeter of the study area (BDCP Chapter 5, *Effects Analysis*).
 32 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 13,659
 33 acres of breeding habitat and 29,953 acres of nonbreeding habitat for tricolored blackbird during
 34 the term of the Plan (8% of the total breeding habitat in the study area and 8% of the total
 35 nonbreeding habitat in the study area). The locations of these losses are described above in the
 36 analyses of individual conservation measures.

37 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 38 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
 39 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*
 40 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
 41 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
 42 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
 43 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that
 44 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3). In addition,

1 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or
2 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored
3 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11
4 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-
5 1A-38. To ensure that natural community conservation benefits tricolored blackbird, the Plan
6 further specifies that cultivated lands protected for tricolored blackbird retain residual wetland,
7 grassland patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting,
8 foraging or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of
9 moderate-, high-, or very high-value cultivated lands would be conserved and managed as
10 nonbreeding foraging habitat, 50% of which would be of high- or very high-value (Objective
11 TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very high breeding foraging
12 habitat would be conserved within 5 miles of occupied or recently occupied (within the last 15
13 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of
14 the loss of breeding and nonbreeding habitat would be to cultivated lands that are abundant
15 throughout the study area, so the loss is not expected to adversely affect the population in the study
16 area.

17 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6.12.2) estimates that the
18 restoration and protection actions discussed above could result in the protection of an estimated
19 46,566 acres of tricolored blackbird habitat (16,476 acres of breeding habitat and 31,090 acres of
20 nonbreeding habitat) and restoration of 31,001 acres of tricolored blackbird habitat (2,190 acres of
21 breeding habitat and 28,811 acres of nonbreeding habitat).

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
26 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
27 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
28 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
29 of the Final EIR/EIS. Considering Alternative 1A's protection and restoration provisions, which
30 would provide acreages of new or enhanced habitat in amounts greater than necessary to
31 compensate for habitats lost to construction and restoration activities, and implementation of
32 *AMM1-AMM7*, and *AMM21 Tricolored Blackbird*, the loss of habitat or direct mortality through the
33 implementation of Alternative 1A as a whole would not result in a substantial adverse effect through
34 habitat modifications and would not substantially reduce the number or restrict the range of the
35 species. Therefore, the alternative would have a less-than-significant impact on tricolored blackbird.

36 **Impact BIO-88: Effects on Tricolored Blackbird Associated with Electrical Transmission** 37 **Facilities**

38 New transmission lines would increase the risk that tricolored blackbirds could be subject to power
39 line strikes, which could result in injury or mortality of individuals. Tricolored blackbirds would
40 have the potential to intersect the proposed transmission lines largely due to winter movements
41 throughout the study area, when individuals are migrating in large flocks and dense fog is common
42 in the area. Although migratory movements and daily flights between roosting and foraging habitat
43 make tricolored blackbird vulnerable to collision with transmission lines, daily flights associated
44 with winter foraging likely occurs in smaller flocks at heights that are lower than the transmission
45 lines (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission*

1 *Lines*). Marking transmission lines with flight diverters that make the lines more visible to birds has
2 been shown to reduce the incidence of bird mortality (Brown and Drewien 1995). For example, Yee
3 (2008) estimated that marking devices in the Central Valley could reduce avian mortality by 60%.
4 As described in *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted
5 with flight diverters which would further reduce any potential for tricolored blackbird collision with
6 transmission lines.

7 Transmission line poles and towers provide perching substrate for raptors, which are predators on
8 tricolored blackbird. Although there is potential for transmission lines to result in increased
9 perching opportunities for raptors and result in increased predation pressure on tricolored
10 blackbirds, the existing network of transmission lines in the Plan Area currently poses these risks
11 and any incremental risk associated with the new power line corridors would not be expected to
12 affect the study area population. Therefore, it is assumed that the increase in predation risk on
13 tricolored blackbird from an increase in raptor perching opportunities is minimal.

14 **NEPA Effects:** New transmission lines would increase the risk for tricolored blackbird powerline
15 strikes, primarily during daily flights between roosting and foraging sites and during winter during
16 migration movements. *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike
17 diverters on all new powerlines, which would reduce the potential impact of the construction of new
18 transmission lines on tricolored blackbird. The increase in predation risk on tricolored blackbird
19 from an increase in raptor perching opportunities is considered minimal. Therefore, the
20 construction and operation of new transmission lines under Alternative 1A would not result in an
21 adverse effect on tricolored blackbird.

22 **CEQA Conclusion:** New transmission lines would increase the risk for tricolored blackbird
23 powerline strikes, primarily during daily flights between roosting and foraging sites and during
24 winter during migration movements. *AMM20 Greater Sandhill Crane* contains the commitment to
25 place bird strike diverters on all new powerlines, which would reduce the potential impact of the
26 construction of new transmission lines on tricolored blackbird. The increase in predation risk on
27 tricolored blackbird from an increase in raptor perching opportunities is considered minimal. The
28 construction and operation of new transmission lines under Alternative 1A would not substantially
29 reduce the number or restrict the range of the species and would therefore result in a less-than-
30 significant impact on tricolored blackbird.

31 **Impact BIO-89: Indirect Effects of Plan Implementation on Tricolored Blackbird**

32 **Indirect Construction- and Operation-Related Effects:** Tricolored blackbird nesting habitat
33 within the vicinity of proposed construction areas that could be indirectly affected by construction
34 activities. Construction noise above background noise levels (greater than 50 dBA) could extend
35 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D,
36 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),
37 although there are no available data to determine the extent to which these noise levels could affect
38 tricolored blackbird. Indirect effects associated with construction include noise, dust, and visual
39 disturbance caused by grading, filling, contouring, and other ground-disturbing operations outside
40 the project footprint but within 1,300 feet from the construction edge. Construction and subsequent
41 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting
42 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM21 Tricolored*
43 *Blackbird* would require preconstruction surveys, and if detected, covered activities would be
44 avoided within a minimum 250 feet of an active nesting colony and up to 1,300 feet where

1 practicable until breeding has ceased. Construction and restoration projects would also be designed,
2 in consultation with CDFW, to avoid construction activity within at least 300 feet from occupied
3 active tricolored blackbird roosting habitat. In addition, monitoring would be implemented to
4 ensure that construction does not adversely affect the nesting colony or roost site. The use of
5 mechanical equipment during water conveyance facilities construction could cause the accidental
6 release of petroleum or other contaminants that could affect tricolored blackbird in the surrounding
7 habitat. The inadvertent discharge of sediment or excessive dust adjacent to tricolored blackbird
8 habitat could also affect the species. AMM1–AMM7, including *AMM2 Construction Best Management*
9 *Practices and Monitoring*, would minimize the likelihood of such spills and ensure that measures are
10 in place to prevent runoff from the construction area and negative effects of dust on active nests.

11 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
12 mercury in avian species, including tricolored blackbird. Marsh (tidal and nontidal) and floodplain
13 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed
14 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to
15 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP
16 restoration activities that create newly inundated areas could increase bioavailability of mercury.

17 Breeding tricolored blackbirds are not thought to be highly susceptible to methylmercury exposure
18 because tidal wetlands are not expected to be a major foraging area for the species. Furthermore,
19 the Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
20 under the plan would generate less methylmercury than the existing managed wetlands, potentially
21 reducing the overall risk. However, species sensitivity to methylmercury differs widely and there is
22 a large amount of uncertainty with respect to species-specific effects and increased methylmercury
23 associated with natural community and floodplain restoration could indirectly affect tricolored
24 blackbird, via uptake in lower trophic levels (as described in Appendix 5.D, *Contaminants* of the
25 BDCP).

26 A detailed review of the methylmercury issues associated with implementation of the BDCP is
27 contained in Appendix 11F, *Substantive BDCP Revisions*. This review includes an overview of the
28 BDCP-related mechanisms that could result in increased mercury in the foodweb, and how exposure
29 of individual species to mercury may occur based on feeding habits and where their habitat overlaps
30 with the areas where mercury bioavailability could increase.

31 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
32 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
33 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
34 project-specific basis, where high potential for methylmercury production is identified that
35 restoration design and adaptive management cannot fully address while also meeting restoration
36 objectives, alternate restoration areas will be considered. CM12 would be implemented in
37 coordination with other similar efforts to address mercury in the Delta, and specifically with the
38 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
39 following actions.

- 40 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
41 mercury methylation and bioavailability
- 42 ● Define design elements that minimize conditions conducive to generation of methylmercury in
43 restored areas.

- 1 • Define adaptive management strategies that can be implemented to monitor and minimize
2 actual postrestoration creation and mobilization of methylmercury.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex
8 classes within a species. In addition, the effect of selenium on a species can be confounded by
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
10 2009).

11 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
12 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
13 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
14 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
15 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
16 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
17 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
18 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
19 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
20 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
21 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
22 levels of selenium have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
24 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
25 exacerbate bioaccumulation of selenium in avian species, including tricolored blackbird. Marsh
26 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
27 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
28 BDCP restoration activities that create newly inundated areas could increase bioavailability of
29 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
30 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
31 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
32 long-term increases in selenium concentrations in water in the Delta under any alternative.
33 However, it is difficult to determine whether the effects of potential increases in selenium
34 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
35 lead to adverse effects on tricolored blackbird.

36 Because of the uncertainty that exists at this programmatic level of review, there could be a
37 substantial effect on tricolored blackbird from increases in selenium associated with restoration
38 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
39 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
40 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
41 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
42 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
43 separately for each restoration effort as part of design and implementation. This avoidance and
44 minimization measure would be implemented as part of the tidal habitat restoration design
45 schedule.

1 **NEPA Effects:** The effects of noise, potential spills of hazardous material, increased dust and
2 sedimentation, and operations and maintenance of the water conveyance facilities would not be
3 adverse with the implementation of AMM1–AMM7 and *AMM21 Tricolored Blackbird*.

4 Tidal habitat restoration could result in increased exposure of tricolored blackbird to selenium. This
5 effect would be addressed through the implementation of *AMM27, Selenium Management* which
6 would provide specific tidal habitat restoration design elements to reduce the potential for
7 bioaccumulation of selenium and its bioavailability in tidal habitats.

8 The implementation of tidal natural communities restoration or floodplain restoration could result
9 in increased exposure of tricolored blackbird to methylmercury. It is unlikely that breeding
10 tricolored blackbird would be highly susceptible to methylmercury exposure because tidal wetlands
11 are not expected to be a major foraging area for the species. However, it is unknown what
12 concentrations of methylmercury are harmful to this species and the potential for increased
13 exposure varies substantially within the study area. Implementation of CM12 which contains
14 measures to assess the amount of mercury before project development, followed by appropriate
15 design and adaptation management, would minimize the potential for increased methylmercury
16 exposure, and would result in no adverse effect on tricolored blackbird.

17 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
18 sedimentation, and operations and maintenance of the water conveyance facilities would be less
19 than significant with the implementation of *AMM21 Tricolored Blackbird* and AMM1–AMM7.

20 Tidal habitat restoration could result in increased exposure of tricolored blackbird to selenium. This
21 impact would be addressed through the implementation of *AMM27, Selenium Management* which
22 would provide specific tidal habitat restoration design elements to reduce the potential for
23 bioaccumulation of selenium and its bioavailability in tidal habitats. The implementation of tidal
24 natural communities restoration or floodplain restoration could result in increased exposure of
25 tricolored blackbird to methylmercury. It is unlikely that breeding tricolored blackbird would be
26 highly susceptible to methylmercury exposure because tidal wetlands are not expected to be a major
27 foraging area for the species. However, it is unknown what concentrations of methylmercury are
28 harmful to this species. Implementation of CM12 which contains measures to assess the amount of
29 mercury before project development, followed by appropriate design and adaptation management,
30 would minimize the potential for increased methylmercury exposure, and would result in no
31 adverse effect on tricolored blackbird.

32 Therefore, with AMM1–7, AMM21, AMM27, and CM12 in place, the indirect effects of Alternative 1A
33 implementation would not result in a substantial adverse effect through habitat modification or
34 potential mortality. Therefore, the indirect effects of Alternative 1A implementation would have a
35 less-than-significant impact on tricolored blackbird.

36 **Impact BIO-90: Periodic Effects of Inundation of Tricolored Blackbird Habitat as a Result of** 37 **Implementation of Conservation Components**

38 Flooding of the Yolo Bypass (CM2) would inundate 2,447–4,312 acres of breeding habitat and 263–
39 1,252 acres of nonbreeding habitat (Table 12-1A-37). Based on hypothetical floodplain restoration,
40 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in
41 periodic inundation of approximately 2,509 acres of breeding habitat (30 acres of nesting, 2,124
42 acres of cultivated lands, 355 acres of noncultivated lands suitable for foraging) and 2,694 acres of
43 nonbreeding habitat (29 acres of roosting, 2,506 acres of cultivated lands, 158 acres of

1 noncultivated lands suitable for foraging, Table 12-1A-37) resulting in the temporary loss of these
2 habitats. Tricolored blackbirds are highly nomadic during the winter and would be expected to
3 move to adjacent suitable foraging habitat when the bypass is inundated, as they do under the
4 current flooding regime. However, this inundation could reduce the availability of nesting habitat
5 during years when flooding extends into the nesting season (past March). The periodic inundation of
6 the Yolo Bypass (CM2) and of other floodplains (CM5) is expected to restore a more natural flood
7 regime in support of wetland and riparian vegetation types that support nesting habitat. There
8 would be no expected adverse effect on tricolored blackbird.

9 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and
10 foraging habitat for tricolored blackbird. Periodic inundation would not result in an adverse effect
11 on tricolored blackbird because inundation is expected to take place outside of the breeding season.
12 Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly
13 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

14 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting
15 and foraging habitat for tricolored blackbird. Periodic inundation would have a less-than-significant
16 impact on tricolored blackbird because inundation is expected to take place outside of the breeding
17 season. Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly
18 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

19 **Western Burrowing Owl**

20 This section describes the effects of Alternative 1A, including water conveyance facilities
21 construction and implementation of other conservation components, on western burrowing owl.
22 Western burrowing owl modeled habitat consisted of high- and low-value habitat for nesting and
23 foraging. High-value habitat consists of plant alliances within the grassland and vernal pool natural
24 communities and pasture. Low-value habitat includes plant alliances and crop types from managed
25 wetland, alkali seasonal wetland, and cultivated lands. Value was determined through reported
26 species use patterns from the literature.

27 Construction and restoration associated with Alternative 1A conservation measures would result in
28 both temporary and permanent losses of western burrowing owl modeled habitat as indicated in
29 Table 12-1A-39. Full implementation of Alternative 1A would also include the following
30 conservation actions over the term of the BDCP to benefit the western burrowing owl (BDCP
31 Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 32 ● Protect at least 1,000 acres of cultivated lands in CZs 1 and 11 that support high-value
33 burrowing owl habitat and are within 0.5 mile of high-value grassland habitat or occupied low-
34 value habitat (Objective WBO1.1, associated with CM3).
- 35 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
36 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
37 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 38 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 39 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
40 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 41 ● Restore or create alkali seasonal wetlands and vernal pool complex in CZs 1, 8, and/or 11 to
42 achieve no net loss of wetted acres (Objectives ASWNC1.2 and VPNC1.2, associated with CM9)

- Increase burrow availability and prey abundance and accessibility (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, VPNC2.5, GNC2.3, and GNC2.4, associated with CM11)
- Protect at least 48,600 acres of cultivated lands that provide suitable habitat for covered and other native wildlife species and maintain and protect the small patches of important wildlife habitats associated with cultivated lands (Objectives CLNC1.1 and CLNC1.3, associated with CM3)

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance habitat for the species and implementation of AMM1–AMM7 and AMM23 *Western Burrowing Owl*, impacts on western burrowing owl would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1A-39. Changes in Western Burrowing Owl Modeled Habitat Associated with Alternative 1A (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	499	499	460	460	NA	NA
	Low-value	2,478	2,478	766	766	NA	NA
Total Impacts CM1		2,977	2,977	1,226	1,226	NA	NA
CM2–CM18	High-value	4,487	11,570	245	328	1,390–3,303	779
	Low-value	3,527	28,506	144	971	1,522–2,927	6,162
Total Impacts CM2–CM18		8,014	40,076	389	1,299	2,912–6,230	6,941
Total High-value		4,986	12,069	705	788	1,390–3,303	779
Total Low-value		6,005	30,984	910	1,737	1,522–2,927	6,162
TOTAL IMPACTS		10,991	43,053	1,615	2,525	2,912–6,230	6,941

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-91: Loss or Conversion of Habitat for and Direct Mortality of Western Burrowing Owl

Alternative 1A conservation measures would result in the combined permanent and temporary loss of up to 45,578 acres of modeled habitat for western burrowing owl (of which 12,857 acres is of high-value and 32,721 acres is of low-value, Table 12-1A-39). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), CM2 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural*

1 *Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM6 Channel Margin*
 2 *Enhancement, CM8 Grassland Natural Community Restoration, CM10 Nontidal Marsh Restoration, and*
 3 *CM18 Conservation Hatcheries.* The majority of habitat loss would result from CM4. Habitat
 4 enhancement and management activities (CM11), which include ground disturbance or removal of
 5 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities
 6 associated with the long-term operation of the water conveyance facilities and other BDCP physical
 7 facilities could degrade or eliminate western burrowing owl habitat. Each of these individual
 8 activities is described below. A summary statement of the combined impacts, NEPA effects and a
 9 CEQA conclusion follow the individual conservation measure discussions.

- 10 • *CM1 Water Facilities and Operation:* Construction of Alternative 1A conveyance facilities would
 11 result in the combined permanent and temporary loss of up to 959 acres of modeled
 12 high-value western burrowing owl habitat (499 acres of permanent loss, 460 acres of temporary
 13 loss) from CZs 3–6 and CZ 8. In addition, 3,244 acres of low-value burrowing owl habitat would
 14 be removed (2,478 acres of permanent loss, 766 acres of temporary loss) from CZs 3–6 and CZ 8.
 15 The majority of high-value grassland that would be removed would be in CZ 8, from the
 16 construction of the new forebay in CZ 8. The footprint for CM1 does not overlap with any
 17 occurrences of western burrowing owl. However, there is a high concentration of CNDDDB and
 18 DHCCP survey records for western burrowing owls in CZ 8 to the west and the south of the
 19 Clifton Court Forebay. The loss of high-value habitat from facility construction and the
 20 establishment of the forebay borrow and spoils area could remove occupied habitat, displace
 21 nesting and wintering owls, and fragment occupied burrowing owl habitat. The implementation
 22 of *AMM23 Western Burrowing Owl* would minimize effects on western burrowing owl if they
 23 were present in the construction area. Refer to the Terrestrial Biology Map Book for a detailed
 24 view of Alternative 1A construction locations. Impacts resulting from CM1 would occur within
 25 the first 10 years of Alternative 1A implementation.
- 26 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
 27 would result in the combined permanent and temporary loss of up to 1,127 acres of high-value
 28 western burrowing owl habitat (882 acres of permanent loss, 245 acres of temporary loss) in
 29 the Yolo Bypass in CZ 2. In addition, 242 acres of low-value habitat would be removed (98 acres
 30 of permanent loss, 144 acres of temporary loss). The loss is expected to occur during the first 10
 31 years of Alternative 1A implementation.
- 32 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and
 33 inundation would permanently remove an estimated 29,668 acres of modeled western
 34 burrowing owl habitat in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. The majority of removed or converted
 35 acres (19,739 acres) is composed of low-value habitat. However, 9,929 acres of high-value
 36 habitat would also be lost from tidal restoration actions. Tidal restoration would directly impact
 37 and fragment remaining high-value grassland habitat just north of Rio Vista in and around
 38 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Tidal
 39 natural community restoration efforts would impact one extant record of burrowing owl just
 40 northeast of Oakley along Dutch Slough and one possibly extirpated record in Suisun Marsh.
- 41 • *CM5 Seasonally Inundated Floodplain Restoration:* Construction of setback levees to restore
 42 seasonally inundated floodplain would permanently and temporarily remove approximately
 43 2,504 acres of modeled western burrowing owl in CZs 2, 4, and 7. This total is comprised of
 44 2,279 acres of low-value habitat. Also, 225 acres of high-value grassland habitat would be
 45 removed (142 permanent, 83 temporary) consisting of small patches of habitat along the San
 46 Joaquin, Old, and Middle Rivers in CZ 7.

- 1 • *CM6 Channel Margin Enhancement*: Sites for channel margin enhancement would be located
2 along levees where western burrowing owl could be present. The species is known to use often
3 the grassland edges along canals and levees in agricultural areas. The implementation of *AMM23*
4 *Western Burrowing Owl* would reduce the potential for channel margin enhancement activities
5 to disturb owls or affect active nests.
- 6 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
7 approximately 11 acres of high-value burrowing owl habitat as part of tidal restoration. In
8 addition, 960 acres of low-value habitat would be removed as a part of tidal restoration and
9 3,991 acres would be removed as part of seasonal floodplain restoration through CM7.
- 10 • *CM8 Grassland Natural Community Restoration*: Grassland restoration would primarily be
11 implemented on agricultural lands and would result in the permanent loss of 1,676 acres (362
12 acres of high-value and 1,314 acres of low-value) of western burrowing owl habitat. The
13 conversion of 1,676 acres of low-value habitat to high-value grassland, would temporarily
14 remove available habitat but would ultimately have a beneficial effect on the western burrowing
15 owl.
- 16 • *CM10 Nontidal Marsh Restoration*: Implementation would result in the permanent removal of
17 159 acres of high-value and 952 acres of low-value western burrowing owl habitat.
- 18 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
19 actions that are designed to enhance wildlife values in restored or protected habitats could
20 result in localized ground disturbances that could temporarily remove small amounts of
21 western burrowing owl habitat. The burrowing owl's fossorial habits make the species more
22 sensitive to the effects of ground disturbance than other raptors. Ground-disturbing activities,
23 such as removal of nonnative vegetation and road and other infrastructure maintenance
24 activities, would be expected to have minor adverse effects on available western burrowing owl
25 habitat and would be expected to result in overall improvements to and maintenance of habitat
26 values over the term of the BDCP. CM11 would also include the construction of recreational-
27 related facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered*
28 *Activities and Associated Federal Actions*). The construction of trailhead facilities, signs, staging
29 areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when and
30 where possible. However, approximately 50 acres of grassland habitat would be lost from the
31 construction of trails and facilities.
- 32 Habitat management- and enhancement-related activities and equipment operation could
33 destroy nests burrows, and noise and visual disturbances could lead to their abandonment,
34 resulting in mortality of eggs and nestlings. The potential for these activities to result in nest
35 failure and mortality or other adverse effects on western burrowing owl would be avoided or
36 minimized with the incorporation of *AMM23 Western Burrowing Owl* into the BDCP which would
37 require surveys to determine presence or absence and the establishment of no-disturbance
38 buffers around active sites.
- 39 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
40 value western burrowing owl habitat for the development of a delta and longfin smelt
41 conservation hatchery in CZ 1.
- 42 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
43 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
44 disturbances that could affect western burrowing owl use of the surrounding habitat.

1 Maintenance activities would include vegetation management, levee and structure repair, and
2 re-grading of roads and permanent work areas. These effects, however, would be reduced by
3 AMMs and conservation actions as described below.

- 4 • Injury and Direct Mortality: Construction would not be expected to result in direct mortality of
5 western burrowing owl. However, if nest burrows were occupied in the vicinity of construction
6 activities, equipment operation could destroy nests and noise and visual disturbances could lead
7 to abandonment. *AMM23 Western Burrowing Owl* would ensure that preconstruction surveys
8 detected any occupied burrows and no-disturbance buffers would be implemented.

9 The following paragraphs summarize the combined effects discussed above and describe other
10 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
11 included.

12 ***Near-Term Timeframe***

13 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
14 the near-term BDCP conservation strategy has been evaluated to determine whether it would
15 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
16 effects of construction would not be adverse under NEPA. The Plan would remove 5,691 acres
17 (4,986 acres permanent, 705 acres temporary) of high-value habitat for western burrowing owl in
18 the study area in the near-term. These effects would result from the construction of the water
19 conveyance facilities (CM1, 959 acres), and implementing other conservation measures (*CM2 Yolo*
20 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*
21 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*
22 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*
23 *and CM18 Conservation Hatcheries—4,732 acres*). In addition, 6,915 acres of low-value habitat
24 would be removed or converted in the near-term (CM1, 3,244 acres; *CM2 Yolo Bypass Fisheries*
25 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community*
26 *Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*
27 *Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18*
28 *Conservation Hatcheries—3,671 acres*).

29 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
30 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the
31 loss of low-value habitat would result from conversion and enhancement to high-value habitats.
32 Using these typical ratios would indicate that 1,918 acres should be protected to compensate for the
33 loss of high-value habitat from CM1 and that 3,244 acres should be protected to compensate for the
34 loss of low-value habitat from CM1. The near-term effects of other conservation actions would
35 require 9,464 acres of protection to compensate for the loss of high-value habitat and 3,671 acres of
36 protection to compensate for the loss of low-value habitat using the same typical NEPA and CEQA
37 ratios (2:1 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value
38 habitat).

39 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
40 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
41 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
42 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
43 in the same timeframe as the construction and early restoration losses.

1 The protection of high-value grasslands is essential in order to sustain existing western burrowing
 2 owl populations in the plan area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
 3 7, 8, and 11. (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
 4 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
 5 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
 6 pool natural communities which would provide habitat for western burrowing owl and reduce the
 7 effects of current levels of habitat fragmentation. This protection would not only expand the amount
 8 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl
 9 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
 10 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
 11 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
 12 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
 13 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*
 14 *Communities Enhancement and Management*, small mammal and insect prey populations would be
 15 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
 16 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected
 17 natural communities by encouraging ground squirrel occupancy and expansion through the creation
 18 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
 19 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance
 20 standards for considering the effectiveness of conservation actions.

21 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
 22 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
 23 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
 24 CM1 on western burrowing owl habitat. Some portion of the 15,400 acres of cultivated lands
 25 protected in the near-term timeframe would include high-value crop types. These acres, in addition
 26 to the management and enhancement activities that are contained in the Plan goals, would satisfy
 27 the typical mitigation ratios that would be applied to the other near-term conservation actions,
 28 providing that the 15,400 acres of cultivated lands protected in the near-term were managed in
 29 suitable crop types to compensate for the loss of high-value habitat at a ratio of 2:1. Mitigation
 30 Measure BIO-91, *Compensate for Near-Term Loss of High-Value Western Burrowing Owl Habitat*,
 31 would be available to address the potential effect of high-value habitat loss in the near-term. The
 32 acres of protection of cultivated lands would be sufficient to compensate for the loss of low-value
 33 burrowing owl habitat from CM1 and from the other near-term conservation actions.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 38 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 39 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 40 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 41 of the Final EIR/EIS.

42 **Late Long-Term Timeframe**

43 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and
 44 254,352 acres of low-value habitat for western burrowing owl. Alternative 1A as a whole would
 45 result in the permanent loss of and temporary effects on 12,857 acres of high-value habitat and

1 32,721 acres of low value habitat over the term of the Plan. The locations of these losses are
2 described above in the analyses of individual conservation measures.

3 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
4 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
5 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural
6 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
7 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
8 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
9 7, 8, and 11. (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
10 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
11 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
12 pool natural communities which would provide habitat for western burrowing owl and reduce the
13 effects of current levels of habitat fragmentation. This protection would not only expand the amount
14 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl
15 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
16 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
17 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
18 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
19 cultivated lands can support breeding and wintering burrowing owls. To ensure that cultivated
20 lands conservation benefits western burrowing owl, the Plan's biological goals and objectives
21 further specify that, of the cultivated lands protected in the late long-term, at least 1,000 acres
22 would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are within
23 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1). Under
24 *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey
25 populations would be increased on protected lands, enhancing the foraging value of these natural
26 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would
27 be increased on protected natural communities by encouraging ground squirrel occupancy and
28 expansion through the creation of berms, mounds, edges, and through the prohibition of ground
29 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

30 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
31 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
32 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres of high-
33 value and 25,177 acres of low-value habitat) and restoration of 1,645 acres of western burrowing
34 owl habitat (1,642 acres of high-value and 3 acres of low-value habitat).

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
36 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
37 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
38 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
39 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
40 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
41 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
42 of the Final EIR/EIS.

43 **NEPA Effects:** The loss of western burrowing owl habitat and potential for mortality of this special-
44 status species under Alternative 1A would represent an adverse effect in the absence of other
45 conservation actions. With habitat protection and restoration associated with CM3, CM8, and CM11,

1 guided by biological goals and objectives and by AMM1–AMM7 and AMM23 *Western Burrowing Owl*,
2 and with the implementation of Mitigation Measure BIO-91, *Compensate For the Near-Term Loss of*
3 *High-Value Burrowing Owl Habitat*, which would be available to guide the near-term protection and
4 management of cultivated lands, the effects of habitat loss and potential mortality on western
5 burrowing owl would not be adverse under Alternative 1A.

6 **CEQA Conclusion:**

7 **Near-Term Timeframe**

8 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
9 the near-term BDCP conservation strategy has been evaluated to determine whether it would
10 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
11 effects of construction would be less than significant under CEQA. The Plan would remove 5,691
12 acres (4,986 acres permanent, 705 acres temporary) of high-value habitat for western burrowing
13 owl in the study area in the near-term. These effects would result from the construction of the water
14 conveyance facilities (CM1, 959 acres), and implementing other conservation measures (CM2 *Yolo*
15 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian Natural*
16 *Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and Alkali*
17 *Seasonal Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and Management*
18 and CM18 *Conservation Hatcheries*—4,732 acres). In addition, 6,915 acres of low-value habitat
19 would be removed or converted in the near-term (CM1, 3,244 acres; CM2 *Yolo Bypass Fisheries*
20 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian Natural Community*
21 *Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and Alkali Seasonal*
22 *Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and Management* and CM18
23 *Conservation Hatcheries*—3,671 acres).

24 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
25 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the
26 loss of low-value habitat would result from conversion and enhancement to high-value habitats.
27 Using these typical ratios would indicate that 2,464 acres should be protected to mitigate the loss of
28 high-value habitat from CM1 and that 3,702 acres should be protected to mitigate the loss of low-
29 value habitat from CM1. The near-term effects of other conservation actions would require 9,464
30 acres of protection to mitigate the loss of high-value habitat and 3,671 acres of protection to
31 compensate for the loss of low-value habitat using the same typical NEPA and CEQA ratios (2:1
32 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value habitat).

33 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
34 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
35 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
36 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
37 in the same timeframe as the construction and early restoration losses.

38 The protection of high-value grasslands is essential in order to sustain existing western burrowing
39 owl populations in the plan area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
40 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
41 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
42 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
43 pool natural communities which would provide habitat for western burrowing owl and reduce the
44 effects of current levels of habitat fragmentation. This protection would not only expand the amount

1 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl
 2 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
 3 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
 4 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
 5 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
 6 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*
 7 *Communities Enhancement and Management*, small mammal and insect prey populations would be
 8 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
 9 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected
 10 natural communities by encouraging ground squirrel occupancy and expansion through the creation
 11 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
 12 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance
 13 standards for considering the effectiveness of conservation actions.

14 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
 15 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
 16 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
 17 CM1 on western burrowing owl habitat. Some portion of the 15,400 acres of cultivated lands
 18 protected in the near-term timeframe would include high-value crop types. These acres, in addition
 19 to the management and enhancement activities that are contained in the Plan goals, would satisfy
 20 the typical mitigation ratios that would be applied to the other near-term conservation actions,
 21 providing that the 15,400 acres of cultivated lands protected in the near-term were managed in
 22 suitable crop types to compensate for the loss of high-value habitat at a ratio of 2:1. Mitigation
 23 Measure BIO-91, *Compensate for Near-Term Loss of High-Value Western Burrowing Owl Habitat*,
 24 would reduce the impact of high-value habitat loss in the near-term. The acres of protection of
 25 cultivated lands would be sufficient to compensate for the loss of low-value burrowing owl habitat
 26 from CM1 and from the other near-term conservation actions.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 31 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 32 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 33 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 34 of the Final EIR/EIS.

35 ***Late Long-Term Timeframe***

36 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and
 37 254,352 acres of low-value habitat for western burrowing owl. Alternative 1A as a whole would
 38 result in the permanent loss of and temporary effects on 12,857 acres of high-value habitat and
 39 32,721 acres of low value habitat over the term of the Plan. The locations of these losses are
 40 described above in the analyses of individual conservation measures.

41 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 42 *Restoration*, *CM8 Grassland Natural Communities Restoration*, and *CM9 Vernal Pool and Alkali*
 43 *Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland
 44 natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal

1 wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native
 2 wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1,
 3 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11
 4 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1
 5 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and
 6 vernal pool natural communities which would provide habitat for western burrowing owl and
 7 reduce the effects of current levels of habitat fragmentation. This protection would not only expand
 8 the amount of protected high-value habitat in the Plan Area, but also support existing western
 9 burrowing owl populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11,
 10 which would especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo
 11 Bay. Certain types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some
 12 row crops can provide foraging habitat for western burrowing owl. Under appropriate management
 13 regimes, cultivated lands can support breeding and wintering burrowing owls. To ensure that
 14 cultivated lands conservation benefits western burrowing owl, the Plan's biological goals and
 15 objectives further specify that, of the cultivated lands protected in the late long-term, at least 1,000
 16 acres would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are
 17 within 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1).
 18 Under *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey
 19 populations would be increased on protected lands, enhancing the foraging value of these natural
 20 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would
 21 be increased on protected natural communities by encouraging ground squirrel occupancy and
 22 expansion through the creation of berms, mounds, edges, and through the prohibition of ground
 23 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

24 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
 25 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
 26 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-
 27 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl
 28 habitat (1,642 acres high-value and 3 acres low-value habitat.)

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 33 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 34 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 35 been updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and
 36 CMs, of the Final EIR/EIS.

37 Considering Alternative 1A's protection and restoration provisions, which would provide acreages
 38 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
 39 construction and restoration activities, and implementation of *AMM1-AMM7*, *AMM23 Western*
 40 *Burrowing Owl*, and Mitigation Measure BIO-91, *Compensate for Near-Term Loss of High-Value*
 41 *Western Burrowing Owl Habitat*, which would be available to guide the near-term protection and
 42 management of cultivated lands, the loss of habitat and direct mortality through implementation of
 43 Alternative 1A would not result in a substantial adverse effect through habitat modifications and
 44 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of
 45 habitat or potential mortality under this alternative would have a less-than-significant impact on
 46 western burrowing owl.

1 **Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western**
2 **Burrowing Owl Habitat**

3 Because the BDCP lacks acreage commitment for crop types that would be protected and
4 managed within the 15,400 acres of cultivated lands protected in the near-term time period,
5 DWR will compensate for the loss of high-value burrowing owl habitat with high-value natural
6 communities or cultivated crop types a ratio of 2:1 in the near-term time period.

7 **Impact BIO-92: Effects on Western Burrowing Owl Associated with Electrical Transmission**
8 **Facilities**

9 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,
10 which could result in injury or mortality of western burrowing owl. The species is large-bodied but
11 with relatively long and rounded wings, making it moderately maneuverable. While burrowing owls
12 may nest in loose colonies, they do not flock or congregate in roosts or foraging groups. Collectively,
13 the species' keen eyesight and largely ground-based hunting behavior make it a relatively low-risk
14 species for powerline collision. While the species is not widespread in the study area, it may become
15 more widely distributed as grassland enhancement improves habitat for the species. Even so, the
16 risk of effects on the population are low, given the species' physical and behavioral characteristics
17 (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).
18 New transmission lines would not be expected to have an adverse effect on the species. Marking
19 transmission lines with flight diverters that make the lines more visible to birds has been shown to
20 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
21 marking devices in the Central Valley could reduce avian mortality by 60%. All new project
22 transmission lines would be fitted with flight diverters. Bird flight diverters would make
23 transmission lines highly visible to western burrowing owls and would further reduce any potential
24 for powerline collisions.

25 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
26 adverse effect on western burrowing owl because the risk of bird strike is considered to be minimal
27 based on the owl's physical and behavioral characteristics. All new transmission lines constructed as
28 a result of the project would be fitted with bird diverters (*AMM20 Greater Sandhill Crane*), which
29 have been shown to reduce avian mortality by 60% and which would further reduce any potential
30 for powerline collisions.

31 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
32 significant impact on western burrowing owl because the risk of bird strike is considered to be
33 minimal based on the owl's physical and behavioral characteristics. All new transmission lines
34 constructed as a result of the project would be fitted with bird diverters (*AMM20 Greater Sandhill*
35 *Crane*), which have been shown to reduce avian mortality by 60% and which would further reduce
36 any potential for powerline collisions.

37 **Impact BIO-93: Indirect Effects of Plan Implementation on Western Burrowing Owl**

38 Noise and visual disturbances associated with construction-related activities could result in
39 temporary disturbances that affect western burrowing owl use of modeled habitat adjacent to
40 proposed construction areas. Indirect effects associated with construction include noise, dust, and
41 visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations.
42 Any disturbance within 250 feet of a burrow occupied by burrowing owl during the breeding season
43 (February 1–August 31) and within 160 feet during the nonbreeding season (September 1–January

1 31) could potential displace winter owls or cause abandonment of active nests. These potential
2 effects would be minimized with the implementation of *AMM23 Western Burrowing Owl* into the
3 BDCP, which would require preconstruction surveys and establish no-disturbance buffers around
4 active burrows. Construction noise above background noise levels (greater than 50 dBA) could
5 extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment
6 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),
7 although there are no available data to determine the extent to which these noise levels could affect
8 western burrowing owl.

9 The use of mechanical equipment during water conveyance facilities construction could cause the
10 accidental release of petroleum or other contaminants that could affect western burrowing owl in
11 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
12 western burrowing owl habitat could also affect the species. *AMM1-AMM7* in addition to *AMM23*
13 *Western Burrowing Owl* would minimize the likelihood of such spills and ensure that measures were
14 in place to prevent runoff from the construction area and any adverse effects of dust on active nests.

15 **NEPA Effects:** Indirect effects on western burrowing owl as a result of Alternative 1A
16 implementation could have adverse effects on this species through the modification of habitat and
17 potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential to
18 disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton Court
19 Forebay and adjacent to work area. With the implementation of *AMM1-AMM7*, and *AMM23 Western*
20 *Burrowing Owl*, the indirect effects resulting from Alternative 1A implementation would not be
21 adverse under NEPA.

22 **CEQA Conclusion:** Indirect effects on western burrowing owl as a result of Alternative 1A
23 implementation could have significant impacts on these species through the modification of habitat
24 and potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential
25 to disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton
26 Court Forebay and adjacent to work areas. With the implementation of *AMM1-AMM7* and *AMM23*
27 *Western Burrowing Owl*, the indirect effects resulting from Alternative 1A implementation would
28 have a less-than-significant impact on western burrowing owl.

29 **Impact BIO-94: Periodic Effects of Inundation on Western Burrowing Owl Habitat as a Result** 30 **of Implementation of Conservation Components**

31 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
32 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,195-
33 3,004 acres of high-value habitat and 1,522-2,927 acres of low-value habitat (Table 12-1A-39).

34 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
35 *Restoration* could result in the periodic inundation of up to approximately 6,941 acres of modeled
36 habitat (6,162 acres of which would be low-value foraging habitat; Table 12-1A-39).

37 Burrowing owls cannot use inundated areas for foraging or nesting, and increased inundation
38 frequency and duration of cultivated lands and grassland habitats may affect prey populations that
39 have insufficient time to recover following inundation events. Depending on timing, seasonal
40 inundation of western burrowing owl habitat could result in displacement from nesting burrows or
41 drowning of individuals. The potential for this effect is considered low because suitable burrow sites
42 would most likely be located along setback levees, which are expected to be subject to inundation
43 less frequently than floodplain surfaces that would be less likely to support suitable nesting

1 burrows. The periodically inundated habitat would not be expected to have an adverse effect on the
2 population.

3 **NEPA Effects:** The periodically inundated habitat would not be expected to have an adverse effect on
4 the population. The potential for direct mortality of western burrowing owl caused by inundation
5 would be low because the locations of burrows would likely be above elevations consistently subject
6 to inundation; therefore, the potential effect would not be adverse.

7 **CEQA Conclusion:** The potential for direct mortality of western burrowing owl caused by inundation
8 would be low because the locations of burrows would likely be above elevations consistently subject
9 to inundation. Therefore, periodic inundation would be expected to have a less-than-significant
10 impact on the population.

11 **Western Yellow-Billed Cuckoo**

12 This section describes the effects of Alternative 1A, including water conveyance facilities
13 construction and implementation of other conservation components, on western yellow-billed
14 cuckoo. The habitat model for western yellow-billed cuckoo includes potential breeding habitat,
15 which includes plant alliances from the valley/foothill riparian modeled habitat that contain a dense
16 forest canopy for foraging with understory willow for nesting, and a minimum patch size of 50 acres.
17 Modeled habitat also includes migratory habitat, which contains the same plant alliances as
18 breeding habitat but without the minimum 50-acre patch size requirement.

19 The western yellow-billed cuckoo is uncommon in the Plan Area at present, and the likelihood that it
20 will be found using the modeled habitat is low relative to more abundant riparian species. Nesting of
21 the species in the plan area has not been confirmed for approximately 100 years. Western yellow-
22 billed cuckoo was detected in the study area during 2009 DHCCP surveys, but nesting was not
23 confirmed and the bird is suspected to have been a migrant (Appendix 12C, *2009 to 2011 Bay Delta
24 Conservation Plan EIR/EIS Environmental Data Report*). Construction and restoration associated
25 with Alternative 1A conservation measures would result in both temporary and permanent losses of
26 western yellow-billed cuckoo modeled habitat as indicated in Table 12-1A-40. Full implementation
27 of Alternative 1A would also include the following conservation actions over the term of the BDCP to
28 benefit the western yellow-billed cuckoo (BDCP Chapter 3, Section 3.3, *Biological Goals and
29 Objectives*).

- 30 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
31 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
32 associated with CM7).
- 33 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
34 10 (Objective VFRNC1.2, associated with CM3).
- 35 ● Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,
36 associated with CM3 and CM7).
- 37 ● Maintain the at least 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion
38 of the early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a
39 minimum patch size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4,
40 associated with CM3 and CM7).

41 As explained below, with the restoration or protection of these amounts of habitat, in addition to
42 management activities that would enhance these natural communities for the species and

1 implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least*
 2 *Bell's Vireo, Western Yellow-Billed Cuckoo*, impacts on Western yellow-billed cuckoo would not be
 3 adverse for NEPA purposes and would be less than significant for CEQA purposes.

4 **Table 12-1A-40. Changes in Western Yellow-Billed Cuckoo Modeled Habitat Associated with**
 5 **Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Breeding	0	0	0	0	NA	NA
	Migratory	23	23	14	14	NA	NA
Total Impacts CM1		23	23	14	14	NA	NA
CM2–CM18	Breeding	29	142	5	10	11–20	17
	Migratory	278	383	83	94	37–64	125
Total Impacts CM2–CM18		307	525	88	104	48–84	142
Total Breeding		29	142	5	10	11–20	17
Total Migratory		301	406	97	108	37–64	125
TOTAL IMPACTS		330	548	102	118	48–84	142

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

6

7 **Impact BIO-95: Loss or Conversion of Habitat for and Direct Mortality of Western Yellow-**
 8 **Billed Cuckoo**

9 Alternative 1A conservation measures would result in the combined permanent and temporary loss
 10 of up to 666 acres of modeled habitat for western yellow-billed cuckoo (152 acres of breeding
 11 habitat, 514 acres of migratory habitat, Table 12-1A-40). Conservation measures that would result
 12 in these losses are conveyance facilities and transmission line construction, and establishment and
 13 use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat
 14 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management
 15 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,
 16 could result in local adverse habitat effects. In addition, maintenance activities associated with the
 17 long-term operation of the water conveyance facilities and other BDCP physical facilities could
 18 degrade or eliminate western yellow-billed cuckoo modeled habitat. Each of these individual
 19 activities is described below. A summary statement of the combined impacts and NEPA effects and a
 20 CEQA conclusion follow the individual conservation measure discussions.

- 1 ● *CM1 Water Facilities and Operation*: Construction of Alternative 1A water conveyance facilities
2 would result in the combined permanent and temporary loss of up to 37 acres of modeled
3 western yellow-billed cuckoo migratory habitat (Table 12-1A-40). No modeled breeding habitat
4 would be impacted by CM1. Of the 37 acres of modeled habitat that would be removed for the
5 construction of the conveyance facilities, 23 acres would be a permanent loss and 14 acres
6 would be a temporary loss of migratory habitat. Activities that would impact modeled habitat
7 consist of tunnel, forebay, and intake construction, temporary access roads, and construction of
8 transmission lines. Impacts from CM1 would occur in the central delta in CZ 3, CZ 4, CZ 5, CZ 6,
9 and CZ 8. There are no extant occurrences of yellow-billed cuckoo nests in the study area.
10 However, this loss would have the potential to displace individuals, if present, and remove the
11 functions and value of modeled habitat for nesting, protection, or foraging. Refer to the
12 Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations.
13 Impacts from CM1 would occur within the first 10 years of Alternative 1A implementation.
- 14 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
15 would result in the loss of approximately 31 acres of breeding habitat (26 acres of permanent
16 loss and 5 acres of temporary loss) and 140 acres of migratory habitat (57 acres of permanent
17 loss and 83 acres of temporary loss) for yellow-billed cuckoo in the Yolo Bypass in CZ 2. The loss
18 is expected to occur during the first 10 years of Alternative 1A implementation. There are no
19 extant occurrences of yellow-billed cuckoo nesting in the study area.
- 20 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
21 inundation would permanently remove an estimated 110 acres of modeled yellow-billed cuckoo
22 breeding habitat and 310 acres of modeled migratory habitat in CZ 1, 2, 6, and 11. There are no
23 extant nesting records of yellow-billed cuckoo in the study area. However, a yellow-billed
24 cuckoo detection was recorded during DHCCP surveys in 2009 (Appendix 12C, *2009 to 2011 Bay
25 Delta Conservation Plan EIR/EIS Environmental Data Report*) in CZ 5 between Twin Cities Road
26 and Walnut Grove. These detections do not overlap with the hypothetical restoration areas for
27 CM4.
- 28 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
29 seasonally inundated floodplain would permanently and temporarily remove approximately 11
30 acres of modeled yellow-billed cuckoo breeding habitat (6 acres of permanent loss and 5 acres
31 of temporary loss) and 27 acres of migratory habitat (16 acres of permanent loss and 11 acres of
32 temporary loss) in CZ 7. Based on the riparian habitat restoration assumptions, approximately
33 3,000 acres of valley/foothill riparian habitat would be restored as a component of seasonally
34 inundated floodplain restoration actions. The actual number of acres that would be restored
35 may differ from these estimates, depending on how closely the outcome of seasonally inundated
36 floodplain restoration approximates the assumed outcome. Once this restored riparian
37 vegetation has developed habitat functions, a portion of it would be suitable to support western
38 yellow-billed cuckoo habitat once the riparian vegetation has developed habitat functions for
39 the cuckoo.
- 40 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
41 activities that could be implemented in protected western yellow-billed cuckoo habitats would
42 maintain and improve the functions of the habitat over the term of the BDCP. With conditions
43 favorable for its future establishment in the Plan Area, western yellow-billed cuckoo would be
44 expected to benefit from the increase in protected habitat. However, habitat management- and
45 enhancement-related activities could disturb western yellow-billed cuckoo nests if they were
46 present near work sites. *CM11 Natural Communities Enhancement and Management* actions

1 designed to enhance wildlife values in restored riparian habitats may result in localized ground
2 disturbances that could temporarily remove small amounts of western yellow-billed cuckoo
3 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and
4 other infrastructure maintenance activities, would be expected to have minor adverse effects on
5 available western yellow-billed cuckoo habitat and would be expected to result in overall
6 improvements and maintenance of western yellow-billed cuckoo habitat values over the term of
7 the BDCP.

- 8 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,
9 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.
10 Temporarily affected areas would be restored as riparian habitat within 1 year following
11 completion of construction activities. Although the effects are considered temporary, the
12 restored riparian habitat would require 5 years to several decades, for ecological succession to
13 occur and for restored riparian habitat to functionally replace habitat that has been affected. The
14 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;
15 therefore, the replaced riparian vegetation would be expected to have structural components
16 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial
17 restoration activities are complete.
- 18 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
19 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
20 disturbances that could affect western yellow-billed cuckoo use of the surrounding habitat.
21 Maintenance activities would include vegetation management, levee and structure repair, and
22 re-grading of roads and permanent work areas. These effects, however, would be reduced by
23 AMMs and conservation actions as described below.
- 24 ● Injury and Direct Mortality: Western yellow-billed cuckoo nesting has not been confirmed in the
25 Delta for approximately 100 years. However, an unconfirmed breeding detection in 2009 in
26 DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*
27 *Data Report*) and the present of suitable habitat indicates that the species is potentially breeding
28 in the study area, or may nest there in the future. Construction-related activities would not be
29 expected to result in direct mortality of adult or fledged western yellow-billed cuckoo if they
30 were present in the Plan Area, because they would be expected to avoid contact with
31 construction and other equipment. If western yellow-billed cuckoo were to nest in the
32 construction area, construction-related activities, including equipment operation, noise and
33 visual disturbances could destroy nests or lead to their abandonment, resulting in mortality of
34 eggs and nestlings. These effects would be avoided and minimized with the incorporation of
35 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
36 *Cuckoo* into the BDCP.

37 The following paragraphs summarize the combined effects discussed above and describe other
38 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
39 included.

40 ***Near-Term Timeframe***

41 Because the water conveyance facilities construction is being evaluated at the project level, the near-
42 term BDCP conservation strategy has been evaluated to determine whether it would provide
43 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
44 effects of construction would not be adverse under NEPA. The Plan would remove 432 acres of

1 modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects would
2 result from the construction of the water conveyance facilities (CM1, 37 acres of modeled migratory
3 habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries Enhancement*,
4 CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain Restoration*—
5 395 acres of modeled nesting and migratory habitat). These habitat losses would primarily consist
6 of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value habitat for the
7 species.

8 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
9 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter
10 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
11 habitat. Using these ratios would indicate that 37 acres of valley/foothill riparian habitat should be
12 restored/created and 37 acres should be protected to compensate for the CM1 losses of yellow-
13 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres
14 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of
15 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
16 protection).

17 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
18 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These
19 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as
20 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
21 yellow-billed cuckoo. The majority of the riparian restoration acres would occur in CZ 7 as part of a
22 reserve system with extensive wide bands or large patches of valley/foothill riparian natural
23 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Goals
24 and objectives in the Plan for riparian restoration also include the restoration, maintenance and
25 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among
26 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and
27 grasslands (Objective VFRNC2.1). These natural community biological goals and objectives would
28 inform the near-term protection and restoration efforts and represent performance standards for
29 considering the effectiveness of conservation actions for the species.

30 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
31 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the
32 restored riparian habitat would require several years (early-mid successional) and several decades
33 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to
34 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not
35 known to be an established breeder in the Plan Area, the time lag in riparian restoration from BDCP
36 actions would not be expected to have an adverse population-level effect on the species. Overall,
37 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed
38 cuckoo by increasing opportunities for a breeding population to become reestablished in the study
39 area.

40 The Plan also includes commitments to implement AMM1 *Worker Awareness Training*, AMM2
41 *Construction Best Management Practices and Monitoring*, AMM3 *Stormwater Pollution Prevention*
42 *Plan*, AMM4 *Erosion and Sediment Control Plan*, AMM5 *Spill Prevention, Containment, and*
43 *Countermeasure Plan*, AMM6 *Disposal and Reuse of Spoils*, AMM7 *Barge Operations Plan*, and AMM22
44 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
45 these AMMs include elements that would avoid or minimize the risk of affecting individuals and

1 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
2 which have since been updated and which are provided in Appendix 3B, *Environmental*
3 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

4 **Late Long-Term Timeframe**

5 The habitat model indicates that the study area supports approximately 12,395 acres of modeled
6 breeding and migratory habitat for yellow-billed cuckoo. Alternative 1A as a whole would result in
7 the permanent loss of and temporary effects on 666 acres of modeled habitat (5% of the modeled
8 habitat in the Plan Area). These losses would occur from the construction of the water conveyance
9 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
10 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
11 would be in fragmented riparian habitat throughout the study area.

12 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
13 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
14 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
15 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
16 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
17 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least
18 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This
19 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian
20 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet
21 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.
22 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its
23 entirety the vegetative structure needed to support these species, because patch sizes may not be
24 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected
25 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11
26 would expand the patches of existing riparian forest in order to support the species should they
27 become established breeders in the study area.

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
29 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
30 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
32 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
33 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
34 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
35 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
36 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
37 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
38 which have since been updated and which are provided in Appendix 3B, *Environmental*
39 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

40 **NEPA Effects:** The loss of western yellow-billed cuckoo habitat associated with Alternative 1A would
41 represent an adverse effect in the absence of other conservation actions. However, the species is not
42 an established breeder in the study area and current presence is limited to migrants. In addition, the
43 habitat lost would consist of small, fragmented riparian stands that would not provide high-value
44 habitat for the species. With habitat protection and restoration associated with CM3, CM7, and

1 CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM22 Suisun Song*
2 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be in
3 place during all project activities, the effects of habitat loss and potential mortality on western
4 yellow-billed cuckoo would not be adverse under Alternative 1A.

5 **CEQA Conclusion:**

6 **Near-Term Timeframe**

7 Because the water conveyance facilities construction is being evaluated at the project level, the near-
8 term BDCP conservation strategy has been evaluated to determine whether it would provide
9 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
10 effects of construction would be less than significant under CEQA. The Plan would remove 432 acres
11 of modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects would
12 result from the construction of the water conveyance facilities (CM1, 37 acres of modeled migratory
13 habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement,*
14 *CM4 Tidal Natural Communities Restoration,* and *CM5 Seasonally Inundated Floodplain Restoration—*
15 *395 acres of modeled nesting and migratory habitat*). These habitat losses would primarily consist
16 of small, fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the
17 species.

18 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
19 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter
20 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
21 habitat. Using these ratios would indicate that 37 acres of valley/foothill riparian habitat should be
22 restored/created and 37 acres should be protected to compensate for the CM1 losses of yellow-
23 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres
24 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of
25 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
26 protection).

27 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
28 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These
29 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as
30 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
31 yellow-billed cuckoo. The majority of the riparian restoration acres would occur in CZ 7 as part of a
32 reserve system with extensive wide bands or large patches of valley/foothill riparian natural
33 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Goals
34 and objectives in the Plan for riparian restoration also include the restoration, maintenance and
35 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among
36 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and
37 grasslands (Objective VFRNC2.1). These natural community biological goals and objectives would
38 inform the near-term protection and restoration efforts and represent performance standards for
39 considering the effectiveness of conservation actions for the species.

40 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
41 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the
42 restored riparian habitat would require several years (early-mid successional) and several decades
43 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to
44 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not

1 known to be an established breeder in the Plan Area, the time lag in riparian restoration from BDCP
2 actions would not be expected to have an adverse population-level effect on the species. Overall,
3 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed
4 cuckoo by increasing opportunities for a breeding population to become reestablished in the study
5 area.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
10 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo*. All of
11 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
12 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
13 which have since been updated and which are provided in Appendix 3B, *Environmental*
14 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

15 ***Late Long-Term Timeframe***

16 The habitat model indicates that the study area supports approximately 12,395 acres of modeled
17 breeding and migratory habitat for yellow-billed cuckoo. Alternative 1A as a whole would result in
18 the permanent loss of and temporary effects on 666 acres of modeled habitat (5% of the modeled
19 habitat in the Plan Area). These losses would occur from the construction of the water conveyance
20 facilities (*CM1*) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
21 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
22 would be in fragmented riparian habitat throughout the study area.

23 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
24 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
25 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
26 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
27 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
28 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least
29 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This
30 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian
31 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet
32 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.
33 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its
34 entirety the vegetative structure needed to support these species, because patch sizes may not be
35 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected
36 habitat would provide suitable habitat for the species. Restoration actions through *CM7* and *CM11*
37 would expand the patches of existing riparian forest in order to support the species should they
38 become established breeders in the study area.

39 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
40 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
41 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
2 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of
3 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
4 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
5 which have since been updated and which are provided in Appendix 3B, *Environmental*
6 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

7 In the absence of other conservation actions, effects on Western yellow-billed cuckoo from
8 Alternative 1A would represent an adverse effect as a result of habitat modification and potential for
9 direct mortality of a special-status species; however, considering Alternative 1A's protection and
10 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
11 greater than necessary to compensate for the time lag of restoring habitats lost to construction and
12 restoration activities, and implementation of AMM1–AMM7, AMM10, and AMM22 *Suisun Song*
13 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, the loss of habitat or
14 direct mortality through implementation of Alternative 1A would not result in a substantial adverse
15 effect through habitat modifications and would not substantially reduce the number or restrict the
16 range of the species. Therefore, the loss of habitat or potential mortality under this alternative
17 would have a less-than-significant impact on western yellow-billed cuckoo.

18 **Impact BIO-96: Fragmentation of Western Yellow-Billed Cuckoo Habitat as a Result of** 19 **Constructing the Water Conveyance Facilities**

20 Grading, filling, contouring, and other initial ground-disturbing operations for water conveyance
21 facilities construction may temporarily fragment modeled western yellow-billed cuckoo habitat.
22 This could temporarily reduce the extent and functions supported by the affected habitat. Because
23 western yellow-billed cuckoo is not currently known to breed in the study area, and the protection
24 and restoration of riparian habitat will expand contiguous habitat block requirements, habitat
25 fragmentation would have a minimal effect on the species.

26 **NEPA Effects:** Fragmentation of habitat would not have an adverse effect on western yellow-billed
27 cuckoo. The habitat functions in the study area for the species would be greatly improved through
28 the implementation of CM5, which would restore and protect large contiguous patches of riparian
29 habitat.

30 **CEQA Conclusion:** Fragmentation of habitat would have a less-than-significant impact on western
31 yellow-billed cuckoo. The habitat functions in the study area for the species would be greatly
32 improved through the implementation of CM5, which would restore and protect large contiguous
33 patches of riparian habitat.

34 **Impact BIO-97: Effects on Western Yellow-Billed Cuckoo Associated with Electrical** 35 **Transmission Facilities**

36 New transmission lines would increase the risk for bird-power line strikes, which could result in
37 injury or mortality of western yellow-billed cuckoo. Because the western yellow-billed cuckoo uses
38 riparian forests to meet all of its breeding and wintering life requisites, the species remains
39 primarily within the canopy of riparian forests and rarely ventures into open spaces except during
40 migration, limiting its opportunity to encounter the proposed transmission lines. As a summer
41 resident, if the species were to occur in the study area, it would be during periods of relatively high
42 visibility and clear weather conditions, thus further reducing collision risk from daily use patterns
43 or seasonal migration flights. Finally, western yellow-billed cuckoo wing shape is characterized by

1 low wing loading and a moderate aspect ratio, making the species moderately maneuverable and
2 presumably able to avoid collisions, especially during high-visibility conditions (BDCP Attachment
3 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).

4 Transmission line poles and towers also provide perching substrate for raptors, which are predators
5 on western yellow-billed cuckoo. Although there is potential for transmission lines to result in
6 increased perching opportunities for raptors, the existing network of transmission lines in the study
7 area currently poses these risks and any incremental risk associated with the new power line
8 corridors would not be expected to affect the population. Because there is low probability for the
9 species to occur in the study area, any increase in predation risk on western yellow-billed cuckoo
10 from an increase in raptor perching opportunities would be minimal.

11 **NEPA Effects:** The risk of bird-strike is considered to be minimal based on the species' rarity in the
12 study area, its proclivity to remain in the riparian canopy, its presence in the study area during
13 periods of relative high visibility, and its overall ability to successfully negotiate around overhead
14 wires that it may encounter. Transmission line poles and towers also provide perching substrate for
15 raptors, which could result in increased predation pressure on western yellow-billed cuckoo.
16 However, because there is a low probability for the species to occur in the study area, any increase
17 in predation risk on western yellow-billed cuckoo from an increase in raptor perching opportunities
18 would be minimal. Therefore, the construction and operation of new transmission lines under
19 Alternative 1A would not result in an adverse effect on western yellow-billed cuckoo.

20 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
21 significant impact on western yellow-billed cuckoo because the risk of bird-strike is considered to
22 be minimal based on the species' rarity in the study area, its proclivity to remain in the riparian
23 canopy, its presence during periods of relative high visibility, and its overall ability to successfully
24 negotiate around overhead wires that it may encounter. Transmission line poles and towers also
25 provide perching substrate for raptors, which could result in increased predation pressure on
26 western yellow-billed cuckoo. However, because there is a low probability for the species to occur in
27 the study area, any increase in predation risk on western yellow-billed cuckoo from an increase in
28 raptor perching opportunities would be minimal. Therefore the construction and operation of new
29 transmission lines under Alternative 1A would result in a less-than-significant impact on western
30 yellow-billed cuckoo.

31 **Impact BIO-98: Indirect Effects of Plan Implementation on Western Yellow-Billed Cuckoo**

32 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
33 with construction-related activities could result in temporary disturbances that affect western
34 yellow-billed cuckoo use of modeled habitat adjacent to proposed construction areas. Construction
35 noise above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from
36 the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*
37 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no
38 available data to determine the extent to which these noise levels could affect western yellow-billed
39 cuckoo. Indirect effects associated with construction include noise, dust, and visual disturbance
40 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
41 footprint but within 1,300 feet from the construction edge. If western yellow-billed cuckoo were to
42 nest in or adjacent to work areas, construction and subsequent maintenance-related noise and
43 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
44 functions of suitable nesting habitat for these species. These potential effects would be minimized

1 with incorporation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
2 *Yellow-Billed Cuckoo* into the BDCP. The use of mechanical equipment during water conveyance
3 facilities construction could cause the accidental release of petroleum or other contaminants that
4 could affect western yellow-billed cuckoo in the surrounding habitat. The inadvertent discharge of
5 sediment or excessive dust adjacent to western yellow-billed cuckoo habitat could also affect the
6 species. *AMM1-AMM7*, including *AMM2 Construction BMPs and Monitoring*, in addition to *AMM22*
7 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would
8 minimize the likelihood of such spills and ensure that measures were in place to prevent runoff from
9 the construction area and any adverse effects of dust on active nests.

10 **Methylmercury Exposure:** Western yellow-billed cuckoo modeled habitat includes primarily
11 middle marsh habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is
12 also used if it is of high value, and low marsh provides foraging habitat for the species. Cuckoos are a
13 top predator in the benthic food chain; they forage by probing their beaks into the mud (Zembal and
14 Fancher 1988) and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects
15 (Eddleman and Conway 1998).

16 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
17 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
18 species would overestimate the effects on western yellow-billed cuckoo. Organisms feeding within
19 pelagic-based (algal) foodwebs have been found to have higher concentrations of methylmercury
20 than those in benthic or epibenthic foodwebs; this has been attributed to food chain length and
21 dietary segregation (Grimaldo et al. 2009).

22 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
23 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
24 Thus, Alternative 1A restoration activities that create newly inundated areas could increase
25 bioavailability of mercury. Concentrations of methylmercury known to be toxic to bird embryos
26 have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003);
27 however, currently, it is unknown how much of the sediment-derived methylmercury enters the
28 food chain in Suisun Marsh or what tissue concentrations are actually harmful to the western
29 yellow-billed cuckoo. In general, the highest methylation rates are associated with high tidal
30 marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers
31 et al. 2008). In Suisun Marsh, the conversion of managed wetlands to tidal wetlands is expected to
32 result in an overall reduction in mercury methylation. Due to the complex and very site-specific
33 factors that will determine if mercury becomes mobilized into the foodweb, *CM12 Methylmercury*
34 *Management* is included to provide for site-specific evaluation for each restoration project. If a
35 project is identified where there is a high potential for methylmercury production that could not be
36 fully addressed through restoration design and adaptive management, alternate restoration areas
37 would be considered. *CM12* would be implemented in coordination with other similar efforts to
38 address mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis
39 Section. This conservation measure would include the following actions.

- 40 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
41 mercury methylation and bioavailability
- 42 ● Define design elements that minimize conditions conducive to generation of methylmercury in
43 restored areas.

- 1 • Define adaptive management strategies that can be implemented to monitor and minimize
2 actual postrestoration creation and mobilization of methylmercury.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex
8 classes within a species. In addition, the effect of selenium on a species can be confounded by
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
10 2009).

11 The primary source of selenium bioaccumulation in birds is through diet (Ackerman and Eagles-
12 Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the trophic
13 level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson
14 Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be
15 two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay
16 contained much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004).
17 Studies conducted at the Grasslands in Merced County recorded higher selenium levels in black-
18 necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
19 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
20 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
21 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
22 have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
24 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
25 exacerbate bioaccumulation of selenium in avian species, including western yellow-billed cuckoo.
26 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
27 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
28 Alternative 1A restoration activities that create newly inundated areas could increase bioavailability
29 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
30 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
31 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
32 increases in selenium concentrations in water in the Delta under any alternative. However, it is
33 difficult to determine whether the effects of potential increases in selenium bioavailability
34 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
35 effects on western yellow-billed cuckoo.

36 Because of the uncertainty that exists at this programmatic level of review, there could be a
37 substantial effect on western yellow-billed cuckoo from increases in selenium associated with
38 restoration activities. This effect would be addressed through the implementation of *AMM27*
39 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
40 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
41 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
42 selenium management to reduce selenium concentrations and/or bioaccumulation would be
43 evaluated separately for each restoration effort as part of design and implementation. This
44 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
45 design schedule.

1 **NEPA Effects:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 1A
2 implementation could have adverse effects on the species through the modification of habitat and
3 potential for direct mortality.

4 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
5 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
6 the western yellow-billed cuckoo foodweb to methylmercury in these areas, with the level of
7 exposure dependent on the amounts of mercury available in the soils and the biogeochemical
8 conditions. However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would
9 be expected to reduce the overall production of methylmercury, resulting in a net benefit to the
10 species. Implementation of CM12, which contains measures to assess the amount of mercury before
11 project development, followed by appropriate design and adaptation management, would minimize
12 the potential for increased methylmercury exposure, and would result in no adverse effect on the
13 species.

14 Tidal habitat restoration could result in increased exposure of western yellow-billed cuckoo to
15 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
16 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
17 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

18 Because of the species' minimal presence in the study area, and with the incorporation of AMM1–
19 AMM7, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed*
20 *Cuckoo*, and *AMM27 Selenium Management* into the BDCP, indirect effects would not have an adverse
21 effect on western yellow-billed cuckoo.

22 **CEQA Conclusion:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 1A
23 implementation could have a significant impact on the species from modification of habitat.

24 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
25 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
26 the western yellow-billed cuckoo foodweb to methylmercury in these areas, with the level of
27 exposure dependent on the amounts of mercury available in the soils and the biogeochemical
28 conditions. However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would
29 be expected to reduce the overall production of methylmercury, resulting in a net benefit to the
30 species. Implementation of CM12, which contains measures to assess the amount of mercury before
31 project development, followed by appropriate design and adaptation management, would minimize
32 the potential for increased methylmercury exposure, and would result in no adverse effect on the
33 species.

34 Tidal habitat restoration could result in increased exposure of western yellow-billed cuckoo to
35 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
36 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
37 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

38 With the incorporation of AMM1–AMM7, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least*
39 *Bell's Vireo*, *Western Yellow-Billed Cuckoo*, and *AMM27 Selenium Management* into the BDCP, indirect
40 effects as a result of Alternative 1A implementation would have a less-than-significant impact on
41 western yellow-billed cuckoo.

1 **Impact BIO-99: Periodic Effects of Inundation of Western Yellow-Billed Cuckoo Habitat as a**
2 **Result of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
4 duration of inundation of approximately 11-20 acres of modeled western yellow-billed cuckoo
5 breeding habitat and 37–64 acres of modeled migratory habitat. No adverse effects of increased
6 inundation frequency on western yellow-billed cuckoo or its habitat are expected because the
7 cuckoo breeding period is outside the period the weir would be operated. In addition, riparian
8 vegetation supporting habitat has persisted under the existing Yolo Bypass flooding regime, and
9 changes to frequency and inundation would be within the tolerance of these vegetation types.

10 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
11 inundation of up to 142 acres of modeled western yellow-billed cuckoo habitat (17 acres of breeding
12 habitat, 125 acres of migratory habitat). Inundation of restored floodplains is not expected to affect
13 western yellow-billed cuckoo or its habitat adversely because the cuckoo breeding period is outside
14 the period the floodplains would likely be inundated, and periodic inundation of floodplains is
15 expected to restore a more natural flood regime in support of riparian vegetation types that provide
16 nesting and migratory habitat for western yellow-billed cuckoo. The overall effect of seasonal
17 inundation in existing riparian natural communities is likely to be beneficial for western yellow-
18 billed cuckoo, because, historically, flooding was the main natural disturbance regulating ecological
19 processes in riparian areas, and flooding promotes the germination and establishment of many
20 native riparian plants.

21 **NEPA Effects:** Periodic effects of inundation would not have an adverse on yellow-billed cuckoo if
22 they were to establish as breeders in the study area, because flooding is expected to occur outside of
23 the breeding season.

24 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on
25 yellow-billed cuckoos if they were to establish as breeders in the study area, because flooding is
26 expected to occur outside of the breeding season.

27 **White-Tailed Kite**

28 This section describes the effects of Alternative 1A, including water conveyance facilities
29 construction and implementation of other conservation components, on white-tailed kite. The
30 habitat model used to assess impacts on white-tailed kite includes nesting habitat and foraging
31 habitat. Most white-tailed kites in the Sacramento Valley are found in oak and cottonwood riparian
32 forests, valley oak woodlands, or other groups of trees and are usually associated with compatible
33 foraging habitat for the species in patches greater than 1,500 square meters (Erichsen et al. 1996).
34 Modeled foraging habitat for white-tailed kite consists of pasture and hay crops, compatible row and
35 grain crops and natural vegetation such as seasonal wetlands and annual grasslands (Erichsen
36 1995).

37 Construction and restoration associated with Alternative 1A conservation measures would result in
38 both temporary and permanent losses of white-tailed kite modeled habitat as indicated in Table 12-
39 1A-41. The majority of the losses would take place over an extended period of time as tidal marsh is
40 restored in the study area. Although restoration for the loss of nesting and foraging habitat would be
41 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)
42 for restored habitats to replace the functions of habitat lost. This time lag between impacts and
43 restoration of habitat function would be minimized by specific requirements of *AMM39 White-Tailed*

1 *Kite*, including the planting of mature trees in the near-term time period. Full implementation of
2 Alternative 1A would also include the following biological objectives over the term of the BDCP to
3 benefit the white-tailed kite (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*).

- 4 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
5 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
6 associated with CM7).
- 7 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
8 10 (Objective VFRNC1.2, associated with CM3).
- 9 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
10 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
11 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 12 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 13 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
14 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 15 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
16 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 17 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
18 VPNC2.5, and GNC2.4, associated with CM11).
- 19 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
20 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 21 ● Plant and maintain native trees along roadsides and field borders within protected cultivated
22 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 23 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
24 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
25 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
26 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 27 ● Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey
28 populations throughout protected cultivated lands (Objective SH2.2, associated with CM11)

29 As explained below, with the restoration or protection of these amounts of habitat, in addition to
30 management activities that would enhance these natural communities for the species and
31 implementation of AMM1–AMM7 and AMM39 *White-Tailed Kite*, impacts on white-tailed kite would
32 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-41. Changes in White-Tailed Kite Modeled Habitat Associated with Alternative 1A**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	29	29	20	20	NA	NA
	Foraging	3,299	3,299	1,432	1,432	NA	NA
Total Impacts CM1		3,328	3,328	1,452	1,452	NA	NA
CM2-CM18	Nesting	312	507	88	121	48-82	230
	Foraging	8,723	52,675	516	1,484	3,030-6,651	7,402
Total Impacts CM2-CM18		9,035	53,182	604	1,605	3,078-6,733	7,632
Total Nesting		341	536	108	141	48-82	230
Total Foraging		12,022	55,974	1,948	2,916	3,030-6,651	7,402
TOTAL IMPACTS		12,363	56,510	2,056	3,057	3,078-6,733	7,632

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-100: Loss or Conversion of Habitat for and Direct Mortality of White-Tailed Kite**

5 Alternative 1A conservation measures would result in the combined permanent and temporary loss
6 of up to 59,567 acres of modeled habitat (677 acres of nesting habitat and 58,890 acres of foraging
7 habitat) for white-tailed kite (Table 12-1A-41). Conservation measures that would result in these
8 losses are conveyance facilities and transmission line construction, and establishment and use of
9 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration
10 (CM4), floodplain restoration (CM5), riparian restoration, (CM7), grassland restoration (CM8),
11 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of
12 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which
13 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.
14 In addition, maintenance activities associated with the long-term operation of the water conveyance
15 facilities and other BDCP physical facilities could affect white-tailed kite modeled habitat. Each of
16 these individual activities is described below. A summary statement of the combined impacts and
17 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A water conveyance facilities
19 would result in the combined permanent and temporary loss of up to 49 acres of white-tailed
20 kite nesting habitat (29 acres of permanent loss and 20 acres of temporary loss). In addition,
21 4,731 acres of foraging habitat would be removed (3,299 acres of permanent loss, 1,432 acres of

temporary loss). (Table 12-1A-41). Activities that would impact modeled White-tailed kite habitat consist of tunnel, forebay, and intake construction, temporary access roads, and construction of transmission lines. Most of the permanent loss of nesting habitat would occur where Intakes 1–5 impact the Sacramento River’s east bank between Freeport and Courtland. The riparian areas here are very small patches, some dominated by valley oak and others by nonnative trees. Temporary losses of nesting habitat would occur where pipelines cross Snodgrass Slough and other small waterways east of the Sacramento River, and where temporary work areas surround intake sites. The riparian habitat in these areas is also composed of very small patches or stringers bordering waterways, which are composed of valley oak and scrub vegetation. There are no occurrences of nesting white-tailed kite that overlap with the construction footprint of CM1. However, the implementation of *AMM39 White-Tailed Kite* would minimize effects on white-tailed kites if they were to nest within or adjacent to the construction footprint. Impacts on white-tailed kite foraging habitat would occur in the central delta in CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations. Impacts from CM1 would occur within the first 10 years of Alternative 1A implementation.

- *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement would result in the combined permanent and temporary loss of up to 170 acres of nesting habitat (82 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2. In addition, 1,525 acres of foraging habitat would be removed (1,008 acres of permanent loss, 516 acres of temporary loss). Activities through CM2 could involve excavation and grading in valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the riparian losses would occur at the north end of Yolo Bypass where major fish passage improvements are planned. Excavation to improve water movement in the Toe Drain and in the Sacramento Weir would also remove white-tailed kite habitat. The loss is expected to occur during the first 10 years of Alternative 1A implementation.
- *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration (CM4) site preparation and inundation would permanently remove an estimated 383 acres of white-tailed kite nesting habitat and 41,625 acres of foraging habitat. The majority of the acres lost would consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact and fragment grassland just north of Rio Vista in and around French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on the northern fringes of Suisun Marsh. The conversion of cultivated lands to tidal wetlands over fairly broad areas within the tidal restoration footprints could result in the removal or abandonment of nesting territories that occur within or adjacent to the restoration areas. Trees would not be actively removed but tree mortality would be expected over time as areas became tidally inundated. Depending on the extent and value of remaining habitat, this could reduce the local nesting population.
- *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore seasonally inundated floodplain and riparian restoration actions would remove approximately 75 acres of white-tailed kite nesting habitat (42 acres of permanent loss, 33 acres of temporary loss) and 2,675 acres of foraging habitat (1,706 acres of permanent loss, 968 acres of temporary

1 loss). These losses would be expected after the first 10 years of Alternative 1A implementation
2 along the San Joaquin River and other major waterways in CZ 7.

- 3 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
4 approximately 971 acres of white-tailed kite foraging habitat as part of tidal restoration and
5 3,991 acres as part of seasonal floodplain restoration through CM7.
- 6 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
7 implemented on agricultural lands and would result in the conversion of 1,849 acres of white-
8 tailed kite agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8, and 11.
9 If agricultural lands supporting higher value foraging habitat than the restored grassland were
10 removed, there would be a loss of white-tailed kite foraging habitat value.
- 11 • *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would
12 result in the permanent conversion of 1,440 acres of cultivated lands to nontidal marsh in CZ 2
13 and CZ 4. This would not result in a loss of foraging habitat as both natural communities are
14 foraging habitat for white-tailed kite. Small patches of riparian vegetation that support White-
15 tailed kite nesting habitat may develop along the margins of restored nontidal marsh restoration
16 would also provide foraging habitat for the species.
- 17 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and
18 enhancement-related activities could disturb white-tailed kite nests if they were present near
19 work sites. A variety of habitat management actions that are designed to enhance wildlife values
20 in BDCP-protected habitats may result in localized ground disturbances that could temporarily
21 remove small amounts of white-tailed kite habitat and reduce the functions of habitat until
22 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
23 and road and other infrastructure maintenance, are expected to have minor effects on available
24 white-tailed kite habitat and are expected to result in overall improvements to and maintenance
25 of habitat values over the term of the BDCP. These effects cannot be quantified, but are expected
26 to be minimal and would be avoided and minimized by the AMMs listed below. CM11 would also
27 include the construction of recreational-related facilities including trails, interpretive signs, and
28 picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The
29 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be
30 placed on existing, disturbed areas when and where possible. However, approximately 50 acres
31 of white-tailed kite grassland foraging habitat would be lost from the construction of trails and
32 facilities.
- 33 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
34 white-tailed kite foraging habitat for the development of a delta and longfin smelt conservation
35 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.

36 Permanent and temporary white-tailed kite nesting habitat losses from the above conservation
37 measures, would primarily consist of small, fragmented riparian stands. Temporarily affected
38 nesting habitat would be restored as riparian habitat within 1 year following completion of
39 construction activities. The restored riparian habitat would require 1 to several decades to
40 functionally replace habitat that has been affected and for trees to attain sufficient size and
41 structure suitable for nesting by white-tailed kite. *AMM39 White-Tailed Kite* contains actions
42 described below to reduce the effect of temporal loss of nesting habitat, including the
43 transplanting of mature trees and planting of trees near high-value foraging habitat. The
44 functions of agricultural and grassland communities that provide foraging habitat for white-
45 tailed kite are expected to be restored relatively quickly.

- 1 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
2 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
3 disturbances that could affect white-tailed kite use of the surrounding habitat. Maintenance
4 activities would include vegetation management, levee and structure repair, and re-grading of
5 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7
6 and *AMM39 White-Tailed Kite* in addition to conservation actions as described below.
- 7 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
8 direct mortality of adult or fledged white-tailed kite if they were present in the Plan Area,
9 because they would be expected to avoid contact with construction and other equipment.
10 However, if white-tailed kite were to nest in the construction area, construction-related
11 activities, including equipment operation, noise and visual disturbances could affect nests or
12 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects
13 would be avoided and minimized with the incorporation of *AMM39 White-Tailed Kite* into the
14 BDCP.

15 The following paragraphs summarize the combined effects discussed above and describe other
16 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
17 included.

18 ***Near-Term Timeframe***

19 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
20 the near-term BDCP conservation strategy has been evaluated to determine whether it would
21 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
22 the effect of construction would not be adverse under NEPA. The Plan would remove 449 acres (338
23 acres of permanent loss, 111 acres of temporary loss) of white-tailed kite nesting habitat in the
24 study area in the near-term. These effects would result from the construction of the water
25 conveyance facilities (CM1, 49 acres), and implementing other conservation measures (*CM2 Yolo*
26 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
27 *Inundated Floodplain Restoration*—400 acres). In addition, 14,873 acres of white-tailed kite foraging
28 habitat would be removed or converted in the near-term (CM1, 5,634 acres; *CM2 Yolo Bypass*
29 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5, Seasonally Inundated*
30 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*
31 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*
32 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—9,239
33 acres).

34 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
35 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of
36 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
37 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 49
38 acres of nesting habitat should be restored/created and 49 acres should be protected to mitigate the
39 CM1 losses of white-tailed kite nesting habitat. In addition, 5,634 acres of foraging habitat should be
40 protected to compensate for the CM1 losses of white-tailed kite foraging habitat. The near-term
41 effects of other conservation actions would remove 400 acres of modeled nesting habitat, and
42 therefore require 400 acres of restoration and 400 acres of protection of nesting habitat. Similarly,
43 the near-term effects of other conservation actions would result in the loss or conversion of 9,239
44 acres of modeled foraging habitat, and therefore require 9,239 acres of protection of foraging

1 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection of
2 nesting habitat; 1:1 for protection of foraging habitat).

3 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
4 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
5 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
6 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
7 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
8 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation
9 actions are associated with CM3, CM4, CM7, and CM8 and would occur in the same timeframe as the
10 construction and early restoration losses.

11 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
12 system with extensive wide bands or large patches of valley/foothill riparian natural community
13 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
14 restoration would expand the patches of existing riparian forest in order to support nesting habitat
15 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
16 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
17 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
18 would be increased by planting and maintaining native trees along roadsides and field borders
19 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
20 small but essential nesting habitat associated with cultivated lands would also be maintained and
21 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
22 farmyards or at rural residences (Objective CLNC1.3).

23 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
24 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
25 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
26 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
27 would provide foraging habitat for white-tailed kite and reduce the effects of current levels of
28 habitat fragmentation. Small mammal populations would also be increased on protected lands,
29 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
30 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through
31 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within
32 protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other
33 uncultivated areas would also be protected and maintained as part of the cultivated lands reserve
34 system which would provide additional foraging habitat and a source of rodent prey that could
35 recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including
36 upland grassland components) that dry during the spring would also serve as foraging habitat for
37 white-tailed kite as prey species recolonize the fields (Objective MWNC1.1). In addition, the
38 restoration of 19,150 acres of tidal natural communities, including transitional uplands would
39 provide high-value foraging habitat for the white-tailed kite. At least 15,400 acres of cultivated lands
40 that provide habitat for covered and other native wildlife species would be protected in the near-
41 term time period (Objective CLNC1.1). These biological goals and objectives would inform the near-
42 term protection and restoration efforts and represent performance standards for considering the
43 effectiveness of restoration actions. The acres of restoration and protection contained in the near-
44 term Plan goals and the additional detail in the biological objectives satisfy the typical mitigation
45 that would be applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well
46 as mitigate the near-term effects of the other conservation measures.

1 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
 2 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
 3 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian
 4 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
 5 require one to several decades to functionally replace habitat that has been affected and for trees to
 6 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between
 7 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite
 8 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting
 9 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
 10 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat
 11 would further reduce this limited resource and could reduce or restrict the number of active white-
 12 tailed kite nests within the Plan Area until restored riparian habitat is sufficiently developed.

13 *AMM39 White-Tailed Kite* would implement a program to plant large mature trees, including
 14 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson's hawk
 15 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
 16 within the 125-acre block are removed. These mature trees would be supplemented with additional
 17 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
 18 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
 19 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
 20 system for every tree 20 feet or taller removed by construction during the near-term period. A
 21 variety of native tree species would be planted to provide trees with differing growth rates,
 22 maturation, and life span. Trees would be planted within the BDCP reserve system in areas that
 23 support high value foraging habitat to increase nest sites, or within riparian plantings as a
 24 component of the riparian restoration (CM5, CM7) where they are in close proximity to suitable
 25 foraging habitat. Replacement trees that were incorporated into the riparian restoration would not
 26 be clustered in a single region of the Plan Area, but would be distributed throughout the lands
 27 protected as foraging habitat for white-tailed kite. Further details of AMM39 are provided in
 28 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. With this program
 29 in place, Alternative 1A would not have a substantial adverse effect on white-tailed kite in the near-
 30 term timeframe, either through direct mortality or through habitat modifications.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
 32 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
 33 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 34 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
 35 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 36 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 37 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 38 of the Final EIR/EIS.

39 ***Late Long-Term Timeframe***

40 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres
 41 of modeled foraging habitat for white-tailed kite. Alternative 1A as a whole would result in the
 42 permanent loss of and temporary effects on 677 acres of potential nesting habitat (5% of the
 43 potential nesting habitat in the study area) and the loss or conversion of 59,793 acres of foraging
 44 habitat (12% of the foraging habitat in the study area). The locations of these losses are described
 45 above in the analyses of individual conservation measures.

1 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
2 *Restoration, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*
3 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Community*
4 *Restoration*, to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
5 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
6 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
7 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that
8 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal
9 wetlands (Table 3-4 in Chapter 3).

10 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
11 system with extensive wide bands or large patches of valley/foothill riparian natural community
12 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
13 restoration would expand the patches of existing riparian forest in order to support nesting habitat
14 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
15 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
16 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
17 would be increased by planting and maintaining native trees along roadsides and field borders
18 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
19 small but essential nesting habitat associated with cultivated lands would also be maintained and
20 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
21 farmyards or at rural residences (Objective CLNC1.3).

22 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
23 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
24 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
25 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
26 would provide foraging habitat for white-tailed kite and reduce the effects of current levels of
27 habitat fragmentation. Small mammal populations would also be increased on protected lands,
28 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
29 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through
30 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within
31 protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other
32 uncultivated areas would also be protected and maintained as part of the cultivated lands reserve
33 system which would provide additional foraging habitat and a source of rodent prey that could
34 recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including
35 upland grassland components) that dry during the spring would also serve as foraging habitat for
36 white-tailed kite as prey species recolonize the fields (Objective MWNC1.1). In addition, the
37 restoration of at least 65,000 acres of tidal natural communities, including transitional uplands
38 would provide high-value foraging habitat for the white-tailed kite. At least 45,405 acres of
39 cultivated lands that provide foraging habitat for white-tailed kite would be protected by the late
40 long-term time period (Objective CLNC1.1).

41 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
42 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
43 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration
44 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 8 of the Final EIR/EIS.

9 **NEPA Effects:** The loss of white-tailed kite habitat and potential for direct mortality of this special-
 10 status species under Alternative 1A would represent an adverse effect in the absence of other
 11 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,
 12 CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM39 White-*
 13 *Tailed Kite*, which would be in place during all project activities, the effects of habitat loss and
 14 potential mortality on white-tailed kite under Alternative 1A would not be adverse.

15 **CEQA Conclusion:**

16 **Near-Term Timeframe**

17 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 18 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 19 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
 20 the effect of construction would be less than significant under CEQA. The Plan would remove 449
 21 acres (338 acres of permanent loss, 111 acres of temporary loss) of white-tailed kite nesting habitat
 22 in the study area in the near-term. These effects would result from the construction of the water
 23 conveyance facilities (CM1, 49 acres), and implementing other conservation measures (*CM2 Yolo*
 24 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
 25 *Inundated Floodplain Restoration*—400 acres). In addition, 14,873 acres of white-tailed kite foraging
 26 habitat would be removed or converted in the near-term (CM1, 5,634 acres; *CM2 Yolo Bypass*
 27 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*
 28 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*
 29 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*
 30 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—9,239
 31 acres).

32 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
 33 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of
 34 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
 35 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 49
 36 acres of nesting habitat should be restored/created and 49 acres should be protected to mitigate the
 37 CM1 losses of white-tailed kite nesting habitat. In addition, 5,634 acres of foraging habitat should be
 38 protected to compensate for the CM1 losses of white-tailed kite foraging habitat. The near-term
 39 effects of other conservation actions would remove 400 acres of modeled nesting habitat, and
 40 therefore require 400 acres of restoration and 400 acres of protection of nesting habitat. Similarly,
 41 the near-term effects of other conservation actions would result in the loss or conversion of 9,239
 42 acres of modeled foraging habitat, and therefore require 9,239 acres of protection of foraging
 43 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection of
 44 nesting habitat; 1:1 for protection of foraging habitat).

1 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
2 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
3 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
4 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
5 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
6 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation
7 actions are associated with CM3, CM4, CM7, and CM8 and would occur in the same timeframe as the
8 construction and early restoration losses.

9 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
10 system with extensive wide bands or large patches of valley/foothill riparian natural community
11 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
12 restoration would expand the patches of existing riparian forest in order to support nesting habitat
13 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
14 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
15 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
16 would be increased by planting and maintaining native trees along roadsides and field borders
17 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
18 small but essential nesting habitat associated with cultivated lands would also be maintained and
19 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
20 farmyards or at rural residences (Objective CLNC1.3).

21 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
22 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
23 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
24 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
25 would provide foraging habitat for white-tailed kite and reduce the effects of current levels of
26 habitat fragmentation. Small mammal populations would also be increased on protected lands,
27 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
28 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through
29 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within
30 protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other
31 uncultivated areas would also be protected and maintained as part of the cultivated lands reserve
32 system which would provide additional foraging habitat and a source of rodent prey that could
33 recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including
34 upland grassland components) that dry during the spring would also serve as foraging habitat for
35 white-tailed kite as prey species recolonize the fields (Objective MWNC1.1). In addition, the
36 restoration of 19,150 acres of tidal natural communities, including transitional uplands would
37 provide high-value foraging habitat for the white-tailed kite. At least 15,400 acres of cultivated lands
38 that provide habitat for covered and other native wildlife species would be protected in the near-
39 term time period (Objective CLNC1.1). These biological goals and objectives would inform the near-
40 term protection and restoration efforts and represent performance standards for considering the
41 effectiveness of restoration actions. The acres of restoration and protection contained in the near-
42 term Plan goals and the additional detail in the biological objectives satisfy the typical mitigation
43 that would be applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well
44 as mitigate the near-term effects of the other conservation measures.

45 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
46 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and

1 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian
 2 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
 3 require one to several decades to functionally replace habitat that has been affected and for trees to
 4 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between
 5 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite
 6 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting
 7 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
 8 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat
 9 would further reduce this limited resource and could reduce or restrict the number of active white-
 10 tailed kite nests within the Plan Area until restored riparian habitat is sufficiently developed.

11 *AMM39 White-Tailed Kite* would implement a program to plant large mature trees, including
 12 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson’s hawk
 13 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
 14 within the 125-acre block are removed. These would be supplemented with additional saplings and
 15 would be expected to reduce the temporal effects of loss of nesting habitat. The plantings would
 16 occur prior to or concurrent with (in the case of transplanting) the loss of trees. In addition, at least
 17 five trees (5-gallon container size) would be planted within the BDCP reserve system for every tree
 18 20 feet or taller removed by construction during the near-term period. A variety of native tree
 19 species would be planted to provide trees with differing growth rates, maturation, and life span.
 20 Trees would be planted within the BDCP reserve system in areas that support high value foraging
 21 habitat to increase nest sites, or within riparian plantings as a component of the riparian restoration
 22 (CM5, CM7) where they are in close proximity to suitable foraging habitat. Replacement trees that
 23 were incorporated into the riparian restoration would not be clustered in a single region of the Plan
 24 Area, but would be distributed throughout the lands protected as foraging habitat for white-tailed
 25 kite. Further details of AMM39 are provided in Appendix 3B, *Environmental Commitments, AMMs,*
 26 *and CMs*, of the Final EIR/EIS. With this program in place, Alternative 1A would not have a
 27 substantial adverse effect on white-tailed kite in the near-term timeframe, either through direct
 28 mortality or through habitat modifications.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
 30 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
 31 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 32 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
 33 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 34 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 35 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs,*
 36 of the Final EIR/EIS.

37 ***Late Long-Term Timeframe***

38 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres
 39 of modeled foraging habitat for white-tailed kite. Alternative 1A as a whole would result in the
 40 permanent loss of and temporary effects on 677 acres of potential nesting habitat (5% of the
 41 potential nesting habitat in the study area) and the loss or conversion of 59,793 acres of foraging
 42 habitat (12% of the foraging habitat in the study area).

43 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 44 *Restoration, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*

1 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Community*
2 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
3 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
4 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
5 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that
6 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal
7 wetlands (Table 3-4 in Chapter 3).

8 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
9 system with extensive wide bands or large patches of valley/foothill riparian natural community
10 (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation Strategy*). Riparian restoration
11 would expand the patches of existing riparian forest in order to support nesting habitat for the
12 species. White-tailed kite is excluded from narrow bands of riparian vegetation by Swainson's
13 hawks and therefore requires wide patches of nesting habitat where its range overlaps with
14 Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees would be
15 increased by planting and maintaining native trees along roadsides and field borders within
16 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small
17 but essential nesting habitat associated with cultivated lands would also be maintained and
18 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
19 farmyards or at rural residences (Objective CLNC1.3).

20 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
21 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
22 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
23 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
24 would provide foraging habitat for white-tailed kite and reduce the effects of current levels of
25 habitat fragmentation. Small mammal populations would also be increased on protected lands,
26 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
27 GNC2.4). Foraging opportunities would also be improved by enhancing prey populations through
28 the establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within
29 protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other
30 uncultivated areas would also be protected and maintained as part of the cultivated lands reserve
31 system which would provide additional foraging habitat and a source of rodent prey that could
32 recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands (including
33 upland grassland components) that dry during the spring would also serve as foraging habitat for
34 white-tailed kite as prey species recolonize the fields (Objective MWNC1.1). In addition, the
35 restoration of at least 65,000 acres of tidal natural communities, including transitional uplands
36 would provide high-value foraging habitat for the white-tailed kite. At least 45,405 acres of
37 cultivated lands that provide foraging habitat for white-tailed kite would be protected by the late
38 long-term time period (Objective CLNC1.1).

39 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
40 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
41 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration
42 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
44 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
45 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
2 *these AMMs include elements that would avoid or minimize the risk of affecting individuals and*
3 *species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since*
4 *been updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs,*
5 *of the Final EIR/EIS.*

6 In the absence of other conservation actions, the effects on white-tailed kite habitat from Alternative
7 1A would represent an adverse effect as a result of habitat modification and potential for direct
8 mortality of a special status species; however, considering Alternative 1A's protection and
9 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
10 greater than necessary to compensate for the time lag of restoring riparian and foraging habitats
11 lost to construction and restoration activities, and implementation of AMM1–AMM7, and AMM39
12 *White-Tailed Kite*, the loss of habitat or direct mortality through implementation of Alternative 1A
13 would not result in a substantial adverse effect through habitat modifications and would not
14 substantially reduce the number or restrict the range of the species. In particular, 95% of the loss of
15 foraging habitat effects involve the conversion from one habitat type to another form of suitable
16 foraging habitat. Therefore, the loss of habitat or potential mortality under this alternative would
17 have a less-than-significant impact on white-tailed kite.

18 **Impact BIO-101: Effects on White-Tailed Kite Associated with Electrical Transmission** 19 **Facilities**

20 There are several known occurrences of nesting white-tailed kite within 5 miles of the proposed
21 transmission line alignment. While white-tailed kite flight behavior puts them regularly within the
22 range of heights proposed for the new transmission lines (50 to 110 feet), their keen vision and high
23 maneuverability substantially reduce powerline collision risk for the species. Like other diurnal
24 raptors, white-tailed kites have highly developed eyesight (Jones et al. 2007), allowing them to
25 detect small prey while hunting from relatively high altitudes. Keen eyesight also allows for
26 detection and avoidance of other aerial objects, including above-ground utility lines. Like many
27 other falcons, the white-tailed kite has long, narrow, tapered wings and body size that allow for
28 efficient soaring flight and highly developed aerial maneuverability. White-tailed kite is at low risk
29 of bird strike mortality from the construction of new transmission lines based on its general
30 maneuverability, its keen eyesight, and lack of flocking behavior (BDCP Attachment 5.J-2,
31 *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Marking
32 transmission lines with flight diverters that make the lines more visible to birds has been shown to
33 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
34 marking devices in the Central Valley could reduce avian mortality by 60%. With the
35 implementation of AMM20 *Greater Sandhill Crane*, all new transmission lines would be fitted with
36 flight diverters, which would substantially reduce any risk of collision with lines.

37 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
38 adverse effect because the risk of bird strike is considered to be minimal based on the species'
39 general maneuverability, keen eyesight, and lack of flocking behavior. In addition, AMM20 *Greater*
40 *Sandhill Crane* contains the commitment to place bird strike diverters on all new powerlines, which
41 would eliminate or nearly eliminate the risk of mortality from bird strike for white-tailed kite from
42 the project. Therefore, the construction and operation of new transmission lines under Alternative
43 1A would not result in an adverse effect on white-tailed kite.

1 **CEQA Conclusion:** The construction and presence of new transmission lines would not represent a
2 significant impact because the risk of bird strike is considered to be minimal based on the species'
3 general maneuverability, keen eyesight, and lack of flocking behavior. In addition, *AMM20 Greater*
4 *Sandhill Crane* contains the commitment to place bird strike diverters on all new powerlines, which
5 would eliminate or nearly eliminate the risk of mortality from bird strike for white-tailed kite from
6 the project. Therefore, the construction and operation of new transmission lines under Alternative
7 1A would result in a less-than-significant impact on white-tailed kite.

8 **Impact BIO-102: Indirect Effects of Plan Implementation on White-Tailed Kite**

9 White-tailed kite nesting habitat within the vicinity of proposed construction areas could be
10 indirectly affected by construction activities. Construction noise above background noise levels
11 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
12 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
13 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
14 which these noise levels could affect white-tailed kite. Indirect effects associated with construction
15 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
16 disturbing operations outside the project footprint but within 1,300 feet from the construction edge.
17 If white-tailed kite were to nest in or adjacent to work areas, construction and subsequent
18 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting
19 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM39 White-*
20 *Tailed Kite* would require preconstruction surveys, and if detected, 200 yard no disturbance buffers
21 would be established around active nests. The use of mechanical equipment during water
22 conveyance facilities construction could cause the accidental release of petroleum or other
23 contaminants that could affect white-tailed kite in the surrounding habitat. The inadvertent
24 discharge of sediment or excessive dust adjacent to white-tailed kite habitat could also affect the
25 species. *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*,
26 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff
27 from the construction area and negative effects of dust on active nests.

28 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
29 mercury in avian species, including white-tailed kite. Marsh (tidal and nontidal) and floodplain
30 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed
31 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to
32 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP
33 restoration activities that create newly inundated areas could increase bioavailability of mercury
34 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Increased methylmercury
35 associated with natural community and floodplain restoration may indirectly affect white-tailed kite
36 (see BDCP Appendix 5.D, *Contaminants*). However, the potential mobilization or creation of
37 methylmercury within the study area varies with site-specific conditions and would need to be
38 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-
39 specific Mercury Management Plans. Site-specific restoration plans that address the creation and
40 mobilization of mercury, as well as monitoring and adaptive management as described in *CM12*
41 would be available to address the uncertainty of methylmercury levels in restored tidal marsh and
42 potential impacts on white-tailed kite.

43 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
44 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
45 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,

1 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 2 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 3 classes within a species. In addition, the effect of selenium on a species can be confounded by
 4 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 5 2009).

6 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 7 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 8 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 9 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 10 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 11 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 12 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 13 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 14 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 15 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
 16 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 17 levels of selenium have a higher risk of selenium toxicity.

18 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 19 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 20 exacerbate bioaccumulation of selenium in avian species, including white-tailed kite. Marsh (tidal
 21 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
 22 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP
 23 restoration activities that create newly inundated areas could increase bioavailability of selenium
 24 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
 25 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
 26 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
 27 increases in selenium concentrations in water in the Delta under any alternative. However, it is
 28 difficult to determine whether the effects of potential increases in selenium bioavailability
 29 associated with restoration-related conservation measures (CM4–CM5) would lead to adverse
 30 effects on white-tailed kite.

31 Because of the uncertainty that exists at this programmatic level of review, there could be a
 32 substantial effect on white-tailed kite from increases in selenium associated with restoration
 33 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
 34 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
 35 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
 36 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
 37 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
 38 separately for each restoration effort as part of design and implementation. This avoidance and
 39 minimization measure would be implemented as part of the tidal habitat restoration design
 40 schedule.

41 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
 42 could reduce white-tailed kite use of modeled habitat adjacent to work areas. Moreover, operation
 43 and maintenance of the water conveyance facilities, including the transmission facilities, could result
 44 in ongoing but periodic postconstruction disturbances that could affect white-tailed kite use of the
 45 surrounding habitat. Noise, potential spills of hazardous materials, increased dust and

1 sedimentation, and operations and maintenance of the water conveyance facilities under Alternative
 2 1A would not have an adverse effect on white-tailed kite with the implementation of AMM1-AMM7,
 3 and *AMM39 White-Tailed Kite*. Tidal habitat restoration could result in increased exposure of white-
 4 tailed kite to selenium. This effect would be addressed through the implementation of *AMM27*,
 5 *Selenium Management* which would provide specific tidal habitat restoration design elements to
 6 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
 7 indirect effects associated with noise and visual disturbances, potential spills of hazardous material,
 8 and increased exposure to selenium from Alternative 1A implementation would not have an adverse
 9 effect on white-tailed kite. Tidal habitat restoration is unlikely to have an adverse effect on white-
 10 tailed kite through increased exposure to methylmercury, as kites currently forage in tidal marshes
 11 where elevated methylmercury levels exist. However, it is unknown what concentrations of
 12 methylmercury are harmful to the species and the potential for increased exposure varies
 13 substantially within the study area. Site-specific restoration plans in addition to monitoring and
 14 adaptive management, described in *CM12 Methylmercury Management*, would address the
 15 uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning phase of
 16 marsh restoration would be the appropriate place to assess the potential for risk of methylmercury
 17 exposure for white-tailed kite, once site specific sampling and other information could be developed.

18 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
 19 operations and maintenance of the water conveyance facilities under Alternative 1A would have a
 20 less-than-significant impact on white-tailed kite with the implementation of *AMM39 White-Tailed*
 21 *Kite*, and AMM1-AMM7. Tidal habitat restoration could result in increased exposure of white-tailed
 22 kite to selenium. This effect would be addressed through the implementation of *AMM27*, *Selenium*
 23 *Management* which would provide specific tidal habitat restoration design elements to reduce the
 24 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
 25 implementation of tidal natural communities restoration or floodplain restoration could result in
 26 increased exposure of white-tailed kite to methylmercury. However, it is unknown what
 27 concentrations of methylmercury are harmful to this species. *CM12 Methylmercury Management*
 28 includes provisions for project-specific Mercury Management Plans. Site-specific restoration plans
 29 that address the creation and mobilization of mercury, as well as monitoring and adaptive
 30 management as described in *CM12*, would better inform potential impacts and address the
 31 uncertainty of methylmercury levels in restored tidal marsh in the study area on white-tailed kite.
 32 With these measures in place, the indirect effects associated with noise and visual disturbances,
 33 potential spills of hazardous material, and increased exposure to selenium from Alternative 1A
 34 implementation would have a less-than-significant impact on white-tailed kite.

35 **Impact BIO-103: Periodic Effects of Inundation of White-Tailed Kite Habitat as a Result of**
 36 **Implementation of Conservation Components**

37 Flooding of the Yolo Bypass from Fremont Weir operations related to *CM2 Yolo Bypass Fisheries*
 38 *Enhancement* would increase the frequency and duration of inundation on approximately 48-82
 39 acres of modeled white-tailed kite nesting habitat and 3,030-6,651 acres of modeled white-tailed
 40 kite foraging habitat (Table 12-1A-41). During inundation years, affected cultivated lands and
 41 grassland would not be available as foraging habitat until prey populations have re-inhabited
 42 inundated areas. This would result in temporary periodic reduction in availability of foraging
 43 habitat. If late-season Fremont Weir operations were to preclude the planting of some crop types,
 44 there could be a further loss of foraging habitat value if the crop type that would have been planted
 45 would provide greater foraging habitat value than the fallowed fields. No known white-tailed kite

1 nest sites would be affected, and increased periodic flooding is not expected to cause any adverse
2 effect on nest sites that may be within the inundation area because existing trees already withstand
3 floods in the area, the increase in inundation frequency and duration is expected to remain within
4 the range of tolerance of riparian trees, and any nest sites would be located above floodwaters.

5 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
6 inundation of up to approximately 230 acres of modeled white-tailed kite nesting habitat and 7,402
7 acres of modeled white-tailed kite foraging habitat (Table 12-1A-41). Inundation of foraging habitat
8 could result in a periodic reduction of available foraging habitat due to the reduction in available
9 prey. Following draw-down, inundated habitats are expected to recover and provide suitable
10 foraging conditions until the following inundation period. Thus, this is considered a periodic impact
11 that is unlikely to affect white-tailed kite distribution and abundance, or foraging use of the Plan
12 Area.

13 Periodic inundation of floodplains (through CM2 and CM5) would be expected to restore a more
14 natural flood regime in support of riparian vegetation types that support white-tailed kite nesting
15 habitat. No adverse effects of inundation on white-tailed kite riparian habitat are expected because
16 valley/foothill riparian vegetation is expected to benefit from seasonal inundation.

17 **NEPA Effects:** Although foraging habitat would be periodically unavailable to white-tailed kite
18 because of CM2 and CM5 implementation, inundated habitats are expected to recover following
19 draw-down. Any effects are considered short-term and would not result in an adverse effect.

20 **CEQA Conclusion:** Although foraging habitat would be periodically unavailable to white-tailed kite
21 because of CM2 and CM5 implementation, inundated habitats are expected to recover following
22 draw-down. Any effects are considered short-term and would be expected to have a less-than-
23 significant impact on white-tailed kite.

24 **Yellow-Breasted Chat**

25 This section describes the effects of Alternative 1A, including water conveyance facilities
26 construction and implementation of other conservation components, on yellow-breasted chat.
27 Yellow-breasted chat modeled habitat includes suitable nesting and migratory habitat as those plant
28 alliances from the valley/foothill riparian modeled habitat that contain a shrub component and an
29 overstory component. Primary nesting and migratory habitat is qualitatively distinguished from
30 secondary habitat in Delta areas as those plant associations that support a greater percentage of a
31 suitable shrub cover, particularly blackberry, and California wild rose, and have an open to
32 moderately dense overstory canopy, using data from Hickson and Keeler-Wolf (2007). No
33 distinction is made between primary and secondary habitat for Suisun Marsh/Yolo Basin habitats
34 because supporting information is lacking. For this reason, the effects analysis only provides the
35 breakdown between primary and secondary habitat in the habitat loss totals and associated tables,
36 and does not provide this breakdown in the text by activity or effect type.

37 Construction and restoration associated with Alternative 1A conservation measures would result in
38 both temporary and permanent losses of yellow-breasted chat modeled habitat as indicated in Table
39 12-1A-42. Full implementation of Alternative 1A would also include the following conservation
40 actions over the term of the BDCP to benefit the yellow-breasted chat (BDCP Chapter 3, Section 3.3,
41 *Biological Goals and Objectives*).

- 1 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
2 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
3 associated with CM7).
- 4 • Protect at least 750 acres of existing valley/foothill riparian natural community in C Z7 by year
5 10 (Objective VFRNC1.2, associated with CM3).
- 6 • Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal
7 overlap among vegetation components and over adjacent riverine channels, freshwater
8 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM7).
- 9 • Maintain at least 1,000 acres of early- to mid-successional vegetation with a well-developed
10 understory of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2,
11 associated with CM7).

12 As explained below, with the restoration or protection of these amounts of habitat, in addition to
13 management activities that would enhance these natural communities for the species and
14 implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least*
15 *Bell's Vireo*, *Western Yellow-Billed Cuckoo*, impacts on yellow-breasted chat would not be adverse for
16 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-42. Changes in Yellow-Breasted Chat Modeled Habitat Associated with Alternative 1A**
2 **(acres)^a**

Conservation Measure ^b	Nesting and Migratory Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	20	20	5	5	NA	NA
	Secondary	10	10	12	12	NA	NA
	Suisun Marsh/ Upper Yolo Bypass	0	0	0	0	NA	NA
Total Impacts CM1		30	30	17	17	NA	NA
CM2-CM18	Primary	96	214	58	73	19-38	92
	Secondary	209	357	0	6	6-18	56
	Suisun Marsh/ Upper Yolo Bypass	76	85	29	29	23-32	0
Total Impacts CM2-CM18		381	656	87	108	48-88	148
Total Primary		116	234	63	78	19-38	92
Total Secondary		219	367	12	18	6-18	56
Total Suisun Marsh/Upper Yolo Bypass		76	85	29	29	23-32	0
TOTAL IMPACTS		411	686	104	125	48-88	148

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-104: Loss or Conversion of Habitat for and Direct Mortality of Yellow-Breasted**
5 **Chat**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss
7 of up to 811 acres of modeled nesting and migratory habitat for yellow-breasted chat (686 acres of
8 permanent loss, 125 acres of temporary loss, Table 12-1A-42). Conservation measures that would
9 result in these losses are conveyance facilities and transmission line construction, and establishment
10 and use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal
11 habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management
12 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,
13 could result in local adverse habitat effects. In addition, maintenance activities associated with the
14 long-term operation of the water conveyance facilities and other BDCP physical facilities could
15 degrade or eliminate yellow-breasted chat habitat. Each of these individual activities is described

1 below. A summary statement of the combined impacts and NEPA effects, and a CEQA conclusion
2 follow the individual conservation measure discussions.

- 3 ● *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
4 result in the combined permanent and temporary loss of up to 25 acres of primary habitat (20
5 acres of permanent loss, 5 acres of temporary loss). In addition, 22 acres of secondary habitat
6 would be removed (10 acres of permanent loss, 12 acres of temporary loss), (Table 12-1A-42).
7 Activities that would impact modeled habitat consist of tunnel, forebay, and intake construction,
8 temporary access roads, and construction of transmission lines. Impacts from CM1 would occur
9 in the central delta in CZs 3- 6, and 8. This loss would have the potential to displace individuals,
10 if present, and remove the functions and value of modeled habitat for resting, protection, or
11 foraging. There are no occurrences of yellow-breasted chat that overlap with the CM1
12 construction footprint. The implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted*
13 *Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would minimize effects on yellow-breasted
14 chat if they were to nest within or adjacent to the construction footprint. Refer to the Terrestrial
15 Biology Map Book for a detailed view of Alternative 1A construction locations. Impacts from
16 CM1 would occur within the first 10 years of Alternative 1A implementation.
- 17 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction would permanently remove
18 approximately 83 acres and temporarily remove 88 acres of yellow-breasted chat habitat in the
19 Yolo Bypass in CZ 2. The loss is expected to occur during the first 10 years of Alternative 1A
20 implementation.
- 21 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
22 inundation would permanently remove an estimated 545 acres of modeled yellow-breasted chat
23 habitat in CZ 1, 2, 6, and 11. This total is composed of an estimated 182 acres of primary nesting
24 and migratory habitat, 349 acres of secondary nesting and migratory habitat, and 14 acres of
25 nesting and migratory habitat in the Suisun Marsh and upper Yolo Bypass areas.
- 26 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
27 seasonally inundated floodplain would permanently and temporarily remove approximately 49
28 acres of modeled yellow-breasted chat habitat in CZ 7. This total is comprised of 28 acres of
29 primary nesting and migratory habitat and 21 acres of secondary nesting and migratory habitat.
30 Based on the riparian habitat restoration assumptions, approximately 3,000 acres of
31 valley/foothill riparian habitat would be restored as a component of seasonally inundated
32 floodplain restoration actions. The actual number of acres that would be restored may differ
33 from these estimates, depending on how closely the outcome of seasonally inundated floodplain
34 restoration approximates the assumed outcome. Once this restored riparian vegetation has
35 developed habitat functions, a portion of it would be suitable to support yellow-breasted chat
36 habitat.
- 37 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
38 activities that could be implemented in protected yellow-breasted chat habitats would be
39 expected to maintain and improve the functions of the habitat over the term of the BDCP.
40 Yellow-breasted chat would be expected to benefit from the increase in protected habitat, which
41 would maintain conditions favorable for the chat's use of the Plan Area.

42 Habitat management- and enhancement-related activities could disturb yellow-breasted chat
43 nests if they are present near work sites. Equipment operation could destroy nests, and noise
44 and visual disturbances could lead to their abandonment, resulting in mortality of eggs and
45 nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*

1 *Billed Cuckoo* would ensure that these activities do not result in direct mortality of yellow-
2 breasted chat or other adverse effects.

3 Occupied habitat would be monitored to determine if there is a need to implement controls on
4 brood parasites (brown-headed cowbird) or nest predators. If implemented, these actions
5 would be expected to benefit the yellow-breasted chat by removing a potential stressor that
6 could, if not addressed, adversely affect the stability of newly established populations.

7 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*
8 *and Management* that are designed to enhance wildlife values in restored riparian habitats may
9 result in localized ground disturbances that could temporarily remove small amounts of yellow-
10 breasted chat habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
11 road and other infrastructure maintenance activities, are expected to have minor adverse effects
12 on available yellow-breasted chat habitat and are expected to result in overall improvements to
13 and maintenance of yellow-breasted chat habitat values over the term of the BDCP.

- 14 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
15 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
16 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding
17 habitat. Maintenance activities would include vegetation management, levee and structure
18 repair, and re-grading of roads and permanent work areas. These effects, however, would be
19 reduced by AMMs and conservation actions as described below.
- 20 ● Injury and Direct Mortality: Construction is not expected to result in direct mortality of yellow-
21 breasted chat because adults and fledged young are expected to occur only in very small
22 numbers and, if present, would avoid contact with construction and other equipment. If yellow-
23 breasted chat were to nest in the vicinity of construction activities, equipment operation could
24 destroy nests and noise and visual disturbances could lead to nest abandonment. *AMM22 Suisun*
25 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would avoid
26 and minimize this effect.
- 27 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,
28 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.
29 Temporarily affected areas would be restored as riparian habitat within 1 year following
30 completion of construction activities. Although the effects are considered temporary, the
31 restored riparian habitat would require 5 years to several decades, for ecological succession to
32 occur and for restored riparian habitat to functionally replace habitat that has been affected. The
33 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;
34 therefore, the replaced riparian vegetation would be expected to have structural components
35 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial
36 restoration activities are complete.

37 The following paragraphs summarize the combined effects discussed above and describe other
38 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
39 included.

40 ***Near-Term Timeframe***

41 Because the water conveyance facilities construction is being evaluated at the project level, the near-
42 term BDCP conservation strategy has been evaluated to determine whether it would provide
43 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the

1 effects of construction would not be adverse under NEPA. The Plan would remove 515 acres of
2 modeled habitat for yellow-breasted chat in the study area in the near-term. These effects would
3 result from the construction of the water conveyance facilities (CM1, 47 acres of modeled nesting
4 and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
5 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
6 *Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses would
7 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value
8 habitat for the species.

9 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
10 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter
11 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
12 habitat. Using these ratios would indicate that 47 acres of valley/foothill riparian habitat should be
13 restored/created and 47 acres should be protected to compensate for the CM1 losses of yellow-
14 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres
15 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of
16 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
17 protection).

18 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
19 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These
20 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as
21 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
22 yellow-breasted chat. The majority of the riparian restoration acres would occur in CZ 7 as part of a
23 reserve system with extensive wide bands or large patches of valley/foothill riparian natural
24 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Goals
25 and objectives in the Plan for riparian restoration also include the restoration, maintenance and
26 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among
27 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and
28 grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural habitat
29 requirements, so only the early- to mid-successional portions of the restored and protected riparian
30 natural would be expected to provide suitable habitat characteristics for the species. These natural
31 community biological goals and objectives would inform the near-term protection and restoration
32 efforts and represent performance standards for considering the effectiveness of conservation
33 actions for the species.

34 The acres of protection contained in the near-term Plan goals and the additional detail in the
35 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be
36 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other
37 conservation measures. The restored riparian habitat could require 5 years to several decades, for
38 ecological succession to occur and for restored riparian habitat to functionally replace habitat that
39 has been affected. However, because the modeled habitat impacted largely consists of small patches
40 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have an adverse
41 population-level effect on the species in the near-term time period.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
45 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*

1 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of
2 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
3 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
4 which have since been updated and which are provided in Appendix 3B, *Environmental*
5 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

6 **Late Long-Term Timeframe**

7 The habitat model indicates that the study area supports approximately 14,547 acres of modeled
8 nesting and migratory habitat for yellow-breasted chat. Alternative 1A as a whole would result in
9 the permanent loss of and temporary effects on 811 acres of modeled habitat (6% of the modeled
10 habitat in the Plan Area). These losses would occur from the construction of the water conveyance
11 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
12 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The locations of these losses
13 would be in fragmented riparian habitat throughout the study area.

14 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
15 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
16 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
17 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
18 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
19 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted
20 chat has specific structural habitat requirements, so only the early- to mid-successional portions of
21 the restored and protected riparian natural would be expected to provide suitable habitat
22 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to
23 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to
24 natural erosion and deposition, which would provide conditions conducive to the establishment of
25 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if
26 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted
27 population in the Plan Area, a cowbird control program would be implemented through *CM11*
28 *Natural Communities Enhancement and Management.* Goals and objectives in the Plan for riparian
29 restoration also include the maintenance and enhancement of structural heterogeneity (Objective
30 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

31 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
32 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
33 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted
34 chat.

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
36 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
37 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
38 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
39 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of
40 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
41 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
42 which have since been updated and which are provided in Appendix 3B, *Environmental*
43 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 **NEPA Effects:** The loss of western yellow-breasted chat habitat and potential direct mortality of this
2 special-status species would represent an adverse effect in the absence of other conservation
3 actions. It would take 5 years to several decades for ecological succession to occur and for restored
4 riparian habitat to functionally replace habitat that has been affected. However, because the nesting
5 and migratory habitat that would be lost is small relative to the species' range throughout California
6 and North America, and because the habitat that would be lost consists of small, fragmented riparian
7 stands that do not provide high-value habitat for the species, BDCP actions would not be expected to
8 have an adverse population-level effect on the species. With habitat protection and restoration
9 associated with CM3, CM7, and CM11, guided by biological goals and objectives and by *AMM1*
10 *Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*
11 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*
12 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge*
13 *Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
14 *Yellow-Billed Cuckoo*, which would be in place during all project activities, the effects of habitat loss
15 and potential mortality on yellow-breasted chat under Alternative 1A would not be adverse.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Because the water conveyance facilities construction is being evaluated at the project level, the near-
19 term BDCP conservation strategy has been evaluated to determine whether it would provide
20 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
21 impact of construction would be less than significant under CEQA. The Plan would remove 515 acres
22 of modeled habitat for yellow-breasted chat in the study area in the near-term. These effects would
23 result from the construction of the water conveyance facilities (CM1, 47 acres of modeled nesting
24 and migratory habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries*
25 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain*
26 *Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses would
27 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value
28 habitat for the species.

29 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
30 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter
31 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
32 habitat. Using these ratios would indicate that 47 acres of valley/foothill riparian habitat should be
33 restored/created and 47 acres should be protected to compensate for the CM1 losses of yellow-
34 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres
35 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of
36 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
37 protection).

38 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
39 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These
40 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as
41 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
42 yellow-breasted chat. The majority of the riparian restoration acres would occur in CZ 7 as part of a
43 reserve system with extensive wide bands or large patches of valley/foothill riparian natural
44 community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation Strategy*). Goals and

1 objectives in the Plan for riparian restoration also include the restoration, maintenance and
2 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among
3 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and
4 grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural habitat
5 requirements, so only the early- to mid-successional portions of the restored and protected riparian
6 natural would be expected to provide suitable habitat characteristics for the species. These natural
7 community biological goals and objectives would inform the near-term protection and restoration
8 efforts and represent performance standards for considering the effectiveness of conservation
9 actions for the species.

10 The acres of protection contained in the near-term Plan goals and the additional detail in the
11 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be
12 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other
13 conservation measures. The restored riparian habitat could require 5 years to several decades, for
14 ecological succession to occur and for restored riparian habitat to functionally replace habitat that
15 has been affected. However, because the modeled habitat impacted largely consists of small patches
16 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have a significant
17 population-level impact on the species in the near-term time period.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
23 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
24 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
25 which have since been updated and which are provided in Appendix 3B, *Environmental*
26 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

27 ***Late Long-Term Timeframe***

28 The habitat model indicates that the study area supports approximately 14,547 acres of modeled
29 nesting and migratory habitat for yellow-breasted chat. Alternative 1A as a whole would result in
30 the permanent loss of and temporary effects on 811 acres of modeled habitat (6% of the modeled
31 habitat in the Plan Area). These losses would occur from the construction of the water conveyance
32 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
33 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
34 would be in fragmented riparian habitat throughout the study area.

35 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
36 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
37 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
38 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
39 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
40 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted
41 chat has specific structural habitat requirements, so only the early- to mid-successional portions of
42 the restored and protected riparian natural would be expected to provide suitable habitat
43 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to
44 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to

1 natural erosion and deposition, which would provide conditions conducive to the establishment of
2 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if
3 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted
4 population in the Plan Area, a cowbird control program would be implemented through *CM11*
5 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian
6 restoration also include the maintenance and enhancement of structural heterogeneity (Objective
7 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

8 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
9 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
10 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted
11 chat.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
16 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
17 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
18 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
19 which have since been updated and which are provided in Appendix 3B, *Environmental*
20 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

21 In the absence of other conservation actions, the effects on yellow-breasted chat habitat from
22 Alternative 1A would represent an adverse effect as a result of habitat modification and potential for
23 direct mortality of special-status species. Considering Alternative 1A's protection and restoration
24 provisions, which would provide acreages of new or enhanced habitat in amounts suitable to
25 compensate for habitats lost to construction and restoration activities, and implementation of
26 *AMM1-AMM7* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
27 *Yellow-Billed Cuckoo*, the loss of habitat and direct mortality through implementation of Alternative
28 1A would not result in a substantial adverse effect through habitat modifications and would not
29 substantially reduce the number or restrict the range of the species. Therefore, the loss of habitat
30 and potential mortality under this alternative would have a less-than-significant impact on western
31 yellow-breasted chat.

32 **Impact BIO-105: Fragmentation of Yellow-Breasted Chat Habitat as a Result of Constructing** 33 **the Water Conveyance Facilities**

34 Grading, filling, contouring, and other initial ground-disturbing activities for water conveyance
35 facilities construction may temporarily fragment modeled yellow-breasted chat habitat. This could
36 temporarily reduce the extent of and functions supported by the affected habitat. Because of the
37 current infrequent occurrence and small numbers of yellow-breasted chat in the Plan Area, and
38 because *CM5* would restore and protect contiguous high-value riparian habitat in CZ 7, any such
39 habitat fragmentation is expected to have no or minimal effect on the species.

40 **NEPA Effects:** Temporary fragmentation of habitat would not result in an adverse effect on yellow-
41 breasted chat. The habitat functions for the species would be significantly improved through the
42 implementation of *CM5*, which would restore and protect large contiguous patches of riparian
43 habitat.

1 **CEQA Conclusion:** Temporary fragmentation of habitat would have a less-than-significant impact on
2 yellow-breasted chat. The habitat functions for the species would be significantly improved through
3 the implementation of CM5, which would restore and protect large contiguous patches of riparian
4 habitat.

5 **Impact BIO-106: Effects on Yellow-Breasted Chat Associated with Electrical Transmission**
6 **Facilities**

7 Yellow-breasted chats are migratory and usually arrive at California breeding grounds in April from
8 their wintering grounds in Mexico and Guatemala. Departure for wintering grounds occurs from
9 August to September. These are periods of relative high visibility when the risk of powerline
10 collisions would be low. The species' small, relatively maneuverable body; its foraging behavior; and
11 its presence in the Plan Area during the summer contribute to a low risk of collision with the
12 proposed transmission lines (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*
13 *BDCP Transmission Lines*). Marking transmission lines with flight diverters that make the lines more
14 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
15 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
16 by 60%. All new project transmission lines would be fitted with flight diverters. Bird flight diverters
17 would further reduce any potential for powerline collisions.

18 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
19 adverse effect on yellow-breasted chat because the risk of bird strike is considered to be minimal
20 based on the species' small, relatively maneuverable body; its foraging behavior; and its presence in
21 the study area during the summer, when visibility is high. Under *AMM20 Greater Sandhill Crane*, all
22 new project transmission lines would be fitted with bird diverters which would further reduce any
23 potential for powerline collisions.

24 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
25 significant impact on yellow-breasted chat because the risk of bird-strike is considered to be
26 minimal based on the species' small, relatively maneuverable body, its foraging behavior, and its
27 presence in the Plan Area during the summer during periods of high visibility. Under *AMM20 Greater*
28 *Sandhill Crane*, all new project transmission lines would be fitted with bird diverters which would
29 further reduce any potential for powerline collisions.

30 **Impact BIO-107: Indirect Effects of Plan Implementation on Yellow-Breasted Chat**

31 Noise and visual disturbances associated with construction-related activities could result in
32 temporary disturbances that affect yellow-breasted chat use of modeled habitat adjacent to
33 proposed construction areas. Construction noise above background noise levels (greater than 50
34 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,
35 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
36 *Crane*, Table 4), although there are no available data to determine the extent to which these noise
37 levels could affect yellow-breasted chat. Indirect effects associated with construction include noise,
38 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
39 operations outside the project footprint but within 1,300 feet of the construction edge. If yellow-
40 breasted chat were to nest in or adjacent to work areas, construction and subsequent maintenance-
41 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and
42 reduce the functions of suitable nesting habitat for these species. These potential effects would be
43 minimized with incorporation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*

1 *Vireo*, *Western Yellow-Billed Cuckoo* into the BDCP, which would ensure 250-foot no-disturbance
 2 buffers were established around active nests. The use of mechanical equipment during water
 3 conveyance facilities construction could cause the accidental release of petroleum or other
 4 contaminants that could affect yellow-breasted chat in the surrounding habitat. The inadvertent
 5 discharge of sediment or excessive dust adjacent to yellow-breasted chat habitat could also affect
 6 the species. AMM1–AMM7, including *AMM2 Construction BMPs and Monitoring*, in addition to
 7 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*,
 8 would minimize the likelihood of such spills from occurring and ensure that measures were in place
 9 to prevent runoff from the construction area and any adverse effects of dust on active nests. If
 10 present, yellow-breasted chat individuals could be temporarily affected by noise and visual
 11 disturbances adjacent to water conveyance construction sites, *AMM22 Suisun Song Sparrow, Yellow-*
 12 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would minimize this effect on the
 13 species.

14 **Methylmercury Exposure:** Yellow-breasted chat modeled habitat includes primarily middle marsh
 15 habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is also used if it is
 16 of high value, and low marsh provides foraging habitat for the species. Yellow-breasted chats are a
 17 top predator in the benthic food chain; they forage by probing their beaks into the mud (Zembal and
 18 Fancher 1988) and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects
 19 (Eddleman and Conway 1998).

20 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
 21 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
 22 species would overestimate the effects on yellow-breasted chat. Organisms feeding within pelagic-
 23 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
 24 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
 25 segregation (Grimaldo et al. 2009).

26 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
 27 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
 28 Thus, Alternative 1A restoration activities that create newly inundated areas could increase
 29 bioavailability of mercury. Concentrations of methylmercury known to be toxic to bird embryos
 30 have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003);
 31 however, currently, it is unknown how much of the sediment-derived methylmercury enters the
 32 food chain in Suisun Marsh or what tissue concentrations are actually harmful to the yellow-
 33 breasted chat. In general, the highest methylation rates are associated with high tidal marshes that
 34 experience intermittent wetting and drying and associated anoxic conditions (Alpers et al. 2008). In
 35 Suisun Marsh, the conversion of managed wetlands to tidal wetlands is expected to result in an
 36 overall reduction in mercury methylation. Because of the complex and very site-specific factors that
 37 determine if mercury becomes mobilized into the foodweb, *CM12 Methylmercury Management* is
 38 included to provide for site-specific evaluation for each restoration project. If a project is identified
 39 where there is a high potential for methylmercury production that could not be fully addressed
 40 through restoration design and adaptive management, alternate restoration areas would be
 41 considered. CM12 would be implemented in coordination with other similar efforts to address
 42 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
 43 conservation measure would include the following actions.

- 44 • Assess pre-restoration conditions to determine the risk that the project could result in increased
 45 mercury methylation and bioavailability.

- 1 • Define design elements that minimize conditions conducive to generation of methylmercury in
2 restored areas.
- 3 • Define adaptive management strategies that can be implemented to monitor and minimize
4 actual postrestoration creation and mobilization of methylmercury.

5 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
6 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
7 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
8 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
9 2009). The effect of selenium toxicity differs widely between species and also between age and sex
10 classes within a species. In addition, the effect of selenium on a species can be confounded by
11 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
12 2009).

13 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
14 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
15 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
16 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
17 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
18 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
19 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
20 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
21 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
22 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
23 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
24 have a higher risk of selenium toxicity.

25 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
26 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
27 exacerbate bioaccumulation of selenium in avian species, including yellow-breasted chat. Marsh
28 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
29 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
30 Alternative 1A restoration activities that create newly inundated areas could increase bioavailability
31 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
32 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
33 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
34 increases in selenium concentrations in water in the Delta under any alternative. However, it is
35 difficult to determine whether the effects of potential increases in selenium bioavailability
36 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
37 effects on yellow-breasted chat.

38 Because of the uncertainty that exists at this programmatic level of review, there could be a
39 substantial effect on yellow-breasted chat from increases in selenium associated with restoration
40 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
41 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
42 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
43 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
44 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
45 separately for each restoration effort as part of design and implementation. This avoidance and

1 minimization measure would be implemented as part of the tidal habitat restoration design
2 schedule.

3 **NEPA Effects:** Restoration actions that would create tidal marsh could provide biogeochemical
4 conditions for methylation of mercury in the newly inundated soils. There is potential for increased
5 exposure of the yellow-breasted chat foodweb to methylmercury in these areas, with the level of
6 exposure dependent on the amounts of mercury available in the soils and the biogeochemical
7 conditions. However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would
8 be expected to reduce the overall production of methylmercury, resulting in a net benefit to the
9 species. Implementation of CM12, which contains measures to assess the amount of mercury before
10 project development, followed by appropriate design and adaptation management, would minimize
11 the potential for increased methylmercury exposure, and would result in no adverse effect on the
12 species.

13 Tidal habitat restoration could result in increased exposure of yellow-breasted chat to selenium.
14 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
15 would provide specific tidal habitat restoration design elements to reduce the potential for
16 bioaccumulation of selenium and its bioavailability in tidal habitats.

17 The potential for noise and visual disturbance, hazardous spills, increased dust and sedimentation,
18 and the potential impacts of operations and maintenance of the water conveyance facilities would
19 not result in an adverse effect on yellow-breasted chat with the incorporation of AMM1–AMM7,
20 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,*
21 *and AMM27 Selenium Management* into the BDCP.

22 **CEQA Conclusion:** Restoration actions that would create tidal marsh could provide biogeochemical
23 conditions for methylation of mercury in the newly inundated soils. There is potential for increased
24 exposure of the yellow-breasted chat foodweb to methylmercury in these areas, with the level of
25 exposure dependent on the amounts of mercury available in the soils and the biogeochemical
26 conditions. However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would
27 be expected to reduce the overall production of methylmercury, resulting in a net benefit to the
28 species. Implementation of CM12, which contains measures to assess the amount of mercury before
29 project development, followed by appropriate design and adaptation management, would minimize
30 the potential for increased methylmercury exposure, and would result in no adverse effect on the
31 species.

32 Tidal habitat restoration could result in increased exposure of yellow-breasted chat to selenium.
33 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
34 would provide specific tidal habitat restoration design elements to reduce the potential for
35 bioaccumulation of selenium and its bioavailability in tidal habitats.

36 The potential for noise and visual disturbance, hazardous spills, increased dust and sedimentation,
37 and the potential impacts of operations and maintenance of the water conveyance facilities would
38 have a less-than-significant impact on yellow-breasted chat with the incorporation of AMM1–AMM7,
39 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,*
40 *and AMM27 Selenium Management* into the BDCP.

1 **Impact BIO-108: Periodic Effects of Inundation of Yellow-Breasted Chat Habitat as a Result of**
2 **Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
4 duration of inundation of approximately 48–88 acres of modeled yellow-breasted chat nesting and
5 migratory habitat. No adverse effects of increased inundation frequency on yellow-breasted chat or
6 its habitat are expected because the chat breeding period is outside the period the weir would be
7 operated. Moreover, riparian vegetation supporting habitat has persisted under the existing Yolo
8 Bypass flooding regime, and changes to frequency and inundation would be within the tolerance of
9 these vegetation types.

10 Based on hypothetical floodplain restoration, CM5 could result in periodic inundation of up to 148
11 acres of modeled yellow-breasted chat habitat. Inundation of restored floodplains is not expected to
12 affect yellow-breasted chat or its habitat because the chat breeding period is outside the period the
13 floodplains would likely be inundated. In addition, providing for periodic inundation of floodplains
14 is expected to restore a more natural flood regime in support of riparian vegetation types that
15 provide nesting and migratory habitat for yellow-breasted chat. The overall effect of seasonal
16 inundation in existing riparian natural communities is likely to be beneficial because, historically,
17 flooding was the main natural disturbance regulating ecological processes in riparian areas, and
18 flooding promotes the germination and establishment of many native riparian plants.

19 **NEPA Effects:** Increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain
20 restoration would be expected to create more natural flood regimes that would support riparian
21 habitat, which would not result in an adverse effect on yellow breasted chat.

22 **CEQA Conclusion:** Periodic inundation would have a less-than-significant impact on yellow-breasted
23 chat because inundation would occur outside of the breeding season and would not be expected to
24 adversely modify habitat or result in direct mortality of the species. Flooding promotes the
25 germination and establishment of many native riparian plants. Therefore, the overall impact of
26 seasonal inundation would be beneficial for yellow-breasted chat.

27 **Cooper's Hawk and Osprey**

28 This section describes the effects of Alternative 1A, including water conveyance facilities
29 construction and implementation of other conservation components, on Cooper's hawk and osprey.
30 Although osprey often nest on manmade structures such as telephone poles, and Cooper's hawk will
31 nest in more developed landscapes, modeled nesting habitat for these species is restricted to
32 valley/foothill riparian forest.

33 Construction and restoration associated with Alternative 1A conservation measures would result in
34 both temporary and permanent losses of Cooper's hawk and osprey modeled habitat as indicated in
35 Table 12-1A-43. The majority of the losses would take place over an extended period of time as tidal
36 marsh is restored in the study area. Although restoration for the loss of nesting habitat would be
37 initiated in the same timeframe as the losses, it could take one or more decades for restored habitats
38 to replace the functions of habitat lost. This time lag between impacts and restoration of habitat
39 function would be minimized by specific requirements of *AMM18 Swainson's Hawk*, including the
40 planting of mature trees in the near-term time period. Full implementation of Alternative 1A would
41 include the following conservation actions over the term of the BDCP which would also benefit
42 Cooper's hawk and osprey (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 1 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
2 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
3 associated with CM7)
- 4 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
5 10 (Objective VFRNC1.2, associated with CM3).
- 6 • Plant and maintain native trees along roadsides and field borders within protected cultivated
7 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 8 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
9 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
10 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
11 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3 and CM11).

12 As explained below, with the acres of restoration or protection included in the Plan, in addition to
13 management activities to enhance natural communities for species and the implementation of
14 AMM1–AMM7, AMM18 *Swainson’s Hawk*, and Mitigation Measure BIO-75, impacts on Cooper’s hawk
15 and osprey would not be adverse for NEPA purposes and would be less than significant for CEQA
16 purposes.

17 **Table 12-1A-43. Changes in Cooper’s Hawk and Osprey Modeled Habitat Associated with**
18 **Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	29	29	20	20	NA	NA
Total Impacts CM1		29	29	20	20	NA	NA
CM2–CM18	Nesting	312	507	88	121	48–82	230
Total Impacts CM2–CM18		312	507	88	121	48–82	230
TOTAL IMPACTS		341	536	108	141	48–82	230

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

19

20 **Impact BIO-109: Loss or Conversion of Habitat for and Direct Mortality of Cooper’s Hawk and**
21 **Osprey**

22 Alternative 1A conservation measures would result in the combined permanent and temporary loss
23 of up to 677 acres of modeled nesting habitat (536 acres of permanent loss, 141 acres of temporary

1 loss) habitat for Cooper’s hawk and osprey (Table 12-1A-43). Conservation measures that would
 2 result in these losses are Water Facilities and Operation (CM1) (which would involve construction of
 3 conveyance facilities and transmission lines and establishment and use of borrow and spoil areas),
 4 Yolo Bypass Fisheries Enhancement (CM2), Tidal Natural Communities Restoration (CM4), and
 5 Seasonally Inundated Floodplain Restoration (CM5). Habitat enhancement and management
 6 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,
 7 could result in local adverse habitat effects. In addition, maintenance activities associated with the
 8 long-term operation of the water conveyance facilities and other BDCP physical facilities could affect
 9 Cooper’s hawk and osprey modeled habitat. Each of these individual activities is described below. A
 10 summary statement of the combined impacts and NEPA and CEQA conclusions follows the
 11 individual conservation measure discussions.

- 12 ● *CM1 Water Facilities and Operation:* Construction of Alternative 1A water conveyance facilities
 13 would result in the combined permanent and temporary loss of up to 49 acres of modeled
 14 Cooper’s hawk and osprey habitat (Table 12-1A-43). Of the 49 acres of modeled habitat that
 15 would be removed for the construction of the conveyance facilities, 29 acres would be a
 16 permanent loss and 20 acres would be a temporary loss of habitat. This loss would have the
 17 potential to displace individuals, if present, and remove the functions and value of potentially
 18 suitable habitat. Activities that would impact modeled habitat consist of tunnel, forebay, and
 19 intake construction, temporary access roads, and construction of transmission lines. Impacts
 20 resulting from CM1 would occur in the central delta in CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8. There are
 21 no occurrences of Cooper’s hawk or osprey that overlap with the construction footprint for CM1.
 22 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
 23 *of Nesting Birds*, would require pre-construction surveys and the establishment of no-
 24 disturbance buffers and would be available to address potential effects on cooper’s hawk and
 25 osprey if either species were to nest in or adjacent to the construction footprint. Refer to the
 26 Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations.
 27 Impacts from CM1 would occur within the first 10 years of Alternative 1A implementation.
- 28 ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
 29 would result in the combined permanent and temporary loss of up to 170 acres of Cooper’s
 30 hawk and osprey nesting habitat (82 acres of permanent loss, 88 acres of temporary loss) in the
 31 Yolo Bypass in CZ 2. Activities through CM2 could involve excavation and grading in
 32 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
 33 riparian losses would occur at the north end of Yolo Bypass where major fish passage
 34 improvements are planned. Excavation to improve water movement in the Toe Drain and in the
 35 Sacramento Weir would also remove potential Cooper’s hawk and osprey habitat. The loss is
 36 expected to occur during the first 10 years of Alternative 1A implementation.
- 37 ● *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration could permanently
 38 remove up to 383 acres of potential Cooper’s hawk and osprey nesting habitat. Trees would not
 39 be actively removed but tree mortality would be expected over time as areas became tidally
 40 inundated.
- 41 ● *CM5 Seasonally Inundated Floodplain Restoration:* Construction of setback levees to restore
 42 seasonally inundated floodplain and riparian restoration actions would remove approximately
 43 75 acres of Cooper’s hawk and osprey nesting habitat (42 acres of permanent loss, 33 acres of
 44 temporary loss). These losses would be expected after the first 10 years of Alternative 1A
 45 implementation along the San Joaquin River and other major waterways in CZ 7. CM11 Natural
 46 Communities Enhancement and Management: Habitat management- and enhancement-related

1 activities could disturb Cooper's hawk and osprey nests if they were present near work sites. A
2 variety of habitat management actions included in CM11 Natural Communities Enhancement
3 and Management that are designed to enhance wildlife values in BDCP-protected habitats may
4 result in localized ground disturbances that could temporarily remove small amounts of
5 Cooper's hawk and osprey habitat and reduce the functions of habitat until restoration is
6 complete. Ground-disturbing activities, such as removal of nonnative vegetation and road and
7 other infrastructure maintenance, are expected to have minor effects on available Cooper's
8 hawk and osprey habitat and are expected to result in overall improvements to and
9 maintenance of habitat values over the term of the BDCP. These effects cannot be quantified, but
10 are expected to be minimal and would be avoided and minimized by the AMMs listed below.

11 Permanent and temporary habitat losses from the above conservation measures would
12 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored
13 as riparian habitat within 1 year following completion of construction activities. Although the
14 effects are considered temporary, the restored riparian habitat would require 1 to several
15 decades to functionally replace habitat that has been affected and for trees to attain sufficient
16 size and structure suitable for nesting by Cooper's hawk or osprey. *AMM18 Swainson's Hawk*
17 contains actions described below to reduce the effect of temporal loss of nesting habitat,
18 including the transplanting of mature trees.

- 19 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
20 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
21 disturbances that could affect Cooper's hawk or osprey use of the surrounding habitat.
22 Maintenance activities would include vegetation management, levee and structure repair, and
23 re-grading of roads and permanent work areas. These effects, however, would be reduced by
24 AMM1-AMM7 and conservation actions as described below.
- 25 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in
26 direct mortality of adult or fledged Cooper's hawk or osprey if they were present in the Plan
27 Area, because they would be expected to avoid contact with construction and other equipment.
28 If Cooper's hawk or osprey were to nest in the construction area, construction-related activities,
29 including equipment operation, noise and visual disturbances could affect nests or lead to their
30 abandonment, potentially resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
31 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
32 be available to address these potential effects on Cooper's hawk and osprey.

33 The following paragraphs summarize the combined effects discussed above and describe other
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
35 included.

36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would
39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
40 effect of construction would not be adverse under NEPA. The Plan would remove 449 acres (338
41 acres of permanent loss, 111 acres of temporary loss) of Cooper's hawk and osprey nesting habitat
42 in the study area in the near-term. These effects would result from the construction of the water
43 conveyance facilities (CM1, 49 acres), and implementing other conservation measures (*CM2 Yolo*

1 *Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally*
2 *Inundated Floodplain Restoration—400 acres of habitat).*

3 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
4 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.
5 Using these ratios would indicate that 49 acres of nesting habitat should be restored/created and 49
6 acres should be protected to compensate for the CM1 losses of modeled Cooper's hawk and osprey
7 habitat. In addition, The near-term effects of other conservation actions would remove 400 acres of
8 modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of
9 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios.

10 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
11 valley/foothill riparian natural community (Table 3-4 in Chapter 3). These conservation actions are
12 associated with CM3, and CM7 and would occur in the same timeframe as the construction and early
13 restoration losses. The majority of riparian protection and restoration acres would occur in CZ 7 as
14 part of a reserve system with extensive wide bands or large patches of valley/foothill riparian
15 natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*).
16 Riparian restoration would expand the patches of existing riparian forest in order to support nesting
17 habitat for riparian species. The Plan's objectives would also benefit Cooper's hawk and osprey by
18 protecting small but essential habitats that occur within cultivated lands, such as tree rows along
19 field borders or roads, and small clusters of trees in farmyards or rural residences (Objective
20 CLNC1.3). In addition, the distribution and abundance of potential nest trees would be increased by
21 planting and maintaining native trees along roadsides and field borders within protected cultivated
22 lands at a rate of one tree per 10 acres (Objective SWHA2.1).

23 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
24 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
25 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored
26 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but
27 would require one to several decades to functionally replace habitat that has been affected and for
28 trees to attain sufficient size and structure suitable for nesting by these species. This time lag
29 between the removal and restoration of nesting habitat could have a substantial impact on nesting
30 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,
31 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
32 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
33 habitat would further reduce this limited resource and could reduce or restrict the number of active
34 nests within the study area until restored riparian habitat is sufficiently developed.

35 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
36 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
37 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
38 within the 125-acre block are removed. These mature trees would be supplemented with additional
39 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
40 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
41 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
42 system for every tree 20 feet or taller by construction during the near-term period. A variety of
43 native tree species would be planted to provide trees with differing growth rates, maturation, and
44 life span. Trees would be planted within the BDCP reserve system to increase nest sites, or within
45 riparian plantings as a component of the riparian restoration (CM5, CM7). Replacement trees that

1 were incorporated into the riparian restoration would not be clustered in a single region of the
2 study area, but would be distributed throughout the conserved lands. Further details of AMM18 are
3 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
5 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
6 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
7 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
8 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
9 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
10 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
11 of the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. For
12 the BDCP to have a less than adverse effect on individuals, preconstruction surveys for noncovered
13 avian species would be required to ensure that active nests are detected and avoided. Mitigation
14 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
15 *Birds*, would be available to address this potential effect.

16 ***Late Long-Term Timeframe***

17 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk
18 and osprey. Alternative 1A as a whole would result in the permanent loss of and temporary effects
19 on 677 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

20 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
21 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*
22 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
23 riparian natural community (Table 3-4 in Chapter 3). The majority of riparian protection and
24 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
25 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP
26 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing
27 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would
28 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within
29 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in
30 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of
31 potential nest trees would be increased by planting and maintaining native trees along roadsides
32 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective
33 SWHA2.1).

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
35 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
36 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
37 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
38 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
39 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
40 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
41 of the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. For
42 the BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
43 species would be required to ensure that active nests are detected and avoided. Mitigation Measure

1 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
2 be available to address this potential effect.

3 **NEPA Effects:** The loss of Cooper's hawk and osprey habitat and potential for direct mortality of
4 these special-status species under Alternative 1A would represent an adverse effect in the absence
5 of other conservation actions. However, with habitat protection and restoration associated with
6 CM3, CM5, CM7, guided by biological goals and objectives and by AMM1–AMM7 and *AMM18*
7 *Swainson's Hawk*, which would be in place during all project activities, the effects of habitat loss on
8 Cooper's hawk and osprey under Alternative 1A would not be adverse. Cooper's hawk and osprey
9 are not covered species under the BDCP and, in order for the BDCP not to have an adverse effect on
10 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
11 nests are detected and avoided. Mitigation Measure BIO-75 would be available to address this effect.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
15 the near-term BDCP conservation strategy has been evaluated to determine whether it would
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
17 effect of construction would not be adverse under NEPA. The Plan would remove 449 acres (338
18 acres of permanent loss, 111 acres of temporary loss) of Cooper's hawk and osprey nesting habitat
19 in the study area in the near-term. These effects would result from the construction of the water
20 conveyance facilities (CM1, 49 acres), and implementing other conservation measures (*CM2 Yolo*
21 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
22 *Inundated Floodplain Restoration*—400 acres of habitat).

23 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
24 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.
25 Using these ratios would indicate that 49 acres of nesting habitat should be restored/created and 49
26 acres should be protected to mitigate the CM1 losses of modeled Cooper's hawk and osprey habitat.
27 In addition, The near-term effects of other conservation actions would remove 400 acres of modeled
28 breeding habitat, and therefore require 400 acres of restoration and 400 acres of protection of
29 modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios. The BDCP has
30 committed to near-term goals of protecting 750 acres and restoring 800 acres of valley/foothill
31 riparian natural community (Table 3-4 in Chapter 3). These conservation actions are associated
32 with CM3, and CM7 and would occur in the same timeframe as the construction and early
33 restoration losses. The majority of riparian protection and restoration acres would occur in CZ 7 as
34 part of a reserve system with extensive wide bands or large patches of valley/foothill riparian
35 natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*).
36 Riparian restoration would expand the patches of existing riparian forest in order to support nesting
37 habitat for riparian species. The Plan's objectives would also benefit Cooper's hawk and osprey by
38 protecting small but essential habitats that occur within cultivated lands, such as tree rows along
39 field borders or roads, and small clusters of trees in farmyards or rural residences (Objective
40 CLNC1.3). In addition, the distribution and abundance of potential nest trees would be increased by
41 planting and maintaining native trees along roadsides and field borders within protected cultivated
42 lands at a rate of one tree per 10 acres (Objective SWHA2.1).

43 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
44 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and

1 other near-term impacts on Cooper’s hawk and osprey nesting habitat. The 800 acres of restored
 2 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but
 3 would require one to several decades to functionally replace habitat that has been affected and for
 4 trees to attain sufficient size and structure suitable for nesting by these species. This time lag
 5 between the removal and restoration of nesting habitat could have a substantial impact on nesting
 6 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,
 7 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
 8 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
 9 habitat would further reduce this limited resource and could reduce or restrict the number of active
 10 nests within the study area until restored riparian habitat is sufficiently developed.

11 *AMM18 Swainson’s Hawk* would implement a program to plant large mature trees, including
 12 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson’s hawk
 13 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
 14 within the 125-acre block are removed. These mature trees would be supplemented with additional
 15 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
 16 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
 17 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
 18 system for every tree 20 feet or taller removed by construction during the near-term period. A
 19 variety of native tree species would be planted to provide trees with differing growth rates,
 20 maturation, and life span. Trees would be planted within the BDCP reserve system to increase nest
 21 sites, or within riparian plantings as a component of the riparian restoration (CM5, CM7).
 22 Replacement trees that were incorporated into the riparian restoration would not be clustered in a
 23 single region of the study area, but would be distributed throughout the conserved lands. Further
 24 details of AMM18 are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the
 25 Final EIR/EIS.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
 27 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
 28 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 29 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
 30 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 31 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 32 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 33 of the Final EIR/EIS. Cooper’s hawk and osprey are not species that are covered under the BDCP. For
 34 the BDCP to avoid a significant impact on individuals, preconstruction surveys for noncovered avian
 35 species would be required to ensure that active nests are detected and avoided. Mitigation Measure
 36 BIO-75 would reduce the potential impact on nesting Cooper’s hawk and osprey to a less-than-
 37 significant level.

38 ***Late Long-Term Timeframe***

39 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper’s hawk
 40 and osprey. Alternative 1A as a whole would result in the permanent loss of and temporary effects
 41 on 677 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

42 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 43 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*
 44 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill

1 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of
2 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with
3 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives
4 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would
5 expand the patches of existing riparian forest in order to support nesting habitat for riparian
6 species. The Plan's objectives would also benefit Cooper's hawk and osprey by protecting small but
7 essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,
8 and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition, the
9 distribution and abundance of potential nest trees would be increased by planting and maintaining
10 native trees along roadsides and field borders within protected cultivated lands at a rate of one tree
11 per 10 acres (Objective SWHA2.1).

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
16 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
17 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
18 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
19 of the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. For
20 the BDCP to have a less-than-significant impact on individuals, preconstruction surveys for
21 noncovered avian species would be required to ensure that active nests are detected and avoided.
22 Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
23 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

24 Considering Alternative 1A's protection and restoration provisions, which would provide acreages
25 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of
26 restoring riparian habitats lost to construction and restoration activities, and implementation of
27 AMM1-AMM7, *AMM18 Swainson's Hawk*, and Mitigation Measure BIO-75, the loss of habitat and
28 direct mortality through implementation of Alternative 1A would not result in a substantial adverse
29 effect through habitat modifications and would not substantially reduce the number or restrict the
30 range of either species. Therefore, the loss of habitat and potential mortality under this alternative
31 would have a less-than-significant impact on Cooper's hawk and osprey.

32 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
33 **Disturbance of Nesting Birds**

34 See Mitigation Measure BIO-75 under Impact BIO-75.

35 **Impact BIO-110: Effects on Cooper's Hawk and Osprey Associated with Electrical**
36 **Transmission Facilities**

37 New transmission lines would increase the risk for bird-power line strikes, which could result in
38 injury or mortality of Cooper's hawk and osprey. However, the flight behavior of these species, their
39 keen vision, and high maneuverability substantially reduce the risk of powerline collisions. The
40 existing network of transmission lines in the project area currently poses the same small risk for
41 Cooper's hawk and osprey, and any incremental risk associated with the new power line corridors
42 would also be expected to be low. Marking transmission lines with flight diverters that make the
43 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and

1 Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian
2 mortality by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission
3 lines would be fitted with flight diverters, which would further reduce any risk of collision with
4 lines.

5 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
6 adverse effect because the risk of bird strike is considered to be minimal based on the flight
7 behavior, the general maneuverability, and keen eyesight of Cooper's hawk and osprey. In addition,
8 *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters on all new
9 powerlines, which would further reduce any risk of mortality from bird strike for Cooper's hawk
10 and osprey from the project. Therefore, the construction and operation of new transmission lines
11 under Alternative 1A would not result in an adverse effect on Cooper's hawk and osprey.

12 **CEQA Conclusion:** The construction and presence of new transmission lines would not represent an
13 adverse effect because the risk of bird strike is considered to be minimal based on the flight
14 behavior, the general maneuverability, and keen eyesight of Cooper's hawk and osprey. In addition,
15 *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters on all new
16 powerlines, which would further reduce any risk of mortality from bird strike for Cooper's hawk
17 and osprey from the project. Therefore, the construction and operation of new transmission lines
18 under Alternative 1A would result in a less-than-significant impact on Cooper's hawk and osprey.

19 **Impact BIO-111: Indirect Effects of Plan Implementation on Cooper's Hawk and Osprey**

20 **Indirect Construction- and Operation-Related Effects:** Construction noise above background
21 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
22 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
23 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
24 the extent to which these noise levels could affect Cooper's hawk or osprey. If Cooper's hawk or
25 osprey were to nest in or adjacent to work areas, construction and subsequent maintenance-related
26 noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce
27 the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct*
28 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid the
29 potential for adverse effects of construction-related activities on survival and productivity of nesting
30 Cooper's hawk and osprey. The use of mechanical equipment during water conveyance facilities
31 construction could cause the accidental release of petroleum or other contaminants that could affect
32 Cooper's hawk and osprey in the surrounding habitat. The inadvertent discharge of sediment or
33 excessive dust adjacent to suitable habitat could also have an adverse effect on these species.
34 *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*, would
35 minimize the likelihood of such spills and ensure that measures are in place to prevent runoff from
36 the construction area and negative effects of dust on active nests.

37 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
38 mercury in avian species, including Cooper's hawk and osprey. Future operational impacts under
39 CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury concentration
40 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to
41 estimate fish-tissue concentrations under these future operational conditions (evaluated starting
42 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues
43 due to ESO were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

1 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to
2 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
3 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
4 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas
5 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of
6 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of
7 uncertainty with respect to species-specific effects. Increased methylmercury associated with
8 natural community and floodplain restoration could indirectly affect cooper's hawk and osprey, via
9 uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

10 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
11 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
12 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
13 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
14 adaptive management as described in CM12 would be available to address the uncertainty of
15 methylmercury levels in restored tidal marsh and potential impacts on cooper's hawk and osprey.

16 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
17 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
18 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
19 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
20 2009). The effect of selenium toxicity differs widely between species and also between age and sex
21 classes within a species. In addition, the effect of selenium on a species can be confounded by
22 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
23 2009).

24 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
25 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the trophic level
26 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
27 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
28 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
29 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
30 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
31 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
32 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
33 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
34 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
35 have a higher risk of selenium toxicity.

36 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
37 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
38 exacerbate bioaccumulation of selenium in avian species, including Cooper's hawk and osprey, and
39 floodplain restoration has the potential to mobilize selenium and, therefore, to increase avian
40 exposure from ingestion of prey items with elevated selenium levels. Thus, Alternative 1A
41 restoration activities that create newly inundated areas could increase bioavailability of selenium
42 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
43 concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to Existing
44 Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases
45 in selenium concentrations in water in the Delta under any alternative. However, it is difficult to

1 determine whether the effects of potential increases in selenium bioavailability associated with
2 restoration-related conservation measures (CM4 and CM5) would lead to adverse effects on
3 Cooper's hawk and osprey.

4 Because of the uncertainty that exists at this programmatic level of review, there could be a
5 substantial effect on Cooper's hawk and osprey from increases in selenium associated with
6 restoration activities. This effect would be addressed through the implementation of *AMM27*
7 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
8 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
9 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
10 selenium management to reduce selenium concentrations and/or bioaccumulation would be
11 evaluated separately for each restoration effort as part of design and implementation. This
12 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
13 design schedule.

14 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
15 could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas. Moreover,
16 operation and maintenance of the water conveyance facilities, including the transmission facilities,
17 could result in ongoing but periodic postconstruction disturbances that could affect Cooper's hawk
18 and osprey use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
19 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address potential
20 effects on nesting individuals in addition to AMM1–AMM7.

21 The implementation of tidal natural communities restoration or floodplain restoration could result
22 in increased exposure of Cooper's hawk or osprey to methylmercury, through the ingestion of fish or
23 small mammals in tidally restored areas. However, it is currently unknown what concentrations of
24 methylmercury are harmful to these species and the potential for increased exposure varies
25 substantially within the study area. Site-specific restoration plans that address the creation and
26 mobilization of mercury, as well as monitoring and adaptive management as described in CM12
27 would better inform potential impacts and address the uncertainty of methylmercury levels in
28 restored tidal marsh in the study area on cooper's hawk and osprey. The site-specific planning phase
29 of marsh restoration would be the appropriate place to assess the potential for risk of
30 methylmercury exposure for Cooper's hawk and osprey, once site specific sampling and other
31 information could be developed.

32 Tidal habitat restoration could result in increased exposure of Cooper's hawk and osprey to
33 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
34 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
35 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

36 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
37 facilities could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas.
38 Moreover, operation and maintenance of the water conveyance facilities, including the transmission
39 facilities, could result in ongoing but periodic postconstruction disturbances that could affect
40 Cooper's hawk and osprey use of the surrounding habitat. Noise, the potential for hazardous spills,
41 increased dust and sedimentation, and operations and maintenance of the water conveyance
42 facilities under Alternative 1A would have a less-than-significant impact on Cooper's hawk and
43 osprey with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
44 *Surveys and Avoid Disturbance of Nesting Birds*, and AMM1–AMM7.

1 The implementation of tidal natural communities restoration or floodplain restoration could result
2 in increased exposure of Cooper's hawk or osprey to methylmercury through the ingestion of fish or
3 small mammals in restored tidal areas. However, it is currently unknown what concentrations of
4 methylmercury are harmful to these species. Site-specific restoration plans that address the creation
5 and mobilization of mercury, as well as monitoring and adaptive management as described in CM12,
6 would address the uncertainty of methylmercury levels in restored tidal marsh in the study area and
7 better inform potential impacts on Cooper's hawk and osprey. Tidal habitat restoration could result
8 in increased exposure of Cooper's hawk and osprey to selenium. With implementation of *AMM27*
9 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
10 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats. With
11 implementation of *AMM27*, the impact of potential increased selenium exposure would be less than
12 significant.

13 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
14 **Disturbance of Nesting Birds**

15 See Mitigation Measure BIO-75 under Impact BIO-75.

16 **Impact BIO-112: Periodic Effects of Inundation of Cooper's Hawk and Osprey Nesting Habitat**
17 **as a Result of Implementation of Conservation Components**

18 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
19 duration of inundation of approximately 48-82 acres of modeled Cooper's hawk and osprey
20 breeding habitat. However, increased periodic flooding is not expected to cause any adverse effect on
21 breeding habitat because trees in which nest sites are situated already withstand floods, the
22 increase in inundation frequency and duration is expected to remain within the range of tolerance of
23 riparian trees, and nest sites are located above floodwaters.

24 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
25 inundation of up to 230 acres of breeding habitat for Cooper's hawk and osprey. The overall effect of
26 seasonal inundation in existing riparian natural communities is likely to be beneficial for these
27 species, because, historically, flooding was the main natural disturbance regulating ecological
28 processes in riparian areas, and flooding promotes the germination and establishment of many
29 native riparian plants.

30 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
31 sites because trees in which nest sites are situated already withstand floods, the increase in
32 inundation frequency and duration is expected to remain within the range of tolerance of riparian
33 trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic
34 inundation resulting from CM2 and CM5 would not have an adverse effect on Cooper's hawk and
35 osprey.

36 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
37 nest sites because trees in which nest sites are situated already withstand floods, the increase in
38 inundation frequency and duration is expected to remain within the range of tolerance of riparian
39 trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic
40 inundation resulting from CM2 and CM5 would have a less-than-significant impact on Cooper's
41 hawk and osprey.

1 **Golden Eagle and Ferruginous Hawk**

2 This section describes the effects of Alternative 1A, including water conveyance facilities
3 construction and implementation of other conservation components, on golden eagle and
4 ferruginous hawk. Modeled foraging habitat for these species consists of grassland, alkali seasonal
5 wetland, vernal pool complex, alfalfa, grain and hay, pasture, and idle cropland throughout the study
6 area.

7 Construction and restoration associated with Alternative 1A conservation measures would result in
8 both temporary and permanent losses of golden eagle and ferruginous hawk modeled foraging
9 habitat as indicated in Table 12-1A-44. Full implementation of Alternative 1A would include the
10 following conservation actions over the term of the BDCP that would also benefit golden eagles or
11 ferruginous hawk (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 12 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
13 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
14 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 15 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 16 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
17 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 18 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
19 VPNC2.5, and GNC2.4, associated with CM11).
- 20 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
21 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 22 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
23 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value
24 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

25 As explained below, with the restoration or protection of these amounts of habitat, in addition to
26 management activities to enhance natural communities for species and implementation of AMM1–
27 AMM7, impacts on golden eagle and ferruginous hawk would not be adverse for NEPA purposes and
28 would be less than significant for CEQA purposes.

1 **Table 12-1A-44. Changes in Golden Eagle and Ferruginous Hawk Habitat Associated with**
2 **Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Foraging	1,660	1,660	673	673	NA	NA
Total Impacts CM1		1,660	1,660	673	673	NA	NA
CM2-CM18	Foraging	5,450	26,198	376	893	1,158-3,650	3,823
Total Impacts CM2-CM18		5,450	26,198	376	893	1,158-3,650	3,823
TOTAL IMPACTS		7,110	27,858	1,049	1,566	1,158-3,650	3,823

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-113: Loss or Conversion of Habitat for and Direct Mortality of Golden Eagle and**
5 **Ferruginous Hawk**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss
7 of up to 29,424 acres of modeled foraging habitat for golden eagle and ferruginous hawk (27,858
8 acres of permanent loss and 1,566 acres of temporary loss, Table 12-1A-44). Conservation measures
9 that would result in these losses are conveyance facilities and transmission line construction, and
10 establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2),
11 tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland
12 restoration (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10),
13 and construction of conservation hatcheries (CM18). The majority of habitat loss (20,880 acres)
14 would result from CM4. Habitat enhancement and management activities (CM11), which include
15 ground disturbance or removal of nonnative vegetation, and the construction of recreational trails,
16 signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities
17 associated with the long-term operation of the water conveyance facilities and other BDCP physical
18 facilities could degrade or eliminate foraging habitat for both species. Each of these individual
19 activities is described below. A summary statement of the combined impacts and NEPA effects, and a
20 CEQA conclusion follows the individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
22 result in the combined permanent and temporary loss of up to 2,333 acres of modeled golden
23 eagle and ferruginous hawk foraging habitat (1,660 acres of permanent loss, 673 acres of
24 temporary loss) from CZs 3-6 and CZ 8. The majority of habitat that would be removed would be
25 in CZ 8, from the construction of the new forebay (685 acres) and the four proposed Reusable
26 Tunnel Material storage areas in the central Delta (on Victoria Island, Bacon Island, Tyler Island,

1 and Andrus Island) that are each approximately 288-572 acres. The potential borrow spoil site
2 southwest of the proposed forebay would also temporarily remove golden eagle and ferruginous
3 hawk foraging habitat. The CM1 construction footprint does not overlap with any occurrences of
4 golden eagle or ferruginous hawk. However, some of the grassland habitat lost in CZ 8 is
5 composed of larger stands of ruderal and herbaceous vegetation and California annual
6 grassland, which provides high-value foraging habitat for these species. Refer to the Terrestrial
7 Biology Map Book for a detailed view of Alternative 1A construction locations. Impacts from
8 CM1 would occur within the first 10 years of Alternative 1A implementation.

- 9 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
10 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
11 golden eagle and ferruginous hawk foraging habitat (898 acres of permanent loss, 376 acres of
12 temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of
13 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass
14 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.
15 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland
16 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10
17 years of Alternative 1A implementation.
- 18 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
19 inundation would permanently remove an estimated 20,880 acres of modeled golden eagle and
20 ferruginous hawk habitat. The majority of the acres lost would consist of cultivated lands in CZs
21 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache Slough, on
22 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
23 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact
24 and fragment grassland just north of Rio Vista in and around French and Prospect Islands, and in
25 an area south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex
26 habitat would likely occur in the south end of the Yolo Bypass and on the northern fringes of
27 Suisun Marsh.
- 28 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
29 seasonally inundated floodplain would permanently and temporarily remove approximately
30 1,450 acres of modeled golden eagle and ferruginous hawk foraging habitat (933 permanent,
31 517 temporary). These losses would be expected after the first 10 years of Alternative 1A
32 implementation along the San Joaquin River and other major waterways in CZ 7.
- 33 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
34 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
35 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
36 would be restored after the construction periods. Grassland restoration would be implemented
37 on agricultural lands that also provide foraging habitat for golden eagle and ferruginous hawk
38 and would result in the conversion of 837 acres of cultivated lands to grassland.
- 39 ● *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
40 removal of 705 acres of golden eagle and ferruginous hawk foraging habitat.
- 41 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
42 actions included in CM11 that are designed to enhance wildlife values in restored or protected
43 habitats could result in localized ground disturbances that could temporarily remove small
44 amounts of golden eagle and ferruginous hawk foraging habitat. Ground-disturbing activities,
45 such as removal of nonnative vegetation and road and other infrastructure maintenance

1 activities, would be expected to have minor adverse effects on available habitat for these
2 species. CM11 would also include the construction of recreational-related facilities including
3 trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated*
4 *Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas,
5 bathrooms, etc. would be placed on existing, disturbed areas when and where possible.
6 However, approximately 50 acres of grassland habitat would be lost from the construction of
7 trails and facilities.

- 8 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
9 modeled golden eagle and ferruginous hawk foraging habitat for the development of a delta and
10 longfin smelt conservation hatchery in CZ 1.
- 11 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
12 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
13 disturbances that could affect golden eagle and ferruginous hawk use of the surrounding habitat.
14 Maintenance activities would include vegetation management, levee and structure repair, and
15 re-grading of roads and permanent work areas. These effects, however, would be reduced by
16 AMM1–AMM7 and conservation actions as described below.
- 17 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
18 golden eagle and ferruginous hawk because foraging individuals would be expected to
19 temporarily avoid the increased noise and activity associated with construction areas.

20 The following paragraphs summarize the combined effects discussed above and describe other
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
22 included.

23 ***Near-Term Timeframe***

24 Because the water conveyance facility construction is being evaluated at the project level, the near-
25 term BDCP conservation strategy has been evaluated to determine whether it would provide
26 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
27 such conveyance facility construction would not be adverse under NEPA. The Plan would remove
28 8,167 acres (7,110 permanent, 1,049 temporary) of modeled golden eagle and ferruginous hawk
29 foraging habitat in the study area in the near-term. These effects would result from the construction
30 of the water conveyance facilities (CM1, 2,333 acres), and implementing other conservation
31 measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7*
32 *Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal*
33 *Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and*
34 *Management and CM18 Conservation Hatcheries—5,826 acres).*

35 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
36 would be 2:1 for protection of habitat. Using this ratio would indicate that 4,666 acres should be
37 protected to compensate for the CM1 losses of 2,333 acres of golden eagle and ferruginous hawk
38 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of
39 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous
40 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

41 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
42 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
43 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4

1 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
2 in the same timeframe as the construction and early restoration losses thereby avoiding adverse
3 effects of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland
4 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11. (Objectives GNC1.1 and
5 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali
6 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
7 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
8 expand golden eagle and ferruginous hawk foraging habitat and reduce the effects of current levels
9 of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect
10 and mammal prey populations would be increased on protected lands, enhancing the foraging value
11 of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability
12 would be increased on protected natural communities by encouraging ground squirrel occupancy
13 and expansion through the creation of berms, mounds, edges, and through the prohibition of ground
14 squirrel control programs (i.e., poisoning).

15 Cultivated lands that provide habitat for covered and other native wildlife species would provide
16 approximately 15,400 acres of potential foraging habitat for golden eagle and ferruginous hawk
17 (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time
18 period would be in alfalfa and pasture crop types (very high- and high-value crop types) for
19 Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.
20 This biological objective provides an estimate for the high proportion of cultivated lands protected
21 in the near-term time period which would be suitable for golden eagle and ferruginous hawk.

22 The acres of restoration and protection contained in the near-term Plan goals and the additional
23 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
24 level effects of CM1 on golden eagle and ferruginous hawk, as well as mitigate the near-term effects
25 of the other conservation measures with the consideration that some portion of the 15,400 acres of
26 cultivated lands protected in the near-term timeframe would be managed in suitable crop types to
27 compensate for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-113, *Compensate for the*
28 *Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, would be available to
29 address the effect of habitat loss in the near-term.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
34 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
35 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
36 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
37 of the Final EIR/EIS.

38 ***Late Long-Term Timeframe***

39 Based on modeled habitat, the study area supports approximately 269,411 acres of modeled
40 foraging habitat for golden eagle and ferruginous hawk. Alternative 1A as a whole would result in
41 the permanent loss of and temporary effects on 29,424 acres of modeled foraging habitat during the
42 term of the Plan (11% of the modeled habitat in the study area). The locations of these losses are
43 described above in the analyses of individual conservation measures.

1 The Plan includes conservation commitments through CM3 Natural Communities Protection and
 2 Restoration, CM8 Grassland Natural Communities Restoration, and CM9 Vernal Pool and Alkali
 3 Seasonal Wetland Complex Restoration to protect 8,000 acres and restore 2,000 acres of grassland
 4 natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal
 5 wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native
 6 wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland restoration and
 7 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland
 8 protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and alkali seasonal wetland
 9 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
 10 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand
 11 foraging habitat for golden eagle and ferruginous hawk and reduce the effects of current levels of
 12 habitat fragmentation. Under CM11 Natural Communities Enhancement and Management, insect
 13 and small mammal prey populations would be increased on protected lands, enhancing the foraging
 14 value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow
 15 availability would be increased on protected natural communities by encouraging ground squirrel
 16 occupancy and expansion through the creation of berms, mounds, edges, and through the
 17 prohibition of ground squirrel control programs (i.e., poisoning). Cultivated lands that provide
 18 habitat for covered and other native wildlife species would provide approximately 15,400 acres of
 19 potential habitat for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 42,275
 20 acres of cultivated lands protected would be in alfalfa and pasture crop types (very high- and high-
 21 value crop types) for Swainson’s hawk (Objective SH1.2) which are also suitable for golden eagle
 22 and ferruginous hawk.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 26 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 27 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 28 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 29 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 30 of the Final EIR/EIS.

31 **NEPA Effects:** The loss of golden eagle and ferruginous hawk habitat and potential for mortality of
 32 this special-status species under Alternative 1A would represent an adverse effect in the absence of
 33 other conservation actions. With habitat protection and restoration associated with CM3, CM8, CM9,
 34 and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in place
 35 during all project activities, and with implementation of Mitigation Measure BIO-113, *Compensate*
 36 *for the Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the effects of habitat
 37 loss and potential direct mortality on golden eagle and ferruginous hawk under Alternative 1A
 38 would not be adverse.

39 **CEQA Conclusion:**

40 **Near-Term Timeframe**

41 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 42 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 43 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 44 effects of construction would be less than significant under CEQA. The Plan would remove 8,167

1 acres (7,110 permanent, 1,049 temporary) of modeled golden eagle and ferruginous hawk foraging
2 habitat in the study area in the near-term. These effects would result from the construction of the
3 water conveyance facilities (CM1, 2,333 acres), and implementing other conservation measures
4 (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian
5 Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and
6 Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and
7 Management and CM18 Conservation Hatcheries—5,826 acres).

8 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
9 would be 2:1 for protection of habitat. Using this ratio would indicate that 4,666 acres should be
10 protected to compensate for the CM1 losses of 2,333 acres of golden eagle and ferruginous hawk
11 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of
12 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous
13 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

14 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
15 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
16 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
17 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
18 in the same timeframe as the construction and early restoration losses thereby avoiding significant
19 impacts of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland
20 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and
21 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali
22 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
23 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
24 expand golden eagle and ferruginous hawk foraging habitat and reduce the effects of current levels
25 of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect
26 and mammal prey populations would be increased on protected lands, enhancing the foraging value
27 of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability
28 would be increased on protected natural communities by encouraging ground squirrel occupancy
29 and expansion through the creation of berms, mounds, edges, and through the prohibition of ground
30 squirrel control programs (i.e., poisoning). Cultivated lands that provide habitat for covered and
31 other native wildlife species would provide approximately 15,400 acres of potential foraging habitat
32 for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 87% of cultivated lands
33 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-
34 and high-value crop types) for Swainson's hawk (Objective SH1.2) which are also suitable for golden
35 eagle and ferruginous hawk. This biological objective provides an estimate for the high proportion of
36 cultivated lands protected in the near-term time period which would be suitable for golden eagle
37 and ferruginous hawk.

38 These Plan objectives represent performance standards for considering the effectiveness of
39 conservation actions. The acres of restoration and protection contained in the near-term Plan goals
40 and the additional detail in the biological objectives satisfy the typical mitigation that would be
41 applied to the project-level effects of CM1 on golden eagle and ferruginous hawk, as well as mitigate
42 the near-term effects of the other conservation measures with the consideration that some portion
43 of the 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in
44 suitable crop types to compensate for the loss of habitat at a ratio of 2:1. The implementation of
45 Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous*

1 *Hawk Foraging Habitat*, would reduce the effect of habitat loss in the near-term to less than
2 significant.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
7 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
8 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
9 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
10 of the Final EIR/EIS.

11 **Late Long-Term Timeframe**

12 Based on modeled habitat, the study area supports approximately 269,411 acres of modeled
13 foraging habitat for golden eagle and ferruginous hawk. Alternative 1A as a whole would result in
14 the permanent loss of and temporary effects on 29,424 acres of modeled foraging habitat during the
15 term of the Plan (11% of the modeled habitat in the study area). The locations of these losses are
16 described above in the analyses of individual conservation measures.

17 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
18 *Restoration*, *CM8 Grassland Natural Communities Restoration*, and *CM9 Vernal Pool and Alkali*
19 *Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland
20 natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal
21 wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native
22 wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1,
23 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, CZ 8, and CZ 11
24 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1
25 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and
26 vernal pool natural communities which would expand foraging habitat for golden eagle and
27 ferruginous hawk and reduce the effects of current levels of habitat fragmentation. Under *CM11*
28 *Natural Communities Enhancement and Management*, insect and small mammal prey populations
29 would be increased on protected lands, enhancing the foraging value of these natural communities
30 (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would be increased on protected
31 natural communities by encouraging ground squirrel occupancy and expansion through the creation
32 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
33 poisoning). Cultivated lands that provide habitat for covered and other native wildlife species would
34 provide approximately 15,400 acres of potential habitat for golden eagle and ferruginous hawk
35 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa
36 and pasture crop types. These are very high- and high-value crop types for Swainson's hawk
37 (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
41 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
42 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
43 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since

1 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
2 of the Final EIR/EIS.

3 In the absence of other conservation actions, the effects on golden eagle and ferruginous hawk
4 foraging habitat would represent an adverse effect as a result of habitat modification and potential
5 for direct mortality of special-status species; however, considering Alternative 1A's protection and
6 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
7 suitable to compensate for habitats lost to construction and restoration activities, and with the
8 implementation of AMM1–AMM7, and Mitigation Measure BIO-113, *Compensate for the Near-Term*
9 *Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the loss of habitat or direct mortality
10 through implementation of Alternative 1A would not result in a substantial adverse effect through
11 habitat modifications and would not substantially reduce the number or restrict the range of either
12 species. Therefore, the loss of habitat or potential mortality under this alternative would have a less-
13 than-significant impact on golden eagle and ferruginous hawk.

14 **Mitigation Measure BIO-113: Compensate for the Near-term Loss of Golden Eagle and**
15 **Ferruginous Hawk Foraging Habitat**

16 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
17 crops, or alfalfa to provide golden eagle and ferruginous hawk foraging habitat such that the
18 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of
19 2:1. Additional grassland protection, enhancement, and management may be substituted for the
20 protection of high-value cultivated lands.

21 **Impact BIO-114: Effects on Golden Eagle and Ferruginous Hawk Associated with Electrical**
22 **Transmission Facilities**

23 Golden eagle and ferruginous hawk would be at low risk of bird strike mortality from the
24 construction of new transmission lines based on their maneuverability, their keen eyesight, their
25 lack of flocking behavior, and other factors assessed in the bird strike vulnerability analysis (BDCP
26 Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission*
27 *Lines*). Marking transmission lines with flight diverters that make the lines more visible to birds has
28 been shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008)
29 estimated that marking devices in the Central Valley could reduce avian mortality by 60%. With the
30 implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines would be fitted with
31 flight diverters, which would substantially reduce any potential for powerline collisions.

32 **NEPA Effects:** Golden eagle and ferruginous hawk are already at a low risk of bird strike mortality
33 based on their general maneuverability, keen eyesight, and lack of flocking behavior. All new
34 transmission lines constructed as a result of the project would be fitted with bird diverters, which
35 have been shown to reduce avian mortality by 60%. By implementing *AMM20 Greater Sandhill*
36 *Crane*, the construction and operation of transmission lines would not result in an adverse effect on
37 golden eagle or ferruginous hawk.

38 **CEQA Conclusion:** Golden eagle and ferruginous hawk are already at a low risk of bird strike
39 mortality based on their general maneuverability, keen eyesight and lack of flocking behavior. All
40 new transmission lines constructed as a result of the project would be fitted with bird diverters,
41 which have been shown to reduce avian mortality by 60%. By implementing *AMM20 Greater*
42 *Sandhill Crane*, the construction and operation of transmission lines would result in a less-than-
43 significant impact on golden eagle or ferruginous hawk.

1 **Impact BIO-115: Indirect Effects of Plan Implementation on Golden Eagle and Ferruginous**
2 **Hawk**

3 **Indirect construction-and operation-related effects:** Construction- and subsequent
4 maintenance-related noise and visual disturbances could disrupt foraging, and reduce the functions
5 of suitable foraging habitat for golden eagle and ferruginous hawk. Construction noise above
6 background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of
7 construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*
8 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to
9 determine the extent to which these noise levels could affect golden eagle or ferruginous hawk.
10 Indirect effects associated with construction include noise, dust, and visual disturbance caused by
11 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical
12 equipment during water conveyance facilities construction could cause the accidental release of
13 petroleum or other contaminants that could affect these species or their prey in the surrounding
14 habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
15 would minimize the likelihood of such spills. The inadvertent discharge of sediment or excessive
16 dust adjacent to golden eagle and ferruginous hawk grassland habitat could also have a negative
17 effect on the species. However, AMM1–AMM7 would also ensure that measures would be in place to
18 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to
19 work areas.

20 **NEPA Effects:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative 1A
21 implementation could have adverse effects on these species through the modification of habitat.
22 With the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 1A
23 implementation would not have an adverse effect on golden eagle and ferruginous hawk.

24 **CEQA Conclusion:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative
25 1A implementation could have a significant impact on the species from modification of habitat. With
26 the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 1A
27 implementation would have a less-than-significant impact on golden eagle and ferruginous hawk.

28 **Impact BIO-116: Periodic Effects of Inundation on Golden Eagle and Ferruginous Hawk**
29 **Habitat as a Result of Implementation of Conservation Components**

30 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
31 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–
32 3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat (Table 12-1A-44).

33 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
34 *Restoration* could result in the periodic inundation of up to approximately 3,823 acres of modeled
35 habitat (Table 12-1A-44).

36 Golden eagles and ferruginous hawks would not likely use inundated areas for foraging, and
37 increased frequency and duration of inundation of grassland habitats may affect prey populations
38 that have insufficient time to recover following inundation events. However, periodically inundated
39 habitat would not be expected to have an adverse effect on local or migratory golden eagles or the
40 wintering ferruginous hawk populations in the study area.

41 **NEPA Effects:** Implementation of CM2 would increase the frequency and duration of inundation on
42 approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat. In

1 addition, implementation of CM5 could result in the periodic inundation of up to 3,823 acres of
2 modeled habitat. However, periodic inundation would not be expected to have an adverse effect on
3 the wintering golden eagle or ferruginous hawk populations in the study area.

4 **CEQA Conclusion:** Implementation of CM2 would increase the frequency and duration of inundation
5 on approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging
6 habitat. In addition, implementation of CM5 could result in the periodic inundation of up to 3,823
7 acres of modeled habitat. However, periodic inundation would be expected to have a less-than-
8 significant impact on the golden eagle and ferruginous hawk populations in the study area.

9 **Cormorants, Herons and Egrets**

10 This section describes the effects of Alternative 1A, including water conveyance facilities
11 construction and implementation of other conservation components, on double-crested cormorant,
12 great blue heron, great egret, snowy egret, and black-crowned night heron. Modeled breeding
13 habitat for these species consists of valley/foothill riparian forest.

14 Construction and restoration associated with Alternative 1A conservation measures would result in
15 both temporary and permanent losses of cormorant, heron, and egret modeled habitat as indicated
16 in Table 12-1A-45. The majority of the losses would take place over an extended period of time as
17 tidal marsh is restored in the study area. Although restoration for the loss of nesting habitat would
18 be initiated in the same timeframe as the losses, it could take one or more decades for restored
19 habitats to replace the functions of habitat lost. This time lag between impacts and restoration of
20 habitat function would be minimized by specific requirements of *AMM18 Swainson's Hawk*, including
21 the planting of mature trees in the near-term time period. Full implementation of Alternative 1A
22 would include the following conservation actions over the term of the BDCP which would also
23 benefit cormorants, herons, and egrets (BDCP Chapter 3, Section 3.3, *Biological Goals and*
24 *Objectives*).

- 25 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
26 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
27 associated with CM7).
- 28 ● Protect at least 750 acres of existing valley/foothill riparian natural community in C Z7 by year
29 10 (Objective VFRNC1.2, associated with CM3).
- 30 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
31 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
32 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
33 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

34 As explained below, with the restoration or protection of these amounts of habitat, in addition to
35 management activities to enhance natural communities for species, *AMM1–AMM7*, *AMM18*
36 *Swainson's Hawk*, Mitigation Measure BIO-75, and Mitigation Measure BIO-117, impacts on
37 cormorants, herons, and egrets would not be adverse for NEPA purposes and would be less than
38 significant for CEQA purposes.

1 **Table 12-1A-45. Changes in Cormorant, Heron and Egret Modeled Habitat Associated with**
2 **Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting (Rookeries)	58	58	28	28	NA	NA
Total Impacts CM1		58	58	28	28	NA	NA
CM2-CM18	Nesting (Rookeries)	387	684	88	123	51-92	266
Total Impacts CM2-CM18		387	684	88	123	51-92	266
TOTAL IMPACTS		445	742	116	151	51-92	266

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-117: Loss or Conversion of Nesting Habitat for and Direct Mortality of**
5 **Cormorants, Herons and Egrets**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss
7 of up to 893 acres of modeled nesting habitat (742 acres of permanent loss and 151 acres of
8 temporary loss) for double-crested cormorant, great blue heron, great egret, snowy egret, and black-
9 crowned night heron (Table 12-1A-45). Conservation measures that would result in these losses are
10 conveyance facilities and transmission line construction, and establishment and use of borrow and
11 spoil areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2), tidal natural
12 communities restoration (CM4), and seasonally inundated floodplain restoration (CM5). Habitat
13 enhancement and management activities (CM11) which include ground disturbance or removal of
14 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities
15 associated with the long-term operation of the water conveyance facilities and other BDCP physical
16 facilities could degrade or eliminate cormorant, heron, and egret modeled habitat. Each of these
17 individual activities is described below. A summary statement of the combined impacts, NEPA
18 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A water conveyance facilities
20 would result in the combined permanent and temporary loss of up to 86 acres of modeled
21 nesting habitat for cormorants, herons, and egrets (Table 12-1A-45). Of the 86 acres of modeled
22 habitat that would be removed for the construction of the conveyance facilities, 58 acres would
23 be a permanent loss and 28 acres would be a temporary loss of habitat. This loss would have the
24 potential to displace individuals, if present, and remove the functions and value of potentially

1 suitable habitat. Activities that would impact modeled nesting habitat consist of tunnel, forebay,
2 and intake construction, temporary access roads, and construction of transmission lines. Most of
3 the permanent loss would occur where Intakes 1–5 impact the Sacramento River’s east bank
4 between Freeport and Courtland. The riparian areas here are very small patches, some
5 dominated by valley oak and others by nonnative trees. Temporary losses would occur where
6 pipelines cross Snodgrass Slough and other small waterways east of the Sacramento River, and
7 where temporary work areas surround intake sites. The riparian habitat in these areas is also
8 composed of very small patches or stringers bordering waterways, which are composed of
9 valley oak and scrub vegetation. Impacts from CM1 would occur in the central delta in CZ 3, CZ 4,
10 CZ 5, CZ 6, and CZ 8. Impacts from CM1 would occur within the first 10 years of Alternative 1A
11 implementation.

12 The primary impact of concern regarding double-crested cormorant, great blue heron, great
13 egret, snowy egret, and black-crowned night heron is the loss of existing known nest trees, and
14 other large trees associated with known nest sites. There is one great blue heron rookery that is
15 currently intersected by the proposed permanent powerline associated with CM1, east of Little
16 Mandeville Island. Because the species is highly traditional in their use of rookeries, the
17 establishment of new nest sites is unpredictable. Therefore to avoid adverse effects on great
18 blue herons (and cormorants, herons, and egrets, should future surveys detect additional
19 rookeries), existing rookeries must be avoided. The transmission line alignment has not been
20 finalized for Alternative 1A, and therefore, avoidance would be feasible. Mitigation Measure BIO-
21 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and
22 Mitigation Measure BIO-117, *Avoid Impacts on Rookeries* would be available to address this
23 potential effect on cormorants, herons, and egrets. Refer to the Terrestrial Biology Map Book for
24 a detailed view of Alternative 1A construction locations.

25 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
26 would result in the combined permanent and temporary loss of up to 177 acres of nesting
27 habitat (89 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2.
28 Activities through CM2 could involve excavation and grading in valley/foothill riparian areas to
29 improve passage of fish through the bypasses. Most of the riparian losses would occur at the
30 north end of Yolo Bypass where major fish passage improvements are planned. Excavation to
31 improve water movement in the Toe Drain and in the Sacramento Weir would also remove
32 potential nesting habitat. The loss is expected to occur during the first 10 years of Alternative 1A
33 implementation.

34 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
35 inundation would permanently remove an estimated 552 acres of nesting habitat for
36 cormorants, herons and egrets. Trees would not be actively removed but tree mortality would
37 be expected over time as areas became tidally inundated. Depending on the extent and value of
38 remaining habitat, this could reduce use of these habitats by these species. There is one CNDDB
39 occurrence of a great blue heron rookery that overlaps with the hypothetical restoration
40 footprint for tidal restoration. The occurrence is on Decker Island and tidal restoration could
41 potentially impact the nest trees from inundation. This effect would need to be addressed within
42 the project specific analysis for tidal restoration projects.

43 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
44 seasonally inundated floodplain would permanently remove approximately 43 acres and
45 temporarily remove approximately 35 acres of potential cormorants, heron, and egret nesting

1 habitat. These losses would be expected after the first 10 years of Alternative 1A
2 implementation along the San Joaquin River and other major waterways in CZ 7.

- 3 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and
4 enhancement-related activities could disturb cormorant, heron, and egret nests if they were
5 present near work sites. A variety of habitat management actions included in CM11 that are
6 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground
7 disturbances that could temporarily remove small amounts of cormorant, heron, and egret
8 habitat and reduce the functions of habitat until restoration is complete. Ground-disturbing
9 activities, such as removal of nonnative vegetation and road and other infrastructure
10 maintenance, are expected to have minor effects on available habitat for these species and are
11 expected to result in overall improvements to and maintenance of habitat values over the term
12 of the BDCP. These effects cannot be quantified, but are expected to be minimal and would be
13 avoided and minimized by the AMMs listed below.
- 14 • Permanent and temporary habitat losses from the above conservation measures would
15 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored
16 as riparian habitat within 1 year following completion of construction activities. Although the
17 effects are considered temporary, the restored riparian habitat would require years to several
18 decades to functionally replace habitat that has been affected and for trees to attain sufficient
19 size and structure for established rookeries. *AMM18 Swainson's Hawk* contains actions described
20 below to reduce the effect of temporal loss of mature riparian habitat, including the
21 transplanting of mature trees.
- 22 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
23 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
24 disturbances that could affect use of the surrounding habitat by cormorants, herons or egrets.
25 Maintenance activities would include vegetation management, levee and structure repair, and
26 re-grading of roads and permanent work areas. These effects, however, would be reduced by
27 AMMs and conservation actions as described below.
- 28 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
29 direct mortality of adult or fledged double-crested cormorant, great blue heron, great egret,
30 snowy egret, and black-crowned night heron if they were present in the Plan Area, because they
31 would be expected to avoid contact with construction and other equipment. If birds were to nest
32 in the construction area, construction-related activities, including equipment operation, noise
33 and visual disturbances could affect nests including any nests that are built on the ground (e.g.
34 Cormorant nests that have been built on the ground after nest trees fall over or die from stress
35 and guano produced by a rookery) or lead to their abandonment, potentially resulting in
36 mortality of eggs and nestlings. Because cormorants, herons and egrets are highly traditional in
37 their use of nest sites, all disturbance to nesting birds must be avoided or minimized. Mitigation
38 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
39 *Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries* would be available to
40 address these adverse effects on cormorants, herons, and egrets.

41 The following paragraphs summarize the combined effects discussed above and describe other
42 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
43 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
5 effects of construction would not be adverse under NEPA. The Plan would remove 561 acres of
6 nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These effects
7 would result from the construction of the water conveyance facilities (CM1, 86 acres of nesting
8 habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,
9 *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*—
10 475 acres of nesting habitat).

11 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
12 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for
13 breeding habitat. Using these ratios would indicate that 86 acres of breeding habitat should be
14 restored/created and 86 acres should be protected to compensate for the CM1 losses of modeled
15 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions
16 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of
17 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the
18 same typical NEPA and CEQA ratios.

19 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
20 system with extensive wide bands or large patches of valley/foothill riparian natural community
21 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
22 restoration would expand the patches of existing riparian forest in order to support nesting habitat
23 for these species. In addition, small but essential nesting habitat associated with cultivated lands
24 would also be maintained and protected such as isolated trees, tree rows along field borders or
25 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

26 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
27 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
28 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored
29 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but
30 would require years to several decades to functionally replace habitat that has been affected and for
31 trees to attain sufficient size and structure suitable for established rookeries. This time lag between
32 the removal and restoration of nesting habitat could have a substantial impact on cormorants,
33 herons and egrets in the near-term time period.

34 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
35 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
36 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
37 within the 125-acre block are removed. These mature trees would be supplemented with additional
38 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
39 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
40 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
41 system for every tree 20 feet or taller removed by construction during the near-term period. A
42 variety of native tree species would be planted to provide trees with differing growth rates,
43 maturation, and life span. Replacement trees that were incorporated into the riparian restoration
44 would not be clustered in a single region of the study area, but would be distributed throughout

1 protected lands. Further details of AMM18 are provided in Appendix 3B, *Environmental*
2 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
7 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
8 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
9 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
10 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
11 black-crowned night heron are not species that are covered under the BDCP. For the BDCP to avoid
12 adverse effects on individuals, existing nests and rookeries would have to be avoided. Mitigation
13 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
14 *Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to address
15 effects on nesting cormorants, herons, and egrets.

16 **Late Long-Term Timeframe**

17 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting
18 habitat for cormorants, herons, and egrets. Alternative 1A as a whole would result in the permanent
19 loss of and temporary effects on 893 acres of potential breeding habitat (5% of the potential
20 breeding habitat in the study area).

21 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
22 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*
23 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
24 riparian natural community (Table 3-4 in Chapter 3). The majority of riparian protection and
25 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
26 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP
27 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing
28 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would
29 also benefit cormorants, herons, and egrets by protecting small but essential habitats that occur
30 within cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in
31 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of
32 potential nest trees would be increased by planting and maintaining native trees along roadsides
33 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective
34 SWHA2.1).

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
36 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
37 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
38 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
39 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
40 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
41 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
42 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
43 black-crowned night heron are not species that are covered under the BDCP. These species are
44 highly traditional in their use of nest sites, and, in order for the BDCP to avoid a significant impact on

1 individuals, preconstruction surveys would be required to ensure that nests are detected and any
2 direct and indirect impacts on rookeries are avoided. Mitigation Measure BIO-75, *Conduct*
3 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure
4 BIO-117, *Avoid Impacts on Rookeries*, would be available to address adverse effects on nesting
5 cormorants, herons, and egrets.

6 **NEPA Effects:** The loss of cormorant, heron, and egret habitat and potential for direct mortality of
7 these special-status species under Alternative 1A would represent an adverse effect in the absence
8 of other conservation actions. With habitat protection and restoration associated with CM3, CM5,
9 CM7, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and
10 *AMM18 Swainson’s Hawk*, which would be in place during all project activities, the effects of habitat
11 loss and potential mortality on cormorants, herons, and egrets under Alternative 1A would not be
12 adverse. Double-crested cormorant, great blue heron, great egret, snowy egret, and black-crowned
13 night heron are not species that are covered under the BDCP. Preconstruction surveys for
14 noncovered species would be required for the BDCP to avoid an adverse effect on individuals.
15 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
16 *Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries* would be available to
17 address adverse effects on nesting cormorants, herons, and egrets.

18 **CEQA Conclusion:**

19 **Near-Term Timeframe**

20 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
21 the near-term BDCP conservation strategy has been evaluated to determine whether it would
22 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
23 effects of construction would be less than significant under NEPA. The Plan would remove 561 acres
24 of nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These
25 effects would result from the construction of the water conveyance facilities (CM1, 86 acres of
26 nesting habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
27 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
28 *Restoration*—475 acres of nesting habitat).

29 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
30 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for
31 breeding habitat. Using these ratios would indicate that 86 acres of breeding habitat should be
32 restored/created and 86 acres should be protected to mitigate the CM1 losses of modeled
33 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions
34 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of
35 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the
36 same typical NEPA and CEQA ratios.

37 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
38 system with extensive wide bands or large patches of valley/foothill riparian natural community
39 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
40 restoration would expand the patches of existing riparian forest in order to support nesting habitat
41 for these species. In addition, small but essential nesting habitat associated with cultivated lands
42 would also be maintained and protected such as isolated trees, tree rows along field borders or
43 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

1 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
2 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
3 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored
4 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but
5 would require years to several decades to functionally replace habitat that has been affected and for
6 trees to attain sufficient size and structure suitable for established rookeries. This time lag between
7 the removal and restoration of nesting habitat could have a substantial impact on cormorants,
8 herons and egrets in the near-term time period.

9 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
10 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
11 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
12 within the 125-acre block are removed. These mature trees would be supplemented with additional
13 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
14 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
15 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
16 system for every tree 20 feet or taller removed by construction during the near-term period. A
17 variety of native tree species would be planted to provide trees with differing growth rates,
18 maturation, and life span. Replacement trees that were incorporated into the riparian restoration
19 would not be clustered in a single region of the study area, but would be distributed throughout
20 protected lands. Further details of AMM18 are provided in Appendix 3B, *Environmental*
21 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
26 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
27 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
28 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
29 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
30 black-crowned night heron are not species that are covered under the BDCP. For the BDCP to avoid a
31 significant impact on individuals, preconstruction surveys for noncovered avian species would be
32 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
33 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this
34 potential impact to a less-than-significant level.

35 **Late Long-Term Timeframe**

36 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting
37 habitat for cormorants, herons, and egrets. Alternative 1A as a whole would result in the permanent
38 loss of and temporary effects on 871 acres of potential breeding habitat (5% of the potential
39 breeding habitat in the study area).

40 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
41 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*
42 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
43 riparian natural community (Table 3-4 in Chapter 3). The majority of riparian protection and
44 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large

1 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP
2 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing
3 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would
4 also benefit cormorants, herons, and egrets by protecting small but essential habitats that occur
5 within cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in
6 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of
7 potential nest trees would be increased by planting and maintaining native trees along roadsides
8 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective
9 SWHA2.1).

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
14 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
15 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
16 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
17 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
18 black-crowned night heron are not species that are covered under the BDCP. These species are
19 highly traditional in their use of nest sites and, for the BDCP to avoid a significant impact on
20 individuals, preconstruction surveys would be required to ensure that nests are detected and any
21 direct and indirect impacts on rookeries are avoided. Mitigation Measure BIO-75, *Conduct*
22 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure
23 BIO-117, *Avoid Impacts on Rookeries*, would reduce this potential impact to a less-than-significant
24 level.

25 In the absence of other conservation actions, effects on nesting cormorants, herons, and egrets
26 would represent an adverse effect as a result of habitat modification and potential for direct
27 mortality of special-status species. This impact would be considered significant. Considering
28 Alternative 1A's protection and restoration provisions, which would provide acreages of new or
29 enhanced habitat in amounts sufficient to compensate for the loss of riparian habitats lost to
30 construction and restoration activities, and considering implementation of AMM1-AMM7, *AMM18*
31 *Swainson's Hawk*, Mitigation Measure BIO-75, and Mitigation Measure BIO-117, the loss of habitat or
32 direct mortality through implementation of Alternative 1A would not result in a substantial adverse
33 effect through habitat modifications and would not substantially reduce the number or restrict the
34 range of cormorants, herons, and egrets. Therefore, the loss of habitat and potential mortality under
35 this alternative would have a less-than-significant impact on cormorants, herons, and egrets.

36 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
37 **Disturbance of Nesting Birds**

38 See Mitigation Measure BIO-75 under Impact BIO-75.

39 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

40 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);
41 therefore, DWR will avoid all direct and indirect impacts on rookeries.

1 **Impact BIO-118: Effects Associated with Electrical Transmission Facilities on Cormorants,**
2 **Herons and Egrets**

3 New transmission lines would increase the risk for bird-power line strikes, which could result in
4 injury or mortality of cormorants, herons and egrets. New transmission lines would increase the
5 risk for bird-power line strikes. Waterbirds have a higher susceptibility to collisions than passerines,
6 raptors, and other birds. Marking transmission lines with flight diverters that make the lines more
7 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
8 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
9 by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines
10 constructed as a result of the project would be fitted with flight diverters, which would reduce bird
11 strike risk of cormorants, herons, and egrets.

12 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
13 could result in injury or mortality of cormorants, herons, and egrets. The implementation of *AMM20*
14 *Greater Sandhill Crane* would require the installation of bird flight diverters on all new transmission
15 lines, which could reduce bird strike risk of cormorants, herons, and egrets by 60%. With the
16 installation of bird flight diverters, the construction and operation of new transmission lines under
17 Alternative 1A would not result in an adverse effect on cormorants, herons, and egrets.

18 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
19 could result in injury or mortality of cormorants, herons, and egrets. The implementation of *AMM20*
20 *Greater Sandhill Crane* would require the installation of bird flight diverters on all new transmission
21 lines, which could reduce bird strike risk of cormorants, herons, and egrets by 60%. With the
22 installation of bird flight diverters, the construction and operation of new transmission lines under
23 Alternative 1A would result in a less-than-significant impact on cormorants, herons, and egrets.

24 **Impact BIO-119: Indirect Effects of Plan Implementation on Cormorants, Herons and Egrets**

25 **Indirect Construction- and Operation-Related Effects:** Construction noise above background
26 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
27 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
28 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
29 the extent to which these noise levels could affect cormorants, herons, or egrets. If cormorants,
30 herons or egrets were to nest in or adjacent to work areas, construction and subsequent
31 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting
32 behaviors, and reduce the functions of suitable nesting habitat for these species. Mitigation Measure
33 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
34 avoid the potential for adverse effects of construction-related activities on survival and productivity
35 of nesting cormorants, herons, and egrets. The use of mechanical equipment during water
36 conveyance facilities construction could cause the accidental release of petroleum or other
37 contaminants that could affect cormorants, herons or egrets in the surrounding habitat. The
38 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an
39 adverse effect on these species. AMM1-AMM7, including *AMM2 Construction Best Management*
40 *Practices and Monitoring*, would minimize the likelihood of such spills and ensure that measures are
41 in place to prevent runoff from the construction area and negative effects of dust on active nests.

42 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
43 mercury in avian species, including cormorants, herons or egrets.

1 A detailed review of the methylmercury issues associated with implementation of the BDCP is
 2 contained in Appendix 11F, *Substantive BDCP Revisions*. This review includes an overview of the
 3 BDCP-related mechanisms that could result in increased mercury in the foodweb, and how exposure
 4 of individual species to mercury may occur based on feeding habits and where their habitat overlaps
 5 with the areas where mercury bioavailability could increase. Mercury is transformed into the more
 6 bioavailable form of methylmercury in aquatic systems, especially areas subjected to regular
 7 wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Bioaccumulation of
 8 methylmercury varies by species as there are taxonomic differences in rates of detoxification within
 9 the liver (Eagles-Smith et al. 2009). Organisms feeding within pelagic-based (algal) foodwebs have
 10 been found to have higher concentrations of methylmercury than those in benthic or epibenthic
 11 food webs; this has been attributed to food chain length and dietary segregation (Grimaldo et al.
 12 2009). That is, the pelagic food chain tends to be longer than the benthic food chain, which allows
 13 for greater biomagnification of methylmercury in top predators. Also, there is less prey diversity at
 14 the top of the pelagic food chain than in the benthic food chain; pelagic top predators eat smaller fish
 15 and little else, while benthic top predators consume a variety of organisms, many of which are lower
 16 in the food chain than fishes and thus have less potential for methylmercury biomagnification.

17 Largemouth bass was used as a surrogate species for analysis (Appendix 11F, *Substantive BDCP*
 18 *Revisions*) and the modeled effects of mercury concentrations from changes in water operations
 19 under CM1 on largemouth bass did not differ substantially from existing conditions; therefore,
 20 results also indicate that cormorant, heron, and egret tissue concentrations would not measurably
 21 increase as a result of CM1 implementation.

22 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to
 23 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
 24 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
 25 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas
 26 could increase bioavailability of mercury. Species sensitivity to methylmercury differs widely and
 27 there is a large amount of uncertainty with respect to species-specific effects. Increased
 28 methylmercury associated with natural community and floodplain restoration could indirectly effect
 29 on cormorants, herons or egrets, via uptake in lower trophic levels (as described in BDCP Appendix
 30 5.D, *Contaminants*). Mercury is generally elevated throughout the Delta, and restoration of the lower
 31 potential areas in total may result in generalized, very low level increases of mercury. Given that
 32 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in
 33 some level of effects. Restoration in Suisun Marsh would convert managed wetlands to tidal
 34 wetlands, which would be expected to result in an overall reduction in mercury methylation.

35 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
 36 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
 37 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
 38 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
 39 adaptive management as described in CM12 would be available to address the uncertainty of
 40 methylmercury levels in restored tidal marsh and potential impacts on cormorants, herons or
 41 egrets.

42 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
 43 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
 44 each restoration project. On a project-specific basis, where high potential for methylmercury
 45 production is identified that restoration design and adaptive management cannot fully address

1 while also meeting restoration objectives, alternate restoration areas would be considered. CM12
2 would be implemented in coordination with other similar efforts to address mercury in the Delta,
3 and specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
4 would include the following actions.

- 5 • Assess pre-restoration conditions to determine the risk that the project could result in increased
6 mercury methylation and bioavailability
- 7 • Define design elements that minimize conditions conducive to generation of methylmercury in
8 restored areas.
- 9 • Define adaptive management strategies that can be implemented to monitor and minimize
10 actual postrestoration creation and mobilization of methylmercury.

11 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
12 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
13 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
14 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
15 2009). The effect of selenium toxicity differs widely between species and also between age and sex
16 classes within a species. In addition, the effect of selenium on a species can be confounded by
17 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
18 2009).

19 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
20 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
21 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
22 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
23 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
24 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
25 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
26 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
27 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
28 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
29 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
30 levels of selenium have a higher risk of selenium toxicity.

31 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
32 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
33 exacerbate bioaccumulation of selenium in avian species, including cormorants, herons, and egrets.
34 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
35 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
36 BDCP restoration activities that create newly inundated areas could increase bioavailability of
37 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
38 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
39 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
40 long-term increases in selenium concentrations in water in the Delta under any alternative.
41 However, it is difficult to determine whether the effects of potential increases in selenium
42 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
43 lead to adverse effects on cormorants, herons, and egrets.

1 Because of the uncertainty that exists at this programmatic level of review, there could be a
2 substantial effect on cormorants, herons, and egrets from increases in selenium associated with
3 restoration activities. This effect would be addressed through the implementation of *AMM27*
4 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
5 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
6 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
7 selenium management to reduce selenium concentrations and/or bioaccumulation would be
8 evaluated separately for each restoration effort as part of design and implementation. This
9 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
10 design schedule.

11 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
12 could reduce cormorant, heron, and egret use of modeled habitat adjacent to work areas. Moreover,
13 operation and maintenance of the water conveyance facilities, including the transmission facilities,
14 could result in ongoing but periodic postconstruction disturbances that could affect cormorant,
15 heron, and egret use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
16 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*
17 *Impacts on Rookeries*, would be available to address potential effects on nesting individuals in
18 addition to AMM1–AMM7. Tidal habitat restoration could result in increased exposure of
19 cormorants, herons, and egrets to selenium. This effect would be addressed through the
20 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
21 restoration design elements to reduce the potential for bioaccumulation of selenium and its
22 bioavailability in tidal habitats.

23 The implementation of tidal natural communities restoration or floodplain restoration could result
24 in increased exposure of cormorants, herons or egrets to methylmercury through the ingestion of
25 fish in restored tidal areas. However, it is unknown what concentrations of methylmercury are
26 harmful to these species and the potential for increased exposure varies substantially within the
27 study area. Implementation of CM12 which contains measures to assess the amount of mercury
28 before project development, followed by appropriate design and adaptation management, would
29 minimize the potential for increased methylmercury exposure, and would result in no adverse effect
30 on cormorants, herons, and egrets.

31 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
32 sedimentation, and operations and maintenance of the water conveyance facilities would represent
33 an adverse effect in the absence of other conservation actions. This impact would be significant.
34 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
35 *Nesting Birds*, Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, and AMM1–AMM7, would
36 reduce this impact to a less-than-significant level.

37 Tidal habitat restoration could result in increased exposure of cormorants, herons, and egrets to
38 selenium which could result in mortality of special-status species. This effect would be addressed
39 through the implementation of *AMM27 Selenium Management*, which would provide specific tidal
40 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its
41 bioavailability in tidal habitats. With implementation of AMM27, potential for increased selenium
42 exposure would result in no adverse effect on the species.

43 The implementation of tidal natural communities restoration or floodplain restoration could result
44 in increased exposure of cormorants, herons or egrets to methylmercury, through the ingestion of

1 fish in tidally restored areas. However, it is unknown what concentrations of methylmercury are
2 harmful to these species. Implementation of CM12 which contains measures to assess the amount of
3 mercury before project development, followed by appropriate design and adaptation management,
4 would minimize the potential for increased methylmercury exposure, and would result in no
5 adverse effect on the species.

6 With AMM1-7, AMM27, and CM12 in place, in addition to the implementation of Mitigation Measure
7 BIO-75 and BIO-117 measures in place, indirect effects of plan implementation would not result in a
8 substantial adverse effect on cormorants, herons, and egrets through habitat modification or
9 potential mortality. Therefore, the indirect effects of Alternative 1A implementation would have a
10 less-than-significant impact on cormorants, herons, and egrets.

11 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
12 **Disturbance of Nesting Birds**

13 See Mitigation Measure BIO-75 under Impact BIO-75.

14 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

15 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);
16 therefore, DWR will avoid all direct and indirect impacts on rookeries.

17 **Impact BIO-120: Periodic Effects of Inundation on Cormorants, Herons and Egrets as a Result**
18 **of Implementation of Conservation Components**

19 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
20 duration of inundation of approximately 51–92 acres of modeled breeding habitat for cormorants,
21 herons and egrets. However, increased periodic flooding is not expected to cause any adverse effect
22 on breeding habitat because trees in which nest sites are situated already withstand floods, the
23 increase in inundation frequency and duration is expected to remain within the range of tolerance of
24 riparian trees, and nest sites are located above floodwaters.

25 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
26 inundation of up to 266 acres of breeding habitat for cormorants, herons and egrets. The overall
27 effect of seasonal inundation in existing riparian natural communities is likely to be beneficial for
28 these species, because, historically, flooding was the main natural disturbance regulating ecological
29 processes in riparian areas, and flooding promotes the germination and establishment of many
30 native riparian plants.

31 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
32 sites because trees in which nest sites are situated already withstand floods, the increase in
33 inundation frequency and duration is expected to remain within the range of tolerance of riparian
34 trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic
35 inundation from CM2 and CM5 would not result in an adverse effect on cormorants, herons and
36 egrets.

37 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
38 nest sites because trees in which nest sites are situated already withstand floods, the increase in
39 inundation frequency and duration is expected to remain within the range of tolerance of riparian
40 trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic

1 inundation from CM2 and CM5 would have a less-than-significant impact on cormorants, herons and
2 egrets.

3 **Short-Eared Owl and Northern Harrier**

4 This section describes the effects of Alternative 1A, including water conveyance facilities
5 construction and implementation of other conservation components, on short-eared owl and
6 northern harrier. Modeled habitat for short-eared owl and northern harrier include tidal brackish
7 and freshwater emergent wetland, nontidal freshwater perennial emergent wetland, managed
8 wetland, other natural seasonal wetland, grassland, alkali seasonal wetland, vernal pool complex,
9 and selected cultivated lands (grain and hay crops, pasture [including alfalfa], rice, truck, nursery,
10 and berry crops [including tomatoes and melons], beets, and idle lands).

11 Construction and restoration associated with Alternative 1A conservation measures would result in
12 both temporary and permanent losses of modeled habitat for short-eared owl and northern harrier
13 as indicated in Table 12-1A-46. Full implementation of Alternative 1A would include the following
14 conservation actions over the term of the BDCP which would also benefit short-eared owl and
15 northern harrier (BDCP Chapter 3, *Conservation Strategy*).

- 16 • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at
17 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
18 with CM4).
- 19 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,
20 and/or 7 (Objective TFEWNC1.2, associated with CM4).
- 21 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
22 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
23 associated with CM10).
- 24 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
25 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
26 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 27 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 28 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
29 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 30 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
31 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 32 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
33 VPNC2.5, and GNC2.4, associated with CM11).

34 As explained below, with the restoration or protection of these amounts of habitat, in addition to
35 management activities that would enhance habitat for these species and implementation of AMM1–
36 AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on short-eared owl
37 and northern harrier would not be adverse for NEPA purposes and would be less than significant for
38 CEQA purposes.

1 **Table 12-1A-46. Changes in Short-Eared Owl and Northern Harrier Modeled Habitat Associated with**
2 **Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting and Foraging	1,707	1,707	876	876	NA	NA
Total Impacts CM1		1,707	1,707	876	876	NA	NA
CM2-CM18	Nesting and Foraging	12,281	46,700	471	1,224	2,926-8,060	5,978
Total Impacts CM2-CM18		12,281	46,700	471	1,224	2,926-8,060	5,978
TOTAL IMPACTS		13,988	48,407	1,347	2,100	2,926-8,060	5,978

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-121: Loss or Conversion of Habitat for and Direct Mortality of Short-Eared Owl**
5 **and Northern Harrier**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss
7 of up to 50,507 acres of modeled habitat for short-eared owl and northern harrier (48,407 acres of
8 permanent loss 2,100 acres of temporary loss, Table 12-1A-46). Conservation measures that would
9 result in these losses are conveyance facilities and transmission line construction, and establishment
10 and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat
11 restoration (CM4), floodplain restoration (CM5), grassland restoration (CM8), vernal pool and
12 wetland restoration (CM9), marsh restoration (CM10) and construction of conservation hatcheries
13 (CM18). The majority of habitat loss would result from CM4. Habitat enhancement and management
14 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,
15 could result in local adverse habitat effects. In addition, maintenance activities associated with the
16 long-term operation of the water conveyance facilities and other BDCP physical facilities could
17 degrade or eliminate short-eared owl and northern harrier modeled habitat. Each of these
18 individual activities is described below. A summary statement of the combined impacts and NEPA
19 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
21 result in the combined permanent and temporary loss of up to 2,583 acres of modeled short-
22 eared owl and northern harrier habitat (1,707 acres of permanent loss, 876 acres of temporary
23 loss) from CZs 3-6 and CZ 8. Activities that would impact modeled habitat consist of tunnel,
24 forebay, and intake construction, temporary access roads, and construction of transmission

1 lines. The majority of habitat removed would consist of grassland and alfalfa fields. There are no
 2 occurrences of nesting short-eared owl and northern harrier that overlap with the construction
 3 footprint of CM1. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
 4 *Avoid Disturbance of Nesting Birds* would require preconstruction surveys and the establishment
 5 of no-disturbance buffers and would be available to address potential effects on short-eared
 6 owls and northern harriers if they were to nest in or adjacent to construction activities. Refer to
 7 the Terrestrial Biology Map Book for a detailed view of Alternative 1A construction locations.
 8 Impacts from CM1 would occur within the first 10 years of Alternative 1A implementation.

- 9 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 10 would permanently remove 1,021 acres of modeled short-eared owl and northern harrier
 11 habitat in the Yolo Bypass in CZ 2. In addition, 471 acres of habitat would be temporarily
 12 removed. The impact would primarily consist of loss of acreages of pastures. The conversion is
 13 expected to occur during the first 10 years of Plan implementation.
- 14 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 15 inundation would permanently remove an estimated 39,017 acres of modeled short-eared owl
 16 and northern harrier habitat. The majority of the losses would be managed wetlands and
 17 cultivated lands in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. Tidal restoration actions through CM4 would
 18 restore an estimated 55,000 acres of tidal natural communities. These restored wetland areas
 19 could provide suitable nesting habitat for short-eared owl and northern harrier. Consequently,
 20 although existing nesting habitat for short-eared owl and northern harrier would be removed,
 21 restoration of wetland habitats is expected to benefit marsh associated ground nesting birds by
 22 increasing the extent and value of their nesting habitat. Grizzley Island supports the only known
 23 resident population of short-eared owls in the Suisun Marsh and Sacramento-San Joaquin River
 24 Delta (Roberson 2008). Grizzley Island does not overlap with the hypothetical footprint for *CM4*
 25 *Tidal Natural Communities Restoration*. However, this is an important breeding area for short-
 26 eared owl and if restoration footprints were changed during the implementation process of
 27 BDCP to overlap with this area, the effects on breeding short-eared owls could likely be adverse.
 28 Future NEPA and CEQA analysis would be conducted for restoration projects under BDCP and if
 29 restoration was proposed to occur outside of the hypothetical footprints used for this
 30 programmatic analysis, potential impacts on these species would be captured in the project-
 31 level analysis (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*).
- 32 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 33 seasonally inundated floodplain would permanently and temporarily remove approximately
 34 2,086 acres of modeled short-eared owl and northern harrier habitat (1,332 permanent, 754
 35 temporary). These losses would be expected to occur along the San Joaquin River and other
 36 major waterways in CZ 7.
- 37 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
 38 approximately 623 acres of short-eared owl and northern harrier habitat as part of tidal
 39 restoration and 2,479 acres of habitat as part of seasonal floodplain restoration.
- 40 ● *CM8 Grassland Natural Community Restoration* Restoration of grassland is expected to be
 41 implemented on agricultural lands and would result in the conversion of 1,066 acres of
 42 cultivated lands to grassland in CZs 1, 2, 4, 5, 7, 8, and 11. The resulting 2,000 acres of grassland
 43 would provide habitat for short-eared owl and northern harrier.
- 44 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
 45 actions included in CM11 that are designed to enhance wildlife values in restored or protected

1 habitats could result in localized ground disturbances that could temporarily remove small
 2 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
 3 vegetation and road and other infrastructure maintenance activities, would be expected to have
 4 minor adverse effects on available habitat and would be expected to result in overall
 5 improvements to and maintenance of habitat values over the term of the BDCP. Habitat
 6 management- and enhancement-related activities could short-eared owl and northern harrier
 7 nests. If either species were to nest in the vicinity of a worksite, equipment operation could
 8 destroy nests, and noise and visual disturbances could lead to their abandonment, resulting in
 9 mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
 10 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize these
 11 potential effects.

- 12 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of short-
 13 eared owl and northern harrier habitat for the development of a delta and longfin smelt
 14 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan
 15 implementation.
- 16 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
 17 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
 18 disturbances that could affect short-eared owl and northern harrier use of the surrounding
 19 habitat. Maintenance activities would include vegetation management, levee and structure
 20 repair, and re-grading of roads and permanent work areas. These effects, however, would be
 21 reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as described
 22 below.
- 23 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
 24 direct mortality of adult or fledged short-eared owl and northern harrier if they were present in
 25 the Plan Area, because they would be expected to avoid contact with construction and other
 26 equipment. If either species were to nest in the construction area, construction-related
 27 activities, including equipment operation, noise and visual disturbances could destroy nests or
 28 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
 29 75 would be available to address these potential effects.

30 The following paragraphs summarize the combined effects discussed above and describe other
 31 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
 32 included.

33 ***Near-Term Timeframe***

34 Because water conveyance facilities construction is being evaluated at the project level, the near-
 35 term BDCP conservation strategy has been evaluated to determine whether it would provide
 36 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
 37 construction would not be adverse under NEPA. The Plan would remove 15,537 acres of modeled
 38 habitat (14,293 permanent, 1,244 temporary) for short-eared owl and northern harrier in the study
 39 area in the near-term. These effects would result from the construction of the water conveyance
 40 facilities (CM1, 2,583 acres), and implementing other conservation measures (*CM2 Yolo Bypass*
 41 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*
 42 *Floodplain Restoration*, *CM7, Riparian Natural Community Restoration*, *CM8 Grassland Natural*
 43 *Community Restoration*, *CM10 Nontidal Marsh Restoration*, and *CM18 Conservation Hatcheries—*
 44 *12,752 acres*).

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
2 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios
3 would indicate that 2,583 acres of habitat should be restored and 2,583 acres should be protected to
4 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term
5 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore
6 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern
7 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 2:1 for
8 protection).

9 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
10 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
11 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
12 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
13 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation
14 actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the
15 construction and early restoration losses.

16 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
17 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
18 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
19 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
20 would provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the
21 effects of current levels of habitat fragmentation. Small mammal populations would also be
22 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
23 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing
24 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders
25 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland
26 or other uncultivated areas would also be protected and maintained as part of the cultivated lands
27 reserve system which would provide additional foraging habitat and a source of rodent prey that
28 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
29 (including upland grassland components) would preserve habitat for short-eared owl and northern
30 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
31 objective would focus on highly degraded areas in order to provide the greatest possible level of
32 enhancement benefit to the managed wetland natural community and associated species. Managed
33 wetland protection and enhancement would be concentrated in Suisun Marsh, which currently
34 supports a high concentration of nesting short-eared owls on Grizzley Island.

35 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would
36 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and
37 northern harrier nest in tidal brackish and freshwater emergent wetland, nontidal freshwater
38 perennial emergent wetland, managed wetland, other natural seasonal wetland, grassland, alkali
39 seasonal wetland, vernal pool complex, and selected cultivated lands, which includes alfalfa,
40 irrigated pasture, and other grain fields. At least 15,400 acres of cultivated lands that provide
41 habitat for covered and other native wildlife species would be protected in the near-term time
42 period (Objective CLNC1.1). A minimum of 87% of cultivated lands protected by the late long-term
43 time period would be in alfalfa, irrigated pasture, and other hay crops (Objective SH1.2). This
44 biological objective provides an estimate for the proportion of cultivated lands protected in the
45 near-term time period which would provide suitable nesting and foraging habitat for short-eared
46 owl and northern harrier. These biological goals and objectives would inform the near-term

1 protection and restoration efforts and represent performance standards for considering the
2 effectiveness of restoration actions.

3 The acres of protection and restoration contained in the near-term Plan goals satisfy the typical
4 mitigation ratios that would be applied to the project-level effects of CM1 and the near-term effects
5 of other conservation actions. The impacts from other near-term conservation actions would be
6 compensated for with tidal and grassland restoration and some portion of the protection of
7 cultivated lands, in addition to management activities initiated through CM3 and CM11.

8 The Plan also includes commitments to implement AMM1 Worker Awareness Training, AMM2
9 Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention
10 Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and
11 Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of
12 these AMMs include elements that avoid or minimize the risk of affecting habitats and species
13 adjacent to work areas and disposal sites. BDCP Appendix 3.C describes the AMMs, which have since
14 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
15 of the Final EIR/EIS. Short-eared owl and northern harrier are not covered species under the BDCP.
16 In order for the BDCP to have a less than adverse effect on individuals, preconstruction surveys for
17 noncovered avian species would be required to ensure that nests are detected and avoided.
18 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
19 *Nesting Birds*, would be available to address this effect.

20 **Late Long-Term Timeframe**

21 The study area supports approximately 406,784 acres of modeled habitat for short-eared owl and
22 northern harrier. Alternative 1A as a whole would result in the permanent loss of and temporary
23 effects on 50,507 acres of modeled short-eared owl and northern harrier habitat during the term of
24 the Plan (12% of the modeled habitat in the study area). The locations of these losses are described
25 above in the analyses of individual conservation measures.

26 The Plan includes conservation commitments through CM3 Natural Communities Protection and
27 Restoration, CM4 Tidal Natural Communities Restoration, and CM8 Grassland Natural Communities
28 Restoration, to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
29 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect
30 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable
31 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in
32 Chapter 3).

33 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
34 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
35 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
36 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
37 would provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the
38 effects of current levels of habitat fragmentation. Small mammal populations would also be
39 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
40 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing
41 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders
42 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland
43 or other uncultivated areas would also be protected and maintained as part of the cultivated lands
44 reserve system which would provide additional foraging habitat and a source of rodent prey that

1 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
 2 (including upland grassland components) would preserve habitat for short-eared owl and northern
 3 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
 4 objective would focus on highly degraded areas in order to provide the greatest possible level of
 5 enhancement benefit to the managed wetland natural community and associated species. Managed
 6 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
 7 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the
 8 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time
 9 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands
 10 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared
 11 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated
 12 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected
 13 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated
 14 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 19 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 20 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 21 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 22 of the Final EIR/EIS. Short-eared owl and northern harrier are not species that are covered under
 23 the BDCP. For the BDCP not to have an adverse effect on individuals, preconstruction surveys for
 24 noncovered avian species would be required to ensure that active nests are detected and avoided.
 25 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
 26 *Nesting Birds*, would be available to address this effect.

27 **NEPA Effects:** The loss of short-eared owl and northern harrier habitat and potential for direct
 28 mortality of these special-status species under Alternative 1A would represent an adverse effect in
 29 the absence of other conservation actions. With habitat protection and restoration associated with
 30 CM3, CM8, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would
 31 be in place during all project activities, the effects of habitat loss resulting from Alternative 1A
 32 would not be adverse. Short-eared owl and northern harrier are not covered species under the
 33 BDCP and preconstruction surveys for noncovered avian species would be required to ensure that
 34 nests are detected and avoided. Mitigation Measure BIO-75 would be available to address the effect
 35 of direct mortality on short-eared owl and northern harrier.

36 **CEQA Conclusion:**

37 **Near-Term Timeframe**

38 Because the water conveyance facilities construction is being evaluated at the project level, the near-
 39 term BDCP conservation strategy has been evaluated to determine whether it would provide
 40 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
 41 construction would be less than significant. The Plan would remove 15,537 acres of modeled habitat
 42 (14,293 permanent, 1,244 temporary) for short-eared owl and northern harrier in the study area in
 43 the near-term. These effects would result from the construction of the water conveyance facilities
 44 (CM1, 2,583 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*

1 *Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*
2 *Restoration, CM7, Riparian Natural Community Restoration, CM8 Grassland Natural Community*
3 *Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation Hatcheries—12,752 acres).*

4 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
5 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios
6 would indicate that 2,583 acres of habitat should be restored and 2,583 acres should be protected to
7 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term
8 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore
9 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern
10 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 2:1 for
11 protection).

12 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
13 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
14 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
15 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
16 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation
17 actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the
18 construction and early restoration losses.

19 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
20 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
21 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
22 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
23 would provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the
24 effects of current levels of habitat fragmentation. Small mammal populations would also be
25 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
26 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing
27 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders
28 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland
29 or other uncultivated areas would also be protected and maintained as part of the cultivated lands
30 reserve system which would provide additional foraging habitat and a source of rodent prey that
31 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
32 (including upland grassland components) would preserve habitat for short-eared owl and northern
33 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
34 objective would focus on highly degraded areas in order to provide the greatest possible level of
35 enhancement benefit to the managed wetland natural community and associated species. Managed
36 wetland protection and enhancement would be concentrated in Suisun Marsh, which currently
37 supports a high concentration of nesting short-eared owls on Grizzley Island.

38 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would
39 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and
40 northern harrier nest in tidal brackish and freshwater emergent wetland, nontidal freshwater
41 perennial emergent wetland, managed wetland, other natural seasonal wetland, grassland, alkali
42 seasonal wetland, vernal pool complex, and selected cultivated lands, which includes alfalfa,
43 irrigated pasture, and other grain fields. At least 15,400 acres of cultivated lands that provide
44 habitat for covered and other native wildlife species would be protected in the near-term time
45 period (Objective CLNC1.1). A minimum of 87% of cultivated lands protected by the late long-term

1 time period would be in alfalfa, irrigated pasture, and other hay crops (Objective SH1.2). This
2 biological objective provides an estimate for the proportion of cultivated lands protected in the
3 near-term time period which would provide suitable nesting and foraging habitat for short-eared
4 owl and northern harrier. These biological goals and objectives would inform the near-term
5 protection and restoration efforts and represent performance standards for considering the
6 effectiveness of restoration actions.

7 The acres of protection and restoration contained in the near-term Plan goals satisfy the typical
8 mitigation ratios that would be applied to the project-level effects of CM1 and the near-term effects
9 of other conservation actions. The impacts from other near-term conservation actions would be
10 compensated for with tidal and grassland restoration and some portion of the protection of
11 cultivated lands, in addition to management activities initiated through CM3 and CM11. The Plan
12 also includes commitments to implement AMM1 Worker Awareness Training, AMM2 Construction
13 Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4
14 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan,
15 AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of these AMMs include
16 elements that avoid or minimize the risk of affecting habitats and species adjacent to work areas and
17 disposal sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which
18 are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.
19 Short-eared owl and northern harrier are not covered species under the BDCP. For the BDCP to have
20 a less-than-significant impact on individuals, preconstruction surveys for noncovered avian species
21 would be required to ensure that nests are detected and avoided. The implementation of Mitigation
22 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
23 *Birds*, would reduce impacts on nesting short-eared owl and northern harrier to a less-than-
24 significant level.

25 **Late Long-Term Timeframe**

26 The study area supports approximately 406,784 acres of modeled habitat for short-eared owl and
27 northern harrier. Alternative 1A as a whole would result in the permanent loss of and temporary
28 effects on 50,507 acres of modeled short-eared owl and northern harrier habitat during the term of
29 the Plan (12% of the modeled habitat in the study area). The locations of these losses are described
30 above in the analyses of individual conservation measures.

31 The Plan includes conservation commitments through CM3 *Natural Communities Protection and*
32 *Restoration*, CM4 *Tidal Natural Communities Restoration*, and CM8 *Grassland Natural Communities*
33 *Restoration*, to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
34 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect
35 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable
36 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in
37 Chapter 3).

38 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
39 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
40 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
41 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
42 would provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the
43 effects of current levels of habitat fragmentation. Small mammal populations would also be
44 increased on protected lands, enhancing the foraging value of these natural communities (Objectives

1 ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing
2 prey populations through the establishment of 20- to 30-foot-wide hedgerows along field borders
3 and roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland
4 or other uncultivated areas would also be protected and maintained as part of the cultivated lands
5 reserve system which would provide additional foraging habitat and a source of rodent prey that
6 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
7 (including upland grassland components) would preserve habitat for short-eared owl and northern
8 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
9 objective would focus on highly degraded areas in order to provide the greatest possible level of
10 enhancement benefit to the managed wetland natural community and associated species. Managed
11 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
12 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the
13 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time
14 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands
15 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared
16 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated
17 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected
18 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated
19 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
24 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
25 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
26 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
27 of the Final EIR/EIS. Short-eared owl and northern harrier are not species that are covered under
28 the BDCP. For the BDCP to have a less-than-significant impact on individuals, preconstruction
29 surveys for noncovered avian species would be required to ensure that active nests are detected and
30 avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
31 *Disturbance of Nesting Birds*, would be reduce the impact to a less-than-significant level.

32 In the absence of other conservation actions, effects on short-eared owl and northern harrier would
33 represent an adverse effect as a result of habitat modification and potential for direct mortality of
34 special-status species. This impact would be considered significant. Considering Alternative 1A's
35 protection and restoration provisions, which would provide acreages of new high-value or enhanced
36 habitat in amounts suitable to compensate for habitats lost to construction and restoration
37 activities, and with the implementation of AMM1–AMM7 and Mitigation Measure BIO-75, the loss of
38 habitat or direct mortality through implementation of Alternative 1A would not result in a
39 substantial adverse effect through habitat modifications and would not substantially reduce the
40 number or restrict the range of either species. Therefore, the loss of habitat or potential mortality
41 under this alternative would have a less-than-significant impact on short-eared owl and northern
42 harrier.

43 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
44 **Disturbance of Nesting Birds**

45 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-122: Effects on Short-Eared Owl and Northern Harrier Associated with Electrical**
2 **Transmission Facilities**

3 New transmission lines would increase the risk that short-eared owl and northern harrier could be
4 subject to power line strikes, which could result in injury or mortality of these species. Short-eared
5 owl and northern harrier would be at low risk of bird strike mortality based on their keen eyesight
6 and largely ground-based foraging behavior (BDCP Attachment 5.J-2, *Memorandum: Analysis of*
7 *Potential Bird Collisions at Proposed BDCP Transmission Lines*). The existing network of transmission
8 lines in the project area currently poses the same small risk for these species, and any incremental
9 risk associated with the new power line corridors would also be expected to be low. Marking
10 transmission lines with flight diverters that make the lines more visible to birds has been shown to
11 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
12 marking devices in the Central Valley could reduce avian mortality by 60%. With the
13 implementation of *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted
14 with flight diverters, which would further reduce any bird strike risk of short-eared owl and
15 northern harrier.

16 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
17 adverse effect on short-eared owl or northern harrier because the risk of bird strike is considered to
18 be low for both species based on their keen eyesight and behavioral characteristics. New
19 transmission lines would minimally increase the risk for short-eared owl and northern harrier
20 power line strikes. All new transmission lines constructed for the project would be fitted with bird
21 diverters (*AMM20 Greater Sandhill Crane*), which have been shown to reduce avian mortality by
22 60%, which would further reduce any potential for powerline collisions. Therefore, the construction
23 and operation of transmission lines under Alternative 1A would not result in an adverse effect on
24 short-eared owl or northern harrier.

25 **CEQA Conclusion:** The construction and presence of new transmission lines would not result in a
26 significant impact on short-eared owl or northern harrier because the risk of bird strike is
27 considered to be low for both species based on their keen eyesight and behavioral characteristics.
28 New transmission lines would minimally increase the risk for short-eared owl and northern harrier
29 power line strikes. All new transmission lines constructed as a result of the project would be fitted
30 with bird diverters (*AMM20 Greater Sandhill Crane*), which have been shown to reduce avian
31 mortality by 60% and which would further reduce any potential for powerline collisions. Therefore,
32 the construction and operation of transmission lines under Alternative 1A would result in a less-
33 than-significant impact on short-eared owl or northern harrier.

34 **Impact BIO-123: Indirect Effects of Plan Implementation on Short-Eared Owl and Northern**
35 **Harrier**

36 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
37 with construction-related activities could result in temporary disturbances that affect short-eared
38 owl and northern harrier use of modeled habitat. Construction noise above background noise levels
39 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
40 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
41 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
42 which these noise levels could affect short-eared owl or northern harrier. Indirect effects associated
43 with construction include noise, dust, and visual disturbance caused by grading, filling, contouring,
44 and other ground-disturbing operations. Construction-related noise and visual disturbances could

1 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could
 2 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*
 3 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize
 4 potential effects on active nests. The use of mechanical equipment during water conveyance
 5 construction could cause the accidental release of petroleum or other contaminants that could affect
 6 these species or their prey in the surrounding habitat. AMM1–AMM7, including, *AMM2 Construction*
 7 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills. The
 8 inadvertent discharge of sediment or excessive dust adjacent to short-eared owl and northern
 9 harrier could also have a negative effect on these species. AMM1–AMM7 would ensure that
 10 measures are in place to prevent runoff from the construction area and the negative effects of dust
 11 on wildlife adjacent to work areas.

12 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
 13 mercury in avian species, including short-eared owl and northern harrier. Marsh (tidal and nontidal)
 14 and floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
 15 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
 16 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
 17 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
 18 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity
 19 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-
 20 specific effects. Increased methylmercury associated with natural community and floodplain
 21 restoration could indirectly affect short-eared owl and northern harrier, via uptake in lower trophic
 22 levels (as described in BDCP Appendix 5.D, *Contaminants*).

23 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
 24 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
 25 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
 26 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
 27 adaptive management as described in CM12 would be available to address the uncertainty of
 28 methylmercury levels in restored tidal marsh and potential impacts on short-eared owl and
 29 northern harrier.

30 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 31 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 32 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 33 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 34 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 35 classes within a species. In addition, the effect of selenium on a species can be confounded by
 36 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 37 2009).

38 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 39 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 40 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 41 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 42 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 43 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 44 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 45 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are

1 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 2 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
 3 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 4 levels of selenium have a higher risk of selenium toxicity.

5 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 6 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 7 exacerbate bioaccumulation of selenium in avian species, including short-eared owl and northern
 8 harrier. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
 9 selenium, and therefore increase avian exposure from ingestion of prey items with elevated
 10 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase
 11 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).
 12 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was
 13 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
 14 in substantial, long-term increases in selenium concentrations in water in the Delta under any
 15 alternative. However, it is difficult to determine whether the effects of potential increases in
 16 selenium bioavailability associated with restoration-related conservation measures (CM4–CM5)
 17 would lead to adverse effects on short-eared owl and northern harrier.

18 Because of the uncertainty that exists at this programmatic level of review, there could be a
 19 substantial effect on short-eared owl and northern harrier from increases in selenium associated
 20 with restoration activities. This effect would be addressed through the implementation of *AMM27*
 21 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 22 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
 23 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
 24 selenium management to reduce selenium concentrations and/or bioaccumulation would be
 25 evaluated separately for each restoration effort as part of design and implementation. This
 26 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
 27 design schedule.

28 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
 29 could reduce short-eared owl and northern harrier use of modeled habitat adjacent to work areas.
 30 Moreover, operation and maintenance of the water conveyance facilities, including the transmission
 31 facilities, could result in ongoing but periodic postconstruction disturbances that could affect short-
 32 eared owl and northern harrier use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*
 33 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
 34 address potential effects on nesting individuals in addition to AMM1–AMM7. Tidal habitat
 35 restoration could result in increased exposure of short-eared owl and northern harrier to
 36 bioavailable selenium. This effect would be addressed through the implementation of *AMM27*
 37 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 38 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

39 Tidal habitat restoration is unlikely to have an adverse effect on short-eared owl and northern
 40 harrier through increased exposure to methylmercury, as these species currently nest and forage in
 41 tidal marshes where elevated methylmercury levels exist. However, it is unknown what
 42 concentrations of methylmercury are harmful to the species and the potential for increased
 43 exposure varies substantially within the study area. Site-specific restoration plans in addition to
 44 monitoring and adaptive management, described in CM12 *Methylmercury Management*, would
 45 address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning

1 phase of marsh restoration would be the appropriate place to assess the potential for risk of
2 methylmercury exposure for short-eared owl and northern harrier, once site specific sampling and
3 other information could be developed.

4 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
5 operations and maintenance of the water conveyance facilities would have a less-than-significant
6 impact on short-eared owl and northern harrier with the implementation of Mitigation Measure
7 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds* and
8 AMM1–AMM7. Tidal habitat restoration is unlikely to have a significant impact on short-eared owl
9 and northern harrier through increased exposure to methylmercury, as these species currently nest
10 and forage in tidal marshes where elevated methylmercury levels exist. However, it is unknown
11 what concentrations of methylmercury are harmful to these species. Site-specific restoration plans
12 that address the creation and mobilization of mercury, as well as monitoring and adaptive
13 management as described in CM12 would better inform potential impacts and address the
14 uncertainty of methylmercury levels in restored tidal marsh in the study area. Tidal habitat
15 restoration could result in increased exposure of short-eared owl and northern harrier to
16 bioavailable selenium. This effect would be addressed through the implementation of *AMM27*
17 *Selenium Management* which would provide specific tidal habitat restoration design elements to
18 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats.
19 Therefore, the indirect effects of Alternative 1A implementation would not have a significant impact
20 on short-eared owl and northern harrier.

21 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
22 **Disturbance of Nesting Birds**

23 See Mitigation Measure BIO-75 under Impact BIO-75.

24 **Impact BIO-124: Periodic Effects of Inundation on Short-Eared Owl and Northern Harrier as a**
25 **Result of Implementation of Conservation Components**

26 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
27 *Enhancement*) would increase the frequency and duration of inundation on approximately 946–
28 2,445 acres of modeled short-eared owl and northern harrier habitat (Table 12-1A-46).

29 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
30 *Restoration* could result in the periodic inundation of up to approximately 2,878 acres of modeled
31 habitat (Table 12-1A-46), the majority of which would be pasture and other cultivated lands.

32 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
33 season due to periodic inundation. However, inundation would occur during the nonbreeding
34 season and would not be expected to have an adverse effect on either species.

35 **NEPA Effects:** Increased frequency and duration of inundation of short-eared owl and northern
36 harrier habitat as a result of CM2 and CM5 implementation would not have an adverse effect
37 because inundation would occur during the nonbreeding season.

38 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on short-
39 eared owl and northern harrier because inundation is expected to occur prior to the breeding
40 season.

1 **Redhead and Tule Greater White-Fronted Goose**

2 Impacts, relevant protection and restoration actions, and mitigation requirements under CEQA are
3 discussed for these species in the *General Terrestrial Biology Effects* section under Impacts BIO-178
4 through BIO-183. Further details of the methods of analysis for waterfowl and shorebirds can be
5 found in the *BDCP Waterfowl and Shorebird Effects Analysis* (Ducks Unlimited 2013).

6 **Mountain Plover**

7 This section describes the effects of Alternative 1A, including water conveyance facilities
8 construction and implementation of other conservation components, on mountain plover. Modeled
9 habitat for mountain plover include grassland, alkali seasonal wetland, vernal pool complex, alfalfa,
10 grain and hay, pasture, and idle cropland throughout the study area.

11 Construction and restoration associated with Alternative 1A conservation measures would result in
12 both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table
13 12-1A-47. Full implementation of Alternative 1A would include the following biological objectives
14 over the term of the BDCP which would also benefit the mountain plover (BDCP Chapter 3,
15 *Conservation Strategy*).

- 16 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
17 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
18 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 19 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 20 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
21 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 22 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
23 VPNC2.5, GNC2.4, associated with CM11).
- 24 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
25 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 26 • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
27 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value
28 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

29 As explained below, with the restoration or protection of these amounts of habitat, in addition to
30 management activities that would enhance these natural communities for the species, impacts on
31 mountain plover would not be adverse for NEPA purposes and would be less than significant for
32 CEQA purposes.

1 **Table 12-1A-47. Changes in Mountain Plover Modeled Habitat Associated with Alternative 1A**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Wintering	1,660	1,660	673	673	NA	NA
Total Impacts CM1		1,660	1,660	673	673	NA	NA
CM2–CM18	Wintering	5,450	26,198	376	893	1,158–3,650	3,823
Total Impacts CM2–CM18		5,450	26,198	376	893	1,158–3,650	3,823
TOTAL IMPACTS		7,110	27,858	1,049	1,566	1,158–3,650	3,823

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-125: Loss or Conversion of Habitat for and Direct Mortality of Mountain Plover**

5 Alternative 1A conservation measures would result in the combined permanent and temporary loss
6 of up to 29,424 acres of modeled habitat for mountain plover (27,858 acres of permanent loss and
7 1,566 of temporary loss, Table 12-1A-47). Conservation measures that would result in these losses
8 are conveyance facilities and transmission line construction, and establishment and use of borrow
9 and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4),
10 floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), vernal pool
11 and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of
12 conservation hatcheries (CM18). The majority of habitat loss (20,880 acres) would result from CM4.
13 Habitat enhancement and management activities (CM11), which include ground disturbance or
14 removal of nonnative vegetation, and the construction of recreational trails, signs, and facilities,
15 could result in local adverse habitat effects. In addition, maintenance activities associated with the
16 long-term operation of the water conveyance facilities and other BDCP physical facilities could
17 degrade or eliminate mountain plover modeled wintering habitat. Each of these individual activities
18 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA
19 conclusion follows the individual conservation measure discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
21 result in the combined permanent and temporary loss of up to 2,333 acres of modeled mountain
22 plover habitat (1,660 acres of permanent loss, 673 acres of temporary loss) from CZs 3–6 and CZ
23 8. The majority of habitat affected would be cultivated lands and grassland that would be
24 removed from CZ 8, from the construction of the new forebay and the potential borrow and
25 spoils site southwest of the proposed forebay. Some of the grassland habitat lost in CZ 8 is
26 composed of larger stands of ruderal and herbaceous vegetation and California annual

1 grassland, which provides wintering habitat for the species. There are no CNDDDB occurrences of
 2 mountain plover that intersect with the CM1 footprint. However, the study area does overlap
 3 with the species' winter range, and there are occurrences west and north of the study area.
 4 Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1A construction
 5 locations. Impacts from CM1 would occur within the first 10 years of Alternative 1A
 6 implementation.

- 7 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 8 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
 9 mountain plover wintering habitat (898 acres of permanent loss, 376 acres of temporary loss) in
 10 the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of grassland and pasture.
 11 Most of the grassland losses would occur at the north end of the bypass below Fremont Weir,
 12 along the Toe Drain/Tule Canal, and along the west side channels. Realignment of Putah Creek
 13 could also involve excavation and grading in alkali seasonal wetland complex habitat as a new
 14 channel is constructed. The loss is expected to occur during the first 10 years of Plan
 15 implementation.
- 16 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 17 inundation would permanently remove an estimated 20,880 acres of modeled mountain plover
 18 habitat. The majority of the acres lost would consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or
 19 7. Grassland losses would likely occur in the vicinity of Cache Slough, on Decker Island in the
 20 West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow bands adjacent to
 21 waterways in the South Delta ROA. Tidal restoration would directly impact and fragment
 22 grassland just north of Rio Vista in and around French and Prospect Islands, and in an area
 23 south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex habitat
 24 would likely occur in the south end of the Yolo Bypass and on the northern fringes of Suisun
 25 Marsh.
- 26 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 27 seasonally inundated floodplain would permanently and temporarily remove approximately
 28 1,450 acres of modeled mountain plover habitat (933 permanent, 517 temporary). These losses
 29 would be expected after the first 10 years of Alternative 1A implementation along the San
 30 Joaquin River and other major waterways in CZ 7.
- 31 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
 32 approximately 370 acres of mountain plover wintering habitat as part of tidal restoration and
 33 1,489 acres of habitat as part of seasonal floodplain restoration.
- 34 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
 35 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
 36 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
 37 would be restored after the construction periods. Grassland restoration would be implemented
 38 on agricultural lands that also provide wintering habitat for mountain plover and would result
 39 in the conversion of 837 acres of cultivated lands to grassland.
- 40 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
 41 removal of 705 acres of mountain plover habitat.
- 42 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
 43 actions included in CM11 that are designed to enhance wildlife values in restored or protected
 44 habitats could result in localized ground disturbances that could temporarily remove small

1 amounts of mountain plover habitat. Ground-disturbing activities, such as removal of nonnative
2 vegetation and road and other infrastructure maintenance activities, would be expected to have
3 minor adverse effects on available mountain plover habitat. CM11 would also include the
4 construction of recreational-related facilities including trails, interpretive signs, and picnic
5 tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of
6 trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
7 disturbed areas when and where possible. However, approximately 50 acres of grassland
8 habitat would be lost from the construction of trails and facilities.

- 9 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
10 modeled mountain plover habitat for the development of a delta and longfin smelt conservation
11 hatchery in CZ 1.
- 12 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
13 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
14 disturbances that could affect mountain plover use of the surrounding habitat. Maintenance
15 activities would include vegetation management, levee and structure repair, and re-grading of
16 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7
17 and conservation actions as described below.
- 18 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
19 mountain plover because foraging individuals would be expected to temporarily avoid the
20 increased noise and activity associated with construction areas.

21 The following paragraphs summarize the combined effects discussed above and describe other
22 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
23 included.

24 ***Near-Term Timeframe***

25 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
26 the near-term BDCP conservation strategy has been evaluated to determine whether it would
27 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
28 effects of construction would not be adverse under NEPA. The Plan would remove 8,167 acres
29 (7,110 permanent, 1,049 temporary) of modeled mountain plover wintering habitat in the study
30 area in the near-term. These effects would result from the construction of the water conveyance
31 facilities (CM1, 2,333 acres), and implementing other conservation measures (*CM2 Yolo Bypass*
32 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*
33 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*
34 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*
35 and *CM18 Conservation Hatcheries*—5,826 acres).

36 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
37 would be 2:1 for protection of habitat. Using this ratio would indicate that 4,666 acres should be
38 protected to compensate for the CM1 losses of 2,333 acres of mountain plover wintering habitat.
39 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,
40 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical
41 NEPA and CEQA ratio (2:1 for protection).

42 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
43 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of

1 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
 2 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
 3 in the same timeframe as the construction and early restoration losses thereby avoiding adverse
 4 effects of habitat loss on mountain plover wintering in the study area. Grassland restoration and
 5 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland
 6 protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and alkali seasonal wetland
 7 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
 8 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand
 9 mountain plover wintering habitat and reduce the effects of current levels of habitat fragmentation.
 10 Under *CM11 Natural Communities Enhancement and Management*, insect prey populations would be
 11 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
 12 ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other
 13 native wildlife species would provide approximately 15,400 acres of potential wintering habitat for
 14 mountain plover (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late
 15 long-term time period would be in alfalfa and pasture crop types (very high- and high-value crop
 16 types) for Swainson's hawk (Objective SH1.2) which are also modeled habitat for wintering
 17 mountain plover. This biological objective provides an estimate for the high proportion of cultivated
 18 lands protected in the near-term time period which would be suitable for mountain plover.

19 The acres of restoration and protection contained in the near-term Plan goals and the additional
 20 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
 21 level effects of CM1 on mountain plover, as well as mitigate the near-term effects of the other
 22 conservation measures with the consideration that some portion of the 15,400 acres of cultivated
 23 lands protected in the near-term timeframe would be managed in suitable crop types to compensate
 24 for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-125, *Compensate for the Near-Term*
 25 *Loss of Mountain Plover Wintering Habitat*, would be available to address the effect of habitat loss in
 26 the near-term.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 31 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 32 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 33 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 34 of the Final EIR/EIS.

35 **Late Long-Term Timeframe**

36 Based on the habitat model, the study area supports approximately 269,411 acres of potential
 37 habitat for mountain plover. Alternative 1A as a whole would result in the permanent loss of and
 38 temporary effects on 29,424 acres of modeled mountain plover wintering habitat during the term of
 39 the Plan. The locations of these losses are described above in the analyses of individual conservation
 40 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
 41 *Protection and Restoration*, *CM8 Grassland Natural Communities Restoration*, and *CM9 Vernal Pool*
 42 *and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
 43 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
 44 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
 45 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would

1 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, CZ
 2 8, and CZ 11 would be associated with vernal pool and alkali seasonal wetland complexes
 3 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali
 4 seasonal wetland, and vernal pool natural communities which would expand habitat for mountain
 5 plover and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*
 6 *Communities Enhancement and Management*, insect prey populations would be increased on
 7 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
 8 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife
 9 species would provide approximately 15,400 acres of potential wintering habitat for mountain
 10 plover (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in
 11 alfalfa and pasture crop types (very high- and high-value crop types) for Swainson’s hawk (Objective
 12 SH1.2) which would also provide potential wintering habitat for mountain plover.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 16 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 17 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 18 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 19 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 20 of the Final EIR/EIS.

21 **NEPA Effects:** The loss of mountain plover habitat and potential for mortality of this special-status
 22 species under Alternative 1A would represent an adverse effect in the absence of other conservation
 23 actions. With habitat protection and restoration associated with CM3, CM8, CM9, and CM11, guided
 24 by biological goals and objectives and by AMM1–AMM7, which would be in place during all project
 25 activities, and with implementation of Mitigation Measure BIO-125, *Compensate for the Near-Term*
 26 *Loss of Mountain Plover Wintering Habitat*, the effects of habitat loss and potential direct mortality
 27 on mountain plover under Alternative 1A would not be adverse.

28 **CEQA Conclusion:**

29 **Near-Term Timeframe**

30 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 31 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 32 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 33 effects of construction would be less than significant under CEQA. The Plan would remove 8,167
 34 acres (7,110 permanent, 1,049 temporary) of modeled mountain plover wintering habitat in the
 35 study area in the near-term. These effects would result from the construction of the water
 36 conveyance facilities (CM1, 2,333 acres), and implementing other conservation measures (*CM2 Yolo*
 37 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*
 38 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*
 39 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*
 40 and *CM18 Conservation Hatcheries*—5,826 acres).

41 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
 42 would be 2:1 for protection of habitat. Using this ratio would indicate that 4,666 acres should be
 43 protected to compensate for the CM1 losses of 2,333 acres of mountain plover wintering habitat.
 44 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,

1 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical
2 NEPA and CEQA ratio (2:1 for protection).

3 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
4 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
5 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
6 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
7 in the same timeframe as the construction and early restoration losses thereby avoiding significant
8 impacts of habitat loss on mountain plover. Grassland restoration and protection would occur in CZs
9 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs1, 8, and 11 would
10 be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
11 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
12 pool natural communities which would expand wintering habitat for mountain plover and reduce
13 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
14 *Enhancement and Management*, insect prey populations would be increased on protected lands,
15 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
16 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would
17 provide approximately 15,400 acres of potential wintering habitat for mountain plover (Objective
18 CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time period would
19 be in alfalfa and pasture crop types (very high- and high-value crop types) for Swainson's hawk
20 (Objective SH1.2) which would also provide potential habitat for mountain plover wintering in the
21 study area. This biological objective provides an estimate for the high proportion of cultivated lands
22 protected in the near-term time period which would provide habitat for mountain plover.

23 These Plan objectives represent performance standards for considering the effectiveness of
24 conservation actions. The acres of restoration and protection contained in the near-term Plan goals
25 and the additional detail in the biological objectives satisfy the typical mitigation that would be
26 applied to the project-level effects of CM1 on mountain plover, as well as mitigate the near-term
27 effects of the other conservation measures with the consideration that some portion of the 15,400
28 acres of cultivated lands protected in the near-term timeframe would be managed in suitable crop
29 types to compensate for the loss of habitat at a ratio of 2:1. The implementation of Mitigation
30 Measure BIO-125, *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, would
31 reduce the impact of habitat loss in the near-term to a less-than-significant level.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
36 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
37 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
38 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
39 of the Final EIR/EIS.

40 **Late Long-Term Timeframe**

41 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 29,424
42 acres of mountain plover habitat during the term of the Plan (11% of the total habitat in the study
43 area). The locations of these losses are described above in the analyses of individual conservation
44 measures. The Plan includes conservation commitments through *CM3 Natural Communities*

1 *Protection and Restoration, CM8 Grassland Natural Communities Restoration, and CM9 Vernal Pool*
2 *and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
3 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
4 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
5 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would
6 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, CZ
7 8, and CZ 11 would be associated with vernal pool and alkali seasonal wetland complexes
8 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali
9 seasonal wetland, and vernal pool natural communities which would expand wintering habitat for
10 mountain plover and reduce the effects of current levels of habitat fragmentation. Under *CM11*
11 *Natural Communities Enhancement and Management*, insect prey populations would be increased on
12 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
13 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife
14 species would provide approximately 15,400 acres of potential habitat for mountain plover
15 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa
16 and pasture crop types (very high- and high-value crop types) for Swainson's hawk (Objective
17 SH1.2) which would also provide habitat for mountain plover.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
19 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
20 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
21 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
22 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
23 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
24 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
25 of the Final EIR/EIS.

26 In the absence of other conservation actions, effects on mountain plover would represent an adverse
27 effect as a result of habitat modification and potential for direct mortality of special-status species.
28 This impact would be considered significant. Considering Alternative 1A's protection and
29 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
30 suitable to compensate for habitats lost to construction and restoration activities, and with the
31 implementation of AMM1-AMM7, and Mitigation Measure BIO-125, *Compensate for the Near-Term*
32 *Loss of Mountain Plover Wintering Habitat*, the loss of habitat or direct mortality through
33 implementation of Alternative 1A would not result in a substantial adverse effect through habitat
34 modifications and would not substantially reduce the number or restrict the range of mountain
35 plover. Therefore, the loss of habitat or potential mortality under this alternative would have a less-
36 than-significant impact on mountain plover.

37 **Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover** 38 **Wintering Habitat**

39 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
40 crops, or alfalfa to provide habitat for mountain plover such that the total acres of high-value
41 habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1. Additional grassland
42 protection, enhancement, and management may be substituted for the protection of high-value
43 cultivated lands.

1 **Impact BIO-126: Effects on Mountain Plover Associated with Electrical Transmission**
2 **Facilities**

3 Mountain plovers congregate in flocks during the winter and travel between grasslands and
4 cultivated lands that provide foraging habitat for the species. This flocking behavior puts them at
5 risk of collisions with powerlines. However, plovers exhibit low wing loading and high aspect-ratio
6 wings and as a result can maneuver relatively quickly around an obstacle such as a transmission
7 line. Their wing structure and design allow for rapid flight and quick, evasive actions. Marking
8 transmission lines with flight diverters that make the lines more visible to birds has been shown to
9 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
10 marking devices in the Central Valley could reduce avian mortality by 60%. Plovers are primarily
11 visual foragers and therefore, the risk for collision would be further reduced by *AMM20 Greater*
12 *Sandhill Crane*, which would require the installation of bird flight diverters on all new transmission
13 lines in the study area.

14 **NEPA Effects:** New transmission lines are not expected to have an adverse effect on mountain plover
15 because the probability of bird-powerline strikes is highly unlikely due to their flight behaviors. The
16 implementation of *AMM20 Greater Sandhill Crane* would require the installation of bird flight
17 diverters on all new transmission lines, which would further reduce any potential for mortality.
18 Therefore, the construction and operation of new transmission lines under Alternative 1A would not
19 result in an adverse effect on mountain plover. **CEQA Conclusion:** New transmission lines would
20 have a less-than-significant impact on mountain plover because the probability of bird-powerline
21 strikes is highly unlikely due to plover's flight behaviors. The implementation of *AMM20 Greater*
22 *Sandhill Crane* would require the installation of bird flight diverters on all new transmission lines,
23 which would further reduce any potential for mortality. Therefore, the construction and operation
24 of new transmission lines under Alternative 1A would result in a less-than-significant impact on
25 mountain plover.

26 **Impact BIO-127: Indirect Effects of Plan Implementation on Mountain Plover**

27 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt
28 foraging, and reduce the functions of suitable foraging habitat for mountain plover. Construction
29 noise above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from
30 the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*
31 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no
32 available data to determine the extent to which these noise levels could affect mountain plover.
33 Indirect effects associated with construction include noise, dust, and visual disturbance caused by
34 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical
35 equipment during water conveyance facilities construction could cause the accidental release of
36 petroleum or other contaminants that could affect these species or their prey in the surrounding
37 habitat. AMM1-AMM7, would minimize the likelihood of such spills from occurring. The inadvertent
38 discharge of sediment or excessive dust adjacent to mountain plover grassland habitat could also
39 have a negative effect on the species. However, AMM1-AMM7 would also ensure that measures
40 would be in place to prevent runoff from the construction area and the negative effects of dust on
41 wildlife adjacent to work areas.

42 **NEPA Effects:** Indirect effects on mountain plover as a result of Alternative 1A implementation could
43 have adverse effects on the species through the modification of habitat. With the implementation of

1 AMM1–AMM7, indirect effects as a result of Alternative 1A implementation would not have an
2 adverse effect on mountain plover.

3 **CEQA Conclusion:** Indirect effects on mountain plover as a result of Alternative 1A implementation
4 could have a significant impact on the species from modification of habitat. With the implementation
5 of AMM1–AMM7, indirect effects as a result of Alternative 1A implementation would have a less-
6 than-significant impact on mountain plover.

7 **Impact BIO-128: Periodic Effects of Inundation on Mountain Plover as a Result of** 8 **Implementation of Conservation Components**

9 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
10 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–
11 3,650 acres of modeled mountain plover foraging habitat (Table 12-1A-47).

12 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
13 *Restoration*, could result in the periodic inundation of up to approximately 3,823 acres of modeled
14 habitat (Table 12-1A-47). Periodic inundation from CM2 and CM5 would not have an adverse effect
15 on mountain plover because birds would be expected to move to adjacent foraging habitat.

16 **NEPA Effects:** Implementation of CM2 and CM5 would periodically inundate suitable mountain
17 plover foraging habitat. However, periodic inundation would not have an adverse effect on
18 mountain plover because birds would be expected to move to adjacent foraging habitat.

19 **CEQA Conclusion:** Implementation of CM2 and CM5 would periodically inundate suitable mountain
20 plover foraging habitat. However, periodic inundation would have a less-than-significant impact on
21 mountain plover because birds would be expected to move to adjacent foraging habitat.

22 **Black Tern**

23 This section describes the effects of Alternative 1A, including water conveyance facilities
24 construction and implementation of other conservation components, on black tern. Modeled nesting
25 habitat for black tern in the study area is currently limited to rice in CZ 2.

26 Construction and restoration associated with Alternative 1A conservation measures would result in
27 both temporary and permanent losses of modeled habitat for black tern as indicated in Table 12-1A-
28 48. Full implementation of Alternative 1A would include the following biological objectives over the
29 term of the BDCP which would also benefit the black tern (BDCP Chapter 3, *Conservation Strategy*).

- 30 ● Protect 700 acres of cultivated lands, with at least 500 acres consisting of rice land, to expand
31 upon and buffer newly restored/created nontidal perennial habitat in CZ 2, (Objective GGS2.3,
32 associated with CM3).
- 33 ● Protect up to 1,700 acres of rice land or equivalent habitat (e.g., perennial wetland) in the Yolo
34 Bypass if this portion meets the criteria specified in CM3, *Reserve Design Requirements by Species*
35 for giant garter snake. Any remaining acreage (from a total 2,740 acre commitment) will consist
36 of rice land or equivalent-value habitat outside the Yolo Bypass in CZs 1, 2, 4, or 5 (Objective
37 GGS3.1, associated with CM3).
- 38 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
39 and/or 7 (Objective TFEWNC1.1, associated with CM4).

1 Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
2 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
3 associated with CM10).

4 As explained below, with the restoration and protection of these amounts of habitat, in addition to
5 management activities that would enhance this habitat for the species and implementation of
6 AMM1-AMM7 and Mitigation Measure BIO-75, impacts on black tern would not be adverse for NEPA
7 purposes and would be less than significant for CEQA purposes.

8 **Table 12-1A-48. Changes in Black Tern Habitat Associated with Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2-CM18	Nesting	306	490	1	1	791-1,582	0
Total Impacts CM2-CM18		306	490	1	1	791-1,582	0
TOTAL IMPACTS		306	490	1	1	791-1,582	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

9

10 **Impact BIO-129a: Loss or Conversion of Habitat for and Direct Mortality of Black Tern**

11 Alternative 1A conservation measures would result in the permanent loss of up to 491 acres of
12 modeled nesting habitat for black tern, consisting of freshwater wetlands and rice in CZ 2 (Table 12-
13 1A-48). Conservation measures that would result in these losses are Yolo Bypass fisheries
14 improvements (CM2), tidal habitat restoration (CM4), grassland restoration (CM8) and nontidal
15 marsh restoration (CM10). Each of these individual activities is described below. A summary
16 statement of the combined impacts and NEPA effects, and a CEQA conclusion follows the individual
17 conservation measure discussions.

- 18 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
19 would permanently remove 31 acres of modeled black tern habitat in the Yolo Bypass in CZ 2. In
20 addition, 1 acre of habitat would be temporarily removed. The loss is expected to occur during
21 the first 10 years of Alternative 1A implementation.
- 22 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
23 inundation would permanently remove an estimated 199 acres of modeled black tern habitat in
24 CZ 2.

- 1 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
2 implemented on agricultural lands and would result in the conversion of 52 acres of rice lands
3 to grassland in CZ 2 by the late-long time period. An estimated 30 acres of impact would occur in
4 the first 10 years.
- 5 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
6 removal of 208 acres of black tern nesting habitat in in CZ 2. An estimated 46 acres would be
7 removed in the first 10 years.
- 8 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
9 actions that are designed to enhance wildlife values in restored or protected habitats could
10 result in localized ground disturbances that could temporarily remove small amounts of
11 modeled habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road
12 and other infrastructure maintenance activities, would be expected to have minor adverse
13 effects on available habitat and would be expected to result in overall improvements to and
14 maintenance of habitat values over the term of the BDCP. Habitat management- and
15 enhancement-related activities could disturb nesting black terns if they were to nest in the
16 vicinity of a worksite. Equipment operation could destroy nests, and noise and visual
17 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings. The
18 potential for these activities to result in direct mortality of black tern would be minimized with
19 the implementation of and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
20 *Surveys and Avoid Disturbance of Nesting Birds*.
- 21 • *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration
22 infrastructure could result in ongoing but periodic disturbances that could affect black tern
23 nesting adjacent to maintenance areas. Maintenance activities would include vegetation
24 management, levee and structure repair, and re-grading of roads and permanent work areas.
25 These effects, however, would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and
26 conservation actions as described below.
- 27 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
28 direct mortality of adult or fledged black tern individuals if they were present in the study area,
29 because they would be expected to avoid contact with construction and other equipment. If
30 black tern were to nest in the construction area, construction-related activities, including
31 equipment operation, noise and visual disturbances could destroy nests or lead to their
32 abandonment, resulting in mortality of eggs and nestlings. These effects would be avoided and
33 minimized with the implementation of Mitigation Measure BIO-75.
- 34 • *Late season flooding in the Yolo Bypass* could result in the loss of rice (nesting habitat for black
35 tern) by precluding the preparation and planting of rice fields. The methods for estimating loss
36 of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation*
37 *of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo Bypass*. This analysis
38 concludes that the estimated loss of rice could be up to 1,662 acres by the late long-term
39 timeframe. This potential impact is further described under Impact BIO-129c below.

40 The following paragraphs summarize the combined effects discussed above and describe other
41 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
42 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
5 effects of construction would not be adverse under NEPA. There would be no impacts on black tern
6 nesting habitat resulting from the construction of the water conveyance facilities (CM1). However,
7 there would be a loss of 307 acres of modeled nesting habitat for black tern in the study area in the
8 near-term. These effects would result from implementing *CM2 Yolo Bypass Fisheries Enhancements*,
9 *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration* and
10 *CM10 Nontidal Marsh Restoration*.

11 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection and 1:1
12 restoration for the loss of black tern nesting habitat. Using this ratio would indicate that 307 acres of
13 rice lands and/or freshwater wetlands should be protected and 307 acres should be restored in CZ 2
14 to compensate for the losses of black tern nesting habitat.

15 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or
16 equivalent habitat and restoring 8,850 acres of tidal freshwater emergent wetland (see Table 3-4 in
17 Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3 and CM4
18 and would occur in the same timeframe as the early restoration losses. The BDCP also contains
19 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to
20 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria
21 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3
22 and GGS 3.1) by the late long-term time period. The tidal freshwater emergent wetland would be
23 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*
24 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that
25 increase connectivity among protected lands (Objective TFEWNC2.2).

26 These objectives would inform the near-term protection actions, and therefore some portion of the
27 200 acres of rice and 700 acres of rice or equivalent habitat and the 8,850 acres of tidal freshwater
28 emergent wetland would be expected to be restored in CZ 2. However, there is no near-term acreage
29 commitment in the plan that is specific to CZ 2. In order to avoid an adverse effect on black tern from
30 habitat loss, protection and restoration of 307 acres of rice and/or freshwater wetlands would need
31 to occur in CZ 2 in the near-term timeframe. Mitigation Measure BIO-129a, *Compensate for Loss of*
32 *Black Tern Nesting Habitat*, would be available to address this effect.

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
37 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
38 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
39 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
40 of the Final EIR/EIS. Black tern is not a covered species under the BDCP. For the BDCP to avoid an
41 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
42 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
43 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
44 address this effect.

1 **Late Long-Term Timeframe**

2 Alternative 1A as a whole would result in the permanent loss of 491 acres of modeled black tern
 3 nesting habitat during the term of the Plan. This impact would result from the removal or
 4 conversion of rice and freshwater wetlands in CZ 2. The Plan includes conservation commitments
 5 through *CM3 Natural Communities Protection and Restoration* to protect 500 acres of rice lands
 6 (Table 3-4 in Chapter 3) and up to 1,700 acres of rice lands or equivalent habitat for the giant garter
 7 snake (Objective GGS3.1) in CZ 2. The nesting habitat for black tern in the northern part of the study
 8 area has largely been reduced to rice lands, and these acres would provide protected nesting habitat
 9 for the species. The Plan also includes conservation commitments through *CM4 Tidal Natural*
 10 *Communities Restoration* to restore or create at least 24,000 acres of tidal freshwater emergent
 11 wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1).

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 16 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 17 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 18 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 19 of the Final EIR/EIS. Black tern is not a covered species under the BDCP. For the BDCP to avoid an
 20 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
 21 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
 22 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
 23 address this effect.

24 **NEPA Effects:** The loss of black tern nesting habitat and potential for mortality of this special-status
 25 species under Alternative 1A would represent an adverse effect in the absence of other conservation
 26 actions. With habitat protection associated with CM3, guided by biological goals and objectives and
 27 by AMM1–AMM7, which would be in place during all project activities, the effects of habitat loss
 28 under Alternative 1A would not be adverse under NEPA. Black tern is not a covered species under
 29 the BDCP and the potential for mortality would be an adverse effect without preconstruction
 30 surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
 31 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
 32 address this effect.

33 **CEQA Conclusion:**

34 **Near-term Timeframe**

35 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 36 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 37 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 38 effects of construction would be less than significant under CEQA. There would be no impacts on
 39 black tern nesting habitat resulting from the construction of the water conveyance facilities (CM1).
 40 However, there would be a loss of 307 acres of modeled nesting habitat for black tern in the study
 41 area in the near-term. These effects would result from implementing *CM2 Yolo Bypass Fisheries*
 42 *Enhancements*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*
 43 *Restoration* and *CM10 Nontidal Marsh Restoration*.

1 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection and 1:1
2 restoration for the loss of black tern nesting habitat. Using this ratio would indicate that 307 acres of
3 rice lands and/or freshwater wetlands should be protected and 307 acres should be restored in CZ 2
4 to mitigate the losses of black tern nesting habitat.

5 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or
6 equivalent habitat and restoring 8,850 acres of tidal freshwater emergent wetland (see Table 3-4 in
7 Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3 and CM4
8 and would occur in the same timeframe as the early restoration losses. The BDCP also contains
9 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to
10 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria
11 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3
12 and GGS 3.1) by the late long-term time period. The tidal freshwater emergent wetland would be
13 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*
14 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that
15 increase connectivity among protected lands (Objective TFEWNC2.2).

16 These objectives would inform the near-term protection actions, and therefore some portion of the
17 200 acres of rice and 700 acres of rice or equivalent habitat and the 8,850 acres of tidal freshwater
18 emergent wetland would be expected to be restored and protected in CZ 2. However, there is no
19 near-term acreage commitment in the plan that is specific to CZ 2. In order to compensate for black
20 tern habitat loss, the protection and restoration of 307 acres of rice or freshwater wetlands would
21 need to occur in CZ 2 in the near-term timeframe. Mitigation Measure BIO-129a, *Compensate for Loss*
22 *of Black Tern Nesting Habitat*, would reduce this potential impact to a less-than-significant level.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
26 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
27 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
28 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
29 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
30 of the Final EIR/EIS. Black tern is not a covered species under the BDCP. For the BDCP to have a less-
31 than-significant impact on individuals, preconstruction surveys would be required to ensure that
32 nests are detected and avoided. In the absence of other conservation actions, effects on black tern
33 would represent an adverse effect as a result of habitat modification and potential for direct
34 mortality of a special-status species. This impact would be significant. However, the BDCP has
35 committed to habitat protection, restoration, management and enhancement activities described
36 above. As outlined in BDCP Chapter 3, Section 3.4, *Conservation Measures*, natural community
37 restoration and protection are planned so that they keep pace with project impacts. Thus, there
38 would be minimal lag time between impacts and those measures designed to offset those impacts on
39 natural communities and the species that use them. In addition, implementation of AMM1-AMM7,
40 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
41 *Nesting Birds*, and Mitigation Measure BIO-129a, *Compensate for Loss of Black Tern Nesting Habitat*,
42 which would require 1:1 protection of habitat in CZ 2 in the near-term time frame, would reduce this
43 potential impact to a less-than-significant level.

1 **Late Long-Term Timeframe**

2 Alternative 1A as a whole would result in the permanent loss of 491 acres of modeled black tern
3 nesting habitat during the term of the Plan. This impact would result from the removal or
4 conversion of rice and freshwater wetlands in CZ 2. The Plan includes conservation commitments
5 through *CM3 Natural Communities Protection and Restoration* to protect 500 acres of rice lands
6 (Table 3-4 in Chapter 3) and up to 1,700 acres of rice lands or equivalent habitat for the giant garter
7 snake (Objective GGS3.1) in CZ 2. The nesting habitat for black tern in the northern part of the study
8 area has largely been reduced to rice lands, and these acres would provide protected nesting habitat
9 for the species. The Plan also includes conservation commitments through *CM4 Tidal Natural*
10 *Communities Restoration* to restore or create at least 24,000 acres of tidal freshwater emergent
11 wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1).

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
16 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
17 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
18 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
19 of the Final EIR/EIS. Black tern is not a covered species under the BDCP. For the BDCP to avoid an
20 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
21 required to ensure that nests are detected and avoided. Implementation of Mitigation Measure BIO-
22 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
23 identify any nesting terns during preconstruction surveys and ensure that active nests are avoided
24 which would reduce the potential impact on nesting black tern to a less-than-significant level.

25 In the absence of other conservation actions, effects on black tern would represent an adverse effect
26 as a result of habitat modification and potential for direct mortality of special-status species. This
27 impact would be considered significant. Considering Alternative 1A's protection provisions, which
28 would provide acreages of new or enhanced habitat in amounts greater than necessary to
29 compensate for habitats lost to construction and restoration activities, loss of habitat and direct
30 mortality through implementation of Alternative 1A would not result in a substantial adverse effect
31 through habitat modifications and would not substantially reduce the number or restrict the range
32 of the species. Therefore, the alternative would have a less-than-significant impact on black tern.

33 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
34 **Disturbance of Nesting Birds**

35 See Mitigation Measure BIO-75 under Impact BIO-75.

36 **Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat**

37 Because there is no near-term acreage commitment associated with the protection of rice and
38 the restoration of freshwater wetlands in CZ 2, BDCP proponents must protect and restore rice
39 and/or freshwater wetlands at a 1:1 ratio for each acre of habitat impacted in CZ 2.

1 **Impact BIO-129b: Indirect Effects of Plan Implementation on Black Tern**

2 If black terns were to nest in or adjacent to work areas, construction and subsequent maintenance-
3 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and
4 reduce the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75,
5 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid
6 the potential for adverse effects of construction-related activities on survival and productivity of
7 nesting black terns. The use of mechanical equipment during restoration activities could cause the
8 accidental release of petroleum or other contaminants that could affect black terns in the
9 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable
10 habitat could also have an adverse effect on these species. AMM1–AMM7, including *AMM2*
11 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such
12 spills and ensure that measures are in place to prevent runoff from the construction area and
13 negative effects of dust on active nests.

14 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
15 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
16 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
17 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
18 2009). The effect of selenium toxicity differs widely between species and also between age and sex
19 classes within a species. In addition, the effect of selenium on a species can be confounded by
20 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
21 2009).

22 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
23 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
24 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
25 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
26 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
27 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
28 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
29 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
30 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
31 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
32 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
33 levels of selenium have a higher risk of selenium toxicity.

34 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
35 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
36 exacerbate bioaccumulation of selenium in avian species, including black tern. Marsh (tidal and
37 nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore increase
38 avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP restoration
39 activities that create newly inundated areas could increase bioavailability of selenium (see BDCP
40 Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium concentrations
41 were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to Existing
42 Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases
43 in selenium concentrations in water in the Delta under any alternative. However, it is difficult to
44 determine whether the effects of potential increases in selenium bioavailability associated with
45 restoration-related conservation measures (CM4–CM5) would lead to adverse effects on black tern.

1 Because of the uncertainty that exists at this programmatic level of review, there could be an effect
2 on black tern from increases in selenium associated with restoration activities. This effect would be
3 addressed through the implementation of *AMM27 Selenium Management*, which would provide
4 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
5 selenium and its bioavailability in tidal habitats (see Appendix 3B, *Environmental Commitments*,
6 *AMMs*, and *CMs*). Furthermore, the effectiveness of selenium management to reduce selenium
7 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as
8 part of design and implementation. This avoidance and minimization measure would be
9 implemented as part of the tidal habitat restoration design schedule.

10 **NEPA Effects:** Noise and visual disturbances from the construction of conservation components
11 could affect black tern use of modeled habitat adjacent to work areas. Moreover, the use of
12 mechanical equipment for the construction of conservation components could cause the accidental
13 release of petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust
14 adjacent to suitable habitat. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct Preconstruction*
15 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address potential
16 effects on nesting individuals. Tidal habitat restoration could result in increased exposure of black
17 tern to selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
18 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
19 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

20 **CEQA Conclusion:** Noise and visual disturbances from the construction of conservation components
21 could affect black tern use of modeled habitat adjacent to work areas. Moreover, the use of
22 mechanical equipment for the construction of conservation components could cause the accidental
23 release of petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust
24 adjacent to suitable habitat which could result in potential mortality of a special-status species.
25 These impacts would be significant. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct*
26 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce these
27 impacts to a less-than-significant level.

28 Tidal habitat restoration could result in increased exposure of black tern to selenium, which could
29 result in the mortality of a special-status species. This impact would be significant. This impact
30 would be addressed through the implementation of *AMM27 Selenium Management*, which would
31 provide specific tidal habitat restoration design elements to reduce the potential for
32 bioaccumulation of selenium and its bioavailability in tidal habitats. With AMM27 in place, potential
33 effects of increased exposure of black tern to selenium would be reduced to a less-than-significant
34 impact.

35 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
36 **Disturbance of Nesting Birds**

37 See Mitigation Measure BIO-75 under Impact BIO-75.

38 **Impact BIO-129c: Periodic Effects of Inundation on Black Tern Nesting Habitat as a Result of**
39 **Implementation of Conservation Components**

40 Flooding of the Yolo Bypass would inundate 791–1,582 acres of suitable black tern nesting habitat
41 (land currently managed as rice in CZ 2). Inundation would occur during the nonbreeding season
42 but could reduce the availability of nesting habitat during years that flooding extends into the
43 nesting season (past March). Extended inundation of the Yolo Bypass would not be expected to

1 affect black tern nesting habitat. However, if periodic inundation took land out of rice production,
2 this could have an adverse effect on black tern nesting habitat. Late season flooding in the Yolo
3 Bypass could result in the loss of rice (nesting habitat for black tern) by precluding the preparation
4 and planting of rice fields. The methods for estimating loss of rice in the bypass and results are
5 provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter Snake*
6 *Summer Foraging Habitat in the Yolo Bypass*. This analysis concludes that the estimated loss of rice
7 could be up to 1,662 acres by the late long-term timeframe. The BDCP has committed to protect,
8 restore and/or create up to 1,700 acres of rice in the Yolo Bypass (Objective GGS3.1). These acres of
9 rice would be protected in areas that are less susceptible to inundation, which would benefit the
10 black tern during years in which the magnitude and duration of inundation were increased.

11 **NEPA Effects:** Flooding of the Yolo Bypass is not expected to adversely affect nesting habitat for
12 black tern. However, if flooding were to extend into the nesting season or were to significantly
13 reduce rice production it could also reduce suitable black tern nesting habitat. This potential effect
14 would not be adverse with the creation and/or protection of 1,700 acres of rice in CZ 2 under BDCP
15 Objective GGS3.1.

16 **CEQA Conclusion:** Flooding of the Yolo Bypass is not expected to have a significant impact on
17 nesting habitat for black tern. However, if flooding were to extend into the nesting season or were to
18 significantly reduce rice production, it could also reduce suitable black tern nesting habitat. This
19 potential impact would be reduced to a less-than-significant level by the creation and/or protection
20 of 1,700 acres of rice in CZ 2 under BDCP Objective GGS3.1.

21 **California Horned Lark and Grasshopper Sparrow**

22 This section describes the effects of Alternative 1A, including water conveyance facilities
23 construction and implementation of other conservation components, on California horned lark and
24 grasshopper sparrow. The primary impact of concern for grasshopper sparrow and California
25 horned lark would be the loss of nesting habitat in the Plan Area, which includes grassland, vernal
26 pool complex, and alkali seasonal wetland natural communities and selected cultivated lands
27 including grain and hay crops and pasture.

28 Construction and restoration associated with Alternative 1A conservation measures would result in
29 both temporary and permanent losses of modeled breeding habitat for California horned lark and
30 grasshopper sparrow as indicated in Table 12-1A-49. Full implementation of Alternative 1A would
31 include the following biological objectives over the term of the BDCP which would also benefit the
32 California horned lark and the grasshopper sparrow (BDCP Chapter 3, *Conservation Strategy*).

- 33 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
34 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
35 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 36 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 37 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
38 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 39 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
40 other native wildlife species (Objective CLNC1.1, associated with CM3).

- Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of cultivated lands as Swainson’s hawk foraging habitat with at least 50% in very high-value habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4, VPNC2.5, and GNC2.4, associated with CM11).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance habitat for these species and implementation of AMM1–AMM7 and Mitigation Measure BIO-75, impacts on California horned lark and grasshopper sparrow would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1A-49. Changes in California Horned Lark and Grasshopper Sparrow Modeled Habitat Associated with Alternative 1A (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Breeding	1,660	1,660	673	673	NA	NA
Total Impacts CM1		1,660	1,660	673	673	NA	NA
CM2–CM18	Breeding	5,450	26,198	376	893	777–2,423	3,823
Total Impacts CM2–CM18		5,450	26,198	376	893	777–2,423	3,823
TOTAL IMPACTS		7,110	27,858	1,049	1,566	777–2,423	3,823

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

12

Impact BIO-130: Loss or Conversion of Habitat for and Direct Mortality of California Horned Lark and Grasshopper Sparrow

Alternative 1A conservation measures would result in the combined permanent and temporary loss of up to 29,424 acres of modeled nesting habitat for California horned lark and grasshopper sparrow (27,858 acres of permanent loss and 1,566 of temporary loss, Table 12-1A-49). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of conservation hatcheries (CM18). The majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative

1 vegetation, and the construction of recreational trails, signs, and facilities, could result in local
 2 adverse habitat effects. In addition, maintenance activities associated with the long-term operation
 3 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate
 4 California horned lark and grasshopper sparrow modeled habitat. Each of these individual activities
 5 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA
 6 conclusion follow the individual conservation measure discussions.

- 7 ● *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
 8 result in the combined permanent and temporary loss of up to 2,333 acres of modeled California
 9 horned lark and grasshopper sparrow habitat (1,660 acres of permanent loss, 673 acres of
 10 temporary loss) from CZs 3–6 and CZ 8. The majority of habitat that would be removed would be
 11 in CZ 8, from the construction of the new forebay and from the potential borrow and spoils site
 12 south of the proposed forebay. Some of this habitat south of Clifton Court Forebay is composed
 13 of larger stands of ruderal and herbaceous vegetation and California annual grassland, which is
 14 suitable nesting habitat for these species. Grasshopper sparrows were detected in DHCCP
 15 surveys south of Byron Highway in CZ 8 (1 occurrence) and east of Intakes 1–5 (6 occurrences),
 16 in the Stone Lakes NWR. However, the CM1 footprint does not overlap with any grasshopper
 17 sparrow or California horned lark occurrences. However, Mitigation Measure BIO-75, *Conduct*
 18 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would require
 19 preconstruction surveys and the establishment of no-disturbance buffers and would be
 20 available to address potential effects on California horned larks and grasshopper sparrows if
 21 they were to nest in or adjacent to construction areas. Refer to the Terrestrial Biology Map Book
 22 for a detailed view of Alternative 1A construction locations. Impacts from CM1 would occur
 23 within the first 10 years of Alternative 1A implementation.
- 24 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 25 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
 26 California horned lark and grasshopper sparrow habitat (898 acres of permanent loss, 376 acres
 27 of temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of
 28 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass
 29 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.
 30 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland
 31 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10
 32 years of Plan implementation.
- 33 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 34 inundation would permanently remove an estimated 20,880 acres of modeled California horned
 35 lark and grasshopper sparrow habitat. The majority of the acres lost would consist of cultivated
 36 lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache
 37 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and
 38 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
 39 directly impact and fragment grassland just north of Rio Vista in and around French and
 40 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
 41 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
 42 the northern fringes of Suisun Marsh.
- 43 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 44 seasonally inundated floodplain would permanently and temporarily remove approximately
 45 1,450 acres of modeled California horned lark and grasshopper sparrow nesting habitat (933

1 permanent, 517 temporary). These losses would be expected after the first 10 years of
2 Alternative 1A implementation along the San Joaquin River and other major waterways in CZ 7.

- 3 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
4 approximately 370 acres of California horned lark and grasshopper sparrow nesting habitat as
5 part of tidal restoration and 1,489 acres as part of seasonal floodplain restoration.
- 6 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
7 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
8 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
9 would be restored after the construction periods. Grassland restoration would be implemented
10 on agricultural lands that also provide nesting habitat for California horned lark and
11 grasshopper sparrow and would result in the conversion of 837 acres of cultivated lands to
12 grassland.
- 13 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
14 removal of 705 acres of California horned lark and grasshopper sparrow nesting habitat.
- 15 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
16 actions included in CM11 that are designed to enhance wildlife values in restored or protected
17 habitats could result in localized ground disturbances that could temporarily remove small
18 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
19 vegetation and road and other infrastructure maintenance activities, would be expected to have
20 minor adverse effects on available habitat and would be expected to result in overall
21 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would
22 also include the construction of recreational-related facilities including trails, interpretive signs,
23 and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The
24 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be
25 placed on existing, disturbed areas when and where possible. However, approximately 50 acres
26 of grassland habitat would be lost from the construction of trails and facilities.

27 Habitat management- and enhancement-related activities could disturb California horned lark
28 and grasshopper sparrow nests. If either species were to nest in the vicinity of a worksite,
29 equipment operation could destroy nests, and noise and visual disturbances could lead to their
30 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct*
31 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available
32 to address these potential effects.

- 33 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
34 modeled California horned lark and grasshopper sparrow habitat for the development of a delta
35 and longfin smelt conservation hatchery in CZ 1.
- 36 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
37 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
38 disturbances that could affect California horned lark and grasshopper sparrow use of the
39 surrounding habitat. Maintenance activities would include vegetation management, levee and
40 structure repair, and re-grading of roads and permanent work areas. These effects, however,
41 would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as
42 described below.
- 43 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
44 direct mortality of adult or fledged California horned lark and grasshopper sparrow if they were

1 present in the Plan Area, because they would be expected to avoid contact with construction and
2 other equipment. If either species were to nest in the construction area, construction-related
3 activities, including equipment operation, noise and visual disturbances could destroy nests or
4 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
5 75 would be available to address these potential effects.

6 The following paragraphs summarize the combined effects discussed above and describe other
7 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
8 included.

9 ***Near-Term Timeframe***

10 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
11 the near-term BDCP conservation strategy has been evaluated to determine whether it would
12 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
13 effects of construction would not be adverse under NEPA. The Plan would remove 8,167 acres
14 (7,110 permanent, 1,049 temporary) of modeled breeding habitat for California horned lark and
15 grasshopper sparrow in the study area in the near-term. These effects would result from the
16 construction of the water conveyance facilities (CM1, 2,333 acres), and implementing other
17 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
18 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*
19 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*
20 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

21 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
22 would be 2:1 for protection of habitat. Using this ratio would indicate that 4,666 acres should be
23 protected to compensate for the CM1 losses of 2,333 acres of California horned lark and
24 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove
25 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California
26 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio
27 (2:1 for protection).

28 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
29 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
30 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
31 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
32 in the same timeframe as the construction and early restoration losses thereby avoiding adverse
33 effects of habitat loss on California horned lark and grasshopper sparrow. Grassland restoration and
34 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland
35 protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland
36 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
37 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand
38 breeding habitat for California horned lark and grasshopper sparrow and reduce the effects of
39 current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and*
40 *Management*, insect prey populations would be increased on protected lands, enhancing the
41 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
42 Cultivated lands that provide habitat for covered and other native wildlife species would provide
43 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper
44 sparrow (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-

1 term time period would be in alfalfa and pasture crop types (very high- and high-value crop types)
2 for Swainson's hawk (Objective SH1.2) which would also provide potential nesting habitat for
3 California horned lark and grasshopper sparrow. This biological objective provides an estimate for
4 the high proportion of cultivated lands protected in the near-term time period which would provide
5 nesting habitat for California horned lark and grasshopper sparrow.

6 The acres of restoration and protection contained in the near-term Plan goals and the additional
7 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
8 level effects of CM1 on California horned lark and grasshopper sparrow, as well as mitigate the near-
9 term effects of the other conservation measures with the consideration that some portion of the
10 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in suitable
11 crop types to compensate for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-130,
12 *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper Sparrow Habitat*,
13 would be available to address the effect of habitat loss in the near-term.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
18 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
19 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
20 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
21 of the Final EIR/EIS.

22 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the
23 BDCP not to have an adverse effect on individuals, preconstruction surveys for noncovered avian
24 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-
25 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
26 available to address this potential effect.

27 **Late Long-Term Timeframe**

28 Based on the habitat model, the study area supports approximately 269,411 acres of modeled
29 California horned lark and grasshopper sparrow habitat. Alternative 1A as a whole would result in
30 the permanent loss of and temporary effects on 29,494 acres of modeled habitat for these species
31 over the term of the Plan. The locations of these losses are described above in the analyses of
32 individual conservation measures. The Plan includes conservation commitments through *CM3*
33 *Natural Communities Protection and Restoration*, *CM8 Grassland Natural Communities Restoration*,
34 and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and
35 restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex,
36 protect 150 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands
37 that provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3). Grassland
38 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and
39 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali
40 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
41 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
42 expand breeding habitat for California horned lark and grasshopper sparrow and reduce the effects
43 of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and*
44 *Management*, insect prey populations would be increased on protected lands, enhancing the

1 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
2 Cultivated lands that provide habitat for covered and other native wildlife species would provide
3 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper
4 sparrow (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in
5 alfalfa and pasture crop types. These are very high- and high-value crop types for Swainson's hawk
6 (Objective SH1.2) and would provide potential nesting habitat for California horned lark and
7 grasshopper sparrow.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
9 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
10 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
11 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
12 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
13 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
14 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
15 of the Final EIR/EIS. California horned lark and grasshopper sparrow are not covered species under
16 the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
17 noncovered avian species would be required to ensure that nests are detected and avoided.
18 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
19 *Nesting Birds*, would be available to address this potential effect.

20 **NEPA Effects:** The loss of California horned lark and grasshopper sparrow habitat and potential for
21 mortality of these special-status species under Alternative 1A would represent an adverse effect in
22 the absence of other conservation actions. With habitat protection and restoration associated with
23 CM3, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which
24 would be in place during all project activities, and with implementation of Mitigation Measure BIO-
25 130, *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper Sparrow Habitat*,
26 the effects of habitat loss under Alternative 1A on California horned lark and grasshopper sparrow
27 would not be adverse. California horned lark and grasshopper sparrow are not covered species
28 under the BDCP and the potential for mortality would be an adverse effect without preconstruction
29 surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75 would be
30 available to address this effect.

31 **CEQA Conclusion:**

32 **Near-Term Timeframe**

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
36 effects of construction would be less than significant under CEQA. The Plan would remove 8,167
37 acres (7,110 permanent, 1,049 temporary) of modeled breeding habitat for California horned lark
38 and grasshopper sparrow in the study area in the near-term. These effects would result from the
39 construction of the water conveyance facilities (CM1, 2,333 acres), and implementing other
40 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
41 *Restoration, CMμ7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*
42 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*
43 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

1 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
2 would be 2:1 for protection of habitat. Using this ratio would indicate that 4,666 acres should be
3 protected to compensate for the CM1 losses of 2,333 acres of California horned lark and
4 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove
5 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California
6 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio
7 (2:1 for protection).

8 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
9 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
10 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
11 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
12 in the same timeframe as the construction and early restoration losses thereby avoiding significant
13 impacts on California horned lark and grasshopper sparrow. Grassland restoration and protection
14 would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in
15 CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes
16 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali
17 seasonal wetland, and vernal pool natural communities which would expand breeding habitat for
18 California horned lark and grasshopper sparrow and reduce the effects of current levels of habitat
19 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
20 populations would be increased on protected lands, enhancing the foraging value of these natural
21 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat
22 for covered and other native wildlife species would provide approximately 15,400 acres of potential
23 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).
24 Approximately 87% of cultivated lands protected by the late long-term time period would be in
25 alfalfa and pasture crop types (very high- and high-value crop types) for Swainson's hawk (Objective
26 SH1.2) which would also provide potential nesting habitat for California horned lark and
27 grasshopper sparrow. This biological objective provides an estimate for the high proportion of
28 cultivated lands protected in the near-term time period which would provide nesting habitat for
29 California horned lark and grasshopper sparrow.

30 The acres of restoration and protection contained in the near-term Plan goals and the additional
31 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
32 level effects of CM1 on California horned lark and grasshopper sparrow, as well as mitigate the near-
33 term effects of the other conservation measures with the consideration that some portion of the
34 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in suitable
35 crop types to compensate for the loss of habitat at a ratio of 2:1. Implementation of Mitigation
36 Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper*
37 *Sparrow Habitat*, would reduce the impact of habitat loss in the near-term to a less-than-significant
38 level.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
43 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
44 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
45 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
46 of the Final EIR/EIS.

1 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the
2 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
3 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-
4 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
5 reduce this potential impact to a less-than-significant level.

6 ***Late Long-Term Timeframe***

7 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 29,424
8 acres of modeled California horned lark and grasshopper sparrow nesting habitat during the term of
9 the Plan (11% of the total habitat in the study area). The locations of these losses are described
10 above in the analyses of individual conservation measures. The Plan includes conservation
11 commitments through *CM3 Natural Communities Protection and Restoration*, *CM8 Grassland Natural*
12 *Communities Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to
13 protect 8,000 acres and restore 2,000 acres of grassland natural community, protect 600 acres of
14 vernal pool complex, protect 150 acres of alkali seasonal wetland complex and protect 48,625 acres
15 of cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3).
16 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
17 and GNC1.2). Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
18 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
19 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
20 would expand breeding habitat for California horned lark and grasshopper sparrow and reduce the
21 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*
22 *and Management*, insect prey populations would be increased on protected lands, enhancing the
23 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
24 Cultivated lands that provide habitat for covered and other native wildlife species would provide
25 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper
26 sparrow (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in
27 alfalfa and pasture crop types (very high- and high-value crop types) for Swainson's hawk (Objective
28 SH1.2) which would also provide potential nesting habitat for California horned lark and
29 grasshopper sparrow.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
34 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
35 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
36 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
37 of the Final EIR/EIS. California horned lark and grasshopper sparrow are not covered species under
38 the BDCP. For the BDCP to avoid significant impacts on individuals, preconstruction surveys for
39 noncovered avian species would be required to ensure that nests are detected and avoided.
40 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
41 *Nesting Birds*, would reduce this potential impact to a less-than-significant level.

42 Considering Alternative 1A's protection and restoration provisions, which would provide acreages
43 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
44 construction and restoration activities, and with the implementation of AMM1-AMM7, Mitigation
45 Measure BIO-75, and Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California*

1 *Horned Lark and Grasshopper Sparrow Habitat*, the loss of habitat and direct mortality through
2 implementation of Alternative 1A would not result in a substantial adverse effect through habitat
3 modifications and would not substantially reduce the number or restrict the range of either species.
4 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-
5 significant impact on California horned lark and grasshopper sparrow.

6 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
7 **Disturbance of Nesting Birds**

8 See Mitigation Measure BIO-75 under Impact BIO-75.

9 **Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned**
10 **Lark and Grasshopper Sparrow Habitat**

11 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
12 crops, or alfalfa to provide California horned lark and grasshopper sparrow habitat such that the
13 total acres of habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1
14 protection. Additional grassland protection, enhancement, and management may be substituted
15 for the protection of cultivated lands.

16 **Impact BIO-131: Effects on California Horned Lark and Grasshopper Sparrow and Associated**
17 **with Electrical Transmission Facilities**

18 New transmission lines would increase the risk for bird-power line strikes, which could result in
19 injury or mortality of grasshopper sparrow and California horned lark. *AMM20 Greater Sandhill*
20 *Crane* would minimize the risk of bird strikes. Thus, there would be no adverse effect.

21 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
22 could result in injury or mortality of grasshopper sparrow and California horned lark. With the
23 implementation of *AMM20 Greater Sandhill Crane* the effect of new transmission lines on California
24 horned lark and grasshopper sparrow would not be adverse.

25 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
26 could result in injury or mortality of grasshopper sparrow and California horned lark. With the
27 incorporation of *AMM20 Greater Sandhill Crane* into the BDCP, new transmission lines would have a
28 less-than-significant impact on grasshopper sparrow and California horned lark.

29 **Impact BIO-132: Indirect Effects of Plan Implementation on Grasshopper Sparrow and**
30 **California Horned Lark**

31 **Indirect construction-and operation-related effects:** Noise and visual disturbances associated
32 with construction-related activities could result in temporary disturbances that affect California
33 horned lark and grasshopper sparrow use of modeled habitat. Construction noise above background
34 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
35 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
36 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
37 the extent to which these noise levels could affect California horned lark or grasshopper sparrow.
38 Indirect effects associated with construction include noise, dust, and visual disturbance caused by
39 grading, filling, contouring, and other ground-disturbing operations. Construction-related noise and
40 visual disturbances could disrupt nesting and foraging behaviors, and reduce the functions of

1 suitable habitat which could result in an adverse effect on these species. Mitigation Measure BIO-75,
2 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
3 available to minimize potential effects on active nests. The use of mechanical equipment during
4 water conveyance construction could cause the accidental release of petroleum or other
5 contaminants that could affect these species or their prey in the surrounding habitat. AMM1–AMM7,
6 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the
7 likelihood of such spills from occurring. The inadvertent discharge of sediment or excessive dust
8 adjacent to grasshopper sparrow and California horned lark and grasshopper sparrow nesting
9 habitat could also have a negative effect on these species. AMM1–AMM7 would ensure that
10 measures are in place to prevent runoff from the construction area and the negative effects of dust
11 on wildlife adjacent to work areas.

12 **NEPA Effects:** Indirect effects on California horned lark and grasshopper sparrow as a result of
13 Alternative 1A implementation could have adverse effects on these species through the modification
14 of habitat and potential for direct mortality. California horned lark and grasshopper sparrow are not
15 covered species under the BDCP and the potential for mortality would be an adverse effect without
16 preconstruction surveys to ensure that nests are detected and avoided. In conjunction with AMM1–
17 AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
18 *Disturbance of Nesting Birds*, would be available to address this effect.

19 **CEQA Conclusion:** Indirect effects on California horned lark and grasshopper sparrow as a result of
20 Alternative 1A implementation could have a significant impact on these species. The incorporation
21 of AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*
22 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds* would reduce this
23 impact to a less-than-significant level.

24 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
25 **Disturbance of Nesting Birds**

26 See Mitigation Measure BIO-75 under Impact BIO-75.

27 **Impact BIO-133: Periodic Effects of Inundation on California Horned Lark and Grasshopper**
28 **Sparrow as a Result of Implementation of Conservation Components**

29 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
30 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158-
31 3,650 acres of modeled California horned lark and grasshopper sparrow habitat (Table 12-1A-49).

32 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
33 *Restoration*, could result in the periodic inundation of up to approximately 656 acres of modeled
34 habitat (Table 12-1A-49).

35 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
36 season due to periodic inundation. However, inundation would occur during the nonbreeding
37 season and would not be expected to have an adverse effect on either species.

38 **NEPA Effects:** Periodic inundation of floodplains would not have adverse effects on grasshopper
39 sparrow or California horned lark because inundation is expected to occur prior to the breeding
40 season.

1 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on
2 grasshopper sparrow or California horned lark because inundation is expected to occur prior to the
3 breeding season.

4 **Least Bittern and White-Faced Ibis**

5 This section describes the effects of Alternative 1A, including water conveyance facilities
6 construction and implementation of other conservation components, on least bittern and white-
7 faced ibis. Modeled breeding habitat for least bittern and white-faced ibis includes tidal freshwater
8 emergent wetlands, nontidal freshwater emergent wetlands, managed wetlands, and other natural
9 seasonal wetlands in CZs 2, 4, and 11. Construction and restoration associated with Alternative 1A
10 conservation measures would result in both temporary and permanent losses of modeled habitat for
11 mountain plover as indicated in Table 12-1A-50. Full implementation of Alternative 1A would
12 include the following biological objectives over the term of the BDCP which would also benefit least
13 bittern and white-faced ibis (BDCP Chapter 3, *Conservation Strategy*).

- 14 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
15 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 16 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
17 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
18 associated with CM10).
- 19 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
20 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).

21 As explained below, with the restoration or protection of these amounts of habitat, in addition to
22 management activities that would enhance habitat for these species and implementation of AMM1-
23 AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on least bittern and
24 white-faced ibis would not be adverse for NEPA purposes and would be less than significant for
25 CEQA purposes.

1 **Table 12-1A-50. Changes in Least Bittern and White-Faced Ibis Modeled Habitat Associated with**
2 **Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	0	0	77	77	NA	NA
Total Impacts CM1		0	0	77	77	NA	NA
CM2–CM18	Nesting	5,134	13,063	45	45	961–2,672	NA
Total Impacts CM2–CM18		5,134	13,063	45	45	961–2,672	NA
TOTAL IMPACTS		5,134	13,063	122	122	961–2,672	NA

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-134: Loss or Conversion of Habitat for and Direct Mortality of Least Bittern and**
5 **White-Faced Ibis**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss
7 of up to 13,185 acres of modeled habitat for least bittern and white-faced ibis (13,063 acres of
8 permanent loss and 122 of temporary loss, Table 12-1A-50). Conservation measures that would
9 result in these losses are conveyance facilities and transmission line construction, and establishment
10 and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), and tidal
11 habitat restoration (CM4). Habitat enhancement and management activities (CM11), which would
12 include ground disturbance and removal of nonnative vegetation, could result in local adverse
13 habitat effects. In addition, maintenance activities associated with the long-term operation of the
14 water conveyance facilities and other BDCP physical facilities could degrade or eliminate least
15 bittern and white-faced ibis habitat. Each of these individual activities is described below. A
16 summary statement of the combined impacts, NEPA effects, and a CEQA conclusion follow the
17 individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
19 result in the temporary loss of up to 77 acres of modeled least bittern and white-faced ibis
20 habitat from CZ 4. The construction footprint for CM1 does not overlap with any occurrences of
21 least bittern or white-faced ibis. Refer to the Terrestrial Biology Map Book for a detailed view of
22 Alternative 1A construction locations. Impacts from CM1 would occur within the first 10 years
23 of Alternative 1A implementation.
- 24 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
25 would permanently remove 55 acres of modeled least bittern and white-faced ibis habitat in the

1 Yolo Bypass in CZ 2. In addition, 45 acres of habitat would be temporarily removed. The loss is
2 expected to occur during the first 10 years of Alternative 1A implementation.

- 3 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
4 inundation would permanently remove an estimated 13,008 acres of modeled least bittern and
5 white-faced ibis habitat in CZ 2, 4, and 11 by the late long-term time period.
- 6 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
7 actions included in CM11 that are designed to enhance wildlife values in restored or protected
8 habitats could result in localized ground disturbances that could temporarily remove small
9 amounts of least bittern and white-faced ibis habitat. Ground-disturbing activities, such as
10 removal of nonnative vegetation and road and other infrastructure maintenance activities,
11 would be expected to have minor adverse effects on available least bittern and white-faced ibis
12 habitat.
- 13 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
14 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
15 disturbances that could affect least bittern and white-faced ibis use of the surrounding habitat.
16 Maintenance activities would include vegetation management, levee and structure repair, and
17 re-grading of roads and permanent work areas. These effects, however, would be reduced by
18 AMM1–AMM7 described below and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
19 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to further reduce
20 potential effects.
- 21 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
22 direct mortality of least bittern and white-faced ibis because adults and fledged young would be
23 expected to avoid contact with construction and other equipment. However, if either species
24 were to nest in the construction area, equipment operation, noise and visual disturbances could
25 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings.
26 Mitigation Measure BIO-75 would be available to address these potential effects.

27 The following paragraphs summarize the combined effects discussed above and describe other
28 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
29 included.

30 ***Near-Term Timeframe***

31 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
32 the near-term BDCP conservation strategy has been evaluated to determine whether it would
33 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
34 effects of construction would not be adverse under NEPA. The Plan would remove 5,256 acres of
35 modeled habitat for least bittern and white-faced ibis in the study area in the near-term (5,134 acres
36 of permanent loss, and 122 acres of temporary loss). These effects would result from the
37 construction of the water conveyance facilities (CM1, 77 acres), and the implementation of other
38 conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration [CM4]
39 5,179 acres).

40 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
41 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using
42 these ratios would indicate that 77 acres of habitat should be restored and 77 acres of habitat
43 should be protected to compensate for the CM1 losses of 77 acres of least bittern and white-faced

1 ibis habitat. The near-term effects of other conservation actions would remove 5,179 acres of
2 modeled habitat, and therefore require 5,179 acres of restoration and 5,179 acres of protection of
3 least bittern and white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for
4 restoration and 1:1 for protection).

5 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
6 wetland and protecting and enhancing 4,800 acres of managed wetland in the Plan Area (Table 3-4
7 in Chapter 3). These conservation actions are associated with CM4 and CM3 and would occur in the
8 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
9 habitat loss on least bittern and white-faced ibis. The tidal freshwater emergent wetland would be
10 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*
11 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that
12 increase connectivity among protected lands (Objective TFEWNC2.2). The 4,800 acres of managed
13 wetland would be protected and enhanced in CZ 11 and would benefit these species through the
14 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
15 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
16 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). In addition, at
17 least 400 acres of nontidal marsh would be created, some of which would provide nesting habitat
18 for least bittern and white-faced ibis. These Plan objectives represent performance standards for
19 considering the effectiveness of restoration and protection actions. The acres of restoration and
20 protection contained in the near-term Plan goals satisfy the typical mitigation that would be applied
21 to the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation
22 measures.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
26 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
27 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
28 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
29 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
30 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
31 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
32 noncovered avian species would be required to ensure that nests are detected and avoided.

33 ***Late Long-Term Timeframe***

34 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 13,185
35 acres (13,063 acres of permanent loss, 122 acres of temporary loss) of least bittern and white-faced
36 ibis habitat during the term of the Plan. The locations of these losses are described above in the
37 analyses of individual conservation measures. The Plan includes conservation commitments
38 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
39 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200
40 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres
41 of managed wetland would be protected and enhanced in CZ 11.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
2 *these AMMs include elements that avoid or minimize the risk of affecting individuals and species*
3 *habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which*
4 *have since been updated and which are provided in Appendix 3B, *Environmental Commitments,**
5 *AMMs, and CMs, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species*
6 *under the BDCP. For the BDCP not to have an adverse effect on individuals, preconstruction surveys*
7 *for noncovered avian species would be required to ensure that nests are detected and avoided.*

8 **NEPA Effects:** The loss of least bittern and white-faced ibis habitat and potential mortality of these
9 special-status species under Alternative 1A would represent an adverse effect in the absence of
10 other conservation actions. However, with the habitat protection and restoration associated with
11 CM3, CM4, CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7,
12 which would be in place during all project activities, the effects of habitat loss on least bittern and
13 white-faced ibis would not be adverse under Alternative 1A. Least bittern and white-faced ibis are
14 not covered species under the BDCP and the potential for mortality would be an adverse effect
15 without preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure
16 BIO-75 would be available to address this effect.

17 **CEQA Conclusion:**

18 ***Near-Term Timeframe***

19 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
20 the near-term BDCP conservation strategy has been evaluated to determine whether it would
21 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
22 impacts of construction would be less than significant under CEQA. The Plan would remove 5,256
23 acres of modeled habitat for least bittern and white-faced ibis in the study area in the near-term
24 (5,134 acres of permanent loss, and 122 acres of temporary loss). These effects would result from
25 the construction of the water conveyance facilities (CM1, 77 acres), and the implementation of other
26 conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration [CM4]
27 5,179 acres).

28 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
29 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using
30 these ratios would indicate that 77 acres of habitat should be restored and 77 acres of habitat
31 should be protected to compensate for the CM1 losses of 77 acres of least bittern and white-faced
32 ibis habitat. The near-term effects of other conservation actions would remove 5,179 acres of
33 modeled habitat, and therefore require 5,179 acres of restoration and 5,179 acres of protection of
34 least bittern and white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for
35 restoration and 1:1 for protection).

36 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal freshwater emergent
37 wetland and 4,800 acres of managed wetland in the Plan Area (Table 3-4 in Chapter 3). These
38 conservation actions are associated with CM4 and CM3 and would occur in the same timeframe as
39 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
40 least bittern and white-faced ibis. The tidal freshwater emergent wetland would be restored in CZs
41 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be
42 restored in a way that creates topographic heterogeneity and in areas that increase connectivity
43 among protected lands (Objective TFEWNC2.2). The 4,800 acres of managed wetland would be
44 protected and enhanced in CZ 11 and would benefit these species through the enhancement of

1 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists
2 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-
3 American bulrush plant associations (Objective MWNC1.1). In addition, at least 400 acres of nontidal
4 marsh would be created, some of which would provide nesting habitat for least bittern and white-
5 faced ibis. These Plan objectives represent performance standards for considering the effectiveness
6 of restoration and protection actions. The acres of restoration and protection contained in the near-
7 term Plan goals satisfy the typical mitigation that would be applied to the project-level effects of
8 CM1, as well as mitigate the near-term effects of the other conservation measures.

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
13 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
14 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
15 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
16 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
17 under the BDCP. For the BDCP to have a less-than-significant impact on individuals, preconstruction
18 surveys would be required to ensure that nests were detected and avoided. Mitigation Measure BIO-
19 *75 Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
20 reduce the potential impact on nesting least bittern and white-faced ibis to a less-than-significant
21 level.

22 **Late Long-Term Timeframe**

23 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 13,185
24 acres (13,063 acres of permanent loss, 122 acres of temporary loss) of least bittern and white-faced
25 ibis habitat during the term of the Plan. The locations of these losses are described above in the
26 analyses of individual conservation measures. The Plan includes conservation commitments
27 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
28 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200
29 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres
30 of managed wetland would be protected and enhanced in CZ 11.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
35 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
36 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
37 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
38 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
39 under the BDCP. To avoid a significant impact on individuals, preconstruction surveys for
40 noncovered avian species would be required to ensure that nests were detected and avoided.
41 Mitigation Measure BIO-75 would reduce the potential impact on nesting least bittern and white-
42 faced ibis and to a less-than-significant level.

43 Considering Alternative 1A's protection and restoration provisions, which would provide acreages
44 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to

1 construction and restoration activities, and with the implementation of AMM1–AMM7 and
2 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
3 *Nesting Birds*, the loss of habitat or direct mortality through implementation of Alternative 1A would
4 not result in a substantial adverse effect through habitat modifications and would not substantially
5 reduce the number or restrict the range of the species. Therefore, the loss of habitat and potential
6 mortality under this alternative would have a less-than-significant impact on least bittern and
7 white-faced ibis.

8 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
9 **Disturbance of Nesting Birds**

10 See Mitigation Measure BIO-75 under Impact BIO-75.

11 **Impact BIO-135: Effects on Least Bittern and White-Faced Ibis Associated with Electrical**
12 **Transmission Facilities**

13 New transmission lines would increase the risk for bird-power line strikes, which could result in
14 injury or mortality of least bittern and white-faced ibis. Waterbirds have a higher susceptibility to
15 collisions than passerines, raptors, and other birds. Bitterns and ibises have a high wing loading/low
16 aspect ratio that limits their maneuverability and makes them more vulnerable to collisions than
17 more agile species are (see BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions*
18 *at Proposed BDCP Powerlines*). Marking transmission lines with flight diverters that make the lines
19 more visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
20 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
21 by 60%. All new project transmission lines would be fitted with flight diverters, which would reduce
22 bird strike risk of least bittern and white-faced ibis.

23 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
24 could result in injury or mortality of least bittern and white-faced ibis. Bitterns and ibises have a
25 high wing loading/low aspect ratio that limits their maneuverability and makes them more
26 vulnerable to collisions than more agile species are. The implementation of *AMM20 Greater Sandhill*
27 *Crane* would require the installation of bird flight diverters on all new transmission lines, which
28 could reduce bird strike risk of least bittern and white-faced ibis by 60%. With the installation of
29 bird flight diverters, the construction and operation of new transmission lines under Alternative 1A
30 would not result in an adverse effect on least bittern and white-faced ibis.

31 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
32 could result in injury or mortality of least bittern and white-faced ibis. Bitterns and ibises have a
33 high wing loading/low aspect ratio that limits their maneuverability and makes them more
34 vulnerable to collisions rather than more agile species. The implementation of *AMM20 Greater*
35 *Sandhill Crane* would require the installation of bird flight diverters on all new transmission lines,
36 which could reduce bird strike risk of least bittern and white-faced ibis by 60%. With the installation
37 of bird flight diverters, the construction and operation of new transmission lines under Alternative
38 1A would result in a less-than-significant impact on least bittern and white-faced ibis.

39 **Impact BIO-136: Indirect Effects of Plan Implementation on Least Bittern and White-Faced**
40 **Ibis**

41 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
42 with construction-related activities could result in temporary disturbances that affect least bittern

1 and white-faced ibis use of modeled habitat. Construction noise above background noise levels
 2 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
 3 (BDCP Appendix 5.J, Attachment 5).D, *Indirect Effects of the Construction of the BDCP Conveyance*
 4 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
 5 which these noise levels could affect least bittern or white-faced ibis. Indirect effects associated with
 6 construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and
 7 other ground-disturbing operations. Construction-related noise and visual disturbances could
 8 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could
 9 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*
 10 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize
 11 potential effects on active nests. The use of mechanical equipment during water conveyance
 12 facilities construction could cause the accidental release of petroleum or other contaminants that
 13 could affect these species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2*
 14 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such
 15 spills from occurring. The inadvertent discharge of sediment or excessive dust adjacent to least
 16 bittern and white-faced ibis could also have a negative effect on these species. AMM1–AMM7 would
 17 ensure that measures are in place to prevent runoff from the construction area and the negative
 18 effects of dust on wildlife adjacent to work areas.

19 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
 20 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
 21 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
 22 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
 23 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*
 24 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is
 25 a large amount of uncertainty with respect to species-specific effects. A detailed review of the
 26 methylmercury issues associated with implementation of the BDCP is contained in Appendix 11F,
 27 *Substantive BDCP Revisions*. The review includes an overview of the BDCP-related mechanisms that
 28 could result in increased mercury in the foodweb, and how exposure of individual species to
 29 mercury may occur based on feeding habits and where their habitat overlaps with the areas where
 30 mercury bioavailability could increase. Increased methylmercury associated with natural
 31 community and floodplain restoration could indirectly affect least bittern and white-faced ibis, via
 32 uptake in lower trophic levels (as described in Appendix 11F, *Substantive BDCP Revisions*).

33 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
 34 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
 35 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
 36 project-specific basis, where high potential for methylmercury production is identified that
 37 restoration design and adaptive management cannot fully address while also meeting restoration
 38 objectives, alternate restoration areas would be considered. CM12 would be implemented in
 39 coordination with other similar efforts to address mercury in the Delta, and specifically with the
 40 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
 41 following actions.

- 42 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
- 43 mercury methylation and bioavailability
- 44 ● Define design elements that minimize conditions conducive to generation of methylmercury in
- 45 restored areas.

- 1 • Define adaptive management strategies that can be implemented to monitor and minimize
2 actual postrestoration creation and mobilization of methylmercury.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex
8 classes within a species. In addition, the effect of selenium on a species can be confounded by
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
10 2009).

11 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
12 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
13 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
14 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
15 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
16 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
17 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
18 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
19 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
20 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
21 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
22 levels of selenium have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
24 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
25 exacerbate bioaccumulation of selenium in avian species, including least bittern and white-faced
26 ibis. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium,
27 and therefore increase avian exposure from ingestion of prey items with elevated selenium levels.
28 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
29 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
30 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
31 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
32 long-term increases in selenium concentrations in water in the Delta under any alternative.
33 However, it is difficult to determine whether the effects of potential increases in selenium
34 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to
35 adverse effects on least bittern and white-faced ibis.

36 Because of the uncertainty that exists at this programmatic level of review, there could be a
37 substantial effect on least bittern and white-faced ibis from increases in selenium associated with
38 restoration activities. This effect would be addressed through the implementation of *AMM27*
39 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
40 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
41 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
42 selenium management to reduce selenium concentrations and/or bioaccumulation would be
43 evaluated separately for each restoration effort as part of design and implementation. This
44 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
45 design schedule.

1 **NEPA Effects:** Indirect effects on least bittern and white-faced ibis as a result of constructing the
2 water conveyance facilities could have adverse effects on these species in the absence of other
3 conservation actions. However, the implementation of AMM1–AMM7 would help to reduce this
4 effect. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
5 *Disturbance of Nesting Birds*, would also be available to address the potential indirect effects of
6 construction on active nests. Tidal habitat restoration could result in increased exposure of least
7 bittern and white-faced ibis to selenium. This effect would be addressed through the
8 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
9 restoration design elements to reduce the potential for bioaccumulation of selenium and its
10 bioavailability in tidal habitats.

11 Increased methylmercury associated with natural community and floodplain restoration could
12 indirectly affect least bittern and white-faced ibis, via uptake in lower trophic levels (as described in
13 BDCP Appendix 5.D, *Contaminants*). However, it is unknown what concentrations of methylmercury
14 are harmful to the species, and the potential for increased exposure varies substantially within the
15 study area. Implementation of CM12 which contains measures to assess the amount of mercury
16 before project development, followed by appropriate design and adaptation management, would
17 minimize the potential for increased methylmercury exposure, and would result in no adverse effect
18 on least bittern and white-faced ibis.

19 **CEQA Conclusion:** Indirect effects of noise and visual disturbance, in addition to the potential for
20 hazardous spills or increased dust on least bittern and white-faced ibis and their habitat as a result
21 of plan implementation would represent a substantial adverse effect in the absence of other
22 conservation actions. This impact would be significant. The incorporation of AMM1–AMM7 into the
23 BDCP and the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
24 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant
25 level.

26 Tidal habitat restoration could result in increased exposure of least bittern and white-faced ibis to
27 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
28 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
29 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
30 implementation of tidal natural communities restoration or floodplain restoration could result in
31 increased exposure of least bittern and white-faced ibis to methylmercury in restored tidal areas.
32 However, it is unknown what concentrations of methylmercury are harmful to these species and the
33 potential for increased exposure varies substantially within the study area. Implementation of CM12
34 which contains measures to assess the amount of mercury before project development, followed by
35 appropriate design and adaptation management, would minimize the potential for increased
36 methylmercury exposure, and would result in no adverse effect on least bittern and white-faced ibis.

37 Indirect effects of plan implementation would represent an adverse effect on least bittern and
38 white-faced ibis in the absence of other conservation measures. This would be a significant impact.
39 With AMM1–AMM7, *AMM27 Selenium Management*, and CM12 in place, and with the
40 implementation of Mitigation Measure BIO-75, indirect effects of plan implementation would not
41 result in a substantial adverse effect through habitat modifications and would not substantially
42 reduce the number or restrict the range of either species. Therefore, the indirect effects of
43 Alternative 1A implementation would have a less-than-significant impact on least bittern and white-
44 faced ibis.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 See Mitigation Measure BIO-75 under Impact BIO-75.

4 **Impact BIO-137: Periodic Effects of Inundation on Least Bittern and White-Faced Ibis as a**
5 **Result of Implementation of Conservation Components**

6 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
7 *Enhancement*) would increase the frequency and duration of inundation on approximately 961–
8 2,672 acres of modeled least bittern and white-faced ibis habitat (Table 12-1A-50). However, no
9 adverse effects of increased inundation frequency on nesting habitat are expected because wetland
10 vegetation has persisted under the existing Yolo Bypass flooding regime, and changes to frequency
11 and inundation are within the tolerance of these vegetation types. Inundation would occur in the
12 nonbreeding season and wetlands supporting habitat would not be expected to be affected by flood
13 flows.

14 **NEPA Effects:** Periodic inundation of Yolo Bypass would not be expected to have adverse effects on
15 least bittern or white-faced ibis because wetland vegetation has persisted under the existing Yolo
16 Bypass flooding regime, and changes to frequency and duration of inundation would be within the
17 tolerance of these vegetation types.

18 **CEQA Conclusion:** Periodic inundation of Yolo Bypass would not be expected to have a significant
19 impact on least bittern or white-faced ibis because wetland vegetation has persisted under the
20 existing Yolo Bypass flooding regime, and changes to frequency and duration of inundation would be
21 within the tolerance of these vegetation types.

22 **Loggerhead Shrike**

23 This section describes the effects of Alternative 1A, including water conveyance facilities
24 construction and implementation of other conservation components, on loggerhead shrike. Modeled
25 habitat for loggerhead shrike includes both high-value and low-value modeled habitat. High-value
26 habitat includes grassland, vernal pool complex and alkali seasonal wetland natural communities in
27 addition to cultivated lands, including pasture and grain and hay crops. Breeding shrikes require
28 shrubs and tall trees for perching and nest placement, and are generally associated with riparian
29 edge grasslands (Humble 2008) or cultivated lands with associated trees and shrubs. Loggerhead
30 shrike modeled habitat is overestimated as it does not differentiate between lands with or without
31 associated nesting vegetation. Low-value habitat includes row crops such as truck and berry crops
32 and field crops which are not considered to be valuable habitat for the species but were included in
33 the model as they may provide foraging opportunities.

34 Construction and restoration associated with Alternative 1A conservation measures would result in
35 both temporary and permanent losses of modeled habitat for loggerhead shrike as indicated in
36 Table 12-1A-51. Full implementation of Alternative 1A would include the following biological
37 objectives over the term of the BDCP which would also benefit loggerhead shrike (BDCP Chapter 3,
38 *Conservation Strategy*).

- 39 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
40 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
41 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).

- 1 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 2 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
- 3 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 4 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
- 5 VPNC2.5, and GNC2.4, associated with CM11).
- 6 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
- 7 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 8 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
- 9 lands that occur in cultivated lands within the reserve system, including isolated valley oak
- 10 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
- 11 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
- 12 with CM3 and CM11).
- 13 • Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
- 14 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated
- 15 with CM11).

16 As explained below, with the restoration or protection of these amounts of habitat, in addition to
17 management activities that would enhance habitat for the species and implementation of AMM1-
18 AMM7 and Mitigation Measure BIO-75, impacts on loggerhead shrike would not be adverse for
19 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-51. Changes in Loggerhead Shrike Modeled Habitat Associated with Alternative 1A**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	1,660	1,660	673	673	NA	NA
	Low-value	1,573	1,573	616	616	NA	NA
Total Impacts CM1		3,233	3,233	1,289	1,289	NA	NA
CM2-CM18	High-value	5,450	26,198	376	893	777-2,423	3,823
	Low-value	1,801	17,575	97	624	672-1,996	4,315
Total Impacts CM2-CM18		7,251	43,723	474	1,517	1,830-5,646	8,138
Total High-value		7,110	27,858	1,049	1,566	777-2,423	3,823
Total Low-value		3,374	19,148	713	1,240	672-1,996	4,315
TOTAL IMPACTS		10,484	47,006	1,762	2,806	1,830-5,646	8,138

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-138: Loss or Conversion of Modeled Habitat for and Direct Mortality of**
5 **Loggerhead Shrike**

6 Alternative 1A conservation measures would result in the combined permanent loss or conversion
7 and temporary loss of up to 49,812 acres of modeled habitat for loggerhead shrike (29,424 acres of
8 which would be high-value habitat, Table 12-1A-51). Conservation measures that would result in
9 these losses are conveyance facilities and transmission line construction, and establishment and use
10 of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat
11 restoration (CM4), floodplain restoration (CM5), channel margin enhancement (CM6), riparian
12 restoration, (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9),
13 nontidal marsh restoration (CM10), natural communities enhancement and management (CM11)
14 and construction of conservation hatcheries (CM18). The majority of habitat loss (33,244 acres)
15 would result from CM4. Habitat enhancement and management activities (CM11), which include
16 ground disturbance or removal of nonnative vegetation, and the construction of recreational trails,
17 signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities
18 associated with the long-term operation of the water conveyance facilities and other BDCP physical
19 facilities could degrade or eliminate loggerhead shrike modeled habitat. Each of these individual
20 activities is described below. A summary statement of the combined impacts and NEPA effects, and a
21 CEQA conclusion follow the individual conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
2 result in the combined permanent and temporary loss of up to 2,333 acres of high-value
3 loggerhead shrike habitat (1,660 acres of permanent loss, 673 acres of temporary loss). In
4 addition, 2,189 acres of low-value habitat would be removed (1,573 acres of permanent loss or
5 conversion, 616 acres of temporary loss or conversion). The largest impact from CM1 on
6 loggerhead shrike habitat would occur in CZ 8, where there are larger stands of ruderal and
7 herbaceous vegetation and California annual grassland, which provides high-value habitat for
8 the species. Approximately 685 acres of impact would be from the new forebay constructed
9 south of Clifton Court Forebay and from the potential borrow and spoils site southwest of the
10 proposed forebay. Temporarily affected areas (grassland, cultivated lands, and associated
11 shrubs or trees) would be restored within 1 year following completion of construction activities
12 as described in *AMM10 Restoration of Temporarily Affected Natural Communities*. Loggerhead
13 shrikes nest in high abundance in shrubs associated with the grasslands to the south and to the
14 west of Clifton Court Forebay. Shrikes were detected using this area at a much higher rate than
15 other grasslands and areas in the Delta during DHCCP surveys (Appendix 12C, *2009 to 2011 Bay
16 Delta Conservation Plan EIR/EIS Environmental Data Report*). There are 4 loggerhead shrike
17 occurrences that intersect with the construction footprint for the new forebay. In addition, one
18 occurrence intersects with the footprint for a permanent transmission line south of the forebay.
19 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance
20 of Nesting Birds*, would require preconstruction surveys and the establishment of no-
21 disturbance buffers and would be available to address potential effects on nesting loggerhead
22 shrikes. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1A
23 construction locations. Construction of the water conveyance facilities would occur in the near-
24 term timeframe.
- 25 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries enhancement
26 would result in the combined permanent and temporary loss of up to 1,274 acres of high-value
27 loggerhead shrike habitat (898 acres of permanent loss, 376 acres of temporary loss) in the Yolo
28 Bypass in CZ 2. In addition, 182 acres of low-value habitat would be removed (85 acres of
29 permanent loss, 97 acres of temporary loss). The loss is expected to occur during the first 10
30 years of Alternative 1A implementation.
- 31 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
32 inundation would permanently remove an estimated 20,880 acres of high-value loggerhead
33 shrike habitat and 12,364 acres of low-value habitat. The majority of the acres lost would
34 consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the
35 vicinity of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of
36 Suisun Marsh, and along narrow bands adjacent to waterways in the South Delta ROA. Tidal
37 restoration would directly impact and fragment grassland just north of Rio Vista in and around
38 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses
39 of alkali seasonal wetland complex habitat would likely occur in the south end of the Yolo
40 Bypass and on the northern fringes of Suisun Marsh.
- 41 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
42 seasonally inundated floodplain would permanently and temporarily remove approximately
43 1,450 acres of high-value loggerhead shrike habitat (933 permanent, 517 temporary). These
44 losses would be expected after the first 10 years of Alternative 1A implementation along the San
45 Joaquin River and other major waterways in CZ 7.

- 1 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
2 approximately 370 acres of high-value loggerhead shrike habitat as part of tidal restoration and
3 1,489 acres as part of seasonal floodplain restoration. In addition, 503 acres of low-value habitat
4 would be removed as a part of tidal restoration and 1,971 acres would be removed as part of
5 seasonal floodplain restoration through CM7.

- 6 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
7 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
8 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
9 would be restored after the construction periods. Grassland restoration would be implemented
10 on agricultural lands that also provide habitat for loggerhead shrike and would result in the
11 conversion of 1,849 acres of cultivated lands to high-value grassland.

- 12 ● *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
13 removal of 705 acres of high-value loggerhead shrike habitat and 735 acres of low-value
14 loggerhead shrike habitat.

- 15 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
16 actions included in CM11 that are designed to enhance wildlife values in restored or protected
17 habitats could result in localized ground disturbances that could temporarily remove small
18 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
19 vegetation and road and other infrastructure maintenance activities, would be expected to have
20 minor adverse effects on available habitat and would be expected to result in overall
21 improvements to and maintenance of habitat values over the term of the BDCP. Fences (e.g.
22 barbed wire) installed as part of CM11 in or adjacent to protected grasslands and cultivated
23 lands could benefit loggerhead shrike by providing hunting perches and impalement
24 opportunities. CM11 would also include the construction of recreational-related facilities
25 including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and*
26 *Associated Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic
27 areas, bathrooms, etc. would be placed on existing, disturbed areas when and where possible.
28 However, approximately 50 acres of grassland habitat would be lost from the construction of
29 trails and facilities.

- 30 Habitat management- and enhancement-related activities could disturb loggerhead shrike nests.
31 If the species were to nest in the vicinity of a worksite, equipment operation could destroy nests
32 if shrubs and trees in grasslands or cultivated lands were removed, and noise and visual
33 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings.
34 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
35 *of Nesting Birds*, would be available to address these potential effects.

- 36 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
37 value loggerhead shrike habitat for the development of a delta and longfin smelt conservation
38 hatchery in CZ 1. Hatchery construction is expected to occur within the first 10 years of Plan
39 implementation.

- 40 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
41 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
42 disturbances that could affect loggerhead shrike use of the surrounding habitat. Maintenance
43 activities would include vegetation management, levee and structure repair, and re-grading of
44 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7,
45 Mitigation Measure BIO-75, and conservation actions as described below.

- Injury and Direct Mortality: Construction-related activities would not be expected to result in direct mortality of adult or fledged loggerhead shrike if they were present in the Plan Area, because they would be expected to avoid contact with construction and other equipment. If either species were to nest in the construction area, construction-related activities, including equipment operation, noise and visual disturbances could destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be available to address these potential effects.

The following paragraphs summarize the combined effects discussed above and describe other BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also included.

Near-Term Timeframe

Because the water conveyance facilities construction (CM1) is being evaluated at the project level, the near-term BDCP conservation strategy has been evaluated to determine whether it would provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of construction would not be adverse under NEPA. The Plan would remove 8,159 acres (7,110 permanent, 1,049 temporary) of high-value habitat for loggerhead shrike in the study area in the near-term. These effects would result from the construction of the water conveyance facilities (CM1, 2,333 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres*). In addition, 4,087 acres of low-value habitat would be removed or converted in the near-term (CM1, 2,189 acres; *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management and CM18 Conservation Hatcheries—1,898 acres*).

The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected would be 2:1 protection of high-value habitat. Using this ratio would indicate that 4,666 acres should be protected to compensate for the loss of high-value habitat from CM1. The near-term effects of other conservation actions would require 11,652 acres of protection to compensate for the loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the loss of high-value habitat). The loss of low-value habitat would not require mitigation because a large proportion of the low-value habitat would result from the conversion and enhancement to high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively quickly after completion of construction.

The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur in the same timeframe as the construction and early restoration losses.

Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a

1 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
2 would create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce
3 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
4 *Enhancement and Management*, insect prey populations would be increased on protected lands,
5 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
6 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would
7 provide approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective
8 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and
9 protect small patches of trees and shrubs within cultivated lands that would maintain foraging
10 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows
11 along field borders and roadsides within protected cultivated lands would also provide high-value
12 nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to near-term goals
13 of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural community.
14 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
15 late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
16 *Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
17 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
18 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
19 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
20 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
21 nesting habitat for loggerhead shrike. These Plan objectives represent performance standards for
22 considering the effectiveness of conservation actions.

23 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
24 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
25 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
26 CM1 and other near-term effects on loggerhead shrike high-value habitat with the consideration
27 that some portion of the 15,400 acres of cultivated lands protected in the near-term timeframe
28 would include suitable high-value crop types for loggerhead shrike. Sufficient acreage of the
29 protected cultivated lands would need to be managed in pasture, alfalfa, or grain and hay crops such
30 that the near-term impacts on high-value habitat were compensated for at a ratio of 2:1. Mitigation
31 Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*,
32 would be available to address the effect of near-term, high-value habitat loss. The management and
33 enhancement of cultivated lands including insect prey enhancement through CM3 and CM11, the
34 protection of shrubs and establishment of hedgerows within protected cultivated lands would
35 compensate for any potential effect from the loss of low-value loggerhead shrike foraging habitat.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
40 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
41 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
42 been updated and which are provided in Appendix 3B of the Final EIR/EIS.

43 The loggerhead shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse
44 effect on individuals, preconstruction surveys for noncovered avian species would be required to
45 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*
46 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this effect.

1 **Late Long-Term Timeframe**

2 Alternative 1A as a whole would result in the combined permanent of and temporary effects on
 3 29,424 acres of high-value habitat and 20,388 acres of low-value loggerhead shrike habitat over the
 4 term of the Plan. The locations of these losses are described above in the analyses of individual
 5 conservation measures. The Plan includes conservation commitments through *CM3 Natural*
 6 *Communities Protection and Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8*
 7 *Grassland Natural Communities Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland*
 8 *Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community,
 9 protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex and
 10 protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife species
 11 (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and
 12 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, CZ 8, and CZ 11 would be
 13 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
 14 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
 15 pool natural communities which would create larger, more expansive patches of high-value habitat
 16 for loggerhead shrike and reduce the effects of current levels of habitat fragmentation. Under *CM11*
 17 *Natural Communities Enhancement and Management*, insect prey populations would be increased on
 18 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
 19 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife
 20 species would provide approximately 48,625 acres of potential high-value habitat for loggerhead
 21 shrike (Objective CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to
 22 maintain and protect small patches of trees and shrubs within cultivated lands that would maintain
 23 foraging perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide
 24 hedgerows along field borders and roadsides within protected cultivated lands would also provide
 25 high-value nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to
 26 near-term goals of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural
 27 community. Riparian areas would be restored, maintained, and enhanced to provide a mix of early-
 28 mid- and late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
 29 *Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
 30 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
 31 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
 32 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
 33 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
 34 nesting habitat for loggerhead shrike.

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 36 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 37 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 38 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM10*
 39 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that
 40 would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
 41 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
 42 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. The
 43 loggerhead shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse effect
 44 on individuals, preconstruction surveys for noncovered avian species would be required to ensure
 45 that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*

1 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this potential
2 effect.

3 **NEPA Effects:** The loss of loggerhead shrike habitat and potential for mortality of this special-status
4 species under Alternative 1A would represent an adverse effect in the absence of other conservation
5 actions. With habitat protection and restoration associated with CM3, CM8, CM9, and CM11, guided
6 by biological goals and objectives and by AMM1–AMM6, *AMM10 Restoration of Temporarily Affected*
7 *Natural Communities*, and *AMM18 Swainson's Hawk*, and with implementation of Mitigation Measure
8 BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*, which would
9 be available to guide the near-term protection and management of cultivated lands, the effects of
10 habitat loss on loggerhead shrike under Alternative 1A would not be adverse. Loggerhead shrike is
11 not a covered species under the BDCP and the potential for mortality would be an adverse effect
12 without preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure
13 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
14 be available to address this potential effect.

15 **CEQA Conclusion:**

16 ***Near-Term Timeframe***

17 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
18 the near-term BDCP conservation strategy has been evaluated to determine whether it would
19 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
20 effects of construction would be less than significant under CEQA. The Plan would remove 8,159
21 acres (7,110 permanent, 1,049 temporary) of high-value habitat for loggerhead shrike in the study
22 area in the near-term. These effects would result from the construction of the water conveyance
23 facilities (CM1, 2,333 acres), and implementing other conservation measures (*CM2 Yolo Bypass*
24 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*
25 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*
26 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*
27 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—5,826
28 acres). In addition, 4,087 acres of low-value habitat would be removed or converted in the near-
29 term (CM1, 2,189 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
30 *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community*
31 *Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural*
32 *Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—1,898 acres).

33 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
34 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 4,666 acres
35 should be protected to compensate for the loss of high-value habitat from CM1. The near-term
36 effects of other conservation actions would require 11,652 acres of protection to compensate for the
37 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the
38 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a
39 large proportion of the low-value habitat would result from the conversion and enhancement to
40 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively
41 quickly after completion of construction.

42 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
43 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
44 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4

1 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
2 in the same timeframe as the construction and early restoration losses.

3 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
4 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
5 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
6 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
7 would create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce
8 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
9 *Enhancement and Management*, insect prey populations would be increased on protected lands,
10 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
11 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would
12 provide approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective
13 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and
14 protect small patches of trees and shrubs within cultivated lands that would maintain foraging
15 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows
16 along field borders and roadsides within protected cultivated lands would also provide high-value
17 nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to near-term goals
18 of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural community.
19 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
20 late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
21 *Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
22 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
23 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
24 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
25 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
26 nesting habitat for loggerhead shrike. These Plan objectives represent performance standards for
27 considering the effectiveness of conservation actions.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
32 *Affected Natural Communities*. All of these AMMs include elements that would avoid or minimize the
33 risk of affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C
34 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
35 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

36 In the absence of other conservation actions, the effects on loggerhead shrike habitat would
37 represent an adverse effect as a result of habitat modification and potential direct mortality of a
38 special-status species. This impact would be significant. Loggerhead shrike is not a covered species
39 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
40 noncovered avian species would be required to ensure that nests are detected and avoided. The
41 combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex, and
42 alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
43 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
44 CM1 and other near-term effects on loggerhead shrike high-value habitat with the consideration
45 that some portion of the 15,400 acres of cultivated lands protected in the near-term timeframe
46 would include suitable high-value crop types for loggerhead shrike. Sufficient acreage of the

1 protected cultivated lands would need to be managed in pasture, alfalfa, or grain and hay crops such
 2 that the near-term impacts on high-value habitat were compensated for at a ratio of 2:1.

3 With the acres of habitat protection and restoration described above, in addition to Mitigation
 4 Measure BIO-138, *Compensate for the Near-term Loss of High-Value Loggerhead Shrike Habitat*,
 5 Alternative 1A would not result in a substantial adverse effect through loss of high-value habitat.
 6 The management and enhancement of cultivated lands including insect prey enhancement through
 7 CM3 and CM11, the protection of shrubs and establishment of hedgerows within protected
 8 cultivated lands would compensate for any potential substantial impact from the loss of low-value
 9 loggerhead shrike foraging habitat. In addition, AMM1-AMM7, and implementation of Mitigation
 10 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
 11 *Birds*, would avoid potentially significant impacts on nesting individuals. With these measures in
 12 place, Alternative 1A would not result in a substantial adverse effect through habitat modification
 13 and would not substantially reduce the number or restrict the range of either species. Therefore,
 14 Alternative 1A would have a less-than-significant impact on loggerhead shrike.

15 ***Late Long-Term Timeframe***

16 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 29,692
 17 acres of high-value loggerhead shrike habitat during the term of the Plan. In addition, 21,047 acres
 18 of low-value loggerhead shrike habitat would be impacted. The locations of these losses are
 19 described above in the analyses of individual conservation measures. The Plan includes
 20 conservation commitments through *CM3 Natural Communities Protection and Restoration*, *CM7*,
 21 *Riparian Natural Community Restoration*, *CM8 Grassland Natural Communities Restoration*, and *CM9*
 22 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore
 23 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex, protect 150
 24 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands that provide
 25 suitable habitat for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and
 26 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland
 27 protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and alkali seasonal wetland
 28 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
 29 grassland, alkali seasonal wetland, and vernal pool natural communities which would create larger,
 30 more expansive patches of high-value habitat for loggerhead shrike and reduce the effects of current
 31 levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*,
 32 insect prey populations would be increased on protected lands, enhancing the foraging value of
 33 these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that
 34 provide habitat for covered and other native wildlife species would provide approximately 48,625
 35 acres of potential high-value habitat for loggerhead shrike (Objective CLNC1.1). In addition, there is
 36 a commitment in the plan (Objective CLNC1.3) to maintain and protect small patches of trees and
 37 shrubs within cultivated lands that would maintain foraging perches and nesting habitat for the
 38 species. The establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides
 39 within protected cultivated lands would also provide high-value nesting habitat for loggerhead
 40 shrike (Objective SH2.2). The BDCP has committed to near-term goals of protecting 750 acres and
 41 restoring 800 acres of valley/foothill riparian natural community. Riparian areas would be restored,
 42 maintained, and enhanced to provide a mix of early-, mid- and late-successional habitat types with a
 43 well-developed understory of dense shrubs. *AMM18 Swainson's Hawk* includes a measure to plant
 44 large mature trees, including transplanting trees scheduled for removal. Trees would be planted in
 45 areas that support high-value Swainson's hawk foraging habitat within or adjacent to conserved
 46 cultivated lands, or as a component of the riparian restoration where they are in close proximity to

1 suitable foraging habitat. Locating tree plantings and riparian restoration adjacent to Swainson's
2 hawk foraging habitat would also provide suitable nesting habitat for loggerhead shrike.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
7 *Affected Natural Communities*. All of these AMMs include elements that would avoid or minimize the
8 risk of affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C
9 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
10 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. The loggerhead shrike is not a
11 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
12 preconstruction surveys for noncovered avian species would be required to ensure that nests are
13 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
14 *Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a less-than-significant
15 level.

16 In the absence of other conservation actions, the effects on loggerhead shrike habitat would
17 represent an adverse effect as a result of habitat modification and potential direct mortality of a
18 special-status species. This impact would be significant. Considering Alternative 1A's protection and
19 restoration provisions, which would provide acreages of new high-value or enhanced habitat in
20 amounts suitable to compensate for habitats lost to construction and restoration activities, and with
21 the implementation of AMM1-AMM7, Mitigation Measure BIO-75, and Mitigation Measure BIO-138,
22 *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*, the loss of habitat and
23 direct mortality through implementation of Alternative 1A would not result in a substantial adverse
24 effect through habitat modifications and would not substantially reduce the number or restrict the
25 range of the species. Therefore, the loss of habitat and potential mortality under this alternative
26 would have a less-than-significant impact on loggerhead shrike.

27 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
28 **Disturbance of Nesting Birds**

29 See Mitigation Measure BIO-75 under Impact BIO-75.

30 **Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value**
31 **Loggerhead Shrike Habitat**

32 Because the BDCP does not include acreage commitments for the protection of crop types in the
33 near-term time period, DWR will manage and protect sufficient acres of cultivated lands such as
34 pasture, grain and hay crops, or alfalfa as high-value loggerhead shrike habitat such that the
35 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of
36 2:1. Additional grassland protection, enhancement, and management may be substituted for the
37 protection of high-value cultivated lands.

38 **Impact BIO-139: Effects on Loggerhead Shrike Associated with Electrical Transmission**
39 **Facilities**

40 Loggerhead shrike's small, relatively maneuverable body, its lack of flocking behavior, and its
41 diurnal foraging behavior contribute to a low risk of collision with the proposed transmission lines.
42 Marking transmission lines with flight diverters that make the lines more visible to birds has been

1 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). For example, Yee
2 (2008) estimated that marking devices in the Central Valley could reduce avian mortality by 60%.
3 As described in *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted
4 with flight diverters, which would substantially reduce any potential for mortality of loggerhead
5 shrike individuals from powerline collisions.

6 **NEPA Effects:** Loggerhead shrike's small, relatively maneuverable body, its lack of flocking behavior,
7 and its diurnal foraging behavior contribute to a low risk of collision with the proposed
8 transmission lines. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird
9 strike diverters on all new transmission lines, which would substantially reduce the risk of bird
10 strike for loggerhead shrike from the project. Therefore, the construction and operation of new
11 transmission lines under Alternative 1A would not result in an adverse effect on loggerhead shrike.

12 **CEQA Conclusion:** Loggerhead shrike's small, relatively maneuverable body, its lack of flocking
13 behavior, and its diurnal foraging behavior contribute to a low risk of collision with the proposed
14 transmission lines. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird
15 strike diverters on all new transmission lines, which would substantially reduce the risk of bird
16 strike for loggerhead shrike from the project. Therefore, the construction and operation of new
17 transmission lines under Alternative 1A would result in a less-than-significant impact on loggerhead
18 shrike.

19 **Impact BIO-140: Indirect Effects of Plan Implementation on Loggerhead Shrike**

20 Noise and visual disturbances associated with construction-related activities could result in
21 temporary disturbances that affect loggerhead shrike use of modeled habitat. Construction noise
22 above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge
23 of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*
24 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to
25 determine the extent to which these noise levels could affect loggerhead shrike. Indirect effects
26 associated with construction include noise, dust, and visual disturbance caused by grading, filling,
27 contouring, and other ground-disturbing operations. Construction-related noise and visual
28 disturbances could disrupt nesting and foraging behaviors, and reduce the functions of suitable
29 habitat which could result in an adverse effect on these species. Indirect effects from construction of
30 the new forebay in CZ 8 could result in substantial effects on active loggerhead shrike nests. DHCCP
31 surveys in 2009 detected 10 nest sites south-west of the Clifton Court Forebay (Appendix 12C, *2009*
32 *to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*) and the large expanses of
33 grassland in CZ 8 provide high-value nesting habitat for the species. Mitigation Measure BIO-75,
34 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
35 available to minimize potential effects on active nests. The use of mechanical equipment during
36 water conveyance facilities construction could cause the accidental release of petroleum or other
37 contaminants that could affect these species or their prey in the surrounding habitat. AMM1-AMM7,
38 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the
39 likelihood of such spills. The inadvertent discharge of sediment or excessive dust adjacent to
40 loggerhead shrike nesting habitat could also have a negative effect on these species. AMM1-AMM7
41 would ensure that measures are in place to prevent runoff from the construction area and the
42 negative effects of dust on wildlife adjacent to work areas.

43 **NEPA Effects:** Indirect effects on loggerhead shrike as a result of Plan implementation could have
44 adverse effects on these species through the modification of habitat and potential for direct

1 mortality. The loggerhead shrike is not a covered species under the BDCP and the potential for
2 mortality would be adverse without preconstruction surveys to ensure that nests are detected and
3 avoided. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting
4 loggerhead shrikes in the highly suitable habitat surrounding Clifton Court Forebay and adjacent to
5 work areas. In conjunction with AMM1–AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction*
6 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this
7 potential effect.

8 **CEQA Conclusion:** Indirect effects on loggerhead shrike as a result of Alternative 1A implementation
9 could have a significant impact on these species. Construction of the new forebay in CZ 8 would have
10 the potential to disrupt nesting loggerhead shrikes in the highly suitable habitat surrounding Clifton
11 Court Forebay and adjacent to work areas. The incorporation of AMM1–AMM7 into the BDCP and
12 the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
13 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

14 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 15 **Disturbance of Nesting Birds**

16 See Mitigation Measure BIO-75 under Impact BIO-75.

17 **Impact BIO-141: Periodic Effects of Inundation on Loggerhead Shrike as a Result of** 18 **Implementation of Conservation Components**

19 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
20 *Enhancement*) would increase the frequency and duration of inundation on 1,830–5,646 acres of
21 modeled loggerhead shrike habitat (consisting of approximately 777–2,423 acres of high-value
22 habitat; Table 12-1A-51).

23 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
24 *Restoration*, could result in the periodic inundation of up to approximately 8,138 acres of modeled
25 habitat (Table 12-1A-51), consisting of 3,823 acres of high-value and 4,315 acres of low-value
26 habitat.

27 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
28 season due to periodic inundation. However, increased frequency and duration of inundation would
29 occur during the nonbreeding season.

30 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on loggerhead
31 shrike from the modification of habitat. Reduced foraging habitat availability may be expected
32 during the fledgling period of the nesting season due to periodic inundation. However, increased
33 frequency and duration of inundation would occur during the nonbreeding season.

34 **CEQA Conclusion:** Periodic inundation of floodplains would have a less-than-significant impact on
35 loggerhead shrike from the modification of habitat. Reduced foraging habitat availability may be
36 expected during the fledgling period of the nesting season due to periodic inundation. However,
37 increased frequency and duration of inundation would occur during the nonbreeding season.

38 **Song Sparrow “Modesto” Population**

39 This section describes the effects of Alternative 1A, including water conveyance facilities
40 construction and implementation of other conservation components, on Modesto song sparrow. The

1 Modesto song sparrow is common and ubiquitous throughout the study area, excluding CZ 11, and
2 modeled habitat for the species includes managed wetlands, tidal freshwater emergent, nontidal
3 freshwater emergent, and valley/foothill riparian vegetation communities.

4 Construction and restoration associated with Alternative 1A conservation measures would result in
5 both temporary and permanent removal of Modesto song sparrow habitat in the quantities
6 indicated in Table 12-1A-52. Full implementation of Alternative 1A would include the following
7 biological objectives over the term of the BDCP which would also benefit Modesto song sparrow
8 (BDCP Chapter 3, *Conservation Strategy*).

- 9 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
10 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
11 associated with CM7).
- 12 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
13 10 (Objective VFRNC1.2, associated with CM3).
- 14 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,
15 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 16 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
17 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
18 associated with CM10)
- 19 ● Create 500 acres of managed wetlands in CZ 3, 4, 5, or 6 (Objectives GSHC1.3 and GSHC1.4,
20 associated with CM10).
- 21 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
22 VPNC2.5, and GNC2.4, associated with CM11).
- 23 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
24 lands that occur in cultivated lands within the reserve system, including isolated valley oak
25 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
26 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
27 with CM3).
- 28 ● Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
29 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated
30 with CM3).

31 As explained below, with the restoration or protection of these amounts of habitat, in addition to
32 implementation of AMMs and Mitigation Measure BIO-75, impacts on Modesto song sparrow would
33 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-52. Changes in Modesto Song Sparrow Modeled Habitat Associated with Alternative**
2 **1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	70	70	116	116	NA	NA
Total Impacts CM1		70	70	116	116	NA	NA
CM2–CM18	Nesting	2,444	3,253	133	169	81–158	284
Total Impacts CM2–CM18		2,444	3,253	133	169	81–158	284
TOTAL IMPACTS		2,514	3,323	249	285	81–158	284

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-142: Loss or Conversion of Habitat for and Direct Mortality of Modesto Song**
5 **Sparrow**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss
7 of up to 3,608 acres of modeled habitat for Modesto song sparrow (3,323 acres of permanent loss
8 and 285 acres of temporary loss of habitat, Table 12-1A-52). Conservation measures that would
9 result in these losses are conveyance facilities and transmission line construction, and establishment
10 and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat
11 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management
12 activities (CM11), which would include ground disturbance and removal of nonnative vegetation,
13 could result in local adverse habitat effects. In addition, maintenance activities associated with the
14 long-term operation of the water conveyance facilities and other BDCP physical facilities could
15 degrade or eliminate Modesto song sparrow modeled habitat. Each of these individual activities is
16 described below. A summary statement of the combined impacts and NEPA effects, and a CEQA
17 conclusion follows the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
19 result in the combined permanent and temporary loss of up to 186 acres of modeled Modesto
20 song sparrow habitat (70 acres of permanent loss, 116 acres of temporary loss) from CZs 3–6 and
21 CZ 8. The CM1 construction footprint overlaps with nine Modesto song sparrow occurrences
22 and the species is ubiquitous throughout the Delta. The footprint for the new forebay overlaps
23 with three occurrences, and a temporary intake work area and temporary pipeline work area
24 overlap with 6 occurrences. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
25 *Surveys and Avoid Disturbance of Nesting Birds*, would require preconstruction surveys and the
26 establishment of no-disturbance buffers and would be available to address potential effects on

1 nesting Modesto song sparrows. Refer to the Terrestrial Biology Map Book for a detailed view of
2 Alternative 1A construction locations. Construction of the water conveyance facilities would
3 occur within the first 10 years of Alternative 1A implementation.

- 4 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
5 would permanently remove 143 acres of modeled Modesto song sparrow habitat in the Yolo
6 Bypass in CZ 2. In addition, 133 acres of habitat would be temporarily removed. These losses
7 would occur in the near-term timeframe and primarily consist of valley/foothill riparian natural
8 community and managed wetland. The loss is expected to occur during the first 10 years of
9 Alternative 1A implementation.
- 10 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
11 inundation would result in the conversion of an estimated loss of 3,066 acres of modeled
12 Modesto song sparrow habitat by the late long-term.
- 13 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
14 seasonally inundated floodplain would permanently and temporarily remove approximately 80
15 acres of modeled Modesto song sparrow habitat (44 permanent, 36 temporary). These losses
16 would be expected to occur along the San Joaquin River and other major waterways in CZ 7. The
17 BDCP is expected to restore approximately 5,000 acres of valley/foothill riparian natural
18 community. These lands would be managed as a mosaic of seral stages, age classes, and plant
19 heights, some of which would provide suitable nesting habitat for Modesto song sparrow.
- 20 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
21 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
22 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
23 activity would occur along waterway margins where riparian habitat stringers exist, including
24 levees and channel banks. The improvements would occur within the study area on sections of
25 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
26 Some of the restored riparian habitat in the channel margin would be expected to support
27 nesting habitat for Modesto song sparrow.
- 28 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
29 actions included in CM11 that are designed to enhance wildlife values in restored or protected
30 habitats could result in localized ground disturbances that could temporarily remove small
31 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
32 vegetation and road and other infrastructure maintenance activities, would be expected to have
33 minor adverse effects on available habitat and would be expected to result in overall
34 improvements to and maintenance of habitat values over the term of the BDCP.
35 Habitat management- and enhancement-related activities could affect Modesto song sparrow
36 nests. If the individuals were to nest in the vicinity of a worksite, equipment operation could
37 destroy nests, and noise and visual disturbances could lead to their abandonment, resulting in
38 mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
39 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address these
40 potential effects.
- 41 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
42 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
43 disturbances that could affect Modesto song sparrow use of the surrounding habitat.
44 Maintenance activities would include vegetation management, levee and structure repair, and

1 re-grading of roads and permanent work areas. These effects, however, would be reduced by
2 AMMs, and conservation actions as described below.

- 3 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
4 direct mortality of adult or fledged Modesto song sparrow if they were present in the Plan Area,
5 because they would be expected to avoid contact with construction and other equipment. If
6 either species were to nest in the construction area, construction-related activities, including
7 equipment operation, noise and visual disturbances could destroy nests or lead to their
8 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be
9 available to address these potential effects.

10 The following paragraphs summarize the combined effects discussed above and describe other
11 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
12 also included.

13 ***Near-Term Timeframe***

14 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
15 the near-term BDCP conservation strategy has been evaluated to determine whether it would
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
17 effects of construction would not be adverse under NEPA. The Plan would remove 2,763 acres of
18 modeled habitat (2,514 permanent, 249 temporary) for Modesto song sparrow in the study area in
19 the near-term. These effects would result from the construction of the water conveyance facilities
20 (CM1, 186 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
21 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*
22 *Restoration—2,577 acres).*

23 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
24 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios
25 would indicate that 186 acres of suitable habitat should be restored/created and 186 acres should
26 be protected to compensate for the CM1 losses of Modesto song sparrow habitat. The near-term
27 effects of other conservation actions would remove 2,577 acres of modeled habitat, and therefore
28 require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song sparrow
29 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1 for
30 protection).

31 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
32 valley/foothill riparian natural community, restoring 8,850 acres of tidal freshwater emergent
33 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the
34 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are
35 associated with CM3, CM4, CM7, and CM10 and would occur in the same timeframe as the
36 construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
37 Modesto song sparrow. The majority of the riparian restoration acres would occur in CZ 7 as part of
38 a reserve system with extensive wide bands or large patches of valley/foothill riparian natural
39 community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation Strategy*) and would
40 provide suitable Modesto song sparrow nesting habitat. The tidal freshwater emergent wetland
41 would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be restored in a
42 way that creates topographic heterogeneity and in areas that increase connectivity among protected
43 lands (Objective TFEWNC2.2). The nontidal marsh restoration would occur in CZs 2, 4, and/or 5, and
44 the managed wetland restoration would occur in CZs 3, 4, 5, or 6. Both the nontidal marsh and

1 managed wetland restoration are associated with CM10 and would provide nesting habitat for
2 Modesto song sparrow.

3 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated
4 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands
5 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field
6 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).
7 The management of protected grasslands to increase insect prey through techniques such as the
8 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
9 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
10 standards for considering the effectiveness of conservation actions. The acres of restoration and
11 protection contained in the near-term Plan goals and the additional detail in the biological objectives
12 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
13 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
18 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
19 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
20 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
21 of the Final EIR/EIS.

22 Modesto song sparrow is not a covered species under the BDCP. For the BDCP to avoid an adverse
23 effect on individuals, preconstruction surveys for noncovered avian species would be required to
24 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*
25 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this
26 potential effect.

27 **Late Long-Term Timeframe**

28 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 3,608
29 acres (3,323 acres of permanent loss, 285 acres of temporary loss) of modeled Modesto song
30 sparrow habitat during the term of the Plan. The locations of these losses are described above in the
31 analyses of individual conservation measures. The Plan includes conservation commitments
32 through *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities*
33 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of
34 the valley/foothill riparian natural community, restore 24,000 acres of tidal freshwater emergent
35 wetland, restore 500 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the
36 Plan Area (Table 3-4 in Chapter 3). Additional acres of valley/foothill riparian habitat would be
37 restored as a component of channel margin enhancement actions (CM6) along 20 miles of river and
38 slough channels in the Delta, some of which would be expected to support nesting habitat for
39 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of
40 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,
41 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives
42 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the
43 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would
44 provide suitable nesting habitat for Modesto song sparrow.

1 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
2 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas
3 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh
4 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in
5 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with
6 CM10 and would provide nesting habitat for Modesto song sparrow.

7 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands
8 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective
9 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and
10 roadsides, which would provide additional habitat for the species (Objective SH2.2). The
11 management of protected grasslands to increase insect prey through techniques such as the
12 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
13 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
14 standards for considering the effectiveness of conservation actions. The acres of restoration and
15 protection contained in the near-term Plan goals and the additional detail in the biological objectives
16 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
17 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
22 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
23 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
24 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
25 of the Final EIR/EIS. Modesto song sparrow is not a covered species under the BDCP. For the BDCP
26 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species
27 would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75,
28 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
29 available to address this potential effect.

30 **NEPA Effects:** The loss of Modesto song sparrow habitat and potential for mortality of this special-
31 status species under Alternative 1A would represent an adverse effect in the absence of other
32 conservation actions. With habitat protection and restoration associated with CM3, CM4, CM6, CM7,
33 and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in place
34 during all project activities, the effects of habitat loss on Modesto song sparrow under Alternative
35 1A would not be adverse. The Modesto song sparrow is not a covered species under the BDCP and
36 the potential for mortality would be an adverse effect without preconstruction surveys to ensure
37 that nests are detected and avoided. Mitigation Measure BIO-75 would be available to address this
38 effect.

39 **CEQA Conclusion:**

40 **Near-Term Timeframe**

41 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
42 the near-term BDCP conservation strategy has been evaluated to determine whether it would
43 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
44 effects of construction would be less than significant under CEQA. The Plan would remove 2,763

1 acres of modeled habitat (2,514 permanent, 249 temporary) for Modesto song sparrow in the study
 2 area in the near-term. These effects would result from the construction of the water conveyance
 3 facilities (CM1, 186 acres), and implementing other conservation measures (*CM2 Yolo Bypass*
 4 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated*
 5 *Floodplain Restoration*—2,577 acres).

6 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
 7 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios
 8 would indicate that 186 acres of suitable habitat should be restored/created and 186 acres should
 9 be protected to compensate for the CM1 losses of Modesto song sparrow habitat. The near-term
 10 effects of other conservation actions would remove 2,577 acres of modeled habitat, and therefore
 11 require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song sparrow
 12 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1 for
 13 protection).

14 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
 15 valley/foothill riparian natural community, restoring 8,850 acres of tidal freshwater emergent
 16 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the
 17 Plan Area (Table 3-4 in Chapter 3). These conservation actions are associated with CM3, CM4, CM7,
 18 and CM10 and would occur in the same timeframe as the construction and early restoration losses,
 19 thereby avoiding a significant impact of habitat loss on Modesto song sparrow. The majority of the
 20 riparian restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands
 21 or large patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2
 22 in BDCP Chapter 3, *Conservation Strategy*) and would provide suitable Modesto song sparrow
 23 nesting habitat. The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or
 24 7 (Objective TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity
 25 and in areas that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal
 26 marsh restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would
 27 occur in CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated
 28 with CM10 and would provide nesting habitat for Modesto song sparrow.

29 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated
 30 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands
 31 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field
 32 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).
 33 The management of protected grasslands to increase insect prey through techniques such as the
 34 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
 35 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
 36 standards for considering the effectiveness of conservation actions. The acres of restoration and
 37 protection contained in the near-term Plan goals and the additional detail in the biological objectives
 38 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
 39 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 41 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 42 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 43 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 44 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 45 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since

1 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
2 of the Final EIR/EIS. Modesto song sparrow is not a covered species under the BDCP. For the BDCP
3 to have a less-than-significant impact on individuals, preconstruction surveys for noncovered avian
4 species would be required to ensure that nests were detected and avoided. Implementation of
5 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
6 *Nesting Birds*, would reduce this impact to a less-than-significant level.

7 **Late Long-Term Timeframe**

8 Alternative 1A as a whole would result in the permanent loss of and temporary effects on 3,608
9 acres (3,323 acres of permanent loss, 285 acres of temporary loss) of modeled Modesto song
10 sparrow habitat during the term of the Plan. The locations of these losses are described above in the
11 analyses of individual conservation measures. The Plan includes conservation commitments
12 through *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities*
13 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of
14 the valley/foothill riparian natural community, restore 24,000 acres of tidal freshwater emergent
15 wetland, restore 500 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the
16 Plan Area (Table 3-4 in Chapter 3). Additional acres of valley/foothill riparian habitat would be
17 restored as a component of channel margin enhancement actions (CM6) along 20 miles of river and
18 slough channels in the Delta, some of which would be expected to support nesting habitat for
19 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of
20 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,
21 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives
22 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the
23 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would
24 provide suitable nesting habitat for Modesto song sparrow.

25 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
26 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas
27 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh
28 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in
29 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with
30 CM10 and would provide nesting habitat for Modesto song sparrow.

31 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands
32 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective
33 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and
34 roadsides, which would provide additional habitat for the species (Objective SH2.2). The
35 management of protected grasslands to increase insect prey through techniques such as the
36 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
37 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
38 standards for considering the effectiveness of conservation actions. The acres of restoration and
39 protection contained in the near-term Plan goals and the additional detail in the biological objectives
40 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
41 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
2 *these AMMs include elements that would avoid or minimize the risk of affecting individuals and*
3 *species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since*
4 *been updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs,*
5 *of the Final EIR/EIS. Modesto song sparrow is not a covered species under the BDCP. For the BDCP*
6 *to minimize direct mortality of individuals, preconstruction surveys for noncovered avian species*
7 *would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75,*
8 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would reduce*
9 *this impact to a less-than-significant level.*

10 Considering Alternative 1A's protection and restoration provisions, which would provide acreages
11 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
12 construction and restoration activities, and with the implementation of AMM1-AMM7 and
13 Mitigation Measure BIO-75, the loss of habitat or direct mortality through implementation of
14 Alternative 1A would not result in a substantial adverse effect through habitat modifications and
15 would not substantially reduce the number or restrict the range of either species. Therefore, the loss
16 of habitat or potential mortality under this alternative would have a less-than-significant impact on
17 Modesto song sparrow.

18 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
19 **Disturbance of Nesting Birds**

20 See Mitigation Measure BIO-75 under Impact BIO-75.

21 **Impact BIO-143: Effects on Modesto Song Sparrow Associated with Electrical Transmission**
22 **Facilities**

23 New transmission lines would increase the risk for bird-power line strikes, which could result in
24 injury or mortality of Modesto song sparrow. Existing lines currently pose this risk for Modesto song
25 sparrow and the incremental increased risk from the construction of new transmission lines is not
26 expected to adversely affect the population.

27 **NEPA Effects:** The incremental increased risk of bird-powerline strikes from the construction of new
28 transmission lines would not adversely affect the Modesto song sparrow population.

29 **CEQA Conclusion:** The incremental increased risk of bird-powerline strikes from the construction of
30 new transmission lines would have a less-than-significant impact on the Modesto song sparrow

31 **Impact BIO-144: Indirect Effects of Plan Implementation on Modesto Song Sparrow**

32 **Indirect construction-related effects:** Noise and visual disturbances associated with construction-
33 related activities could result in temporary disturbances that affect Modesto song sparrow use of
34 modeled habitat. Construction noise above background noise levels (greater than 50 dBA) could
35 extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment
36 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),
37 although there are no available data to determine the extent to which these noise levels could affect
38 Modesto song sparrow. Indirect effects associated with construction include noise, dust, and visual
39 disturbance caused by grading, filling, contouring, and other ground-disturbing operations.
40 Construction-related noise and visual disturbances could disrupt nesting and foraging behaviors,
41 and reduce the functions of suitable habitat which could result in an adverse effect on these species.

1 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
2 *Nesting Birds*, would be available to minimize potential effects on active nests. The use of mechanical
3 equipment during water conveyance construction could cause the accidental release of petroleum or
4 other contaminants that could affect these species or their prey in the surrounding habitat. AMM1–
5 AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would minimize
6 the likelihood of such spills. The inadvertent discharge of sediment or excessive dust adjacent to
7 Modesto song sparrow could also have a negative effect on these species. AMM1–AMM7 would
8 ensure that measures are in place to prevent runoff from the construction area and the negative
9 effects of dust on wildlife adjacent to work areas.

10 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
11 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
12 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
13 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
14 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*
15 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is
16 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury
17 associated with natural community and floodplain restoration could indirectly affect Modesto song
18 sparrow, via uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

19 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
20 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
21 *Management* includes provisions for project-specific Mercury Management Plans. Site-specific
22 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
23 adaptive management as described in CM12 would be available to address the uncertainty of
24 methylmercury levels in restored tidal marsh and potential effects on Modesto song sparrow.

25 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
26 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
27 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
28 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
29 2009). The effect of selenium toxicity differs widely between species and also between age and sex
30 classes within a species. In addition, the effect of selenium on a species can be confounded by
31 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
32 2009).

33 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
34 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the trophic level
35 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
36 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
37 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
38 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
39 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
40 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
41 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
42 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
43 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
44 have a higher risk of selenium toxicity.

1 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
2 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
3 exacerbate bioaccumulation of selenium in avian species, including Modesto song sparrow, and
4 floodplain restoration has the potential to mobilize selenium and, therefore, to increase avian
5 exposure from ingestion of prey items with elevated selenium levels. Thus, Alternative 1A
6 restoration activities that create newly inundated areas could increase bioavailability of selenium
7 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
8 concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to Existing
9 Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases
10 in selenium concentrations in water in the Delta under any alternative. However, it is difficult to
11 determine whether the effects of potential increases in selenium bioavailability associated with
12 restoration-related conservation measures (CM4 and CM5) would lead to adverse effects on
13 Modesto song sparrow.

14 Because of the uncertainty that exists at this programmatic level of review, there could be a
15 substantial effect on Modesto song sparrow from increases in selenium associated with restoration
16 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
17 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
18 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
19 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
20 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
21 separately for each restoration effort as part of design and implementation. This avoidance and
22 minimization measure would be implemented as part of the tidal habitat restoration design
23 schedule.

24 **NEPA Effects:** Indirect effects on Modesto song sparrow as a result of constructing the Alternative
25 1A water conveyance facilities could adversely affect individuals in the absence of other
26 conservation actions. The incorporation of AMM1–AMM7 into the BDCP and the implementation of
27 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
28 *Nesting Birds*, would minimize this potential effect.

29 The implementation of tidal natural communities restoration or floodplain restoration could result
30 in increased exposure of Modesto song sparrow to methylmercury. However, it is unknown what
31 concentrations of methylmercury are harmful to the species and the potential for increased
32 exposure varies substantially within the study area. Site-specific restoration plans that address the
33 creation and mobilization of mercury, as well as monitoring and adaptive management as described
34 in *CM12 Methylmercury Management* would address the potential impacts of methylmercury levels
35 in restored tidal marsh in the study area. The site-specific planning phase of marsh restoration
36 would be the appropriate place to assess the potential for risk of methylmercury exposure for
37 Modesto song sparrow, once site specific sampling and other information could be developed.

38 Tidal habitat restoration could result in increased exposure of Modesto song sparrow to selenium.
39 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
40 would provide specific tidal habitat restoration design elements to reduce the potential for
41 bioaccumulation of selenium and its bioavailability in tidal habitats.

42 **CEQA Conclusion:** Indirect effects on Modesto song sparrow as a result of constructing the water
43 conveyance facilities could have a significant impact on these species. The incorporation of AMM1–
44 AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*

1 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this
2 impact to a less-than-significant level. The implementation of tidal natural communities restoration
3 or floodplain restoration could result in increased exposure of Modesto song sparrow to
4 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the
5 species. Site-specific restoration plans that address the creation and mobilization of mercury, as well
6 as monitoring and adaptive management as described in *CM12 Methylmercury Management* would
7 address the potential impacts of methylmercury levels in restored tidal marsh in the study area.
8 Tidal habitat restoration could result in increased exposure of Modesto song sparrow to selenium.
9 With implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
10 restoration design elements to reduce the potential for bioaccumulation of selenium and its
11 bioavailability in tidal habitats, the impact of increased selenium exposure would be less than
12 significant.

13 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
14 **Disturbance of Nesting Birds**

15 See Mitigation Measure BIO-75 under Impact BIO-75.

16 **Impact BIO-145: Periodic Effects of Inundation on Modesto Song Sparrow as a Result of**
17 **Implementation of Conservation Components**

18 Flooding of the Yolo Bypass (CM2) would inundate 81-158 acres of modeled Modesto song sparrow
19 habitat. However, inundation would occur during the nonbreeding season. Reduced foraging habitat
20 availability would be expected during the fledgling period of the nesting season due to periodic
21 inundation.

22 Based on hypothetical floodplain restoration, construction of setback levees from seasonally
23 inundated floodplain restoration (CM5) could result in periodic inundation of up to approximately
24 284 acres of Modesto song sparrow modeled habitat (Table 12-1A-52).

25 The periodic inundation of the Yolo Bypass (CM2) and of seasonal floodplains (CM5) is expected to
26 restore a more natural flood regime in support of wetland and riparian vegetation types that
27 support Modesto song sparrow habitat, but may reduce the availability of nesting habitat during
28 years when flooding extends into the nesting season (after March).

29 **NEPA Effects:** Periodic effects of inundation would not result in an adverse effect on Modesto song
30 sparrow because increased frequency and duration of inundation would be expected to restore a
31 more natural flood regime in support of wetland and riparian vegetation types that provide Modesto
32 song sparrow habitat.

33 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on
34 Modesto song sparrow because increased frequency and duration of inundation would be expected
35 to restore a more natural flood regime in support of wetland and riparian vegetation types that
36 provide Modesto song sparrow habitat.

37 **Bank Swallow**

38 This section describes the effects of Alternative 1A, including construction and implementation of
39 other conservation components, on bank swallow. Bank swallows nest in colonies along rivers,
40 streams, or other water and require fine textured sandy soils in vertical banks to create their
41 burrows. There is little suitable habitat for bank swallow in the study area because most of the

1 erodible banks have been stabilized with of levee revetment. The placement of rock revetment
2 prevents the lateral migration of rivers, removing the natural river process that creates vertical
3 banks through erosion (Bank Swallow Technical Advisory Committee 2013, Stillwater Sciences
4 2007). An estimated 70–90% of the bank swallow population in California nests along the
5 Sacramento and Feather Rivers (Bank Swallow Technical Advisory Committee 2013) upstream of
6 the study area. However, there are three CNDDDB records of bank swallow colonies in the study area:
7 two in CZ 2 north of Fremont Weir, and one in CZ 5 on Brannan Island, just west of Twitchell Island.

8 The closest natural community to represent modeled habitat for bank swallow is valley foothill
9 riparian. Although there are impacts to the valley foothill riparian natural community along the
10 northeast corner of Clifton Court Forebay, at the intermediate forebay, and on Bouldin Island, it is
11 highly unlikely that the habitat in these locations is suitable for bank swallow (alluvial soils that
12 form steep, eroded banks that have not been stabilized with levee revetment). Reusable tunnel
13 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that the
14 substrate would provide suitable nesting habitat for the species. However, if reusable tunnel
15 material areas were to become suitable for swallows over time, Mitigation Measure BIO-146 *Active*
16 *Bank Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*,
17 would avoid impacts on nesting bank swallows by requiring surveys to be conducted prior to the
18 removal of reusable tunnel material. Construction and restoration associated with Alternative 1A
19 conservation measures would not result in the direct loss of modeled habitat for bank swallow
20 (Table 12-1A-53). However, indirect effects of noise and visual disturbance resulting from *CM2 Yolo*
21 *Bypass Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration* could impact bank
22 swallow colonies if they were present near work areas. In addition, there is uncertainty with respect
23 to how water flows upstream of the study area would affect bank swallow habitat.

24 As explained below, impacts on bank swallow would not be adverse for NEPA purposes and would
25 be less than significant for CEQA purposes with the implementation of mitigation measures to
26 monitor colonies and address the uncertainty of upstream operations on the species.

1 **Table 12-1A-53. Changes in Bank Swallow Habitat Associated with Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2–CM18	Nesting	0	0	0	0	0	0
Total Impacts CM2–CM18		0	0	0	0	0	0
TOTAL IMPACTS		0	0	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-146: Indirect Effects of Implementation of Conservation Components on Bank**
4 **Swallow**

5 Noise and visual disturbances during restoration activities from *CM2 Yolo Bypass Fisheries*
6 *Enhancement*, and *CM4 Tidal Natural Communities Restoration*, including operation of earthmoving
7 equipment and human activities at work sites, could result in temporary disturbances that cause
8 bank swallow to abandon active nest burrows adjacent to construction areas. Bank swallow colonies
9 with occupied burrows have been recorded in in CZ 2 and CZ 5 and construction-related
10 disturbances could result in an adverse effect on individuals. Various activities related to *CM11*
11 *Natural Communities Enhancement and Management* could also have indirect effects on bank
12 swallow. Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and Indirect*
13 *Effects on Bank Swallow Will Be Minimized*, would reduce these indirect effects on construction on
14 bank swallow.

15 **NEPA Effects:** Construction activities associated with habitat restoration could adversely affect bank
16 swallow colonies. Noise and visual disturbances could result in adverse effects on bank swallows if
17 active colonies were present within 500 feet of work areas. Mitigation Measure BIO-146, *Active Bank*
18 *Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would be
19 available to address this potential effect.

20 **CEQA Conclusion:** Construction activities associated with habitat restoration could result in a
21 significant impact on bank swallow colonies. Noise and visual disturbances could result in
22 significant impacts on bank swallows if active colonies were present within 500 feet of work areas.
23 Implementation of Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and*
24 *Indirect Effects on Bank Swallow Will Be Minimized*, would reduce this impact to a less-than-
25 significant level.

1 **Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect**
2 **Effects on Bank Swallow Will Be Minimized**

3 To the extent practicable, BDCP proponents will not construct conservation components during
4 the bank swallow nesting season (April 1 through August 31). If restoration activities cannot be
5 avoided during nesting season, a qualified biologist will conduct preconstruction surveys to
6 determine if active bank swallow nesting colonies are present within 500 feet of work areas. If
7 no active nesting colonies are present, no further mitigation is required. Reusable tunnel
8 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that
9 the substrate would provide suitable nesting habitat for the species. However, reusable tunnel
10 material sites could become suitable for swallows over time. Surveys of reusable tunnel material
11 areas that have been present for at least 1 year, allowing the substrate to stabilize, will be
12 conducted prior to the removal of reusable tunnel material.

13 If active colonies are detected, DWR will establish a nondisturbance buffer (determined by DWR
14 in consultation with CDFW and the Bank Swallow Technical Advisory Committee) around the
15 colony during the breeding season. In addition, a qualified biologist will monitor any active
16 colony within 500 feet of construction to ensure that construction activities do not affect nest
17 success.

18 **Impact BIO-147: Effects of Upstream Reservoir and Water Conveyance Facilities Operations**
19 **on Bank Swallow**

20 Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes
21 with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the
22 species is loss of nesting habitat from the placement of rock revetment for levee stabilization.

23 Because of this limited available habitat, and the reduction of natural river process, the species is
24 highly sensitive to 1) reductions in winter flows which are necessary to erode banks for habitat
25 creation, and 2) high flows during the breeding season. The potential impacts of changes in
26 upstream flows during the breeding season on bank swallows are the flooding of active burrows and
27 destruction of burrows from increased bank sloughing. Bank swallows arrive in California and begin
28 to excavate their burrows in March, and the peak egg-laying occurs during April and May (Bank
29 Swallow Technical Advisory Committee 2013). Therefore, increases in flows after the March when
30 the swallows have nested and layed eggs in the burrows could result in the loss of nests. On the
31 Sacramento River, breeding season flows between 14,000 and 30,000 cfs have been associated with
32 localized bank collapses which resulted in partial or complete colony failure (Stillwater Sciences
33 2007).

34 The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations
35 on the Sacramento (Sacramento River at Keswick, Sacramento River upstream of Red Bluff,
36 Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-
37 flow channel at Thermalito Dam, and Feather River at the confluence with the Sacramento River).
38 Flows were estimated for wet years, above normal years, below normal years, dry years, and critical
39 years. An average also was estimated (see Section 5.3.1, Chapter 5, *Water Supply*, for a description of
40 the model).

41 On the Sacramento River, at the Keswick and Red Bluff gauges, mean monthly flows under
42 Alternative 1A could increase between April and August in all but wet years at the Keswick flow
43 gauge based on modeling assumptions (Table 1 in Section 11C.1.1 of Appendix 11C, *CALSIM II Model*

1 *Results Utilized in the Fish Analysis*) and in dry and critical years at the gauge upstream of Red Bluff
 2 (Table 3 of Section 11C.1.1 in Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*)
 3 which could lead to inundation of active colonies. However, model outputs indicate that flows under
 4 Existing Conditions and the predicted flows in the late long-term without the project (NAA) also
 5 show increases in flows during the breeding season (April through August) in these water year
 6 types. Similar trends are shown for the Feather River (Table 15 in Section 11C.1.1 and Table 17 in
 7 Section 11C.1.1 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*). In addition, on
 8 the Sacramento River in average, above normal, and wet water years, flows at the Verona gauge are
 9 predicted to be greater than 14,000 cfs during some months of the breeding season, which could
 10 lead to bank collapse events (Tables 1, 3, and 7 in Section 11C.1.1 of Appendix 11C, *CALSIM II Model*
 11 *Results Utilized in the Fish Analysis*). However, flows of this height are recorded under Existing
 12 Conditions at this flow gauge and are also predicted for the late long-term time without the project
 13 (NAA).

14 **NEPA Effects:** High spring flows in the Sacramento and Feather Rivers may already be impacting
 15 bank swallow colonies during the breeding season, and predicted flows under Alternative 1A would
 16 not differ substantially from those under the No Action Alternative. However, because of the
 17 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding
 18 the potential for and magnitude of upstream impacts on bank swallow resulting from changes in
 19 operations. Soil type, high winter flows, and low spring flows all contribute to successful nesting of
 20 bank swallow, and even moderate changes in seasonal flows could have an adverse effect on
 21 breeding success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and*
 22 *Evaluate Winter and Spring Flows Upstream of the Study Area*, would be available to address the
 23 uncertainty of potential adverse upstream effects of operations on bank swallow.

24 **CEQA Conclusion:** High spring flows in the Sacramento and Feather Rivers may already be
 25 impacting bank swallow colonies during the breeding season, and predicted flows under Alternative
 26 1A would not differ substantially from those under the Existing Conditions. However, because of the
 27 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding
 28 the potential for and magnitude of upstream impacts on bank swallow resulting from changes in
 29 operations. There are many variables that dictate suitable habitat for the species that cannot be
 30 clearly quantified, and seasonal changes in flow could increase or decrease suitable habitat for bank
 31 swallow depending on soil type and location of current colonies. Implementation of Mitigation
 32 Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of*
 33 *the Study Area*, would address this potentially significant impact and further determine if additional
 34 mitigation is required for bank swallow.

35 **Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and**
 36 **Spring Flows Upstream of the Study Area**

37 To address the uncertainty of the impact of upstream spring flows on existing bank swallow
 38 habitat, DWR will continue to support annual monitoring¹ of existing colonies upstream of the
 39 study area. DWR will collect data to be used for quantifying the magnitude of flows that would
 40 result in loss of active nest sites or degradation of available nesting habitat, and the extent to

¹ Bank swallow colonies have historically been and are currently monitored by DWR, USFWS, and CDFW in association with the Bank Swallow Technical Advisory Committee, which is a diverse coalition of state and federal agency and nongovernmental organization personnel, created in response to the continued decline of bank swallow populations on the Sacramento River.

1 which changes in SWP operations attributable solely to the California WaterFix are the cause of
2 such impacts. If DWR determines that changes in SWP operations attributable solely to the
3 California WaterFix have caused loss of active nest sites or degradation of available nesting
4 habitat, replacement habitat will be established at a minimum of 2:1 for the length of bank
5 habitat affected. Replacement habitat will consist of removing bank revetment to create habitat
6 for bank swallow at a location subject to CDFW approval (Bank Swallow Technical Advisory
7 Committee 2013).

8 **Yellow-Headed Blackbird**

9 This section describes the effects of Alternative 1A, including water conveyance facilities
10 construction and implementation of other conservation components, on yellow-headed blackbird.
11 The habitat model used to assess impacts on yellow-headed blackbird includes nesting habitat and
12 foraging habitat. Modeled nesting habitat includes tidal freshwater emergent wetland, other natural
13 seasonal wetland, nontidal freshwater perennial emergent wetland, and managed wetland. These
14 natural communities support aquatic insects which are important prey items for yellow-headed
15 blackbird young (Beedy 2008). Modeled foraging habitat for yellow-headed blackbird consists of
16 cultivated lands and noncultivated land cover types known to support abundant insect populations,
17 including corn, pasture, and feedlots.

18 Construction and restoration associated with Alternative 1A conservation measures would result in
19 both temporary and permanent losses of yellow-headed blackbird modeled habitat as indicated in
20 Table 12-1A-54. Full implementation of Alternative 1A would include the following biological
21 objectives over the term of the BDCP which would also benefit yellow-headed blackbird (BDCP
22 Chapter 3, *Conservation Strategy*).

- 23 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
24 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 25 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
26 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
27 associated with CM10).
- 28 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
29 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 30 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
31 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
32 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 33 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 34 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
35 complex in CZs 1, 8, and/or 11 (Objective ASWNC1.1, Objective VPNC1.1, associated with CM3).
- 36 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
37 lands that occur in cultivated lands within the reserve system, including isolated valley oak
38 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
39 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
40 with CM3).
- 41 ● Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat in CZs 1, 2, 3,
42 4, 7, 8, or 11 (Objective TRBL1.3, associated with CM3).

- Maintain and protect the small patches of important wildlife habitats associated with cultivated lands that occur in cultivated lands within the reserve system, including isolated valley oak trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- Increase prey abundance and accessibility for grassland-foraging species (Objective GNC2.4, associated with CM11).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities to enhance habitats for the species and implementation of AMM1–AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on yellow-headed blackbird would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1A-54. Changes in Yellow-Headed Blackbird Modeled Habitat Associated with Alternative 1A (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	11	11	89	89	NA	NA
	Foraging	1,696	1,696	685	685	NA	NA
Total Impacts CM1		1,707	1,707	774	774	NA	NA
CM2–CM18	Nesting	5,814	13,902	45	46	961–2,678	18
	Foraging	5,612	26,673	376	905	368–1,476	2,701
Total Impacts CM2–CM18		11,426	40,575	421	951	1,495–4,394	2,719
Total Nesting		5,825	13,913	134	135	961–2,678	18
Total Foraging		7,308	28,369	1,061	1,590	368–1,476	2,701
TOTAL IMPACTS		13,133	42,282	1,195	1,725	1,495–4,394	2,719

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-148: Loss of Habitat for and Direct Mortality of Yellow-Headed Blackbird

Alternative 1A conservation measures would result in the combined permanent and temporary loss of up to 44,007 acres of modeled habitat (14,048 acres of nesting habitat and 29,959 acres of foraging habitat) for yellow-headed blackbird (Table 12-1A-54). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat

1 restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration
 2 (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat
 3 enhancement and management activities (CM11) which include ground disturbance or removal of
 4 nonnative vegetation could result in local adverse habitat effects. In addition, maintenance activities
 5 associated with the long-term operation of the water conveyance facilities and other BDCP physical
 6 facilities could degrade or eliminate yellow-headed blackbird suitable habitat. Each of these
 7 individual activities is described below. A summary statement of the combined impacts and NEPA
 8 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 9
 - 10 • *CM1 Water Conveyance Facilities and Operation*: Construction of Alternative 1A water
 11 conveyance facilities would result in the combined permanent and temporary loss of up to 100
 12 acres of yellow-headed blackbird nesting habitat (11 acres of permanent loss and 89 acres of
 13 temporary loss). In addition, 2,381 acres of foraging habitat would be removed (1,696 acres of
 14 permanent loss, 685 acres of temporary loss). (Table 12-1A-54). Activities that would impact
 15 suitable yellow-headed blackbird habitat consist of tunnel, forebay, and intake construction,
 16 temporary access roads, and construction of transmission lines. The largest losses of foraging
 17 habitat would occur from loss of corn. There are no occurrences of yellow-headed blackbird that
 18 overlap with the construction footprint for CM1. However, Mitigation Measure BIO-75, *Conduct*
 19 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would require
 20 preconstruction surveys and the establishment of no-disturbance buffers and would be
 21 available to address potential effects on yellow-headed blackbirds if they were to nest in or
 22 adjacent to construction areas. Impacts resulting from CM1 would occur in the central delta in
 23 CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8. Refer to the Terrestrial Biology Map Book for a detailed view of
 Alternative 1A construction locations.
 - 24 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 25 would result in the combined permanent and temporary loss of up to 100 acres of nesting
 26 habitat (55 acres of permanent loss, 45 acres of temporary loss) in the Yolo Bypass in CZ 2. In
 27 addition, 1,144 acres of foraging habitat would be removed (879 acres of permanent loss, 265
 28 acres of temporary loss). The loss is expected to occur during the first 10 years of Alternative 1A
 29 implementation.
 - 30 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation from CM4 would
 31 permanently remove or convert an estimated 13,847 acres of nesting habitat, which would
 32 consist primarily of managed wetland. In addition, 20,029 acres of foraging habitat would be
 33 lost or converted as a result of tidal restoration, over half of which would be from the loss or
 34 conversion of alfalfa. However, the resulting 65,000 acres of tidal natural communities would
 35 also provide habitat for the species, 24,000 acres of which would be tidal freshwater natural
 36 communities providing breeding habitat for yellow-headed blackbird.
 - 37 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 38 seasonally inundated floodplain and riparian restoration actions would remove approximately 2
 39 acres of yellow-headed blackbird nesting habitat (1 acres of permanent loss, 1 acres of
 40 temporary loss) and 1,641 acres of foraging habitat (1,051 acres of permanent loss, 590 acres of
 41 temporary loss). These losses would be expected after the first 10 years of Alternative 1A
 42 implementation along the San Joaquin River and other major waterways in CZ 7.
 - 43 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
 44 approximately 509 acres of yellow-headed blackbird foraging habitat as part of tidal restoration
 45 and 2,033 acres as part of seasonal floodplain restoration through CM7.

- 1 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
2 implemented on agricultural lands and would result in the conversion of 926 acres of yellow-
3 headed blackbird agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,
4 and 11. If agricultural lands supporting higher value foraging habitat than the restored
5 grassland were removed, there would be a loss of foraging habitat value.
- 6 ● CM8 would result in the restoration of 2,000 acres of grassland foraging habitat in the study
7 area.
- 8 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would
9 result in the permanent conversion of 988 acres of cultivated lands foraging habitat to nontidal
10 marsh in CZ 2 and CZ 4. Yellow-headed blackbird nesting habitat may develop along the margins
11 of restored nontidal marsh and restoration would also provide foraging habitat for the species.
- 12 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
13 enhancement-related activities could disturb yellow-headed blackbird nests if they were
14 present near work sites. A variety of habitat management actions included in CM11 that are
15 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground
16 disturbances that could temporarily remove small amounts of yellow-headed blackbird habitat
17 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,
18 such as removal of nonnative vegetation and road and other infrastructure maintenance, would
19 be expected to have minor effects on available yellow-headed blackbird habitat. These effects
20 cannot be quantified, but are expected to be minimal and would be avoided and minimized by
21 the AMMs listed below. CM11 would also include the construction of recreational-related
22 facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities*
23 *and Associated Federal Actions*). The construction of trailhead facilities, signs, staging areas,
24 picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when and where
25 possible. However, approximately 50 acres of grassland foraging habitat would be lost from the
26 construction of trails and facilities.
- 27 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
28 yellow-headed blackbird foraging habitat for the development of a delta and longfin smelt
29 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan
30 implementation.
- 31 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
32 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
33 disturbances that could affect yellow-headed blackbird use of the surrounding habitat.
34 Maintenance activities would include vegetation management, levee and structure repair, and
35 re-grading of roads and permanent work areas. These effects, however, would be reduced by
36 AMMs and conservation actions as described below.
- 37 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in
38 direct mortality of adult or fledged yellow-headed blackbird if they were present in the Plan
39 Area, because they would be expected to avoid contact with construction and other equipment.
40 If yellow-headed blackbird were to nest in the construction area, construction-related activities,
41 including equipment operation, noise and visual disturbances could destroy nests or lead to
42 their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75,
43 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
44 available to address these potential effects on yellow-headed blackbird.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
3 included.

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
8 effects of construction would not be adverse under NEPA. The Plan would remove 5,959 acres
9 (5,825 acres of permanent loss, 134 acres of temporary loss) of yellow-headed blackbird nesting
10 habitat in the study area in the near-term. These effects would result from the construction of the
11 water conveyance facilities (CM1, 100 acres), and implementing other conservation measures (CM2
12 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*
13 *Inundated Floodplain Restoration*—5,859 acres). In addition, 8,369 acres of yellow-headed blackbird
14 foraging habitat would be removed or converted in the near-term (CM1, 2,381 acres; CM2 *Yolo*
15 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5, *Seasonally*
16 *Inundated Floodplain Restoration*, CM7 *Riparian Natural Community Restoration*, CM8 *Grassland*
17 *Natural Community Restoration*, CM10 *Nontidal Marsh Restoration*, and CM18 *Conservation*
18 *Hatcheries*—5,988 acres).

19 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
20 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection
21 of foraging habitat. Using these ratios would indicate that 100 acres of nesting habitat should be
22 restored/created and 100 acres should be protected to compensate for the CM1 losses of yellow-
23 headed blackbird nesting habitat. In addition, 2,381 acres of foraging habitat should be protected to
24 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of
25 other conservation actions would require 5,859 acres each of restoration and protection of breeding
26 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA
27 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

28 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
29 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of
30 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,
31 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland
32 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3).
33 These conservation actions are associated with CM3, CM4, CM8, and CM10 and would occur in the
34 same timeframe as the construction and early restoration losses.

35 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
36 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
37 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
38 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and
39 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas
40 of bare ground or marsh where the predominant vegetation consists of invasive species such as
41 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant
42 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be
43 created, some of which would provide nesting habitat for the species.

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
2 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
3 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
4 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
5 would provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
6 abundance would also be increased on protected lands, enhancing the foraging value of these
7 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
8 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
9 hedgerows along field borders and roadsides within protected cultivated lands (Objective
10 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
11 wetlands would also be protected and maintained as part of the cultivated lands reserve system
12 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

13 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife
14 species would be protected in the near-term time period (Objective CLNC1.1), much of which would
15 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection
16 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the
17 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed
18 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
23 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
24 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
25 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
26 of the Final EIR/EIS. The yellow-headed blackbird is not a covered species under the BDCP. For the
27 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
28 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-
29 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
30 available to address this potential effect.

31 ***Late Long-Term Timeframe***

32 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres
33 of modeled foraging habitat for yellow-headed blackbird. Alternative 1A as a whole would result in
34 the permanent loss of and temporary effects on 14,048 acres of potential nesting habitat (17% of the
35 potential nesting habitat in the study area) and the loss or conversion of 29,959 acres of foraging
36 habitat (9% of the foraging habitat in the study area). The locations of these losses are described
37 above in the analyses of individual conservation measures.

38 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
39 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Communities*
40 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of
41 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,
42 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres
43 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of

1 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable
2 habitat for native wildlife species (Table 3-4 in Chapter 3).

3 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
4 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
5 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
6 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit
7 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground
8 or marsh where the predominant vegetation consists of invasive species such as perennial
9 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
10 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of
11 which would provide nesting habitat for the species.

12 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
13 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
14 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
15 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
16 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
17 abundance would also be increased on protected lands, enhancing the foraging value of these
18 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
19 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
20 hedgerows along field borders and roadsides within protected cultivated lands (Objective
21 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
22 wetlands would also be protected and maintained as part of the cultivated lands reserve system
23 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the
24 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time
25 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types
26 for tricolored blackbird (Table 3.3-6 in BDCP Chapter 3). These crop types include pasture,
27 sunflower, alfalfa, and other crop types that would provide high-value foraging habitat for yellow-
28 headed blackbird.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
33 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
34 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
35 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
36 of the Final EIR/EIS.

37 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
38 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
39 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
40 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
41 address this effect.

42 **NEPA Effects:** The loss of yellow-headed blackbird habitat and potential for direct mortality of this
43 special-status species associated with Alternative 1A would represent an adverse effect in the
44 absence of other conservation actions. With habitat protection and restoration associated with CM3,

1 CM4, CM8, CM10, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which
2 would be in place during all project activities, the effects of habitat loss would not be adverse under
3 Alternative 1A. The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP
4 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species
5 would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75,
6 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
7 available to address this effect.

8 **CEQA Conclusion:**

9 **Near-Term Timeframe**

10 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
11 the near-term BDCP conservation strategy has been evaluated to determine whether it would
12 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
13 effects of construction would be less than significant under CEQA. The Plan would remove 5,959
14 acres (5,825 acres of permanent loss, 134 acres of temporary loss) of yellow-headed blackbird
15 nesting habitat in the study area in the near-term. These effects would result from the construction
16 of the water conveyance facilities (CM1, 58 acres), and implementing other conservation measures
17 (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5
18 Seasonally Inundated Floodplain Restoration—5,859 acres). In addition, 8,369 acres of yellow-
19 headed blackbird foraging habitat would be removed or converted in the near-term (CM1, 2,381
20 acres; CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5
21 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8
22 Grassland Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation
23 Hatcheries—5,988 acres).

24 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
25 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection
26 of foraging habitat. Using these ratios would indicate that 100 acres of nesting habitat should be
27 restored/created and 100 acres should be protected to compensate for the CM1 losses of yellow-
28 headed blackbird nesting habitat. In addition, 2,381 acres of foraging habitat should be protected to
29 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of
30 other conservation actions would require 5,859 acres each of restoration and protection of breeding
31 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA
32 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

33 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
34 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of
35 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,
36 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland
37 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3).
38 These conservation actions are associated with CM3, CM4, CM8, and CM10 and would occur in the
39 same timeframe as the construction and early restoration losses.

40 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
41 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
42 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
43 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and
44 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas

1 of bare ground or marsh where the predominant vegetation consists of invasive species such as
2 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant
3 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be
4 created, some of which would provide nesting habitat for the species.

5 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
6 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
7 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
8 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
9 would provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
10 abundance would also be increased on protected lands, enhancing the foraging value of these
11 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
12 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
13 hedgerows along field borders and roadsides within protected cultivated lands (Objective
14 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
15 wetlands would also be protected and maintained as part of the cultivated lands reserve system
16 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

17 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife
18 species would be protected in the near-term time period (Objective CLNC1.1), much of which would
19 provide foraging habitat for yellow-headed blackbird.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
24 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
25 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
26 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
27 of the Final EIR/EIS.

28 In the absence of other conservation actions, the effects on yellow-headed blackbird habitat would
29 represent an adverse effect as a result of habitat modification and potential direct mortality of a
30 special-status species. This impact would be significant. Yellow-headed blackbird is not a covered
31 species under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction
32 surveys for noncovered avian species would be required to ensure that nests are detected and
33 avoided. The acres of restoration and protection contained in the near-term Plan goals and the
34 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
35 the project-level effects of CM1 on yellow-headed blackbird habitat, as well as mitigate the near-
36 term effects of the other conservation measures. With the acres of habitat protection and restoration
37 described above, in addition to AMM1–AMM7, and implementation of Mitigation Measure BIO-75,
38 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, Alternative 1A
39 would not result in a substantial adverse effect through habitat modification and would not
40 substantially reduce the number or restrict the range of the species. Therefore, Alternative 1A would
41 have a less-than-significant impact on yellow-headed blackbird.

42 **Late Long-Term Timeframe**

43 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres
44 of modeled foraging habitat for yellow-headed blackbird. Alternative 1A as a whole would result in

1 the permanent loss of and temporary effects on 14,048 acres of potential nesting habitat (17% of the
2 potential nesting habitat in the study area) and the loss or conversion of 29,959 acres of foraging
3 habitat (9% of the foraging habitat in the study area). The locations of these losses are described
4 above in the analyses of individual conservation measures.

5 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
6 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Communities*
7 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of
8 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,
9 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres
10 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of
11 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable
12 habitat for native wildlife species (Table 3-4 in Chapter 3).

13 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
14 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
15 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
16 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit
17 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground
18 or marsh where the predominant vegetation consists of invasive species such as perennial
19 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
20 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of
21 which would provide nesting habitat for the species.

22 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
23 and GNC1.2) Grassland protection in CZ 1, CZ 8, and CZ 11 would be associated with vernal pool and
24 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
25 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
26 would provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
27 abundance would also be increased on protected lands, enhancing the foraging value of these
28 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
29 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
30 hedgerows along field borders and roadsides within protected cultivated lands (Objective
31 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
32 wetlands would also be protected and maintained as part of the cultivated lands reserve system
33 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the
34 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time
35 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types
36 for tricolored blackbird (Table 3.3-6 in BDCP Chapter 3). These crop types include pasture,
37 sunflower, alfalfa, and other crop types that would provide high-value foraging habitat for yellow-
38 headed blackbird.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
43 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
44 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since

1 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
2 of the Final EIR/EIS.

3 In the absence of other conservation actions, the effects on yellow-headed blackbird habitat would
4 represent an adverse effect as a result of habitat modification and potential direct mortality of a
5 special-status species. This impact would be significant. Considering Alternative 1A's protection and
6 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
7 necessary to compensate for habitat lost to construction and restoration activities, and with the
8 implementation of AMM1-AMM7 and Mitigation Measure BIO-75, the loss of habitat or direct
9 mortality through implementation of Alternative 1A would not result in a substantial adverse effect
10 through habitat modifications and would not substantially reduce the number or restrict the range
11 of yellow-headed blackbird. Therefore, the loss of habitat or potential mortality under this
12 alternative would have a less-than-significant impact on yellow-headed blackbird.

13 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
14 **Disturbance of Nesting Birds**

15 See Mitigation Measure BIO-75 under Impact BIO-75.

16 **Impact BIO-149: Effects on Yellow-Headed Blackbird Associated with Electrical Transmission**
17 **Facilities**

18 Yellow-headed blackbirds are colonial and have the potential to collide with the proposed
19 transmission lines when migrating in large flocks. However, similar to tricolored blackbird behavior,
20 daily flights associated with foraging likely occur in smaller flocks at heights that are lower than the
21 transmission lines (BDCP Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at*
22 *Proposed BDCP Transmission Lines*). Marking transmission lines with flight diverters that make the
23 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
24 Drewien 1995). For example, Yee (2008) estimated that marking devices in the Central Valley could
25 reduce avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new project
26 transmission lines would be fitted with flight diverters, which would reduce the potential for yellow-
27 headed blackbird collision with transmission lines. Transmission line poles and towers also provide
28 perching substrate for raptors, which are predators on yellow-headed blackbird. Although there is
29 potential for transmission lines to result in increased perching opportunities for raptors and result
30 in increased predation pressure on yellow-headed blackbirds, the existing network of transmission
31 lines in the study area currently poses this risk for yellow-headed blackbirds, and any incremental
32 risk associated with the new transmission line corridors would not be expected to affect the study
33 area population. Therefore, it is assumed that the increase in predation risk on yellow-headed
34 blackbird from an increase in raptor perching opportunities would be minimal.

35 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
36 could result in injury or mortality of yellow-headed blackbird. *AMM20 Greater Sandhill Crane*
37 contains the commitment to place bird strike diverters on all new powerlines, which would reduce
38 the potential impact of the construction of new transmission lines on yellow-headed blackbird. The
39 increase in predation risk on yellow-headed blackbird from an increase in raptor perching
40 opportunities would be minimal. Therefore, the construction and operation of new transmission
41 lines under Alternative 1A would not result in an adverse effect on yellow-headed blackbird.

42 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
43 could result in injury or mortality of yellow-headed blackbird. *AMM20 Greater Sandhill Crane*

1 contains the commitment to place bird strike diverters on all new powerlines, which would reduce
 2 the potential impact of the construction of new transmission lines on yellow-headed blackbird. The
 3 increase in predation risk on yellow-headed blackbird from an increase in raptor perching
 4 opportunities would be minimal. The construction and operation of new transmission lines under
 5 Alternative 1A would not substantially reduce the number or restrict the range of the species and
 6 would therefore result in a less-than-significant impact on yellow-headed blackbird.

7 **Impact BIO-150: Indirect Effects of Plan Implementation on Yellow-Headed Blackbird**

8 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
 9 with construction-related activities could result in temporary disturbances that affect yellow-
 10 headed blackbird use of suitable habitat. Construction noise above background noise levels (greater
 11 than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP
 12 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*
 13 *Sandhill Crane*, Table 4), although there are no available data to determine the extent to which these
 14 noise levels could affect yellow-headed blackbird. Indirect effects associated with construction
 15 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
 16 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and
 17 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse
 18 effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
 19 *Avoid Disturbance of Nesting Birds*, would be available to minimize potential effects on active nests.
 20 The use of mechanical equipment during water conveyance construction could cause the accidental
 21 release of petroleum or other contaminants that could affect the species in the surrounding habitat.
 22 The inadvertent discharge of sediment or excessive dust adjacent to yellow-headed blackbird
 23 habitat could also have a negative effect on the species. Where nests are located above open water,
 24 impacts of contamination, dust, and sediment in water could impact fledglings directly, or affect
 25 aquatic insect prey, which is important for feeding young. AMM1–AMM7 would minimize the
 26 likelihood of spills and ensure that measures are in place to prevent runoff from the construction
 27 area and the negative effects of dust on wildlife adjacent to work areas.

28 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
 29 mercury in avian species, including yellow-headed blackbird. Marsh (tidal and nontidal) and
 30 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
 31 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
 32 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
 33 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
 34 mercury (see Chapter 3, *Conservation Strategy*, of the BDCP for details of restoration). Species
 35 sensitivity to methylmercury differs widely and there is a large amount of uncertainty with respect
 36 to species-specific effects. A detailed review of the methylmercury issues associated with
 37 implementation of the BDCP is contained in Appendix 11F, *Substantive BDCP Revisions*. The review
 38 includes an overview of the BDCP-related mechanisms that could result in increased mercury in the
 39 foodweb, and how exposure of individual species to mercury may occur based on feeding habits and
 40 where their habitat overlaps with the areas where mercury bioavailability could increase. Increased
 41 methylmercury associated with natural community and floodplain restoration could indirectly affect
 42 yellow-headed blackbird, via uptake in lower trophic levels (as described in Appendix 5.D,
 43 *Contaminants*, of the BDCP).

44 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
 45 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*

1 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
2 project-specific basis, where high potential for methylmercury production is identified that
3 restoration design and adaptive management cannot fully address while also meeting restoration
4 objectives, alternate restoration areas would be considered. CM12 would be implemented in
5 coordination with other similar efforts to address mercury in the Delta, and specifically with the
6 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
7 following actions.

- 8 • Assess pre-restoration conditions to determine the risk that the project could result in increased
9 mercury methylation and bioavailability
- 10 • Define design elements that minimize conditions conducive to generation of methylmercury in
11 restored areas.
- 12 • Define adaptive management strategies that can be implemented to monitor and minimize
13 actual postrestoration creation and mobilization of methylmercury.

14 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
15 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
16 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
17 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
18 2009). The effect of selenium toxicity differs widely between species and also between age and sex
19 classes within a species. In addition, the effect of selenium on a species can be confounded by
20 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
21 2009).

22 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
23 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the trophic level
24 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
25 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
26 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
27 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
28 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
29 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
30 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
31 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
32 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
33 have a higher risk of selenium toxicity.

34 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
35 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
36 exacerbate bioaccumulation of selenium in avian species, including yellow-headed blackbird, and
37 floodplain restoration has the potential to mobilize selenium and, therefore, to increase avian
38 exposure from ingestion of prey items with elevated selenium levels. Thus, Alternative 1A
39 restoration activities that create newly inundated areas could increase bioavailability of selenium
40 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
41 concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to Existing
42 Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases
43 in selenium concentrations in water in the Delta under any alternative. However, it is difficult to
44 determine whether the effects of potential increases in selenium bioavailability associated with

1 restoration-related conservation measures (CM4 and CM5) would lead to adverse effects on yellow-
2 headed blackbird.

3 Because of the uncertainty that exists at this programmatic level of review, there could be a
4 substantial effect on yellow-headed blackbird from increases in selenium associated with
5 restoration activities. This effect would be addressed through the implementation of *AMM27*
6 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
7 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
8 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
9 selenium management to reduce selenium concentrations and/or bioaccumulation would be
10 evaluated separately for each restoration effort as part of design and implementation. This
11 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
12 design schedule.

13 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
14 could reduce yellow-headed blackbird use of modeled habitat adjacent to work areas. Moreover,
15 operation and maintenance of the water conveyance facilities, including the transmission facilities,
16 could result in ongoing but periodic postconstruction disturbances that could affect yellow-headed
17 blackbird use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
18 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address potential
19 effects on nesting individuals in addition to AMM1–AMM7.

20 The implementation of tidal natural communities restoration or floodplain restoration could result
21 in increased exposure of yellow-headed blackbird to methylmercury, in restored tidal areas.
22 However, it is unknown what concentrations of methylmercury are harmful to these species and the
23 potential for increased exposure varies substantially within the study area. Implementation of CM12
24 which contains measures to assess the amount of mercury before project development, followed by
25 appropriate design and adaptation management, would minimize the potential for increased
26 methylmercury exposure, and would result in no adverse effect on yellow-headed blackbird.

27 Tidal habitat restoration could result in increased exposure of yellow-headed blackbird to selenium.
28 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
29 would provide specific tidal habitat restoration design elements to reduce the potential for
30 bioaccumulation of selenium and its bioavailability in tidal habitats.

31 **CEQA Conclusion:** In the absence of other conservation actions, noise and visual disturbance, the
32 potential for hazardous spills, increased dust and sedimentation, and operations and maintenance of
33 the water conveyance facilities under Alternative 1A would represent an adverse effect. This impact
34 would be significant. The implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*
35 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and AMM1–AMM7, would reduce this
36 impact to a less-than-significant level.

37 The implementation of tidal natural communities restoration or floodplain restoration could result
38 in increased exposure of yellow-headed blackbird to methylmercury in restored tidal areas.
39 However, it is unknown what concentrations of methylmercury are harmful to these species and the
40 potential for increased exposure varies substantially within the study area. Implementation of CM12
41 which contains measures to assess the amount of mercury before project development, followed by
42 appropriate design and adaptation management, would minimize the potential for increased
43 methylmercury exposure, and would result in no adverse effect on yellow-headed blackbird.

1 Tidal habitat restoration could result in increased exposure of yellow-headed blackbird to selenium.
2 With implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
3 restoration design elements to reduce the potential for bioaccumulation of selenium and its
4 bioavailability in tidal habitats, the impact of potential increased selenium exposure would be less
5 than significant.

6 Indirect effects of plan implementation would represent an adverse effect on yellow-headed
7 blackbird in the absence of other conservation measures. This would be a significant impact. With
8 AMM1–AMM7, and CM12 in place, and with the implementation of Mitigation Measure BIO-75,
9 indirect effects of plan implementation would not result in a substantial adverse effect through
10 habitat modifications and would not substantially reduce the number or restrict the range of the
11 species. Therefore, indirect effects of plan implementation would have a less-than-significant impact
12 on yellow-headed blackbird.

13 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
14 **Disturbance of Nesting Birds**

15 See Mitigation Measure BIO-75 under Impact BIO-75.

16 **Impact BIO-151: Periodic Effects of Inundation of Yellow-Headed Blackbird Nesting Habitat**
17 **as a Result of Implementation of Conservation Components**

18 Flooding of the Yolo Bypass (CM2) would inundate 961–2,678 acres of nesting habitat and 368–
19 2,678 acres of foraging habitat (Table 12-1A-54). Based on hypothetical floodplain restoration,
20 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in
21 periodic inundation of approximately 18 acres of nesting habitat and 2,701 acres of foraging habitat
22 (Table 12-1A-54) resulting in the temporary loss of these habitats. Foraging yellow-headed
23 blackbirds would be expected to move to adjacent suitable foraging habitat when the bypass is
24 inundated, as they do under the current flooding regime. However, this inundation could reduce the
25 availability of nesting habitat during years when flooding extends into the nesting season (past
26 March). The periodic inundation of the Yolo Bypass (CM2) and of other floodplains (CM5) is
27 expected to restore a more natural flood regime in support of wetland and riparian vegetation types
28 that support nesting habitat.

29 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and
30 foraging habitat for yellow-headed blackbird. Periodic inundation would not have an adverse effect
31 on yellow-headed blackbird because inundation is expected to take place outside of the breeding
32 season, and, although foraging habitat may be temporarily unavailable, birds would be expected to
33 move to adjacent foraging habitat.

34 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting
35 and foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-
36 significant impact on yellow-headed blackbird because inundation is expected to take place outside
37 of the breeding season, and, although foraging habitat would be temporarily unavailable, birds
38 would be expected to move to adjacent foraging habitat.

39 **Riparian Brush Rabbit**

40 The habitat model used to assess effects on the riparian brush rabbit consists of 38 vegetation
41 associations within the valley/foothill riparian natural community and adjacent grasslands. The

1 vegetation associations were selected based on a review of understory and overstory composition
2 from Hickson and Keeler-Wolf (2007) and species habitat requirements.

3 Just until recently, the only known naturally occurring populations of riparian brush rabbits were
4 confined to Caswell Memorial State Park (MSP), a 258-acre park supporting riparian oak woodland
5 on the Stanislaus River immediately southeast of the study area, and in the south Delta southwest of
6 Lathrop, which is within the study area (Williams and Basey 1986; Williams et al. 2002) (Figure 12-
7 46). On October 11, 2012 a single female riparian brush rabbit was captured near Durham Ferry
8 Road in riparian habitat along the San Joaquin River between Caswell MSP and Lathrop (Bradbury
9 pers. comm.). This is only the 2nd naturally occurring population documented outside of Caswell
10 MSP. Factors considered in assessing the value of adversely affected habitat for riparian brush
11 rabbit, to the extent information was available, included size and degree of isolation of habitat
12 patches, proximity to recorded species occurrences, and adjacency to conserved lands.

13 Construction and restoration associated with Alternative 1A conservation measures would result in
14 both temporary and permanent losses of riparian brush rabbit modeled habitat as indicated in Table
15 12-1A-55. Full implementation of Alternative 1A would also include biological objectives over the
16 term of the BDCP to benefit the riparian brush rabbit (BDCP Chapter 3, *Conservation Strategy*). The
17 conservation strategy for the riparian brush rabbit, with conservation principles involves
18 protecting, restoring or creating, and maintaining habitat and corridors near the largest remaining
19 fragments of habitat and extant populations; providing high-water refugia from flooding; and
20 managing feral predators (dogs and cats) in areas occupied by the species. The conservation
21 measures that would be implemented to achieve the biological goals and objectives are summarized
22 below.

- 23 • Provide a range of elevations in restored floodplains that transition from frequently flooded
24 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a
25 range of habitat conditions, upland habitat values, and refugia from flooding during most flood
26 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 27 • Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
28 between existing conservation lands (Objective L1.6, associated with CM3).
- 29 • Allow floods to promote fluvial processes, such that bare mineral soils are available for natural
30 recolonization of vegetation, desirable natural community vegetation is regenerated, and
31 structural diversity is promoted, or implement management actions that mimic those natural
32 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 33 • Protect and improve habitat linkages that allow terrestrial covered and other native species to
34 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
35 associated with CM3–CM8, and CM11).
- 36 • Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000
37 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated
38 with CM3 and CM7).
- 39 • Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
40 (Objective VFRNC1.2, associated with CM3).
- 41 • Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory
42 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated
43 with CM5, CM7, and CM11).

- 1 ● Of the 750 acres of protected valley/foothill riparian natural community protected under
2 Objective VFRNC1.2, protect at least 200 acres of suitable riparian brush rabbit habitat (defined
3 in CM7 Riparian Natural Community Restoration) that is occupied by the species or contiguous
4 with occupied habitat (Objective RBR1.1, associated with 3).
- 5 ● Of the 1,000 acres of early- to midsuccessional riparian habitat maintained under VFRNC2.2,
6 maintain at least 800 acres within the range of the riparian brush rabbit (CZ 7), in areas that are
7 adjacent to or that facilitate connectivity with occupied or potentially occupied habitat
8 (Objective RBR1.2, associated with CM3, CM7, and CM11).
- 9 ● Of the 5,000 acres of valley/foothill riparian natural community restored under Objective
10 VFRNC1.1, restore/create and maintain at least 300 acres of early- to mid-successional riparian
11 habitat that meets the ecological requirements of the riparian brush rabbit and that is within or
12 adjacent to or that facilitates connectivity with existing occupied or potentially occupied habitat
13 (Objective 1.3, associated with CM3, CM7, and CM11).
- 14 ● Create and maintain high-water refugia in the 300 acres of restored riparian brush rabbit
15 habitat and the 200 acres of protected riparian brush rabbit habitat, through the retention,
16 construction and/or restoration of high-ground habitat on mounds, berms, or levees, so that
17 refugia are no further apart than 66 feet (Objective RBR1.4, associated with CM7 and CM11).
- 18 ● In protected riparian areas that are occupied by riparian brush rabbit, monitor for and control
19 nonnative predators that are known to prey on riparian brush rabbit (Objective RBR1.5,
20 associated with CM11).
- 21 ● Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres of
22 grasslands restored under Objective GNC1.2, protect or restore grasslands on the landward side
23 of levees adjacent to restored floodplain to provide flood refugia and foraging habitat for
24 riparian brush rabbit (Objective RBR1.6m associated with CM3 and CM8).

25 As explained below, with the restoration and protection of these amounts of habitat, in addition to
26 the AMMs to reduce potential effects, impacts on riparian brush rabbit would not be adverse for
27 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-55. Changes in Riparian Brush Rabbit Modeled Habitat Associated with Alternative 1A**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	7	7	1	1	NA	NA
	Grassland	150	150	30	30	NA	NA
Total Impacts CM1		157	157	31	31	NA	NA
CM2-CM18	Riparian	0	62	0	35	0	264
	Grassland	0	44	0	20	0	423
Total Impacts CM2-CM18		0	106	0	55	0	687
TOTAL IMPACTS		157	263	31	86	0	687

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-152: Loss or Conversion of Habitat for and Direct Mortality of Riparian Brush**
5 **Rabbit**

6 Alternative 1A conservation measures would result in the permanent and temporary loss of up to
7 105 acres of riparian habitat and 244 acres of associated grassland habitat for the riparian brush
8 rabbit in the study area (Table 12-1A-55). The hypothetical footprint for levee construction under
9 CM5, overlaps with one occurrence record for riparian brush rabbit, south of the
10 Interstate 5/Interstate 205 interchange. Conservation measures resulting in permanent habitat loss
11 include conveyance facilities construction (CM1), tidal natural communities restoration (CM4), and
12 floodplain restoration (CM5). Each of these individual activities is described below. A summary
13 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual
14 conservation measure discussions. Conservation measures resulting in permanent habitat loss
15 include conveyance facilities construction (CM1), tidal natural communities restoration (CM4), and
16 floodplain restoration (CM5). Each of these individual activities is described below. A summary
17 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual
18 conservation measure discussions.

- 19 • *CM1 Water Facilities and Operation*: Development of Alternative 1A water conveyance facilities
20 would result in the permanent removal of approximately 7 acres of riparian habitat and
21 150 acres of associated grassland habitat and in the temporary removal of 1 acre of riparian
22 habitat and 30 acres of grassland habitat for riparian brush rabbit in CZ 8 (Table 12-1A-55). The
23 riparian habitat that would be removed is of low value for the riparian brush rabbit as it consists
24 of several small, isolated patches surrounded by agricultural lands northeast of Clifton Court

1 Forebay. The associated grasslands are also of low value for the species: They consist of long,
2 linear strips that abut riparian habitat, but extend several miles from the riparian habitat and,
3 therefore, provide few if any opportunities for adjacent cover. Trapping efforts conducted for
4 the riparian brush rabbit in this area were negative (BDCP Appendix 3.E, *Conservation Principles*
5 *for the Riparian Brush Rabbit and Riparian Woodrat*). Refer to the Terrestrial Biology Map Book
6 for a detailed view of Alternative 1A construction locations.

- 7 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
8 inundation would permanently remove approximately 19 acres of riparian habitat and 18 acres
9 of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late long-term. The
10 riparian habitat that would be removed consists of relatively small and isolated patches along
11 canals and irrigation ditches surrounded by agricultural lands in the Union Island and Roberts
12 Island areas, and several small patches along the San Joaquin River. The habitat that would be
13 removed is not adjacent to any existing conserved lands, and is several miles north and
14 northeast of the northernmost riparian brush rabbit record located northeast of Paradise Cut
15 (Williams et al. 2002). Although the final footprint for tidal natural communities restoration
16 would differ from the hypothetical footprint, compliance monitoring would be implemented to
17 ensure that acreage limits are not exceeded and the measures described in *AMM25 Riparian*
18 *Woodrat and Riparian Brush Rabbit* require that tidal natural communities restoration avoid
19 removal of any habitat occupied by the riparian brush rabbit.
- 20 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
21 restoration would result in the permanent removal of approximately 43 acres of riparian habitat
22 and 26 acres of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late
23 longterm. Levee construction would also result in the temporary removal of 35 acre riparian
24 habitat and 20 acres of grassland habitat for the riparian brush rabbit. Although the effects are
25 considered temporary, five years to several decades may be required for ecological succession
26 to occur and for restored riparian habitat to replace the function of habitat that has been
27 affected. The value of this habitat for riparian brush rabbit is high: although it consists of small
28 patches and narrow bands of riparian vegetation, these areas are in proximity to, or contiguous
29 with, habitat with recorded occurrences of riparian brush rabbit. The hypothetical footprint for
30 levee construction overlaps with one occurrence record for riparian brush rabbit, south of the
31 Interstate 5/Interstate 205 interchange.

32 Although the final floodplain restoration design would differ from the hypothetical footprint
33 used for this effects analysis, restoration of the river floodplain in CZ 7 would be targeted in the
34 general area of the riparian brush rabbit population. Implementation of adaptive management
35 described in *AMM25* would ensure that riparian brush rabbit habitat permanently removed as a
36 result of floodplain restoration does not exceed maximum allowable habitat loss for this species.

- 37 ● *CM11 Natural Communities Enhancement and Management* A variety of habitat management
38 actions included in *CM11* that are designed to enhance wildlife values in BDCP protected
39 habitats may result in localized ground disturbances that could temporarily remove small
40 amounts of riparian brush rabbit habitat. Passive recreation in the reserve system could result
41 in disturbance of individual riparian brush rabbits foraging in the ecotone between riparian and
42 adjacent open habitats. However, *AMM37 Recreation* limits trail development adjacent to
43 riparian corridors within the range of the riparian brush rabbit. With this minimization measure
44 in place, recreation related effects on the riparian brush rabbit are expected to be minimal.
45 Enhancement and management actions in riparian brush rabbit habitat within the reserve
46 system may include invasive plant removal, planting and maintaining vegetation to improve and

1 sustain habitat characteristics for the species, and creating and maintaining flood refugia. These
2 activities are expected to have minor adverse effects on available riparian brush rabbit habitat
3 and are expected to result in overall improvements to and maintenance of riparian brush rabbit
4 habitat values over the term of the BDCP. These effects cannot be quantified, but are expected to
5 be minimal and would be avoided and minimized through the AMMs listed below.

- 6 ● Operations and maintenance: Ongoing maintenance of BDCP facilities are not expected to
7 adversely affect the riparian brush rabbit because the species is not expected to occur in the
8 vicinity of proposed facilities.
- 9 ● Recreation: Passive recreation in the reserve system could result in disturbance of individual
10 riparian brush rabbits foraging in the ecotone between riparian and adjacent open habitats.
11 However, AMM37, described in Appendix 3B, *Environmental Commitments, AMMs, and CMs,*
12 *Avoidance and Minimization Measures*, limits trail development adjacent to riparian corridors
13 within the range of the riparian brush rabbit. With this minimization measure in place,
14 recreation related effects on the riparian brush rabbit are expected to be minimal.
- 15 ● Injury and direct mortality: Water conveyance facility construction is not is not likely to result in
16 injury or mortality of individual riparian brush rabbits because the species is not likely to be
17 present in the areas that would be affected by this activity, based on live trapping results (BDCP
18 Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal
19 natural communities restoration would not result in injury or mortality of the riparian brush
20 rabbit because tidal natural communities restoration projects would be designed to avoid
21 occupied riparian brush rabbit habitat and, if that is not possible, rabbits would be trapped and
22 relocated as described in AMM25 (see Appendix B, *Environmental Commitments, AMMs, and*
23 *CMs*). Activities associated with construction of setback levees for floodplain restoration could
24 result in injury or mortality of riparian brush rabbits: however, preconstruction surveys,
25 construction monitoring, and other measures would be implemented to avoid and minimize
26 injury or mortality of this species during construction (AMM25).

27 The following paragraphs summarize the combined effects discussed above and describe other
28 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
29 also included.

30 ***Near-Term Timeframe***

31 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
32 the near-term BDCP conservation strategy has been evaluated to determine whether it would
33 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
34 effects of construction would not be adverse under NEPA. Alternative 1A would result in permanent
35 and temporary effects combined on 8 acres of riparian habitat and 180 acres of grassland habitat for
36 riparian brush rabbit in the near-term as a result of construction of the water conveyance facilities
37 (CM1). The habitat would be lost in the valley/foothill riparian and grassland natural communities.
38 All the near-term loss of riparian brush rabbit habitat would occur in an area not likely to be
39 occupied by the species. Habitat loss in CZ 7, in areas known or likely to be occupied, would occur
40 during the early long-term and late long-term implementation periods. Riparian restoration would
41 be phased to minimize temporal habitat loss. There would be no near-term losses resulting from
42 CM2–CM18.

43 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
44 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of

1 the BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural
 2 community, and 2:1 for protection of grassland. Using these ratios would indicate that 8 acres of
 3 riparian habitat should be restored, 8 acres of riparian habitat should be protected, and 360 acres of
 4 grassland should be protected for riparian brush rabbit to mitigate near-term losses. The BDCP has
 5 committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1 and an unknown
 6 number of associated acres of grassland and protection of 750 acres of riparian (Objective
 7 VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in Chapter 3). In
 8 addition, the species-specific biological goals and objectives (RBR1.1–RBR1.6) would inform the
 9 near-term protection and restoration efforts. The natural community restoration and protection
 10 activities are expected to be concluded during the first 10 years of Plan implementation, which is
 11 close enough in time to the occurrence of impacts to constitute adequate mitigation for NEPA
 12 purposes. These commitments are more than sufficient to support the conclusion that the near-term
 13 effects of Alternative 1A would be not be adverse under NEPA, because the number of acres
 14 required to meet the typical ratios described above would be only 10 acres of riparian habitat
 15 restored, 10 acres of riparian habitat protected, and 334 acres of grassland protected.

16 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Presentation*
 18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
 20 *Restoration of Temporarily Affected Natural Communities*, *AMM25 Riparian Woodrat and Riparian*
 21 *Brush Rabbit*, and *AMM37 Recreation*. These AMMs contain elements that avoid or minimize the risk
 22 of BDCP activities affecting habitats and species adjacent to work areas and storage sites. BDCP
 23 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
 24 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

25 ***Late Long-Term Timeframe***

26 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of
 27 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 1A a
 28 whole would result in permanent and temporary effects combined on 105 acres of modeled riparian
 29 habitat and 244 acres of modeled grassland habitat for riparian brush rabbit rabbit in CZ 6, CZ 7, and
 30 CZ 8. Habitat lost in CZ 6 and CZ 8 is fragmented, isolated, and unlikely to support the species.
 31 Habitat would also be lost in areas in CZ 7 that provide high-value habitat for the species.

32 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
 33 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
 34 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to
 35 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or
 36 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist
 37 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800
 38 acres to be conserved would consist of early successional riparian vegetation suitable for riparian
 39 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy
 40 area of protected and restored riparian natural community than what currently exists in CZ 7 and
 41 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific
 42 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at
 43 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological
 44 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal
 45 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines

1 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from
2 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators
3 that are known to prey on riparian brush rabbit would be monitored and controlled (RBR1.5).

4 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the BDCP
5 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation
6 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide
7 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood
8 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would
9 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands
10 on the landward side of levees adjacent to restored floodplain would be restored or protected as
11 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

12 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as
13 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to
14 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently
15 flooded areas would provide refuge for the riparian brush rabbit during most years. The Plan would
16 also create and maintain mounds, levee sections, or other high areas in restored and protected
17 riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia for the
18 riparian brush rabbit (BDCP Appendix 3.F, *Conservation Principles for the Riparian Brush Rabbit and*
19 *Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian brush
20 rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas that
21 are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

22 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
23 and protection actions discussed above, as well as the restoration of valley/foothill riparian and
24 grassland that could overlap with the species model, would result in the restoration of 800 acres of
25 riparian and 79 acres of grassland modeled habitat for riparian brush rabbit. In addition, protection
26 of valley/foothill riparian and grassland could overlap with the species model and would result in
27 the protection of 200 acres of riparian and 317 acres of grassland riparian brush rabbit modeled
28 habitat.

29 **NEPA Effects:** In the near-term, the loss of riparian brush rabbit habitat under Alternative 1A would
30 not be adverse because there is little likelihood of riparian brush rabbits being present and the
31 BDCP has committed to protecting and restoring the acreage required to meet the typical mitigation
32 ratios described above. In the late long-term, the losses of riparian brush rabbit riparian and
33 grassland habitat associated with Alternative 1A, in the absence of other conservation actions,
34 would represent an adverse effect as a result of habitat modification and potential direct mortality
35 of a special-status species. However, with habitat protection and restoration associated with the
36 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM7,
37 AMM10, AMM25, and AMM37, the effects of Alternative 1A as a whole on riparian brush rabbit
38 would not be adverse.

39 **CEQA Conclusion:**

40 **Near-Term Timeframe**

41 Because the water conveyance facilities construction is being evaluated at the project level, the near-
42 term BDCP conservation strategy has been evaluated to determine whether it would provide

1 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
2 construction would be less than significant under CEQA.

3 Alternative 1A would result in permanent and temporary effects combined on 8 acres of riparian
4 habitat and 180 acres of grassland habitat for riparian brush rabbit in the near-term as a result of
5 construction of the water conveyance facilities (CM1). The habitat would be lost in the
6 valley/foothill riparian and grassland natural communities. All the near-term loss of riparian brush
7 rabbit habitat would occur in an area not likely to be occupied by the species. Habitat loss in CZ 7, in
8 areas known or likely to be occupied, would occur during the early long-term and late long-term
9 implementation periods. Riparian restoration would be phased to minimize temporal habitat loss.
10 There would be no near-term losses from CM2–CM18.

11 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
12 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of
13 the BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural
14 community, and 2:1 for protection of grassland. Using these ratios would indicate that 8 acres of
15 riparian habitat should be restored, 8 acres of riparian habitat should be protected, and 360 acres of
16 grassland should be protected for riparian brush rabbit to mitigate near-term losses.

17 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
18 and an unknown number of associated acres of grassland and protection of 750 acres of riparian
19 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in
20 Chapter 3). In addition, the species-specific biological goals and objectives (RBR1.1-RBR1.6) would
21 inform the near-term protection and restoration efforts. The natural community restoration and
22 protection activities are expected to be concluded during the first 10 years of Plan implementation,
23 which is close enough in time to the occurrence of impacts to constitute adequate mitigation for
24 CEQA purposes. These commitments are more than sufficient to support the conclusion that the
25 near-term effects of Alternative 1A would be less than significant under CEQA, because the number
26 of acres required to meet the typical ratios described above would be only 8 acres of riparian habitat
27 restored, 8 acres protected, and 360 acres of grassland protected.

28 The plan also contains commitments to implement AMM1–AMM7, AMM10, AMM25, and AMM37.
29 These AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats
30 and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
31 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
32 *AMMs, and CMs*, of the Final EIR/EIS.

33 **Late Long-Term Timeframe**

34 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of
35 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 1A a
36 whole would result in permanent and temporary effects combined on 105 acres of modeled riparian
37 habitat and 244 acres of modeled grassland habitat for riparian brush rabbit in CZ 6, CZ 7, and CZ 8.
38 Habitat lost in CZ 6 and CZ 8 is fragmented, isolated, and unlikely to support the species. Habitat
39 would also be lost in areas in CZ 7 that provide high-value habitat for the species.

40 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
41 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
42 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to
43 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or

1 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist
2 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800
3 acres to be conserved would consist of early successional riparian vegetation suitable for riparian
4 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy
5 area of protected and restored riparian natural community than what currently exists in CZ 7 and
6 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific
7 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at
8 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological
9 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal
10 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines
11 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from
12 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators
13 that are known to prey on riparian brush rabbit would be monitored and controlled (RBR1.5).

14 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the BDCP
15 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation
16 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide
17 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood
18 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would
19 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands
20 on the landward side of levees adjacent to restored floodplain would be restored or protected as
21 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

22 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as
23 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to
24 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently
25 flooded areas would provide refuge for the riparian brush rabbit during most years. The Plan would
26 also create and maintain mounds, levee sections, or other high areas in restored and protected
27 riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia for the
28 riparian brush rabbit (BDCP Appendix 3.F, *Conservation Principles for the Riparian Brush Rabbit and*
29 *Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian brush
30 rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas that
31 are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

32 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
33 and protection actions discussed above, as well as the restoration of valley/foothill riparian and
34 grassland that could overlap with the species model, would result in the restoration of 800 acres of
35 riparian and 79 acres of grassland modeled habitat for riparian brush rabbit. In addition, protection
36 of valley/foothill riparian and grassland could overlap with the species model and would result in
37 the protection of 200 acres of riparian and 317 acres of grassland riparian brush rabbit modeled
38 habitat.

39 Only a small proportion of the habitat losses would be considered occupied and of high value.
40 Alternative 1A conservation measures provide for large acreages of riparian brush rabbit riparian
41 and grassland habitat to be protected and restored, and the BDCP includes AMM1–AMM7, AMM10,
42 AMM25, and AMM37, which are directed at minimizing or avoiding potential impacts during
43 construction and operation of the conservation measures. Overall, Alternative 1A would provide a
44 substantial net benefit to the riparian brush rabbit through the increase in available habitat and
45 habitat in protected status.

1 Considering the habitat restoration and protection associated with CM3, CM7, CM8, and CM11,
2 guided by species-specific goals and objectives and by AMM1–AMM7, AMM10, AMM25, and AMM37,
3 the temporary and permanent losses of riparian and grassland habitat and potential direct mortality
4 of riparian brush rabbit as a result of implementing Alternative 1A would not represent a
5 substantial adverse effect through habitat modifications and would not substantially reduce the
6 number or restrict the range of the species. The loss of habitat and potential mortality of riparian
7 brush rabbits would be a less-than-significant impact under CEQA.

8 **Impact BIO-153: Indirect Effects of Plan Implementation on Riparian Brush Rabbit**

9 Noise, lighting, and visual disturbances adjacent to construction activities could indirectly affect the
10 use of modeled riparian brush rabbit riparian habitat and of associated grassland habitat. These
11 construction activities would include water conveyance (including transmission line) construction
12 in CZ 8, tidal natural communities restoration construction, and construction of setback levees.
13 Water conveyance construction would potentially affect acres of adjacent riparian habitat and of
14 associated grassland habitat: this construction would occur in CZ 8 where there is suitable habitat
15 for the species but surveys by ESRP did not indicate the species is present in this area;; therefore,
16 the potential for adverse noise and visual effects from conveyance facility construction would be
17 minimal. Tidal natural communities restoration construction would also potentially affect adjacent
18 riparian habitat and associated grassland habitat for this species: however, adverse effects on the
19 species are unlikely because tidal natural communities restoration projects would be sited to avoid
20 areas occupied by riparian brush rabbit. The activity most likely to result in noise, lighting, and
21 visual disturbances to riparian brush rabbit is the construction of setback levees for floodplain
22 restoration, which would take place in CZ 7, where the species is known to occur. The use of
23 mechanical equipment during construction might cause the accidental release of petroleum or other
24 contaminants that would affect the riparian brush rabbit in adjacent habitat, if the species is present.

25 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1A
26 would avoid the potential for substantial adverse effects on riparian brush rabbits, either indirectly
27 or through habitat modifications or result in a substantial reduction in numbers or a restriction in
28 the range of riparian brush rabbits. Therefore, indirect effects of Alternative 1A would not have an
29 adverse effect on riparian brush rabbit.

30 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
31 as construction-related noise, lighting, and visual disturbances could affect riparian brush rabbit in
32 riparian and grassland habitats. The use of mechanical equipment during construction could cause
33 the accidental release of petroleum or other contaminants that could affect riparian brush rabbit.
34 The inadvertent discharge of sediment or excessive dust adjacent to riparian brush rabbit habitat
35 could also have a negative effect on the species. With implementation of AMM1–AMM7, AMM10,
36 AMM25, and AMM37 as part of Alternative 1A, the BDCP would avoid the potential for substantial
37 adverse effects on riparian brush rabbits, either indirectly or through habitat modifications and
38 would not result in a substantial reduction in numbers or a restriction in the range of riparian brush
39 rabbits. Indirect effects of Alternative 1A would have a less-than-significant impact on riparian
40 brush rabbit.

1 **Impact BIO-154: Periodic Effects of Inundation of Riparian Brush Rabbit Habitat as a Result of**
2 **Implementation of Conservation Components**

3 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in
4 periodic inundation of riparian brush rabbit habitat. This activity would periodically inundate
5 approximately 264 acres of riparian habitat (9% of riparian habitat in the Plan Area) and 423 acres
6 of associated grassland habitat (14% of associated grassland habitat in the Plan Area) for the
7 riparian brush rabbit. The area between existing levees that would be breached and the newly
8 constructed setback levees would be inundated through seasonal flooding. The potentially
9 inundated areas consist of high-value habitat for the species: although they consist of small patches
10 and narrow bands of riparian vegetation, many of these areas are in proximity to, or contiguous
11 with, habitat with recorded occurrences of riparian brush rabbit. The restored floodplain would
12 include a range of elevations from lower lying areas that flood frequently (e.g., every 1 to 2 years) to
13 higher elevation areas that flood infrequently (e.g., every 10 years or more).

14 Seasonal flooding in restored floodplains can result in injury or mortality of individuals if riparian
15 brush rabbits occupy these areas and cannot escape flood waters. One recorded occurrence of
16 riparian brush rabbit (Williams et al. 2002), just west of Stewart Road in Mossdale, is in the area that
17 would be seasonally flooded based on the hypothetical restoration footprint.

18 **NEPA Effects:** Floodplain restoration under CM5 would periodically affect only a small proportion of
19 the modeled riparian brush rabbit habitat in the study area. The adverse effects of periodic
20 inundation on the riparian brush rabbit would be minimized through construction and maintenance
21 of flood refugia to allow riparian brush rabbits to escape inundation. Therefore, implementing
22 Alternative 1A, including AMM1–AMM7, AMM10, AMM25, and AMM37, would not be expected to result
23 in substantial adverse effects on riparian brush rabbit, either directly or through habitat
24 modifications and would not result in a substantial reduction in numbers or a restriction in the
25 range of riparian brush rabbits. Therefore, Alternative 1A would not adversely affect the species.

26 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect only a small
27 proportion of the modeled riparian brush rabbit habitat in the study area. The overall effect of
28 seasonal inundation on existing riparian natural communities may instead be beneficial. Historically,
29 flooding was the main natural disturbance regulating ecological processes in riparian areas, and
30 flooding promotes the germination and establishment of many native riparian plants. In the late
31 long-term, seasonal inundation in areas currently occupied by riparian vegetation may contribute to
32 the establishment of high-value habitat for covered riparian species, such as the riparian brush
33 rabbit. Long-term management of riparian areas would ensure that refugia also exist along the
34 edges of seasonally inundated habitat.

35 The adverse effects of periodic inundation on the riparian brush rabbit would be minimized through
36 construction and maintenance of flood refugia to allow riparian brush rabbits to escape inundation.
37 Therefore, implementing Alternative 1A, including AMM1–AMM7, AMM10, AMM25, and AMM37,
38 would not be expected to result in substantial adverse effects on riparian brush rabbit, either
39 directly or through habitat modifications and would not result in a substantial reduction in numbers
40 or a restriction in the range of riparian brush rabbits. Periodic inundation of riparian and grassland
41 habitat for riparian brush rabbit under Alternative 1A would have a less-than-significant impact on
42 the species.

1 **Riparian Woodrat**

2 The habitat model used to assess effects for the riparian woodrat consists of selected plant alliances
3 from the valley/foothill riparian natural community, geographically constrained to the south Delta
4 portion of the BDCP area in CZ 7, south of State Route 4 and Old River Pipeline along the Stanislaus,
5 San Joaquin, Old, and Middle Rivers. Valley/foothill riparian areas along smaller drainages (Paradise
6 Cut, Tom Paine Slough), and some larger streams in the northern portion of CZ 7 were excluded
7 from the riparian woodrat habitat model due to a lack of trees or riparian corridors that were too
8 narrow. Factors considered in assessing the value of affected habitat for the riparian woodrat, to the
9 extent that information is available, include habitat patch size and connectivity.

10 The riparian woodrat is not known to occur in the study area. The only verified extant population of
11 riparian woodrats rangewide is 2 miles east of the southern end of the study area in Caswell
12 Memorial State Park along the Stanislaus River (Williams 1986:1–112; 1993). Riparian woodrat may
13 occur in small patches of valley oak riparian forest along the San Joaquin River from the southern tip
14 of the study area north to approximately the Interstate 5 overcrossing near Lathrop (Figure 12-47).
15 Construction and restoration associated with Alternative 1A conservation measures would result in
16 both temporary and permanent losses of riparian woodrat modeled habitat as indicated in Table 12-
17 1A-56. Tidal habitat restoration, floodplain restoration, and protection and management of natural
18 communities could affect modeled riparian woodrat habitat. However, because the species is not
19 known to occur in the study area it is not expected to be affected by BDCP actions unless the species
20 were to establish in the study area over the term of the BDCP. Full implementation of Alternative 1A
21 would also include biological objectives over the term of the BDCP to benefit the riparian woodrat
22 (BDCP Chapter 3, *Conservation Strategy*). The conservation strategy for the riparian woodrat
23 involves providing opportunities for population expansion into the Plan Area from adjacent lands to
24 the south and southeast. The strategy focuses on restoring and maintaining suitable habitat at the
25 southernmost end of CZ 7, providing connectivity with existing populations to the south and
26 southeast, and creating and maintaining flood refugia. This conservation approach is consistent with
27 the recovery plan (U.S. Fish and Wildlife Service 1998) and conservation principles (BDCP Appendix
28 3.E). The conservation measures that would be implemented to achieve the biological goals and
29 objectives are summarized below.

- 30 ● Provide a range of elevations in restored floodplains that transition from frequently flooded
31 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a
32 range of habitat conditions, upland habitat values, and refugia from flooding during most flood
33 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 34 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
35 between existing conservation lands (Objective L1.6, associated with CM3).
- 36 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to
37 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
38 associated with CM3-CM8, and CM11).
- 39 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with 3,000 acres
40 occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated with
41 CM3 and CM7).
- 42 ● Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
43 (Objective VFRNC1.2, associated with CM3).

- 1 • Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal
2 overlap among vegetation components and over adjacent riverine channels, freshwater
3 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM5, CM7, and CM11).
- 4 • Of the 5,000 acres of valley/foothill riparian natural community restored under Objective
5 VFRNC1.1, restore/create and maintain 300 acres riparian habitat in CZ 7 that meets the
6 ecological requirements of the riparian woodrat (i.e., dense willow understory and oak
7 overstory) and that is adjacent to or facilitates connectivity with existing occupied or potentially
8 occupied habitat (Objective RW1.1, associated with CM3, CM7, CM11).
- 9 • Provide and maintain high-water refugia in the 300 acres of riparian woodrat habitat restored
10 under Objective RW1.1 through the retention, construction, and/or restoration of high-ground
11 habitat on mounds, berms, or levees, so that refugia are no further apart than 67 feet (Objective
12 RW1.2, associated with CM7 and CM11).

13 As explained below, with the restoration and protection of these amounts of habitat, in addition to
14 the AMMs to reduce potential effects, impacts on riparian woodrat would not be adverse for NEPA
15 purposes and would be less than significant for CEQA purposes.

16 **Table 12-1A-56. Changes in Riparian Woodrat Modeled Habitat Associated with Alternative 1A**
17 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2–CM18	Riparian	0	51	0	33	0	203
Total Impacts CM2–CM18		0	51	0	33	0	203
TOTAL IMPACTS		0	51	0	33	0	203

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

18

19 **Impact BIO-155: Loss or Conversion of Habitat for and Direct Mortality of Riparian Woodrat**

- 20 • Alternative 1A conservation measures would result in the permanent loss of up to 51 acres of
21 habitat and temporary loss of up to 33 acres of modeled habitat for riparian woodrat (Table 12-
22 1A-56). There are no riparian woodrat occurrences that overlap with the Plan footprint.
23 Construction of Alternative 1A water conveyance facilities (CM1) would not affect modeled
24 riparian woodrat habitat; however, tidal natural communities restoration (CM4) and seasonally
25 inundated floodplain restoration (CM5) would remove habitat. Each of these individual

1 activities is described below. A summary statement of the combined impacts and NEPA effects
2 and a CEQA conclusion follow the individual conservation measure discussions.

- 3 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
4 inundation would permanently remove approximately 10 acres of modeled habitat for the
5 riparian woodrat in CZ 7. This habitat is of low value, consisting of a small, isolated patch
6 surrounded by agricultural lands, and the species has a relatively low likelihood of being present
7 in these areas. The measures described in *AMM25 Riparian Woodrat and Riparian Brush Rabbit*
8 require that tidal natural communities restoration avoid removal of any habitat occupied by the
9 riparian woodrat as determined by presence/absence surveys. Because the estimates of habitat
10 loss due to tidal inundation are based on projections of where restoration may occur, actual
11 habitat loss is expected to be lower because sites would be selected to minimize effects on
12 riparian woodrat.
- 13 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
14 restoration would result in the permanent removal of approximately 41 acres of modeled
15 habitat for the riparian woodrat in CZ 7. The value of this habitat for riparian woodrat is
16 moderate. Although the habitat consists of small patches and narrow bands of riparian
17 vegetation and no riparian woodrats have been detected in CZ 7, the riparian patches are in proximity
18 to each other along the San Joaquin River. There are two species occurrences immediately south
19 of CZ 7, one of which is less than 1.5 mile from the southernmost patch of riparian habitat
20 potentially affected by levee construction.

21 The final floodplain restoration design would differ from the hypothetical footprint used for this
22 effects analysis. However, monitoring and adaptive management described in *CM11 Natural*
23 *Communities Enhancement and Management*, and *AMM25* would ensure that riparian woodrat
24 habitat permanently removed does not exceed the amount estimated based on the hypothetical
25 footprint. Habitat loss is expected to be lower than 41 acres because sites would be selected and
26 restoration designed to minimize effects on the riparian woodrat. If natural flooding is
27 insufficient to maintain appropriate riparian woodrat vegetation structure, the vegetation
28 would be actively managed to provide suitable habitat structure as described in *CM11 Natural*
29 *Communities Enhancement and Management*.

30 Levee construction would also result in the temporary removal of 33 acres of modeled habitat
31 for the riparian woodrat. Although the effects are considered temporary, 5 years to several
32 decades may be required for ecological succession to occur and for restored riparian habitat to
33 replace the function of habitat that has been affected.

- 34 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
35 actions included in *CM11* that are designed to enhance wildlife values in BDCP protected
36 habitats may result in localized ground disturbances that could temporarily remove small
37 amounts of riparian woodrat habitat. Enhancement and management actions in riparian
38 woodrat habitat within the reserve system may include invasive plant removal, planting and
39 maintaining vegetation to improve and sustain habitat characteristics for the species, and
40 creating and maintaining flood refugia. These activities are expected to have minor adverse
41 effects on available riparian woodrat habitat and are expected to result in overall improvements
42 to and maintenance of riparian woodrat habitat values over the term of the BDCP. These effects
43 cannot be quantified, but are expected to be minimal and would be avoided and minimized
44 through the *AMMs* listed below

- 1 • Operations and maintenance: The only ongoing effects on the riparian woodrat are those
2 potentially resulting from habitat enhancement and management activities. Enhancement and
3 management actions in riparian brush rabbit habitat within the reserve system may include
4 invasive plant removal, planting and maintaining vegetation to improve and sustain habitat
5 characteristics for the species, and creating and maintaining flood refugia. These activities may
6 result in harassment of riparian woodrats through noise and visual disturbance which would be
7 minimized with implementation of AMM1–AMM7, AMM10, and AMM25.
- 8 • Injury and direct mortality: Construction vehicle activity is not likely to result in injury or
9 mortality of individual riparian woodrats because the species is not likely to be present in the
10 areas that would be affected by this activity, based on live trapping results (BDCP Appendix 3.E,
11 *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal natural
12 communities restoration would not result in injury or mortality of the riparian woodrats
13 because tidal natural communities restoration projects would be designed to avoid occupied
14 riparian woodrat habitat and if that is not possible to trap and relocate the species (AMM25).
15 Activities associated with construction of setback levees for floodplain restoration could result
16 in injury or mortality of riparian woodrats: however, preconstruction surveys, construction
17 monitoring, and other measures would be implemented under AMM25 to avoid and minimize
18 injury or mortality of this species during construction, as described in Appendix 3B,
19 *Environmental Commitments, AMMs, and CMs*. If occupied riparian woodrat habitat cannot be
20 avoided, mortality would be avoided through implementation of a trapping and relocation
21 program. The program would be developed in coordination with USFWS, and relocation would
22 be to a site approved by USFWS prior to construction activities.

23 The following paragraphs summarize the combined effects discussed above and describe other
24 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
25 also included.

26 ***Near-Term Timeframe***

27 Because water conveyance facilities construction is being evaluated at the project level, the near-
28 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
29 protection or restoration in an appropriate timeframe to ensure that the construction effects would
30 not be adverse under NEPA.

31 No riparian woodrat habitat would be lost in the near-term timeframe. Implementation of CM11
32 could have minor adverse effects on available riparian woodrat habitat, and activities associated
33 with construction of setback levees for floodplain restoration could result in injury or mortality of
34 riparian woodrats.

35 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
36 and protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3). In addition,
37 the species-specific biological goals and objectives (RW1.1 and RW1.2) would inform the near-term
38 protection and restoration efforts. The natural community restoration and protection activities are
39 expected to be concluded during the first 10 years of Plan implementation, which is close enough in
40 time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes. These
41 commitments are more than sufficient to support the conclusion that the near-term effects of
42 Alternative 1A would be not be adverse under NEPA, because no riparian woodrat habitat would be
43 lost and there is only limited potential for minor adverse effects on woodrats or its habitat from
44 implementation of CM11.

1 These effects cannot be quantified, but are expected to be minimal and would be avoided and
2 minimized through the BDCP's commitment to *AMM1 Worker Awareness Training, AMM2*
3 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
4 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
5 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, AMM10*
6 *Restoration of Temporarily Affected Natural Communities, and AMM25 Riparian Woodrat and*
7 *Riparian Brush Rabbit. BDCP Appendix 3.C describes the AMMs, which have since been updated and*
8 *which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs, of the Final*
9 *EIR/EIS.*

10 **Late Long-Term Timeframe**

11 The habitat model indicates that the study area supports approximately 2,166 acres of riparian
12 woodrat habitat. Alternative 1A as a whole would result in the permanent loss of and temporary
13 removal of 84 acres of modeled habitat for riparian woodrat habitat during the late long-term. This
14 represents 2% of the riparian modeled habitat in the study area. None of this habitat is considered
15 occupied.

16 Alternative 1A would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
17 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
18 (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of riparian
19 habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow
20 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing
21 occupied or potentially occupied habitat to be restored in CZ 7. The conserved habitat would also be
22 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural
23 community than what currently exists in CZ 7 and would be contiguous with existing modeled
24 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of
25 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,
26 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural
27 community would provide riparian woodrat habitat proportional to the amount of modeled habitat
28 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area
29 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community
30 (*CM3*) would provide an estimated 90 acres of protected riparian woodrat habitat that is
31 comparable to or of higher value than existing modeled grassland habitat. All riparian protection
32 would occur during the near-term period, to offset early riparian losses.

33 Alternative 1A would also create and maintain mounds, levee sections, or other high areas in
34 restored and protected riparian areas (Objective RW1.2) that are designed specifically to provide
35 flood refugia for the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian*
36 *Brush Rabbit and Riparian Woodrat*). In addition, the restored floodplains would transition from
37 areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10
38 years or more) (Objective L1.5): these infrequently flooded areas would provide refuge for the
39 riparian woodrat during most years.

40 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
41 and protection actions discussed above, as well as the restoration of valley/foothill riparian that
42 could overlap with the species model, would result in the restoration of 300 acres of modeled
43 habitat for riparian woodrat. In addition, protection of valley/foothill riparian could overlap with
44 the species model and would result in the protection of 90 acres riparian woodrat modeled habitat.

1 Although there are no records of occurrences of the riparian woodrat in the study area, habitat
2 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase
3 opportunities for northward expansion of the species into the study area. Implementation of
4 Alternative 1A conservation measures is not expected to adversely affect the riparian woodrat for
5 the following reasons.

- 6 • There are no riparian woodrat occurrences in the Plan Area.
- 7 • The habitat that would be removed consists of small patches that are of moderate value for the
8 species.
- 9 • The habitat that would be removed permanently is a small proportion of the total habitat in the
10 Plan Area (2%).
- 11 • Avoidance and minimization measures would be implemented to avoid injury or mortality of
12 riparian woodrats, and to minimize loss of occupied habitat.
- 13 • Floodplain restoration would be designed to provide flood refugia so that flooding would not
14 adversely affect any riparian woodrats that occupy restored floodplains.

15 **NEPA Effects:** Alternative 1A would provide a substantial benefit to the riparian woodrat through
16 the net increase in available habitat and a net increase of habitat in protected status. These
17 protected areas would be managed and monitored to support the species. The affected habitat is
18 currently unoccupied and habitat removal is not expected to result in a discernible change in the
19 abundance or distribution of riparian woodrat should they occupy study area habitats. Should the
20 species be detected in the study area, AMM1–AMM7, AMM10, and AMM25 would avoid and
21 minimize the effects of conservation component construction and implementation. Therefore, the
22 loss of habitat and potential mortality of individuals would not have an adverse effect on riparian
23 woodrat.

24 **CEQA Conclusion:**

25 **Near-Term Timeframe**

26 Because water conveyance facilities construction is being evaluated at the project level, the near-
27 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
28 protection or restoration in an appropriate timeframe to ensure that the construction effects would
29 be less than significant for CEQA purposes.

30 No riparian woodrat habitat would be lost in the near-term timeframe. Implementation of CM11
31 could have minor adverse effects on available riparian woodrat habitat, and activities associated
32 with construction of setback levees for floodplain restoration could result in injury or mortality of
33 riparian woodrats.

34 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
35 and protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3). In addition,
36 the species-specific biological goals and objectives (RW1.1 and RW1.2) would inform the near-term
37 protection and restoration efforts. The natural community restoration and protection activities are
38 expected to be concluded during the first 10 years of Plan implementation, which is close enough in
39 time to the occurrence of impacts to constitute adequate mitigation for CEQA purposes. The Plan
40 also contains commitments to implement AMM1–AMM7, AMM10, and AMM25, which include
41 elements that avoid or minimize the risk of affected habitats and species adjacent to work areas.

1 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in
2 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

3 These commitments are more than sufficient to support the conclusion that the near-term effects of
4 Alternative 1A would be less than significant under CEQA, because no riparian woodrat habitat
5 would be lost and there is only limited potential for minor adverse effects on woodrats or its habitat
6 from implementation of CM11.

7 ***Late Long-Term Timeframe***

8 The habitat model indicates that the study area supports approximately 2,166 acres of riparian
9 woodrat habitat. Alternative 1A as a whole would result in the permanent loss and temporary
10 removal of 84 acres of modeled habitat for riparian woodrat habitat during the late long-term. This
11 represents 2% of the riparian modeled habitat in the study area. None of this habitat is considered
12 occupied.

13 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
14 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
15 (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of riparian
16 habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow
17 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing
18 occupied or potentially occupied habitat to be restored in C Z7. The conserved habitat would also be
19 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural
20 community than what currently exists in C Z7 and would be contiguous with existing modeled
21 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of
22 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,
23 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural
24 community would provide riparian woodrat habitat proportional to the amount of modeled habitat
25 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area
26 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community
27 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is
28 comparable to or of higher value than existing modeled grassland habitat. All riparian protection
29 would occur during the near-term period, to offset early riparian losses.

30 Alternative 1A would also create and maintain mounds, levee sections, or other high areas in
31 restored and protected riparian areas (Objective RW1.2) that are designed specifically to provide
32 flood refugia for the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian
33 Brush Rabbit and Riparian Woodrat*). In addition, the restored floodplains would transition from
34 areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10
35 years or more) (Objective L1.5): these infrequently flooded areas would provide refuge for the
36 riparian woodrat during most years.

37 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
38 and protection actions discussed above, as well as the restoration of valley/foothill riparian that
39 could overlap with the species model, would result in the restoration of 300 acres of modeled
40 habitat for riparian woodrat. In addition, protection of valley/foothill riparian could overlap with
41 the species model and would result in the protection of 90 acres riparian woodrat modeled habitat.

42 Although there are no records of occurrences of the riparian woodrat in the study area, habitat
43 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase

1 opportunities for northward expansion of the species into the study area Implementation of
2 Alternative 1A conservation measures is not expected to adversely affect the riparian woodrat for
3 the following reasons.

- 4 • There are no riparian woodrat occurrences in the Plan Area.
- 5 • The habitat that would be removed consists of small patches that are of moderate value for the
6 species.
- 7 • The habitat that would be removed permanently is a small proportion of the total habitat in the
8 Plan Area (2%).
- 9 • Avoidance and minimization measures would be implemented to avoid injury or mortality of
10 riparian woodrats, and to minimize loss of occupied habitat.
- 11 • Floodplain restoration would be designed to provide flood refugia so that flooding would not
12 adversely affect any riparian woodrats that occupy restored floodplains.

13 Alternative 1A would provide a substantial benefit to the riparian woodrat through the net increase
14 in available habitat and a net increase of habitat in protected status. These protected areas would be
15 managed and monitored to support the species. The affected habitat is currently unoccupied and
16 habitat removal is not expected to result in a discernible change in the abundance or distribution of
17 riparian woodrat. Should the species be detected in the study area, implementation of AMM1–
18 AMM7, AMM10, and AMM25 would avoid and minimize the effects of conservation component
19 construction and implementation. Therefore, the loss of habitat and potential mortality of
20 individuals would not have a significant impact on riparian woodrat.

21 **Impact BIO-156: Indirect Effects of Plan Implementation on Riparian Woodrat**

22 Noise, lighting, and visual disturbances adjacent to construction activities could indirectly affect the
23 use of modeled habitat for riparian woodrat. These effects are related to construction activities
24 associated with tidal natural communities restoration (CM4) and construction of setback levees
25 (CM5). Indirect effects on the species from construction associated with tidal natural communities
26 restoration are unlikely because tidal natural communities restoration projects would be sited to
27 avoid areas occupied by riparian woodrat (AMM25). The activity most likely to result in noise,
28 lighting, and visual disturbances to riparian woodrat is the construction of setback levees. These
29 adverse effects would be minimized through implementation of AMM1–AMM7, AMM10, and
30 AMM25.

31 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1A
32 would avoid the potential for substantial effects on riparian woodrats, either indirectly or through
33 habitat modifications, or result in a substantial reduction in numbers or a restriction in the range of
34 riparian woodrats. Therefore, indirect effects of Alternative 1A would not have an adverse effect on
35 riparian woodrat.

36 **CEQA Conclusion:** Should riparian woodrat be detected in the study area, indirect effects of
37 conservation measure construction and implementation could impact this species and its habitat.
38 AMM1–AMM7, AMM10, and AMM25 implemented under Alternative 1A would avoid and minimize
39 the impact and result in a less-than-significant impact.

1 **Impact BIO-157: Periodic Effects of Inundation of Riparian Woodrat Habitat as a Result of**
2 **Implementation of Conservation Components**

3 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in
4 periodic inundation of riparian woodrat habitat. Floodplain restoration would result in periodic
5 inundation of up to 203 acres of riparian woodrat habitat (9% of the riparian woodrat habitat in the
6 Plan Area). The area between existing levees that would be breached and the newly constructed
7 setback levees would be inundated through seasonal flooding. The potentially inundated areas
8 consist of moderate-value habitat for the species. Although the habitat consists of small patches and
9 narrow bands of riparian vegetation and no riparian woodrats have been detected in CZ 7, the
10 riparian patches are in proximity to each other along the San Joaquin River and there are two
11 species occurrences immediately south of CZ 7, one of which is less than 1 mile from the
12 southernmost patch of riparian habitat potentially affected by levee construction. The restored
13 floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to areas that
14 flood infrequently (e.g., every 10 years or more).

15 **NEPA Effects:** Alternative 1A's periodic inundation of 203 acres of riparian habitat for riparian
16 woodrat is not expected to result in substantial adverse effects on riparian woodrat, either directly
17 or through habitat modifications and would not result in a substantial reduction in numbers or a
18 restriction in the range of riparian woodrat. The effects of periodic inundation on the riparian
19 woodrat would be minimized through construction and maintenance of flood refugia to allow
20 riparian woodrats to escape inundation. Therefore, the periodic inundation of riparian woodrat
21 habitat would not adversely affect the species.

22 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect a total of 203 acres of
23 riparian habitat for riparian woodrat, representing 9% of the 2,166 acres of modeled riparian
24 woodrat habitat in the study area. The impact of periodic inundation on the riparian woodrat would
25 be minimized through construction and maintenance of flood refugia to allow riparian woodrats to
26 escape inundation, as described in AMM25. Implementation of CM5 would not be expected to result
27 in significant impacts on riparian woodrat, either directly or through habitat modifications, and
28 would not result in a substantial reduction in numbers or a restriction in the range of riparian
29 woodrats. Periodic inundation of riparian woodrat habitat under Alternative 1A would have a less-
30 than-significant impact.

31 **Salt Marsh Harvest Mouse**

32 The habitat model used to assess effects on the salt marsh harvest mouse includes six habitat types:
33 primary tidal marsh habitat, secondary tidal marsh habitat (low marsh), secondary upland habitat
34 adjacent to tidal marsh habitat, primary habitat within managed wetlands, secondary habitat within
35 managed wetlands (dominated by plants characteristic of low marsh), and upland habitats within
36 managed wetland boundaries. The tidal and managed wetland habitats were discriminated
37 recognizing that regardless of habitat value, managed wetlands are at high risk of catastrophic
38 flooding and have lower long-term conservation value than tidal wetlands.

39 Construction and restoration associated with Alternative 1A conservation measures would result in
40 effects to modeled salt marsh harvest mouse habitat, which would include permanent losses and
41 habitat conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species
42 postrestoration) as indicated in Table 12-1A-57. All of the effects to the species would take place
43 over an extended period of time as tidal marsh is restored in the Plan Area. Full implementation of

1 Alternative 1A would also include the following conservation actions over the term of the BDCP to
2 benefit salt marsh harvest mouse (BDCP Chapter 3, *Conservation Strategy*).

- 3 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with
4 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California
5 (Objective TBEWNC1.1, associated with CM4)
- 6 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500
7 acres of middle and high marsh (primary salt marsh harvest mouse habitat) to contribute to
8 total (existing and restored) acreage targets for each complex as specified in the final Recovery
9 Plan for Tidal Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2,
10 associated with CM4).
- 11 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
12 natural community within the reserve system (Objective TBEWNC2.1).
- 13 ● Protect and enhance at least 1,500 acres of managed wetland in Grizzly Island Marsh Complex
14 for the benefit of salt marsh harvest mouse (Objective MWNC1.1, associated with CM3).
- 15 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide
16 at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective
17 GNC1.4, associated with CM3 and CM8).
- 18 ● Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of restored or
19 created middle and high marsh as defined in the final Recovery Plan for Tidal Marsh Ecosystems
20 of Northern and Central California (Objective SMHM1.1).
- 21 ● Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of managed
22 wetland protected and enhanced in the Grizzly Island Marsh Complex as defined in the final
23 Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California, and increase
24 population levels above the current baseline (Objective SMHM1.2).

25 As explained below, with the restoration or protection of these amounts of habitat, in addition to
26 AMMs to minimize potential effects, impacts on the salt marsh harvest mouse would not be adverse
27 for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-57. Changes in Salt Marsh Harvest Mouse Modeled Habitat Associated with**
2 **Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
CM2–CM18	TBEW Primary	64	67	0	0	0	0
	TBEW Secondary	0	0	0	0	0	0
	Upland Secondary	8	9	0	0	0	0
	MW Wetland Primary	1,913	5,323	0	0	0	0
	MW Wetland Secondary	315	807	0	0	0	0
	MW Upland	165	762	0	0	0	0
Total Impacts CM2–CM18		2,465	6,968	0	0	0	0
TOTAL IMPACTS		2,645	6,968	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

TBEW = tidal brackish emergent wetland

MW = managed wetland

NT = near-term

LLT = late long-term

NA = not applicable

3
4 **Impact BIO-158: Loss or Conversion of Habitat for and Direct Mortality of Salt Marsh Harvest**
5 **Mouse**

6 Alternative 1A tidal restoration (CM4) would be the only conservation measure resulting in effects
7 on salt marsh harvest mouse habitat. Habitat enhancement and management activities (CM11),
8 which include ground disturbance or removal of nonnative vegetation, could result in local adverse
9 habitat effects. Each of these activities is described in detail below. A summary statement of the
10 combined impacts and NEPA and CEQA conclusions follows the individual conservation measure
11 discussions.

- 12 • *CM4 Tidal Natural Communities Restoration*: would result in effects to 6,968 acres of salt marsh
13 harvest mouse modeled habitat, which would include 5,376 acres of permanent losses and 1,592
14 acres of habitat conversions. Salt marsh harvest mouse may be displaced temporarily from areas
15 of converted habitat but these areas would ultimately provide suitable habitat for the species.
16 However, 1,058 of these acres would be downgraded from primary habitat (67 acres of primary
17 tidal brackish emergent wetland and 991 acres of primary managed wetland) to secondary tidal
18 brackish emergent wetland. The hypothetical restoration footprints in Suisun Marsh overlap
19 with 13 CNDDDB records for salt marsh harvest mouse (California Department of Fish and

1 Wildlife 2013); however, the BDCP's conservation actions assume that all suitable habitat in
2 Suisun Marsh is occupied by the species.

- 3 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the
4 restoration of at least 1,500 acres of tidal brackish emergent wetland would be managed to
5 provide viable habitat for salt marsh harvest mouse and the protection of 1,500 acres of
6 managed wetland specifically to be managed for salt marsh harvest mouse. A variety of habitat
7 management actions included in *CM11 Natural Communities Enhancement and Management* that
8 are designed to enhance and manage these areas for salt marsh harvest mouse and may result in
9 localized ground disturbances that could temporarily remove small amounts of salt marsh
10 harvest mouse habitat. The restoration of tidal brackish emergent wetlands, the protection of
11 managed wetlands, and the protection and/or restoration of grasslands within 200 feet of
12 restored salt marsh harvest mouse habitat would also have enhancement and management
13 actions that would include invasive species control, nonnative wildlife control, and vegetation
14 management. Ground-disturbing activities, such as removal of nonnative vegetation are
15 expected to have minor effects on habitat and are expected to result in overall improvements to
16 and maintenance of salt marsh harvest mouse habitat values over the term of the BDCP. These
17 effects cannot be quantified, but are expected to be minimal and would be avoided and
18 minimized by the AMMs listed below.
- 19 • *Injury and Direct Mortality*: The use of heavy equipment and handtools may result in injury or
20 mortality to salt marsh harvest mouse during restoration, enhancement, and management
21 activities. However, preconstruction surveys, construction monitoring, and other measures
22 would be implemented to avoid and minimize injury or mortality of this species during these
23 activities, as required by the AMMs listed below.

24 The following paragraphs summarize the combined effects discussed above and describe other
25 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
26 also included.

27 ***Near-Term Timeframe***

28 The near-term BDCP conservation strategy has been evaluated to determine whether it would
29 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
30 the effects of near-term covered activities would not be adverse under NEPA and would be less than
31 significant under CEQA. Alternative 1A would effect 2,465 acres of salt marsh harvest mouse
32 modeled habitat in the study area in the near-term. These effects include 1,517 acres of permanent
33 loss and 948 acres of converted habitat. Most of the habitat converted would be from primary
34 habitats (599 acres consisting of 64 acres of tidal brackish emergent wetland and 534 acres of
35 managed wetland) to secondary tidal brackish emergent wetland.

36 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
37 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,
38 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest
39 mouse. Though there would be a net loss of modeled habitat, all of these losses (97%) are to
40 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of
41 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation
42 value than tidal wetlands. The species-specific biological goals and objectives would inform the
43 near-term protection and restoration efforts. These Plan goals represent performance standards for
44 considering the effectiveness of restoration actions. The acres of protection and restoration

1 contained in the near-term Plan goals would keep pace with the loss of habitat and effects to salt
2 marsh harvest mouse.

3 Other factors relevant to effects on salt marsh harvest mouse include:

- 4 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
5 wetlands as noted in the specie's draft recovery plan because the conversion of managed
6 wetland to tidal marsh occurs gradually. Tidal marsh restoration is often accomplished by
7 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest
8 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided
9 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a
10 prolonged period (sometimes a decade or more) in which resident mice populations are
11 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these
12 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for
13 restoration of tidal wetlands through the conversion of managed wetlands. These plans are
14 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse
15 habitat from a variety of factors, including flooding from levee failure and cessation of active
16 management (which is often necessary to maintain habitat values in managed wetlands).
17 Therefore, the temporary effects under BDCP are consistent with those deemed acceptable in
18 the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 19 • Restoration in Suisun Marsh would be carefully phased over time to offset adverse effects of
20 restoration as it occurs. This phasing would ensure that temporal loss as a result of tidal natural
21 communities restoration does not adversely affect the salt marsh harvest mouse population,
22 ensure that short-term population loss is relatively small and incremental, and maintain local
23 source populations to recolonize newly restored areas. The tidal restoration projects in Suisun
24 Marsh would be implemented in 150-acre or greater patches that provide viable habitat areas
25 for the salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan
26 (U.S. Fish and Wildlife Service 2010).
- 27 • The salt marsh harvest mouse population would be monitored during the phasing process (see
28 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure
29 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
30 Section 3.6).
- 31 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
32 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
33 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
34 forage and cover.

35 Because there are no project level impacts to salt marsh harvest mouse from CM1, the analysis of the
36 effects and conservation actions does not include a comparison to standard ratios used for project
37 level NEPA analyses.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
41 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
42 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
43 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
44 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

Late Long-Term Timeframe

The study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat. Alternative 1A as a whole would result in effects on 6,968 acres of saltmarsh harvest mouse modeled habitat over the term of the Plan, which would include 5,376 acres of permanent losses and 1,592 acres of habitat conversions. These effects (loss and conversion) would be on 20% of the modeled habitat in the study area. Most of these effects (99%) would be to managed wetlands, which though are known to be occupied by salt marsh harvest mouse are at high risk of catastrophic flooding and have a lower long-term conservation value than tidal wetlands (U.S. Fish and Wildlife Service 2010). Effects on up to 20% of the species' habitat in the Plan Area may diminish the salt marsh harvest mouse population in the Plan Area and result in reduced genetic diversity, thereby putting the local population at risk of local extirpation due to random environmental fluctuations or catastrophic events. This effect is expected to be greatest if large amounts of habitat are removed at one time in Suisun Marsh and are not effectively restored for many years, and if there are no adjacent lands with salt marsh harvest mouse populations to recolonize restored areas.

The Plan includes a commitment to restore or create 6,000 acres to tidal brackish emergent wetland, 1,500 acres of which would target middle and high marsh habitat (primary habitat for salt marsh harvest mouse) (TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4), the protection of 6,500 acres of managed wetlands, 1,500 acres of which would be specifically managed for salt marsh harvest mouse (SMHM1.2 and MWNC1.1, associated with CM3), and the protection and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration) to provide upland refugia for salt marsh harvest mouse (GNC1.4, associated with CM3 and CM8). Other factors relevant to effects on salt marsh harvest mouse are listed below.

- Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the conversion of managed wetland to tidal marsh occurs gradually. Tidal marsh restoration is often accomplished by breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest mouse to tidal wetlands, their historic condition. Conversion of these subsided areas requires sedimentation and accretion over time to restore marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands. These plans are based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and cessation of active management (which is often necessary to maintain habitat values in managed wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- In order to ensure that temporal loss as a result of tidal natural communities restoration does not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure that short-term population loss is relatively small and incremental, and maintain local source populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh would be implemented in 150-acre or greater patches that provide viable habitat areas for the salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish and Wildlife Service 2010).

- 1 ● The salt marsh harvest mouse population would be monitored during the phasing process (see
2 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure
3 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
4 Section 3.6).
- 5 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
6 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
7 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
8 forage and cover.
- 9 ● The habitat that would be restored and protected would consist of large blocks of contiguous
10 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
11 vegetation suitable for the species. This would provide greater habitat connectivity and greater
12 habitat value, which is expected to accommodate larger populations and to therefore increase
13 population resilience to random environmental events and climate change.

14 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
15 and protection actions discussed above could result in the restoration of 6,046 acres and the
16 protection of 1,550 acres of modeled habitat for salt marsh harvest mouse.

17 **NEPA Effects:** In the absence of other conservation actions, the effects on salt marsh harvest mouse
18 habitat from Alternative 1A would represent an adverse effect as a result of habitat modification and
19 potential direct mortality of a special-status species. However, the BDCP has committed to habitat
20 protection, restoration, management, and enhancement associated with CM3, CM4, CM8 and CM11.
21 This habitat protection, restoration, management, and enhancement would be guided by species-
22 specific goals and objectives and by AMM1–AMM5 and AMM26, which would be in place during all
23 project activities. Considering these commitments, losses and conversions of salt marsh harvest
24 mouse habitat and potential mortality of individuals in both the near-term and late long-term under
25 Alternative 1A would not be an adverse effect.

26 **CEQA Conclusion:**

27 **Near-Term Timeframe**

28 The near-term BDCP conservation strategy has been evaluated to determine whether it would
29 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
30 the impacts of near-term covered activities would be less than significant under CEQA. Alternative
31 1A would impacts 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the
32 near-term. These effects include 1,517 acres of permanent loss and 948 acres of converted habitat.
33 Most of the habitat converted would be to primary habitats (599 acres consisting of 64 acres of tidal
34 brackish emergent wetland and 534 acres of managed wetland) to secondary tidal brackish
35 emergent wetland.

36 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
37 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,
38 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest
39 mouse). Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to
40 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of
41 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation
42 value than tidal wetlands. The species-specific biological goals and objectives would inform the
43 near-term protection and restoration efforts. These Plan goals represent performance standards for

1 considering the effectiveness of restoration actions. The acres of protection and restoration
2 contained in the near-term Plan goals would keep pace with the loss of habitat and effects to salt
3 marsh harvest mouse habitat.

4 Other factors relevant to effects on salt marsh harvest mouse include:

- 5 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
6 wetlands as noted in the specie's draft recovery plan because the conversion of managed
7 wetland to tidal marsh occurs gradually. Tidal marsh restoration is often accomplished by
8 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest
9 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided
10 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a
11 prolonged period (sometimes a decade or more) in which resident mice populations are
12 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these
13 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for
14 restoration of tidal wetlands through the conversion of managed wetlands. These plans are
15 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse
16 habitat from a variety of factors, including flooding from levee failure and cessation of active
17 management (which is often necessary to maintain habitat values in managed wetlands).
18 Therefore, the temporary effects under BDCP are consistent with those deemed acceptable in
19 the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 20 • In order to ensure that temporal loss as a result of tidal natural communities restoration does
21 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh
22 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure
23 that short-term population loss is relatively small and incremental, and maintain local source
24 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh
25 would be implemented in 150-acre or greater patches that provide viable habitat areas for the
26 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish
27 and Wildlife Service 2010).
- 28 • The salt marsh harvest mouse population would be monitored during the phasing process (see
29 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure
30 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
31 Section 3.6).
- 32 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
33 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
34 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
35 forage and cover.

36 Because there are no project level impacts to salt marsh harvest mouse from CM1, the analysis of the
37 effects and conservation actions does not include a comparison to standard ratios used for project
38 level CEQA analyses.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
42 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
43 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work

1 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
2 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

3 **Late Long-Term Timeframe**

4 The study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat.
5 Alternative 1A as a whole would result in effects on 6,968 acres of saltmarsh harvest mouse
6 modeled habitat over the term of the Plan, which would include 5,376 acres of permanent losses and
7 1,592 acres of habitat conversions. The Plan contains a commitment to restore or create 6,000 acres
8 of tidal brackish emergent wetland, 1,500 acres of which would target middle and high marsh
9 habitat (primary habitat for salt marsh harvest mouse) (TBEWNC1.1, TBEWNC1.2, SMHM1.1,
10 associate with CM4); the protection of 6,500 acres of managed wetlands, 1,500 acres of which would
11 be specifically managed for salt marsh harvest mouse (SMHM1.2 and MWNC1.1, associated with
12 CM3), and the protection and/or restoration of grassland adjacent to tidal restoration (areas within
13 200 feet of tidal restoration) to provide upland refugia for salt marsh harvest mouse (GNC1.4,
14 associated with CM3 and CM8). Other factors relevant to effects on salt marsh harvest mouse are
15 listed here.

- 16 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
17 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the
18 conversion of managed wetland to tidal marsh occurs gradually. Tidal marsh restoration is often
19 accomplished by breaching levees and converting diked nontidal marsh currently occupied by
20 salt marsh harvest mouse populations to tidal wetlands, their historic condition. Conversion of
21 these subsided areas requires sedimentation and accretion over time to restore marsh plains,
22 resulting in a prolonged period (sometimes a decade or more) in which resident mice
23 populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010).
24 Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan
25 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.
26 These plans are based on the premise that managed wetlands are at high risk of loss of salt
27 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and
28 cessation of active management (which is often necessary to maintain habitat values in managed
29 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed
30 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 31 • In order to ensure that temporal loss as a result of tidal natural communities restoration does
32 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh
33 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure
34 that short-term population loss is relatively small and incremental, and maintain local source
35 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh
36 would be implemented in 150-acre or greater patches that provide viable habitat areas for the
37 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish
38 and Wildlife Service 2010).
- 39 • The salt marsh harvest mouse population would be monitored during the phasing process (see
40 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure
41 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
42 Section 3.6).

- 1 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
2 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
3 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
4 forage and cover.
- 5 • The habitat that would be restored and protected would consist of large blocks of contiguous
6 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
7 vegetation suitable for the species. This would provide greater habitat connectivity and greater
8 habitat, which is expected to accommodate larger populations and to therefore increase
9 population resilience to random environmental events and climate change.

10 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
11 and protection actions discussed above could result in the restoration of 6,046 acres and the
12 protection of 1,550 acres of modeled habitat for salt marsh harvest mouse.

13 Alternative 1A would result in substantial habitat modifications to salt marsh harvest mouse habitat
14 in the absence of other conservation actions. However, with habitat protection, restoration,
15 management, and enhancement associated with CM3, CM4, CM8, and CM11, guided by species-
16 specific goals and objectives and by AMM1–AMM5 and AMM26, which would be in place during all
17 project activities, Alternative 1A over the term of the BDCP would not result in a substantial adverse
18 effect through habitat modifications and would not substantially reduce the number or restrict the
19 range of the species. Therefore, the alternative would have a less-than-significant impact on salt
20 marsh harvest mouse.

21 **Impact BIO-159: Indirect Effects of Plan Implementation on Salt Marsh Harvest Mouse**

22 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),
23 and management and enhancement activities (CM11) could result in temporary noise and visual
24 disturbances to salt marsh harvest mouse occurring within 100 feet of these areas over the term of
25 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM6, and
26 AMM26, which would be in effect throughout the term of the Plan.

27 The use of mechanical equipment during the implementation of the conservation measures could
28 cause the accidental release of petroleum or other contaminants that could affect salt marsh harvest
29 mouse and its habitat. The inadvertent discharge of sediment could also have a negative effect on
30 the species and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would
31 ensure measures are in place to prevent runoff from the construction area and potential effects of
32 sediment on salt marsh harvest mouse.

33 Tidal marsh restoration has the potential to increase salt marsh harvest mouse's exposure to
34 mercury. Mercury is transformed into the more bioavailable form of methylmercury under
35 anaerobic conditions, which in the environment typically occurs in sediments subjected to regular
36 wetting and drying such as tidal marshes and flood plains. Thus, BDCP restoration activities that
37 create newly inundated areas could increase bioavailability of mercury. In general, the highest
38 methylation rates are associated with high tidal marshes that experience intermittent wetting and
39 drying and associated anoxic conditions (Alpers et al. 2008). High tidal marsh is considered to be
40 primary habitat for salt marsh harvest mouse and thus the species could be exposed to methyl
41 mercury in tidal restoration areas. Salt marsh harvest mouse may be exposed to elemental mercury
42 by feeding on pickleweed, which is found concentrated in the distal tips of pickleweed leaves (Yee et
43 al., 2008). Though elemental mercury is less bioavailable than methylmercury, studies have shown

1 that mercury can become methylated in the anaerobic portions of the intestinal tract (Rudd et al.
2 1980, Rieder et al. 2013) and could thus become a pathway for salt marsh harvest exposure to
3 methylmercury. A study of small mammals residing in pickleweed around the San Francisco Bay
4 showed an absence of salt marsh harvest mouse where mercury concentrations measured in house
5 mice (*Mus musculus*) livers were ≥ 0.19 $\mu\text{g/g}$ (dry weight) (Clark et al. 1992). Clark et al (1992) also
6 report that the lack of salt marsh harvest mouse at these locations are not the result of undetected
7 habitat differences or are by chance. Clarke et al (1992) suggest that the absence of salt marsh
8 harvest mouse at certain locations may be associated with higher amounts of mercury and
9 polychlorinated biphenyls (PCBs); however, because their study didn't analyze contaminants in salt
10 marsh harvest mouse and because (at that time) there was no data in the literature on contaminants
11 in harvest mice, they could not make conclusions on these associations. Currently, it is unknown
12 what the exact exposure pathways are or what tissue concentrations are harmful to the salt marsh
13 harvest mouse.

14 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
15 under the plan would generate less methylmercury than the existing managed wetlands. The
16 potential for salt marsh harvest mouse exposure to methylmercury in Suisun Marsh may decrease in
17 the long term because the creation of tidal brackish emergent wetland would predominantly result
18 from the conversion of managed wetlands. *CM12 Methylmercury Management* includes provisions
19 for project-specific Mercury Management Plans. Along with avoidance and minimization measures
20 and adaptive management and monitoring, CM12 could reduce the effects of methylmercury on salt
21 marsh harvest mouse resulting from BDCP tidal restoration.

22 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1A
23 would avoid and minimize indirect effects on salt marsh harvest mouse. These AMMs would also
24 avoid and minimize effects that could substantially reduce the number of salt marsh harvest mouse,
25 or restrict the species' range. Therefore, the indirect effects of Alternative 1A would not have an
26 adverse effect on salt marsh harvest mouse.

27 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could
28 impact salt marsh harvest mouse within 100 feet of these disturbances. The use of mechanical
29 equipment during construction could cause the accidental release of petroleum or other
30 contaminants that could impact salt marsh harvest mouse and its habitat. The inadvertent discharge
31 of sediment adjacent to salt marsh harvest mouse habitat could also impact the species. With
32 implementation of AMM1-AMM5, and AMM26 as part of Alternative 1A construction, operation and
33 maintenance, the BDCP would avoid the potential for substantial adverse effects on salt marsh
34 harvest mouse, either indirectly or through habitat modifications, in that the BDCP would not result
35 in a substantial reduction in numbers or a restriction in the range of salt marsh harvest mouse. The
36 indirect effects of Alternative 1A would have a less-than-significant impact on salt marsh harvest
37 mouse.

38 Salt marsh harvest mouse could experience indirect effects from increased exposure to
39 methylmercury as a result of tidal habitat restoration (CM4). With implementation of CM12, the
40 potential indirect effects of methylmercury would not result in a substantial reduction in numbers
41 or a restriction in the range of salt marsh harvest mouse, and, therefore, would have a less-than-
42 significant impact on the species.

1 **Suisun Shrew**

2 Primary Suisun shrew habitat consists of all *Salicornia*-dominated natural seasonal wetlands and
3 certain *Scirpus* and *Typha* communities found within Suisun Marsh only. Low marsh dominated by
4 *Schoenoplectus acutus* and *S. californicus* and upland transitional zones within 150 feet of the tidal
5 wetland edge were classified separately as secondary habitat because they are used seasonally
6 (Hays and Lidicker 2000). All managed wetlands were excluded from the habitat model.
7 Construction and restoration associated with Alternative 1A conservation measures would result in
8 effects to modeled Suisun shrew habitat, which would include permanent losses and habitat
9 conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species
10 postrestoration) as indicated in Table 12-1A-58. All of the effects on the species would take place
11 over an extended period of time as tidal marsh is restored in the Plan Area.

12 Full implementation of Alternative 1A would also include the following conservation actions over
13 the term of the BDCP to benefit Suisun shrew (BDCP Chapter 3, *Conservation Strategy*).

- 14 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with
15 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California
16 (TBEWNC1.1, associated with CM4)
- 17 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500
18 acres of middle and high marsh (primary Suisun shrew habitat) to contribute to total (existing
19 and restored) acreage targets for each complex as specified in the final Recovery Plan for Tidal
20 Marsh Ecosystems of Northern and Central California (TBEWNC1.2, associated with CM4).
- 21 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
22 natural community within the reserve system (TBEWNC2.1).
- 23 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide at
24 least 200 feet of adjacent grasslands beyond the sea level rise accommodation area, which
25 provides refugia during high tides (GNC1.4, associated with CM3 and CM8).

26 As explained below, with the restoration or protection of these amounts of habitat, impacts on the
27 Suisun shrew would not be adverse for NEPA purposes and would be less than significant for CEQA
28 Alternative 1A.

1 **Table 12-1A-58. Changes in Suisun Shrew Modeled Habitat Associated with Alternative 1A (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
CM2-CM18	Primary	58	60	0	0	0	0
	Secondary	47	342	0	0	0	0
Total Impacts CM2-CM18		105	401	0	0	0	0
TOTAL IMPACTS		105	401	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-160: Loss or Conversion of Habitat for and Direct Mortality of Suisun Shrew**

4 BDCP tidal restoration (CM4) would be the only conservation measure resulting in loss of habitat to
5 Suisun shrew. Habitat enhancement and management activities (CM11), which include ground
6 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. Each of
7 these activities is described in detail below. A summary statement of the combined impacts and
8 NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 9 • *CM4 Tidal Natural Communities Restoration*: would result in effects on 401 acres of Suisun shrew
10 modeled habitat, which would include 377 acres of permanent losses and 24 acres of habitat
11 conversions. Suisun shrew may be displaced temporarily from areas of converted habitat but
12 would ultimately provide suitable habitat for the species. However, all 24 acres would be
13 converted from secondary to primary habitat and therefore over would be net benefit to the
14 species. The hypothetical restoration footprints overlap with two CNDDDB records for Suisun
15 shrew (California Department of Fish and Wildlife 2013).
- 16 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the
17 restoration of at least 6,000 acres of tidal brackish emergent wetland would be managed to
18 provide habitat for covered species, including Suisun shrew. A variety of habitat management
19 actions included in *CM11 Natural Communities Enhancement and Management* that are designed
20 to enhance and manage these areas may result in localized ground disturbances that could
21 temporarily remove small amounts of Suisun shrew habitat. The areas of grasslands that would
22 be protected and/or restored within 200 feet of restored tidal marsh would also have
23 enhancement and management actions that would include invasive species control, nonnative
24 wildlife control, and vegetation management. Ground-disturbing activities, such as removal of

1 nonnative vegetation are expected to have minor effects on habitat and are expected to result in
2 overall improvements to and maintenance of Suisun shrew habitat values over the term of the
3 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
4 and minimized by the AMMs listed below.

- 5 • Injury and Direct Mortality: The use of heavy equipment and handtools may result in injury or
6 mortality to Suisun shrew during restoration, enhancement, and management activities.
7 However, preconstruction surveys, construction monitoring, and other measures would be
8 implemented to avoid and minimize injury or mortality of this species during these activities, as
9 required by the AMM listed below.

10 The following paragraphs summarize the combined effects discussed above and describe other
11 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
12 also included.

13 ***Near-Term Timeframe***

14 The near-term BDCP conservation strategy has been evaluated to determine whether it would
15 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
16 effects of near-term covered activities would not be adverse under NEPA and would be less than
17 significant under CEQA. Alternative 1A would effect 105 acres of Suisun shrew modeled habitat in
18 the study area in the near-term. These effects include 90 acres of permanent loss and 15 acres of
19 converted habitat, which is all secondary habitat being converted to primary habitat.

20 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
21 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal
22 wetlands, of which approximately 150 feet of this area would benefit the species. These Plan goals
23 represent performance standards for considering the effectiveness of restoration actions. The acres
24 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-
25 term Plan goals would keep pace with the loss of habitat and effects to Suisun shrew.

26 Other factors relevant to effects on Suisun shrew include:

- 27 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
28 loss of habitat and habitat fragmentation
- 29 • The habitat that would be restored and protected would consist of large blocks of contiguous
30 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
31 vegetation suitable for the species. This would provide greater habitat connectivity and greater
32 habitat value and quantity, with is expected to accommodate larger populations and to therefore
33 increase population resilience to random environmental events and climate change.
- 34 • The amount of tidal habitat restored in the near term (2,000 acres) greatly exceeds the amount
35 permanently lost (105 acres).

36 Because there are no project level impacts to Suisun shrew from CM1, the analysis of the effects and
37 conservation actions does not include a comparison to standard ratios used for project level NEPA
38 analyses.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
40 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
41 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
2 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
3 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
4 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

5 **Late Long-Term Timeframe**

6 The study area supports approximately 7,515 acres of Suisun shrew modeled habitat. Alternative 1A
7 as a whole would result in effects on 401 acres of Suisun shrew modeled habitat over the term of the
8 Plan, which would include 377 acres of permanent losses and 24 acres of habitat conversions
9 (roughly 5% of the habitat in the study area).

10 The Plan includes a commitment to restore or create 6,000 acres of tidal brackish emergent wetland,
11 1,500 acres of which would target middle and high marsh habitat (primary habitat for Suisun
12 shrew) (TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4) and the protection and/or
13 restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration, of
14 which approximately 150 feet would likely benefit the species) to provide upland refugia for Suisun
15 shrew (GNC1.4, associated with CM3 and CM8). Other factors relevant to effects on Suisun shrew
16 include:

- 17 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
18 loss of habitat and habitat fragmentation
- 19 • The habitat that would be restored and protected would consist of large blocks of contiguous
20 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
21 vegetation suitable for the species. This would provide greater habitat connectivity and greater
22 habitat value and quantity, with is expected to accommodate larger populations and to therefore
23 increase population resilience to random environmental events and climate change.
- 24 • The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost
25 and converted (401 acres).

26 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
27 and protection actions discussed above could result in the restoration of 6,006 acres and the
28 protection of 232 acres of modeled habitat for Suisun shrew.

29 **NEPA Effects:** In the absence of other conservation actions, the effects on Suisun shrew habitat from
30 Alternative 1A would represent an adverse effect as a result of habitat modification and potential
31 direct mortality of a special-status species. However, the BDCP has committed to habitat protection,
32 restoration, management, and enhancement associated with CM3, CM4, CM8 and CM11. This habitat
33 protection, restoration, management, and enhancement would be guided by species-specific goals
34 and objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the
35 construction phase. Considering these commitments, losses and conversions of Suisun shrew habitat
36 and potential mortality of individuals in both the near-term and late long-term under Alternative 1A
37 would not be an adverse effect.

38 **CEQA Conclusion:**

39 **Near-Term Timeframe**

40 The near-term BDCP conservation strategy has been evaluated to determine whether it would
41 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the

1 impacts of near-term covered activities would be less than significant under CEQA. Alternative 1A
2 would impact 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These
3 impacts include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary
4 habitat being converted to primary habitat.

5 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
6 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal
7 wetlands, of which approximately 150 feet would likely benefit the species. These Plan goals
8 represent performance standards for considering the effectiveness of restoration actions. The acres
9 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-
10 term Plan goals would keep pace with the loss of habitat and impacts on Suisun shrew.

11 Other factors relevant to effects on Suisun shrew include:

- 12 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
13 loss of habitat and habitat fragmentation
- 14 ● The habitat that would be restored and protected would consist of large blocks of contiguous
15 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
16 vegetation suitable for the species. This would provide greater habitat connectivity and greater
17 habitat value and quantity, with is expected to accommodate larger populations and to therefore
18 increase population resilience to random environmental events and climate change.
- 19 ● The amount of tidal habitat restored in the near term (2,000 acres) greatly exceeds the amount
20 permanently lost (105 acres).

21 Because there are no project level impacts to Suisun shrew from CM1, the analysis of the effects and
22 conservation actions does not include a comparison to standard ratios used for project level NEPA
23 analyses.

24 The Plan also includes commitments to implement AMM1–AMM5 and AMM26. All of these AMMs
25 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
26 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
27 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

28 These commitments are more than sufficient to support the conclusion that the near-term effects of
29 Alternative 1A would be less than significant under CEQA.

30 ***Late Long-Term Timeframe***

31 The study area supports approximately 7,515 acres of Suisun shrew modeled habitat. Alternative 1A
32 as a whole would result in effects on 401 acres of Suisun shrew modeled habitat over the term of the
33 Plan, which would include 377 acres of permanent losses and 24 acres of habitat conversions
34 (roughly 5% of the habitat in the study area). The Plan contains a commitment to restore or create
35 6,000 acres of tidal brackish emergent wetland, 1,500 acres of which would target middle and high
36 marsh habitat (primary habitat for Suisun shrew) (TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated
37 with CM4) and the protection and/or restoration of grassland adjacent to tidal restoration (areas
38 within 200 feet of tidal restoration, of which approximately 150 feet would likely benefit the
39 species) to provide upland refugia for Suisun shrew (GNC1.4, associated with CM3 and CM8). Other
40 factors relevant to effects on Suisun shrew include:

- 1 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
2 loss of habitat and habitat fragmentation.
- 3 • The habitat that would be restored and protected would consist of large blocks of contiguous
4 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
5 vegetation suitable for the species. This would provide greater habitat connectivity and greater
6 habitat value and quantity, with is expected to accommodate larger populations and to therefore
7 increase population resilience to random environmental events and climate change.
- 8 • The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost
9 and converted (401 acres).

10 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
11 and protection actions discussed above could result in the restoration of 6,006 acres and the
12 protection of 232 acres of modeled habitat for Suisun shrew.

13 Alternative 1A would result in substantial modifications to Suisun shrew habitat in the absence of
14 other conservation actions. However, with habitat protection, restoration, management, and
15 enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and
16 objectives and by AMM1-AMM5 and AMM26, which would be in place during all project activities,
17 Alternative 1A over the term of the BDCP would not result in a substantial adverse effect through
18 habitat modifications and would not substantially reduce the number or restrict the range of the
19 species. Therefore, the alternative would have a less-than-significant impact on Suisun shrew.

20 **Impact BIO-161: Indirect Effects of Plan Implementation on Suisun Shrew**

21 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),
22 and management and enhancement activities (CM11) could result in temporary noise and visual
23 disturbances to Suisun shrew occurring within 100 feet of these areas over the term of the BDCP.
24 These potential effects would be minimized or avoided through AMM1-AMM5 and AMM26, which
25 would be in effect throughout the term of the Plan.

26 The use of mechanical equipment during the implementation of the conservation measures could
27 cause the accidental release of petroleum or other contaminants that could affect Suisun shrew and
28 its habitat. The inadvertent discharge of sediment could also have a negative effect on the species
29 and its habitat. AMM1-AMM5 would minimize the likelihood of such spills occurring and would
30 ensure measures are in place to prevent runoff from the construction area and potential effects of
31 sediment on Suisun shrew.

32 Tidal marsh restoration has the potential to increase Suisun shrew's exposure to mercury. Mercury
33 is transformed into the more bioavailable form of methylmercury under anaerobic conditions,
34 which in the environment typically occurs in sediments subjected to regular wetting and drying
35 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly
36 inundated areas could increase bioavailability of mercury. In general, the highest methylation rates
37 are associated with high tidal marshes that experience intermittent wetting and drying and
38 associated anoxic conditions (Alpers et al. 2008). High and mid tidal marsh is considered to be
39 primary habitat for Suisun shrew and thus the species could be exposed to methylmercury in tidal
40 restoration areas. Suisun shrew could be exposed to methylmercury by feeding on marsh
41 invertebrates that may bioaccumulate methylmercury from marsh sediments. Toxic concentrations
42 of methylmercury have been found in the kidneys of shrews that inhabit contaminated sites and

1 forage on earthworms and other prey that live within contaminated sediments (Talmage and
2 Walton 1993; Hinton and Veiga 2002).

3 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
4 under the plan would generate less methylmercury than the existing managed wetlands. The
5 potential for Suisun shrew exposure to methyl mercury in Suisun Marsh may decrease in the long
6 term because the creation of tidal brackish emergent wetland would predominantly result from the
7 conversion of managed wetlands. *CM12 Methylmercury Management* includes provisions for project-
8 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive
9 management and monitoring, CM12 could reduce the effects of methylmercury on Suisun shrew
10 resulting from BDCP tidal restoration.

11 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1A
12 would avoid and minimize the potential for substantial adverse effects on Suisun shrew, either
13 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that
14 could substantially reduce the number of Suisun shrew, or restrict the species' range. Therefore, the
15 indirect effects of Alternative 1A would not have an adverse effect on Suisun shrew.

16 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could
17 impact Suisun shrew within 100 feet of these disturbances. The use of mechanical equipment during
18 construction could cause the accidental release of petroleum or other contaminants that could
19 impact Suisun shrew and its habitat. The inadvertent discharge of sediment adjacent to Suisun
20 shrew habitat could also impact the species. With implementation of AMM1–AMM5 and AMM26 as
21 part of Alternative 1A construction, operation and maintenance, the BDCP would avoid the potential
22 for substantial adverse effects on Suisun shrew, either indirectly or through habitat modifications, in
23 that the BDCP would not result in a substantial reduction in numbers or a restriction in the range of
24 Suisun shrew. The indirect effects of Alternative 1A would have a less-than-significant impact on
25 Suisun shrew.

26 Suisun shrew could experience indirect effects from increased exposure to methylmercury as a
27 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects
28 of methylmercury would not result in a substantial reduction in numbers or a restriction in the
29 range of Suisun shrew, and, therefore, would have a less-than significant impact on the species.

30 **San Joaquin Kit Fox and American Badger**

31 Within the study area, the modeled habitat for the San Joaquin kit fox and potential habitat for the
32 American badger is restricted to grassland habitat west of Clifton Court Forebay along the study
33 area's southwestern edge, in CZ 7– CZ 10.

34 The study area represents the extreme northeastern corner of San Joaquin kit fox's range in
35 California, which extends westward and southward from the Plan Area border. The northern range
36 of the San Joaquin kit fox (including the study area) was most likely marginal habitat historically and
37 has been further degraded due to development pressures, habitat loss, and fragmentation (Clark et
38 al. 2007). CNDDDB (California Department of Fish and Wildlife 2013) reports eight occurrences of San
39 Joaquin kit foxes along the extreme western edge of the Plan Area within CZ 8, south of Brentwood
40 (Figure 12-49). However, Clark et al. (2007) provide evidence that a number of CNDDDB occurrences
41 in the northern portion of the species' range may be coyote pups misidentified as San Joaquin kit
42 foxes. Smith et al. (2006) suggest that the northern range may possibly be a population sink for the
43 San Joaquin kit fox. There are five American badger records in the study area (California Department

1 of Fish and Wildlife 2013). Two are from 1938 and no longer extant. The remaining three are all
2 located in CZ 8, west of Clifton Court Forebay.

3 Construction and restoration associated with Alternative 1A conservation measures would result in
4 both temporary and permanent losses of San Joaquin kit fox and American badger habitat (Table 12-
5 1A-59). Grassland restoration, and protection and management of natural communities could affect
6 modeled San Joaquin kit fox habitat and potential American badger habitat. Full implementation of
7 Alternative 1A would also include biological objectives over the term of the BDCP to benefit the San
8 Joaquin kit fox which would also benefit American badger which uses similar habitat (BDCP Chapter
9 3, *Conservation Strategy*). The conservation strategy for the San Joaquin kit fox involves protecting
10 and enhancing habitat in the northern extent of the species' range to increase the likelihood that San
11 Joaquin kit fox may reside and breed in the Plan Area; and providing connectivity to habitat outside
12 the Plan Area. The conservation measures that would be implemented to achieve the biological goals
13 and objectives are summarized below.

- 14 • Protect and improve habitat linkages that allow terrestrial covered and other native species to
15 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
16 associated with CM3-CM8, and CM11).
- 17 • Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
18 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 19 • Restore or create alkali seasonal wetlands in CZ 1, CZ 8, and/or CZ 11 (up to 72 acres of alkali
20 seasonal wetland complex restoration) (Objective ASWNC1.2, associated with CM3 and CM9).
- 21 • Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and CZ 11, primarily in core
22 vernal pool recovery areas identified in the Recovery Plan for Vernal Pool Ecosystems of
23 California and Southern Oregon (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,
24 associated with CM3).
- 25 • Restore vernal pool complex in CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool
26 acreage (up to 67 acres of vernal pool complex restoration) (Objective VPNC1.2, associated with
27 CM3 and CM9).
- 28 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 29 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland
30 (Objective GNC1.2, associated with CM3 and CM8).
- 31 • Increase burrow availability for burrow-dependent species in grasslands surrounding alkali
32 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective
33 ASWNC2.3, associated with CM11).
- 34 • Increase prey, especially small mammals and insects, for grassland-foraging species in
35 grasslands surrounding alkali seasonal wetlands within restored and protected alkali seasonal
36 wetland complex (Objective ASWNC2.4, associated with CM11).
- 37 • Increase burrow availability for burrow-dependent species in grasslands surrounding vernal
38 pools within restored and protected vernal pool complex (Objective VPNC2.4, associated with
39 CM11).
- 40 • Increase prey, especially small mammals and insects, for grassland-foraging species in
41 grasslands surrounding vernal pools within restored and protected vernal pool complex
42 (Objective VPNC2.5, associated with CM11).

- 1 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
2 CM11).
- 3 • Increase prey abundance and accessibility, especially small mammals and insects, for grassland-
4 foraging species (Objective GNC2.4, associated with CM11).

5 As explained below, with the restoration and protection of these amounts of habitat, in addition to
6 the implementation of AMMs to reduce potential effects, impacts on San Joaquin kit fox and
7 American badger would not be adverse for NEPA purposes and would be less than significant for
8 CEQA purposes.

9 **Table 12-1A-59. Changes in San Joaquin Kit Fox Modeled Habitat Associated with Alternative 1A**
10 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Grassland	173	173	167	167	NA	NA
Total Impacts CM1		173	173	167	167	NA	NA
CM2-CM18	Grassland	3	8	0	0	0	0
Total Impacts CM2-CM18		0	0	0	0	0	0
TOTAL IMPACTS		176	181	167	167	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

11

12 **Impact BIO-162: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Kit Fox**
13 **and American Badger**

14 Alternative 1A would result in the permanent and temporary loss combined of up to 348 acres of
15 modeled habitat for the San Joaquin kit fox (Table 12-1A-59). Because American badger uses
16 grasslands for denning and foraging may occupy the same range as the San Joaquin kit fox in the
17 project area, effects on are anticipated to be the same as those described for San Joaquin kit fox.
18 Construction of Alternative 1A water conveyance facilities (CM1) and recreation facilities (CM11)
19 would remove habitat. Habitat enhancement and management activities (CM11) could result in local
20 adverse effects on species. In addition, construction vehicle activity could cause injury or mortality
21 of San Joaquin kit foxes and badgers. Each of these individual activities is described below. Each of
22 these individual activities is described below. A summary statement of the combined impacts and
23 NEPA effects and a CEQA conclusion follow the individual conservation measure discussions

- 24 • *CM1 Water Facilities and Operation*: Construction of the conveyance facilities would result in the
25 permanent loss of approximately 173 acres and the temporary loss of 167 acres of modeled San

1 Joaquin kit fox habitat and American badger habitat. This habitat is located in areas of
2 naturalized grassland in a highly disturbed or modified setting on lands immediately adjacent to
3 Clifton Court Forebay, in CZ 8.

- 4 • *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails
5 and recreational staging areas would result in the permanent removal of 8 acres of San Joaquin
6 kit fox modeled habitat and American badger potential habitat. *AMM24 San Joaquin Kit Fox*,
7 would be implemented to ensure that San Joaquin kit fox dens are avoided, as described in
8 Appendix 3B, *Environmental Commitments, AMMs, and CMs*. Mitigation Measure BIO-162:
9 *Conduct Preconstruction Survey for American Badger* would be implemented to ensure that
10 American badger dens are avoided.

11 Passive recreation in the reserve system could result in disturbance of San Joaquin kit foxes and
12 American badgers at their den site. Natal and pupping dens would be particularly vulnerable to
13 human disturbance. Additionally, disease could be transmitted from domestic dogs that enter
14 the reserve system with recreational users. However, *AMM37 Recreation* and Mitigation
15 Measure BIO-162 would prohibit construction of new trails within 250 feet of active San Joaquin
16 kit fox dens and American badger dens. Existing trails would be closed within 250 feet of active
17 natal/pupping dens until young have vacated, and within 50 feet of other active dens. No dogs
18 would be allowed on reserve units with active San Joaquin kit fox and American badger
19 populations. Rodent control would be prohibited even on grazed or equestrian access areas with
20 San Joaquin kit fox or American badger populations. *AMM37* measures to protect San Joaquin kit
21 fox would also benefit American badger if present. With these restrictions, recreation-related
22 effects on San Joaquin kit fox and American badger are expected to be minimal.

23 The BDCP would require the protection of grasslands in large patch sizes connected to existing
24 large areas of grassland, habitat corridors and transition habitat areas to improve the ecological
25 functions of the grasslands necessary to support the San Joaquin kit fox. American badger is
26 expected to benefit in a similar fashion.

27 The BDCP would require the enhancement and management of these protected existing
28 grasslands and restored grasslands to improve their function as a natural community of plants
29 and wildlife and for associated covered species, including San Joaquin kit fox. The BDCP also
30 includes actions to improve rodent prey availability.

31 However, management activities could result in injury or mortality of San Joaquin kit fox or
32 American badger if individuals were present in work sites or if dens were located in the vicinity
33 of habitat management work sites. A variety of habitat management actions included in *CM11*
34 that are designed to enhance wildlife values on protected lands may result in localized ground
35 disturbances that could temporarily remove small amounts of San Joaquin kit fox and American
36 badger habitat near Clifton Court Forebay, in CZ 8. Ground-disturbing activities, such as removal
37 of nonnative vegetation and road and other infrastructure maintenance activities, are expected
38 to have minor effects on available habitat and are expected to result in overall improvements to
39 and maintenance of San Joaquin kit fox and badger habitat values over the term of the BDCP.
40 These effects cannot be quantified, but are expected to be minimal and would be avoided and
41 minimized through the AMMs and mitigation measure listed below. These AMMs and mitigation
42 measure would remain in effect throughout the BDCP's construction phase.

- 43 • *Operations and maintenance*: Ongoing maintenance of BDCP facilities would be expected to have
44 little if any adverse effect on San Joaquin kit fox or American badger. Postconstruction
45 operations and maintenance of the above-ground water conveyance facilities and restoration

1 infrastructure could result in ongoing but periodic disturbances that could affect either species'
2 use of the surrounding habitat near Clifton Court Forebay, in CZ 8. Maintenance activities would
3 include vegetation management, levee and structure repair, and regrading of roads and
4 permanent work areas. These effects, however, would be minimized with implementation of
5 AMM1–AMM6, AMM10, and AMM24 and with preconstruction surveys for the American badger,
6 as required by Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American*
7 *Badger*.

- 8 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
9 either species. If San Joaquin kit fox or American badger reside where activities take place (most
10 likely in the vicinity of Clifton Court Forebay, in CZ 8), the operation of equipment for land
11 clearing, construction, operations and maintenance, and restoration, enhancement, and
12 management activities could result in injury to or mortality of either species. Measures would be
13 implemented to avoid and minimize injury to or mortality of these species as described in
14 AMM1–AMM6, AMM10, and AMM24 (see Appendix 3B, *Environmental Commitments, AMMs, and*
15 *CMs*) and Mitigation Measure BIO-162.

16 The following paragraphs summarize the combined effects discussed above and describe other
17 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
18 also included.

19 ***Near-Term Timeframe***

20 Because water conveyance facilities construction is being evaluated at the project level, the near-
21 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
22 protection or restoration in an appropriate timeframe to ensure that the construction effects would
23 not be adverse under NEPA.

24 Under Alternative 1A there would be a loss of 343 acres of San Joaquin kit fox modeled habitat and
25 American badger habitat from CM1 (340 acres) and CM11 (3 acres).

26 Typical NEPA project-level mitigation ratio for the natural community that would be affected and
27 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3 of the
28 BDCP would be 2:1 for protection of grassland. Using this ratio would indicate that 686 acres of
29 grassland should be protected for San Joaquin kit fox to mitigate near-term losses.

30 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective
31 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland
32 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal
33 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000
34 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities
35 are expected to be concluded during the first 10 years of Plan implementation, which is close
36 enough in time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes.
37 These commitments are more than sufficient to support the conclusion that the near-term effects of
38 Alternative 1A would be not be adverse under NEPA, because the number of acres required to meet
39 the typical ratios described above would be only 686 acres of grassland protected.

40 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger
41 habitat from Alternative 1A would represent an adverse effect as a result of habitat modification and
42 potential direct mortality of a special-status species. However, the effects of Alternative 1A would
43 not be adverse with habitat protection, restoration, management, and enhancement in addition to

1 implementation of *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management*
2 *Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment*
3 *Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and*
4 *Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM24 San*
5 *Joaquin Kit Fox*, and *AMM37 Recreation*. These AMMs contain elements that avoid or minimize the
6 risk of construction activity affecting habitat and species adjacent to work areas and disposal sites.
7 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in
8 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. Remaining effects
9 would be addressed by implementation of Mitigation Measure BIO-162, *Conduct Preconstruction*
10 *Survey for American Badger*.

11 **Late Long-Term Timeframe**

12 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 1A as a
13 whole would result in the permanent loss of and temporary effects on 348 acres of modeled habitat
14 for San Joaquin kit fox and potential habitat for American badger, representing 6% of the modeled
15 habitat.

16 With full implementation of Alternative 1A, at least 1,000 acres of grassland would be protected in
17 CZ 8, where the San Joaquin kit fox and American badger is most likely to occur if present in the
18 study area. Additionally, a portion of the 2,000 acres of grassland restoration would likely occur in
19 CZ 8. Assuming the restored grasslands would provide suitable San Joaquin kit fox habitat
20 proportional to the amount of modeled habitat in this natural community in the study area (6.8% of
21 the grasslands in the Plan Area consist of modeled San Joaquin kit fox habitat), an estimated
22 132 acres of restored grasslands would be suitable for both species (6.6% of 2,000 acres).

23 Because San Joaquin kit fox home ranges are large (varying from approximately 1 to 12 square
24 miles; see BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the
25 conservation of the species. Grasslands would be acquired for protection in locations that provide
26 connectivity to existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining
27 San Joaquin kit fox habitat within and adjacent to the Plan Area. Connectivity to occupied habitat
28 adjacent to the Plan Area would help ensure the movement of San Joaquin kit foxes and American
29 badgers, if present, to larger habitat patches outside of the Plan Area in Contra Costa County.
30 Grassland protection would focus in particular on acquiring the largest remaining contiguous
31 patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (BDCP
32 Appendix 2.A, *Covered Species Accounts*). This area connects to over 620 acres of existing habitat
33 that was protected under the East Contra Costa County HCP/NCCP.

34 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to
35 increase mammal burrows, which could benefit the San Joaquin kit fox and American badger by
36 increasing potential den sites, which are a limiting factor for the San Joaquin kit fox in the northern
37 portion of its range (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective
38 GNC2.3, Objective GNC2.4). These management and enhancement actions are expected to benefit the
39 San Joaquin kit fox by increasing the habitat value of the protected and restoration grasslands.

40 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the
41 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this
42 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches
43 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool
44 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in

1 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities
2 construction.

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
4 and protection actions discussed above, as well as the restoration of grassland and vernal pool that
5 could overlap with the species model, would result in the restoration of 131 acres of modeled
6 habitat for San Joaquin kit fox. In addition, protection of grassland and vernal pool complex could
7 overlap with the species model and would result in the protection of 1,011 acres of modeled habitat
8 for San Joaquin kit fox. These restoration and protection actions would also benefit the American
9 badger.

10 **NEPA Effects:** In the absence of other conservation actions, the effects on San Joaquin kit fox and
11 American badger habitat from Alternative 1A would represent an adverse effect as a result of
12 habitat modification and potential direct mortality of special-status species. However, with habitat
13 protection, restoration, management, and enhancement associated with CM3, CM8, and CM11,
14 guided by AMM1–AMM6, AMM10, AMM24, and AMM37, which would be in place during all project
15 activities, and with implementation of Mitigation Measure BIO-162, the effects of Alternative 1A as a
16 whole on San Joaquin kit fox and American badger would not be adverse under NEPA.

17 **CEQA Conclusion:**

18 **Near-Term Timeframe**

19 Because water conveyance facilities construction (CM1) is being evaluated at the project level, the
20 near-term BDCP strategy has been analyzed to determine whether it would provide sufficient
21 habitat protection or restoration in an appropriate timeframe to ensure that the construction effects
22 under CEQA would be less than significant.

23 Under Alternative 1A there would be a loss of 343 acres of San Joaquin kit fox modeled habitat and
24 American badger habitat from CM1 (340 acres) and CM11 (3 acres).

25 Typical CEQA project-level mitigation ratio for the natural community that would be affected and
26 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3 of the
27 BDCP would be 2:1 for protection of grassland. Using this ratio would indicate that 686 acres of
28 grassland should be protected for San Joaquin kit fox and American badger to mitigate near-term
29 losses.

30 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective
31 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland
32 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal
33 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000
34 acres of grassland (Objective GNC1.1).

35 These conservation actions would occur in the same timeframe as the construction losses, thereby
36 avoiding adverse effects of habitat loss on San Joaquin kit fox and American badger. These Plan
37 objectives represent performance standards for considering the effectiveness of CM3 protection and
38 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
39 and the additional detail in the biological objectives for San Joaquin kit fox and the mitigation
40 measure for American badger satisfy the typical mitigation that would be applied to the project-level
41 effects of CM1, as well as mitigate the near-term effects of the other conservation measures.

1 The BDCP also contains commitments to implement AMM1–6, AMM10, AMM24, and AMM37 which
2 include elements that avoid or minimize the risk of construction activity impacting habitat and
3 species adjacent to work areas and storage sites. Remaining effects would be addressed by
4 implementation of Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American*
5 *Badger*. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
6 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

7 These commitments are more than sufficient to support the conclusion that the near-term impacts
8 of Alternative 1A on San Joaquin kit fox and American badger would be less than significant under
9 CEQA, because the number of acres required to meet the typical ratios described above would be
10 only 686 acres of grassland protected.

11 **Late Long-Term Timeframe**

12 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 1A as a
13 whole would result in the permanent and temporary loss of 348 acres of modeled habitat for San
14 Joaquin kit fox, and potential habitat for American badger representing 6% of the modeled habitat.

15 With full implementation of Alternative 1A, at least 1,000 acres of grassland would be protected in
16 CZ 8, where the San Joaquin kit fox and American badger is most likely to occur if present in the
17 study area. Additionally, a portion of the 2,000 acres of grassland restoration would likely occur in
18 CZ 8. Assuming the restored grasslands would provide suitable San Joaquin kit fox habitat
19 proportional to the amount of modeled habitat in this natural community in the study area (6.8% of
20 the grasslands in the study area consist of modeled San Joaquin kit fox habitat), an estimated
21 132 acres of restored grasslands would be suitable for the species (6.6% of 2,000 acres).

22 Because San Joaquin kit fox home ranges are large (ranging from around 1 to 12 square miles; see
23 BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the conservation of the
24 species. Grasslands would be acquired for protection in locations that provide connectivity to
25 existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining San Joaquin kit
26 fox habitat and American badger within and adjacent to the study area. Connectivity to occupied
27 habitat adjacent to the study area would help ensure the movement of San Joaquin kit foxes and
28 American badger, if present, to larger habitat patches outside of the study area in Contra Costa
29 County. Grassland protection would focus in particular on acquiring the largest remaining
30 contiguous patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (BDCP
31 Appendix 2.A, *Covered Species Accounts*). This area connects to over 620 acres of existing habitat
32 that was protected under the East Contra Costa County HCP/NCCP.

33 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to
34 increase mammal burrows, which could benefit the San Joaquin kit fox and American badger by
35 increasing potential den sites, which are a limiting factor for the San Joaquin kit fox in the northern
36 portion of its range (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective
37 GNC2.3, Objective GNC2.4). These management and enhancement actions are expected to benefit the
38 San Joaquin kit fox as well as the American badger by increasing the habitat value of the protected
39 and restoration grasslands.

40 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the
41 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this
42 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches
43 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool

1 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in
2 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities
3 construction.

4 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
5 and protection actions discussed above, as well as the restoration of grassland and vernal pool that
6 could overlap with the species model, would result in the restoration of 131 acres of modeled
7 habitat for San Joaquin kit fox. In addition, protection of grassland and vernal pool complex could
8 overlap with the species model and would result in the protection of 1,011 acres of modeled habitat
9 for San Joaquin kit fox. These restoration and protection actions would also benefit the American
10 badger.

11 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger
12 habitat from Alternative 1A would represent a significant impact as a result of habitat modification
13 and potential direct mortality of a special-status species. However, with habitat protection,
14 restoration, management, and enhancement associated with CM3, CM8, and CM11, and guided by
15 AMM1-AMM6, AMM10, AMM24, and AMM37, which would be in place throughout the time period
16 of construction, and with implementation of Mitigation Measure BIO-162, the impact of Alternative
17 1A as a whole on San Joaquin kit fox and American badger would be less than significant.

18 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

19 A qualified biologist provided by DWR will survey for American badger concurrent with the
20 preconstruction survey for San Joaquin kit fox and burrowing owl. If badgers are detected, the
21 biologist will passively relocate badgers out of the work area prior to construction if feasible. If
22 an active den is detected within the work area, DWR will establish a suitable buffer distance and
23 avoid the den until the qualified biologist determines the den is no longer active. Dens that are
24 determined to be inactive by the qualified biologist will be collapsed by hand to prevent
25 occupation of the den between the time of the survey and construction activities. In addition,
26 ground disturbance within project-related conservation areas within 50 feet of active American
27 badger dens would be prohibited. Existing trails would be closed within 250 feet of active
28 natal/pupping dens until young have vacated, and within 50 feet of other active dens. No dogs
29 would be allowed on conservation areas with active American badger populations. Rodent
30 control would be prohibited on areas with American badger populations to ensure rodent prey
31 availability. Mitigation Measure BIO-162 is applicable to all ground-disturbing activities related
32 to construction, restoration, and operations and maintenance.

33 **Impact BIO-163: Indirect Effects of Plan Implementation on San Joaquin Kit Fox and** 34 **American Badger**

35 Noise and visual disturbances outside the project footprint but within 250 feet of construction
36 activities could temporarily affect modeled San Joaquin kit fox habitat and potential American
37 badger. Water conveyance facilities operations and maintenance activities would include vegetation
38 and weed control, rodent control, canal maintenance, infrastructure and road maintenance, levee
39 maintenance, and maintenance and upgrade of electrical systems. Because operations and
40 maintenance are covered activities rodent control would be prohibited in areas with San Joaquin kit
41 fox or American badger populations to ensure rodent prey availability. While maintenance activities
42 are not expected to remove San Joaquin kit fox and badger habitat, operation of equipment could
43 disturb small areas of vegetation around maintained structures and could result in injury or

1 mortality of individual foxes and badgers, if present. Given the remote likelihood of active San
2 Joaquin kit fox or badger dens in the vicinity of the conveyance facilities, the potential for this effect
3 is small. The effect would further be minimized with the implementation of seasonal no-disturbance
4 buffers around occupied dens, and other measures as described in AMM1–AMM6, AMM10, AMM24,
5 and AMM37 and Mitigation Measure BIO-162.

6 **NEPA Effects:** Implementation of the AMMs listed above and Mitigation Measure BIO-162, *Conduct*
7 *Preconstruction Survey for American Badger*, would avoid the potential for substantial adverse
8 effects on San Joaquin kit fox or American badger, either indirectly or through habitat modifications.
9 These measures would also avoid and minimize effects that could substantially reduce the number
10 of San Joaquin kit fox or American badger, or restrict either species' range. Therefore, the indirect
11 effects of Alternative 1A would not have an adverse effect on San Joaquin kit fox or American badger.

12 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
13 as construction-related noise and visual disturbances could impact San Joaquin kit fox and American
14 badger. With implementation of AMM1–AMM6, AMM10, AMM24, and AMM37 as part of Alternative
15 1A construction, operation, and maintenance, the BDCP would avoid the potential for significant
16 adverse effects on either species, either indirectly or through habitat modifications, and would not
17 result in a substantial reduction in numbers or a restriction in the range of either species. In
18 addition, Mitigation Measure BIO-162 would reduce the impact of indirect effects of Alternative 1A
19 on American badger to a less-than-significant level.

20 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

21 Please see Mitigation Measure BIO-162 under Impact BIO-162.

22 **San Joaquin Pocket Mouse**

23 This section describes the effects of Alternative 1A, including water conveyance facilities
24 construction and implementation of other conservation components, on San Joaquin pocket mouse.
25 Habitat for this species consists of the grassland natural community throughout the Plan Area. The
26 species requires friable soils for burrowing.

27 Construction and restoration associated with Alternative 1A conservation measures would result in
28 both temporary and permanent losses of San Joaquin pocket mouse habitat as indicated in Table 12-
29 1A-60. Full implementation of Alternative 1A would also include the following conservation actions
30 over the term of the BDCP that would likely benefit San Joaquin pocket mouse.

- 31 ● Protect 8,000 acres of grasslands (GNC1.1, associated with CM3).
- 32 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grasslands
33 (GNC1.2, associated with CM8).
- 34 ● Restore and sustain a mosaic of grassland vegetation alliances, reflecting localized water
35 availability, soil chemistry, soil texture, topography, and disturbance regimes, with
36 consideration of historical states (GNC2.1).

37 As explained below, with the restoration or protection of these amounts of habitat, impacts to San
38 Joaquin pocket mouse would not be adverse for NEPA purposes and would be less than significant
39 for CEQA purposes for Alternative 1A.

1 **Table 12-1A-60. Changes in San Joaquin Pocket Mouse Habitat Associated with Alternative 1A**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Grassland	315	315	262	262	NA	NA
Total Impacts CM1		315	315	262	262	NA	NA
CM2–CM18	Grassland	889	2,056	239	273	385–1,277	514
Total Impacts CM2–CM18		889	2,056	239	273	385–1,277	514
TOTAL IMPACTS		1,204	2,371	501	535	385–1,277	514

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-164: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Pocket**
5 **Mouse**

6 Alternative 1A conservation measures would result in the combined permanent and temporary loss
7 of up to 2,906 acres of habitat for San Joaquin pocket mouse (of which 2,371 acres would be a
8 permanent loss and 535 acres would be a temporary loss of habitat, Table 12-1A-60). Conservation
9 measures that would result in these losses are conveyance facilities and transmission line
10 construction, and establishment and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries*
11 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
12 *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*
13 *Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*, and *CM18*
14 *Conservation Hatcheries*. The majority of habitat loss would result from CM4. Habitat enhancement
15 and management activities (CM11), which include ground disturbance or removal of nonnative
16 vegetation, could result in local adverse habitat effects. In addition, maintenance activities
17 associated with the long-term operation of the water conveyance facilities and other BDCP physical
18 facilities could degrade or eliminate San Joaquin pocket mouse habitat. Each of these individual
19 activities is described below. A summary statement of the combined impacts and NEPA and CEQA
20 conclusions follows the individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
22 result in the combined permanent and temporary loss of up to 577 acres of potential San
23 Joaquin pocket mouse habitat (315 acres of permanent loss, 262 acres of temporary loss) in CZ
24 3-CZ 6 and CZ 8. The majority of grassland that would be removed would be in CZ 8, from the
25 construction around Clifton Court Forebay. Refer to the Terrestrial Biology Map Book for a
26 detailed view of Alternative 1A construction locations. Construction of the forebay would affect

1 the area where there is a record of San Joaquin pocket mouse (California Department of Fish and
2 Wildlife 2013).

- 3 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
4 (CM2) would permanently remove 388 acres of potential San Joaquin pocket mouse habitat in
5 the Yolo Bypass in CZ 2. In addition, 239 acres would be temporarily removed. Most of the
6 grassland losses would occur at the north end of the bypass below Fremont Weir, along the Toe
7 Drain/Tule Canal, and along the west side channels.
- 8 • *CM4 Tidal Habitat Restoration*: Tidal habitat restoration (CM4) site preparation and inundation
9 would permanently remove an estimated 1,122 acres of potential San Joaquin pocket mouse
10 habitat. The majority of the losses would likely occur in the vicinity of Cache Slough, on Decker
11 Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow bands
12 adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact and
13 fragment remaining grassland just north of Rio Vista in and around French and Prospect Islands,
14 and in an area south of Rio Vista around Threemile Slough.
- 15 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
16 seasonally inundated floodplain (CM5) would permanently and temporarily remove
17 approximately 85 acres of San Joaquin pocket mouse habitat (51 permanent, 34 temporary).
18 These losses would be expected to occur along the San Joaquin River and other major
19 waterways in CZ 7.
- 20 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would impact 410 acres of
21 grasslands, primarily in CZ 7, as part of tidal natural communities restoration (11 acres) and
22 seasonal floodplain restoration (399 acres).
- 23 • *CM9 Verna Pool and Alkali Seasonal Wetland Complex Restoration*: Up to 10 acres of grassland
24 would be permanently converted to vernal pool complex. The vernal pool and alkali seasonal
25 wetland restoration would leave intact the grasslands surrounding the vernal pools. Temporary
26 construction-related disturbance of grassland habitat would result from implementation of *CM9*
27 in CZ 1, CZ 8, and CZ 11. However, all areas would be restored to their original or higher value
28 habitat after the construction periods.
- 29 • *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails
30 and recreational staging areas would result in the permanent removal of 50 acres of grassland.
31 The protection of 8,000 acres of grassland for covered species is also expected to benefit San
32 Joaquin pocket mouse by protecting existing habitats from potential loss or degradation that
33 otherwise could occur with future changes in existing land use. Habitat management and
34 enhancement-related activities could cause disturbance or direct mortality to San Joaquin
35 pocket mouse if they are present near work areas.

36 A variety of habitat management actions included in CM11 that are designed to enhance wildlife
37 values in restored or protected habitats could result in localized ground disturbances that could
38 temporarily remove small amounts of San Joaquin pocket mouse habitat. Ground-disturbing
39 activities, such as removal of nonnative vegetation and road and other infrastructure
40 maintenance activities, would be expected to have minor adverse effects on habitat and would
41 be expected to result in overall improvements to and maintenance of habitat values over the
42 term of the BDCP. Noise and visual disturbance from management-related equipment operation
43 could temporarily displace individuals or alter the behavior of the species if adjacent to work
44 areas. With full implementation of the BDCP, enhancement and management actions designed

1 for western burrowing owl would also be expected to benefit these species. San Joaquin pocket
2 mouse would benefit particularly from protection of grassland habitat against potential loss or
3 degradation that otherwise could occur with future changes in existing land use.

- 4 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of San
5 Joaquin pocket mouse habitat.
- 6 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
7 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
8 disturbances that could affect San Joaquin pocket mouse use of the surrounding habitat.
9 Maintenance activities would include vegetation management, levee and structure repair, and
10 re-grading of roads and permanent work areas. These effects, however, would be reduced by
11 AMMs and conservation actions as described below.
- 12 • *Injury and Direct Mortality*: Construction could result in direct mortality of San Joaquin pocket
13 mouse if present in construction areas.

14 The following paragraphs summarize the combined effects discussed above and describe other
15 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
16 also included.

17 ***Near-Term Timeframe***

18 Because the water conveyance facility construction is being evaluated at the project level, the near-
19 term BDCP conservation strategy has been evaluated to determine whether it would provide
20 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
21 effects of such conveyance facility construction would not be adverse under NEPA and would be less
22 than significant under CEQA. Alternative 1A would remove 1,714 acres of San Joaquin pocket mouse
23 habitat (1,204 permanent, 371 temporary) in the study area in the near-term. One record of San
24 Joaquin pocket mouse near Clifton Court forebay could be affected by the construction of the new
25 forebay. These effects would result from the construction of the water conveyance facilities (CM1,
26 577 acres), and implementing other conservation measures (Yolo Bypass Fisheries Enhancement
27 [CM2] Tidal Natural Communities Restoration [CM4], Seasonally Inundated Floodplain Restoration
28 [CM5], Riparian Natural Community Restoration (CM7), Vernal Pool and Alkali Seasonal Wetland
29 Complex Restoration [CM9], Natural Community Enhancement and Management – Recreation
30 Facilities (CM11), and Conservation Hatcheries [CM18] 1,128 acres).

31 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
32 CM1 would be 2:1 protection of grassland habitat. Using these typical ratios would indicate that
33 1,154 acres of grassland natural communities should be protected to mitigate the CM1 losses of 577
34 acres of San Joaquin pocket mouse habitat. The near-term effects of other conservation actions
35 would remove 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of
36 San Joaquin pocket mouse habitat using the same typical NEPA and CEQA ratios (2:1 for protection).

37 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
38 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and
39 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,
40 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and
41 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
42 *Enhancement and Management*, San Joaquin pocket mouse would likely benefit from the
43 management of the grasslands for general wildlife benefit.

1 These natural community biological goals and objectives would inform the near-term protection and
2 restoration efforts and represent performance standards for considering the effectiveness of
3 restoration actions for the species. The acres of protection and restoration contained in the near-
4 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level
5 effects of CM1 especially considering that a large portion of the impacts to grasslands consists of
6 thin strips of grassland along levees and that areas of grassland protection and restoration would be
7 in large contiguous blocks.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
9 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
10 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment and*
11 *Countermeasure Plan, and AMM6 Disposal and Reuse of Spoils, and AMM10 Restoration of Temporary*
12 *Impacts. All of these AMMs include elements that avoid or minimize the risk of affecting habitats and*
13 *species adjacent to work areas and RTM storage sites. BDCP Appendix 3.C describes the AMMs,*
14 *which have since been updated and which are provided in Appendix 3B, Environmental*
15 *Commitments, AMMs, and CMs, of the Final EIR/EIS.*

16 **Late Long-Term Timeframe**

17 The habitat model indicates that the study area supports approximately 78,047 acres of potential
18 habitat for San Joaquin pocket mouse. Alternative 1A as a whole would result in the permanent loss
19 of and temporary effects on 2,906 acres of grasslands that could be suitable for San Joaquin pocket
20 mouse (4% of the habitat in the study area). The locations of these losses are described above in the
21 analyses of individual conservation measures. The Plan includes a commitment to restore or create
22 at least 2,000 acres of grassland in CZ 1, 8 and 11 (GNC1.2) and to protect 8,000 acres of grassland
23 (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000 acres
24 protected in CZ 11, and the remainder distributed throughout CZ 1, 2, 4, 5, 7, 8, and 11 in the study
25 area)(GNC1.1). The Plan's commitment to restore grasslands such that they connect fragmented
26 patches of already protected grasslands (GNC1.2) would improve habitat connectivity and dispersal
27 abilities of San Joaquin pocket mouse within and outside of the plan area. All protected habitat
28 would be managed under *CM11 Natural Communities Enhancement and Management.*

29 **NEPA Effects:** In the near-term, the loss of San Joaquin pocket mouse habitat and potential for direct
30 mortality would not be adverse because the BDCP has committed to protecting and restoring an
31 acreage that would meet the typical mitigation ratios described above. In the late long-term, the
32 effects on San Joaquin pocket mouse habitat and potential mortality of a special-status species
33 resulting from Alternative 1A would represent an adverse effect in the absence of other
34 conservation actions. However, the BDCP has committed to habitat protection and restoration
35 associated with CM3, CM8, and CM11. This habitat protection and restoration would be guided by
36 biological goals and objectives and by AMM1–AMM6 and AMM10, which would be in place during
37 construction activity. Considering these commitments, losses of San Joaquin pocket mouse habitat
38 and potential mortality under Alternative 1A would not be an adverse effect.

39 **CEQA Conclusion:**

40 **Near-Term Timeframe**

41 Because the water conveyance facility construction is being evaluated at the project level, the near-
42 term BDCP conservation strategy has been evaluated to determine whether it would provide
43 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the

1 effects of such conveyance facility construction would not be adverse under NEPA and would be less
2 than significant under CEQA. Alternative 1A would remove 1,714 acres of modeled (1,204
3 permanent, 371 temporary) habitat for San Joaquin pocket mouse in the study area in the near-
4 term. One record of San Joaquin pocket mouse near Clifton Court forebay could be affected by the
5 construction of the new forebay. These effects would result from the construction of the water
6 conveyance facilities (CM1, 577 acres), and implementing other conservation measures (Yolo
7 Bypass Fisheries Enhancement [CM2] Tidal Natural Communities Restoration [CM4], Seasonally
8 Inundated Floodplain Restoration [CM5], Riparian Natural Community Restoration (CM7), Vernal
9 Pool and Alkali Seasonal Wetland Complex Restoration [CM9], Natural Community Enhancement
10 and Management – Recreation Facilities (CM11), and Conservation Hatcheries [CM18] 1,128 acres).

11 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
12 CM1 would be 2:1 protection of grassland habitat. Using these typical ratios would indicate that
13 1,154 acres of grassland natural communities should be protected to mitigate the CM1 losses of 577
14 acres of San Joaquin pocket mouse habitat. The near-term effects of other conservation actions
15 would remove 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of
16 San Joaquin pocket mouse habitat using the same typical NEPA and CEQA ratios (2:1 for protection).

17 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
18 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and
19 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,
20 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and
21 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
22 *Enhancement and Management*, San Joaquin pocket mouse would likely benefit from the
23 management of the grasslands for general wildlife benefit.

24 These natural community biological goals and objectives would inform the near-term protection and
25 restoration efforts and represent performance standards for considering the effectiveness of
26 restoration actions for the species. The acres of protection and restoration contained in the near-
27 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level
28 effects of CM1 especially considering that a large portion of the impacts to grasslands consists of
29 thin strips of grassland along levees and that areas of grassland protection and restoration would be
30 in large contiguous blocks.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
35 *Affected Natural Communities Temporary Impacts*. All of these AMMs include elements that avoid or
36 minimize the risk of affecting habitats and species adjacent to work areas and RTM storage sites.
37 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in
38 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

39 These commitments are more than sufficient to support the conclusion that the near-term effects of
40 Alternative 1A would be less than significant under CEQA.

1 **Late Long-Term Timeframe**

2 The habitat model indicates that the study area supports approximately 78,047 acres of potential
3 habitat for San Joaquin pocket mouse. Alternative 1A as a whole would result in the permanent loss
4 of and temporary effects on 2,906 acres of grasslands that could be suitable for San Joaquin pocket
5 mouse (4% of the habitat in the study area). The locations of these losses are described above in the
6 analyses of individual conservation measures. The Plan includes a commitment to restore or create
7 at least 2,000 acres of grassland in CZ 1, CZ 8 and CZ 11 (Objective GNC1.2) and to protect 8,000
8 acres of grassland (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least
9 2,000 acres protected in CZ 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5, CZ
10 7, CZ 8, and CZ 11 in the study area) (Objective GNC1.1). The Plan's commitment to restore
11 grasslands such that they connect fragmented patches of already protected grasslands (Objective
12 GNC1.2) would improve habitat connectivity and dispersal abilities of San Joaquin pocket mouse
13 within and outside of the Plan Area. All protected habitat would be managed under *CM11 Natural*
14 *Communities Enhancement and Management*.

15 Considering these protection and restoration provisions, which would provide acreages of new
16 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction
17 and restoration activities, and with implementation of AMM1-AMM6, and AMM10, the loss of
18 habitat or direct mortality through implementation of Alternative 1A would not result in a
19 substantial adverse effect through habitat modifications and would not substantially reduce the
20 number or restrict the range of San Joaquin pocket mouse. Therefore, the loss of habitat or potential
21 mortality under this alternative would have a less-than-significant impact on San Joaquin pocket
22 mouse.

23 **Impact BIO-165: Indirect Effects of Plan Implementation on San Joaquin Pocket Mouse**

24 Construction activities associated with water conveyance facilities, conservation components and
25 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
26 conveyance facilities, including the transmission facilities, could result in ongoing periodic
27 postconstruction disturbances and noise with localized effects on San Joaquin kit pocket mouse and
28 its habitat over the term of the BDCP. These potential effects would be minimized and avoided
29 through AMM1-AMM6, and AMM10, which would be in effect throughout the plan's construction
30 phase.

31 Water conveyance facilities operations and maintenance activities would include vegetation and
32 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
33 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance
34 activities are not expected to remove pocket mouse habitat, operation of equipment could disturb
35 small areas of vegetation around maintained structures and could result in injury or mortality of
36 individual pocket mice, if present.

37 **NEPA Effects:** Implementation of the AMMs listed above would avoid the potential for substantial
38 adverse effects on San Joaquin pocket mouse, either indirectly or through habitat modifications.
39 These measures would also avoid and minimize effects that could substantially reduce the number
40 of San Joaquin pocket mouse, or restrict the species' range. Therefore, the indirect effects of
41 Alternative 1A would not have an adverse effect on San Joaquin pocket mouse.

42 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
43 as construction-related noise and visual disturbances could impact San Joaquin pocket mouse. With

1 implementation of AMM1–AMM6, and AMM10 as part of Alternative 1A construction, operation, and
2 maintenance, the BDCP would avoid the potential for significant adverse effects on either species,
3 either indirectly or through habitat modifications, and would not result in a substantial reduction in
4 numbers or a restriction in the range of the species. Therefore, the indirect effects under this
5 alternative would have a less-than-significant impact on San Joaquin pocket mouse.

6 **Special-Status Bat Species**

7 Special-status bat species with potential to occur in the study area employ varied roost strategies,
8 from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as
9 tunnels, buildings, and bridges. Various roost strategies could include night roosts, maternity roosts,
10 migration stopover, or hibernation. The habitat types used to assess effects for special-status bats
11 roosting habitat includes valley/foothill riparian natural community, developed lands and
12 landscaped trees, including eucalyptus, palms and orchards. Potential foraging habitat includes all
13 riparian habitat types, cultivated lands, developed lands, grasslands, and wetlands.

14 There is potential for at least thirteen different bat species to be present in the study area (Figure
15 12-51), including four California species of special concern and nine species ranked from low to
16 moderate priority by the Western Bat Working Group (Table 12A-2 in Appendix 12A, *Special-Status*
17 *Species with Potential to Occur in the Study Area*). In 2009, DHCCP conducted a large-scale effort that
18 involved habitat assessments, bridge surveys, and passive acoustic monitoring surveys for bats (see
19 Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report* for
20 details on methods and results, and Table 12A-2 in Appendix 12A).

21 The majority of the parcels assessed during field surveys contained bat foraging and roosting
22 features and were considered highly suitable habitat. At the time of the 2009 field surveys, DWR
23 biologists initially identified 145 bridges in their survey area. Eleven of the 145 bridges were not
24 accessible and thirteen were determined to not be suitable for bats. Evidence of bat presence was
25 observed at six of the bridges and bat sign (guano, urine staining, odor, or vocalizations) was
26 observed at 26 of the bridges. biologists observed Mexican free-tailed bats at four of the bridges and
27 unidentified species at the remaining two bridges. One of these bridges, over the Yolo Causeway,
28 was used by approximately 10,000 Mexican free-tailed bats, indicating a maternity roost. A second
29 roost site of about 50 individuals was observed under a bridge in eastern Solano County.

30 The remaining 89 bridges contained structural features that were considered conducive to
31 maternity, solitary, day and/or night roosting. Night roosts may have crevices and cracks but more
32 often have box beams or other less protected roosting spots where bats rest temporarily while
33 feeding. Day roosts are commonly found in bridges with expansion joints, crevices, or cracks where
34 bats are protected from predators and weather. Seventeen bridges in the survey area had no
35 potential for roosting because they lacked surface features from which bats could hang and offered
36 no protection from weather or predators.

37 Construction and restoration associated with Alternative 1A conservation measures would result in
38 both temporary and permanent losses of foraging and roosting habitat for special-status bats as
39 indicated in Table 12-1A-61. Protection and restoration for special-status bat species focuses on
40 habitats and does not include manmade structures such as bridges. The conservation measures that
41 would be implemented to achieve the biological goals and objectives that would also benefit special-
42 status bats are summarized below.

- 1 • Protect or restore 142,200 acres of high-value natural communities (Objective L1.1, associated
2 with CM3). This objective includes protecting and restoring a variety of habitat types described
3 below (Table 3.3-4 in BDCP Chapter 3).
 - 4 ○ Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
5 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
 - 6 ○ Protect 600 acres of existing vernal pool complex (Objective VPNC1.1, associated with CM3).
 - 7 ○ Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
 - 8 ○ Protect 8,100 acres of managed wetland (Objective MWNC1.1, associated with CM3 and
9 CM11).
 - 10 ○ Protect 48,625 acres of cultivated lands (Objective CLNC1.1, associated with CM3 and
11 CM11).
 - 12 ○ Protect, restore, or create 2,740 acres of rice land or equivalent habitat type for the giant
13 garter snake (Objective GGS3.1, associated with CM3, CM4, and CM10).
 - 14 ○ Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective
15 GNC1.2, associated with CM3 and CM8).
 - 16 ○ Restore 67 acres of vernal pool complex (Objective VPNC1.2, associated with CM3 and CM9).
 - 17 ○ Restore and protect 65,000 acres of tidal natural communities (Objective L1.2, associated
18 with CM2, 3, and 4).
 - 19 ○ Restore or create 5,000 acres of valley/foothill riparian natural community (Objective
20 VFRNC1.1, associated with CM3 and CM7).
 - 21 ○ Protect 750 acres of existing valley/foothill riparian natural community in C Z7 by year 10
22 (Objective VFRNC1.2, associated with CM3).

23 As explained below, with the restoration and protection of these amounts of habitat, in addition to
24 mitigation measures to reduce potential effects, impacts on special-status bats would not be adverse
25 for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1A-61. Changes in Special-Status Bat Roosting and Foraging Habitat Associated with**
2 **Alternative 1A^a**

Conservation Measure ^b	Habitat Type ^c	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT ^d	CM2	CM5
CM1	Roosting	220	220	213	213	NA	NA
	Foraging	4,389	4,389	2,782	2,782	NA	NA
Total Impacts CM1		4,609	4,609	2,995	2,995	NA	NA
CM2-CM18	Roosting	524	1,570	167	212	324	411
	Foraging	14,497	60,399	773	2,126	21,265	10,137
Total Impacts CM2-CM18		15,021	61,969	940	2,338	21,589	10,548
TOTAL IMPACTS		19,630	66,577	3,935	5,333	21,589	10,548

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c Affected roosting habitat acreages include valley/foothill riparian habitat, developed lands, and orchards. An unknown number of buildings, bridges, tunnels, and individual trees could also be affected but were not included in this analysis. Foraging habitat includes all natural communities, cultivated lands, and developed lands in the study area. Foraging habitat effects for CM2-CM18 were not considered adverse as they reflect a conversion from one foraging habitat type (mostly cultivated lands) to another foraging habitat (wetlands).

^d LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^e Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as the maximum possible based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-166: Loss or Conversion of Habitat for and Direct Mortality of Special-Status Bats**

5 Alternative 1A CM1 would result in the permanent and temporary loss combined of up to 433 acres
6 of roosting habitat and 7,171 acres of foraging habitat for special-status bats in the study area. DWR
7 identified one bridge as potential night roosting habitat that could be affected by construction in
8 CM1. Conservation measures Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat
9 restoration (CM4), and floodplain restoration (CM5) and would result in the permanent and
10 temporary loss of 1,782 acres of roosting habitat and the conversion of approximately 65,525 acres
11 of foraging habitat from mostly cultivated lands and managed wetlands to tidal and nontidal
12 wetlands. Habitat enhancement and management activities (CM11) could result in local adverse
13 effects. In addition, maintenance activities associated with the long-term operation of the water
14 conveyance facilities and other BDCP physical facilities could affect special-status bat habitat. A
15 summary of combined impacts and NEPA effects and a CEQA conclusion follows the individual
16 conservation measure discussions.

- 17 • *CM1 Water Facilities and Operation*: Construction of Alternative 1A conveyance facilities would
18 result in the permanent loss of approximately 220 acres of roosting habitat and 4,389 acres of

1 foraging habitat in the study area. Development of the water conveyance facilities would also
2 result in the temporary removal of up to 213 acres of roosting habitat and up to 2,782 acres of
3 foraging habitat for special-status bats in the study area (Table 12-1A-61). DWR identified one
4 bridge with potential night roosting habitat in a shaft location that could be permanently
5 affected by construction for CM1.

- 6 • *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the
7 conversion of approximately 2,025 acres of foraging habitat into wetlands that could still be
8 used by bats for foraging. CM2 would also result in the permanent removal of 89 acres and
9 temporary removal of 167 acres of roosting habitat for special-status bats. The maternity colony
10 of Mexican free-tailed bats located at both ends of the Yolo Causeway bridge could also be
11 affected during construction for CM2. Implementation of Mitigation Measure BIO-166, *Conduct*
12 *Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, would ensure that
13 improvements in the Yolo Bypass avoid effects on roosting special-status bats.
- 14 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
15 inundation would result in the conversion of approximately 56,810 acres of foraging habitat into
16 wetlands that could still be used by bats for foraging. Approximately 1,425 acres of roosting
17 habitat for special-status bats would permanently affected. This habitat is of low value,
18 consisting of a small, isolated patch surrounded by cultivated lands, and the species have a
19 relatively low likelihood of being present in these areas. The roosting habitat that would be
20 removed consists of relatively small and isolated patches along canals and irrigation ditches
21 surrounded by cultivated lands in the Union Island and Roberts Island areas, and several small
22 patches along the San Joaquin River. Mitigation Measure BIO-166, *Conduct Preconstruction*
23 *Surveys for Roosting Bats and Implement Protective Measures*, requires that tidal natural
24 communities restoration avoid effects on roosting special-status bats.
- 25 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
26 restoration would result in the conversion of an estimated 3,690 acres of foraging habitat into
27 wetlands that could still be used by bats for foraging. CM5 would also result in the permanent
28 removal of 57 acres and temporary removal of 45 acres of roosting habitat for special-status
29 bats in the study area.
- 30 • *CM11 Natural Communities Enhancement and Management*: Implementation of Alternative 1A
31 would result in an overall benefit to special-status bats within the study area through protection
32 and restoration of their foraging and roosting habitats. The majority of affected acres would
33 convert agricultural land to natural communities with higher potential foraging and roosting
34 value, such as riparian, tidal and nontidal wetlands, and periodically inundated lands. Restored
35 foraging habitats primarily would replace agricultural lands. Restored habitats are expected to
36 be of higher function because the production of flying insect prey species is expected to be
37 greater in restored wetlands and uplands on which application of pesticides would be reduced
38 relative to affected agricultural habitats. Noise and visual disturbances during implementation
39 of riparian habitat management actions could result in temporary disturbances that, if bat roost
40 sites are present, could cause temporary abandonment of roosts. This effect would be
41 minimized with implementation of Mitigation Measure BIO-166.
- 42 • *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have
43 little if any adverse effect on special-status bats. Postconstruction operation and maintenance of
44 the above-ground water conveyance facilities and restoration infrastructure could result in
45 ongoing but periodic disturbances that could affect special-status bat use of the surrounding

1 habitat in the Yolo Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ
2 4, CZ 5, CZ 6, CZ 7, and CZ 8). Maintenance activities would include vegetation management,
3 levee and structure repair, and regrading of roads and permanent work areas. These effects,
4 however, would be minimized with implementation of the mitigation measures described
5 below.

- 6 • Injury and direct mortality: In addition, to habitat loss and conversion, construction activities,
7 such as grading, the movement of construction vehicles or heavy equipment, and the installation
8 of water conveyance facilities components and new transmission lines, may result in the direct
9 mortality, injury, or harassment of roosting special-status bats. Construction activities related to
10 conservation components could have similar affects. Preconstruction surveys would be
11 conducted and if roosting or maternity sites are detected, seasonal restrictions would be placed
12 while bats are present, as described below in the mitigation measures.

13 The following paragraphs summarize the combined effects discussed above and describe other
14 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are
15 also included.

16 ***Near-Term Timeframe***

17 Because water conveyance facilities construction is being evaluated at the project level, the near-
18 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
19 protection or restoration in an appropriate timeframe to ensure that the construction effects would
20 not be adverse under NEPA. Because the majority of affected acres would convert agricultural land
21 to natural communities with higher potential foraging and roosting value, such as riparian, tidal and
22 nontidal wetlands, and periodically inundated lands this analysis focuses only on losses to roosting
23 habitat for CM1, CM2, and CM4 in the near-term.

24 Alternative 1A would permanently or temporarily affect 1,124 acres of roosting habitat for special-
25 status bats in the near-term as a result of implementing CM1 (433 acres roosting habitat), CM2 (256
26 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in
27 the late long-term. Only 561 acres of the 1,124 acres of roosting habitat losses would be in
28 valley/foothill riparian habitat.

29 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
30 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian
31 natural community. Using these ratios would indicate that 561 acres of riparian habitat should be
32 restored and 561 acres of riparian habitat should be protected.

33 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status
34 bats within the study area through protection and restoration of their foraging and roosting habitats
35 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and
36 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities
37 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and
38 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging
39 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective
40 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and
41 Objective GNC1.1.). Restored habitats are expected to be of higher function because the production
42 of flying insect prey species is expected to be greater in restored wetlands and uplands on which
43 application of pesticides would be reduced relative to affected agricultural habitats. Conservation

1 components in the near-term would sufficiently offset the adverse effects resulting from near-term
2 effects from Alternative 1A.

3 In addition, activities associated with natural communities enhancement and protection and with
4 ongoing facilities operations and maintenance could affect special-status bat use of surrounding
5 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,
6 described below, requires preconstruction surveys to reduce these effects.

7 The BDCP also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
11 *Affected Natural Communities*. These AMMs include elements that avoid or minimize the risk of
12 construction activity affecting habitat and species adjacent to work areas and storage sites. BDCP
13 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
14 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

15 **Late Long-Term Timeframe**

16 Alternative 1A as a whole would affect 2,215 acres of roosting habitat (Table 12-1A-61). Because the
17 majority of affected acres would convert agricultural land to natural communities with higher
18 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically
19 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5
20 in the late long-term.

21 Implementation of Alternative 1A in the late long-term would result in an overall benefit to special-
22 status bats within the study area through protection and restoration of approximately 142,200 acres
23 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to
24 protect the highest quality natural communities and covered species habitat in the Plan Area to
25 optimize the ecological value of the reserve system for conserving covered species and native
26 biodiversity. The target for total protected and restored acreage is based on the sum of all natural
27 community acreage targets. Achieving this objective is intended to protect and restore natural
28 communities, species-specific habitat elements, and species diversity on a landscape-scale.,
29 Achieving this objective is also intended to conserve representative natural and seminatural
30 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired
31 ecosystem function, and biological diversity.

32 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and
33 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging
34 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,
35 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,
36 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored
37 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of
38 higher function because the production of flying insect prey species is expected to be greater in
39 restored wetlands and uplands on which application of pesticides would be reduced relative to
40 affected agricultural habitats.

41 Should any of the special-status bat species be detected roosting in the study area, construction of
42 water conveyance facilities and restoration activities would have an adverse effect on roosting
43 special-status bats. Noise and visual disturbances and the potential for injury or mortality of

1 individuals associated within implementation of the restoration activities on active roosts would be
2 minimized with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for*
3 *Roosting Bats and Implement Protective Measures*. Conservation components would sufficiently
4 offset the adverse effects resulting from late long-term effects from CM1, CM2, CM4, and CM5.

5 **NEPA Effects:** Because the BDCP has committed to protecting the acreage required to meet the
6 typical mitigation ratios described above, the losses of roosting and foraging habitat for special-
7 status bats associated with implementing Alternative 1A are not expected to result in substantial
8 adverse effects on special-status bats, either directly or through habitat modifications, and would
9 not result in a substantial reduction in numbers or a restriction in the range of special-status bats.
10 With habitat protection and restoration associated with the conservation components, guided by
11 landscape-scale goals and objectives and by AMM1–AMM6, and AMM10, and with implementation of
12 Mitigation Measure BIO-166, loss of habitat and potential mortality under Alternative 1A as a whole
13 would not have an adverse effect on special-status bats.

14 **CEQA Conclusion:**

15 **Near-Term Timeframe**

16 Because water conveyance facilities construction is being evaluated at the project level, the near-
17 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
18 protection or restoration in an appropriate timeframe to ensure that the construction effects would
19 be less than significant under CEQA. Because the majority of affected acres would convert
20 agricultural land to natural communities with higher potential foraging and roosting value, such as
21 riparian, tidal and nontidal wetlands, and periodically inundated lands this analysis focuses only on
22 losses to roosting habitat for CM1, CM2, and CM4 in the near-term.

23 Alternative 1A would permanently or temporarily affect 1,124 acres of roosting habitat for special-
24 status bats in the near-term as a result of implementing CM1 (433 acres roosting habitat), CM2 (256
25 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in
26 the late long-term. Only 561 acres of the 1,124 acres of roosting habitat losses would be in
27 valley/foothill riparian habitat.

28 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
29 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian
30 natural community. Using these ratios would indicate that 561 acres of riparian habitat should be
31 restored and 561 acres of riparian habitat should be protected.

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36 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and
37 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging
38 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective
39 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and
40 Objective GNC1.1.). Restored foraging habitats would replace primarily cultivated lands. Restored
41 habitats are expected to be of higher function because the production of flying insect prey species is
42 expected to be greater in restored wetlands and uplands on which application of pesticides would
43 be reduced relative to affected agricultural habitats. Conservation components in the near-term

1 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 1A. In
2 addition, activities associated with natural communities enhancement and protection and with
3 ongoing facilities operations and maintenance could affect special-status bat use of surrounding
4 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,
5 described below, requires preconstruction surveys to reduce these impacts to less than significant
6 under CEQA.

7 The permanent loss of roosting habitat from Alternative 1A would be mitigated through
8 implementation of Mitigation Measure BIO-166, which would ensure there is no significant impact
9 under CEQA on roosting special-status bats, either directly or through habitat modifications and no
10 substantial reduction in numbers or a restriction in the range of special-status bats. The BDCP also
11 contains commitments to implement AMM1-6 and AMM10. These AMMs include elements that
12 avoid or minimize the risk of construction activity affecting habitat and species adjacent to work
13 areas and storage sites. BDCP. BDCP Appendix 3.C describes the AMMs, which have since been
14 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
15 the Final EIR/EIS.

16 **Late Long-Term Timeframe**

17 Alternative 1A as a whole would affect 2,215 acres of roosting habitat (Table 12-1A-61). Because the
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19 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically
20 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5
21 in the late long-term.

22 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-
23 status bats within the study area through protection and restoration of approximately 142,200 acres
24 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to
25 protect the highest quality natural communities and covered species habitat in the Plan Area to
26 optimize the ecological value of the reserve system for conserving covered species and native
27 biodiversity. The target for total protected and restored acreage is based on the sum of all natural
28 community acreage targets. Achieving this objective is intended to protect and restore natural
29 communities, species-specific habitat elements, and species diversity on a landscape-scale.,
30 Achieving this objective is also intended to conserve representative natural and seminatural
31 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired
32 ecosystem function, and biological diversity.

33 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and
34 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging
35 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,
36 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,
37 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored
38 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of
39 higher function because the production of flying insect prey species is expected to be greater in
40 restored wetlands and uplands on which application of pesticides would be reduced relative to
41 affected agricultural habitats.

42 Should any of the special-status bat species be detected roosting in the study area, construction of
43 water conveyance facilities and restoration activities would have an adverse effect on roosting
44 special-status bats. Noise and visual disturbances and the potential for injury or mortality of

1 individuals associated within implementation of the restoration activities on active roosts would be
2 minimized with implementation of Mitigation Measure BIO-166. Conservation components would
3 sufficiently offset the adverse effects resulting from late long-term effects from CM1, CM2, CM4, and
4 CM5.

5 The permanent loss of roosting habitat from Alternative 1A would be mitigated through
6 implementation of Mitigation Measure BIO-166, which would ensure that there is no significant
7 impact on roosting special-status bats, either directly or through habitat modifications, and that
8 there is no substantial reduction in numbers or a restriction in the range of special-status bats.
9 Therefore, Alternative 1A would not result in a significant impact on special-status bats under CEQA.

10 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and** 11 **Implement Protective Measures**

12 The following measure was designed to avoid and minimize adverse direct and indirect effects
13 on special-status bats. However, baseline data are not available or are limited on how bats use
14 the study area, and on individual numbers of bats and how they vary seasonally. Therefore, it is
15 difficult to determine if there would be a substantial reduction in species numbers. Bat species
16 with potential to occur in the study area employ varied roost strategies, from solitary roosting in
17 foliage of trees to colonial roosting in trees and artificial structures, such as buildings and
18 bridges. Daily and seasonal variations in habitat use are common. To obtain the highest
19 likelihood of detection, preconstruction bat surveys will be conducted by DWR and will include
20 these components.

- 21 • Identification of potential roosting habitat within project footprint.
- 22 • Daytime search for bats and bat sign in and around identified habitat.
- 23 • Evening emergence surveys at potential day-roost sites, using night-vision goggles and/or
24 active full-spectrum acoustic monitoring where species identification is sought.
- 25 • Passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from
26 dusk to dawn over multiple nights.
- 27 • Additional on-site night surveys as needed following passive acoustic detection of special
28 status bats to determine nature of bat use of the structure in question (e.g., use of structure
29 as night roost between foraging bouts).
- 30 • Qualified biologists will have knowledge of the natural history of the species that could
31 occur in the study area and experience using full-spectrum acoustic equipment. During
32 surveys, biologists will avoid unnecessary disturbance of occupied roosts.

33 ***Preconstruction Bridges and Other Structure Surveys***

34 Before work begins on the bridge/structure, qualified biologists will conduct a daytime search
35 for bat sign and evening emergence surveys to determine if the bridge/structure is being used
36 as a roost. Biologists conducting daytime surveys would listen for audible bat calls and would
37 use naked eye, binoculars, and a high-powered spotlight to inspect expansion joints, weep holes,
38 and other bridge features that could house bats. Bridge surfaces and the ground around the
39 bridge/structure would be surveyed for bat sign, such as guano, staining, and prey remains.

1 Evening emergence surveys will consist of at least one biologist stationed on each side of the
2 bridge/structure watching for emerging bats from a half hour before sunset to 1–2 hours after
3 sunset for a minimum of two nights within the season that construction would be taking place.
4 Night-vision goggles and/or full-spectrum acoustic detectors shall be used during emergence
5 surveys to assist in species identification. All emergence surveys would be conducted during
6 favorable weather conditions (calm nights with temperatures conducive to bat activity and no
7 precipitation predicted).

8 Additionally, passive monitoring with full-spectrum bat detectors will be used to assist in
9 determining species present. A minimum of four nights of acoustic monitoring surveys will be
10 conducted within the season that the construction would be taking place. If site security allows,
11 detectors should be set to record bat calls for the duration of each night. To the extent possible,
12 all monitoring will be conducted during favorable weather conditions (calm nights with
13 temperatures conducive to bat activity and no precipitation predicted). The biologists will
14 analyze the bat call data using appropriate software and prepare a report with the results of the
15 surveys. If acoustic data suggest that bats may be using the bridge/structure as a night roost,
16 biologists will conduct a night survey from 1–2 hours past sunset up to 6 hours past sunset to
17 determine if the bridge is serving as a colonial night roost.

18 If suitable roost structures will be removed, additional surveys may be required to determine
19 how the structure is used by bats, whether it is as a night roost, maternity roosts, migration
20 stopover, or for hibernation.

21 ***Preconstruction Tree Surveys***

22 If tree removal or trimming is necessary, qualified biologists will examine trees to be removed
23 or trimmed for suitable bat roosting habitat. High-value habitat features (large tree cavities,
24 basal hollows, loose or peeling bark, larger snags, palm trees with intact thatch, etc.) will be
25 identified and the area around these features searched for bats and bat sign (guano, culled insect
26 parts, staining, etc.). Riparian woodland, orchards, and stands of mature broadleaf trees should
27 be considered potential habitat for solitary foliage roosting bat species.

28 If bat sign is detected, biologists will conduct evening visual emergence survey of the source
29 habitat feature, from a half hour before sunset to 1–2 hours after sunset for a minimum of two
30 nights within the season that construction would be taking place. Methodology should follow
31 that described above for the bridge emergence survey.

32 Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector
33 will be used to assist in determining species present. These surveys would be conducted in
34 coordination with the acoustic monitoring conducted for the bridge/structure.

35 ***Protective Measures for Bats using Bridges/Structures and Trees***

36 Avoidance and minimization measures shall be necessary if it is determined that bats are using
37 the bridge/structure or trees as roost sites and/or sensitive bats species are detected during
38 acoustic monitoring. Appropriate measures will be determined by DWR in consultation with
39 CDFW and shall include, as applicable, the measures listed below.

- 40 • Ensure that bats are protected from noise, vibrations, and light that result from construction
41 activities associated with water conveyance facilities, conservation components, and
42 ongoing habitat enhancement, as well as operations and maintenance of above-ground

- 1 water conveyance facilities, including the transmission facilities. This would be
2 accomplished by either directing noise barriers and lights inward from the disturbance or
3 ensuring that the disturbances do not extend more than 300 feet from the point source.
- 4 ● Disturbance of the bridge will be avoided between March 1 and October 31 (the maternity
5 period) to avoid impacts on reproductively active females and dependent young.
 - 6 ● Installation of exclusion devices from March 1 through October 31 to preclude bats from
7 occupying the bridge during construction. Exclusionary devices will only be installed by or
8 under the supervision of an experienced bat biologist.
 - 9 ● Tree removal will be avoided between April 15 and September 15 (the maternity period for
10 bat species that use trees) to avoid impacts on pregnant females and active maternity roosts
11 (whether colonial or solitary).
 - 12 ● Tree removal will be conducted between September 15 and October 31 to the maximum
13 extent feasible, which corresponds to a time period when bats would not likely have entered
14 winter hibernation and would not be caring for flightless young. If weather conditions
15 remain conducive to regular bat activity beyond October 31, later tree removal may be
16 considered in consultation with CDFW.
 - 17 ● Trees will be removed in pieces, rather than felling the entire tree.
 - 18 ● If a maternity roost is located, whether solitary or colonial, that roost will remain
19 undisturbed with a buffer as determined in consultation with CDFW until September 15 or
20 until a qualified biologist has determined the roost is no longer active.
 - 21 ● If a non-maternity roost is found, that roost will be avoided to the maximum extent feasible
22 and an appropriate buffer established in consultation with CDFW. Every effort would be
23 made to avoid the roost to the maximum extent feasible, as methods to evict bats from trees
24 are largely untested. However, if the roost cannot be avoided, eviction will be attempted and
25 procedures designed in consultation with CDFW to reduce the likelihood of mortality of
26 evicted bats. In all cases:
 - 27 ○ Eviction would not occur before September 15th and would match the timeframe for
28 tree removal approved by CDFW.
 - 29 ○ Qualified biologists would carry out or oversee the eviction tasks and would monitor the
30 tree trimming/removal.
 - 31 ○ Eviction would take place late in the day or in the evening to reduce the likelihood of
32 evicted bats falling prey to diurnal predators.
 - 33 ○ Eviction would take place during weather and temperature conditions conducive to bat
34 activity.
 - 35 ○ Special-status bat roosts would not be disturbed.
- 36 Eviction procedures shall include but are not limited to:
- 37 ○ Pre-eviction surveys to obtain data to inform the eviction approach and subsequent
38 mitigation requirements. Relevant data may include the species, sex, reproductive status
39 and/or number of bats using the roost, and roost conditions themselves such as
40 temperature and dimensions. Surveys may include visual emergence, night vision,
41 acoustic, and/or capture.

- 1 ○ Structural changes may be made to the roost, performed without harming bats, such
2 that the conditions in the roost are undesirable to roosting bats and the bats leave on
3 their own (e.g., open additional portals so that temperature, wind, light and
4 precipitation regime in the roost change).
- 5 ○ Non-injurious harassment at the roost site to encourage bats to leave on their own, such
6 as ultrasound deterrents or other sensory irritants.
- 7 ● Prior to removal/trimming, after other eviction efforts have been attempted, any confirmed
8 roost tree would be shaken, repeatedly struck with a heavy implement such as an axe and
9 several minutes should pass before felling trees or trimming limbs to allow bats time to
10 arouse and leave the tree. The biologists should search downed vegetation for dead and
11 injured bats. The presence of dead or injured bats would be reported to CDFW.

12 Compensatory mitigation for the loss of roosting habitat will also be determined through
13 consultation with CDFW and may include the construction and installation of suitable
14 replacement habitat onsite. Depending on the species and type of roost lost, various roost
15 replacement habitats have met with some success (e.g., bat houses, “bat bark,” planting
16 cottonwood trees, leaving palm thatch in place rather than trimming). The creation of natural
17 habitat onsite is generally preferable to artificial.

18 Artificial roosts are often unsuccessful, and care must be taken to determine as closely as
19 possible the conditions in the natural roost to be replaced. Even with such care, artificial habitat
20 may fail. Several artificial roosts have been highly successful in replacing bridge roost habitat
21 when incorporated into new bridge designs. “Bat bark” has been successfully used by Arizona
22 Department of Game and Fish to create artificial crevice-roosting bat habitat mounted on pine
23 trees (Mering and Chambers 2012: 765). Bat houses have at best an inconsistent track record
24 but information is mounting on how to create successful houses. There is no single protocol or
25 recipe for bat-house success. Careful study of the roost requirements of the species in question;
26 the particular conditions at the lost roost site including temperature, orientation of the
27 openings, airflow, internal dimensions and structures (cavity vs. crevice, etc.) should increase
28 the chances of designing a successful replacement.

29 Restoring riparian woodland with plantings shows signs of success in Colorado. Western red bat
30 activity has been positively correlated with increased vegetation and tree growth, canopy
31 complexity and restoration acreage at cottonwood-wouldow restoration sites along the Lower
32 Colorado River (Broderick 2012: 39). These complex woodland areas would ultimately provide
33 a wider range of bat species with preferred roost types, including both foliage-roosting and
34 crevice-/cavity-roosting bats.

35 **Impact BIO-167: Indirect Effects of Plan Implementation on Special-Status Bats**

36 Construction activities associated with water conveyance facilities, conservation components and
37 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
38 conveyance facilities, including the transmission facilities, could result in ongoing periodic
39 disturbances from light, vibrations, and noise with localized effects on special-status bats and their
40 roosting habitat over the term of the BDCP.

41 Water conveyance facilities operations and maintenance activities would include vegetation and
42 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
43 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance

1 activities are not expected to remove special-status bat habitat, operation of equipment could
2 disturb small areas of vegetation around maintained structures and could result in disturbances to
3 roosting bats, if present. Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting*
4 *Bats and Implement Protective Measures*, is available to address these potential effects.

5 Increased exposure to methylmercury associated with tidal natural communities restoration could
6 indirectly affect special-status bat species. *CM12 Methylmercury Management* describes the process
7 by which tidal natural communities restoration may increase methyl mercury levels in wetlands in
8 the study area. Mercury has been found in high concentrations in some bat species, such as the
9 Indiana bat. Many bat species forage heavily on aquatic insects, which might result in rapid
10 bioaccumulation (Evers et al. 2012). Measures described in *CM12 Methylmercury Management* are
11 expected to reduce the effects of methylmercury on special-status bat species resulting from BDCP
12 tidal natural communities restoration.

13 **NEPA Effects:** Implementation of the Mitigation Measure BIO-166 for special-status bats would
14 avoid the potential for substantial adverse effects on roosting special-status bats, either indirectly or
15 through habitat modifications. This mitigation measure would also avoid and minimize effects that
16 could substantially reduce the number of special-status bats, or restrict species' range. Therefore,
17 the indirect effects of Alternative 1A would not have an adverse effect on special-status bats.

18 **CEQA Conclusion:** Indirect effects from conservation components operations and maintenance as
19 well as construction-related noise and visual disturbances could have a significant impact on
20 special-status bat species, either indirectly or through habitat modifications. Mitigation Measure
21 BIO-166 would reduce this impact to a less-than-significant level and ensure Alternative 1A would
22 not result in a substantial reduction in numbers or a restriction in the range of species.

23 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
24 **Implement Protective Measures**

25 See Mitigation Measure BIO-166 under Impact BIO-166.

26 **Impact BIO-168: Periodic Effects of Inundation of Special-Status Bat Habitat as a Result of**
27 **Implementation of Conservation Components**

28 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
29 324 acres of roosting habitat and 21,265 acres of foraging habitat for special-status bats in the study
30 area (Table 12-1A-61).

31 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate up to 411 acres of
32 roosting habitat and 10,137 acres of foraging habitat for special-status bats (Table 12-1A-61).
33 Potential roosting trees are likely to be retained within seasonally flooded areas, although high
34 velocity flooding could uproot some trees. Seasonal flooding would not adversely affect foraging
35 habitat for the species. The overall effect of seasonal inundation in existing riparian natural
36 communities may instead be beneficial. Historically, flooding was the main natural disturbance
37 regulating ecological processes in riparian areas, and flooding promotes the germination and
38 establishment of many native riparian plants. In the late long-term, seasonal inundation in areas
39 currently occupied by riparian vegetation may contribute to the establishment of high-value habitat
40 for special-status bats that use riparian habitats.

41 **NEPA Effects:** The periodic losses of roosting and foraging habitat for special-status bats associated
42 with implementing Alternative 1A are not expected to result in substantial adverse effects on

1 special-status bats, either directly or through habitat modifications and would not result in a
2 substantial reduction in numbers or a restriction in the range of special-status bats. Mitigation
3 Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective*
4 *Measures*, is available to address any effects of periodic inundation on special-status bats and
5 roosting habitat. Therefore, Alternative 1A would not adversely affect the species.

6 **CEQA Conclusion:** Periodic inundation under CM2 and floodplain restoration under CM5 would
7 periodically affect foraging and roosting habitat for special-status bats in the study area. Any impact
8 of periodic inundation on special-status bats would be mitigated through implementation of
9 Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement*
10 *Protective Measures*, which would ensure there is no significant impact on roosting special-status
11 bats, either directly or through habitat modifications and no substantial reduction in numbers or a
12 restriction in the range of special-status bats.

13 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
14 **Implement Protective Measures**

15 See Mitigation Measure BIO-166 under Impact BIO-166.

16 **Plant Species**

17 **Vernal Pool Plants**

18 Five covered plant species and 12 noncovered special-status plant species occur in vernal pools in
19 the study area (Tables 12-2, 12-3, summarized in Table 12-1A-62). The vernal pool habitat model
20 used for the impact analysis was based on vegetation types and associations from various data sets
21 which were used to create maps showing the distribution of vernal pool habitat in the study area
22 according to three habitat types in which these species are known to occur, including vernal pool
23 complex, degraded vernal pool complex, and alkali seasonal wetland habitat. Vernal pool complex
24 habitat consists of vernal pools and uplands that display characteristic vernal pool and swale visual
25 signatures that have not been significantly impacted by agricultural or development practices.
26 Degraded vernal pool complex habitat consists of habitat that ranges from areas with vernal pool
27 and swale visual signatures that display clear evidence of significant disturbance due to plowing,
28 discing, or leveling to areas with clearly artificial basins such as shallow agricultural ditches,
29 depressions in fallow fields, and areas of compacted soils in pastures. Because wetlands in the
30 degraded vernal pool complex are inundated during the wet season and may have historically been
31 located in or near areas with natural vernal pool complex, they may support individuals or small
32 populations of species that are found in vernal pools and swales. However, they do not possess the
33 full complement of ecosystem and community characteristics of natural vernal pools, swales and
34 their associated uplands and they are generally ephemeral features that are eliminated during the
35 course of normal agricultural practices. A small amount of alkali seasonal wetland habitat was
36 included in the model because alkaline vernal pools are also present in some areas mapped as alkali
37 seasonal wetland.

38 Because each of the vernal pool species addressed in this EIR/EIS have specific microhabitat
39 affinities, and because vernal pool habitat within the study area is highly heterogeneous with
40 respect to habitat parameters such as soil type and pool depth, the vernal pool habitat model greatly
41 overestimates the extent of habitat in the study area occupied by each species. However, the vernal
42 pool habitat model is likely to encompass all or most of the potential area within which special-

1 status vernal pool plant species would occur. Therefore, it is not likely to underestimate the extent
2 of occupied habitat or to underestimate the effects of Alternative 1A.

3 Full implementation of Alternative 1A would include the following conservation actions over the
4 term of the BDCP to benefit covered vernal pool plants (BDCP Chapter 3, Section 3.3, *Biological Goals*
5 *and Objectives*).

- 6 • Protect two currently unprotected occurrences of alkali milk-vetch in the Altamont Hills or
7 Jepson Prairie core recovery areas (Objective VPP1.1, associated with CM3).
- 8 • Maintain no net loss of Heckard's peppergrass in Conservation Zones 1, 8, or 11 within
9 restoration sites or within the area of affected tidal range of restoration projects (Objective
10 VPP1.2, associated with CM3 and CM9).

11 The construction and restoration activities covered under Alternative 1A could have impacts on
12 special-status vernal pool plants. No modeled habitat and no known occurrences of the 17 vernal
13 pool plants are within the proposed footprint for the Alternative 1A water conveyance facilities. No
14 known occurrences of the 17 vernal pool plants are within the hypothetical footprint for restoration
15 activities; however, modeled vernal pool habitat is present within the tidal restoration footprint.
16 Table 12-1A-62 summarizes the acreage of modeled vernal pool habitat in the study area, the
17 number of occurrences of each special-status vernal pool plant in the study area, and potential
18 impacts.

1 **Table 12-1A-62. Summary of Impacts on Vernal Pool Plants under Alternative 1A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Vernal pool complex	9,557	2	0	0	Habitat loss from construction of water conveyance facilities and tidal habitat restoration
Degraded vernal pool complex	2,576	373	0	0	Habitat loss from construction of water conveyance facilities and tidal habitat restoration
Alkali Seasonal Wetland	188	0	0	0	None
Total	12,321	375	0	0	Habitat loss from construction of water conveyance facilities and tidal habitat restoration
Covered Species					
Alkali milk-vetch	0	0	16	0	None
Dwarf downingia	0	0	12	0	None
Boggs Lake hedge-hyssop	0	0	1	0	None
Legenere	0	0	8	0	None
Heckard's peppergrass	0	0	4 ^a	0	None
Noncovered Species					
Ferris' milk-vetch	0	0	6	0	None
Vernal pool smallscale	0	0	2	0	None
Hogwallow starfish	0	0	0	0	None
Ferris' goldfields	0	0	4	0	None
Contra Costa goldfields	0	0	7	0	None
Cotula-leaf navarretia	0	0	5	0	None
Baker's navarretia	0	0	3	0	None
Colusa grass	0	0	1	0	None
Bearded popcorn-flower	0	0	5	0	None
Delta woolly marbles	0	0	3	0	None
Saline clover	0	0	9	0	None
Solano grass	0	0	1	0	None

^a One additional occurrence is in alkali seasonal wetlands.

2

1 **Impact BIO-169: Effects on Habitat and Populations of Vernal Pool Plants**

2 Alternative 1A covered activities could affect habitat for special-status vernal pool plants. The
3 individual effects of each relevant conservation measure are addressed below. A summary
4 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
5 conservation measure discussions.

- 6 • *CM1 Water Facilities and Operations*: Three acres of modeled habitat for covered vernal pool
7 species are present within the proposed footprint for the Alternative 1A water conveyance
8 facilities. No known occurrences of the 17 vernal pool plants are within the proposed footprint
9 for the Alternative 1A water conveyance facilities. However, under Alternative 1A, construction
10 and operation of the water conveyance facilities could affect undiscovered occurrences of the
11 five covered vernal pool plants or the 12 noncovered special-status plants.
- 12 • *CM2 Yolo Bypass Fisheries Enhancement*: No modeled vernal pool habitat and no known
13 occurrences of special-status vernal pool plant species are within the hypothetical footprint for
14 construction or operation of the Yolo Bypass fisheries enhancements. Construction and
15 operation of the Yolo Bypass Fisheries enhancements would not affect the 17 covered or
16 noncovered vernal pool plants.
- 17 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit covered
18 vernal pool plants by protecting 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective
19 VPNC1.1). The protected vernal pool habitat would be managed and enhanced to sustain
20 populations of native vernal pool species. These benefits also would accrue to any noncovered
21 vernal pool plants occurring in the protected vernal pool complex.
- 22 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would result in the
23 inundation of 372 acres of vernal pool complex and would, therefore, potentially affect special-
24 status vernal pool plants. However, most of this habitat (370 acres) consists of degraded vernal
25 pool habitat that is unlikely to contain special-status plants. In addition, 257.8 acres of critical
26 habitat for Contra Costa goldfields could be affected. No known occurrences of covered and
27 noncovered vernal pool plants would be affected.
- 28 • *CM5 Seasonally Inundated Floodplain Restoration*: No vernal pool habitat or occurrences of
29 special-status vernal pool plants are present within areas proposed for floodplain restoration.
30 Therefore, floodplain restoration and construction of new floodplain levees would have no
31 impacts on covered and noncovered vernal pool plants.
- 32 • *CM6 Channel Margin Enhancement*: No vernal pool habitat or occurrences of special-status
33 vernal pool plants are present within areas proposed for channel margin habitat enhancement.
34 Therefore, channel margin habitat enhancement would have no impacts on covered and
35 noncovered vernal pool plants.
- 36 • *CM7 Riparian Natural Community Restoration*: No vernal pool habitat or occurrences of special-
37 status vernal pool plants are present within areas proposed for riparian habitat enhancement.
38 Therefore, riparian habitat enhancement would have no impacts on covered and noncovered
39 vernal pool plants.
- 40 • *CM8 Grassland Natural Community Restoration*: Although the vernal pool complex habitat
41 includes grassland matrix within which the vernal pools occur, grassland restoration activities
42 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands

1 that are not included within vernal pool complex habitat. Therefore, grassland communities
2 restoration would have no impacts on covered and noncovered vernal pool plants.

- 3 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: If, through unforeseen
4 circumstances, BDCP activities result in the net loss of vernal pool habitat, CM9 would be
5 implemented to compensate for that loss. Because vernal pool complex restoration would focus
6 on habitat that had been cleared and leveled but maintained an intact duripan or claypan, the
7 likelihood of affecting any special-status vernal pool plants would be low. However, vernal pool
8 restoration could adversely affect remnant populations of special-status vernal pool plants or
9 potentially affect vernal pool habitat adjacent to the restoration areas.
- 10 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
11 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid vernal pool
12 habitat and would have no impacts on covered and noncovered vernal pool plants.
- 13 • *Avoidance and Minimization Measures*: Effects on covered vernal pool plants potentially
14 resulting from implementation of CM4 would be avoided or minimized though *AMM11 Covered*
15 *Plant Species*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM12 Vernal*
16 *Pool Crustaceans*, and *AMM37 Recreation*. AMM11 prohibits ground disturbance or hydrologic
17 disturbance within 250 feet of existing vernal pools. In addition, AMM11 specifies that
18 individual projects be designed to avoid critical habitat for listed plant and wildlife vernal pool
19 species. AMM12 limits the direct removal of vernal pool crustacean habitat to no more than 10
20 wetted acres and the indirect effect to no more than 20 wetted acres through the life of the Plan.
21 AMM12 also requires that tidal natural communities restoration or other ground-disturbing
22 covered activities in Conservation Zones 1 and 11 not result in the adverse modification of
23 primary constituent elements of critical habitat for vernal pool fairy shrimp, conservancy fairy
24 shrimp, and vernal pool tadpole shrimp. These protections would also apply to critical habitat
25 for Contra Costa goldfields where it overlaps with critical habitat for these vernal pool
26 crustaceans. AMM37 requires that new recreation trails avoid populations of covered vernal
27 pool plants. BDCP Appendix 3.C describes the AMMs, which have since been updated and which
28 are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

29 In addition, the BDCP includes species-specific goals to benefit covered vernal pool plants. This
30 includes protecting two occurrences of alkali milkvetch (Objective VPP1.1) and requiring no net loss
31 of Heckard's peppergrass (Objective VPP1.2).

32 In summary, no adverse effects on covered special-status vernal pool plants would be expected
33 under Alternative 1A. No known occurrences of 17 special-status vernal pool plants would be
34 affected. Beneficial effects on special-status vernal pool plants could occur by protecting 600 acres
35 of vernal pool complex in CZs 1, 8, and 11 and by protecting occurrences of alkali milk-vetch.
36 Because conservation measures that protect covered species do not apply to noncovered species,
37 one occurrence of bearded popcornflower could be adversely affected.

38 The GIS analysis estimated that up to 375 acres of vernal pool complex could be adversely affected
39 by covered activities under Alternative 1A. However, the actual effect on habitat for special-status
40 vernal pool plants is expected to be much less than the estimated impact because the BDCP limits
41 the total loss of wetted vernal pool habitat resulting from specific projects to 10 acres
42 (approximately 67 acres of vernal pool complex) over the permit term (AMM12). At the proposed
43 restoration ratios of 1:1 (prior to impact) and 1.5:1 (concurrent with impact), between 67 and 100.5
44 acres of vernal pool complex restoration would be required to compensate for the loss of modeled

1 habitat for special-status vernal pool plants (Objective VPNC1.2, associated with CM9). This would
2 be consistent with typical NEPA and CEQA project-level mitigation ratios for vernal pool impacts.
3 The limitation on the loss of wetted vernal pool habitat will constrain the implementation of tidal
4 restoration projects that are adjacent to vernal pool complex, which could affect the feasibility of
5 restoring 65,000 acres of tidal habitat (Objective TPANC1.1, associated with CM4).

6 **NEPA Effects:** The loss of modeled habitat for vernal pool plant species would be minimized by
7 AMM12 and offset through CM9. Therefore, Alternative 1A would not result in adverse effects on
8 covered and noncovered vernal pool plant species.

9 **CEQA Conclusion:** Because loss of modeled habitat for vernal pool plants would be offset through
10 restoration, and because impacts on occurrences of covered vernal pool plants would be avoided,
11 implementation of Alternative 1A would not result in a reduction in the range or numbers of 17
12 covered and noncovered special-status vernal pool plants in the study area. This impact would be
13 less than significant, and no mitigation is required.

14 **Alkali Seasonal Wetland Plants**

15 Five covered species and three noncovered plants occur in alkali seasonal wetlands in the study area
16 (Tables 12-2, 12-3, summarized in Table 12-1A-63). Alkali seasonal wetland habitat was modeled
17 separately for four covered plant species occurring in seasonal alkali wetlands.

18 The San Joaquin spearscale habitat model approximated the distribution of suitable San Joaquin
19 spearscale habitat in the study area according to the species' preferred habitat types, intersected
20 with soil series and slope position. Historical and current records of San Joaquin spearscale in the
21 Plan Area indicate that its current distribution is limited to alkaline soil areas with shallow basin or
22 swale microtopography along the western border. The vegetation cover of the alkaline soils is
23 typically a combination of alkaline soil-adapted species and annual grasses, including annual
24 ryegrass and Mediterranean barley. Habitat types used for the model included alkali seasonal
25 wetlands, vernal pool complex, and grasslands. Soil series used in the model consisted of either clays
26 or clay loams with alkaline horizons. San Joaquin spearscale typically occurs in swales or in level
27 terrain but occasionally occurs on the lower slopes adjacent to streams or swales or where seeps are
28 present. Because some of the soil series with which San Joaquin spearscale is associated can occur
29 on hillsides, slope was used to limit the extent of the model to the toe of the slope where these soils
30 occur by excluding areas with slope greater than 1%. Land uses that are incompatible with the
31 species' habitat requirements, such as modeled habitat polygons falling on leveled or developed
32 lands, were removed from the model.

33 Modeled habitat for brittlescale was mapped as hydrologic features such as stream corridors and
34 playa pools located on alluvium associated with the Montezuma Block along the western boundary
35 of the study area or on alluvium associated with tertiary formations located along the southwest
36 boundary of the study area. Stream corridors (intermittent and perennial) that intersected these
37 geologic units were selected and truncated at the point at which they encountered the upper
38 elevation of intertidal marsh. The corridors were buffered 50 feet (15.2 meters) on either side of
39 their centerlines to capture the estimated maximum extent of alluvium deposits in proximity to the
40 streams. Mapped habitat that was occupied by urban or intensive agricultural uses was removed
41 from the model.

1 The habitat model for heartscale was based on the species distribution in the study area (Solano and
2 Yolo Counties) and on the soil types and plant communities within which it occurs. Potential habitat
3 was determined by intersecting the GIS coverage for three parameters: 1) Yolo and Solano County
4 boundaries; 2) Solano, Pescadero, and Willows soils; and 3) grassland, alkali seasonal wetland, and
5 vernal pool complex natural communities. The model excluded areas that have been developed or
6 cultivated, i.e., where the topography, soils, and hydrology have been substantially altered.

7 Delta button-celery habitat was modeled as alkali seasonal wetland complex, vernal pool complex,
8 other natural seasonal wetland, and grassland occurring on Brentwood, Grangerville, Marcuse,
9 Solano, and Vernalis soil map units within the San Joaquin Basin (i.e., south of the mainstem San
10 Joaquin River). For this species, land cover north of the Discovery Bay area where intensive
11 agriculture was classified as annual grassland were manually deleted from the area of predicted
12 habitat. Additionally, other areas of potential habitat that have been developed were also manually
13 deleted.

14 Full implementation of Alternative 1A would include the following conservation actions over the
15 term of the BDCP to benefit covered alkali seasonal wetland plants (BDCP Chapter 3, Section 3.3,
16 *Biological Goals and Objectives*).

- 17 ● Of the 150 acres of alkali seasonal wetland complex protected under Objective ASWNC1.1, 600
18 acres of vernal pool complex protected under Objective VPNC1.1, and 8,000 acres of grassland
19 natural community protected under Objective GNC1.1, protect 75 acres of suitable brittlescale
20 habitat and 75 acres of suitable heartscale habitat in Conservation Zones 1, 8, or 11 (Objective
21 BRIT/HART/SJSC1.1, associated with CM3).
- 22 ● Protect two currently unprotected occurrences of San Joaquin spearscale in Conservation Zones
23 1, 8, or 11 (Objective BRIT/HART/SJSC1.2, associated with CM3).

24 Modeled habitat for Delta button-celery would be adversely affected by construction of the
25 Alternative 1A water conveyance facilities. One population of crownscale also would be adversely
26 affected by construction of the water conveyance facilities. Modeled habitat for brittlescale and
27 heartscale could be adversely affected by tidal habitat restoration. One occurrence each of San
28 Joaquin spearscale and Heckard's peppergrass could be affected by tidal habitat restoration. No
29 adverse effects on palmate-bracted bird's-beak or recurved larkspur would be expected. Table 12-
30 1A-63 summarizes the acreage of modeled alkali seasonal wetland habitat in the study area and the
31 number of occurrences of each special-status alkali seasonal wetland plant in the study area.

1 **Table 12-1A-63. Summary of Impacts on Seasonal Alkali Wetland Plants under Alternative 1A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
San Joaquin spearscale modeled habitat	14,933	748	0	0	Habitat loss from construction of water conveyance facilities, construction of Yolo Bypass fisheries enhancements, tidal habitat restoration, and floodplain restoration levee construction
Brittlescale modeled habitat	451	4	0	0	Habitat loss from tidal habitat restoration
Heartscale modeled habitat	6,528	306	0	0	Habitat loss from tidal habitat restoration
Delta button-celery modeled habitat	3,361 ^a	18	0	0	Habitat loss from construction of water conveyance facilities
Alkali seasonal wetlands	3,723	72	0	0	Habitat loss from tidal restoration and Yolo Bypass fisheries enhancements
Covered Species					
San Joaquin spearscale	0	0	19	1	Population loss from tidal habitat restoration
Brittlescale	0	0	8	0	None
Heartscale	0	0	3	0	None
Delta button celery	0	0	1 ^b	0	None
Heckard's peppergrass	0	0	1 ^c	1	Population loss from tidal habitat restoration
Noncovered Species					
Crownscale	0	0	17	1	Population loss from construction of water conveyance facilities
Palmate-bracted bird's-beak	0	0	1	0	None
Recurved larkspur	0	0	4	0	None
^a portion of this acreage consists of riparian habitat. ^b A second occurrence in study area is in riparian habitat. ^c Two additional occurrences of Heckard's peppergrass are associated with vernal pools.					

2

3 **Impact BIO-170: Effects on Habitat and Populations of Alkali Seasonal Wetland Plants**

4 Alternative 1A would have adverse effects on modeled habitat for San Joaquin spearscale,
 5 brittlescale, heartscale, and Delta button-celery. It would also have adverse effects on occurrences of
 6 heartscale, Heckard's peppergrass, and crownscale.

1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operations*: Under Alternative 1A, construction of the Byron Tract
5 Forebay would permanently remove 69 acres of modeled habitat for San Joaquin spearscale and
6 21 acres of modeled habitat for Delta button-celery. This could be an adverse effect, depending
7 on whether or not the affected modeled habitat is actually occupied by the species. Modeled
8 habitat is assumed to encompass all potential habitat for a species and may therefore
9 overestimate the area actually occupied. Known occurrences of San Joaquin spearscale near the
10 forebay do not appear to be affected by facilities construction. Delta button-celery is not known
11 to occur in CZ 8; the nearest known occurrence, in CZ 9, would not be affected.

12 Construction of the water conveyance facilities would permanently remove 0.2 acre of habitat
13 occupied by crownscale at the Byron Tract Forebay. Part of the occurrence would be removed,
14 but most of the occurrence would not be directly affected. However, a reduction of the
15 population size, both in area and number of individuals present, would be an adverse impact.

16 Construction of the water conveyance facilities would not affect brittlescale, heartscale,
17 Heckard's peppergrass, palmate-bracted bird's-beak, or recurved larkspur.

- 18 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries
19 enhancements would permanently remove 56 acres of modeled habitat for San Joaquin
20 spearscale. No known occurrences of San Joaquin spearscale would be affected. No modeled
21 habitat and no known occurrences of the seven other alkali seasonal wetland plants are within
22 the hypothetical footprint for construction or operation of the Yolo Bypass fisheries
23 enhancements.

- 24 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit alkali
25 seasonal wetland plants by protecting 150 acres of alkali seasonal wetland in Conservation
26 Zones 1, 8, and/or 11. The protected alkali seasonal wetland habitat would be managed and
27 enhanced to sustain populations of native plant species.

- 28 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration is expected to convert
29 alkali seasonal wetlands on the margins of tidal wetlands to freshwater or brackish tidal marsh.
30 Tidal habitat restoration would convert 622 acres of modeled habitat for San Joaquin spearscale
31 to tidal marsh. Tidal habitat restoration would permanently remove 4 acres of modeled habitat
32 for brittlescale in CZ 1 near Lindsey Slough and in CZ 11 near Nurse Slough; however, the BDCP
33 would allow up to 50 acres of modeled habitat to be converted to tidal wetlands. Tidal habitat
34 restoration would remove 306 acres of modeled habitat for heartscale in CZ 1 in the vicinity of
35 Jepson Prairie and in CZ 11 adjacent to Suisun Marsh. The extent to which the modeled habitat is
36 actually occupied by these species is not known; modeled habitat is assumed to encompass all
37 potential habitat for a species and may therefore overestimate the area actually occupied. Tidal
38 habitat restoration could adversely affect an occurrence of Heckard's peppergrass at Hass
39 Slough and an occurrence of San Joaquin spearscale at Main Prairie, both in CZ 1. These
40 occurrences are based on historic records, and the whether or not the populations still exist is
41 not known. In each case, the loss of modeled habitat and occurrences for covered species would
42 be adverse effects. Delta button celery, crownscale, palmate-bracted bird's-beak, and recurved
43 larkspur would not be affected by tidal habitat restoration.

- 1 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
2 would result in the removal of 2 acres of modeled habitat for San Joaquin spearscale. In addition,
3 3 acres would be subject to periodic flooding. No known occurrences of San Joaquin spearscale
4 would be affected. No other alkali seasonal wetland habitat or occurrences of special-status
5 alkali seasonal wetland plants are present within areas proposed for floodplain restoration.
6 Therefore, floodplain restoration and construction of new floodplain levees would have no
7 impacts on covered and noncovered alkali seasonal wetland plants.
- 8 • *CM6 Channel Margin Enhancement*: No alkali seasonal wetland habitat or occurrences of special-
9 status alkali seasonal wetland plants are present within areas proposed for channel margin
10 habitat enhancement. Therefore, channel margin habitat enhancement would have no impacts
11 on covered and noncovered alkali seasonal wetland plants.
- 12 • *CM7 Riparian Natural Community Restoration*: No alkali seasonal wetland habitat or occurrences
13 of special-status alkali seasonal wetland plants are present within areas proposed for riparian
14 habitat enhancement. Therefore, riparian habitat enhancement would have no impacts on
15 covered and noncovered alkali seasonal wetland plants.
- 16 • *CM8 Grassland Natural Community Restoration*: Although the alkali seasonal wetland habitat
17 includes the grassland matrix within which the wetlands occur, grassland restoration activities
18 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands
19 that are not included within alkali seasonal wetland habitat. Therefore, grassland communities
20 restoration would have no impacts on covered and noncovered alkali seasonal wetland plants.
- 21 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Although some vernal pools
22 are alkaline, alkali seasonal wetlands in the study area consist of alkali grassland, alkali meadow,
23 or iodine bush scrub. Therefore, vernal pool restoration would avoid alkali seasonal wetland
24 habitat and would have no impacts on covered and noncovered alkali seasonal wetland plants.
25 In addition, the BDCP would compensate for the loss of alkali seasonal wetlands from other CMs
26 by restoring or creating 72 acres of alkali seasonal wetlands in Conservation Zones 1, 8, or 11 to
27 achieve no net loss of this habitat.
- 28 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
29 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid alkali
30 seasonal wetland habitat and would have no impacts on covered and noncovered alkali seasonal
31 wetland plants.
- 32 • *Avoidance and Minimization Measures*: Effects on special-status alkali seasonal wetland plants
33 potentially resulting from implementation of CM1 and CM4 would be avoided or minimized
34 though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*
35 *Monitoring*, and *AMM37 Recreation*. Under AMM11, surveys for covered plant species would be
36 performed during the planning phase of projects, and any impacts on populations of covered
37 species would be avoided through project design or subsequently minimized through AMM2. In
38 addition, AMM11 prohibits ground disturbance or hydrologic disturbance within 250 feet of
39 existing vernal pools, which would protect those species with modeled habitat that includes
40 vernal pool complex. Occurrences of covered species in vernal pools near tidal wetlands would
41 not be affected by tidal habitat restoration where critical habitat for vernal pool species is
42 present and would be avoided under AMM11. AMM37 requires that new recreation trails avoid
43 populations of covered alkali seasonal wetland plants. BDCP Appendix 3.C describes the AMMs,
44 which have since been updated and which are provided in Appendix 3B, *Environmental*
45 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 In summary, only one known occurrence of a special-status alkali seasonal wetland species
2 (crownscale) would be affected under Alternative 1A, although one historic occurrence of Heckard's
3 peppergrass and one historic occurrence of San Joaquin spearscale could also be affected by tidal
4 restoration activities, if those occurrences still exist. AMM11 would be implemented to avoid an
5 adverse effect on Heckard's peppergrass and San Joaquin spearscale occurrences.

6 The primary effect of Alternative 1A on special-status alkali seasonal wetland plants would be the
7 loss of potential (i.e., modeled) habitat for San Joaquin spearscale, brittlescale, heartscale, and Delta
8 button-celery. Approximately 72 acres of this habitat loss would be alkali seasonal wetlands. The
9 actual effect on modeled habitat for alkali seasonal wetland plants is expected to be somewhat less
10 than the estimated impact because some of this habitat is composed of vernal pool complex, and the
11 BDCP limits the total loss of wetted vernal pool habitat to 10 acres (approximately 67 acres of vernal
12 pool complex) over the permit term (AMM12). Loss of modeled habitat would be compensated for
13 by restoring or creating vernal pool complex, alkali seasonal wetlands, and grasslands, in proportion
14 to the amount of each habitat removed. At the proposed restoration ratios of 1:1 (prior to impact)
15 and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal pool complex restoration
16 would be required to compensate for the loss of modeled habitat composed of vernal pool complex
17 (Objective VPNC1.2, associated with CM9). Approximately 72 acres of alkali seasonal wetlands
18 would be restored (Objective ASWC1.2, associated with CM9). Loss of modeled habitat composed of
19 grasslands would be compensated for by restoring grassland habitat on a 1:1 basis (Objective
20 GNC1.1, associated with CM8). These compensation levels would be consistent with typical NEPA
21 and CEQA project-level mitigation ratios for impacts on vernal pools, alkali seasonal wetlands, and
22 grasslands.

23 The BDCP would have a small beneficial effect on special-status alkali seasonal wetland plants by
24 protecting 150 acres of alkali seasonal wetland habitat. The BDCP also includes the species-specific
25 goal that 75 acres would be modeled habitat for brittlescale and heartscale (Objective
26 BRIT/HART/SJSC1.1) and another goal that would protect 2 occurrences of San Joaquin spearscale
27 (Objective BRIT/HART/SJSC1.2). The benefits of habitat protection and management also would
28 accrue to any noncovered alkali seasonal wetland plants occurring in the protected habitat.

29 **NEPA Effects:** Under Alternative 1A, loss of modeled habitat for alkali seasonal wetland plant
30 species would be offset through restoration of grassland, vernal pool, and alkali seasonal wetland
31 habitat (CM8, CM9), and impacts on one occurrence of San Joaquin spearscale and one occurrence of
32 Heckard's peppergrass would be avoided through AMM11. With avoidance and habitat restoration,
33 these effects would not be adverse.

34 **CEQA Conclusion:** Because loss of modeled habitat for alkali seasonal wetland plant species would
35 be offset through restoration, and because impacts on occurrences of covered alkali seasonal
36 wetland plants would be avoided, impacts on alkali seasonal wetlands as a result of implementing
37 Alternative 1A would not result in substantially reducing the number or restricting the range of five
38 covered and two noncovered plant species. However, conservation measures that benefit or protect
39 covered species do not apply to noncovered species, and portions of the crownscale population at
40 Byron Tract Forebay would be lost, which would be a significant impact. Implementation of
41 Mitigation Measure BIO-170, *Avoid, Minimize, or Compensate for Impacts on Noncovered Special-*
42 *Status Plant Species*, would reduce this impact to a less-than-significant level.

1 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**
2 **Special-Status Plant Species**

3 DWR will evaluate all projects for their impacts on special-status plants, avoid or minimize
4 impacts on species that occur on project sites, and compensate for impacts on species. All
5 impacts on diamond-petaled California poppy and caper-fruited tropidocarpum shall be
6 avoided. Impacts on other special-status plant species shall be avoided to the extent feasible,
7 and any unavoidable impacts shall be compensated for.

- 8 ● DWR shall conduct surveys for the special-status plant species within and adjacent to all
9 project sites. Special-status plant surveys required for project-specific permit compliance
10 will be conducted during the planning phase to allow design of the individual restoration
11 projects to avoid adverse modification of habitat for specified covered plants if practicable.
12 The purpose of these surveys will be to verify that the locations of special-status plants
13 identified in previous record searches or surveys are extant, identify any new special-status
14 plant occurrences, and cover any portions of the project area not previously surveyed. The
15 extent of mitigation of direct loss of or indirect effects on special-status plants will be based
16 on these survey results.
- 17 ● All surveys shall be conducted by qualified biologists using the using *Guidelines for*
18 *Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate*
19 *Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating*
20 *Impacts to Special Status Native Plant Populations and Natural Communities* (California
21 Department of Fish and Game 2009) during the season that special-status plant species
22 would be evident and identifiable, i.e., during their blooming season. Locations of special-
23 status plants in proposed construction areas will be recorded using a GPS unit and flagged.
- 24 ● The construction monitoring plan for the protection of covered fish, wildlife, and plant
25 species, prepared by DWR before implementing an approved project, will provide for
26 construction activity monitoring in areas identified during the planning stages and
27 species/habitat surveys as having noncovered special-status plant species.
- 28 ● Where surveys determine that a special-status plant species is present in or adjacent to a
29 project site, direct and indirect impacts of the project on the species shall be avoided if
30 feasible through the establishment of 250-foot activity exclusion zones surrounding the
31 periphery of occurrences, within which no ground-disturbing activities shall take place,
32 including construction of new facilities, construction staging, or other temporary work
33 areas. Activity exclusion zones for special-status plant species shall be established according
34 to a 250-foot buffer surrounding the periphery of each special-status plant species
35 occurrence, the boundaries of which shall be clearly marked with standard orange plastic
36 construction exclusion fencing or its equivalent. The establishment of activity exclusion
37 zones shall not be required if no construction-related disturbances will occur within 250
38 feet of the occurrence periphery. The size of activity exclusion zones may be reduced
39 through consultation with a qualified biologist and with concurrence from USFWS or CDFW
40 based on project site-specific conditions.
- 41 ● Where avoidance of impacts on a special-status plant species is infeasible, DWR will
42 compensate for loss of individuals or occupied habitat of a special-status plant species
43 through the acquisition, protection, and subsequent management in perpetuity of other
44 existing occurrences at a 2:1 ratio (preservation: impact). DWR will provide detailed
45 information to USFWS and CDFW on the location of the preserved occurrences, quality of

1 the preserved habitat, feasibility of protecting and managing the areas in-perpetuity,
2 responsible parties, and other pertinent information. If suitable occurrences of a special-
3 status plant species are not available for preservation, then the project shall be redesigned
4 to remove features that would result in impacts on that species.

5 **Grassland Plants**

6 One covered plant and 11 noncovered special-status plants occur in grasslands in the study area
7 (Tables 12-2, 12-3, summarized in Table 12-1A-64). The only covered plant species occurring in
8 grassland is Carquinez goldenbush. Carquinez goldenbush modeled habitat included hydrological
9 features such as stream corridors on alluvium derived from the Montezuma Formation. Stream
10 corridors (intermittent and perennial) that intersected these geologic units were selected and
11 truncated at the point at which they encountered the upper elevation of intertidal marsh. The
12 corridors were buffered 50 feet (15 meters) on either side in an effort to capture the estimated
13 maximum extend of alluvium deposits in close proximity to the actual rivers/streams.

14 Full implementation of Alternative 1A would include the following conservation actions over the
15 term of the BDCP to benefit covered grassland plants (BDCP Chapter 3, Section 3.3, *Biological Goals*
16 *and Objectives*).

- 17 • Protect three unprotected occurrences of the Carquinez goldenbush in Conservation Zones 1
18 and/or 11 (Objective CGB1.1, associated with CM3).
- 19 • Maintain and enhance occupied Carquinez goldenbush habitat to slow erosion and reverse
20 degradation from livestock grazing (Objective CGB1.2, associated with CM11).

21 Of 78,047 acres of grasslands in the study area, Alternative 1A would adversely affect 2,857 acres,
22 including 4 acres that are modeled habitat for Carquinez goldenbush. For 10 of the plants, no known
23 occurrences would be affected. One of five Parry's rough tarplant occurrences in the study area
24 could be adversely affected by Alternative 1A. Table 12-1A-64 summarizes the acreage of grassland
25 habitat in the study area and the number of occurrences of each special-status grassland plant in the
26 study area.

1 **Table 12-1A-64. Summary of Impacts on Grassland Plants under Alternative 1A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Carquinez goldenbush modeled habitat	1,346	4	0	0	Habitat loss from tidal habitat restoration
Grassland	78,047	2,857	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, floodplain restoration, and construction of conservation hatcheries facilities
Covered Species					
Carquinez goldenbush	0	0	10	1	Occurrence affected by tidal restoration
Noncovered Species					
Big tarplant	0	0	5	0	None
Round-leaved filaree	0	0	2	0	None
Pappose tarplant	0	0	7	0	None
Parry's rough tarplant	0	0	5	1	Periodic inundation of one occurrence as a result of Yolo Bypass operations
Small-flowered morning-glory	0	0	0	0	None
Diamond-petaled poppy	0	0	1	0	None
Stinkbells	0	0	1	0	None
Fragrant fritillary	0	0	4	0	None
Gairdner's yampah	0	0	0	0	None
Streamside daisy ^a	0	0	1	0	None
Caper-fruited tropidocarpum	0	0	8	0	None
^a This species actually occurs in upland woodland, a habitat that has not been mapped or quantified in the BDCP.					

2

3 **Impact BIO-171: Effects on Habitat and Populations of Grassland Plant Species**

4 Alternative 1A could have adverse effects on modeled habitat for Carquinez goldenbush. It could
5 also have adverse effects on one occurrence of Carquinez goldenbush and one occurrence of Parry's
6 rough tarplant. Although Alternative 1A would have no expected effects on known occurrences of
7 the other special-status plant species that occur in grasslands, the loss of 2,857 acres of grassland
8 would have the potential to adversely affect undocumented populations of special-status grassland
9 species.

1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operations*: No modeled habitat for Carquinez goldenbush and no
5 known occurrences of the 12 special-status grassland plants are within the proposed footprint
6 for the Alternative 1A water conveyance facilities. About 578 acres of grassland habitat would
7 be affected by construction of the water conveyance facilities. However, this grassland habitat
8 consists of small patches of herbaceous ruderal vegetation along levees that do not provide
9 habitat for special-status grassland species. Therefore, under Alternative 1A, construction and
10 operation of the water conveyance facilities would not affect the 12 special-status grassland
11 plants.
- 12 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries
13 enhancements would remove 627 acres of grassland habitat. Yolo Bypass operations would
14 result in more frequent and longer inundation of 1,597 acres of grasslands in the Yolo Causeway
15 (CZ 2) that include habitat for one occurrence of Parry's rough tarplant. Parry's rough tarplant is
16 a summer-blooming plant that occurs in areas subject to occasional inundation during the wet
17 season, such as swales and seasonal wetlands. Increasing the frequency or duration of
18 inundation may decrease the distribution in some areas by making some conditions too wet but
19 would also expand the distribution into areas that may currently be too dry. Overall, changing
20 the frequency and duration of inundation in the area of this occurrence should not result in a
21 substantial change in the range of numbers of Parry's rough tarplant. Construction and
22 operation of the Yolo Bypass Fisheries enhancements would not affect modeled habitat for
23 Carquinez goldenbush or known occurrences of other special-status grassland plants.
- 24 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to preserve 8,000
25 acres of grassland habitat, some of which may contain modeled habitat for Carquinez
26 goldenbush. Protection of grassland habitat may also protect undiscovered occurrences of
27 special-status plant species.
- 28 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently
29 remove 1,122 acres of grassland habitat. Four acres of modeled habitat for Carquinez
30 goldenbush along the eastern side of Suisun Marsh would be adversely affected, including part
31 of one known occurrence. No other known occurrences of special-status grassland plants are
32 within the hypothetical footprint of tidal restoration.
- 33 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of new floodplain levees would
34 result in the loss of 85 acres of grassland habitat. Periodic inundation of the floodplain would
35 affect 513 acres of grassland habitat, and another 399 acres of grassland habitat would be
36 converted to riparian habitat. However, no modeled habitat for Carquinez goldenbush or known
37 occurrences of special-status grassland plants are present within areas proposed for floodplain
38 restoration, and the affected grassland habitat consists of herbaceous ruderal vegetation that
39 does not support special-status grassland plants. Therefore, floodplain restoration and
40 construction of new floodplain levees would have no impacts on covered and noncovered
41 grassland plants.
- 42 • *CM6 Channel Margin Enhancement*: No known occurrences of special-status grassland plants are
43 present within areas proposed for channel margin habitat enhancement. Areas mapped as
44 grassland along levees that would be affected by channel margin habitat enhancement are small
45 patches of ruderal vegetation along levees that do not provide habitat for special-status

1 grassland species and are not modeled habitat for Carquinez goldenbush. Therefore, channel
2 margin habitat enhancement would have no impacts on covered and noncovered grassland
3 plants.

- 4 • *CM7 Riparian Natural Community Restoration*: No modeled habitat for Carquinez goldenbush or
5 known occurrences of special-status grassland plants are present within areas proposed for
6 riparian habitat enhancement. Therefore, riparian habitat enhancement would have no impacts
7 on covered and noncovered grassland plants.
- 8 • *CM8 Grassland Natural Community Restoration*: Grassland restoration would restore 2,000 acres
9 of grassland habitat. Restoration activities would take place in non-grasslands (ruderal habitat,
10 cultivated land) or degraded grasslands. These areas do not currently provide habitat for
11 special-status grassland plants. Therefore, grassland communities restoration would have no
12 impacts on covered and noncovered grassland plants.
- 13 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Vernal pool complex includes
14 vernal pools as well as the surrounding grassland matrix. Because the habitat to be restored
15 would consist of areas of former vernal pool complex that have been leveled for cultivation,
16 special-status grassland plants would not be present. Therefore, vernal pool complex
17 restoration would not affect special-status grassland plants.
- 18 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
19 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid grassland
20 habitat and would have no impacts on covered and noncovered grassland plants.
- 21 • *CM18 Conservation Hatcheries*: Construction of the conservation hatcheries would remove 35
22 acres of grassland habitat. The removed habitat would consist of ruderal herbaceous vegetation
23 that would not be likely to provide habitat for special-status grassland plants. Therefore,
24 construction of the conservation hatcheries would not be expected to affect special-status
25 grassland plants.
- 26 • *Avoidance and Minimization Measures*: Effects on Carquinez goldenbush potentially resulting
27 from implementation of CM4 and potential effects on undiscovered populations of special-status
28 grassland plants would be avoided or minimized through *AMM11 Covered Plant Species*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, and *AMM37 Recreation*. Under AMM11,
30 surveys for covered plant species would be performed during the planning phase of projects,
31 and any impacts on populations of covered species would be avoided through project design or
32 subsequently minimized through AMM2. AMM37 requires that new recreation trails would avoid
33 populations of Carquinez goldenbush. BDCP Appendix 3.C describes the AMMs, which have since
34 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and*
35 *CMs*, of the Final EIR/EIS.

36 The primary effect of Alternative 1A on special-status grassland plants is the loss of potential (i.e.,
37 modeled) habitat for Carquinez goldenbush, including part of one known occurrence. Under
38 AMM11, the occurrence would be surveyed to establish the population limits and to redesign the
39 project to avoid affecting the population, to the extent feasible. Protecting three unprotected
40 occurrences of Carquinez goldenbush (Objective CGB1.1, associated with CM3) and maintaining and
41 enhancing occupied Carquinez goldenbush (Objective CGB1.2, associated with CM11) would
42 compensate for any residual effects. One occurrence of Parry's rough tarplant would be affected by
43 CM2, but the effect is not expected to be adverse. No known occurrences of the other special-status
44 grassland plants would be affected.

1 The BDCP would have a potential beneficial effect on special-status grassland plants by protecting
2 8,000 acres of grassland habitat. To ensure that this habitat preservation would specifically benefit
3 Carquinez goldenbush, the Plan proposes to protect at least three Carquinez goldenbush
4 occurrences in CZs 1 and 11 that are currently not protected and to maintain and enhance occupied
5 Carquinez goldenbush habitat. The preservation of modeled or potential habitat, together with
6 avoidance and minimization of impacts on species occurrences, would reduce any effects of
7 Alternative 1A implementation on covered grassland plants to a level that is no longer adverse.

8 **NEPA Effects:** The loss of modeled and occupied habitat for Carquinez goldenbush would be offset
9 through CM3, CM8, and CM11. Therefore, implementation of Alternative 1A would result in no
10 adverse effects on special-status grassland plants.

11 **CEQA Conclusion:** Because adverse effects on special-status grassland plant species would be
12 avoided or compensated for, Alternative 1A would not result in substantially reducing the numbers
13 or restricting the range of one covered or 11 noncovered special-status grassland plants, and this
14 impact would be less than significant. No mitigation is required.

15 **Valley/Foothill Riparian Plants**

16 Two covered plants and two noncovered special-status plants occur in valley/foothill riparian
17 habitat in the study area (Tables 12-2, 12-3, summarized in Table 12-1A-65). The valley/foothill
18 riparian habitat model for Delta button-celery and slough thistle was mapped as all of the study area
19 along the flood plain of the San Joaquin River between the levees from the Mossdale Bridge to
20 Vernalis. Whether or not this modeled habitat is actually occupied by Delta button-celery and slough
21 thistle is unknown; all known occurrences of these species within the area of modeled habitat are
22 believed to be extirpated.

23 Full implementation of Alternative 1A would include the following conservation actions over the
24 term of the BDCP to benefit covered valley/foothill riparian plants (BDCP Chapter 3, Section 3.3,
25 *Biological Goals and Objectives*).

- 26 ● Protect and enhance two occurrences of delta button celery. If occurrences are not found in the
27 Plan Area, establish self-sustaining occurrences of delta button celery for a total of two
28 occurrences within the restored floodplain habitat on the mainstem of the San Joaquin River in
29 Conservation Zone 7 between Mossdale and Vernalis. (Objective DBC1.1, associated with CM3
30 and CM11).
- 31 ● Protect and enhance two occurrences of slough thistle. If occurrences are not found in the Plan
32 Area, establish self-sustaining occurrences of slough thistle for a total of two occurrences within
33 the 10,000 acres of restored floodplain on the mainstem of the San Joaquin River in
34 Conservation Zone 7 between Mossdale and Vernalis (Objective ST1.1: associated with CM3 and
35 CM11).

36 Of 17,966 acres of valley/foothill riparian habitat in the study area, Alternative 1A would adversely
37 affect 982 acres, including 15 acres that are modeled habitat for Delta button-celery and 11 acres
38 that are modeled habitat for slough thistle. Table 12-1A-65 summarizes the acreage of modeled
39 habitat for Delta button-celery and slough thistle and the number of occurrences of each special-
40 status grassland plant in the study area.

1 **Table 12-1A-65. Summary of Impacts on Valley/Foothill Riparian Plants under Alternative 1A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Delta button-celery modeled habitat	3,361 ^a	15	0	0	Habitat loss from floodplain restoration
Slough thistle modeled habitat	1,834	11	0	0	Habitat loss from floodplain restoration
Valley/foothill riparian habitat	17,966	892	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Covered Species					
Delta button-celery	0	0	1 ^b	1	Occurrence potentially affected by floodplain restoration
Slough thistle	0	0	2	2	Occurrences potentially affected by floodplain restoration
Noncovered Species					
Northern California black walnut	0	0	1	0	None
Wright's trichocoronis	0	0	1	0	None
^a A portion of this acreage consists of alkali seasonal wetland.					
^b A second occurrence is in alkali seasonal wetland.					

2

3 **Impact BIO-172: Effects on Habitat and Populations of Valley/Foothill Riparian Plants**

4 No extant occurrences of Delta button-celery, slough thistle, Northern California black walnut, or
 5 Wright's trichocoronis are present in the study area. Therefore, no impacts on special-status
 6 valley/foothill riparian plants are expected. Modeled habitat for Delta button-celery and slough
 7 thistle, which may support undocumented occurrences of these species, would be affected by
 8 restoration of seasonally inundated floodplain.

9 The individual effects of each relevant conservation measure are addressed below. A summary
 10 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
 11 conservation measure discussions.

- 12 • *CM1 Water Facilities and Operations*: Construction of the water conveyance facilities would
 13 remove 86 acres of valley-foothill riparian habitat under Alternative 1A. However, no modeled
 14 habitat and no known occurrences of the four special-status valley/foothill riparian plants are
 15 within the proposed footprint for the Alternative 1A water conveyance facilities. Therefore,
 16 under Alternative 1A, construction and operation of the water conveyance facilities would not
 17 affect covered or noncovered special-status valley/foothill riparian plants.

- 1 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction and operation of the Yolo Bypass fisheries
2 enhancements would adversely affect 176 acres of valley/foothill riparian habitat. However, no
3 modeled habitat and no known occurrences of the four special-status valley/foothill riparian
4 plants are within the hypothetical footprint for construction or operation of the Yolo Bypass
5 fisheries enhancements. Therefore, construction and operation of the Yolo Bypass fisheries
6 enhancements would not affect the covered or noncovered valley/foothill riparian plants.
- 7 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to protect 552 acres
8 of existing valley/foothill riparian forest in CZ 7. This action would have no substantial effects on
9 special-status valley/foothill plants because no extant occurrences of special-status
10 valley/foothill plants are present in the study area.
- 11 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would inundate 552 acres
12 of valley/foothill riparian habitat. However, no modeled habitat and no known occurrences of
13 the four special-status valley/foothill riparian plants are within the hypothetical footprint for
14 tidal restoration. Therefore, tidal restoration would not affect the covered or noncovered
15 valley/foothill riparian plants.
- 16 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
17 would remove about 78 acres of valley/foothill riparian habitat, including 15 acres of modeled
18 habitat for Delta button-celery along the San Joaquin River in CZ 7. In addition, floodplain
19 restoration would result in more frequent and longer inundation of 18 acres of modeled habitat
20 for Delta button-celery in this area. The area affected contains one historic occurrence of Delta
21 button celery. This occurrence is considered to be extirpated, because all habitat for Delta
22 button-celery at his location has been converted to agriculture (California Department of Fish
23 and Wildlife 2013). Therefore, Alternative 1A would not have an adverse effect on Delta button
24 celery in CZ 7.

25 The BDCP proposes to benefit Delta button-celery at this location by restoring 5,000 acres of
26 valley/foothill riparian habitat and re-introducing two occurrences of Delta button-celery.
27 Although Delta button celery occurs in riparian habitat, it is not associated with woodland or
28 scrub habitats; rather, it occurs in alkali seasonal wetlands in floodplains, which may or may not
29 also contain adjacent woody riparian habitat. Restoring habitat for Delta button-celery may not
30 be compatible with restoring woody riparian habitat. In addition, establishing new populations
31 of Delta button-celery is an untried, unproven procedure and may not be feasible. Therefore, any
32 beneficial effects on Delta button-celery would be speculative.

33 Floodplain restoration levee construction would remove 11 acres of modeled habitat for slough
34 thistle and would result in more frequent and longer inundation of 6 acres of modeled habitat
35 for slough thistle along the San Joaquin River in CZ 7. However, the BDCP would allow up to 50
36 acres of modeled habitat to be converted to riparian habitat. Whether the affected modeled
37 habitat is actually occupied by slough thistle is not known; however, of two historic occurrences
38 of slough thistle present in the study area, only one is considered to be extirpated (California
39 Department of Fish and Wildlife 2013). The BDCP would protect and enhance two occurrences
40 of slough thistle. If occurrences are not found in the study area, then two self-sustaining
41 occurrences of slough thistle would be established using locally-sourced genetic material for a
42 total of two occurrences within the restored floodplain habitat on the main stem of the San
43 Joaquin River in Conservation Zone 7 between Mossdale and Vernalis. Establishing new
44 populations of slough thistle is an untried, unproven procedure and may not be feasible.
45 Therefore, any beneficial effects on slough thistle would be speculative.

1 One historic occurrence of Wright's trichocoronis in the study area near Lathrop (CZ 7) could
 2 also be affected by floodplain restoration. The occurrence is presumed to be extant because the
 3 presence or absence of suitable habitat has not been verified by field surveys (California
 4 Department of Fish and Wildlife 2013). However, the species has not been observed at this
 5 location for nearly a century, and habitat for Wright's trichocoronis, which would have been
 6 similar to that for Delta button celery and slough thistle, no longer appears to be present in
 7 aerial photographs of the area. Therefore, Alternative 1A would not be expected to have an
 8 adverse effect on Wright's trichocoronis.

- 9 ● *CM6 Channel Margin Habitat Enhancement*: No modeled habitat or occurrences of special-status
 10 valley/foothill riparian plants are present within areas proposed for channel margin habitat
 11 enhancement. Therefore, channel margin habitat enhancement would have no impacts on
 12 covered and noncovered valley/foothill riparian plants.
- 13 ● *CM7 Riparian Natural Community Restoration*: No extant occurrences of special-status
 14 valley/foothill riparian plants are present within areas proposed for riparian habitat
 15 restoration. Therefore, riparian habitat restoration would have no impacts on covered and
 16 noncovered valley/foothill riparian plants.
- 17 ● *CM8 Grassland Natural Community Restoration*: No occurrences of special-status valley/foothill
 18 riparian plants are present within areas proposed for grassland communities restoration.
 19 Therefore, grassland communities restoration would have no impacts on covered and
 20 noncovered valley/foothill riparian plants.
- 21 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No occurrences of special-
 22 status valley/foothill riparian plants are present within areas proposed for vernal pool and
 23 alkali seasonal wetland complex restoration. Therefore, vernal pool complex restoration would
 24 have no impacts on covered and noncovered valley/foothill riparian plants.
- 25 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
 26 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid
 27 valley/foothill riparian habitat and would have no impacts on covered and noncovered
 28 valley/foothill riparian plants.
- 29 ● *Avoidance and Minimization Measures*: Effects on Delta button-celery and slough thistle
 30 potentially resulting from implementation of CM5 would be avoided or minimized through
 31 *AMM11 Covered Plant Species* and *AMM2 Construction Best Management Practices and*
 32 *Monitoring*. Under AMM11, surveys for covered plant species would be performed during the
 33 planning phase of projects, and any impacts on populations of covered species would be avoided
 34 through project design or subsequently minimized through AMM2. BDCP Appendix 3.C describes
 35 the AMMs, which have since been updated and which are provided in Appendix 3B,
 36 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

37 Because no extant occurrences of special-status valley/foothill riparian plants are known to occur in
 38 the study area, Alternative 1A is not expected to adversely affect any special-status valley/foothill
 39 riparian plants. Modeled habitat for both Delta button-celery and slough thistle would be affected.
 40 Under AMM11, surveys for covered plants would be performed during the planning phase for
 41 floodplain restoration. If Delta button-celery or slough thistle were found to be present in the
 42 floodplain restoration area, then the project would be designed to avoid impacts on the populations.
 43 Therefore, Alternative 1A would not have an adverse effect on these species.

1 The BDCP proposes to benefit Delta button-celery and slough thistle by restoring 5,000 acres of
2 valley/foothill riparian habitat and re-introducing two occurrences of both species. Establishing
3 new populations of Delta-button-celery or slough thistle would be a beneficial effect. However,
4 establishing new populations is an untried, unproven procedure and may not be feasible.

5 **NEPA Effects:** Implementation of the BDCP under Alternative 1A would not have an adverse effect
6 on special-status valley/foothill riparian plant species.

7 **CEQA Conclusion:** Alternative 1A would not result in a reduction in the range and numbers of
8 covered and noncovered valley/foothill riparian plants. This impact would be less than significant.
9 No mitigation is required.

10 **Tidal Wetland Plants**

11 Seven covered plants and one noncovered special-status plant occur in tidal wetlands in the study
12 area (Tables 12-2, 12-3, summarized in Table 12-1A-66). Five tidal wetland habitat models were
13 developed for the seven covered plant species occurring in tidal wetland habitat.

14 Modeled habitat for Mason's lilaepsis and Delta mudwort was mapped as areas within 10 feet (3
15 meters) on either side of the landward boundary of tidal perennial aquatic land cover type, which
16 was obtained from the BDCP geographic information system (GIS) vegetation data layer.

17 The side-flowering skullcap model mapped the distribution of suitable habitat in the study area
18 according to the species' habitat association with woody riparian habitat. The model selected Delta
19 riparian vegetation types providing the habitat characteristics that side-flowering skullcap seems to
20 require, namely, woody substrate in freshwater tidal areas. The model included vegetation subunits
21 of the BDCP valley/foothill riparian natural community characterized by California dogwood, white
22 alder, and arroyo willow.

23 The modeled habitat for soft bird's-beak consisted of pickleweed- and saltgrass-dominated
24 vegetation units located west of the Antioch Bridge. Modeled habitat for these two plant species was
25 mapped as areas within 10 feet (3 meters) on either side of the landward boundary of tidal
26 perennial aquatic land cover types. The model used all tidal brackish emergent wetland polygons
27 that were limited by specific vegetation units that are known to be closely associated with soft
28 bird's-beak habitat.

29 Habitat for Delta tule pea and Suisun Marsh aster was modeled separately based on the salinity of
30 the water. For the tidal freshwater emergent wetland BDCP land cover type, modeled habitat was
31 mapped as the area within 10 feet (3 meters) of the landward side of the landward boundary,
32 exclusively where this land cover type is adjacent to grassland, vernal pool complex, valley/foothill
33 riparian, or cultivated land habitats cover types. For brackish water areas in and near Suisun Marsh,
34 the model used all tidal brackish emergent wetland polygons within an elevation range of 7 to 10
35 feet (2 to 3 meters) to capture elevations 1 foot (30 centimeters) below intertidal to 2 feet (60
36 centimeters) above intertidal.

37 The modeled habitat for Suisun thistle in and near Suisun Marsh consists of all tidal brackish
38 emergent wetland polygons with the appropriate vegetation. This included vegetation units
39 dominated by saltscale, saltgrass, pickleweed, and broad-leaved peppergrass.

1 Full implementation of Alternative 1A would include the following conservation actions over the
2 term of the BDCP to benefit covered tidal wetland plants (BDCP Chapter 3, Section 3.3, *Biological*
3 *Goals and Objectives*).

- 4 • No net loss of Mason's lilaepsis and delta mudwort occurrences within restoration sites, or
5 within the area of affected tidal range of restoration projects (Objective DMW/ML1.1, associated
6 with CM4 and CM11),
- 7 • No net loss of Delta tulle pea and Suisun Marsh aster occurrences within restoration sites
8 (Objective DTP/SMA1.1, associated with CM4 and CM11).
- 9 • Restore tidal inundation to wetlands in the Hill Slough Ecological Reserve and to the ponded
10 area at Rush Ranch (Objective SBB/SuT1.1, associated with CM4).
- 11 • Complete seed banking of all existing Suisun Marsh populations and the representative genetic
12 diversity using accepted seed banking protocols (Objective SBB/SuT1.2, associated with CM11).
- 13 • Establish a cultivated population of Suisun thistle from wild seed using accepted seed collection
14 protocols (Objective SBB/SuT1.3, associated with CM11).
- 15 • Establish two occurrences of Suisun thistle in Conservation Zone 11 (Objective SBB/SuT1.4,
16 associated with CM11).

17 Of 17,357 acres of tidal wetlands in the study area, Alternative 1A would affect 21 acres, including
18 areas that are modeled habitat for Mason's lilaepsis, Delta mudwort, side-flowering skullcap, Delta
19 tulle pea, Suisun Marsh aster, soft bird's-beak, and Suisun thistle. Known occurrences of all of these
20 species would be affected. In addition, four occurrences of Bolander's water-hemlock, a noncovered
21 special-status plant, could be affected by tidal habitat restoration. Table 12-1A-66 summarizes the
22 acreage of modeled habitat for covered tidal wetland species and the number of occurrences of each
23 special-status tidal wetland plants in the study area.

1 **Table 12-1A-66. Summary of Impacts on Tidal Wetland Plants under Alternative 1A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Delta mudwort/Mason's lilaopsis modeled habitat	6,081	48	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Side-flowering skullcap modeled habitat	2,497	10	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Soft bird's-beak modeled habitat	1,228	73	0	0	Habitat loss from tidal habitat restoration
Delta tule pea/Suisun Marsh aster modeled habitat	5,853	3	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Suisun thistle modeled habitat	1,281	73	0	0	Habitat loss from tidal habitat restoration
Tidal brackish emergent wetland	8,501	0	0	0	Habitat loss from tidal habitat restoration
Tidal freshwater emergent wetland	8,856	21	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Covered Species					
Delta mudwort	0	0	58	3	Occurrences affected by tidal habitat restoration
Delta tule pea	0	0	106	26	Occurrences affected by tidal habitat restoration
Mason's lilaopsis	0	0	181	23	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Side-flowering skullcap	0	0	12	0	None
Soft bird's-beak	0	0	13	7	Occurrences affected by tidal habitat restoration
Suisun Marsh aster	0	0	164	26	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Suisun thistle	0	0	4	0	None
Noncovered Species					
Bolander's water hemlock	0	0	8	3	Occurrences affected by tidal habitat restoration

1 **Impact BIO-173: Effects on Habitat and Populations of Tidal Wetland Plants**

2 Alternative 1A would have adverse effects on tidal marsh special-status plants through
3 implementation of CM1, CM2, CM4, and CM5. No adverse effects are expected from implementation
4 of CM3, CM6, CM7, CM8, and CM9.

5 The individual effects of each relevant conservation measure are addressed below. A summary
6 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
7 conservation measure discussions.

- 8 • *CM1 Water Facilities and Operations*: Construction of the Alternative 1A water conveyance
9 facilities would remove 34 acres of modeled habitat for delta mudwort and Mason's lilaepsis, 4
10 acres of modeled habitat for side-flowering skullcap, and 2 acres of modeled habitat for Delta
11 tule pea and Suisun Marsh aster. The extent to which modeled habitat is actually occupied by
12 these species is not known; however, 8 occurrences of Mason's lilaepsis, one occurrence of
13 Suisun Marsh aster, and one occurrence of side-flowering skullcap in the study area could be
14 affected by construction impacts. No known occurrences of the other covered and noncovered
15 tidal wetland species would be affected by construction of the water conveyance facilities.
- 16 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries
17 enhancements would remove 5 acres of modeled habitat for Mason's lilaepsis and delta
18 mudwort. The extent to which modeled habitat is actually occupied by these species is not
19 known; however, no known occurrences in the study area would be affected. Yolo Bypass
20 operations would result in more frequent and longer inundation of 8 acres of modeled habitat
21 Delta tule peas and Suisun Marsh aster. Two occurrences of Suisun Marsh aster would be
22 affected by Yolo Bypass operations. Habitat for these species is normally periodically inundated
23 or saturated; therefore, a small increase in the frequency and duration of periodic inundation of
24 the habitat would not be expected to have a substantial effect.
- 25 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes restoring or creating
26 20 linear miles of transitional tidal areas within other natural communities that would be
27 created or restored, including 6,000 acres of tidal brackish emergent wetland and 24,000 acres
28 of tidal freshwater emergent wetland. In addition, the habitat and ecosystem functions of these
29 areas would be maintained and enhanced. The BDCP does not specifically propose to protect
30 any occurrences of tidal wetland plants nor does it propose active restoration of affected habitat
31 or occurrences. Instead, the BDCP assumes that the 20 linear miles of restored transitional tidal
32 areas would be passively colonized by the covered tidal wetland plants.
- 33 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently
34 remove 6 acres of modeled habitat for Mason's lilaepsis and Delta mudwort. Habitat loss would
35 occur through conversion of the species habitat (at and immediately above the tidal zone in
36 marshes and along rivers and streams) to inundated tidal habitat. The extent to which modeled
37 habitat is actually occupied by the species is not known; however, 14 of 181 known occurrences
38 of Mason's lilaepsis and 3 of 58 known occurrences of delta mudwort in the study area could be
39 affected by tidal habitat restoration.
40 Tidal habitat restoration would remove 4 acres of modeled habitat for side-flowering skullcap.
41 Whether the affected modeled habitat is actually occupied by side-flowering skullcap is not
42 known; however, none of the 12 known occurrences in the study area would be affected.
43 Tidal habitat restoration would remove 2 acres of modeled habitat for Delta tule pea and Suisun
44 Marsh aster. However, the BDCP would allow up to 50 acres of modeled habitat to be removed.

1 Habitat loss would result from conversion of the species habitat (at and immediately above the
2 tidal zone in marshes and along rivers and streams) to inundated tidal habitat. The extent to
3 which modeled habitat is actually occupied by the species is not known; however, 26 of 106
4 known occurrences of Delta tule pea and 24 of 164 occurrences of Suisun Marsh aster in the
5 study area would be affected.

6 Tidal habitat restoration could affect 73 acres of modeled habitat for soft bird's-beak and Suisun
7 thistle, including 1.3 acres of critical habitat. The extent to which modeled habitat is actually
8 occupied by the species is not known; however, seven of 13 known occurrences of soft bird's-
9 beak in the study area could be affected. None of the four known occurrences of Suisun thistle in
10 the study area would be affected.

11 Tidal habitat restoration could affect three of eight known occurrences of Bolander's water-
12 hemlock, a noncovered special-status species in the study area. Because Bolander's water-
13 hemlock occurs in tidal marsh, it may benefit from tidal marsh restoration. However, site
14 preparation, earthwork, and other site activities could adversely affect Bolander's water-
15 hemlock through direct habitat removal.

- 16 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
17 would remove 3 acres of modeled habitat for Mason's lilaepsis and delta mudwort and 2 acres
18 of modeled habitat for side-flowering skullcap. No known occurrences of these species in the
19 study area would be affected by floodplain restoration.

20 Floodplain restoration would result in more frequent and longer inundation of 2 acres of
21 modeled habitat for Mason's lilaepsis and delta mudwort, 18 acres of modeled habitat for side-
22 flowering skullcap, and 1 acre of modeled habitat for Delta tule peas and Suisun Marsh aster. No
23 known occurrences of these species in the study area would be affected by periodic inundation
24 of restored floodplain habitat. Habitat for these species is normally periodically inundated or
25 saturated; therefore, a small increase in the frequency and duration of periodic inundation of the
26 habitat would not be expected to have a substantial effect.

- 27 ● *CM6 Channel Margin Enhancement*: Effects of channel margin enhancement were not analyzed
28 separately from the effects of tidal habitat restoration. Channel margin enhancement would
29 have adverse effects on tidal wetland plants through direct removal and habitat modification.
30 However, it would have beneficial effects on these species by improving the habitat functions for
31 these species as a result of riprap removal and creation of floodplain benches. Side-flowering
32 skullcap would benefit from installation of large woody material, which it appears to colonize.
- 33 ● *CM7 Riparian Natural Community Restoration*: Riparian habitat restoration is not expected to
34 adversely affect special-status tidal wetland plants. Preparatory work that involves habitat
35 disturbance would occur during implementation of CM4 and CM5. Riparian plantings carried out
36 for CM7 would be placed in floodplain areas, not in tidal wetlands.
- 37 ● *CM8 Grassland Natural Community Restoration*: No tidal wetlands or occurrences of special-
38 status tidal wetland plants are present within areas proposed for grassland communities
39 restoration. Therefore, grassland communities restoration would have no impacts on covered
40 and noncovered tidal wetland plants.
- 41 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No tidal wetlands or
42 occurrences of special-status tidal wetland plants are present within areas proposed for vernal
43 pool complex restoration. Therefore, vernal pool complex restoration would have no impacts on
44 covered and noncovered tidal wetland plants.

- 1 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
2 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid tidal wetland
3 habitat and would have no impacts on covered and noncovered tidal wetland plants.
- 4 • *Avoidance and Minimization Measures*: Effects on covered tidal wetland plants potentially
5 resulting from implementation of CM1, CM2, CM4, and CM5 would be avoided or minimized
6 though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*
7 *Monitoring*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37 Recreation*.
8 Under AMM11, surveys for covered plant species would be performed during the planning
9 phase of projects, and any impacts on populations of covered species would be avoided through
10 project design or subsequently minimized through AMM2. In addition, AMM11 contains specific
11 guidance to avoid adverse modification of any of the primary constituent elements for Suisun
12 thistle or soft bird's-beak critical habitat. AMM30, which specifies that the alignment of
13 proposed transmission lines will be designed to avoid sensitive terrestrial and aquatic habitats
14 when siting poles and towers, to the maximum extent feasible, would avoid some impacts on
15 Mason's lilaepsis and woolly rose-mallow. AMM37 requires that new recreation trails avoid
16 populations of covered tidal wetland plants. BDCP Appendix 3.C describes the AMMs, which
17 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
18 *AMMs, and CMs*, of the Final EIR/EIS.

19 In summary, the GIS analysis indicates that Alternative 1A would result in the loss of modeled
20 habitat for all of the covered species and result in adverse effects on known occurrences of most of
21 the special-status plants occurring in tidal wetlands. However, the BDCP predicts that habitat
22 restoration activities would greatly expand the amount of habitat available to each of these species,
23 offsetting any potential loss of habitat or occurrences resulting from covered activities.

24 Delta mudwort could lose 48 acres of modeled habitat (0.8%), including all or part of three
25 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
26 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
27 colonization by Delta mudwort, which could offset this habitat loss. Channel margin enhancement
28 (CM6) and riparian natural community restoration (CM7) will also consider the potential for
29 creating habitat for Delta mudwort; creation of suitable habitat under these measures could also
30 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP
31 predicts that natural expansion of populations into the restored habitat would take place and result
32 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation
33 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that
34 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

35 Mason's lilaepsis could lose 48 acres of modeled habitat (0.8%), including all or part of 23
36 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
37 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
38 colonization by Mason's lilaepsis, which could offset this habitat loss. Channel margin enhancement
39 (CM6) and riparian natural community restoration (CM7) will also consider the potential for
40 creating habitat for Mason's lilaepsis; creation of suitable habitat under these measures could also
41 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP
42 predicts that natural expansion of populations into the restored habitat would take place and result
43 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation
44 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that
45 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

1 Delta tule pea could lose 3 acres of modeled habitat (0.05%), including all or part of 26 occurrences.
2 The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives
3 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by
4 Delta tule pea, which could offset this habitat loss. Channel margin enhancement (CM6) and riparian
5 natural community restoration (CM7) will also consider the potential for creating habitat for Delta
6 tule pea; creation of suitable habitat under these measures could also help offset this habitat loss.
7 Although active restoration of this species is not proposed, the BDCP predicts that natural expansion
8 of populations into the restored habitat would take place and result in no net loss of occurrences
9 (Objective DTP/SMA1.1, associated with CM11). Post-implementation monitoring of affected
10 occurrences and occurrences in reserve lands would be done to confirm that no net loss of
11 occurrences has been achieved (Monitoring Action CM11–22, associated with CM11).

12 Suisun Marsh aster could lose 3 acres of modeled habitat (0.05%), including all or part of 26
13 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
14 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
15 colonization by Suisun Marsh aster, which could offset this habitat loss. Channel margin
16 enhancement (CM6) and riparian natural community restoration (CM7) will also consider the
17 potential for creating habitat for Suisun marsh aster; creation of suitable habitat under these
18 measures could also help offset this habitat loss. Although active restoration of this species is not
19 proposed, the BDCP predicts that natural expansion of populations into the restored habitat would
20 occur and result in no net loss of occurrences (Objective DTP/SMA1.1, associated with CM11). Post-
21 implementation monitoring of affected occurrences and occurrences in reserve lands would be done
22 to confirm that no net loss of occurrences has been achieved (Monitoring Action CM11-22,
23 associated with CM11).

24 All four of these species (Delta mudwort, Mason’s lilaepsis, Delta tule pea, and Suisun Marsh aster)
25 are widespread in the study area with many occurrences. Habitat modification and loss are the
26 primary stressors that are responsible for their decline and that currently limit their distribution
27 and abundance. Therefore, restoring large areas of habitat and improving habitat functions for these
28 species would provide a reasonable expectation that the distribution and abundance of these
29 species would also improve. Because a relatively small amount of modeled habitat would be
30 adversely affected (less than 1% of the total), it is likely that the initial adverse effects of covered
31 activities on these species would be offset and that the overall effect of Alternative 1A on these
32 species would not be adverse.

33 Side-flowering skullcap could lose 10 acres of modeled habitat (0.4%), but no occurrences would be
34 affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives
35 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by
36 side-flowering skullcap, which could offset this habitat loss. Channel margin enhancement (CM6)
37 and riparian natural community restoration (CM7) will also consider the potential for creating
38 habitat for side-flowering skullcap; creation of suitable habitat under these measures could also help
39 offset this habitat loss. No active restoration of this species is proposed, and no post-implementation
40 monitoring of affected occurrences and occurrences in reserve lands would be done. Because loss of
41 modeled habitat for the species would be offset through restoration, the overall effect of Alternative
42 1A on this species would not be adverse.

43 Soft bird’s-beak could lose 73 acres of modeled habitat (6%), including all or part of seven
44 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
45 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for

1 colonization by soft bird's-beak, which could offset this habitat loss. Tidal restoration in the Hill
 2 Slough Ecological Reserve would be done to increase potential habitat there for soft bird's-beak
 3 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and
 4 manage livestock in tidal marsh habitat under CM11 could enhance habitat for soft bird's-beak.
 5 Although no active restoration of this species is proposed, post-implementation monitoring of soft
 6 bird's-beak occurrences in proximity to tidal restoration sites would be done to confirm that
 7 occurrences are stable or increasing (Monitoring Action CM11-22, associated with CM11). Soft
 8 bird's-beak has a restricted distribution in the study area with highly localized occurrences, and
 9 habitat modification is the primary factor responsible for the species' decline and limiting the
 10 species' distribution and abundance. Improving habitat functions for this species would provide a
 11 reasonable expectation that the distribution and abundance of soft bird's-beak would also improve.
 12 Although a substantial amount of modeled habitat could be affected, the primary habitat for soft
 13 bird's-beak is high tidal brackish marsh, and the affected habitat is low tidal brackish marsh.
 14 Therefore, it is likely that the overall effect of Alternative 1A on this species would not be adverse.

15 Suisun thistle could lose 73 acres of modeled habitat (6%), although no occurrences would be
 16 affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives
 17 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by
 18 Suisun thistle, which could offset this habitat loss. Tidal restoration in the Hill Slough Ecological
 19 Reserve and at Rush Ranch would be done to increase potential habitat there for Suisun thistle
 20 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and
 21 manage livestock in tidal marsh habitat under CM11 could enhance habitat for Suisun thistle. In
 22 addition, two new occurrences of Suisun thistle would be established in CZ 11 (Objective
 23 SBB/SuT1.4, associated with CM11). Post-implementation monitoring of Suisun thistle occurrences
 24 in proximity to tidal restoration sites would be done to confirm that occurrences are stable or
 25 increasing (Monitoring Action CM11-22, associated with CM11). Habitat restoration, enhancement
 26 of habitat functions, and establishment of new occurrences would offset any potential loss of
 27 modeled habitat for Suisun Marsh thistle.

28 Three occurrences of Bolander's water-hemlock could be affected. Although the extent of potential
 29 habitat affected was not determined, it would be comparable to that for Delta tule pea and Suisun
 30 Marsh aster (5 acres). Tidal habitat restoration activities proposed under CM4 (Objectives
 31 TBEWNC1.1 and TFEWNC1.1) could increase the extent of habitat available for colonization by
 32 Bolander's water-hemlock, which could offset this habitat loss. Because only a few scattered
 33 occurrences of Bolander's water-hemlock are present in the study area, there is no reasonable
 34 expectation that habitat restoration without active species-specific restoration activities would
 35 result in the establishment of new occurrences to offset the losses. Also, because Bolander's water-
 36 hemlock is a noncovered species, the species protections and occurrence monitoring afforded to
 37 covered species under the BDCP would not apply to this species. Therefore, the effects of Alternative
 38 1A on Bolander's water hemlock could be adverse.

39 **NEPA Effects:** The loss of modeled and occupied habitat for special-status tidal wetland plants
 40 would be offset through tidal habitat restoration (CM4). Therefore, implementation of Alternative
 41 1A would result in no adverse effects on seven of eight special-status grassland plants in the study
 42 area. Alternative 1A would result in a reduction in the range and numbers of Bolander's water-
 43 hemlock, which would be an adverse effect. Adverse effects on Bolander's water-hemlock could be
 44 avoided or offset through implementation of Mitigation Measure BIO-170.

CEQA Conclusion: Because loss of occurrences and modeled habitat for covered tidal habitat plant species would be offset through habitat restoration, impacts on covered tidal wetland plants as a result of implementing Alternative 1A would not be significant. However, the loss of Bolander’s water-hemlock populations in CZ 11 would result in a reduction in the range and numbers of this species and would be a significant impact. Implementation of Mitigation Measure BIO-170 would reduce this impact to a less-than-significant level.

Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered Special-Status Plant Species

Please see Mitigation Measure BIO-170 under Impact BIO-170.

Inland Dune Plants

Five special-status plants occur in inland dune habitat in the study area. None of the species is covered under the BDCP, and no habitat models were prepared for inland dune habitat. Table 12-1A-67 summarizes the acreage of inland dune habitat in the study area and the number of occurrences of each special-status inland dune plant in the study area.

Table 12-1A-67. Summary of Impacts on Inland Dune Plants under Alternative 1A

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Inland Dunes	19	0	0	0	None
Noncovered Species					
Hoover’s cryptantha	0	0	1	0	None
Antioch Dunes buckwheat	0	0	1	0	None
Mt. Diablo buckwheat	0	0	1	0	None
Contra Costa wallflower	0	0	3	0	None
Antioch Dunes evening-primrose	0	0	9	0	None

Impact BIO-174: Effects on Habitat and Populations of Inland Dune Plants

Alternative 1A, would have no adverse effects on inland dune plants (Table 12-1A-67). No construction activities or habitat restoration would take place where the species occur. No specific actions to benefit inland dune species are proposed.

NEPA Effects: Implementing the BDCP under Alternative 1A would not affect special-status inland dune plant species.

CEQA Conclusion: Because the BDCP would not affect inland dune habitat, implementation of Alternative 1A would have no impacts on inland dune species. No mitigation is required.

Nontidal Wetland Plants

No covered plant species occur in nontidal wetlands in the study area; however, six noncovered special-status plant species occur in nontidal wetlands in the study area. Table 12-1A-68

1 summarizes the acreage of nontidal wetland habitat in the study area and the number of
2 occurrences of each special-status nontidal wetland plant in the study area.

3 **Table 12-1A-68. Summary of Impacts on Nontidal Wetland Plants under Alternative 1A**

	Acres in Study Area	Acres affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Nontidal perennial aquatic	5,567	290	0	0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Nontidal freshwater perennial emergent wetland	1,509	128	0	0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass Fisheries enhancements, and floodplain restoration
Noncovered Species					
Watershield	0	0	3	1	Loss of habitat from construction of water conveyance facilities
Bristly sedge	0	0	18	2	Loss of habitat from construction of water conveyance facilities
Woolly rose-mallow ^a	0	0	121	13	Loss of habitat from construction of water conveyance facilities and tidal habitat restoration
Eel grass pondweed	0	0	1	0	None
Sanford's arrowhead	0	0	23	2	Loss of habitat from construction of water conveyance facilities and tidal habitat restoration
Marsh skullcap ^a	0	0	5	0	None

^a Also occurs in valley/foothill riparian habitat.

4

5 **Impact BIO-175: Effects on Habitat and Populations of Nontidal Wetland Plants**

6 Under Alternative 1A, known occurrences watershield, bristly sedge, woolly rose-mallow, and
7 Sanford's arrowhead are within the proposed footprint for the water conveyance facilities or within
8 the hypothetical footprint for restoration activities and would be adversely affected. Alternative 1A
9 would have no adverse effects on eel-grass pondweed or marsh skullcap.

10 The individual effects of each relevant conservation measure are addressed below. A summary
11 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
12 conservation measure discussions.

- 1 ● *CM1 Water Facilities and Operations*: Construction of the Alternative 1A water conveyance
2 facilities would adversely affect four noncovered special-status plants occurring in nontidal
3 wetlands. One of three watershield occurrences in CZ 5 on Bouldin Island could be affected by
4 construction of the water conveyance facilities. This is a historical occurrence that has not been
5 observed since 1893, and it may be extirpated (California Department of Fish and Wildlife
6 2013). Two occurrences of bristly sedge in CZ 4 and CZ 5, including approximately 1.54 acres of
7 occupied habitat, would be affected by construction of the water conveyance facilities. Twelve
8 occurrences of woolly rose-mallow would be affected. Three occurrences in CZ 3 would be
9 removed during construction of the intake facilities, and five occurrences in CZ 6 and one
10 occurrence in CZ 8 would be affected by construction of other facilities. Construction of the
11 water conveyance facilities would remove occupied habitat at one occurrence of Sanford's
12 arrowhead in CZ 5.
- 13 ● *CM2 Yolo Bypass Fisheries Enhancement*: No known occurrences of special-status nontidal
14 wetland plants are present in the hypothetical footprint for construction or operation of the
15 Yolo Bypass fisheries enhancements. Therefore, construction and operation of the Yolo Bypass
16 fisheries enhancements would not affect special-status nontidal marsh plants.
- 17 ● *CM3 Natural Communities Protection and Restoration*: No specific natural communities
18 protection is proposed for nontidal wetlands under the BDCP. Therefore, no occurrences of
19 special-status nontidal plants are proposed for protection.
- 20 ● *CM4 Tidal Natural Communities Restoration*: One known occurrence of Sanford's arrowhead and
21 one occurrence of woolly rose mallow in CZ 7 are present within areas that could be affected by
22 tidal habitat restoration. Therefore, tidal habitat restoration could have an adverse effect on
23 these two species. No other known occurrences of special-status nontidal wetland plants are
24 present within areas proposed for tidal habitat restoration.
- 25 ● *CM5 Seasonally Inundated Floodplain Restoration*: No known occurrences of special-status
26 nontidal wetland plants are present within areas proposed for floodplain restoration. Therefore,
27 floodplain restoration and construction of new floodplain levees would have no impacts on
28 special-status nontidal wetland plants.
- 29 ● *CM6 Channel Margin Enhancement*: No known occurrences of special-status nontidal wetland
30 plants are present within areas proposed for channel margin habitat enhancement. Therefore,
31 channel margin habitat enhancement would have no impacts on special-status nontidal wetland
32 plants.
- 33 ● *CM7 Riparian Natural Community Restoration*: No known occurrences of special-status nontidal
34 wetland plants are present within areas proposed for riparian habitat restoration. Therefore,
35 riparian habitat restoration would have no impacts on special-status nontidal wetland plants.
- 36 ● *CM8 Grassland Natural Community Restoration*: No known occurrences of special-status nontidal
37 wetland plants are present within areas proposed for grassland communities restoration.
38 Therefore, grassland communities restoration would have no impacts on special-status nontidal
39 wetland plants.
- 40 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No known occurrences of
41 special-status nontidal wetland plants are present within areas proposed for vernal pool and
42 alkali seasonal wetland complex restoration. Therefore, vernal pool complex restoration would
43 have no impacts on special-status nontidal wetland plants.

- 1 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
2 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid existing
3 nontidal marsh and would have no adverse effects on special-status nontidal wetland plants.
4 The BDCP may benefit nontidal wetland species by creating 400 acres of nontidal freshwater
5 marsh, including components of nontidal perennial aquatic and nontidal freshwater perennial
6 emergent wetland communities, and by maintaining and enhancing the habitat functions of
7 protected and created nontidal wetland habitats for covered and other native species. However,
8 no specific actions to benefit noncovered species are proposed.

9 Under Alternative 1A, 1,500 acres of nontidal marsh would be restored (Objective
10 NFEW/NPANC1.1, addressed under CM10). However, these wetlands would be restored primarily
11 as habitat for giant garter snake. These habitat restoration activities would be unlikely to expand the
12 amount of habitat available to watershield, bristly sedge, woolly rose-mallow, and Sanford's
13 arrowhead, potential loss of habitat or occurrences resulting from covered activities would not be
14 compensated for. Moreover, because special-status nontidal wetland plant species are not covered
15 under the BDCP, the species protections afforded to covered species under the AMMs do not apply
16 to these species, and the effects of Alternative 1A on these species would be adverse.

17 **NEPA Effects:** Implementation of the BDCP under Alternative 1A could result in a reduction in the
18 range and numbers of watershield, bristly sedge, woolly rose-mallow, and Sanford's arrowhead, four
19 noncovered nontidal wetland species, which would be an adverse effect. Adverse effects on these
20 species could be avoided or offset through implementation of Mitigation Measure BIO-170.

21 **CEQA Conclusion:** Under Alternative 1A, construction of the water conveyance facilities could result
22 in a reduction in the range and numbers of watershield, bristly sedge, woolly rose-mallow, and
23 Sanford's arrowhead. Tidal habitat restoration could result in a reduction in the range and numbers
24 of Sanford's arrowhead. These impacts would be significant. Implementation of Mitigation Measure
25 BIO-170 would reduce these impacts to a less-than-significant level.

26 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered** 27 **Special-Status Plant Species**

28 Please see Mitigation Measure BIO-170 under Impact BIO-170.

29 **General Terrestrial Biology Effects**

30 **Wetlands and Other Waters of the United States**

31 Alternative 1A actions would both permanently and temporarily remove or convert wetlands and
32 open water that are regulated by USACE under Section 404 of the CWA. The Section 404 regulations
33 and relevant information regarding mitigation of impacts on wetlands and waters of the United
34 States are described in Section 12.2.1.1. The following two impacts address the project-level effects
35 of CM1 on these potential wetlands and waters, and the programmatic-level effects of other relevant
36 conservation actions (CM2–CM10). CM11–CM21 would not directly result in loss or conversion of
37 wetlands or other waters of the United States. The methods used to conduct these analyses are
38 described in Section 12.3.2.4, *Methods Used to Assess Wetlands and Other Waters of the United States*.
39 The waters of the United States data used for this analysis is based on a verified wetland delineation
40 from USACE that was completed in early 2015. These waters of the United States were mapped at
41 finer scale than that which was done for the natural community mapping for the BDCP; therefore,
42 the acreages of these two datasets differ. The waters of the United States mapping identified

1 numerous agricultural ditches and seasonal wetlands occurring within and associated with
2 cultivated lands, which explains the majority of the difference.

3 **Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and**
4 **Other Waters of the United States**

5 Alternative 1A proposes the construction, maintenance, and operation of water conveyance facilities
6 within, or requiring the unavoidable fill of, waters of the United States. The estimated fill of
7 jurisdictional waters associated with this alternative is described in Table 12-1A-69. Based on the
8 methodology used to conduct this analysis, the losses would occur at intake, tunnel, pipeline, canal,
9 and RTM and borrow/spoil storage sites, transmission corridors, and multiple temporary work
10 areas associated with the construction activity. The permanent open water and wetland losses
11 would occur at various locations along the pipeline/tunnel alignment, but the majority would occur
12 due to construction of Alternative 1A's five intake structures along the eastern bank of the
13 Sacramento River between Freeport and Courtland in the north Delta (including associated
14 spoil/borrow areas), construction of forebays in both the north and south Delta areas, and the RTM
15 storage sites associated with tunnel construction at various locations, including on Andrus, Tyler,
16 Venice and Bacon Islands. However, through implementation of an environmental commitment to
17 reuse RTM or dispose of it at appropriate facilities, as described in Appendix 3B, *Environmental*
18 *Commitments, AMMs, and CMs*, it is anticipated that the material would be removed from these areas
19 and applied, as appropriate, as bulking material for levee maintenance or as fill material for habitat
20 restoration projects, or would be put to other beneficial means of reuse identified for the material.
21 The temporary open water and wetland effects would also occur mainly at the five intake
22 construction sites along the eastern bank of the Sacramento River, and at barge unloading facilities
23 in the San Joaquin and Middle Rivers.

24 **Table 12-1A-69. Estimated Fill of Waters of the United States Associated with the Construction of**
25 **Water Conveyance Facilities under Alternative 1A (acres)**

Wetland/Water Type	Permanent Impact	Temporary Impacts Treated as Permanent ^a	Temporary Impact	Total Impact
Agricultural Ditch	64.9	23.4	0	88.4
Alkaline Wetland	0.10	0	0	0.1
Clifton Court Forebay	1.0	0	0	1.0
Conveyance Channel	12.7	1.1	0	13.8
Depression	1.9	1.8	0	3.7
Emergent Wetland	46.8	7.3	0	54.0
Forest	5.8	11.9	0	17.7
Lake	0	0.3	0	0.3
Scrub-Shrub	20.6	4.3	0	24.9
Seasonal Wetland	18.7	26.6	0	45.4
Tidal Channel	42.9	133.8	0	176.7
Vernal Pool	0	0	0	0
Total	215	211	0	426

^a Temporary impacts treated as permanent are temporary impacts expected to last over one year. These impact sites will eventually be restored to pre-project conditions; however, due to the duration of effect, compensatory mitigation will be included for these areas.

26

1 The majority of the impacts on wetlands and waters of United States are on tidal channels, emergent
2 wetlands, and wetlands and waters found within cultivated lands (agricultural ditches and seasonal
3 wetlands). These impacts would mostly result from the construction of the barge unloading
4 facilities, intake work areas, shaft locations, and transmission lines. The impacted seasonal wetlands
5 mapped within the Conveyance Planning Area, as described in Section 12.3.2.4, *Methods Used to*
6 *Assess Wetlands and Other Waters of the United States*, all occur in the central Delta within plowed
7 agricultural fields.

8 Unavoidable impacts on waters of the United States would be offset such that the loss of acreage and
9 functions due to construction activities are fully compensated. Wetland functions are defined as a
10 process or series of processes that take place within a wetland. These include the storage of water,
11 transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have
12 value for the wetland itself, for surrounding ecosystems, and for people. Functions can be grouped
13 broadly as habitat, hydrologic/hydraulic, or water quality. Not all wetlands perform all functions nor
14 do they perform all functions equally well. The location and size of a wetland may determine what
15 functions it will perform. For example, the geographic location may determine its habitat functions,
16 and the location of a wetland within a watershed may determine its hydrologic/hydraulic or water-
17 quality functions. Many factors determine how well a wetland will perform these functions: climatic
18 conditions, quantity and quality of water entering the wetland, and disturbances or alteration within
19 the wetland or the surrounding ecosystem. Wetland disturbances may be the result of natural
20 conditions, such as an extended drought, or human activities, such as land clearing, dredging, or the
21 introduction of nonnative species. Wetlands are among the most productive habitats in the world,
22 providing food, water, and shelter for fish, shellfish, birds, and mammals, and serving as a breeding
23 ground and nursery for numerous species. Many endangered plant and animal species are
24 dependent on wetland habitats for their survival. Hydrologic and hydraulic functions are those
25 related to the quantity of water that enters, is stored in, or leaves a wetland. These functions include
26 such factors as the reduction of flow velocity, the role of wetlands as ground-water recharge or
27 discharge areas, and the influence of wetlands on atmospheric processes. Water-quality functions
28 include the trapping of sediment, pollution control, and the biochemical processes that take place as
29 water enters, is stored in, or leaves a wetland.

30 The functions of the waters of the United States that would be temporarily or permanently impacted
31 by this alternative vary greatly depending primarily on existing land uses and historical levels of
32 disturbance. Generally, agricultural ditches and conveyance channels, which are regularly
33 maintained and often devoid of vegetation, support only minimal hydraulic function (water
34 conveyance), with virtually no water quality or habitat function. With respect to Clifton Court
35 Forebay, the facility is regularly maintained, but supports some hydrologic, hydraulic, and water
36 quality functions (e.g., reduction of velocity, groundwater recharge, and trapping of sediment). Tidal
37 channels affected by this alternative support functions in all three categories, but the level at which
38 these functions perform vary depending on setting, size, and level of disturbance. The alkaline
39 wetlands and vernal pools exist in non-native grasslands and have been subjected to some
40 disturbance due to past land uses. Although these features likely support habitat, water quality, and
41 hydrologic/hydraulic functions, the capacity of these features to perform such functions vary
42 depending on the overall ecological setting and level of disturbance. Functions associated with
43 emergent wetland, forest, and scrub-shrub, depend primarily on the location of these habitat types.
44 Where they exist as in-stream (in-channel islands) or as the thick band of habitat adjacent to a
45 waterway, these features are expected to function at a high level. However, where these habitats
46 exist as thin bands, or where they are situated in agricultural fields, their habitat functions will be

1 considerably lower. All of the wetlands classified as seasonal wetlands occur in agricultural fields. As
2 such, their habitat functions have been greatly compromised, but they retain some water quality and
3 hydrologic/hydraulic function. Like seasonal wetlands, most depressions occur within agricultural
4 areas; however the depressions may support wetland vegetation at their edges. The areas mapped
5 as lake are the dredged borrow ponds created during the construction of Interstate 5. Although
6 relatively small, each lake is likely performing functions from all three categories.

7 A functional assessment of wetlands proposed for fill will be conducted during the development of
8 the Conceptual Mitigation Plan as part of the CWA permitting process. The results of this assessment
9 will be compared with the expected functions at the proposed mitigation site(s) such that it can be
10 confirmed that the compensatory mitigation will in fact accomplish full functional replacement of
11 impacted wetlands. All impacted wetlands would be replaced with fully functional compensatory
12 wetland habitat demonstrating high levels of habitat, water quality, and hydrologic/hydraulic
13 function. Because many impacted wetlands are significantly less than high function, the
14 compensatory mitigation would result in a net increase in wetland function.

15 Alternative 1A was designed to avoid waters of the United States to the maximum extent practicable.
16 Each of the conveyance components has been located in upland areas where it was feasible to do so.
17 Once construction begins, specific measures would be implemented, as described in the AMMs set
18 out in BDCP Appendix 3.C and Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the
19 Final EIR/EIS, to further avoid and minimize effects on waters of the United States as well as on
20 special-status species. The AMMs would be implemented at all phases of a project, from siting
21 through design, construction, and on to operations and maintenance. The AMMs that pertain
22 specifically to waters of the United States are *AMM1 Worker Awareness Training, AMM2 Construction*
23 *Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4*
24 *Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan,*
25 *AMM6 Disposal and Reuse of Spoils, Barge Operations Plan, AMM10 Restoration of Temporarily*
26 *Affected Natural Communities, AMM12 Vernal Pool Crustaceans, AMM30 Transmission Line Design and*
27 *Alignment Guidelines, AMM34 Construction Site Security, and AMM36 Notification of Activities in*
28 *Waterways.*

29 The implementation of measures to avoid and minimize impacts on habitat for aquatic species and
30 species which utilize aquatic habitats, such as California tiger salamander, giant garter snake,
31 California red legged frog, western pond turtle, riparian woodrat, and riparian brush rabbit, would
32 also result in further avoidance and minimization of effects to waters of the United States.

33 Aside from wetland habitats that would be created as a result of implementing CM4-CM10, some of
34 which could serve the dual purpose of offsetting effects on species and mitigating impacts on waters
35 of the United States, more specific mitigation is required to ensure that there is no net loss of
36 wetland functions and values as a result of implementing Alternative 1A pursuant to USACE's and
37 the Environmental Protection Agency's Mitigation Rule (see Section 12.2.1.1, *Sections 404 and 401 of*
38 *the Clean Water Act*). Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters of the*
39 *U.S.* would be available to address adverse impacts on waters of the United States.

40 **NEPA Effects:** The permanent and temporary loss of these jurisdictional wetlands and waters as a
41 result of constructing Alternative 1A water conveyance facilities would be a substantial effect if not
42 compensated by wetland protection and/or restoration. This loss would represent a removal of
43 federally protected wetlands as defined by Section 404 of the CWA. Impacts on wetlands from CM1
44 construction would occur in the first 10 years after BDCP approval. Project proponents under

1 Alternative 1A would also implement AMM1–AMM7, AMM10, AMM12, AMM30, AMM34, and
2 AMM36, which would avoid and minimize fill of wetlands and waters and any indirect effects to
3 wetlands and waters. However, specific mitigation would be required to ensure that Alternative 1A
4 does not result in a loss of functions and values of waters of the United States and thus that the affect
5 is not adverse. Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters of the United*
6 *States*, would be available to reduce these effects such that they are not adverse.

7 **CEQA Conclusion:** The permanent and temporary loss of these jurisdictional wetlands and waters of
8 the United States as a result of constructing Alternative 1A water conveyance facilities would be a
9 significant impact. Specific mitigation would be required to ensure that Alternative 1A does not
10 result in a loss of functions and values of waters of the United States. Mitigation Measure BIO-176,
11 *Compensatory Mitigation for Fill of Waters of the United States*, would be available to reduce the
12 impact to a less-than-significant level. Alternative 1A does propose to restore up to 76,721 acres of
13 wetland natural communities under the Plan, which would include 65,000 acres of tidal marsh
14 restoration (CM4), 10,000 acres of seasonally inundated floodplain restoration (CM5), 21 acres of
15 vernal pool/alkali seasonal wetlands (CM9; 67 acres of vernal pool complex and 72 acres of alkali
16 seasonal wetland complex assuming a wetland density of 15%), and 1,700 acres of nontidal marsh
17 restoration (CM10). In addition, Alternative 1A would restore 5,000 acres of riparian habitat (CM7),
18 some portion of which may also qualify as forested or scrub-shrub wetland. In addition, 20 miles of
19 levees will have channel margin enhancement conducted on them (CM6), which would include
20 improving channel geometry and restoring riparian, marsh, and mudflat habitats on the water side
21 of levees.

22 The success in implementing these Conservation Measures would be assured through effectiveness
23 monitoring, which includes success criteria, and adaptive management as outlined in the *Adaptive*
24 *Management and Monitoring* sections of the BDCP for tidal marsh restoration (BDCP Chapter 3,
25 Section 3.4.4.4), seasonal floodplain restoration (BDCP Section 3.4.5.4), channel margin
26 enhancement (BDCP Section 3.4.6.4), valley/foothill riparian restoration (BDCP Section 3.4.7.4),
27 vernal pool and alkali seasonal wetland complex restoration (BDCP Section 3.4.9.4), and nontidal
28 marsh restoration (BDCP Section 3.4.10.3). All restored areas will be secured in fee-title or through
29 conservation easements.

30 Alternative 1A would also result in the protection and management of the following natural
31 communities that contain wetlands: 750 acres of valley/foothill riparian, 600 acres of vernal pool
32 complex, 150 acres of alkali seasonal wetland complex, 8,100 acres of managed wetlands, and 50
33 acres of nontidal marsh. In addition, 8,000 acres of grasslands and 51,625 acres of cultivated lands
34 will be protected and managed, which would likely include areas of seasonal wetlands, ponds, and
35 agricultural ditches.

36 Project proponents under Alternative 1A would also implement AMM1–AMM7, AMM10, AMM12,
37 AMM30, AMM34, and AMM36, which would avoid and minimize fill of waters of the United States
38 and any indirect effects on wetlands and waters. As stated above, specific mitigation would be
39 required to ensure that Alternative 1A does not result in a loss of functions and values of waters of
40 the United States. Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters of the*
41 *United States*, would be available to reduce the impact to a less-than-significant level.

1 **Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United**
2 **States**

3 All mitigation proposed as compensatory mitigation would be subject to specific success criteria,
4 success monitoring, long-term preservation, and long-term maintenance and monitoring
5 pursuant to the requirements of the Mitigation Rule. All compensatory mitigation shall fully
6 replace lost function through the mechanisms discussed below which will result in restoration
7 and/or creation of habitat with at least as much function and value as those of the impacted
8 habitat. In some cases, the mitigation habitat will afford significantly higher function and value
9 than that of impacted habitat.

10 Compensation ratios are driven by type, condition, and location of replacement habitat as
11 compared to type, condition and location of impacted habitat. Compensatory mitigation usually
12 includes restoration, creation, or rehabilitation of aquatic habitat. The USACE does not typically
13 accept preservation as the only form of mitigation; use of preservation as mitigation typically
14 requires a very high ratio of replacement to impact. It is anticipated that ratios will be a
15 minimum of 1:1, depending on the factors listed above.

16 Compensatory mitigation will consist of restoration, creation, and/or rehabilitation of aquatic
17 habitat. Typically, impacted habitat will be replaced in-kind, although impacts on some habitat
18 types such as agricultural ditches, conveyance channels, and Clifton Court Forebay, will be
19 mitigated out-of-kind with higher functioning habitat types such as riparian wetland, marsh,
20 and/or seasonal wetland. Compensatory mitigation shall be accomplished by one, or a
21 combination of the following methods:

- 22 • Purchase credits for restored/created/rehabilitated habitat at an approved wetland
23 mitigation bank;
- 24 • On-site (adjacent to the project footprint) restoration or rehabilitation of wetlands
25 converted to uplands due to past land use activities (such as agriculture) or functionally
26 degraded by such activities;
- 27 • On-site (adjacent to the project footprint) creation of aquatic habitat;
- 28 • Off-site (within the Delta) restoration or rehabilitation of wetlands converted to uplands
29 due to past land use activities (such as agriculture) or functionally degraded by such
30 activities;
- 31 • Off-site (within the Delta) creation of aquatic habitat; and/or
- 32 • Payment into the Corps' Fee-in-Lieu program.

33 ***Purchase of Credits or Payment into Fee-in-Lieu Program***

34 It is envisioned that purchase of bank credits and/or payment into a fee-in-lieu program will be
35 utilized for habitat types that would be difficult to restore or create within the Delta. Examples
36 are vernal pool habitat, which requires an intact hardpan or other impervious layer and very
37 specific soil types, and alkali seasonal wetland, which requires a specific set of chemical soil
38 parameters. It is anticipated that only a small amount of compensatory mitigation will fall into
39 these categories.

1 ***On-Site Restoration, Rehabilitation and/or Creation***

2 Much of the Delta consists of degraded or converted habitat that is more or less functioning as
3 upland. Opportunities will be sought where on-site restoration, rehabilitation, and/or creation
4 could occur immediately adjacent to the project footprint. It is anticipated that some of the
5 compensatory mitigation will fall into this category.

6 ***Off-Site Restoration, Rehabilitation and/or Creation***

7 There exists, within the immediate vicinity of the project area, Delta land which has been subject
8 to agricultural practices or other land uses which have degraded or even converted wetlands
9 that existed historically. Sites within the Delta will be evaluated for their restoration,
10 rehabilitation, and/or creation potential. It is anticipated that most of the compensatory
11 mitigation will fall into this category.

12 Compensatory mitigation will result in no net loss of acreage of waters of the United States and
13 will accomplish full functional replacement of impacted wetlands. All impacted wetlands will be
14 replaced with fully functioning wetland habitat demonstrating high levels of habitat, water
15 quality, and hydrologic/hydraulic function. Since many impacted wetlands are likely to function
16 at significantly less than high levels, the compensatory mitigation will result in a significant net
17 increase in wetland function.

18 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on**
19 **Wetlands and Other Waters of the United States**

20 The habitat protection and restoration activities associated with Alternative 1A's other conservation
21 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and waters of
22 the United States in the study area over the course of BDCP conservation action implementation.
23 Because these conservation measures have not been defined to the level of site-specific footprints, it
24 is not possible to delineate and quantify these effects in detail. Several of the conservation measures
25 (CM2, CM4, and CM5) have been described with theoretical footprints for purposes of the effects
26 analysis contained in BDCP Chapter 5, *Effects Analysis*.

27 Because the wetland delineation was only conducted within the Conveyance Planning Area and not
28 the remainder of the Plan Area, the effects on potential wetlands and waters of the United States
29 from CM2-CM10 were analyzed by looking at effects on wetland natural communities mapped
30 within the theoretical footprints for CM2, CM4, and CM5 by assuming that 100% of the
31 predominantly wetland natural communities listed in Appendix 12E, *Detailed Accounting of Direct*
32 *Effects of Alternatives on Natural Communities and Covered Species*, and that 10% of all of the non-
33 wetland natural communities listed in that table would qualify as wetlands or other waters of the
34 United States under the CWA. Based on this approach approximately 19,850 acres of potentially
35 jurisdictional wetlands and waters could be affected by CM2-CM10. The majority of these impacts
36 are attributable to the conversion of 13,746 acres of managed wetland to tidal marsh under CM4,
37 which would likely result in an improvement of wetland function in the Plan Area.

38 ***NEPA Effects:*** The conversion of existing wetland natural communities to other types of wetland
39 natural communities through implementation of CM2–CM10 for Alternative 1A would be
40 approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open
41 water through implementation of CM4. Although the increase in wetland acreage and wetland
42 functions from these restoration actions could in part offset the effects on waters of the United

1 States in these areas, implementation of Mitigation Measure BIO-176, *Compensatory Mitigation for*
2 *Fill of Waters of the United States*, would be required to ensure that these effects are not adverse.

3 **CEQA Conclusion:** The conversion of existing wetland natural communities to other types of
4 wetland natural communities through implementation of CM2–CM10 for Alternative 1A would be
5 approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open
6 water through implementation of CM4. In total, up to 76,721 acres of wetland natural communities
7 would be restored under Alternative 1A. Although the increase in wetland acreage and wetland
8 functions from this restoration could in part offset the effects on waters of the United States in these
9 areas, implementation of Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters of*
10 *the United States*, would be required to ensure that the impacts are reduced to a less-than-significant
11 level.

12 **Shorebirds and Waterfowl**

13 Managed wetlands, tidal natural communities, and cultivated lands (including grain and hay crops,
14 pasture, field crops, rice, and idle lands) provide freshwater nesting, feeding, and resting habitat for
15 a large number of Pacific flyway waterfowl and shorebirds. The primary effects of concern for
16 shorebirds and waterfowl are related to the conversion of managed wetland and cultivated lands to
17 tidal marsh associated with habitat restoration. Ducks Unlimited (2013) conducted an analysis to
18 determine the effects of BDCP conservation measures on waterfowl, as well as to determine whether
19 BDCP actions would impede attainment of the goals established by the Central Valley Joint Venture
20 (CVJV) Implementation Plan for the Delta, Yolo, and Suisun Marsh drainage basins. The CVJV efforts
21 are guided by its 2006 Implementation Plan, which is founded on the principles of strategic habitat
22 conservation (Central Valley Joint Venture 2006). Those principles emphasize the establishment of
23 population abundance objectives and the use of species-habitat models to link population objectives
24 to habitat needs. The CVJV has used species-habitat models to translate bird abundance objectives
25 into habitat objectives, while explicitly identifying the biological assumptions that underpin these
26 models and the data used to populate them. As a result, the CVJV's biological planning provides a
27 framework for evaluating the effects of the BDCP on waterfowl.

28 The Ducks Unlimited waterfowl analysis focused primarily on dabbling ducks. Less than 5% of all
29 geese in the Central Valley occur in the Yolo, Delta, and Suisun Marsh drainage basins. Moreover,
30 geese in the Central Valley rely mostly on agricultural habitats to meet their food energy needs. The
31 BDCP's effect on agricultural habitats is limited to the Delta Basin where about 2500 acres of corn
32 now available to geese would be converted to other habitats (Ducks Unlimited 2013: Table 5). Food
33 supplies for geese would still be well in excess of demand even with the loss of these agricultural
34 habitats (Central Valley Joint Venture 2006, Ducks Unlimited 2013). The duck population objectives
35 used in the analysis were taken directly from the CVJV Plan. Dabbling duck species make up 92% of
36 this objective, while diving duck species make up the remaining 8%. Thus, the results were mostly
37 driven by dabbling duck needs and largely interpreted in the context of dabbling duck foraging
38 ecology. The 55,000 acres of Tidal Natural Communities Restoration (CM4) would be expected to
39 benefit diving ducks by providing deep water foraging habitat. Refer to the Ducks Unlimited Report
40 (Ducks Unlimited 2013) for details of the analysis and methods with respect to the TRUMET model
41 used to quantify effects on food biomass and food quality.

42 An analysis was conducted to determine the effects of the BDCP covered activities on wintering and
43 breeding shorebird habitat (ICF International 2013). This analysis evaluated the relative increase
44 and decrease in natural communities known to provide important foraging, roosting, and breeding

1 habitat. Similar to the waterfowl analysis, the results were broken up into the three Central Valley
2 Joint Venture Basins that overlap with the BDCP Plan Area: Yolo, Delta, and Suisun. Natural
3 community losses and gains were then translated into species-specific outcomes, comparing the
4 relative habitat value of each BDCP natural community for each Central Valley shorebird species
5 (Table 1, ICF International 2013). The shorebird species ranking system displayed in Table 1 (ICF
6 International 2013) was modified from a table in Stralberg et. al (2010). The table was created using
7 survey data and experts' species-specific habitat rankings. The survey data included fall, winter, and
8 spring density data. This resulted in an overall, cross-season representation of habitat requirements.

9 **Impact BIO-178: Loss or Conversion of Habitat for Waterfowl and Shorebirds as a Result of**
10 **Water Conveyance Facilities Construction**

11 Development of the water conveyance facilities (CM1) would result in the permanent removal of
12 approximately 3 acres of managed wetland, 6 acres of tidal wetlands, 13 acres of nontidal wetlands,
13 and 2,541 acres of suitable cultivated lands (including grain and hay crops, pasture, field crops, rice,
14 and idle lands). In addition, 83 acres of managed wetland, 6 acres of tidal wetlands, 10 acres of
15 nontidal wetlands, and 899 acres of cultivated lands would be temporarily impacted.

16 These losses of habitat would occur within the first 10 years of Alternative 1A implementation in the
17 Delta Basin. The BDCP has committed to the near-term protection of 15,400 acres of non-rice
18 cultivated lands, 200 acres of rice, and 700 acres of rice or "rice equivalent" natural communities
19 including nontidal wetlands in the near-term. In addition, 4,100 acres of managed wetlands would
20 be created, protected, and enhanced, 8,850 acres of freshwater tidal wetlands would be restored,
21 and 2,000 acres of tidal brackish emergent wetland would be restored (Table 3-4, Chapter 3).

22 Construction activities could have an adverse effect on nesting shorebirds or waterfowl if they were
23 present in or adjacent to work areas and could result in destruction of nests or disturbance of
24 nesting and foraging behaviors. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
25 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on
26 nesting birds.

27 **NEPA Effects:** Habitat loss from construction of the Alternative 1A water conveyance facilities would
28 not result in an adverse effect on shorebirds and waterfowl because of the acres of natural
29 communities and cultivated lands that would be restored and protected in the near-term timeframe.
30 If waterfowl were present in or adjacent to work areas, construction activities could result in
31 destruction of nests or disturbance of nesting and foraging behaviors, which would be an adverse
32 effect on nesting shorebirds and waterfowl. Mitigation Measure BIO-75, *Conduct Preconstruction*
33 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse
34 effects on nesting birds.

35 **CEQA Conclusion:** Habitat loss from construction of the Alternative 1A water conveyance facilities
36 would have a less-than-significant impact on shorebirds and waterfowl because of the acres of
37 natural communities and cultivated lands that would be restored and protected in the near-term
38 timeframe. If waterfowl were present in or adjacent to work areas, construction activities could
39 result in destruction of nests or disturbance of nesting and foraging behaviors, which would be a
40 significant impact. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
41 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact on nesting birds to a
42 less-than-significant level.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 See Mitigation Measure BIO-75 under Impact BIO-75.

4 **Impact BIO-179: Loss or Conversion of Habitat for Wintering Waterfowl as a Result of**
5 **Implementation of Conservation Components**

6 **Suisun Marsh:** Managed seasonal wetlands in Suisun Marsh would be reduced by an estimated
7 8,818 acres as a result of Alternative 1A implementation. This would represent a 25% decrease in
8 managed seasonal wetlands compared with long-term conditions without Alternative 1A (Ducks
9 Unlimited 2013, Table 5). There is considerable uncertainty about the biomass and nutritional
10 quality of waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult
11 to identify the amount of mitigation needed. To address this uncertainty, three levels of food
12 biomass and three levels of nutritional quality were modeled for these existing habitats (Ducks
13 Unlimited 2013, Table 7). Three mitigation scenarios based on these energetic assumptions of
14 biomass and food quality were then run to determine a minimum acreage of managed seasonal
15 wetlands to be protected and enhanced to compensate for the loss of productivity resulting from
16 habitat conversion to tidal wetlands.

- 17 ● Scenario 1) Assume that existing managed seasonal wetlands provide low food biomass and low
18 food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh produce
19 50% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds
20 have 60% of the metabolizable energy of seeds produced outside of Suisun Marsh. Given the
21 assumption that managed seasonal wetlands in Suisun could be enhanced to provide high food
22 biomass and high food quality (equal to wetlands in the Central Valley), 5,000 acres of managed
23 wetlands protected and managed for high biomass and high food quality would mitigate the
24 conversion of 8,857 acres of managed seasonal wetland to tidal marsh.
- 25 ● Scenario 2) Assume that the managed seasonal wetlands lost provide medium food biomass and
26 medium food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh
27 produce 75% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and
28 these seeds have 80% of the metabolizable energy of seeds produced outside of Suisun Marsh.
29 Given the assumption that managed seasonal wetlands in Suisun Marsh could be enhanced to
30 provide high food biomass and high food quality (equal to wetlands in the Central Valley),
31 13,300 acres of managed wetlands protected and managed for high biomass and high food
32 quality would mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal
33 marsh.
- 34 ● Scenario 3) Assume that existing managed seasonal wetlands provide low food biomass and low
35 food quality. Given the assumption that managed seasonal wetlands in Suisun Marsh could only
36 be enhanced to provide medium food biomass and medium food quality (produce 75% of the
37 seed biomass of seasonal wetlands elsewhere in the Central Valley, with these seeds having 80%
38 of the metabolizable energy of seeds produced outside of Suisun Marsh), 8,800 acres of
39 managed wetlands protected and managed for medium biomass and medium food quality would
40 mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal marsh.

41 The BDCP has committed to protecting and enhancing a minimum of 5,000 acres of managed
42 seasonal wetlands in Suisun Marsh to compensate for the loss of productivity from habitat
43 conversion to tidal marsh. This minimum commitment of 5,000 acres would mitigate the reduced

1 productivity resulting from conversion of managed seasonal wetlands under the assumptions that
2 1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-
3 quality food to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce
4 high biomass and high food quality. However, the food biomass and productivity in Suisun Marsh
5 would need to be quantified in order to determine if the 5,000 acres was sufficient to avoid an
6 adverse effect on wintering waterfowl in the Suisun Marsh, or if additional mitigation would be
7 needed. Mitigation Measure BIO-179a, *Conduct Food Studies and Monitoring for Wintering Waterfowl*
8 *in Suisun Marsh*, would be available to address this effect.

9 **Yolo and Delta Basins:** The replacement of 1,400 acres of managed seasonal wetland with 19,000
10 acres of palustrine tidal wetlands in the Delta watershed, and the replacement of 600 acres of
11 managed seasonal wetlands with 2,000 acres of palustrine tidal wetlands in the Yolo watershed
12 would not be expected to have an adverse effect on food productivity, under the assumption that
13 these wetlands would provide adequate food sources. However, a monitoring component and a food
14 study in these tidal habitats would be necessary in order to demonstrate that there would be a less
15 than significant loss of food value in these habitats for wintering waterfowl. If it is determined from
16 monitoring that there in fact would be a significant loss in food productivity resulting from habitat
17 conversion to tidal wetlands, the protection and enhancement of managed wetlands in these
18 watersheds would require mitigation for the change in food biomass and quality. Mitigation
19 Measure *BIO-179b, Conduct Food Studies and Monitoring to Demonstrate Food Quality of Palustrine*
20 *Tidal Wetlands in the Yolo and Delta Basins*, would be available to address this uncertainty.

21 **NEPA Effects:** There is considerable uncertainty about the biomass and nutritional quality of
22 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify
23 the level of effect that Alternative 1A habitat loss or conversion would have. The BDCP has
24 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in
25 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal
26 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.
27 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced
28 productivity from conversion of managed seasonal wetlands under the assumptions that 1) existing
29 managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food
30 to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high
31 biomass and high-quality food. However, the food biomass and productivity in Suisun Marsh would
32 need to be quantified to determine if the 5,000 acres would be sufficient for Alternative 1A to avoid
33 an adverse effect on wintering waterfowl in the Suisun Marsh. Mitigation Measure BIO-179a,
34 *Conduct Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would be available to
35 address this adverse effect.

36 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal
37 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands
38 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter
39 food productivity for wintering waterfowl. However, the conclusion that these new wetlands would
40 provide adequate food sources is entirely dependent on assumptions about food production in
41 palustrine tidal habitats. Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring to*
42 *Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would be
43 available to address this uncertainty and avoid an adverse effect on wintering waterfowl.

1 **CEQA Conclusion:** There is considerable uncertainty about the biomass and nutritional quality of
2 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify
3 the level of impact that Alternative 1A habitat loss or conversion would have. The BDCP has
4 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in
5 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal
6 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.
7 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced
8 productivity resulting from conversion of managed seasonal wetlands under the assumptions that
9 1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-
10 quality food for wintering waterfowl and 2) protected seasonal wetlands can be managed to
11 produce high biomass and high-quality food. However, the food biomass and productivity in Suisun
12 Marsh would need to be quantified to determine if the 5,000 acres would be sufficient for
13 Alternative 1A to avoid having a significant impact on wintering waterfowl in the Suisun Marsh, or if
14 additional mitigation would be needed. Implementation of Mitigation Measure BIO-179a, *Conduct*
15 *Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would address this potential
16 significant impact.

17 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal
18 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands
19 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter
20 food productivity. However, the conclusion that these tidal wetlands would provide adequate food
21 sources for wintering waterfowl is entirely dependent on assumptions about food production in
22 palustrine tidal habitats. Studies of food biomass and food quality in palustrine tidal habitats are
23 needed to confirm that no mitigation for wintering waterfowl would be required in the Yolo and
24 Delta Basins. Implementation of Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring*
25 *to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would address
26 this uncertainty and would reduce this impact on wintering waterfowl to a less-than-significant
27 level.

28 **Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering**
29 **Waterfowl in Suisun Marsh**

30 Poorly managed wetlands (considered low biomass and food quality) will be identified and
31 managed by BDCP proponents to improve food quality and biomass. Studies will be required to
32 quantify 1) food production of existing managed wetlands in Suisun Marsh and 2) energetic
33 productivity of brackish and tidal marsh habitats. Protected wetlands will be monitored to
34 measure changes in the energetic productivity of these sites. Based on the food studies and
35 monitoring results, BDCP proponents will determine if the minimum commitment of 5,000 acres
36 is sufficient to meet the goal of 1:1 compensation for loss of wintering waterfowl habitat with
37 the protection and management of managed wetlands in perpetuity. If monitoring demonstrates
38 that additional acreage is needed to meet this goal, additional acreage of protection or creation
39 of managed wetlands and management will be required.

40 **Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate**
41 **Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins**

42 In order to address the uncertainty of the impact of loss of managed wetlands in the Yolo and
43 Delta Basins on wintering waterfowl, BDCP proponents will conduct food studies and
44 monitoring to demonstrate the food quality of palustrine tidal habitats in these basins. If studies

1 show that the assumption of no effect was inaccurate, and the food quality goal of 1:1
2 compensation for wintering waterfowl food value is not met, additional acreage of protection or
3 creation of managed wetland and management will be required.

4 **Impact BIO-180: Loss or Conversion of Habitat for Breeding Waterfowl from Implementation**
5 **of Conservation Components**

6 Implementation of Alternative 1A would reduce managed wetlands in the Yolo and Delta basins by
7 437 acres and 1,155 acres respectively. Under the assumption that 15% of these wetlands are
8 managed as semi-permanent wetlands, Alternative 1A would reduce semipermanent wetlands in
9 the Yolo and Delta drainage basins by 77 acres and 203 acres respectively. While a reduction in
10 these semipermanent habitats would represent a habitat loss for breeding waterfowl, with the
11 restoration of 24,000 acres of palustrine tidal wetlands (Table 3-4, Chapter 3) in the Yolo and Delta
12 basins there would be a less than adverse effect on breeding waterfowl. These palustrine habitats
13 would presumably contain water during the breeding period (i.e., March through July), and would
14 be expected to compensate for the loss of 280 acres of managed semi-permanent wetlands in the
15 Yolo and Delta watersheds attributed to Alternative 1A.

16 **Suisun Marsh:** Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640
17 acres from the conversion of managed seasonal and semi-permanent wetlands to tidal habitats.
18 Some of the remaining seasonal wetlands could be managed as semi-permanent wetlands to offset
19 the loss of breeding habitat, but this could further reduce food supplies available to wintering
20 waterfowl under the assumption that semi-permanent wetlands provide few food resources
21 compared to seasonally managed habitats (Central Valley Joint Venture 2006).

22 The BDCP includes a commitment to protect and enhance 1,600 acres of permanently flooded
23 managed wetlands in Suisun Marsh to provide habitat for breeding waterfowl. In addition, 5,000
24 acres of semipermanent wetlands that would be protected and enhanced for wintering and
25 migratory waterfowl (Table 3-4, Chapter 3; Objective MWNC1.1, BDCP Chapter 3, *Conservation*
26 *Strategy*).

27 Food studies and monitoring would be necessary to determine how increases in tidal marsh and
28 salinity levels would affect the overall reproductive capacity of the marsh. These studies would be
29 needed in order to quantify impacts on breeding waterfowl in Suisun Marsh and to determine not
30 only the number of acres that would compensate for loss of breeding habitat at a ratio of 1:1 for
31 habitat value, but how those acres should be managed. Mitigation Measure BIO-180, *Conduct Food*
32 *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address the
33 uncertainty of this effect.

34 In addition to providing semipermanent wetlands to breeding waterfowl, the Suisun Marsh contains
35 several key upland areas that have significant nesting value. The largest block of upland habitat in
36 the region is the core area on the Grizzly Island Wildlife Area. This area does not overlap with the
37 hypothetical footprint for *CM4 Tidal Natural Communities Restoration*. However, this core area
38 includes over 2,000 acres of upland grasslands that have some of the highest duck nesting densities
39 in California (Central Valley Joint Venture 2006). A few small wetland areas are scattered within this
40 core grassland mosaic that provide necessary freshwater brooding habitat. If restoration footprints
41 were changed during the implementation process of BDCP to overlap with this area, the effects on
42 breeding waterfowl would likely be greatly increased.

1 **NEPA Effects:** Alternative 1A would reduce managed wetlands in the Yolo and Delta basins by 437
 2 acres and 1,155 acres, respectively. Under the assumption that 15% of these wetlands are managed
 3 as semi-permanent wetlands, Alternative 1A would reduce semi-permanent wetlands in the Yolo
 4 and Delta drainage basins by 77 acres and 203 acres, respectively. The reduction in these semi-
 5 permanent habitats would represent a habitat loss for breeding waterfowl. However, with the
 6 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 1A
 7 would not have an adverse effect on breeding waterfowl. These palustrine habitats would
 8 presumably contain water during the breeding period (March through July), and would be expected
 9 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta
 10 watersheds attributed to Alternative 1A implementation. Total managed wetlands in Suisun Marsh
 11 would decline from 41,012 acres to 30,640 acres with the conversion of managed seasonal and
 12 semi-permanent wetlands to tidal habitats. Some of the remaining seasonal wetlands could be
 13 managed as semi-permanent wetlands to offset the loss of breeding habitat, but such management
 14 could further reduce food supplies available to wintering waterfowl under the assumption that
 15 semi-permanent wetlands provide few food resources compared with seasonally managed habitats.
 16 The protection and enhancement of 1,600 acres of permanently flooded managed wetlands would
 17 provide habitat for breeding waterfowl. However, food studies and monitoring would be necessary
 18 to determine how increases in tidal marsh and salinity levels would affect the overall reproductive
 19 capacity of the marsh. Therefore, the loss of breeding waterfowl habitat resulting from
 20 implementation of Alternative 1A could have an adverse effect. Mitigation Measure BIO-180,
 21 *Conduct Food and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to
 22 address the uncertainty of model assumptions and the potential adverse effect of habitat conversion
 23 on breeding waterfowl in Suisun Marsh.

24 **CEQA Conclusion:** Alternative 1A would reduce managed wetlands in the Yolo and Delta basins by
 25 437 acres and 1,155 acres, respectively. Under the assumption that 15% of these wetlands are
 26 managed as semi-permanent wetlands, Alternative 1A would reduce semi-permanent wetlands in
 27 the Yolo and Delta drainage basins by 77 acres and 203, acres respectively. The reduction in these
 28 semi-permanent habitats would represent a habitat loss for breeding waterfowl. However, with the
 29 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 1A
 30 would have a less-than-significant impact on breeding waterfowl. These palustrine habitats would
 31 presumably contain water during the breeding period (March through July), and would be expected
 32 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta
 33 watersheds attributed to Alternative 1A.

34 Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640 acres with the
 35 conversion of managed seasonal and semi-permanent wetlands to tidal habitats. Some of the
 36 remaining seasonal wetlands could be managed as semi-permanent wetlands to offset the loss of
 37 breeding habitat, but this management could further reduce food supplies available to wintering
 38 waterfowl under the assumption that semi-permanent wetlands provide few food resources
 39 compared with seasonally managed habitats. The protection and enhancement of 1,600 acres of
 40 permanently flooded managed wetlands would provide habitat for breeding waterfowl. However,
 41 food studies and monitoring would be necessary to determine how increases in tidal marsh and
 42 salinity levels would affect the overall reproductive capacity of the marsh. Therefore, the loss or
 43 conversion of habitat from implementation of Alternative 1A could have a significant impact on
 44 breeding waterfowl in Suisun Marsh. Implementation of Mitigation Measure BIO-180, *Conduct Food
 45 and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would address the uncertainty of
 46 model assumptions and reduce the impact to a less-than-significant level.

1 **Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding**
2 **Waterfowl in Suisun Marsh**

3 To address the uncertainty of the impact of loss of managed wetlands in Suisun Marsh on
4 breeding waterfowl, BDCP proponents will conduct food studies and monitoring to determine
5 how increases in tidal marsh and salinity levels will affect the overall reproductive capacity of
6 the marsh.

7 The required studies will examine how increases in tidal marsh and salinity levels will affect the
8 overall reproductive capacity of the Marsh. Reproductive studies will address but will not be
9 limited to the following questions:

- 10 • How does the distribution of breeding waterfowl in Suisun Marsh differ in tidal versus
11 managed habitats and across salinity gradients?
- 12 • How does waterfowl nest success and nest density vary with respect to tidal versus
13 managed habitats and across salinity gradients?
- 14 • What are the patterns of habitat selection and movements by waterfowl broods in relation
15 to tidal vs. managed habitats, and are there impacts on duckling survival?
- 16 • What is the current relationship between waterfowl reproductive success and interactions
17 with alternate prey and predators, and how is tidal restoration likely to alter these
18 relationships?

19 **Impact BIO-181: Loss or Conversion of Habitat for Shorebirds from Implementation of**
20 **Conservation Components**

21 Shorebird use of the study area varies by species and fluctuates both geographically and by habitat
22 type throughout the year. Shallow flooded agricultural fields and wetlands support large numbers of
23 wintering and migrating shorebirds (Shuford et al. 1998), particularly least and western sandpipers,
24 dunlin, greater yellowlegs and long-billed dowitcher. Rice lands of the Sacramento Valley provide
25 important breeding habitat for shorebirds such as American avocet and black-necked stilt (Shuford
26 et al. 2004) and have been designated as a Western Hemisphere Shorebird Reserve Network Site of
27 International Importance (Hickey et al. 2003). Managed wetlands provide suitable foraging and
28 roosting habitat for shorebirds; black-necked stilts, avocets, and yellowlegs use this habitat type
29 almost exclusively. Water depth in all of these habitat types is an important habitat variable as the
30 majority of shorebird species require water depths of approximately 10–20 cm for foraging (Isola et
31 al. 2000, Hickey et al. 2003).

32 ***Managed Wetlands***

33 **Yolo Basin:** Primarily as a result of *CM4 Tidal Natural Communities Restoration* within the Yolo
34 Basin, 1,185 acres of managed wetland habitat would be permanently converted; 1,066 acres of
35 which are protected. In addition, 42 acres of managed wetland habitat would be temporarily lost by
36 construction-related activities associated with tidal restoration (CM4) and Fisheries Enhancement
37 activities (CM2) (Table 2, ICF International 2013). Increased inundation frequency, depth and
38 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could
39 periodically affect managed wetlands ranging from an estimated 643 acres during a notch flow of
40 1,000 cfs to an estimated 2,055 acres during a notch flow of 4,000 cfs (Table 5.4-2, in BDCP Chapter
41 5, *Effects Analysis*) in the Yolo Basin.

1 **Delta Basin:** Within the Delta Basin, 90 acres of managed wetland habitat would be permanently
2 converted, as a result of tidal restoration (CM4). Thirteen of the 90 acres are protected (Table 3, ICF
3 International 2013). Periodic flooding would not affect this natural community type in Delta Basin.

4 **Suisun Basin:** Within the Suisun Basin, 11,532 acres of managed wetland habitat would be
5 permanently converted as a result of tidal restoration (CM4); 10,354 of which are protected. (Table
6 4). Periodic flooding would not affect this natural community type in Suisun Basin.

7 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for
8 managed wetland habitat suitability (Table 1, ICF International 2013): black-necked stilt
9 (*Himantopus mexicanus*), greater yellowlegs (*Tringa melanoleuca*), and long-billed dowitcher
10 (*Limnodromus scolopaceus*). Dunlin (*Calidris alpina*), least sandpiper (*Calidris minutilla*),
11 semipalmated plover (*Charadrius semipalmatus*), and western sandpiper (*Calidris mauri*), had a rank
12 2 for managed wetland habitat suitability. Black-bellied plover (*Pluvialis squatarola*) and whimbrel
13 (*Numenius phaeopus*) both had rank 3 for managed wetland habitat suitability.

14 Managed wetlands would decrease in overall extent by 20% (Table 5, ICF International 2013). Most
15 of this loss would occur in Suisun with some additional acreage loss in the Yolo Basin. The loss of
16 managed wetland habitat for covered species and waterfowl would be compensated for with 8,200
17 acres remaining managed wetland protection in Suisun Marsh. Of these 8,200 acres, the 5,000 acres
18 of seasonal wetland protected, enhanced, and managed to provide overwintering waterfowl foraging
19 habitat would be the habitat type most likely to benefit overwintering shorebirds. However, the
20 1,600 acres of semi-permanent and permanent managed wetlands for breeding waterfowl and 1,500
21 acres of managed wetlands for salt marsh harvest mouse would also be expected to have some
22 benefit to wintering and breeding shorebirds.

23 **Cultivated Lands**

24 **Yolo Basin:** Primarily as a result of tidal restoration (CM4) and Fisheries Enhancement activities
25 (CM2) within the Yolo Basin, 8,309 acres of cultivated lands would be permanently converted; 1,272
26 acres of which are protected. Also within the Yolo Basin, increased inundation frequency, depth and
27 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could affect an
28 estimated 3,219 acres of cultivated lands during a notch flow of 1,000 cfs to an estimated 5,512
29 acres during a notch flow of 6,000 cfs (Table 5.4-2, in BDCP Chapter 5, *Effects Analysis*).

30 **Delta Basin:** Within the Delta Basin, as a result of tidal restoration (CM4) and floodplain restoration
31 (CM5), 25,633 acres of cultivated lands would be permanently converted. There would also be an
32 additional 112 acres lost temporarily due to CM5 activities. Of the total permanently converted
33 lands, 3,925 acres are protected (Table 3, ICF International 2013). Seasonal flooding (CM5) on the
34 restored floodplain would periodically affect 738 acres of cultivated lands in Delta.

35 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for
36 cultivated lands habitat suitability (Table 1, ICF International 2013): killdeer (*Charadrius*
37 *vociferous*), long-billed curlew, and whimbrel within pasture habitat. Long-billed dowitcher and
38 killdeer both had a rank 2 for idle crop habitat suitability and black-bellied plover was ranked 2 for
39 pasture habitat. Red-necked phalarope (*Phalaropus lobatus*) and Wilson's phalarope (*Phalaropus*
40 *tricolor*) were both ranked 2 for grain and hay crops. Long-billed dowitcher, dunlin, least sandpiper,
41 and long-billed curlew were all ranked 3 for rice habitat suitability and killdeer was ranked 3 for
42 field crop habitat suitability.

1 Cultivated land loss would occur in all three basins, but the majority of acreage loss would occur in
 2 the Delta basin. Pasture crop types would decrease in overall extent by 15% over baseline (Table 5,
 3 ICF International 2013), but would increase in protection by 135%. More than half of all cultivated
 4 lands within the 48,000-acre BDCP cultivated lands reserve would be in pasture production
 5 (primarily alfalfa) and enhanced and managed to benefit Swainson's hawk. Idle crop types are not
 6 identified as a specific conservation target in the BDCP, are expected to occur within the reserve and
 7 are recognized in the BDCP as having "moderate" foraging habitat value for Swainson's hawk, white-
 8 tailed kite, and greater sandhill crane.

9 Grain and hay crop would be expected to decrease by 13% (Table 5, ICF International 2013) while
 10 protection, enhancement and management would be expected to increase by 28% (Table 6, ICF
 11 International 2013). These crop types would be managed for a tricolored blackbirds, Swainson's
 12 hawk, white-tailed kite, greater sandhill crane, and burrowing owls.

13 Rice would decrease in overall extent by 2% (Table 5, ICF International 2013) but increase in total
 14 protection by 57%. Rice lands would be protected, enhanced, and managed for the benefit for giant
 15 garter snake.

16 **Tidal Wetlands**

17 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)
 18 within the Yolo Basin, 194 acres of tidal wetland habitat would be permanently converted; 180 acres
 19 of which are protected. In addition, 12 acres of tidal wetland habitat would be temporarily lost by
 20 construction-related activities associated with Fisheries Enhancement activities (CM2) (Table 2, ICF
 21 International 2013). Periodic flooding in Yolo Bypass would affect 3,957 acres of tidal wetlands in
 22 Yolo Basin.

23 **Delta Basin:** Within the Delta Basin, 54 acres of tidal wetlands would be permanently converted as
 24 a result of tidal restoration (CM4) (Table 3, ICF International 2013). Of the total permanently
 25 converted lands, 26 acres are protected. Periodic flooding in Yolo Bypass would affect 26 acres of
 26 tidal wetlands in Delta Basin.

27 **Suisun Basin:** Within the Suisun Basin, 219 acres of tidal wetland habitat would be permanently
 28 converted as a result of tidal restoration (CM4); 215 of which are protected. (Table 4, ICF
 29 International 2013). Periodic flooding would not affect this natural community type in Suisun Basin.

30 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for
 31 tidal mudflat habitat suitability (Table 6, ICF International 2013): black-bellied plover, dunlin, least
 32 sandpiper, marbled godwit (*Limosa fedoa*), semipalmated plover, short-billed dowitcher
 33 (*Limnodromus griseus*), western sandpiper, and willet (*Tringa semipalmata*). Long-billed curlew
 34 (*Numenius americanus*) and whimbrel both had a rank 2 for tidal mudflat habitat suitability.
 35 American avocet (*Recurvirostra americana*) was ranked 3 for tidal mudflat habitat suitability. For
 36 tidal brackish emergent wetland/tidal freshwater emergent wetland, willet was ranked 2 and long-
 37 billed curlew and whimbrel were both ranked 3 for habitat suitability.

38 Tidal mudflat habitat would be estimated to increase in extent by 1,780 acres. This extremely large
 39 increase in tidal mudflat habitat would occur almost exclusively in Suisun Marsh as the result of
 40 tidal restoration and the conversion of existing mid- and high-marsh types to low marsh and tidal
 41 mudflats in response to sea level rise. BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*,
 42 details the methods and assumptions modeled to come about this result. Tidal mudflat habitats
 43 would be expected to require management, however, sediment augmentation has been discussed as

1 an experimental method that could be employed in places like Suisun to combat the loss of intertidal
2 marshes in the face of sea level rise and reduced sediment supplies.

3 Tidal emergent wetland habitat would increase in extent by 152% (Table 5, ICF International 2013).
4 Of the 30,000 acres of emergent wetland restoration, 6,000 acres would be in the Suisun Basin and
5 the rest would be distributed between the Yolo and Delta Basins. Enhancement and management on
6 these lands would be likely to be focused on nonnative, invasive species management. Any
7 additional actions in Suisun would be focused on salt marsh harvest mouse, Suisun shrew, California
8 clapper rail, black rail, Suisun thistle, and soft bird's-beak. In freshwater marshes, enhancement and
9 management would be likely to focus on black rail, western pond turtle, and, in some cases, giant
10 garter snake.

11 ***Nontidal Wetlands***

12 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)
13 within the Yolo Basin, 313 acres of nontidal wetland habitat would be permanently converted; 119
14 acres of which are protected. In addition, 11 acres of nontidal wetland habitat would be temporarily
15 lost by construction-related activities associated with Fisheries Enhancement activities (CM2)
16 (Table 2, ICF International 2013). Periodic flooding in Yolo Bypass associated with ongoing Fremont
17 Weir operation (CM2) would affect 305 acres of nontidal wetlands in Yolo Basin, specifically
18 nontidal perennial aquatic habitat.

19 **Delta Basin:** Within the Delta Basin, 99 acres of nontidal wetlands would be permanently converted
20 as a result of tidal restoration (CM4) and floodplain restoration (CM5) (Table 3, ICF International
21 2013). There would also be 8 acres of nontidal perennial aquatic habitat temporarily lost from CM5
22 activities. Of the total permanently converted lands, 29 acres are protected. Periodic flooding from
23 CM5 would affect 4 acres of nontidal perennial aquatic habitat in Delta Basin.

24 **Suisun Basin:** Within the Suisun Basin, 1 acre of nontidal wetland habitat, specifically vernal pool
25 complex, would be permanently converted as a result of tidal restoration (CM4); and is not
26 protected. (Table 4, ICF International 2013). Periodic flooding would not affect this natural
27 community type in Suisun Basin.

28 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for
29 nontidal wetland habitat suitability (Table 6, ICF International 2013): red-necked phalarope and
30 Wilson's phalarope for nontidal freshwater perennial emergent wetland and American avocet for
31 alkali seasonal wetland complex. Greater yellowlegs had a rank 2 for vernal pool complex habitat
32 suitability. Red-necked phalarope and western sandpiper were both ranked 3 for alkali seasonal
33 wetland habitat suitability and greater yellowlegs was ranked 3 for nontidal freshwater perennial
34 emergent wetland habitat suitability.

35 Nontidal freshwater emergent wetland would increase in extent by 88% as a result of BDCP
36 implementation (Table 5, ICF International 2013). These lands would be managed to benefit giant
37 garter snake and located within the Delta Basin (likely in the vicinity of White Slough) and the Yolo
38 Basin (in the Cache Slough area).

39 Impacts on wetted acres of vernal pool complex and alkali seasonal wetland complex would be
40 avoided and thus loss of this community is not expected. However, up to 10 acres of wetted acre loss
41 could be permitted under the Plan. Protection of vernal pool complex natural community would
42 increase by 13% and by 6% for alkali seasonal wetlands (Table 6, ICF International 2013).

1 Protection of these two community types would enhance and manage habitat for vernal pool
2 crustaceans and alkali-related plant species.

3 The protection and restoration of natural communities under the BDCP would also include
4 management and enhancement actions under *CM11 Natural Communities Enhancement and*
5 *Management*. The following management activities to benefit shorebirds would be considered for
6 implementation under CM11, in areas where they would not conflict with covered species
7 management.

8 ● Managed Wetlands

- 9 ○ Managed wetlands can be potentially manipulated to provide the optimum water depths for
10 foraging shorebirds and islands for nesting (Hickey et al. 2003).
- 11 ○ During fall and spring, stagger the timing and location of draining and flooding to optimize
12 the extent of shallow-water habitat; varying depths within the wetland unit helps to create
13 temporal variation in foraging opportunities. During warm, dry springs when wetland units
14 dry quickly, wetland units can be re-supplied with water to extend habitat availability for
15 shorebirds.
- 16 ○ Provide open, shallow water habitat adjacent to minimally vegetated, shallowly sloped
17 edges for nesting shorebirds between April and July.
- 18 ○ Provide islands with little to no vegetation to increase the likelihood of shorebird roosting
19 and nesting.
- 20 ○ Create low slopes on islands and levees; gradual angles (10-12:1) are better than steep
21 angles.
- 22 ○ Limit levee maintenance during the nesting season (April through July). However, mowing
23 the center of levees is fine.
- 24 ○ Potentially add material to levees or to islands to encourage nesting for some species.

25 ● Cultivated Lands

- 26 ○ Maintaining a mosaic of dry and flooded crop types, and varying water depths will promote
27 a diverse community of waterbirds, including shorebirds, during fall migration and winter
28 (Shuford et al. 2013).
- 29 ○ To provide wintering habitat for multiple waterbird guilds, including shorebirds, use a
30 combination of flooding practices that include one-time water application and maintenance
31 flooding while also providing unflooded habitat (Strum et al. *in review*).
- 32 ○ The post-harvest flooding of winter wheat and potato fields in early fall (July–September)
33 can provide substantial benefits to shorebirds at a time of very limited shallow-water
34 habitat on the landscape (Shuford et al. 2013).
- 35 ○ Stagger the drawdown of flooded rice and other winter-flooded agricultural fields to
36 prolong the availability of flooded habitat (Iglecia et al. 2012). Be aware of soil type because
37 this practice may not be as effective on soils that drain quickly.
- 38 ○ Remove as much stubble as possible in rice and other agricultural fields after harvest to
39 increase the potential shorebird habitat on intentionally flooded or unflooded fields that
40 may passively gather rain water (Iglecia et al. 2012).

- 1 ○ Shallowly flood available agricultural fields during July, August, and September to provide
2 early fall migration habitat for shorebirds. Fields should be free of vegetation prior to
3 flooding, have minimal micro-topography (e.g., no large clods), and should remain flooded
4 for up to three week periods (after three weeks, vegetation encroachment reduces habitat
5 value for shorebirds; ICF International 2013).
- 6 ○ Manage levee habitats to have minimal vegetation but do not spray herbicide directly or
7 drive on levees during the nesting season (April–July, Iglecia et al. 2012).
- 8 ○ Maintain a minimum top-width of 30 inches for levees, based on increased avocet use of
9 wider levees (Iglecia et al. 2012).
- 10 ○ When possible, flood fields with nesting habitat (modified levees and islands) in late April to
11 provide nesting habitat for American avocets (Iglecia et al. 2012).
- 12 ○ Finer grained substrate (clods smaller than a fist) in rice and other agricultural fields may be
13 more appealing for nesting shorebirds (Iglecia et al. 2012).
- 14 ○ Maintain gently sloping levees and island sides (10-12:1; Iglecia et al. 2012).
- 15 ○ Islands should be disked along with the rest of the field after harvest to help inhibit
16 vegetation growth (Iglecia et al. 2012).

17 **NEPA Effects:** Alternative 1A implementation would result in the conversion of managed wetland
18 and cultivated lands to tidal natural communities, including tidal mudflat. The result would be
19 substantial loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,
20 and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least
21 sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and
22 willet. While substantial losses of cultivated lands would be incurred, protection, enhancement, and
23 management of the remaining acres would likely have substantial benefits for select species of
24 wintering and breeding shorebirds. This is because impacts on crop types would be distributed
25 across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,
26 and rice types. While the protection, enhancement, and management of these crop types are being
27 driven by covered species, these management actions would also benefit shorebirds. The protection,
28 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation
29 for the loss of substantial acreage, would have some incremental benefits for shorebirds, but would
30 be unlikely to compensate for the overall loss. However, with the protection and restoration of acres
31 in the Delta and Yolo watersheds, in addition to the implementation of the management actions
32 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would not
33 be expected to result in an adverse effect on shorebird populations in the study area.

34 **CEQA Conclusion:** Alternative 1A implementation would result in the conversion of managed
35 wetland and cultivated lands to tidal natural communities, including tidal mudflat. The result would
36 be significant loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,
37 and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least
38 sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and
39 willet. While significant losses of cultivated lands would be incurred, protection, enhancement, and
40 management of the remaining acres would likely have substantial benefits for select species of
41 wintering and breeding shorebirds. This is because impacts on crop types would be distributed
42 across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,
43 and rice types. While the protection, enhancement, and management of these types are being driven
44 by covered species, these management actions would also benefit shorebirds. The protection,

1 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation
2 for substantial acreage loss, would have some incremental benefits for shorebirds, but would be
3 unlikely to compensate for the overall loss. However, with the protection and restoration of acres in
4 the Delta and Yolo watersheds, in addition to the implementation of the management actions
5 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would be
6 expected to have a less-than-significant impact on shorebird populations in the study area.

7 **Impact BIO-182: Effects on Shorebirds and Waterfowl Associated with Electrical** 8 **Transmission Facilities**

9 New transmission lines installed in the study area would increase the risk for bird-power line
10 strikes, which could result in injury or mortality of shorebirds and waterfowl. The existing network
11 of power lines in the study currently poses a risk for shorebirds and waterfowl in the Delta. New
12 transmission lines would increase this risk and have an adverse effect on shorebird and waterfowl
13 species in the absence of other conservation actions. The implementation of *AMM20 Greater Sandhill*
14 *Crane* would reduce potential effects through the installation of flight-diverters on new transmission
15 lines, and selected existing transmission lines in the study area.

16 **NEPA Effects:** New transmission lines would increase the risk for shorebird and waterfowl power
17 line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the potential effect of the
18 construction of new transmission lines on shorebird and waterfowl would not be adverse.

19 **CEQA Conclusion:** New transmission lines would increase the risk for shorebird and waterfowl
20 power line strikes. The implementation of *AMM20 Greater Sandhill Crane* would reduce the potential
21 impact of the construction of new transmission lines on shorebirds and waterfowl to a less-than-
22 significant level.

23 **Impact BIO-183: Indirect Effects of Plan Implementation on Shorebirds and Waterfowl**

24 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
25 with construction-related activities could result in temporary disturbances that affect shorebird and
26 waterfowl use of modeled habitat. Indirect effects associated with construction include noise, dust,
27 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
28 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
29 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
30 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
31 *Disturbance of Nesting Birds*, would be available to minimize effects on active nests. The use of
32 mechanical equipment during water conveyance construction could cause the accidental release of
33 petroleum or other contaminants that could affect shorebirds and waterfowl or their prey in the
34 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
35 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge
36 of sediment or excessive dust adjacent to shorebirds and waterfowl in the study area could also have
37 a negative effect on these species. AMM1–AMM7 would ensure that measures were in place to
38 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to
39 work areas.

40 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
41 mercury in avian species, including shorebird and waterfowl species. Marsh (tidal and nontidal) and
42 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
43 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas

1 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
 2 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
 3 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity
 4 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-
 5 specific effects. Increased methylmercury associated with natural community and floodplain
 6 restoration could indirectly affect shorebirds and waterfowl, via uptake in lower trophic levels (as
 7 described in BDCP Appendix 5.D, *Contaminants*).

8 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
 9 with site-specific conditions and would need to be assessed at the project level. Measures described
 10 in BDCP Chapter 3, Section 3.4.13, *Conservation Measure 12 Methylmercury Management*, include
 11 provisions for project-specific Mercury Management Plans. Site-specific restoration plans that
 12 address the creation and mobilization of mercury, as well as monitoring and adaptive management
 13 as described in CM12 would be available to address the uncertainty of methylmercury levels in
 14 restored tidal marsh and potential impacts on shorebirds and waterfowl.

15 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 16 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 17 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 18 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 19 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 20 classes within a species. In addition, the effect of selenium on a species can be confounded by
 21 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 22 2009).

23 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 24 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 25 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 26 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 27 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 28 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 29 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 30 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 31 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 32 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
 33 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 34 levels of selenium have a higher risk of selenium toxicity.

35 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 36 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 37 exacerbate bioaccumulation of selenium in avian species, including shorebird and waterfowl
 38 species. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
 39 selenium, and therefore increase avian exposure from ingestion of prey items with elevated
 40 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase
 41 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).
 42 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was
 43 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
 44 in substantial, long-term increases in selenium concentrations in water in the Delta under any
 45 alternative. However, it is difficult to determine whether the effects of potential increases in

1 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)
2 would lead to adverse effects on shorebirds and waterfowl species.

3 Because of the uncertainty that exists at this programmatic level of review, there could be a
4 substantial effect on shorebirds and waterfowl from increases in selenium associated with
5 restoration activities. This effect would be addressed through the implementation of *AMM27*
6 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
7 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
8 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
9 selenium management to reduce selenium concentrations and/or bioaccumulation would be
10 evaluated separately for each restoration effort as part of design and implementation. This
11 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
12 design schedule.

13 **NEPA Effects:** Noise and visual disturbances from the construction of Alternative 1A water
14 conveyance facilities could reduce shorebird and waterfowl use of modeled habitat adjacent to work
15 areas. Moreover, operation and maintenance of the water conveyance facilities, including the
16 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could
17 affect shorebird and waterfowl use of the surrounding habitat. AMM1–AMM7 would minimize these
18 effects, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
19 *Disturbance of Nesting Birds*, would be available to address adverse effects on nesting individuals.
20 Tidal habitat restoration could result in increased exposure of shorebirds and waterfowl to
21 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
22 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
23 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the
24 indirect effects associated with noise and visual disturbances, and increased exposure to selenium
25 from Alternative 1A implementation would not have an adverse effect on shorebirds and waterfowl.
26 Tidal habitat restoration is unlikely to have an adverse effect on shorebirds and waterfowl through
27 increased exposure to methylmercury, as these species currently nest and forage in tidal marshes
28 with elevated methylmercury levels. However, it is unknown what concentrations of methylmercury
29 are harmful to species of waterfowl and shorebirds, and the potential for increased exposure would
30 vary substantially within the study area. Site-specific restoration plans in addition to monitoring and
31 adaptive management, described in *CM12 Methylmercury Management*, would address the
32 uncertainty of methylmercury levels in restored tidal marsh. Once site-specific sampling and other
33 information is developed, the site-specific planning phase of marsh restoration would be the
34 appropriate place to assess the potential risk of shorebird and waterfowl exposure to
35 methylmercury.

36 **CEQA Conclusion:** Noise, potential hazardous spills, and increased dust and sedimentation as a
37 result of Alternative 1A water conveyance facilities construction and operation and maintenance
38 would have a significant impact on shorebirds and waterfowl. AMM1–AMM7 would minimize these
39 impacts, and implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
40 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce the impacts to a less-than-significant
41 level. Tidal habitat restoration is unlikely to have a significant impact on shorebirds and waterfowl
42 species through increased exposure to methylmercury, as these species currently nest and forage in
43 tidal marshes with elevated methylmercury levels. However, it is unknown what concentrations of
44 methylmercury are harmful to species of waterfowl and shorebirds. Site-specific restoration plans
45 that address the creation and mobilization of mercury, as well as the monitoring and adaptive
46 management described in *CM12*, would be the appropriate place to assess the potential risk of

1 shorebird and waterfowl exposure to methylmercury in the study area. Tidal habitat restoration
2 could result in increased exposure of shorebirds and waterfowl to selenium. This effect would be
3 addressed through the implementation of *AMM27 Selenium Management*, which would provide
4 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
5 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 1A
6 implementation would have a less-than-significant impact on shorebirds and waterfowl.

7 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
8 **Disturbance of Nesting Birds**

9 See Mitigation Measure BIO-75 under Impact BIO-75.

10 **Common Wildlife and Plants**

11 Common wildlife and plants are widespread, often abundant, species that are not covered under
12 laws or regulations that address conservation or protection of individual species. Examples of
13 common wildlife and plants occurring in the study area are provided within the discussion for each
14 natural community type in Section 12.1.2.2, *Special-Status and Other Natural Communities*. Impacts
15 on common wildlife and plants would occur through the same mechanisms discussed for natural
16 communities and special-status wildlife and plants for each alternative.

17 **Impact BIO-184: Effects on Habitat and Populations of Common Wildlife and Plants**

18 Effects on habitat of common wildlife and plants, including habitat removal and conversion, are
19 discussed in in the analysis of Alternative 1A effects on natural communities (Impacts BIO-1 through
20 BIO-31). In general, effects on habitat of common wildlife and plants would not be adverse. Through
21 the course of implementing the Plan over a 50-year time period, several natural communities and
22 land cover types would be reduced in size, primarily from restoration of other natural communities.
23 Grassland, managed wetland and cultivated lands would be reduced in acreage, so the common
24 species that occupy these habitats would be affected. However, the losses in acreage and value of
25 these habitats would be offset by protection, restoration, enhancement and management actions
26 contained in the BDCP, including *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal*
27 *Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM6 Channel*
28 *Margin Enhancement*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*
29 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM10*
30 *Nontidal Marsh Restoration*, and *CM11 Natural Communities Enhancement and Management*. In
31 addition, the AMMs contained in Appendix 3.C of the BDCP and updated in Appendix 3B,
32 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS would be in place to reduce or
33 eliminate the potential to adversely affect both special-status and common wildlife and plants.

34 Direct effects on common wildlife and plants from constructing water conveyance facilities and
35 implementing BDCP conservation measures would include construction or inundation-related
36 disturbances that result in injury or mortality of wildlife or plants and the immediate displacement
37 of wildlife, including increased traffic on local roads from construction vehicles that could increase
38 wildlife mortality and impede wildlife movement. Effects of construction traffic on wildlife moving
39 in the vicinity of Stone Lakes National Wildlife Refuge would be minimized by AMM 20 *Greater*
40 *Sandhill Crane*, which includes a measure for the installation of a vegetation screen or other noise
41 and visual barrier along Hood Frankling Road for the benefit of cranes, which would be a minimum
42 of 5 feet high (above the adjacent elevated road, if applicable) and would provide a continuous
43 surface impenetrable by light (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). This

1 measure would potentially direct wildlife wishing to cross Hood Franklin toward the overcrossing of
2 the canal that links the Stone Lakes properties (just east of the Town of Hood). The overcrossing
3 includes strips of terrestrial habitat on either side of the canal.

4 Indirect effects include project-related disturbances to nearby wildlife and plants during
5 construction (e.g., disruption of breeding and foraging behaviors from noise and human activity,
6 habitat degradation from fugitive dust and runoff) and effects occurring later in time (e.g., collisions
7 of birds with transmission lines, habitat fragmentation, vegetation management). Indirect effects
8 could result both from construction and from operations and maintenance (e.g., ground
9 disturbances could result in the spread and establishment of invasive plants).

10 **NEPA Effects:** The direct and indirect effects of constructing water conveyance facilities and
11 restoring tidal and other habitats associated with Alternative 1A would not be adverse to common
12 wildlife and plants because conservation measures and AMMs also expand and protect natural
13 communities, avoid or minimize effects on special-status species, prevent the introduction and
14 spread of invasive species, and enhance natural communities. These actions would result in avoiding
15 and minimizing effects on common wildlife and plants as well.

16 **CEQA Conclusion:** Construction and operation of the water conveyance facilities and habitat
17 restoration activities would have impacts on common wildlife and plants in the study area through
18 habitat loss and through direct or indirect loss or injury of individuals. The loss of habitat would not
19 be substantial, because habitat restoration would increase the amount and extent of habitat
20 available for use by most common wildlife and plant species. Conservation measures to avoid or
21 minimize effects on special-status species, to prevent the introduction and spread of invasive
22 species, and to enhance natural communities also would result in avoiding and minimizing effects on
23 common wildlife and plants. Consequently, implementation of the BDCP is not expected to cause any
24 populations of common wildlife or plants to drop below self-sustaining levels, and this impact would
25 be less than significant. No mitigation would be required.

26 **Wildlife Corridors**

27 Essential Connectivity Areas (ECAs) are lands likely to be important to wildlife movement between
28 large, mostly natural areas at the state wide level. The ECAs form a functional network of wildlands
29 that are considered important to the continued support of California's diverse natural communities.
30 Four general areas were identified within the study area that contain ECAs (Figure 12-2). The BDCP
31 also identified important landscape linkages in the Plan Area to guide reserve design, which can also
32 be seen on Figure 12-2.

33 **Impact BIO-185: Effect of BDCP Conservation Measures on Wildlife Corridors**

34 Alternative 1A water conveyance facilities would cross two of the ECAs identified during the
35 analysis, the Stone Lake-Yolo Bypass ECA and the Mandeville Island-Statens Island ECA. The
36 conveyance facilities would also cross one landscape linkage identified in the BDCP, the *Middle River*
37 linkage (#6 in Figure 12-2). Though the conveyance facilities shown on Figure 12-2 overlap with the
38 line representing the Sacramento River linkage (#9 in Figure 12-2) this line generally represents the
39 course of the Sacramento River and is intended to address the needs of aquatic species and will thus
40 not be addressed in this chapter.

41 The construction of Intakes 1, 2, 3, and 4, associated borrow and RTM areas, and forebay just east
42 and south of Clarksburg, would be constructed within the Stone Lake-Yolo Bypass ECA. These

1 activities would result in the permanent loss of narrow strips of riparian vegetation along the
2 Sacramento River and the permanent and temporary loss of cultivated lands. Alternative 1A would
3 not substantially increase impediments to the movement of any wildlife that could move from Stone
4 Lakes to Yolo Bypass because the Sacramento River and Sacramento River Deep Water Ship Channel
5 already create a barrier to dispersal for nonavian species. However, the conversion of riparian and
6 cultivated lands and the presence of the intakes and forebay would create a substantial barrier to
7 the north-south movement of nonavian terrestrial species in the area between the Sacramento River
8 and the Southern Pacific Dredger Cut west of Stone Lakes, as well as the east-west movement
9 between Stone Lakes and the east bank of the Sacramento River. No records of wildlife species were
10 identified within these construction footprints, though there are several records for Swainson's
11 hawk in the vicinity. Though there would be losses in Swainson's hawk foraging habitat and
12 potential nesting habitat in these areas, these losses would not substantially impede the movements
13 of Swainson's hawks in the area. The loss in habitat is addressed in the Swainson's hawk effects
14 analysis.

15 The addition of new permanent transmission lines within the Stone Lake-Yolo Bypass ECA could
16 adversely affect birds during periods of low visibility. Sandhill cranes that are known to roost at
17 Stone Lakes could particularly be adversely affected by the addition of the north-south running
18 transmission line to the west of Stone Lakes (see impact discussions for greater and lesser sandhill
19 cranes). No records of wildlife species were identified within these construction footprints, though
20 there are several records for Swainson's hawk in the vicinity. Though there would be losses in
21 Swainson's hawk foraging habitat and potential nesting habitat in these areas, these losses would not
22 substantially impede the movements of Swainson's hawks in the area. The loss in habitat is
23 addressed in the Swainson's hawk effects analysis.

24 The Alternative 1A transmission line would also pass through the Mandeville Island-Staten Island
25 ECA, which also has several known roost locations for greater sandhill crane. As discussed above,
26 the transmission lines could adversely affect the movement of cranes and other bird species during
27 periods of low visibility. The conveyance alignment at this location would be within the pipeline and
28 thus not create a barrier to wildlife movement.

29 Alternative 1A temporary transmission lines would cross the *Middle River* linkage on Woodward
30 Island. This linkage was established to guide riparian restoration along the Middle River to
31 improve riparian connectivity for the benefit of riparian brush rabbit, riparian woodrat, least Bell's
32 vireo, yellow-breasted chat, yellow-billed cuckoo, Swainson's hawk, and white-tailed kite. Because
33 this transmission line is temporary it would only temporarily conflict with the future planning for
34 and the current movement of the avian species that use riparian corridors.

35 Alternative 1A conveyance facilities would create a local barrier to wildlife movement in the area
36 between Hood and Clarksburg along the east side of the Sacramento River. The temporary and
37 permanent transmission lines would create additional barriers to movement for avian species
38 during periods of low visibility. However, overall the Alternative 1A alignment would not create
39 substantial barriers to movement between ECAs because the majority of the alignment consists of a
40 tunnel that would be beneath riparian corridors, which are the most likely dispersal routes for
41 terrestrial animals in the majority of the study area, and because the large surface impacts (the
42 intakes and forebay) are in areas that already have barriers to movement for nonavian terrestrial
43 species (Sacramento River and Sacramento River Deep Water Ship Channel; and the Clifton Court
44 Forebay and associated canals).

1 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*
2 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*
3 *Restoration*). These activities would generally improve the movement of wildlife within and outside
4 of the study area. In addition, the preservation of restored lands (CM3) and the enhancement and
5 management of these areas (CM11) would improve and maintain wildlife corridors within the study
6 area.

7 **NEPA Effects:** Alternative 1A conveyance facilities would create local barriers to dispersal but
8 overall the restoration activities would improve opportunities for wildlife dispersal within the study
9 area and between areas outside of the study area and therefore overall Alternative 1A would not
10 adversely affect wildlife corridors.

11 **CEQA Conclusion:** Alternative 1A conveyance facilities would create some localized disruption in
12 wildlife movement and the permanent and temporary transmission lines would create additional
13 barriers to movement for avian species during periods of low visibility. However, overall the
14 Alternative 1A alignment would not create substantial barriers to movement between ECAs because
15 the majority of the alignment consists of a tunnel that would be beneath riparian corridors, which
16 are the most likely dispersal routes for terrestrial animals in the majority of the study area, and
17 because the large surface impacts (the intakes and the forebay) are in areas that already have
18 barriers to movement for nonavian terrestrial species (Sacramento River and Sacramento River
19 Deep Water Ship Channel).

20 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*
21 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*
22 *Restoration*). These activities would generally improve the movement of wildlife within and outside
23 of the Plan Area. In addition, the preservation of restored lands (CM3) and the enhancement and
24 management of these areas (CM11) would improve and maintain wildlife corridors within the Plan
25 Area.

26 Alternative 1A conveyance facilities would create local barriers to dispersal and create barriers to
27 safe movement of avian species during periods of low visibility but overall the restoration activities
28 would improve opportunities for wildlife dispersal within the study area and between areas outside
29 of the study area and therefore overall Alternative 1A would result in less-than-significant impacts
30 on wildlife corridors.

31 **Invasive Plant Species**

32 The invasive plant species that primarily affect natural communities in the study area, which include
33 water hyacinth, perennial pepperweed, giant reed, and Brazilian waterweed, are discussed in
34 Section 12.1.4. Invasive species compete with native species for resources and can alter natural
35 communities by influencing fire regimes, hydrology (e.g., sedimentation and erosion), light
36 availability, nutrient cycling, and soil chemistry but also have the potential to harm human health
37 and the economy by adversely affecting natural ecosystems, water delivery, flood protection
38 systems, recreation, agricultural lands, and developed areas (Randall and Hoshovsky 2000). The
39 construction and restoration activities covered under the BDCP could result in the introduction or
40 spread of invasive plant species by creating temporary ground disturbance that provides
41 opportunities for colonization by invasive plants in the study area.

42 The primary mechanisms for the introduction of invasive plants as the result of implementation of
43 Alternative 1A are listed below.

- 1 • Grading, excavation, grubbing, and placement of fill material.
 - 2 • Breaching, modification, or removal of existing levees and construction of new levees.
 - 3 • Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,
 - 4 electric transmission and gas lines, irrigation infrastructure).
 - 5 • Maintenance of infrastructure.
 - 6 • Removal of existing vegetation and planting or seeding of vegetation.
 - 7 • Maintaining vegetation and vegetation structure (e.g., grazing, mowing, burning, trimming).
 - 8 • Dredging waterways.
- 9 Clearing operations and the movement of vehicles, equipment, and construction materials in the
 10 study area would facilitate the introduction and spread of invasive plants by bringing in or moving
 11 seeds and other propagules. These effects would result from activities listed here.
- 12 • Spreading chipped vegetative material from clearing operations over topsoil after earthwork
 13 operations are complete.
 - 14 • Importing, distributing, storing, or disposing of fill, borrow, spoil, or dredge material.
 - 15 • Traffic from construction vehicles (e.g., water and cement trucks) and personal vehicles of
 16 construction staff.
 - 17 • Transport of construction materials and equipment within the study area and to/from the study
 18 area.

19 Table 12-1A-70 lists the acreages of temporary disturbance in each natural community in the study
 20 area that would result from implementation of Alternative 1A.

21 **Table 12-1A-70. Summary of Temporary Disturbance in Natural Communities under Alternative 1A**

Natural Community	Temporary Impacts (acres)
Tidal perennial aquatic	149
Tidal brackish emergent wetland	-
Tidal freshwater emergent wetland	7
Valley/foothill riparian	151
Nontidal perennial aquatic	37
Nontidal freshwater perennial emergent wetland	2
Alkali seasonal wetland complex	-
Vernal pool complex	-
Managed wetland	127
Other natural seasonal wetland	-
Grassland	535
Inland dune scrub	-
Cultivated lands	3,748
Total	4,756

22

1 **Impact BIO-186: Adverse Effects on Natural Communities Resulting from the Introduction**
2 **and Spread of Invasive Plant Species**

3 Under Alternative 1A, the BDCP would have adverse effects on natural communities resulting from
4 the introduction and spread of invasive plant species through implementation of CM1–CM10 and
5 AMM6. No adverse effects are expected as a result of implementation of CM11–CM21.

- 6 • *CM1 Water Facilities and Operations*: Construction of the Alternative 1A water conveyance
7 facilities would result in the temporary disturbance of 2,713 acres that would provide
8 opportunities for colonization by invasive plant species.
- 9 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries
10 enhancements would result in the temporary disturbance of 758 acres that would provide
11 opportunities for colonization by invasive plant species. Vegetation maintenance activities for
12 the Fremont Weir and Yolo Bypass improvements may include the removal of giant reed;
13 however, the clearing of linear areas to facilitate water flow may also result in increased
14 opportunities for invasion. Sediment removal, transportation, and application as a source
15 material for restoration or levee projects as part of Fremont Weir and Yolo Bypass maintenance
16 activities could also result in the spread of invasive species if the sediment contains viable
17 invasive plant propagules.
- 18 • *CM3 Natural Communities Protection and Restoration*: The restoration activities in the natural
19 communities located in the 11 conservation zones would result in the temporary disturbance of
20 restoration areas that would provide opportunities for colonization by invasive plant species.
- 21 • *CM4 Tidal Natural Communities Restoration*: The activities associated with the restoration of
22 tidal perennial aquatic, tidal mudflat, tidal freshwater emergent wetland, and tidal brackish
23 emergent wetland in ROAs would result in the temporary disturbance of tidal areas that would
24 provide opportunities for colonization by invasive plant species. These adverse effects would be
25 reduced by designing restoration projects to minimize the establishment of nonnative
26 submerged aquatic vegetation. Early restoration projects would be monitored to assess the
27 response of nonnative species to restoration designs and local environmental conditions. If
28 indicated by monitoring results, the BDCP Implementation Office would implement invasive
29 plant control measures in restored natural communities to help ensure the establishment of
30 native marsh plain plant species. Additionally, the BDCP Implementation Office would actively
31 remove submerged and floating aquatic vegetation in subtidal portions of tidal natural
32 communities restoration sites.
- 33 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
34 would result in the temporary disturbance of 1,285 acres along channels in the north, east, and
35 south Delta (San Joaquin, Old, and Middle Rivers) that would provide opportunities for
36 colonization by invasive plant species.
- 37 • *CM6 Channel Margin Enhancement*: The temporary effects of channel margin enhancement were
38 not estimated because specific locations for this activity and their areal extent have not been
39 developed. Channel margin enhancement (Sacramento River between Freeport and Walnut
40 Grove, San Joaquin River between Vernalis and Mossdale, Steamboat and Sutter Sloughs, and
41 salmonid migration channels in the interior Delta) would result in the temporary disturbance of
42 channel areas that would provide opportunities for colonization by invasive plant species.

- 1 ● *CM7 Riparian Natural Community Restoration*: The restoration of valley/foothill riparian habitat
2 would result in the temporary disturbance of riparian areas that would provide opportunities
3 for colonization by invasive plant species.
- 4 ● *CM8 Grassland Natural Community Restoration*: The restoration of grassland habitat in CZs 1, 8
5 and/or 11 would result in the temporary disturbance of degraded grassland or cultivated land
6 that would provide opportunities for colonization by invasive plant species.
- 7 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: The restoration of vernal pool
8 and alkali seasonal wetland complexes in CZs 1, 8, or 11 would result in the temporary
9 disturbance of grassland areas that would provide opportunities for colonization by invasive
10 plant species.
- 11 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration, which would take place through
12 conversion of cultivated lands in CZs 2 and 4, would result in the temporary disturbance of
13 fallow agricultural areas that would provide opportunities for colonization by invasive plant
14 species. These adverse effects would be reduced by monitoring the development of marsh
15 vegetation to determine if nonnative vegetation needs to be controlled to facilitate the
16 establishment of native marsh vegetation or if restoration success could be improved with
17 supplemental plantings of native species. If indicated by monitoring, nonnative vegetation
18 control measures and supplemental plantings would be implemented.
- 19 ● *Avoidance and Minimization Measures: AMM6 Disposal and Reuse of Spoils* would have adverse
20 effects if spoils, RTM, dredged material, or chipped vegetative materials containing viable
21 invasive plant propagules are used as topsoil in uninfested areas.

22 The adverse effects that would result from the introduction and spread of invasive plants through
23 colonization of temporarily disturbed areas would be minimized by implementation of *CM11, AMM4*
24 *Erosion and Sediment Control Plan, AMM10 Restoration of Temporarily Affected Natural Communities,*
25 and *AMM11 Covered Plant Species*.

26 *CM11 Natural Communities Enhancement and Management* would reduce these adverse effects by
27 implementing invasive plant control within the BDCP reserve system to decrease competition with
28 native species, thereby improving conditions for covered species, ecosystem function, and native
29 biodiversity. The invasive plant control efforts would target new infestations that are relatively easy
30 to control or the most ecologically damaging nonnative plants for which effective suppression
31 techniques are available. In aquatic and emergent wetland communities, Brazilian waterweed,
32 perennial pepperweed, barbgrass, and rabbitsfoot grass would be controlled and tidal mudflats
33 would be maintained. In riparian areas, invasive plant control would focus on reducing or
34 eliminating species such as Himalayan blackberry, giant reed, and perennial pepperweed. In
35 grassland areas, techniques such as grazing and prescribed burning may be used to decrease the
36 cover of invasive plant species.

37 Implementation of *AMM4, AMM10, and AMM11* would also reduce the adverse effects that could
38 result from construction activities. The *AMMs* provide methods to minimize ground disturbance,
39 guidance for developing restoration and monitoring plans for temporary construction effects, and
40 measures to minimize the introduction and spread of invasive plants. *AMM4* would include the
41 preparation and implementation of an erosion and sediment control plan that would control erosion
42 and sedimentation and restore soils and vegetation in affected areas. The restoration and
43 monitoring plans for implementation of *AMM10* would include methods for stockpiling, storing, and
44 restoring topsoil, revegetating disturbed areas, monitoring and maintenance schedules, adaptive

1 management strategies, reporting requirements, and success criteria. AMM10 would also involve
2 planting native species appropriate for the natural community being restored, except at some
3 borrow sites in cultivated lands that would be restored as grasslands.

4 AMM11 specifies that the BDCP Implementation Office would retain a qualified botanist or weed
5 scientist prior to clearing operations to determine if affected areas contain invasive plants. If areas
6 to be cleared do contain invasive plants, then chipped vegetation material from those areas would
7 not be used for erosion control but would be disposed to minimize the spread of invasive plant
8 propagules (e.g., burning, composting). During construction of the water conveyance facilities and
9 construction activities associated with the other CMs, construction vehicles and construction
10 machinery would be cleaned prior to entering construction sites that are in or adjacent natural
11 communities other than cultivated lands and prior to entering any BDCP restoration sites or
12 conservation lands other than cultivated lands. Vehicles working in or travelling off paved roads
13 through areas with infestations of invasive plant species would be cleaned before travelling to other
14 parts of the study area. Cleaning stations would be established at the perimeter of BDCP covered
15 activities along construction routes as well as at the entrance to reserve system lands. Biological
16 monitoring would include locating and mapping locations of invasive plant species within the
17 construction areas during the construction phase and the restoration phase. Infestations of invasive
18 plant species would be targeted for control or eradication as part of the restoration and revegetation
19 of temporarily disturbed construction areas.

20 **NEPA Effects:** The implementation of AMM4, AMM10, AMM11, and CM11 would reduce the
21 potential for the introduction and spread of invasive plants and avoid or minimize the potential
22 effects on natural communities and special-status species; therefore, these effects would not be
23 adverse.

24 **CEQA Conclusion:** Under Alternative 1A, impacts on natural communities from the introduction or
25 spread of invasive plants as a result of implementing BDCP CM1-CM11 and AMM4, AMM10 and
26 AMM11 would not result in the long-term degradation of a sensitive natural community due to
27 substantial alteration of site conditions and would, therefore, be considered less than significant. No
28 mitigation would be required.

29 **Compatibility with Plans and Policies**

30 **Impact BIO-187: Compatibility of the Proposed Water Conveyance Facilities and Other** 31 **Conservation Measures with Federal, State, or Local Laws, Plans, Policies, or Executive Orders** 32 **Addressing Terrestrial Biological Resources in the Study Area**

33 Constructing the water conveyance facilities (CM1) and implementing CM2–CM21 for Alternative 1A
34 have the potential for being incompatible with plans and policies related to managing and protecting
35 terrestrial biological resources of the study area. A number of laws, plans, policies, programs, and
36 executive orders that are relevant to actions in the study area provide guidance for terrestrial
37 biological resource issues as overviewed in Section 12.2, *Regulatory Setting*. This overview of plan
38 and policy compatibility evaluates whether Alternative 1A would be compatible or incompatible
39 with such enactments, rather than whether impacts would be adverse or not adverse, or significant
40 or less than significant. If the incompatibility relates to an applicable plan, policy, or executive order
41 adopted to avoid or mitigate terrestrial biological resource effects, then an incompatibility might be
42 indicative of a related significant or adverse effect under CEQA and NEPA, respectively. Such
43 physical effects of Alternative 1A on terrestrial biological resources are addressed under the impacts

1 on natural communities and species. The following is a summary of compatibility evaluations
2 related to terrestrial biological resources for laws, plans, policies, and executive orders relevant to
3 the BDCP.

4 **Federal and State Legislation**

- 5 ● The federal *Clean Water Act*, *Endangered Species Act*, *Fish and Wildlife Coordination Act*,
6 *Migratory Bird Treaty Act*, *Rivers and Harbors Act* and *Marine Mammal Protection Act* all contain
7 legal guidance that either directly or indirectly promotes or stipulates the protection and
8 conservation of terrestrial biological resources in the process of undertaking activities that
9 involve federal decisionmaking. The biological goals and objectives contained in the BDCP that
10 provide the major guidance for implementing the various conservation elements of Alternative
11 1A are all designed to promote the long-term viability of the natural communities, special-status
12 species, and common species that inhabit the Plan Area. While some of the conservation
13 measures of the alternative involve permanent and temporary loss of natural communities and
14 associated habitats during facilities construction and expansion of certain natural communities,
15 the long-term guidance in the Plan would provide for the long-term viability and expansion of
16 the habitats and special-status species populations in the Plan Area. Alternative 1A conservation
17 actions would be compatible with the policies and directives for terrestrial biological resources
18 contained in these federal laws.
- 19 ● The *California Endangered Species Act*, *California Native Plant Protection Act*, *Porter-Cologne*
20 *Water Quality Control Act*, and *Natural Communities Conservation Planning Act* are state laws
21 that have relevance to the management and protection of terrestrial biological resources in the
22 study area. Each of these laws promotes consideration of wildlife and native vegetation either
23 through comprehensive planning or through regulation of activities that may have an adverse
24 effect on the terrestrial and aquatic natural resources of the state. The BDCP, which is the basis
25 for Alternative 1A, contains biological goals and objectives that have been developed to promote
26 the species protection and natural resource conservation that are directed by these state laws.
27 Alternative 1A conservation actions would be compatible with the policies and directives
28 contained in these laws.
- 29 ● The *Johnston-Baker-Andal-Boatwright Delta Protection Act of 1992 (Delta Protection Act)* and the
30 *Sacramento-San Joaquin Delta Reform Act*, which updated the Delta Protection Act, promote the
31 maintenance and protection of natural resources and the protection of agricultural land uses in
32 the Delta's primary zone through the goals and policies contained in the 2009 updated Land Use
33 and Resources Management Plan (LURMP). While nothing in the LURMP is binding on state
34 agencies that are BDCP proponents, the LURMP does promote restoration and enhancement of
35 habitats for the terrestrial and aquatic species of the Delta on public land. The BDCP biological
36 goals and objectives would be compatible with these LURMP goals (Delta Protection
37 Commission 2010).
- 38 ● The *Suisun Marsh Preservation Act* of 1974 was designed to protect the Suisun Marsh for long-
39 term use as wildlife habitat, with a goal of preserving and enhancing the quality and diversity of
40 the Marsh's aquatic and wildlife habitats. The BDCP and its plans for protection and restoration
41 of tidal marsh habitats in Suisun Marsh would be compatible with the intent of the Suisun Marsh
42 Preservation Act.

1 **Plans, Programs, and Policies**

- 2 • *The Delta Plan*, which was developed by the Delta Stewardship Council in compliance with the
3 2009 Sacramento-San Joaquin Delta Reform Act, is mandated to achieve two co-equal goals:
4 provide for a more reliable water supply for California and protect, restore, and enhance the
5 Delta ecosystem. The co-equal goals are to be achieved in a manner that protects and enhances
6 the unique cultural, recreational, natural resource, and agricultural values of the Delta as an
7 evolving place. The BDCP is intended to become a component of the Delta Plan. The Delta
8 Stewardship Council will determine whether the BDCP is compatible with the goals and
9 objectives of the Delta Plan prior to its incorporation into the Plan. The compatibility of the
10 BDCP with the Delta Plan is considered in detail in Section 13.2.2.2 of Chapter 13, *Land Use*.
- 11 • *California Wetlands Conservation Policy*, which was adopted by Executive Order in 1993,
12 promotes a long-term gain in the quantity, quality and permanence of wetlands acreages and
13 values in California. The BDCP conservation measures that provide for a significant expansion of
14 wetland acreage and quality in the Delta and Suisun Marsh are compatible with the intent of the
15 California Wetlands Conservation Policy.
- 16 • *The North American Waterfowl Management Plan (NAWMP)* and *Central Valley Joint Venture*
17 *(CVJV)* strive to maintain and expand wetlands and uplands for waterfowl and shorebirds in the
18 major basins of California's Central Valley. The NAWMP is a management plan jointly approved
19 by the United States and Canada in 1986. It contains general guidance from the principal wildlife
20 management agencies of the two countries for sustaining abundant waterfowl populations by
21 conserving landscapes through self-directed partnerships (joint ventures) that are guided by
22 sound science. The CVJV is the joint venture established for overseeing NAWMP implementation
23 in the Central Valley. The CVJV is made up of 21 conservation organizations, state and federal
24 government agencies, and one corporation that have formed a partnership to improve the
25 habitat conditions for breeding and nonbreeding waterfowl, breeding and nonbreeding
26 shorebirds, waterbirds, and riparian-dependent songbirds in the Central Valley. The CVJV's
27 2006 Implementation Plan (Central Valley Joint Venture 2006) establishes conservation
28 objectives and priorities for these bird groups within the basins of the Central Valley. The BDCP
29 Plan Area includes all or portions of three Implementation Plan basins—the Delta, Yolo and
30 Suisun basins. The 2006 Implementation Plan contains basin-specific objectives for wetland
31 restoration, protection of existing wetland habitats, wetland enhancement, adequate power and
32 water supplies for wetland management, agricultural land enhancement, farmland easements
33 that maintain waterfowl food resources on agricultural land, and farmland easements that
34 buffer existing wetlands from urban and residential growth.

35 Implementation of the Alternative 1A conservation measures would result in significant
36 reductions in cultivated land and managed wetland acreage in the Delta, Yolo and Suisun basins;
37 however, significant increases in tidal and nontidal wetlands in these basins would be another
38 result. Because of the large conversion of managed wetland in the Suisun basin, the BDCP has
39 included a large managed wetland conservation and enhancement goal for this area. For the
40 Suisun basin conversions to be compatible with the 2006 Implementation Plan goals, this
41 EIR/EIS has added mitigation that would require food production studies and adaptive
42 management to ensure that the Suisun basin would continue to provide the waterfowl and
43 shorebird habitat envisioned in the Implementation Plan.

- 1 • *Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan, Cosumnes River Preserve*
2 *Management Plan, Brannan Island and Franks Tract State Recreation Areas General Plan, Yolo*
3 *Bypass Wildlife Area Land Management Plan, Grizzly Island Wildlife Area Management Plan, and*
4 *the Lower Sherman Island Wildlife Area Land Management Plan* are primarily designed to
5 preserve and enhance the natural resource and recreation qualities of these areas.
6 Implementing Alternative 1A, especially construction of CM1 and CM2 facilities, and land
7 modification associated with CM4 restoration activities, could create temporary disruptions to
8 the terrestrial biological resource management activities in these management areas. The
9 ultimate goals of aquatic and terrestrial habitat enhancement and restoration contained in the
10 BDCP would be compatible with the long-term management goals of these areas. Proposed
11 restoration areas in the Yolo Bypass, on Sherman Island, and in Suisun Marsh would be designed
12 to be compatible with and to complement the current management direction for these areas and
13 would be required to adapt restoration proposals to meet current policy established for
14 managing these areas.
- 15 • *Suisun Marsh Preservation Agreement and Suisun Marsh Plan* are the most recent efforts by the
16 state and federal agencies responsible for Suisun Marsh (the Marsh) to maintain its long-term
17 viability as managed wetlands and wildlife habitat, consistent with the Suisun Marsh
18 Preservation Act. The Suisun Marsh Preservation Agreement (SMPA) was signed in 1987 and
19 modified in 2005 by DWR, CDFW, Reclamation and the Suisun Resource Conservation District to
20 establish the mitigation approach in the Marsh for effects of operating the SWP and CVP. The
21 primary concerns were the effects of CVP and SWP Delta diversions on salinity in the Marsh. The
22 SMPA focused on ways to ensure adequate water quality and quantity for the managed wetlands
23 and wildlife habitats in the Marsh to assure equal waterfowl values in the Marsh. The Suisun
24 Marsh Plan, for which a Final EIS/EIR was released in 2010 by these agencies, provides for
25 restoration of tidal marsh habitat and enhancement of managed wetland in the Marsh,
26 maintenance of waterfowl hunting and recreational opportunities in the Marsh, maintenance
27 and improvement of the Marsh levee system, and protection and enhancement of water quality
28 for beneficial uses of the Marsh. An integral component of the Suisun Marsh Plan is balancing
29 continued managed wetland operation with new tidal wetland restoration to provide improved
30 and greater habitat for fish and wildlife species. The Suisun Marsh Plan is a programmatic, long-
31 term plan and does not include specific projects, project proponents, or funding
32 mechanisms. However, the Suisun Marsh Plan relies on tidal restoration to allow for managed
33 wetland operations to continue. The BDCP would provide a funding mechanism and increased
34 management potential relative to existing and restored habitats, assisting the Suisun Marsh Plan
35 in meeting its broader ecological goals, consistent with long-term operation of the SWP and CVP
36 water conveyance facilities. The conservation actions contained in the BDCP, which are designed
37 to ensure the long-term protection and recovery of special-status fish and wildlife species
38 dependent on the Marsh, would be compatible with the water quality and habitat restoration
39 goals of the SMPA and Suisun Marsh Plan.
- 40 • *California Aquatic Invasive Species Management Plan* does not address terrestrial invasive
41 species. Implementation of the Plan's long-term control and management objectives affect
42 terrestrial species that utilize study area aquatic habitats. These effects are positive in that Plan
43 objectives are to control and remove invasive aquatic species that are detrimental to native
44 aquatic and terrestrial species. Implementation of BDCP's conservation actions would be
45 undertaken with the goal of avoiding any further spread of aquatic invasive species. Alternative
46 1A would, therefore, be compatible with the objectives of the California Aquatic Invasive Species
47 Management Plan.

- 1 • *Habitat Conservation Plans and Natural Community Conservation Plans* are the subject of a
2 detailed analysis at the end of this chapter. The analysis considers the compatibility of the BDCP
3 with all HCPs and NCCPs that share planning area with the BDCP Plan Area.

4 ***Executive Orders***

- 5 • *Executive Order 11990: Protection of Wetlands* requires all federal agencies to consider wetland
6 protection in their policies and actions. The BDCP proposes to protect, enhance and expand the
7 wetlands of the Plan Area, and, therefore, would be compatible with Executive Order 11990.
- 8 • *Executive Order 13112: Invasive Species* directs federal agencies to prevent and control the
9 introduction and spread of invasive species in a cost-effective and environmentally sound
10 manner. Alternative 1A construction and restoration actions have the potential to both
11 introduce and spread invasive species in the study area. Implementation of mitigation measures
12 described in this chapter would be capable of making Alternative 1A implementation compatible
13 with Executive Order 13112.
- 14 • *Executive Order 113443: Facilitation of Hunting Heritage and Wildlife Conservation* directs
15 federal agencies whose activities affect public land management, outdoor recreation, and
16 wildlife management to facilitate the expansion and enhancement of hunting opportunities, and
17 the management of game species and their habitat. Alternative 1A conservation measures that
18 involve conversion of cultivated land and managed wetland to tidal and nontidal wetlands and
19 other natural communities would conflict with the hunting expansion and enhancement aspects
20 of this executive order. Refer to Chapter 15, *Recreation*, for a detailed analysis of the effects of
21 alternatives on hunting opportunities. The habitat protection and expansion conservation
22 measures of Alternative 1A would be compatible with the executive order's goal of facilitating
23 the management of habitats for some game species.

24 ***CEQA Conclusion:*** The potential plan and policy incompatibilities of implementing Alternative 1A
25 identified in the analysis above indicate the potential for a physical consequence to the environment.
26 The primary physical consequence of concern is the conversion of large acreages of cultivated land
27 and managed wetland to natural wetland and riparian habitat in the study area. The physical effects
28 are discussed in the *Shorebirds and Waterfowl* analysis above, and no additional CEQA conclusion is
29 required related to the compatibility of the alternative with relevant plans and polices. The reader is
30 referred to Section 13.2.3 of Chapter 13, *Land Use*, for a further discussion of the responsibilities of
31 state and federal agencies to comply with local regulations, and for a discussion of the relationship
32 between plan and policy consistency and physical consequences to the environment.

12.3.3.3 Alternative 1B—Dual Conveyance with East Alignment and Intakes 1–5 (15,000 cfs; Operational Scenario A)

Section 3.5.3 in Chapter 3, *Description of Alternatives*, fully describes Alternative 1B, and Figure 3-4 depicts the alternative.

Natural Communities

Tidal Perennial Aquatic

Construction, operation, maintenance and management associated with the Alternative 1B conservation components would have no long-term adverse effects on the habitats associated with the tidal perennial aquatic natural community. Initial development and construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal or modification of this community (see Table 12-1B-1). Full implementation of Alternative 1B would also include the following conservation actions over the term of the BDCP to benefit the tidal perennial aquatic natural community (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- Restore and protect 65,000 acres of tidal natural communities and transitional uplands to accommodate sea level rise (Objective L1.3, associated with CM4).
- Within the restored and protected tidal natural communities and transitional uplands, restore or create tidal perennial aquatic natural community as necessary when creating tidal emergent wetland (Objective TPANC1.1, associated with CM4).
- Control invasive aquatic vegetation that adversely affects native fish habitat (Objective TPANC2.1, associated with CM13).

There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section 3.3 that would improve the value of tidal perennial aquatic natural community for terrestrial species. As explained below, with the restoration and enhancement of these amounts of habitat, in addition to AMMs, impacts on tidal aquatic natural community would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Note that two time periods are represented in Table 12-1B-1 and the other tables contained in the analysis of Alternative 1B. The near-term (NT) acreage effects listed in the table would occur over the first 10 years of Plan implementation. The late long-term (LLT) effects contained in these tables represent the cumulative effects of all activities over the entire 50-year term of the Plan. This table and all impact tables in the chapter include reference to only those CMs that would eliminate natural community acreage either through construction or restoration activities, or would result in periodic inundation of the community. Table 3-4 in Chapter 3, *Description of Alternatives*, describes the implementation schedule for all natural community protection and restoration conservation measures.

1 **Table 12-1B-1. Changes in Tidal Perennial Aquatic Natural Community Associated with Alternative**
2 **1B (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	33	33	145	145	0	0
CM2	8	8	11	11	9-36	0
CM4	11	18	0	0	0	0
CM5	0	2	0	5	0	39
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	52	61	156	161	9-36	39

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-1: Changes in Tidal Perennial Aquatic Natural Community as a Result of**
5 **Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,
7 CM4, CM5, and CM6 would permanently affect an estimated 61 acres and temporarily remove 161
8 acres of tidal perennial aquatic natural community in the study area. These modifications represent
9 less than 1% of the 86,263 acres of the community that is mapped in the study area. The majority of
10 the permanent and temporary effects would happen during the first 10 years of Alternative 1B
11 implementation, as water conveyance facilities are constructed and habitat restoration is initiated.
12 Natural communities restoration would add 8,300 acres of tidal wetlands, including an estimated
13 3,400 acres of tidal perennial aquatic natural community during the same period, which would
14 expand the area of that habitat and offset the losses. The 3,400-acre increase is estimated, based on
15 modeling reported in BDCP Appendix 3.B, Table 5, by comparing existing Plan Area subtidal habitat
16 to near-term subtidal habitat with the Plan. The BDCP beneficial effects analysis (BDCP Chapter 5,
17 Section 5.4.1.2) indicates that, while there would be no minimum restoration requirement for the
18 tidal perennial aquatic natural community, an estimated approximately 27,000 acres of tidal
19 perennial aquatic natural community would be restored based on tidal restoration modeling. This
20 estimate is based on Table 5 in BDCP Appendix 3.B, subtracting late long-term acreage without
21 project from late long-term acreage with project.

22 The individual effects of each relevant conservation measure are addressed below. A summary
23 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
24 conservation measure discussions.

- 1 ● *CM1 Water Facilities and Operation*: Construction of the Alternative 1B water conveyance
2 facilities would permanently remove 33 acres and temporarily remove 145 acres of tidal
3 perennial aquatic community. Most of the permanent loss would occur where Intakes 1–5
4 encroach on the Sacramento River’s east bank between Freeport and Courtland (see Terrestrial
5 Biology Mapbook, a support document to the EIS/EIR, for a detailed view of proposed facilities
6 overlain on natural community mapping). The footings and the screens at the intake sites would
7 be placed into the river margin and would displace moderately deep to shallow, flowing open
8 water with a mud substrate and very little aquatic vegetation. Small areas of this community
9 would also be lost to canal construction approximately 1.2 miles south of Hood Franklin Road
10 and immediately west of Stone Lakes NWR (less than 1 acre), and at crossings of a canal and
11 connecting slough just south of Lambert Road and west of the railroad tracks. The temporary
12 effects on tidal perennial aquatic habitats would occur at numerous locations, including in the
13 Sacramento River at Intakes 1–5, and at temporary siphon construction work areas where the
14 canal would cross Beaver Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment
15 Slough and Middle River just southeast of Victoria Canal. Tunnel work areas and transmission
16 construction sites at the junction of the new canal and the new Byron Court Forebay would also
17 temporarily affect West Canal, Grant Line Canal and Old River just south of Clifton Court
18 Forebay. The details of these locations can be seen in the Terrestrial Biology Mapbook. These
19 losses would take place during the near-term construction period.
- 20 ● *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
21 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
22 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
23 Sacramento Weir improvements. Some of these activities could involve excavation and grading
24 in tidal perennial aquatic areas to improve passage of fish through the bypasses. Based on
25 hypothetical construction footprints, a total of 8 acres could be permanently lost and another 11
26 acres could be temporarily removed. This activity would occur primarily in the near-term
27 timeframe.
- 28 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
29 footprints, implementation of CM4 would affect 18 acres of tidal perennial aquatic community.
30 CM4 involves conversion of existing natural communities to a variety of tidal wetlands,
31 including tidal perennial aquatic, tidal brackish emergent, and tidal freshwater emergent
32 wetlands. Specific locations for these conversions are not known. The 18 acres could remain
33 tidal perennial aquatic with a modified tidal prism, or they could eventually be converted to one
34 of the other tidal wetland types. For purposes of this analysis, a conservative approach has been
35 taken and the effect has been discussed simultaneously with the habitat losses associated with
36 other conservation measures.

37 An estimated 65,000 acres of tidal wetlands and transitional uplands would be restored during
38 tidal habitat restoration, consistent with BDCP Objective L1.3. Of these acres, an estimated
39 27,000 acres of tidal perennial aquatic habitat would be restored, based on modeling conducted
40 by ESA PWA (refer to Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*).
41 This restoration would be consistent with BDCP Objective TPANC1.1. Approximately 3,400 acres
42 of the restoration would happen during the first 10 years of Alternative 1B implementation,
43 which would coincide with the timeframe of water conveyance facilities construction. The
44 remaining restoration would be spread over the following 30 years. Tidal natural communities
45 restoration is expected to be focused in the ROAs identified in Figure 12-1. Some of the

1 restoration would occur in the lower Yolo Bypass, but restoration would also be spread among
2 the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.

- 3 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
4 would permanently remove 2 acres and temporarily remove 5 acres of tidal perennial aquatic
5 habitat. The construction-related losses would be considered a permanent removal of the tidal
6 perennial aquatic habitats directly affected. This activity is scheduled to start following
7 construction of water conveyance facilities, which is expected to take 10 years. Specific locations
8 for the floodplain restoration have not been identified, but it is expected that much of the
9 activity would occur in the south Delta along the major rivers. Floodplain restoration along the
10 San Joaquin River would improve connectivity for a variety of species that rely on tidal
11 perennial aquatic habitat. The regional and Plan Area landscape linkages along the San Joaquin
12 River are included in Figure 12-2.
- 13 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
14 of small amounts of tidal perennial aquatic habitat along 20 miles of river and sloughs. The
15 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity
16 would occur on tidal perennial aquatic habitat margins, including levees and channel banks. The
17 improvements would occur within the study area on sections of the Sacramento, San Joaquin
18 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

19 The following paragraphs summarize the combined effects discussed above and describe other
20 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
21 also included.

22 ***Near-Term Timeframe***

23 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would
24 affect the tidal perennial aquatic community through CM1 construction losses (33 acres permanent
25 and 145 acres temporary) and the CM2 construction losses (8 acres permanent and 11 acres
26 temporary). The habitat would be lost primarily along the Sacramento River at intake sites, at
27 slough crossings along the eastern canal alignment, or in the northern Yolo Bypass. Approximately
28 11 acres of the inundation and construction-related effects resulting from CM4 would occur during
29 the near-term throughout the ROAs mapped in Figure 12-1.

30 The construction losses of this special-status natural community would represent an adverse effect
31 if they were not offset by avoidance and minimization measures and restoration actions associated
32 with BDCP conservation components. Loss of tidal perennial aquatic natural community would be
33 considered both a loss in acreage of a sensitive natural community and a loss of waters of the United
34 States as defined by Section 404 of the CWA. The creation of approximately 3,400 acres of high-
35 quality tidal perennial aquatic natural community as part of CM4 during the first 10 years of
36 Alternative 1B implementation would offset this near-term loss, avoiding any adverse effect. Typical
37 project-level mitigation ratios (1:1 for restoration) would indicate 248 acres of restoration would be
38 needed to offset (i.e., mitigate) the 248 acres of effect (the total permanent and temporary near-term
39 effects listed in Table 12-1B-1) associated with near-term activities, including water conveyance
40 facilities construction.

41 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
42 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
43 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of

1 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
2 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
3 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

4 ***Late Long-Term Timeframe***

5 Implementation of Alternative 1B as a whole would result in relatively minor (less than 1%)
6 conversions or losses of tidal perennial aquatic community in the study area. These losses or
7 conversions (101 acres of permanent and 161 acres of temporary loss) would be largely associated
8 with construction of the water conveyance facilities (CM1), construction of Yolo Bypass fish
9 improvements (CM2), and inundation during tidal marsh restoration (CM4). Inundation conversions
10 would occur over the course of the Plan's restoration activities at various tidal restoration sites
11 throughout the study area. By the end of the Plan timeframe, a total of 27,000 acres of high-value
12 tidal perennial aquatic natural community would be restored over a wide region of the study area,
13 including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Slough, and South Delta ROAs (see
14 Figure 12-1). The restoration acreage has been estimated from Table 5 in BDCP Appendix 3.B, *BDCP*
15 *Tidal Habitat Evolution Assessment*.

16 ***NEPA Effects:*** The creation of approximately 3,400 acres of high-value tidal perennial aquatic
17 natural community as part of CM4 during the first 10 years of BDCP implementation would offset
18 near-term losses associated with construction activities for CM1, CM2, CM4 and CM6, avoiding any
19 adverse effect. Alternative 1B, which includes restoration of an estimated 27,000 acres of this
20 natural community over the course of the Plan, would not result in a net long-term reduction in the
21 acreage of a sensitive natural community; the effect would be beneficial.

22 ***CEQA Conclusion:***

23 ***Near-Term Timeframe***

24 Alternative 1B would result in the loss or conversion of approximately 248 acres of tidal perennial
25 aquatic natural community due to construction of the water conveyance facilities (CM1) and fish
26 passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The
27 construction losses would be primarily along the Sacramento River at intake sites, at slough
28 crossings during canal construction, and within the northern section of the Yolo Bypass, while
29 inundation conversions would be at various tidal restoration sites throughout the study area. The
30 losses and conversions would be spread across the 10-year near-term timeframe. These losses and
31 conversions would be offset by planned restoration of an estimated 3,400 acres of high-value tidal
32 perennial aquatic natural community scheduled for the first 10 years of Alternative 1B
33 implementation (CM4). AMM1, AMM2, AMM6, AMM7, and AMM10 would also be implemented to
34 minimize impacts. Because of these offsetting near-term restoration activities and AMMs, impacts
35 would be less-than-significant. Typical project-level mitigation ratios (1:1 for restoration) would
36 indicate that 248 acres of restoration would be needed to offset (i.e., mitigate) the 248 acres of loss
37 or conversion. The restoration would be initiated at the beginning of Alternative 1B implementation
38 to minimize any time lag in the availability of this habitat to special-status species, and would result
39 in a net gain in acreage of this sensitive natural community.

40 ***Late Long-Term Timeframe***

41 At the end of the Plan period, 262 acres of the natural community would be lost or converted and an
42 estimated 27,000 acres of this community would be restored. There would be no net permanent

1 reduction in the acreage of this sensitive natural community within the study area. Therefore,
2 Alternative 1B would not have a substantial adverse effect on this natural community; the impact
3 would be beneficial.

4 **Impact BIO-2: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 5 **Perennial Aquatic Natural Community**

6 Two Alternative 1B conservation measures would modify the water depths and inundation regimes
7 of both natural and man-made waterways in the study area. CM2, which is designed to improve fish
8 passage and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic
9 inundation of tidal perennial aquatic natural community on small acreages, while CM5 would expose
10 this community to additional flooding as channel margins are modified and levees are set back to
11 improve fish habitat along some of the major rivers and waterways throughout the study area.

12 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1B
13 would result in an increase in the frequency, magnitude and duration of inundation-related
14 changes in water depth and velocity of 9–36 acres of tidal perennial aquatic natural community.
15 The methods used to estimate these inundation acreages are described in BDCP Appendix 5.J,
16 *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected by
17 inundation would vary with the flow volume that would pass through the newly-constructed
18 notch in the Fremont Weir. The 9-acre increase in inundation would be associated with a notch
19 flow of 1,000 cfs, and the 36-acre increase would result from a notch flow of 4,000 cfs. Plan-
20 related increases in flow through Fremont Weir would be expected in 30% of the years. Most of
21 the tidal perennial aquatic community occurs in the southern section of the bypass on Liberty
22 Island, and, to a lesser extent, along the eastern edge of the bypass, including the Tule Canal/Toe
23 Drain. The anticipated change in management of flows in the Yolo Bypass includes more
24 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some
25 years, later releases into the bypass in spring months (April and May). The modification of
26 periodic inundation events would be expected to be beneficial to the ecological function of tidal
27 perennial aquatic habitat in the bypass as it relates to BDCP covered aquatic species. The Yolo
28 Bypass waterway is the key element in the Yolo Bypass landscape linkage mapped in Figure 12-
29 2 and described in detail in BDCP Chapter 3, Table 3.2-3. The change in periodic inundation in
30 the bypass would not substantially modify its value for special-status or common terrestrial
31 species. Water depths and water flow rates would increase over Existing Conditions and the No
32 Action condition in approximately 30% of the years, but it would not fragment the habitat or
33 make it less accessible to special-status or common terrestrial species. The modifications would
34 not result in a loss of this community. The plant species associated with this community are
35 adapted to inundation. The extended inundation would be designed to expand foraging and
36 spawning habitat for Delta fishes. The effects of these changes in the inundation regime on
37 terrestrial species that rely on tidal perennial aquatic habitats are discussed in detail later in this
38 chapter, under the individual species assessments.

39 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
40 increase in the frequency and duration of flooding of 39 acres of tidal perennial aquatic habitat.
41 Specific locations for this restoration activity have not been identified, but they would likely be
42 focused in the south Delta area, along the major rivers and Delta channels. The more frequent
43 exposure of these wetlands to stream flooding events would be beneficial to the ecological
44 function of tidal perennial aquatic habitats, especially as they relate to BDCP target aquatic

1 species. The plant species associated with these tidal perennial aquatic areas are adapted to
2 inundation and would not be substantially modified.

3 In summary, 48–75 acres of tidal perennial aquatic community in the study area would be subjected
4 to more frequent increases in water depth and velocity as a result of implementing two Alternative
5 1B conservation measures (CM2 and CM5). Tidal perennial aquatic community is already, by
6 definition, permanently inundated aquatic habitat of value to terrestrial and aquatic species in the
7 study area; periodic inundation would not result in a net permanent reduction in the acreage of this
8 community in the study area.

9 **NEPA Effects:** Increasing periodic inundation of tidal perennial aquatic natural community
10 associated with Alternative 1B would not have an adverse effect on the community.

11 **CEQA Conclusion:** An estimated 48–75 acres of tidal perennial aquatic community in the study area
12 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under
13 Alternative 1B. Tidal perennial aquatic community is already, by definition, permanently inundated
14 aquatic habitat of value to terrestrial and aquatic species in the study area. The periodic inundation
15 would not result in a net permanent reduction in the acreage of this community in the study area.
16 Therefore, there would no substantial adverse effect on the community. The impact would be less
17 than significant.

18 **Impact BIO-3: Modification of Tidal Perennial Aquatic Natural Community from Ongoing** 19 **Operation, Maintenance and Management Activities**

20 Once the physical facilities associated with Alternative 1B are constructed and the stream flow
21 regime associated with changed water management is in effect, there would be new ongoing and
22 periodic actions associated with operation, maintenance and management of the water conveyance
23 facilities and conservation lands that could affect tidal perennial aquatic natural community in the
24 study area. The ongoing actions include modifications in the release of water from upstream
25 reservoirs in the Sacramento River system, the diversion of Sacramento River flows in the north
26 Delta, and reduced diversions from south Delta channels. These actions are associated with CM1
27 (see the impact discussion above for effects associated with CM2). The periodic actions would
28 involve access road and conveyance facility repair, vegetation management at the various water
29 conveyance facilities and habitat restoration sites (CM13), levee and canal repair and replacement of
30 levee armoring, channel dredging, and habitat enhancement in accordance with natural community
31 management plans. The potential effects of these actions are described below.

- 32 • *Modified river flows upstream of and within the study area and reduced diversions from south*
33 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
34 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
35 channels (associated with Operational Scenario A) would not result in the permanent reduction
36 in acreage of a sensitive natural community in the study area. Flow levels in the upstream rivers
37 would not change such that the acreage of tidal perennial aquatic community would be reduced
38 on a permanent basis. Some minor increases and some decreases would be expected to occur
39 during some seasons and in some water-year types, but there would be no permanent loss.
40 Similarly, increased diversions of Sacramento River flows in the north Delta would not result in
41 a permanent reduction in tidal perennial aquatic community downstream of these diversions.
42 Tidal influence on water levels in the Sacramento River and Delta waterways would continue to
43 be dominant. Reduced diversions from the south Delta channels would not create a reduction in
44 this natural community.

1 The periodic changes in flows in the Sacramento River, Feather River, and American River
 2 associated with Alternative 1B operations would affect salinity, water temperature, dissolved
 3 oxygen levels, turbidity, contaminant levels, and dilution capacity in these rivers and Delta
 4 waterways. These changes are discussed in detail in Chapter 8, *Water Quality*. Potentially
 5 substantial increases in electrical conductivity (salinity) are predicted for the Delta and Suisun
 6 Marsh as a result of increased export of Sacramento River water. These salinity changes are not
 7 expected to result in a permanent reduction in the acreage or value of tidal perennial aquatic
 8 natural community for terrestrial species in the study area.

- 9 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
 10 conveyance facilities and levees associated with the BDCP actions have the potential to require
 11 removal of adjacent vegetation and could entail earth and rock work in tidal perennial aquatic
 12 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering tidal
 13 perennial aquatic habitats. These activities would be subject to normal erosion, turbidity and
 14 runoff control management practices, including those developed as part of *AMM2 Construction*
 15 *Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
 16 vegetation removal or earthwork adjacent to or within aquatic habitats would require use of
 17 sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces. Proper
 18 implementation of these measures would avoid permanent adverse effects on this community.
- 19 ● *Vegetation management.* Vegetation management in the form of physical removal and chemical
 20 treatment would be a periodic activity associated with the long-term maintenance of water
 21 conveyance facilities and restoration sites. Vegetation management is also the principal activity
 22 associated with *CM13 Invasive Aquatic Vegetation Control* and is consistent with BDCP Objective
 23 TPANC2.1. Use of herbicides to control nuisance vegetation could pose a long-term hazard to
 24 tidal perennial aquatic natural community at or adjacent to treated areas. The hazard could be
 25 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
 26 onto the natural community, or direct discharge of herbicides to tidal perennial aquatic areas
 27 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
 28 *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce
 29 hazards to humans and the environment from use of various chemicals during maintenance
 30 activities, including the use of herbicides. These commitments are described in Appendix 3B,
 31 including the commitment to prepare and implement spill prevention, containment, and
 32 countermeasure plans and stormwater pollution prevention plans. Best management practices,
 33 including control of drift and runoff from treated areas, and use of herbicides approved for use
 34 in aquatic environments would also reduce the risk of affecting natural communities adjacent to
 35 water conveyance features and levees associated with restoration activities.

36 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
 37 normal ecological function of tidal aquatic habitats in planned restoration areas. The treatment
 38 activities would be conducted in concert with the California Department of Boating and
 39 Waterways' invasive species removal program. Eliminating large stands of water hyacinth and
 40 Brazilian waterweed would improve habitat conditions for some aquatic species by removing
 41 cover for nonnative predators, improving water flow and removing barriers to movement (see
 42 Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also benefit terrestrial
 43 species that use tidal perennial aquatic natural community for movement corridors and for
 44 foraging. Vegetation management effects on individual species are discussed in the species
 45 sections on following pages.

- 1 • *Channel dredging.* Long-term operation of the Alternative 1B intakes on the Sacramento River
2 would include periodic dredging of sediments that might accumulate in front of intake screens.
3 The dredging would occur in tidal perennial aquatic natural community and would result in
4 short-term increases in turbidity and disturbance of the substrate. These conditions would not
5 eliminate the community, but would diminish its value for special-status and common species
6 that rely on it for movement corridor or foraging area. The individual species effects are
7 discussed later in this chapter.
- 8 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
9 communities within the Plan Area (CM11). For tidal perennial aquatic natural community, a
10 management plan would be prepared that specifies actions to improve the value of the habitats
11 for covered species. Actions would include control of invasive nonnative plant and animal
12 species, restrictions on vector control and application of herbicides, and maintenance of
13 infrastructure that would allow for movement through the community. The enhancement efforts
14 would improve the long-term value of this community for both special-status and common
15 species.

16 The various operations and maintenance activities described above could alter acreage of tidal
17 perennial aquatic natural community in the study area through changes in flow patterns and
18 changes in water quality. Activities could also introduce sediment and herbicides that would reduce
19 the value of this community to common and sensitive plant and wildlife species. Other periodic
20 activities associated with the Plan, including management, protection and enhancement actions
21 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
22 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
23 community. While some of these activities could result in small reductions in acreage, these
24 reductions would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural*
25 *Communities Restoration*. The management actions associated with levee repair, periodic dredging
26 and control of invasive plant species would also result in a long-term benefit to the species
27 associated with tidal perennial aquatic habitats by improving water movement.

28 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
29 Alternative 1B would not result in a net permanent reduction in the tidal perennial aquatic natural
30 community within the study area. Therefore, there would be no adverse effect on this natural
31 community.

32 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would
33 have the potential to create minor losses in total acreage of tidal perennial aquatic natural
34 community in the study area, and could create temporary increases in turbidity and sedimentation.
35 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
36 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize
37 these impacts, and other operations and maintenance activities, including management, protection
38 and enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
39 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
40 improved water movement in these habitats. Long-term restoration activities associated with *CM4*
41 *Tidal Natural Communities Restoration* would greatly expand this natural community in the study
42 area. Ongoing operation, maintenance and management activities would not result in a net
43 permanent reduction in the acreage and value of this sensitive natural community within the study
44 area. Therefore, there would be a less-than-significant impact.

1 **Tidal Brackish Emergent Wetland**

2 Construction, operation, maintenance and management associated with the conservation
3 components of Alternative 1B would have no adverse effect on the habitats associated with the tidal
4 brackish emergent wetland natural community. Habitat restoration and construction associated
5 with CM1, CM2, CM5 and CM6 would not remove tidal brackish emergent wetland; levee breaching
6 and minor construction associated with CM4 may temporarily remove small amounts of this natural
7 community (see Table 12-1B-2). Full implementation of Alternative 1B would include the following
8 conservation actions over the term of the BDCP to benefit the tidal brackish emergent wetland
9 natural community.

- 10 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
11 accommodate sea level rise (Objective L1.3 associated with CM4).
- 12 ● Within the restored and protected tidal natural communities and transitional uplands, include
13 sufficient transitional uplands along the fringes of restored brackish and freshwater tidal
14 emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow for
15 the future upslope establishment of tidal emergent wetland communities (Objective L1.7,
16 associated with CM4).
- 17 ● Within the restored and protected tidal natural communities and transitional uplands, restore
18 or create at least 6,000 acres of tidal brackish emergent wetland in Conservation Zone 11
19 (Objective TBEWNC1.1 associated with CM4).
- 20 ● Restore connectivity to isolated patches of tidal brackish emergent marsh where isolation has
21 reduced effective use of these marshes by the species that depend on them (Objective
22 TBEWNC1.3 associated with CM4).
- 23 ● Create topographic heterogeneity in restored tidal brackish emergent wetland to provide
24 variation in inundation characteristics and vegetative composition (Objective TBEWNC1.4
25 associated with CM4).
- 26 ● Limit perennial pepperweed to no more than 10% cover in tidal brackish emergent wetland
27 natural community within the reserve system (Objective TBEWNC2.1 associated with CM11).

28 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
29 3.3 that would improve the value of tidal brackish emergent wetland natural community for
30 terrestrial species. As explained below, with the restoration and enhancement of these amounts of
31 habitat, in addition to implementation of AMMs, impacts on this natural community would not be
32 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-2. Changes in Tidal Brackish Emergent Wetland Natural Community Associated with**
 2 **Alternative 1B (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0	0
CM4	Unk.	Unk.	Unk.	Unk.	0	0
CM5	0	0	0	0	0	0
CM6	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-4: Changes in Tidal Brackish Emergent Wetland Natural Community as a Result of**
 5 **Implementing BDCP Conservation Measures**

6 Construction of the Alternative 1B water conveyance facilities (CM1) would not affect tidal brackish
 7 emergent wetland natural community.

8 Restoration of tidal marsh habitats associated with CM4 would require site preparation, earthwork,
 9 and other site activities that could remove tidal brackish emergent wetland. Levee modifications,
 10 grading or contouring, filling to compensate for land subsidence, and creation of new channels could
 11 also result in the removal of tidal brackish emergent wetland. All of this construction and land
 12 modification activity that could affect tidal brackish emergent wetland would occur in Suisun Marsh
 13 (CZ 11). The acreage of loss has not been calculated because the specific locations for site
 14 preparation and earthwork have not been identified, but the loss would likely be small (less than 1
 15 acre). These activities would occur in small increments during the course of the CM4 restoration
 16 program. The restoration elements of CM4 would greatly exceed any of the short-term losses
 17 described above. At least 6,000 acres of tidal brackish emergent wetland would be restored in the
 18 Plan Area (BDCP Objective TBEWNC1.1, associated with CM4), with 2,000 acres of restoration
 19 occurring in the near-term timeframe. In addition, the habitat and ecosystem functions of BDCP
 20 restored tidal brackish emergent wetland would be maintained and enhanced (CM11). The BDCP
 21 beneficial effects evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.3.2) states that at least
 22 6,000 acres of tidal brackish emergent wetland community would be restored in CZ 11, and that
 23 tidal natural communities restoration would decrease habitat fragmentation by providing additional
 24 connectivity between isolated patches of tidal brackish emergent wetland. These same conservation
 25 actions would be implemented under Alternative 1B.

1 The restoration activities associated with CM4 in Suisun Marsh would result in other effects that
2 could alter the habitat value of tidal brackish emergent wetland. Disturbances associated with levee
3 breaching and grading or contouring would increase opportunities for the introduction or spread of
4 invasive species. Implementation of CM11 would limit this risk through invasive species control and
5 wetland management and enhancement activities to support native species. Tidal flooding of dry
6 areas could also increase the bioavailability of methylmercury in Suisun Marsh. Site-specific
7 conditions would dictate the significance of this hazard to tidal brackish marsh vegetation and
8 associated wildlife. According to the Suisun Marsh Plan EIR/EIS (Bureau of Reclamation et al. 2010,
9 pg. 5.2-18), marsh creation may generate less methylmercury than is currently being generated by
10 managed wetlands. However, this has not been confirmed through comprehensive studies. Because
11 of the difficulty in assessing this risk at a programmatic level, it will need to be considered at a
12 project level. Site-specific restoration plans that address the creation and mobilization of mercury,
13 and monitoring and adaptive management as described in *CM12 Methylmercury Management*, would
14 be available to address the uncertainty of methylmercury levels in restored tidal marsh.

15 Water temperature fluctuations in newly created marsh and the potential for increased nitrogen
16 deposition associated with construction vehicles are also issues of concern that are difficult to
17 quantify at the current stage of restoration design. None of these effects is expected to limit the
18 extent or value of tidal brackish emergent wetland in the study area.

19 **NEPA Effects:** The increase of tidal brackish emergent wetland associated with CM4 would be a
20 beneficial effect on the natural community.

21 **CEQA Conclusion:** Tidal brackish emergent wetland natural community could experience small
22 losses in acreage in Suisun Marsh (CZ 11) as a result of the large-scale tidal marsh restoration
23 planned as part of CM4. These losses (expected to not exceed 1 acre) would be associated with levee
24 modification, site preparation and other earthwork needed to expose diked lands to tidal influence.
25 Because at least 6,000 acres of tidal brackish emergent wetland would be restored in the study area
26 as part of CM4, including 2,000 acres restored in the near-term timeframe, there would be a large
27 increase in tidal brackish emergent wetland both in the near-term and over the life of the Plan.
28 Indirect effects associated with the expansion of tidal brackish emergent wetland natural
29 community, including the potential spread of invasive species, the generation of methylmercury,
30 increases in marsh water temperatures, and increased nitrogen deposition are not expected to have
31 a significant impact on this natural community in the study area. Therefore, this impact would be
32 beneficial.

33 **Impact BIO-5: Modification of Tidal Brackish Emergent Wetland Natural Community from** 34 **Ongoing Operation, Maintenance and Management Activities**

35 Once the physical facilities associated with CM4 of Alternative 1B are constructed and the water
36 management practices associated with changed reservoir operations, diversions from the north
37 Delta and marsh restoration are in effect, there would be new ongoing and periodic actions that
38 could affect tidal brackish emergent wetland natural community in the study area. The ongoing
39 actions would involve water releases and diversions, access road and levee repair, replacement of
40 levee armoring, channel dredging, and habitat enhancement in accordance with natural community
41 management plans. The potential effects of these actions are described below.

- 42 • *Modified river flows upstream of and within the study area and reduced diversions from south*
43 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
44 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta

1 channels would not result in the permanent reduction in acreage of tidal brackish emergent
 2 wetland natural community in the study area. Flow levels in the upstream rivers would not
 3 directly affect this natural community because it does not exist upstream of the Delta. Increased
 4 diversions of Sacramento River flows in the north Delta would not result in a permanent
 5 reduction in tidal brackish emergent wetland downstream of these diversions. Salinity levels in
 6 Suisun Marsh channels would be expected to increase with reduced Sacramento River outflows
 7 (see Chapter 8, Section 8.3.3.9), but this change would not be sufficient to change the acreage of
 8 brackish marsh. This natural community persists in an environment that experiences natural
 9 fluctuations in salinity due to tidal ebb and flow. Reduced diversions from the south Delta
 10 channels would not create a reduction in this natural community.

11 The increased diversion of Sacramento River flows in the north Delta would result in reductions
 12 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The
 13 reduction is estimated to be approximately 9% of the river's current sediment load for
 14 Alternative 4, which would have a north Delta diversion capacity of 9,000 cfs under Operational
 15 Scenario H (see BDCP Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3 for a detailed analysis of
 16 this issue). Alternative 1B, which would have a 15,000 cfs diversion capacity (Operational
 17 Scenario A), would be expected to reduce the sediment load by approximately 15%, assuming
 18 that most of the sediment would be removed during high river flow periods when north Delta
 19 pumping would normally be running at or near intake capacity. This would contribute to a
 20 decline in sediment reaching the Delta and Suisun Marsh that has been occurring over the past
 21 50+ years due to a gradual depletion of sediment from the upstream rivers. The depletion has
 22 been caused by a variety of factors, including depletion of hydraulic mining sediment in
 23 upstream areas, armoring of river channels and a cutoff of sediment due to dam construction on
 24 the Sacramento River and its major tributaries (Wright and Schoellhamer 2004; Barnard et al.
 25 2013).

26 Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on
 27 tidal marsh, including tidal brackish emergent wetland. Sediment trapped by the marsh
 28 vegetation allows the emergent plants to maintain an appropriate water depth as water levels
 29 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The BDCP
 30 proponents have incorporated an environmental commitment (see Appendix 3B, Section
 31 3B.2.18, *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*) into the
 32 project that would lessen this potential effect. The Sacramento River water diverted at north
 33 Delta intakes would pass through sedimentation basins before being pumped to water
 34 conveyance structures. The commitment states that sediment collected in these basins would be
 35 periodically removed and reused, to the greatest extent feasible, in the Plan Area for a number of
 36 purposes, including marsh restoration, levee maintenance, subsidence reversal, flood response,
 37 and borrow area fill. The portion of the sediment re-introduced to the Delta and estuary for
 38 marsh restoration would remain available for marsh accretion. With this commitment to reuse
 39 in the Plan Area, the removal of sediment at the north Delta intakes would not result in a net
 40 reduction in the acreage and value of this special-status marsh community. The effect would not
 41 be adverse (NEPA) and would be less than significant (CEQA).

- 42 ● *Access road and levee repair.* Periodic repair of access roads and levees associated with the BDCP
 43 actions has the potential to require removal of adjacent vegetation and could entail earth and
 44 rock work in tidal brackish emergent wetland habitats. This activity could lead to increased soil
 45 erosion, turbidity and runoff entering these habitats. The activities would be subject to normal
 46 erosion, turbidity and runoff control management practices, including those developed as part

1 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
2 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic
3 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation
4 of disturbed surfaces. Proper implementation of these measures would avoid permanent
5 adverse effects on this community.

- 6 ● *Vegetation management*. Vegetation management in the form of physical removal and chemical
7 treatment would be a periodic activity associated with the long-term maintenance of restoration
8 sites (*CM11 Natural Communities Enhancement and Management*). Use of herbicides to control
9 nuisance vegetation could pose a long-term hazard to tidal brackish emergent wetland natural
10 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of
11 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or
12 direct discharge of herbicides to wetland areas being treated for invasive species removal.
13 Environmental commitments and *AMM5 Spill Prevention, Containment and Countermeasure Plan*
14 have been made part of the BDCP to reduce hazards to humans and the environment from use of
15 various chemicals during maintenance activities, including the use of herbicides. These
16 commitments are described in Appendix 3B, including the commitment to prepare and
17 implement spill prevention, containment, and countermeasure plans and stormwater pollution
18 prevention plans. Best management practices, including control of drift and runoff from treated
19 areas, and use of herbicides approved for use in aquatic environments would also reduce the
20 risk of affecting natural communities adjacent to levees associated with tidal wetland
21 restoration activities.
- 22 ● *Channel dredging*. Long-term maintenance of tidal channels that support wetland expansion in
23 Suisun Marsh would include periodic dredging of sediments. The dredging would take place
24 adjacent to tidal brackish emergent wetland natural community and would result in short-term
25 increases in turbidity and disturbance of the substrate. These conditions would not eliminate
26 the community, but would diminish its value in the short term for special-status and common
27 species that rely on it for cover, movement corridor or foraging area. The individual species
28 effects are discussed later in this chapter.
- 29 ● *Habitat enhancement*. The BDCP includes a long-term management element for the natural
30 communities within the Plan Area (CM11). For tidal brackish emergent wetland natural
31 community, a management plan would be prepared that specifies actions to improve the value
32 of the habitats for covered species. Actions would include control of invasive nonnative plant
33 and animal species, fire management, restrictions on vector control and application of
34 herbicides, and maintenance of infrastructure that would allow for movement through the
35 community. The enhancement efforts would improve the long-term value of this community for
36 both special-status and common species.

37 The various operations and maintenance activities described above could alter acreage and value of
38 tidal brackish emergent wetland natural community in the study area through water operations,
39 levee and road maintenance, channel dredging and vegetation management in or adjacent to this
40 community. Activities could also introduce sediment and herbicides that would reduce the value of
41 this community to common and sensitive plant and wildlife species. Other periodic activities
42 associated with the Plan, including management, protection and enhancement actions associated
43 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*
44 *Enhancement and Management*, would be undertaken to enhance the value of the community. While
45 some of these activities could result in small changes in acreage, these changes would be greatly
46 offset by restoration activities planned as part of *CM4 Tidal Natural Communities Restoration*. The

1 management actions associated with levee repair, periodic dredging and control of invasive plant
2 species would also result in a long-term benefit to the species associated with tidal brackish
3 emergent wetland habitats by improving water movement.

4 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
5 Alternative 1B would not result in a net permanent reduction in the tidal brackish emergent wetland
6 natural community within the study area. There would be no adverse effect on the tidal brackish
7 emergent wetland natural community.

8 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would
9 have the potential to create minor changes (not exceeding 1 acre) in total acreage of tidal brackish
10 emergent wetland natural community in the study area, and could create temporary increases in
11 turbidity and sedimentation. The activities could also introduce herbicides periodically to control
12 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and
13 AMM5 would minimize these impacts, and other operations and maintenance activities, including
14 management, protection and enhancement actions associated with *CM3 Natural Communities*
15 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
16 create positive effects, including improved water movement in these habitats. Long-term restoration
17 activities associated with *CM4 Tidal Natural Communities Restoration* would greatly expand tidal
18 brackish emergent wetland natural community in the study area. Ongoing operation, maintenance
19 and management activities would not result in a net permanent reduction in this sensitive natural
20 community within the study area. Therefore, there would be a less-than-significant impact.

21 **Tidal Freshwater Emergent Wetland**

22 Construction, operation, maintenance and management associated with the conservation
23 components of Alternative 1B would have no long-term adverse effects on the habitats associated
24 with the tidal freshwater emergent wetland natural community. Initial development and
25 construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary
26 removal of small acreages of this community (see Table 12-1B-3). Full implementation of
27 Alternative 1B would also include the following conservation actions over the term of the BDCP to
28 benefit the tidal freshwater emergent wetland natural community.

- 29 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
30 accommodate sea level rise (Objective L1.3 associated with CM4).
- 31 ● Within the 65,000 acres of tidal natural communities and transitional uplands, include sufficient
32 transitional uplands along the fringes of restored brackish and freshwater tidal emergent
33 wetlands to accommodate up to 3 feet of sea level rise where possible and allow for the future
34 upslope establishment of tidal emergent wetland communities (Objective L1.7, associated with
35 CM4).
- 36 ● Within the 65,000 acres of tidal natural communities, restore or create at least 24,000 acres of
37 tidal freshwater emergent wetland in Conservation Zones 1, 2, 4, 5, 6 and/or 7 (Objective
38 TFEWNC1.1, associated with CM4).
- 39 ● Restore tidal freshwater emergent wetlands in areas that increase connectivity among
40 conservation lands (Objective TFEWNC1.2, associated with CM4).
- 41 ● Restore and sustain a diversity of marsh vegetation that reflects historical species compositions
42 and high structural complexity (Objective TFEWNC2.1, associated with CM4).

- Create topographic heterogeneity in restored tidal freshwater emergent wetland to provide variation in inundation characteristics and vegetative composition (Objective TFEWNC2.2, associated with CM4).

There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section 3.3, that would improve the value of tidal freshwater emergent wetland natural community for terrestrial species. As explained below, with the restoration and enhancement of these amounts of habitat, in addition to implementation of AMMs, impacts on this natural community would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1B-3. Changes in Tidal Freshwater Emergent Wetland Natural Community Associated with Alternative 1B (acres)^a

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	8	8	11	11	0	0
CM2	6	6	0	0	24-58	0
CM4	1	1	0	0	0	0
CM5	0	1	0	1	0	3
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	15	16	11	12	24-58	3

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

Unk. = unknown

Impact BIO-6: Changes in Tidal Freshwater Emergent Wetland Natural Community as a Result of Implementing BDCP Conservation Measures

Construction and land grading activities that would accompany the implementation of CM1, CM2, CM4, CM5, and CM6 would permanently eliminate an estimated 16 acres and temporarily remove 12 acres of tidal freshwater emergent wetland natural community in the study area. These modifications represent less than 1% of the 8,856 acres of the community that is mapped in the study area. The majority of the permanent and temporary losses would happen during the first 10 years of Alternative 1B implementation, as water conveyance facilities are constructed and habitat restoration is initiated. Natural communities restoration would add at least 24,000 acres of high value tidal freshwater emergent wetland natural community during the course of the Plan restoration activities, which would expand the area of that habitat and offset the losses. The BDCP beneficial effects evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.4.2) states that the implementation of *CM4 Tidal Natural Communities Restoration* would restore at least 24,000 acres of tidal freshwater emergent wetland community in Cache Slough (Conservation Zones 1, 2, and 3), the

1 Cosumnes/Mokelumne (Conservation Zone 4), West Delta (Conservation Zone 5 and 6), and South
2 Delta (Conservation Zone 7) ROAs. The BDCP evaluation also states that the objectives in the Plan
3 would promote vegetation diversity and structural complexity (as incorporated into the restoration
4 design) in restored tidal freshwater marsh. These same conservation activities would be
5 implemented under Alternative 1B.

6 The individual effects of each relevant conservation measure are addressed below. A summary
7 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
8 conservation measure discussions.

- 9
- 10 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1B water conveyance
11 facilities would permanently remove 8 acres and temporarily remove 11 acres of tidal
12 freshwater emergent wetland community. Permanent losses would occur as a result of
13 constructing the east canal. Small areas of emergent wetland would be removed where the canal
14 would cross manmade channels just south of Hood and at Lambert Road in the north Delta.
15 Permanent losses would also occur at canal crossings of Beaver Slough and a channel just north
16 of White Slough in the east Delta. The temporary losses would be associated primarily with
17 siphon construction where the canal would cross White Slough, Disappointment Slough, and
18 Middle River just south of Victoria Canal. Small temporary losses would also occur where a
19 tunnel would be constructed under Old River just north of its junction with Victoria Canal, and
20 where transmission lines would be constructed south of the new forebay adjacent to Clifton
21 Court Forebay. Refer to the Terrestrial Biology Mapbook to see the details of these locations.
22 These losses would take place during the near-term construction period.

23 There is the potential for increased nitrogen deposition associated with construction vehicles
24 during the construction phase of CM1. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related*
25 *Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been
26 concluded that this potential deposition would pose a low risk of changing tidal freshwater
27 emergent wetland natural community because the construction would occur primarily
28 downwind of the natural community and the construction would contribute a negligible amount
29 of nitrogen to regional projected emissions. No adverse effect is expected.

- 30 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 would involve a number of
31 construction or channel modification activities within the Yolo and Sacramento Bypasses,
32 including improvements in flow through the west side channel of the bypass, Putah Creek
33 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. All of
34 these activities could involve excavation and grading in tidal freshwater emergent wetland areas
35 to improve passage of fish through the bypasses. Based on hypothetical construction footprints,
36 a total of 6 acres could be permanently lost to these activities. The loss is expected to occur
37 during the first 10 years of Alternative 1B implementation.

- 38 • *CM4 Tidal Natural Communities Restoration:* Based on hypothetical footprints of this restoration
39 activity, initial land grading and levee modification could permanently remove 1 acre of tidal
40 freshwater emergent wetland natural community. This loss would occur during the near-term
41 timeframe throughout the ROAs identified for tidal wetland restoration. At the same time, an
42 estimated 24,000 acres of tidal freshwater emergent wetland community would be restored
43 during tidal habitat restoration, consistent with BDCP Objective TFEWNC1.1, associated with
44 CM4. Approximately 8,850 acres of the restoration would occur during the first 10 years of
45 BDCP implementation, which would coincide with the timeframe of water conveyance facilities
construction. The remaining restoration would be spread over the following 30 years. Tidal

1 wetland communities restoration is expected to be focused in the ROAs identified in Figure 12-1.
2 Restoration would be located and designed to improve habitat connectivity (Objective
3 TFEWNC1.2), improve marsh species diversity (Objective TFEWNC2.1), and provide variation in
4 inundation characteristics (Objective TFEWNC2.2). Some of the restoration would happen in the
5 lower Yolo Bypass, but restoration would also be spread among the Suisun Marsh, South Delta,
6 Cosumnes/Mokelumne and West Delta ROAs.

- 7 ● The restoration activities associated with CM4 in the Plan Area ROAs would result in other
8 effects that could alter the habitat value of tidal freshwater emergent wetland. Disturbances
9 associated with levee breaching and grading or contouring would increase opportunities for the
10 introduction or spread of invasive species. Implementation of CM11 would limit this risk
11 through invasive species control and wetland management and enhancement activities to
12 support native species. Flooding of dry areas for tidal freshwater marsh creation could also
13 increase the bioavailability of methylmercury, especially in the Cache Slough,
14 Cosumnes/Mokelumne and Suisun Marsh ROAs. Site-specific conditions would dictate the
15 significance of this hazard to marsh vegetation and associated wildlife. Because of the difficulty
16 in assessing this risk at a programmatic level, it will need to be considered at a project level.
17 Site-specific restoration plans that address the creation and mobilization of mercury, and
18 monitoring and adaptive management as described in *CM12 Methylmercury Management*, would
19 be available to address the uncertainty of methylmercury levels in restored tidal marsh. Water
20 temperature fluctuations in newly created marsh is also an issue of concern that is difficult to
21 quantify at the current stage of restoration design. None of these effects is expected to limit the
22 extent or value of tidal freshwater emergent wetland in the study area.
23 *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction would permanently remove 1
24 acre and temporarily remove 1 acre of tidal freshwater emergent wetland habitat. The
25 construction-related losses would be considered a permanent removal of the habitats directly
26 affected. The majority of seasonally inundated floodplain restoration is expected to be
27 implemented along the lower San Joaquin River in the south and central Delta areas. Floodplain
28 restoration along the San Joaquin River would improve connectivity for a variety of species that
29 rely on freshwater marsh and riparian habitats. The regional and Plan Area landscape linkages
30 along the San Joaquin River are included in Figure 12-2. This activity is scheduled to start
31 following construction of water conveyance facilities, which is expected to take 10 years.
- 32 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
33 of small amounts of tidal freshwater emergent wetland habitat along 20 miles of river and
34 sloughs. The extent of this loss cannot be quantified at this time, but the majority of the
35 enhancement activity would take place on narrow strips of habitat, including levees and channel
36 banks. The improvements would occur within the study area on sections of the Sacramento, San
37 Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

38 The following paragraphs summarize the combined effects discussed above and describe other
39 BDCP conservation actions that would offset or avoid these effects. NEPA and CEQA impact
40 conclusions are also included.

41 ***Near-Term Timeframe***

42 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would
43 affect the tidal freshwater emergent wetland natural community through CM1 construction losses
44 (8 acres permanent and 11 acres temporary), CM2 construction losses (6 acres permanent), and
45 CM4 construction losses (1 acre permanent). The tidal freshwater emergent wetland natural

1 community would be lost in the north Delta near Hood, in the east Delta at various slough crossings,
2 in the south Delta near the new forebay, and at various locations within the Yolo Bypass and the
3 tidal restoration ROAs.

4 The construction losses of this special-status natural community would represent an adverse effect
5 if they were not offset by avoidance and minimization measures and restoration actions associated
6 with BDCP conservation components. Loss of tidal freshwater emergent wetland natural community
7 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
8 defined by Section 404 of the CWA. However, the creation of 8,850 acres of tidal freshwater
9 emergent wetland natural community as part of CM4 during the first 10 years of Alternative 1B
10 implementation would offset this near-term loss, avoiding any adverse effect. Typical project-level
11 mitigation ratios (1:1 for restoration) would indicate that 26 acres of restoration would be needed
12 to offset (i.e., mitigate) the 26 acres of loss (the total permanent and temporary near-term effects
13 listed in Table 12-1B-3).

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
15 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
16 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
17 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
18 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
19 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

20 **Late Long-Term Timeframe**

21 Implementation of Alternative 1B as a whole would result in relatively minor (less than 1%) losses
22 of tidal freshwater emergent wetland community in the study area. These losses (16 acres of
23 permanent and 12 acres of temporary loss) would be largely associated with construction of the
24 water conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and levee
25 modification and land grading for tidal marsh restoration (CM4) and floodplain restoration (CM5).
26 The CM4 and CM5 losses would occur during the course of the CM4 and CM5 conservation actions at
27 various tidal and floodplain restoration sites throughout the study area. By the end of the Plan
28 timeframe, a total of 24,000 acres of this natural community would be restored over a wide region of
29 the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Slough, and South
30 Delta ROAs (see Figure 12-1).

31 **NEPA Effects:** The creation of 8,850 acres of tidal freshwater emergent wetland natural community
32 as part of CM4 during the first 10 years of BDCP implementation would offset the construction and
33 inundation-related effects of implementing CM1, CM2, CM4 and CM5, avoiding any adverse effect in
34 the near-term. Because of the 24,000 acres of tidal freshwater emergent wetland restoration that
35 would occur over the course of the Plan, Alternative 1B would not result in a net long-term
36 reduction in the acreage of a sensitive natural community; the effect would be beneficial.

37 **CEQA Conclusion:**

38 **Near-Term Timeframe**

39 Alternative 1B would result in the near-term loss of approximately 26 acres of tidal freshwater
40 emergent wetland natural community due to construction of the water conveyance facilities (CM1)
41 and fish passage improvements (CM2), tidal marsh restoration (CM4), and floodplain restoration
42 (CM5). The construction losses would occur in the north Delta near Hood, in the east Delta at several

1 slough crossings and in the south Delta at the new forebay. The losses would be spread across a 10-
2 year near-term timeframe and would be offset by planned restoration of 8,850 acres of tidal
3 freshwater emergent wetland natural community scheduled for the first 10 years of Alternative 1B
4 implementation (CM4). AMM1, AMM2, AMM6, AMM7, and AMM10 would also be implemented to
5 minimize impacts. Because of these offsetting near-term restoration activities and AMMs, impacts
6 would be less-than-significant. Typical project-level mitigation ratios (1:1 for restoration) would
7 indicate that 26 acres of restoration would be needed to offset (i.e., mitigate) the 26 acres of loss
8 (the combination of the near-term permanent and temporary losses included in Table 12-1B-3). The
9 restoration would be initiated at the beginning of Alternative 1B implementation to minimize any
10 time lag in the availability of this habitat to special-status species, and would result in a net gain in
11 acreage of this sensitive natural community.

12 **Late Long-Term Timeframe**

13 At the end of the Plan period, 28 acres of tidal freshwater emergent wetland natural community
14 would be lost to conservation activities, and 24,000 acres of this community would be restored.
15 There would be no net permanent reduction in the acreage of this sensitive natural community
16 within the study area. Therefore, Alternative 1B would not have a substantial adverse effect on this
17 natural community; the impact would be beneficial.

18 **Impact BIO-7: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 19 **Freshwater Emergent Wetland Natural Community**

20 Two Alternative 1B conservation measures would modify the inundation/flooding regimes of both
21 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
22 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
23 of tidal freshwater emergent wetland natural community on small acreages, while CM5 would
24 expose this community to additional flooding as channel margins are modified and levees are set
25 back to improve fish habitat along some of the major rivers and waterways throughout the study
26 area.

- 27 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1B
28 would result in an increase in the frequency, magnitude and duration of inundation of 24–58
29 acres of tidal freshwater emergent wetland natural community. The methods used to estimate
30 these inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*
31 *Wildlife, and Plants*. The area more frequently inundated would vary with the flow volume that
32 would pass through the newly-constructed notch in the Fremont Weir. The 24-acre increase in
33 inundation would be associated with a notch flow of 1,000 cubic feet per second (cfs), and the
34 58-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow
35 through Fremont Weir would be expected in 30% of the years. Most of this community occurs in
36 the southern section of the bypass on Liberty Island, on the fringes of tidal perennial aquatic
37 habitats. Smaller areas are scattered among the cropland within the bypass, south of Interstate
38 80. The anticipated change in management of flows in the Yolo Bypass includes more frequent
39 releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some years,
40 later releases into the bypass in spring months (April and May). The modification of periodic
41 inundation events would not adversely affect the ecological function of tidal freshwater
42 emergent wetland habitats and would not substantially modify its value for special-status or
43 common terrestrial species. The plants in this natural community are adapted to periodic

1 inundation events within the Yolo Bypass. The effects of this inundation on wildlife and plant
2 species are described in detail in later sections of this chapter.

- 3 • *CM5 Seasonally Inundated Floodplain Restoration:* Floodplain restoration would result in a
4 seasonal increase in the frequency and duration of inundation of 3 acres of tidal freshwater
5 emergent wetland habitats. Specific locations for this restoration activity have not been
6 identified, but they would likely be focused along the major rivers and Delta channels in the
7 south Delta. The reconnection of these wetlands to stream flooding events would be beneficial to
8 the wetlands' ecological function, especially as they relate to the BDCP's target terrestrial and
9 aquatic species. Foraging activity and refuge sites would be expanded into areas currently
10 unavailable or infrequently available to some aquatic species.

11 In summary, 27–61 acres of tidal freshwater emergent wetland natural community in the study area
12 would be subjected to more frequent inundation as a result of implementing two Alternative 1B
13 conservation measures (CM2 and CM5). Tidal freshwater emergent wetland natural community is a
14 habitat of great value to both terrestrial and aquatic species in the study area, and increases in
15 inundation for relatively short periods of time would not reduce the acreage or the value of this
16 community.

17 **NEPA Effects:** Periodic inundation would not result in a net permanent reduction in the acreage and
18 value of the tidal freshwater emergent wetland natural community in the study area. Therefore,
19 there would be no adverse effect.

20 **CEQA Conclusion:** An estimated 27–61 acres of tidal freshwater emergent wetland natural
21 community in the study area would be subjected to more frequent inundation as a result of
22 implementing CM2 and CM5 under Alternative 1B. This community is of great value to aquatic and
23 terrestrial species in the study area. The periodic inundation would not result in a net permanent
24 reduction in the acreage and value of this community in the study area. Therefore, there would be a
25 less-than-significant impact on the community.

26 **Impact BIO-8: Modification of Tidal Freshwater Emergent Wetland Natural Community from** 27 **Ongoing Operation, Maintenance and Management Activities**

28 Once the physical facilities associated with Alternative 1B are constructed and the stream flow
29 regime associated with changed water management is in effect, there would be new ongoing and
30 periodic actions associated with operation, maintenance and management of the BDCP facilities and
31 conservation lands that could affect tidal freshwater emergent wetland natural community in the
32 study area. The ongoing actions include the diversion of Sacramento River flows in the north Delta,
33 and reduced diversions from south Delta channels. These actions are associated with CM1 (see
34 Impact BIO-7 for effects associated with CM2). The periodic actions would involve access road and
35 conveyance facilities repair, vegetation management at the various water conveyance facilities and
36 habitat restoration sites (CM11), levee and canal repair and replacement of levee armoring, channel
37 dredging, and habitat enhancement in accordance with natural community management plans. The
38 potential effects of these actions are described below.

- 39 • *Modified river flows upstream of and within the study area and reduced diversions from south*
40 *Delta channels.* Reduced diversions from the south Delta channels would not create a reduction
41 in tidal freshwater emergent wetland in the study area. However, the periodic changes in flows
42 in the Sacramento River, Feather River, and American River associated with modified reservoir
43 operations, and the increased diversion of Sacramento River flows at north Delta intakes

1 associated with Alternative 1B would affect salinity, water temperature, dissolved oxygen levels,
 2 turbidity, contaminant levels and dilution capacity in these rivers and Delta waterways. These
 3 changes are discussed in detail in Chapter 8, *Water Quality*. Potentially substantial increases in
 4 electrical conductivity (salinity) are predicted for the west Delta and Suisun Marsh as a result of
 5 these changed water operations. These salinity changes may alter the plant composition of tidal
 6 freshwater emergent wetland along the lower Sacramento and San Joaquin Rivers and west
 7 Delta islands. The severity and extent of these salinity changes would be complicated by
 8 anticipated sea level rise and the effects of downstream tidal restoration over the life of the Plan.
 9 There is the potential that some tidal freshwater marsh may become brackish. These potential
 10 changes are not expected to result in a significant reduction in the acreage and value of tidal
 11 freshwater emergent wetland natural community in the study area.

12 The increased diversion of Sacramento River flows in the north Delta would result in reductions
 13 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The
 14 reduction is estimated to be approximately 9% of the river's current sediment load for
 15 Alternative 4, which would have a north Delta diversion capacity of 9,000 cfs under Operational
 16 Scenario H (see BDCP Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3 for a detailed analysis of
 17 this issue). Alternative 1B, which would have a 15,000 cfs diversion capacity (Operational
 18 Scenario A), would be expected to reduce the sediment load by approximately 15%, assuming
 19 that most of the sediment would be removed during high river flow periods when north Delta
 20 pumping would normally be running at or near intake capacity. This would contribute to a
 21 decline in sediment reaching the Delta and Suisun Marsh that has been occurring over the past
 22 50+ years due to a gradual depletion of sediment from the upstream rivers. The depletion has
 23 been caused by a variety of factors, including depletion of hydraulic mining sediment in
 24 upstream areas, armoring of river channels and a cutoff of sediment due to dam construction on
 25 the Sacramento River and its major tributaries (Wright and Schoellhamer 2004; Barnard et al.
 26 2013).

27 Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on
 28 tidal marsh, including tidal freshwater emergent wetland. Sediment trapped by the marsh
 29 vegetation allows the emergent plants to maintain an appropriate water depth as water levels
 30 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The BDCP
 31 proponents have incorporated an environmental commitment (see Appendix 3B, Section
 32 3B.2.18, *Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged Material*) into the
 33 project that would lessen this potential effect. The Sacramento River water diverted at north
 34 Delta intakes would pass through sedimentation basins before being pumped to water
 35 conveyance structures. The commitment states that sediment collected in these basins would be
 36 periodically removed and reused, to the greatest extent feasible, in the Plan Area for a number of
 37 purposes, including marsh restoration, levee maintenance, subsidence reversal, flood response,
 38 and borrow area fill. The portion of the sediment re-introduced to the Delta and estuary for
 39 marsh restoration would remain available for marsh accretion. With this commitment to reuse
 40 in the Plan Area, the removal of sediment at the north Delta intakes would not result in a net
 41 reduction in the acreage and value of this special-status marsh community. The effect would not
 42 be adverse (NEPA) and would be less than significant (CEQA).

- 43 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
 44 conveyance facilities and levees associated with the BDCP actions have the potential to require
 45 removal of adjacent vegetation and could entail earth and rock work in or adjacent to tidal
 46 freshwater emergent wetland habitats. This activity could lead to increased soil erosion,

1 turbidity and runoff entering tidal aquatic habitats. These activities would be subject to normal
 2 erosion, turbidity and runoff control management practices, including those developed as part
 3 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
 4 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within emergent
 5 wetland habitats would require use of sediment and turbidity barriers, soil stabilization and
 6 revegetation of disturbed surfaces. Proper implementation of these measures would avoid
 7 permanent adverse effects on this community.

- 8 ● *Vegetation management*. Vegetation management, in the form of physical removal and chemical
 9 treatment, would be a periodic activity associated with the long-term maintenance of water
 10 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
 11 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
 12 tidal freshwater emergent wetland natural community at or adjacent to treated areas. The
 13 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
 14 stormwater onto the natural community, or direct discharge of herbicides to tidal aquatic areas
 15 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
 16 *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce
 17 hazards to humans and the environment from use of various chemicals during maintenance
 18 activities, including the use of herbicides. These commitments are described in Appendix 3B,
 19 including the commitment to prepare and implement spill prevention, containment, and
 20 countermeasure plans and stormwater pollution prevention plans. Best management practices,
 21 including control of drift and runoff from treated areas, and use of herbicides approved for use
 22 in aquatic environments would also reduce the risk of affecting natural communities adjacent to
 23 water conveyance features and levees associated with restoration activities.
- 24 ● *Channel dredging*. Long-term operation of the Alternative 1B intakes on the Sacramento River
 25 would include periodic dredging of sediments that might accumulate in front of intake screens.
 26 The dredging would be done in waterways adjacent to tidal freshwater emergent wetlands and
 27 would result in short-term increases in turbidity and disturbance of the substrate. These
 28 conditions would not eliminate the community, but would diminish its value for special-status
 29 and common species that rely on it for cover or foraging area. The individual species effects are
 30 discussed later in this chapter.
- 31 ● *Habitat enhancement*. The BDCP includes a long-term management element for the natural
 32 communities within the Plan Area (CM11). For tidal freshwater emergent wetland community, a
 33 management plan would be prepared that specifies actions to improve the value of the habitats
 34 for covered species. Actions would include control of invasive nonnative plant and animal
 35 species, fire management, restrictions on vector control and application of herbicides, and
 36 maintenance of infrastructure that would allow for movement through the community. The
 37 enhancement efforts would improve the long-term value of this community for both special-
 38 status and common species.

39 The various operations and maintenance activities described above could alter acreage of tidal
 40 freshwater emergent wetland natural community in the study area through changes in flow patterns
 41 and resultant changes in water quality. Activities could also introduce sediment and herbicides that
 42 would reduce the value of this community to common and sensitive plant and wildlife species. Other
 43 periodic activities associated with the Plan, including management, protection and enhancement
 44 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
 45 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
 46 community. While some of these activities could result in small changes in acreage, these changes

1 would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural Communities*
2 *Restoration*. The management actions associated with levee repair, periodic dredging and control of
3 invasive plant species would also result in a long-term benefit to the species associated with tidal
4 freshwater emergent wetland habitats by improving water movement.

5 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
6 Alternative 1B would not result in a net permanent reduction in the tidal freshwater emergent
7 wetland natural community within the study area. Therefore, there would be no adverse effect on
8 this natural community.

9 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B,
10 including changed water operations in the upstream rivers, would have the potential to create
11 minor changes in total acreage of tidal freshwater emergent wetland natural community in the study
12 area, and could create temporary increases in turbidity and sedimentation. The activities could also
13 introduce herbicides periodically to control nonnative, invasive plants. Implementation of
14 environmental commitments and AMM2, AMM4, and AMM5 would minimize these impacts, and
15 other operations and maintenance activities, including management, protection and enhancement
16 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
17 *Communities Enhancement and Management*, would create positive effects, including improved
18 water movement in these habitats. Long-term restoration activities associated with *CM4 Tidal*
19 *Natural Communities Restoration* would greatly expand this natural community in the study area.
20 Ongoing operation, maintenance and management activities would not result in a net permanent
21 reduction in this sensitive natural community within the study area. Therefore, there would be a
22 less-than-significant impact on the tidal freshwater emergent wetland natural community.

23 **Valley/Foothill Riparian**

24 Construction, operation, maintenance and management associated with the conservation
25 components of Alternative 1B would have no long-term adverse effects on the habitats associated
26 with the valley/foothill riparian natural community. Initial development and construction of CM1,
27 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this
28 community (see Table 12-1B-4). Full implementation of Alternative 1B would also include the
29 following conservation actions over the term of the BDCP to benefit the valley/foothill riparian
30 natural community.

- 31 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000
32 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated
33 with CM7).
- 34 ● Protect 750 acres of existing valley/foothill riparian natural community in Conservation Zone 7
35 by year 10 (Objective VFRNC1.2, associated with CM3).
- 36 ● Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory
37 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated
38 with CM5 and CM7).
- 39 ● Maintain 500 acres of mature riparian forest in Conservation Zones 4 or 7 (Objective VFRNC2.3,
40 associated with CM3 and CM7).
- 41 ● Maintain 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion of the early-
42 to late-successional riparian vegetation (VFRNC2.2,) in large blocks with a minimum patch size

1 of 50 acres and minimum width of 330 feet (Objective VFRNC2.4, associated with CM3 and
2 CM7).

- 3 • Maintain or increase abundance and distribution of valley/foothill riparian natural community
4 vegetation alliances that are rare or uncommon as recognized by California Department of Fish
5 and Game (2010), such as button willow thickets alliance and blue elderberry stands alliance
6 (Objective VFRNC3.1).

7 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
8 3.3, that would improve the value of valley/foothill riparian natural community for terrestrial
9 species. As explained below, with the restoration and enhancement of these amounts of habitat, in
10 addition to implementation of AMMs, impacts on this natural community would not be adverse for
11 NEPA purposes and would be less than significant for CEQA purposes.

12 **Table 12-1B-4. Changes in Valley/Foothill Riparian Natural Community Associated with Alternative**
13 **1B (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	51	51	39	39	0	0
CM2	89	89	88	88	51-92	0
CM4	298	552	0	0	0	0
CM5	0	43	0	35	0	266
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	438	735	127	162	51-92	266

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

14

15 **Impact BIO-9: Changes in Valley/Foothill Riparian Natural Community as a Result of**
16 **Implementing BDCP Conservation Measures**

17 Construction, land grading and habitat restoration activities that would accompany the
18 implementation of CM1, CM2, CM4, CM5, and CM6 would permanently eliminate an estimated 735
19 acres and temporarily remove 162 acres of valley/foothill riparian natural community in the study
20 area. These modifications represent approximately 5% of the 17,966 acres of the community that is
21 mapped in the study area. The majority of the permanent and temporary losses would happen
22 during the first 10 years of Alternative 1B implementation, as water conveyance facilities are
23 constructed and habitat restoration is initiated. Valley/foothill riparian protection (750 acres) and

1 restoration (800 acres) would be initiated during the same period. By the end of the Plan period,
2 5,000 acres of this natural community would be restored. The BDCP beneficial effects analysis
3 (BDCP Chapter 5, Section 5.4.5.2) indicates that implementation of Alternative 4 would restore or
4 create 5,000 acres of riparian forest and scrub in Conservation Zones 1, 2, 4, 5, 6, and 7, with at least
5 3,000 acres occurring on restored seasonally inundated floodplain. Alternative 4 would also protect
6 750 acres of existing valley/foothill riparian natural community in Conservation Zone 7. These
7 conservation measures would also be implemented under Alternative 1B.

8 The individual effects of each relevant conservation measure are addressed below. A summary
9 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
10 conservation measure discussions.

- 11 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1B water conveyance
12 facilities would permanently remove 51 acres and temporarily remove 39 acres of
13 valley/foothill riparian natural community. The habitat would be removed at multiple locations
14 from the north Delta to the east Delta and in the vicinity of Clifton Court Forebay. Almost all of
15 the losses would occur on the borders of waterways. In the north Delta, most of the permanent
16 loss would occur where Intakes 1–5 encroach on the Sacramento River’s east bank between
17 Freeport and Courtland. The riparian areas here are very small patches, some dominated by
18 valley oak and others by nonnative trees and scrub vegetation (see Terrestrial Biology
19 Mapbook). Other small patches or narrow bands of riparian vegetation dominated by valley oak,
20 willow, cottonwood or mixed brambles would be permanently removed by canal construction
21 adjacent to Intake 1, between Intakes 2 and 4, and just south of Lambert Road. In the east Delta,
22 small permanent losses would occur from canal construction just south of Twin Cities Road and
23 just north of Walnut Grove Road. A small area of riparian habitat (mostly blackberries) would be
24 permanently removed in the south Delta at the new forebay construction site. The temporary
25 riparian losses would occur at the intake sites along the Sacramento River and at temporary
26 siphon work areas where the canal would cross Beaver Slough, Hog Slough, Sycamore Slough,
27 White Slough, Disappointment Slough, Railroad Canal, and Middle River just south of Victoria
28 Canal. Tunnel construction at Old River just south of Victoria Canal would also temporarily
29 remove mixed willows and brambles. These losses would take place during the near-term
30 construction period.
- 31 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
32 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
33 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
34 Sacramento Weir improvements. All of these activities could involve excavation and grading in
35 valley/foothill riparian areas to improve passage of fish through the bypasses. Based on
36 hypothetical construction footprints, a total of 89 acres could be permanently lost and another
37 88 acres could be temporarily removed. Most of the riparian losses would occur at the north end
38 of Yolo Bypass where major fish passage improvements are planned. This vegetation is a mix of
39 valley oak, sycamore, cottonwood and willow trees. The riparian areas here are primarily small,
40 disconnected patches with moderate to low value as wildlife movement corridors. Most of these
41 patches lack structural complexity. Excavation to improve water movement in the Toe Drain and
42 in the Sacramento Weir would remove similar linear strips of vegetation. These losses would
43 occur primarily in the near-term timeframe.
- 44 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
45 footprints, implementation of CM4 would permanently inundate or remove 552 acres of
46 valley/foothill riparian community. The losses would be spread among most of the ROAs

1 established for tidal restoration (see Figure 12-1). No losses would occur from Suisun Marsh
 2 restoration. These ROAs support a mix of riparian vegetation types, including valley oak stands,
 3 extensive willow and cottonwood stringers along waterways, and areas of scrub vegetation
 4 dominated by blackberry. These areas are considered of low to moderate habitat value (BDCP
 5 Chapter 5, Section 5.4.5.1.1). The actual loss of riparian habitat to marsh restoration would be
 6 expected to be smaller than predicted by use of the theoretical footprint. As marsh restoration
 7 projects were identified and planned, sites could be selected that avoid riparian areas as much
 8 as possible.

- 9 ● *CM5 Seasonally Inundated Floodplain Restoration:* Floodplain restoration levee construction
 10 would permanently remove 43 acres and temporarily remove 35 acres of valley/foothill
 11 riparian natural community. The construction-related losses would be considered a permanent
 12 removal of the habitats directly affected. These losses would be expected to occur along the San
 13 Joaquin River and other major waterways in CZ 7 (see Figure 12-1). This activity is scheduled to
 14 start following construction of water conveyance facilities, which is expected to take 10 years.
- 15 ● *CM6 Channel Margin Enhancement:* Channel margin habitat enhancement could result in
 16 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
 17 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
 18 activity would occur along waterway margins where riparian habitat stringers exist, including
 19 levees and channel banks. The improvements would occur within the study area on sections of
 20 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 21 ● *CM7 Riparian Natural Community Restoration:* The valley/foothill riparian natural community
 22 would be restored primarily in association with the tidal (CM4) and floodplain (CM5)
 23 restoration and channel margin enhancements. Following community-specific goals and
 24 objectives in the Plan, a total of 5,000 acres of this community would be restored (BDCP
 25 Objective VFRNC1.1) and 750 acres would be protected (BDCP Objective VFRNC1.2) over the life
 26 of the Plan. Approximately 800 acres would be restored and the entire 750 acres would be
 27 protected during the first 10 years of Plan implementation. Riparian restoration and protection
 28 would be focused in CZ 4 and CZ 7 (BDCP Objective VFRNC2.3), with a goal of adding a 500-acre
 29 portion of the restoration in one or the other of these zones. A variety of successional stages
 30 would also be sought to benefit the variety of sensitive plant and animal species that rely on this
 31 natural community in the study area (BDCP Objective VFRNC2.4).

32 The following paragraphs summarize the combined effects discussed above and describe other
 33 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
 34 also included.

35 ***Near-Term Timeframe***

36 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would
 37 affect the valley/foothill riparian natural community through CM1 construction losses (51 acres
 38 permanent and 39 acres temporary) and the CM2 construction losses (89 acres permanent and 88
 39 acres temporary). The natural community would be lost primarily along the eastern bank of the
 40 Sacramento River at intake sites, along the eastern canal route in the northern and eastern Delta
 41 areas, in the vicinity of the new forebay construction site in the south Delta, and in the northern Yolo
 42 Bypass. Approximately 298 acres of the inundation and construction-related loss from CM4 would
 43 occur during the near-term throughout the ROAs mapped in Figure 12-1.

1 The construction losses of this special-status natural community would represent an adverse effect
 2 if they were not offset by avoidance and minimization measures and protection/restoration actions
 3 associated with BDCP conservation components. Loss of valley/foothill riparian natural community
 4 would be considered a loss in acreage of a sensitive natural community, and could be considered a
 5 loss of wetlands as defined by Section 404 of the CWA. Most of the losses would be in small patches
 6 or narrow strips along waterways, with limited structural complexity. The restoration of 800 acres
 7 and protection (including significant enhancement) of 750 acres of valley/foothill riparian natural
 8 community as part of CM7 and CM3 during the first 10 years of BDCP implementation would
 9 minimize this near-term loss, avoiding an adverse effect. At least 400 acres of the protection is
 10 planned for the first 5 years of Alternative 1B implementation. The restoration areas would be large
 11 areas providing connectivity with existing riparian habitats and would include a variety of trees and
 12 shrubs to produce structural complexity. Typical project-level mitigation ratios (1:1 for restoration
 13 and 1:1 for protection) would indicate that 565 acres of protection and 565 acres of restoration
 14 would be needed to offset (i.e., mitigate) the 565 acres of loss (the combination of permanent and
 15 temporary losses in the near-term listed in Table 12-1B-4). The combination of the two approaches
 16 (protection and restoration) is designed to avoid a temporal lag in the value of riparian habitat
 17 available to sensitive species.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 19 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM10*
 20 *Restoration of Temporarily Affected Natural Communities*, and *AMM18 Swainson's Hawk*. All of these
 21 AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
 22 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
 23 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

24 **Late Long-Term Timeframe**

25 Implementation of Alternative 1B as a whole would result in 6% losses of valley/foothill riparian
 26 community in the study area. These losses (735 acres of permanent and 162 acres of temporary
 27 loss) would be largely associated with construction of the water conveyance facilities (CM1),
 28 construction of Yolo Bypass fish improvements (CM2), and inundation during tidal marsh
 29 restoration (CM4). Inundation losses would occur during the course of the Plan's restoration
 30 activities at various tidal restoration sites throughout the study area. By the end of the Plan
 31 timeframe, a total of 5,000 acres of this natural community would be restored and 750 acres would
 32 be protected (CM7 and CM3, respectively). The restoration would occur primarily in CZ 4 and CZ 7,
 33 in the Cosumnes/Mokelumne and South Delta ROAs (see Figure 12-1).

34 **NEPA Effects:** The restoration of 800 acres and protection (including significant enhancement) of
 35 750 acres of valley/foothill riparian natural community as part of CM7 and CM3 during the first 10
 36 years of BDCP implementation would minimize the near-term loss of this community, avoiding any
 37 adverse effect. Because of the Plan's commitment to restoration of 5,000 acres and protection of 750
 38 acres of valley/foothill riparian natural community during the course of the Plan, Alternative 1B
 39 would not result in a net long-term reduction in the acreage of a sensitive natural community; the
 40 effect would be beneficial.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Alternative 1B would result in the near-term loss of approximately 565 acres of valley/foothill
 4 riparian natural community due to construction of the water conveyance facilities (CM1) and fish
 5 passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The natural
 6 community would be lost primarily along the Sacramento River at intake sites, along the eastern
 7 canal route in the northern and eastern Delta areas, in the vicinity of the new forebay construction
 8 site in the south Delta, and within the northern section of the Yolo Bypass, while inundation losses
 9 would occur at various tidal restoration sites throughout the study area. The construction losses
 10 would be spread across a 10-year near-term timeframe. These losses would be minimized by
 11 planned restoration of 800 acres (CM7) and protection (including significant enhancement) of 750
 12 acres (CM3) of valley/foothill riparian natural community scheduled for the first 10 years of BDCP
 13 implementation. At least 400 acres of the protection is planned for the first 5 years of Plan
 14 implementation. AMM1, AMM2, AMM6, AMM7, AMM10, and AMM18 would also be implemented to
 15 minimize impacts. Because of these near-term restoration and protection activities and AMMs,
 16 impacts would be less-than-significant. Typical project-level mitigation ratios (1:1 for protection
 17 and 1:1 for restoration) would indicate that 565 acres of protection and 565 acres of restoration
 18 would be needed to offset (i.e., mitigate) the 565 acres of loss. The combination of the two
 19 approaches (protection and restoration) is designed to avoid a temporal lag in the value of riparian
 20 habitat available to sensitive species. The restoration would be initiated at the beginning of Plan
 21 implementation to minimize any time lag in the availability of this habitat to special-status species,
 22 and would result in a net gain in acreage of this sensitive natural community.

23 **Late Long-Term Timeframe**

24 At the end of the Plan period, 897 acres of valley/foothill riparian natural community would be
 25 permanently or temporarily removed by conservation actions, 5,000 acres would be restored and
 26 750 acres would be protected. There would be no net permanent reduction in the acreage of this
 27 sensitive natural community within the study area. Therefore, Alternative 1B would not have a
 28 substantial adverse effect on this natural community; the impact on the valley/foothill riparian
 29 natural community would be beneficial.

30 **Impact BIO-10: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
 31 **Valley/Foothill Riparian Natural Community**

32 Two Alternative 1B conservation measures would modify the inundation/flooding regimes of both
 33 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
 34 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
 35 of valley/foothill riparian natural community at scattered locations, while CM5 would expose this
 36 community to additional flooding as channel margins are modified and levees are set back to
 37 improve fish habitat along some of the major rivers and waterways of the study area.

- 38 • *CM2 Yolo Bypass Fisheries Enhancement:* Operation of the Yolo Bypass under Alternative 1B
 39 would result in an increase in the frequency, magnitude and duration of inundation of 51–92
 40 acres of valley/foothill riparian natural community. The area more frequently inundated would
 41 vary with the flows that would be passed through the newly-constructed notch in the Fremont
 42 Weir. The 51 acres would be created by a notch flow of 8,000 cfs and the 92 acres would be
 43 created by a notch flow of 4,000 cfs. The methods used to estimate these inundation acreages

1 are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. These
2 increased flow conditions would be expected to occur in no more than 30% of all years (see
3 BDCP Chapter 5, Section 5.4.1.2). The valley/foothill riparian community occurs throughout the
4 bypass, including a large acreage just below Fremont Weir in the north end of the bypass. There
5 are other riparian habitat areas on Liberty Island, and, to a lesser extent, along the eastern and
6 western edges of the bypass, including along the Tule Canal/Toe Drain, the west side channels
7 and the Sacramento Bypass. The anticipated change in management of flows in the Yolo Bypass
8 includes more frequent releases in flows into the bypass from the Fremont and Sacramento
9 Weirs, and in some years, later releases into the bypass in spring months (April and May). The
10 modification of periodic inundation events would not adversely affect riparian habitats, as they
11 have persisted under similar high flows and extended inundation periods in the Yolo Bypass.
12 The effects of this inundation on wildlife and plant species are described in detail in later
13 sections of this chapter.

- 14 • **CM5 Seasonally Inundated Floodplain Restoration:** Floodplain restoration would result in an
15 increase in the frequency and duration of inundation of 266 acres of valley/foothill riparian
16 habitats. Specific locations for this restoration activity have not been identified, but they would
17 likely be focused in the south Delta area, along the major rivers and Delta channels in CZ 7 (see
18 Figure 3-1). The reconnection of riparian vegetation to periodic stream flooding events would
19 be beneficial to the ecological function of this natural community, especially in the germination
20 and establishment of native riparian plants as flood scour increases.

21 In summary, from 317 to 368 acres of valley/foothill riparian community in the study area would be
22 subjected to more frequent inundation as a result of implementing two Alternative 1B conservation
23 measures (CM2 and CM5). The valley/foothill riparian community is conditioned to and benefits
24 from periodic inundation; therefore, periodic inundation would not result in a net permanent
25 reduction in the acreage of this community in the study area. The increased inundation would create
26 a beneficial effect on the community as it relates to germination and establishment of native riparian
27 plants.

28 **NEPA Effects:** Increasing periodic inundation of valley/foothill riparian natural community in the
29 Yolo Bypass and along south Delta waterways would have a beneficial effect on the community.

30 **CEQA Conclusion:** An estimated 317 to 368 acres of valley/foothill riparian community in the study
31 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5
32 under Alternative 1B. The valley/foothill riparian community is conditioned to and benefits from
33 periodic inundation; therefore, periodic inundation would not result in a net permanent reduction in
34 the acreage of this community in the study area. Increasing periodic inundation of valley/foothill
35 riparian natural community in the Yolo Bypass and along south Delta waterways would have a
36 beneficial impact on the community.

37 **Impact BIO-11: Modification of Valley/Foothill Riparian Natural Community from Ongoing** 38 **Operation, Maintenance and Management Activities**

39 Once the physical facilities associated with Alternative 1B are constructed and the stream flow
40 regime associated with changed water management is in effect, there would be new ongoing and
41 periodic actions associated with operation, maintenance and management of the water conveyance
42 facilities and conservation lands that could affect valley/foothill riparian natural community in the
43 study area. The ongoing actions include modified operation of upstream reservoirs, the diversion of
44 Sacramento River flows in the north Delta, reduced diversions from south Delta channels, and

1 recreational use of reserve areas. These actions are associated with CM1 and CM11 (see Impact BIO-
2 10 for effects associated with CM2). The periodic actions would involve access road and conveyance
3 facility repair, vegetation management at the various water conveyance facilities and habitat
4 restoration sites (CM13), levee and canal repair and replacement of levee armoring, channel
5 dredging, and habitat enhancement in accordance with natural community management plans. The
6 potential effects of these actions are described below.

- 7 ● *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
8 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect
9 valley/foothill riparian natural community. The anticipated water levels over time with
10 Alternative 1B, as compared with no action, would be slightly lower in the October to May
11 timeframe. The small changes in frequency of higher water levels in these lakes would not
12 substantially reduce the small patches of riparian vegetation that occupy the upper fringes of
13 the reservoir pools. Changes in releases that would influence downstream river flows are
14 discussed below.
- 15 ● *Modified river flows upstream of and within the study area and reduced diversions from south*
16 *Delta channels.* Changes in releases from reservoirs upstream of the study area and their
17 resultant changes in flows in the Sacramento, American and Feather Rivers (associated with
18 Operational Scenario A) would not be expected to result in the permanent reduction in acreage
19 of valley/foothill riparian natural community along these waterways. There is no evidence that
20 flow levels in the upstream rivers would change such that the acreage of this community would
21 be reduced on a permanent basis. Riparian habitats along the rivers of the Sacramento Valley
22 have historically been exposed to significant variations in river stage. Based on modeling
23 conducted for the BDCP (see Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*),
24 flow levels in these upstream rivers could be reduced by as much as 19% in the July to
25 November time frame when compared to No Action, while flow levels in the February to May
26 time frame could increase as much as 48% with implementation of Alternative 1B. Similarly,
27 increased diversions of Sacramento River flows in the north Delta would not be expected to
28 result in a permanent reduction in valley/foothill riparian community downstream of these
29 diversions, even though river flows are modeled to be reduced by 11–27% compared with No
30 Action, depending on month and water-year type (see Section 11C.4 in Appendix 11C, *CALSIM II*
31 *Model Results Utilized in the Fish Analysis*). Reduced diversions from the south Delta channels
32 would not create a reduction in this natural community.

33 The periodic changes in flows in the Sacramento River, Feather River, and American River
34 associated with modified reservoir operations, and the increased diversion of Sacramento River
35 flows at north Delta intakes associated with Alternative 1B would affect salinity, water
36 temperature, dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in
37 these rivers and Delta waterways. These changes are discussed in detail in Chapter 8, *Water*
38 *Quality*. Potentially substantial increases in electrical conductivity (salinity) are predicted for the
39 west Delta and Suisun Marsh as a result of these changed water operations. These salinity
40 changes may alter the plant composition of riparian habitats along the lower Sacramento and
41 San Joaquin Rivers and west Delta islands. The severity and extent of these salinity changes
42 would be complicated by anticipated sea level rise and the effects of downstream tidal
43 restoration over the life of the Plan. There is the potential that some valley/foothill riparian
44 natural community may be degraded immediately adjacent to river channels. The riparian
45 communities in the west Delta are dominated by willows, cottonwood and mixed brambles.

1 These potential changes are not expected to result in a significant reduction in the acreage and
2 value of valley/foothill riparian natural community in the study area.

- 3 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
4 conveyance facilities and levees associated with the BDCP actions have the potential to require
5 removal of adjacent vegetation and could entail earth and rock work in valley/foothill riparian
6 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering these
7 habitats. These activities would be subject to normal erosion, turbidity and runoff control
8 management practices, including those developed as part of *AMM2 Construction Best*
9 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
10 vegetation removal or earthwork adjacent to or within riparian habitats would require use of
11 sediment barriers, soil stabilization and revegetation of disturbed surfaces (*AMM10 Restoration*
12 *of Temporarily Affected Natural Communities*). Proper implementation of these measures would
13 avoid permanent adverse effects on this community.
- 14 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
15 treatment, would be a periodic activity associated with the long-term maintenance of water
16 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
17 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
18 valley/foothill riparian natural community at or adjacent to treated areas. The hazard could be
19 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
20 onto the natural community, or direct discharge of herbicides to riparian areas being treated for
21 invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment*
22 *and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and
23 the environment from use of various chemicals during maintenance activities, including the use
24 of herbicides. These commitments are described in Appendix 3B, including the commitment to
25 prepare and implement spill prevention, containment, and countermeasure plans and
26 stormwater pollution prevention plans. Best management practices, including control of drift
27 and runoff from treated areas, and use of herbicides approved for use in terrestrial
28 environments would also reduce the risk of affecting natural communities adjacent to water
29 conveyance features and levees associated with restoration activities.
- 30 • *Channel dredging.* Long-term operation of the Alternative 1B intakes on the Sacramento River
31 would include periodic dredging of sediments that might accumulate in front of intake screens.
32 The dredging could occur adjacent to valley/foothill riparian natural community. This activity
33 should not adversely affect riparian plants as long as dredging equipment is kept out of riparian
34 areas and dredge spoil is disposed of outside of riparian corridors.
- 35 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
36 communities within the Plan Area (CM11). For the valley/foothill riparian natural community, a
37 management plan would be prepared that specifies actions to improve the value of the habitats
38 for covered species. Actions would include control of invasive nonnative plant and animal
39 species, fire management, restrictions on vector control and application of herbicides, and
40 maintenance of infrastructure that would allow for movement through the community. The
41 enhancement efforts would improve the long-term value of this community for both special-
42 status and common species.
- 43 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to
44 valley/foothill riparian natural community in the reserve system. The activities could include
45 wildlife and plant viewing and hiking. *CM11 Natural Communities Enhancement and*

1 *Management* (BDCP Chapter 3, Section 3.4.11) describes this program and identifies applicable
2 restrictions on recreation that might adversely affect riparian habitat. The BDCP also includes an
3 avoidance and minimization measure (AMM37) that further dictates limits on recreation
4 activities that might affect this natural community. Priority would be given to use of existing
5 trails and roads, with some potential for new trails. Limited tree removal and limb trimming
6 could also be involved.

7 The various operations and maintenance activities described above could alter acreage of
8 valley/foothill riparian natural community in the study area through changes in flow patterns and
9 resultant changes in water quality. Activities could also introduce sediment and herbicides that
10 would reduce the value of this community to common and sensitive plant and wildlife species.
11 Recreation activities could encroach on riparian areas and require occasional tree removal. Other
12 periodic activities associated with the Plan, including management, protection and enhancement
13 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
14 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
15 community. While some of these activities could result in small changes in acreage, these changes
16 would be greatly offset by restoration and protection activities planned as part of *CM7 Riparian*
17 *Natural Community Restoration* and *CM3 Natural Communities Protection and Restoration*, or
18 minimized by implementation of AMM2, AMM4, AMM5, AMM10, AMM18 and AMM37. The
19 management actions associated with levee repair, periodic dredging and control of invasive plant
20 species would also result in a long-term benefit to the species associated with riparian habitats by
21 improving water movement in adjacent waterways and by eliminating competitive, invasive species
22 of plants.

23 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
24 Alternative 1B would not result in a net permanent reduction in the valley/foothill riparian natural
25 community within the study area. Therefore, there would be no adverse effect on this community.

26 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would
27 have the potential to create minor changes in total acreage of valley/foothill riparian natural
28 community in the study area, and could create temporary increases in turbidity and sedimentation.
29 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
30 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10, AMM18 and
31 AMM37 would minimize these impacts, and other operations and maintenance activities, including
32 management, protection and enhancement actions associated with *CM3 Natural Communities*
33 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
34 create positive effects, including reduced competition from invasive, nonnative plants in these
35 habitats. Long-term restoration and protection activities associated with *CM7 Riparian Natural*
36 *Community Restoration* and *CM3 Natural Communities Protection and Restoration* would expand this
37 natural community in the study area. Ongoing operation, maintenance and management activities
38 would not result in a net permanent reduction in this sensitive natural community within the study
39 area. Therefore, there would be a less-than-significant impact on the valley/foothill riparian natural
40 community.

41 **Nontidal Perennial Aquatic**

42 Construction, operation, maintenance and management associated with the conservation
43 components of Alternative 1B would have no long-term adverse effects on the habitats associated
44 with the nontidal perennial aquatic natural community. Initial development and construction of

1 CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this
2 community (see Table 12-1B-5). Full implementation of Alternative 1B would also include the
3 following conservation actions over the term of the BDCP to benefit the nontidal perennial aquatic
4 natural community.

- 5 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
6 and nontidal freshwater perennial emergent wetland natural communities (Objective
7 NFEW/NPANC1.1, associated with CM10).

8 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
9 3.3 that would improve the value of nontidal perennial aquatic natural community for terrestrial
10 species. As explained below, with the restoration and enhancement of these amounts of habitat, in
11 addition to implementation of AMMs, impacts on this natural community would not be adverse for
12 NEPA purposes and would be less than significant for CEQA purposes.

13 **Table 12-1B-5. Changes in Nontidal Perennial Aquatic Natural Community Associated with**
14 **Alternative 1B (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	19	19	5	5	0	0
CM2	24	24	12	12	50-77	0
CM4	34	189	0	0	0	0
CM5	0	28	0	16	0	25
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	77	260	17	33	50-77	25

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

15
16 **Impact BIO-12: Changes in Nontidal Perennial Aquatic Natural Community as a Result of**
17 **Implementing BDCP Conservation Measures**

18 Construction and land grading activities that would accompany the implementation of CM1, CM2,
19 CM4, CM5, and CM6 would permanently eliminate an estimated 260 acres and temporarily remove
20 33 acres of nontidal perennial aquatic natural community in the study area. These modifications
21 represent approximately 5% of the 5,567 acres of the community that is mapped in the study area.
22 Approximately one-third (94 acres) of the permanent and temporary losses would occur during the
23 first 10 years of BDCP implementation, as water conveyance facilities are constructed and habitat

1 restoration is initiated. Natural communities restoration (CM10) would add 400 acres of nontidal
2 marsh during the same period, which would expand the area of that habitat and offset the losses.
3 The nontidal marsh restoration would include a mosaic of nontidal perennial aquatic and nontidal
4 freshwater perennial emergent wetland natural communities, as specified in Objective
5 NFEW/NPANC1.1. The BDCP beneficial effects analysis (BDCP Chapter 5, Section 5.4.6.2) indicates
6 that implementation of Alternative 4 would result in the restoration of 1,200 acres of nontidal
7 marsh, and that the restoration would occur in blocks that would be contiguous with the Plan's
8 larger reserve system. The nontidal marsh would be restored in the vicinity of giant garter snake
9 subpopulations identified in the recovery plan for this species (U.S. Fish and Wildlife Service 1998).
10 The same conservation actions would be implemented for Alternative 1B.

11 The individual effects of each relevant conservation measure are addressed below. A summary
12 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
13 conservation measure discussions.

- 14 ● *CM1 Water Facilities and Operation:* Construction of the Alternative 1B water conveyance
15 facilities would permanently remove 19 acres and temporarily remove 5 acres of nontidal
16 perennial aquatic community. The permanent losses would occur where the new canal would
17 cross existing irrigation canals at the junction of Blossom Road and West Peltier Road, and just
18 south of Sycamore Slough, and where it would eliminate a small slough just south of the San
19 Joaquin River at its junction with Fourteen Mile Slough. These locations are all in the east Delta.
20 The temporary losses would occur where nontidal canals or sloughs would be affected at canal
21 siphon construction sites adjacent to Hog Slough, Sycamore Slough and Railroad Cut (see
22 Terrestrial Biology Mapbook). These losses would take place during the near-term construction
23 period.
- 24 ● *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 would involve a number of
25 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
26 stilling basin improvements, west side channels modifications, Putah Creek realignment
27 activities, and Sacramento Weir and Tule Canal improvements. All of these activities could
28 involve excavation and grading in nontidal perennial aquatic areas to improve passage of fish
29 through the bypasses. Based on hypothetical construction footprints, a total of 24 acres could be
30 permanently lost and another 12 acres could be temporarily removed. This activity would occur
31 primarily in the near-term timeframe.
- 32 ● *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration
33 footprints, implementation of CM4 would permanently change to tidally influenced inundation
34 or remove 189 acres of nontidal perennial aquatic community. These losses would be expected
35 to occur primarily in the Cache Slough and Cosumnes/Mokelumne ROAs (see Figure 12-1). An
36 estimated 1,200 acres of nontidal marsh would be restored. Approximately 400 acres of the
37 restoration (CM10) would occur during the first 10 years of BDCP implementation, which would
38 coincide with the timeframe of water conveyance facilities construction and early restoration
39 activities. The remaining restoration would be spread over the following 30 years. Nontidal
40 natural communities restoration is expected to be focused in CZs 2, 4 and/or 5 in Figure 12-1.
- 41 ● *CM5 Seasonally Inundated Floodplain Restoration:* Based on theoretical footprints, floodplain
42 restoration levee construction would permanently remove 28 acres and temporarily remove 16
43 acres of nontidal perennial aquatic habitat. The construction-related losses would be considered
44 a permanent removal of the nontidal perennial aquatic habitats. It is expected that floodplain
45 restoration would be focused on the south part of the Plan Area, in CZ 7. Floodplain restoration

1 along the southern Delta rivers would improve connectivity for a variety of species that rely on
2 aquatic and riparian habitats. The regional and Plan Area landscape linkages along the San
3 Joaquin River, Middle River and Old River are included in Figure 12-2. This activity is scheduled
4 to start following construction of water conveyance facilities, which is expected to take 10 years.

- 5 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
6 of small amounts of nontidal perennial aquatic habitat along 20 miles of river and sloughs. The
7 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity
8 would be on the edges of tidal perennial aquatic habitat, including levees and channel banks.
9 Nontidal marsh adjacent to these tidal areas could be affected. Channel margin would be
10 enhanced within the study area on sections of the Sacramento, San Joaquin and Mokelumne
11 Rivers, and along Steamboat and Sutter Sloughs.
- 12 • *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal
13 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic
14 and nontidal freshwater perennial emergent natural communities. This marsh restoration
15 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and
16 would be accompanied by adjacent grassland restoration or protection.

17 The following paragraphs summarize the combined effects discussed above and describe other
18 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
19 also included.

20 ***Near-Term Timeframe***

21 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would
22 affect the nontidal perennial aquatic community through CM1 construction losses (19 acres
23 permanent and 5 acres temporary) and the CM2 construction losses (24 acres permanent and 12
24 acres temporary). The natural community would be lost at scattered locations along the canal
25 construction corridor in the east and south Delta and along the west side channels and channels
26 associated with the Sacramento and Lisbon Weirs in the Yolo Bypass. Approximately 34 acres of the
27 inundation and construction-related losses from CM4 would occur during the near-term throughout
28 several of the ROAs mapped in Figure 12-1.

29 The construction losses of this special-status natural community would represent an adverse effect
30 if they were not offset by avoidance and minimization measures and restoration actions associated
31 with BDCP conservation components. Loss of nontidal perennial aquatic natural community would
32 be considered both a loss in acreage of a sensitive natural community and a loss of waters of the
33 United States as defined by Section 404 of the CWA. However, the creating 400 acres of nontidal
34 marsh as part of CM10 during the first 10 years of BDCP implementation would offset this near-term
35 loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for restoration and 1:1
36 for protection) would indicate 94 acres of restoration and 94 acres of protection would be needed to
37 offset (i.e., mitigate) the 94 acres of loss. While the Plan does not include protection of nontidal
38 perennial aquatic habitat, it includes well in excess of the typical 1:1 restoration acreage (which
39 includes protection in perpetuity), and therefore compensates for the lack of protection.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
41 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
42 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
43 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and

1 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
2 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

3 ***Late Long-Term Timeframe***

4 Implementation of Alternative 1B as a whole would result in relatively minor (5%) losses of
5 nontidal perennial aquatic community in the study area. These losses (260 acres of permanent and
6 31 acres of temporary loss) would be largely associated with construction of the water conveyance
7 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), change to tidally influenced
8 inundation during tidal marsh restoration (CM4), and floodplain restoration (CM5). The changes to
9 tidally influenced inundation would occur during the course of the CM4 restoration activities at
10 various tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of
11 1,200 acres of nontidal marsh would be restored over a wide region of the study area, including
12 within the Cosumnes/Mokelumne, Cache Slough, and South Delta ROAs (see Figure 12-1).

13 ***NEPA Effects:*** During the first 10 years of implementing Alternative 1B, creating 400 acres of
14 nontidal marsh as part of CM10 would offset the construction-related and inundation losses of 94
15 acres of nontidal perennial aquatic natural community. There would be no adverse effect. During the
16 full duration of Plan implementation, Alternative 1B would not result in a net reduction in the
17 acreage of a sensitive natural community; there would be an expansion of nontidal marsh and the
18 effect would be beneficial.

19 ***CEQA Conclusion:***

20 ***Near-Term Timeframe***

21 Alternative 1B would result in the loss of approximately 94 acres of nontidal perennial aquatic
22 natural community due to construction of the water conveyance facilities (CM1) and fish passage
23 improvements (CM2), and change to tidally influenced inundation during tidal marsh restoration
24 (CM4). The natural community would be lost at scattered locations along the canal construction
25 corridor in the east and south Delta and along the west side channels and channels associated with
26 the Sacramento and Lisbon Weirs in the Yolo Bypass. The losses would be spread across a 10-year
27 near-term timeframe. These losses would be offset by planned restoration of 400 acres of nontidal
28 marsh scheduled for the first 10 years of BDCP implementation (CM10). Also, AMM1, AMM2, AMM6,
29 AMM7, and AMM10 would be implemented to minimize impacts. Because of these offsetting near-
30 term restoration activities and AMMs, impacts would be less than significant. Typical project-level
31 mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 94 acres of
32 restoration and 94 acres of protection would be needed to offset (i.e., mitigate) the 94 acres of loss.
33 While the Plan does not include protection in the near-term, it includes well in excess of the typical
34 1:1 restoration acreage (which includes protection in perpetuity), and therefore compensates for
35 the lack of protection. The restoration would be initiated at the beginning of Alternative 1B
36 implementation to minimize any time lag in the availability of this habitat to special-status species,
37 and would result in a net gain in acreage of this sensitive natural community.

38 ***Late Long-Term Timeframe***

39 At the end of the Plan period, 293 acres of the natural community would be removed and 1,200
40 acres of nontidal marsh would be restored. The nontidal marsh would consist of a mosaic of nontidal
41 perennial aquatic and nontidal freshwater perennial emergent wetland natural communities. There
42 would be no net permanent reduction in the acreage of this sensitive natural community within the

1 study area. Therefore, Alternative 1B would not have a substantial adverse effect on this natural
2 community; the impact on the nontidal perennial aquatic natural community would be beneficial.

3 **Impact BIO-13: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
4 **Nontidal Perennial Aquatic Natural Community**

5 Two Alternative 1B conservation measures would modify the inundation/flooding regimes of both
6 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
7 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
8 of nontidal perennial aquatic natural community on small acreages, while CM5 would expose this
9 community to additional inundation as channel margins are modified and levees are set back to
10 improve fish habitat along some of the major rivers and waterways throughout the study area.

- 11 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1B
12 would result in an increase in the frequency, magnitude and duration of inundation of 50–77
13 acres of nontidal perennial aquatic natural community. The methods used to estimate these
14 inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*
15 *Wildlife, and Plants*. The area more frequently affected by inundation would vary with the flow
16 volume that would pass through the newly-constructed notch in the Fremont Weir. The 50-acre
17 increase in inundation would be associated with a notch flow of 3,000 cubic feet per second
18 (cfs), and the 77-acre increase would result from a notch flow of 6,000 cfs. Plan-related
19 increases in flow through Fremont Weir would be expected in 30% of the years. This community
20 occurs in small stringers and patches throughout the bypass, including along the Tule Canal/Toe
21 Drain, the western channels north of Interstate 80, and below the Fremont and Sacramento
22 Weirs. The anticipated change in management of flows in the Yolo Bypass includes more
23 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some
24 years, later releases into the bypass in spring months (April and May). The modification of
25 periodic inundation events would not adversely affect the ecological function of this natural
26 community and would not substantially modify its value for special-status or common wildlife
27 species. Nontidal perennial aquatic habitats in the Yolo Bypass have developed under a long-
28 term regime of periodic inundation events. The extended inundation would be designed to
29 expand foraging and spawning habitat for Delta fishes. The effects of this inundation on wildlife
30 and plant species are described in detail in later sections of this chapter.
- 31 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
32 increase in the frequency and duration of inundation of an estimated 25 acres of nontidal
33 perennial aquatic habitat. Specific locations for this restoration activity have not been identified,
34 but they would likely be focused in the south Delta area, along the major rivers and Delta
35 channels. The reconnection of these wetlands to stream flooding events would be beneficial to
36 the ecological function of nontidal perennial aquatic habitats, especially as they relate to BDCP
37 target aquatic species. Foraging activity and refuge sites would be expanded into areas currently
38 unavailable or infrequently available to some aquatic species. The periodic flooding may also
39 encourage germination of nontidal marsh vegetation.

40 In summary, from 75–102 acres of nontidal perennial aquatic community in the study area would be
41 subjected to more frequent inundation as a result of implementing two Alternative 1B conservation
42 measures (CM2 and CM5). Nontidal perennial aquatic natural community in the Yolo Bypass has
43 developed under a long-term regime of periodic inundation events and inundation along expanded
44 river floodplains would be infrequent.

1 **NEPA Effects:** The increased inundation of nontidal perennial aquatic natural community in the Yolo
2 Bypass and along south Delta waterways would not reduce the acreage of this natural community
3 and could encourage germination of aquatic vegetation. This increased inundation would not be
4 adverse.

5 **CEQA Conclusion:** An estimated 75–102 acres of nontidal perennial aquatic community in the study
6 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5
7 under Alternative 1B. Nontidal perennial aquatic community would not be significantly impacted
8 because its habitats in the Yolo Bypass have developed under a long-term regime of periodic
9 inundation events and inundation along expanded river floodplains would be infrequent. The
10 periodic inundation would not result in a net permanent reduction in the acreage of this community
11 in the study area. Therefore, there would be no substantial adverse effect on the community. The
12 impact would be less than significant.

13 **Impact BIO-14: Modification of Nontidal Perennial Aquatic Natural Community from Ongoing** 14 **Operation, Maintenance and Management Activities**

15 Once the physical facilities associated with Alternative 1B are constructed and the stream flow
16 regime associated with changed water management is in effect, there would be new ongoing and
17 periodic actions associated with operation, maintenance and management of the water conveyance
18 facilities and conservation lands that could affect nontidal perennial aquatic natural community in
19 the study area. The ongoing actions include modified operation of upstream reservoirs, the
20 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
21 channels. These actions would be associated with CM1 (see Impact BIO-13 for effects associated
22 with CM2). The periodic actions would involve access road and conveyance facility repair,
23 vegetation management at the various water conveyance facilities and habitat restoration sites
24 (CM11), levee and canal repair and replacement of levee armoring, channel dredging, and habitat
25 enhancement in accordance with natural community management plans. The potential effects of
26 these actions are described below.

- 27 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
28 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would affect
29 nontidal perennial aquatic natural community, in the form of the reservoir pools. The
30 Alternative 1B operations scheme would alter the surface elevations of these reservoir pools as
31 described in Chapter 6, *Surface Water*. These fluctuations would occur within historic ranges
32 and would not adversely affect the natural community. Changes in releases that would influence
33 downstream river flows are discussed below.
- 34 • *Modified river flows upstream of and within the study area and reduced diversions from south*
35 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
36 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
37 channels (associated with Operational Scenario A) would not result in the permanent reduction
38 in acreage of the nontidal perennial aquatic natural community in the study area. Flow levels in
39 the upstream rivers would not change such that the acreage of nontidal perennial aquatic
40 community would be reduced on a permanent basis. Some minor increases and some decreases
41 would be expected to occur along the major rivers during some seasons and in some water-year
42 types, but there would be no permanent loss. Similarly, increased diversions of Sacramento
43 River flows in the north Delta would not result in a permanent reduction in nontidal perennial
44 aquatic community downstream of these diversions. Nontidal wetlands below the diversions are

1 not directly connected to the rivers, as this reach of the river is tidally influenced. Reduced
2 diversions from the south Delta channels would not create a reduction in this natural
3 community.

- 4 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
5 conveyance facilities and levees associated with the BDCP actions have the potential to require
6 removal of adjacent vegetation and could entail earth and rock work in nontidal perennial
7 aquatic habitats. This activity could lead to increased soil erosion, turbidity and runoff entering
8 nontidal perennial aquatic habitats. These activities would be subject to normal erosion,
9 turbidity and runoff control management practices, including those developed as part of *AMM2*
10 *Construction Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment*
11 *Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic habitats would
12 require use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed
13 surfaces. Proper implementation of these measures would avoid permanent adverse effects on
14 this community.
- 15 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical
16 treatment, would be a periodic activity associated with the long-term maintenance of water
17 conveyance facilities and restoration sites. (*CM11 Natural Community Enhancement and*
18 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
19 nontidal perennial aquatic natural community at or adjacent to treated areas. The hazard could
20 be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
21 onto the natural community, or direct discharge of herbicides to nontidal perennial aquatic
22 areas being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
23 *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce
24 hazards to humans and the environment from use of various chemicals during maintenance
25 activities, including the use of herbicides. These commitments are described in Appendix 3B,
26 including the commitment to prepare and implement spill prevention, containment, and
27 countermeasure plans and stormwater pollution prevention plans. Best management practices,
28 including control of drift and runoff from treated areas, and use of herbicides approved for use
29 in aquatic environments would also reduce the risk of affecting natural communities adjacent to
30 water conveyance features and levees associated with restoration activities.

31 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
32 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
33 The treatment activities would be conducted in concert with the California Department of
34 Boating and Waterways' invasive species removal program. Eliminating large stands of water
35 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
36 by removing cover for nonnative predators, improving water flow and removing barriers to
37 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
38 benefit terrestrial species that use tidal and nontidal perennial aquatic natural community for
39 movement corridors and for foraging. Vegetation management effects on individual species are
40 discussed in the species sections on following pages.

- 41 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural
42 communities within the Plan Area (CM11). For nontidal perennial aquatic natural community, a
43 management plan would be prepared that specifies actions to improve the value of the habitats
44 for covered species. Actions would include control of invasive nonnative plant and animal
45 species, fire management, restrictions on vector control and application of herbicides, and
46 maintenance of infrastructure that would allow for movement through the community. The

1 enhancement efforts would improve the long-term value of this community for both special-
2 status and common species.

3 The various operations and maintenance activities described above could alter acreage of nontidal
4 perennial aquatic natural community in the study area through changes in flow patterns and
5 changes in water quality. Activities could also introduce sediment and herbicides that would reduce
6 the value of this community to common and sensitive plant and wildlife species. Other periodic
7 activities associated with the Plan, including management, protection and enhancement actions
8 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
9 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
10 community. While some of these activities could result in small changes in acreage, these changes
11 would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural Communities*
12 *Restoration* and protection actions associated with *CM3 Natural Communities Protection and*
13 *Restoration*. The management actions associated with levee repair and control of invasive plant
14 species would also result in a long-term benefit to the species associated with nontidal perennial
15 aquatic habitats by improving water movement.

16 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
17 Alternative 1B would not result in a net permanent reduction in the nontidal perennial aquatic
18 natural community within the study area. Therefore, there would be no adverse effect on this
19 natural community.

20 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would
21 have the potential to create minor changes in total acreage of nontidal perennial aquatic natural
22 community in the study area, and could create temporary increases in turbidity and sedimentation.
23 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
24 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize
25 these impacts, and other operations and maintenance activities, including management, protection
26 and enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
27 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
28 improved water movement in these habitats. Long-term restoration activities associated with *CM10*
29 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*
30 *Protection and Restoration* would expand this natural community in the study area. Ongoing
31 operation, maintenance and management activities would not result in a net permanent reduction in
32 this sensitive natural community within the study area. Therefore, there would be a less-than-
33 significant impact.

34 **Nontidal Freshwater Perennial Emergent Wetland**

35 Construction, operation, maintenance and management associated with the conservation
36 components of Alternative 1B would have no long-term adverse effects on the habitats associated
37 with the nontidal freshwater perennial emergent wetland natural community. Initial development
38 and construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary
39 removal of this community (see Table 12-1B-6). Full implementation of Alternative 1B would also
40 include the following conservation actions over the term of the BDCP to benefit the nontidal
41 freshwater perennial emergent wetland natural community.

- 42 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
43 and nontidal freshwater perennial emergent wetland natural communities (Objective
44 NFEW/NPANC1.1, associated with CM10).

- Protect and manage 50 acres of occupied or recently occupied tricolored blackbird nesting habitat located within 5 miles of high-value foraging habitat in Conservation Zones 1, 2, 8 or 11. Nesting habitat will be managed to provide young, lush stands of bulrush/cattail emergent vegetation (Objective TRBL1.1).

There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section 3.3 that would improve the value of nontidal freshwater perennial emergent wetland natural community for terrestrial species. As explained below, with the restoration and enhancement of these amounts of habitat, in addition to implementation of AMMs, impacts on this natural community would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1B-6. Changes in Nontidal Freshwater Perennial Emergent Wetland Natural Community Associated with Alternative 1B (acres)^a

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	5	5	6	6	0	0
CM2	25	25	1	1	6-8	0
CM4	40	99	0	0	0	0
CM5	0	0	0	0	0	8
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	70	129	7	7	6-8	8

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

Impact BIO-15: Changes in Nontidal Freshwater Perennial Emergent Wetland Natural Community as a Result of Implementing BDCP Conservation Measures

Construction and land grading activities that would accompany the implementation of CM1, CM2, CM4, and CM6 would permanently eliminate an estimated 129 acres and temporarily remove 7 acres of nontidal freshwater perennial emergent wetland natural community in the study area. These modifications represent approximately 9% of the 1,509 acres of the community that is mapped in the study area. Approximately 57% (77 acres) of the permanent and temporary losses would happen during the first 10 years of BDCP implementation, as water conveyance facilities are constructed and habitat restoration is initiated. Natural communities restoration (CM10) would add 1,200 acres of nontidal marsh, consistent with BDCP Objective NFEW/NPANC1.1, and natural communities protection (CM3) would protect 50 acres of nontidal marsh, consistent with BDCP

1 Objective TRBL1.1. These actions would be taken over the course of BDCP marsh restoration
2 activities, which would expand the area of that habitat and offset the losses. The nontidal marsh
3 restoration would include a mosaic of nontidal perennial aquatic and nontidal freshwater perennial
4 emergent wetland natural communities. The nontidal marsh protection would be designed to
5 support tricolored blackbird populations in the study area. The BDCP beneficial effects analysis
6 (BDCP Chapter 5, Section 5.4.6.2) indicates that implementation of Alternative 4 would result in the
7 restoration of 1,200 acres of nontidal marsh. The restoration would occur in blocks that would be
8 contiguous with the alternative's larger reserve system. The nontidal marsh would be restored in
9 the vicinity of giant garter snake subpopulations identified in the recovery plan for this species (U.S.
10 Fish and Wildlife Service 1998). These conservation actions would also be implemented under
11 Alternative 1B.

12 The individual effects of each relevant conservation measure are addressed below. A summary
13 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
14 conservation measure discussions.

- 15 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1B water conveyance
16 facilities would permanently remove 5 acres and temporarily remove 6 acres of tidal freshwater
17 perennial emergent wetland community. The permanent loss would occur where the new canal
18 would cross a small channel with emergent wetland just south of the San Joaquin River and
19 adjacent to North Holt Road, immediately west of Stockton. The temporary loss would occur
20 where temporary siphon and railroad work areas would displace emergent wetlands in and
21 adjacent to Railroad Cut at Holt (see Terrestrial Biology Mapbook). These wetlands are
22 extremely small and remote water bodies. These losses would take place during the near-term
23 construction period.
- 24 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
25 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
26 stilling basin improvements, west side channels and Tule Canal modifications, Putah Creek
27 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. Some of
28 these activities could involve excavation and grading in nontidal freshwater perennial emergent
29 wetland areas to improve passage of fish through the bypasses. Based on hypothetical
30 construction footprints, a total of 25 acres could be permanently lost and 1 acre could be
31 temporarily removed. These losses would most likely occur in the Tule Canal and west side
32 channels at the north end of the bypass. The habitat here includes narrow bands within these
33 side channels of the bypass and is isolated from other marsh or open water habitats. The narrow
34 bands are bordered by riparian habitats, primarily willows and cottonwoods. This activity
35 would occur in the near-term timeframe.
- 36 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration
37 footprints, implementation of CM4 would permanently inundate or remove 99 acres of nontidal
38 freshwater perennial emergent wetland community. These losses would be expected to occur
39 primarily in the Cache Slough ROA (see Figure 12-1). An estimated 1,200 acres of nontidal
40 marsh would be restored (CM10) and 50 acres would be protected (CM3) during nontidal
41 habitat conservation actions. Approximately 400 acres of the restoration and 25 acres of the
42 protection would happen during the first 10 years of BDCP implementation, which would
43 coincide with the timeframe of water conveyance facilities construction and early tidal marsh
44 restoration. The remaining restoration would be spread over the following 30 years. Nontidal
45 marsh natural communities restoration is expected to be focused in the vicinity of giant garter
46 snake populations in the eastern Delta and near the Yolo Bypass. *CM5 Seasonally Inundated*

1 *Floodplain Restoration*: Based on theoretical footprints, floodplain restoration levee construction
2 would not affect nontidal freshwater perennial emergent wetland natural community.

- 3 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
4 of small amounts of nontidal freshwater perennial emergent wetland habitat along 20 miles of
5 river and sloughs. The extent of this loss cannot be quantified at this time, but the majority of the
6 enhancement activity would occur on the edges of tidal perennial aquatic habitat, including
7 levees and channel banks. Nontidal marsh adjacent to these tidal areas could be affected. The
8 improvements would occur within the study area on sections of the Sacramento, San Joaquin
9 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 10 ● *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal
11 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic
12 and nontidal freshwater perennial emergent natural communities. This marsh restoration
13 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and
14 would be accompanied by adjacent grassland restoration or protection.

15 The following paragraphs summarize the combined effects discussed above and describe other
16 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
17 also included.

18 ***Near-Term Timeframe***

19 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would
20 affect the nontidal freshwater perennial emergent wetland community through CM1 construction
21 losses (5 acres permanent and 6 acres temporary) and the CM2 construction losses (25 acres
22 permanent and 1 acre temporary). These losses would occur along the eastern canal route just south
23 of the San Joaquin River and adjacent to North Holt Road, and just north of Holt in the south Delta,
24 and in the Yolo Bypass. Approximately 40 acres of the inundation and construction-related losses
25 from CM4 would occur in the near-term. These losses would occur throughout several of the ROAs
26 mapped in Figure 12-1.

27 The construction losses of this special-status natural community would represent an adverse effect
28 if they were not offset by avoidance and minimization measures and restoration actions associated
29 with BDCP conservation components. Loss of nontidal freshwater perennial emergent wetland
30 natural community would be considered both a loss in acreage of a sensitive natural community and
31 a loss of wetland as defined by Section 404 of the CWA. However, the combination of creating 400
32 acres and protecting 25 acres of nontidal perennial marsh as part of CM3 and CM10 during the first
33 10 years of BDCP implementation would offset this near-term loss, avoiding any adverse effect.
34 Typical project-level mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate 77
35 acres of restoration and 77 acres of protection would be needed to offset (i.e., mitigate) the 77 acres
36 of loss (the combination of temporary and permanent near-term losses included in Table 12-1B-6).
37 While the Plan includes just 25 acres of protection in the near-term, it includes in excess of the
38 typical 1:1 restoration acreage (which includes protection in perpetuity), and therefore
39 compensates for the shortfall in protection.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
41 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
42 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
43 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and

1 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
2 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

3 **Late Long-Term Timeframe**

4 Implementation of Alternative 1B as a whole would result in 9% losses of nontidal freshwater
5 perennial emergent wetland community in the study area. These losses (129 acres of permanent
6 and 7 acres of temporary loss) would be associated with construction of the water conveyance
7 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and inundation during tidal
8 marsh restoration (CM4). Inundation losses would occur during the course of the CM4 restoration
9 activities at various tidal restoration sites throughout the study area. By the end of the Plan
10 timeframe, a total of 1,200 acres of nontidal marsh would be restored and 50 acres would be
11 protected. The restoration would occur near giant garter snake occupied habitat in the eastern Delta
12 and near Yolo Bypass, in CZs 2, 4 and 5. The 50 acres of protection would occur in CZ 1, 2, 8 or 11 to
13 provide nesting habitat for tri-colored blackbird (see Figure 12-1).

14 **NEPA Effects:** In the near-term, the combination of creating 400 acres and protecting 25 acres of
15 nontidal perennial marsh as part of CM3 and CM10 would offset the near-term losses associated
16 with construction of CM1, CM2 and CM4 facilities, avoiding any adverse effect. With 1,200 acres of
17 nontidal marsh restoration (BDCP Objective NFEW/NPANC1.1) and 50 acres of protection (BDCP
18 Objective TRBL1.1) included with full implementation of the Plan, Alternative 1B would not result in
19 a net long-term reduction in the acreage of a sensitive natural community; the effect would be
20 beneficial.

21 **CEQA Conclusion:**

22 **Near-Term Timeframe**

23 Alternative 1B would result in the loss of approximately 77 acres of nontidal freshwater perennial
24 emergent wetland natural community due to construction of the water conveyance facilities (CM1)
25 and fish passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The
26 construction losses would occur along the eastern canal route at and just north of Holt in the south
27 Delta, and in the Yolo Bypass. Approximately 40 acres of the inundation and construction-related
28 losses from CM4 would occur in the near-term. These losses would occur throughout several of the
29 ROAs mapped in Figure 12-1.

30 The losses would be spread across a 10-year near-term timeframe. These losses would be offset by
31 planned restoration of 400 acres and protection of 25 acres of nontidal marsh scheduled for the first
32 10 years of BDCP implementation (CM3 and CM10). AMM1, AMM2, AMM6, AMM7, and AMM10
33 would also be implemented to minimize impacts. Because of these offsetting near-term restoration
34 activities and AMMs, impacts would be less-than-significant. Typical project-level mitigation ratios
35 (1:1 for restoration and 1:1 for protection) would indicate that 77 acres of restoration and 77 acres
36 of protection would be needed to offset (i.e., mitigate) the 77 acres of loss. While the Plan includes
37 just 25 acres of protection in the near-term, it includes well in excess of the typical 1:1 restoration
38 acreage (which includes protection in perpetuity), and therefore compensates for the shortfall in
39 protection. The restoration and protection would be initiated at the beginning of Alternative 1B
40 implementation to minimize any time lag in the availability of this habitat to special-status species,
41 and would result in a net gain in acreage of this sensitive natural community.

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, 136 acres of the natural community would be removed and 1,200
3 acres of nontidal marsh would be restored. There would be no net permanent reduction in the
4 acreage of the nontidal freshwater perennial emergent wetland natural community within the study
5 area. Therefore, Alternative 1B would not have a substantial adverse effect on this natural
6 community; the impact would be beneficial.

7 **Impact BIO-16: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 8 **Nontidal Freshwater Perennial Emergent Wetland Natural Community**

9 Two Alternative 1B conservation measures would modify the inundation/flooding regimes of both
10 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
11 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
12 of nontidal freshwater perennial emergent wetland natural community on small acreages, while
13 CM5 would expose this community to additional inundation as channel margins are modified and
14 levees are set back to improve fish habitat along some of the major rivers and waterways
15 throughout the study area.

- 16 ● *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1B
17 would result in an increase in the frequency and duration of inundation of 6-8 acres of nontidal
18 freshwater perennial emergent wetland natural community. The methods used to estimate
19 these inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*
20 *Wildlife, and Plants*. The area more frequently affected by inundation would vary with the flow
21 volume that would pass through the newly-constructed notch in the Fremont Weir. The 6-acre
22 increase in inundation would be associated with a notch flow of 1,000 cubic feet per second
23 (cfs), and the 8-acre increase would result from a notch flow of 6,000 cfs. Plan-related increases
24 in flow through Fremont Weir would be expected in 30% of the years. This community occurs in
25 small stringers and isolated patches along the Tule Canal and western channel in the north end
26 of the bypass. These areas are not connected to other adjacent marsh and open water habitats;
27 they are surrounded by riparian habitat, scoured grassland and agricultural lands. The
28 anticipated change in management of flows in the Yolo Bypass includes more frequent releases
29 in flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later
30 releases into the bypass in spring months (April and May). The modification of periodic
31 inundation events would not adversely affect the ecological function of this natural community
32 and would not substantially modify its value for special-status or common wildlife species.
33 Nontidal freshwater perennial emergent wetland plant species in the Yolo Bypass have
34 developed under a long-term regime of periodic inundation events. The extended inundation
35 would be designed to expand foraging and spawning habitat for Delta fishes. The effects of this
36 increased inundation on terrestrial wildlife and plant species are described in detail in later
37 sections of this chapter.
- 38 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
39 increase in the frequency and duration of inundation of an estimated 8 acres of nontidal
40 freshwater perennial emergent wetland habitat. Specific locations for this restoration activity
41 have not been identified, but they would likely be focused in the south Delta area, along the
42 major rivers and Delta channels. The reconnection of these wetlands to stream flooding events
43 would be beneficial to the ecological function of nontidal freshwater perennial emergent
44 wetland habitats, especially as they relate to BDCP target aquatic species. The added exposure to
45 inundation could also encourage germination of nontidal marsh plant species. Foraging activity

1 and refuge sites would be expanded into areas currently unavailable or infrequently available to
2 some aquatic species.

3 In summary, 14-16 acres of nontidal freshwater perennial emergent wetland community in the
4 study area would be subjected to more frequent inundation as a result of implementing two
5 Alternative 1B conservation measures (CM2 and CM5). This community would not be adversely
6 affected because its habitats in the Yolo Bypass have developed under a long-term regime of
7 periodic inundation events and inundation along expanded river floodplains would be infrequent.

8 **NEPA Effects:** The increased inundation of nontidal freshwater perennial emergent wetland natural
9 community in the Yolo Bypass and in the southern Delta would not reduce the acreage of this
10 natural community and could encourage germination of emergent wetland vegetation. The
11 increased inundation would not be an adverse effect.

12 **CEQA Conclusion:** An estimated 16-18 acres of nontidal freshwater perennial emergent wetland
13 community in the study area would be subjected to more frequent inundation as a result of
14 implementing CM2 and CM5 under Alternative 1B. This community would not be significantly
15 impacted because its habitats in the Yolo Bypass have developed under a long-term regime of
16 periodic inundation events and inundation along expanded river floodplains would be infrequent.
17 The periodic inundation would not result in a net permanent reduction in the acreage of this
18 community in the study area. Therefore, there would be no substantial adverse effect on the
19 community. The impact would be less than significant.

20 **Impact BIO-17: Modification of Nontidal Freshwater Perennial Emergent Wetland Natural** 21 **Community from Ongoing Operation, Maintenance and Management Activities**

22 Once the physical facilities associated with Alternative 1B are constructed and the stream flow
23 regime associated with changed water management is in effect, there would be new ongoing and
24 periodic actions associated with operation, maintenance and management of the water conveyance
25 facilities and conservation lands that could affect nontidal freshwater perennial emergent wetland
26 natural community in the study area. The ongoing actions include modified operation of upstream
27 reservoirs, the diversion of Sacramento River flows in the north Delta, and reduced diversions from
28 south Delta channels. These actions are associated with CM1 (see Impact BIO-16 for effects
29 associated with CM2). The periodic actions would involve access road and conveyance facility
30 repair, vegetation management at the various water conveyance facilities and habitat restoration
31 sites (CM13), levee and canal repair and replacement of levee armoring, channel dredging, and
32 habitat enhancement in accordance with natural community management plans. The potential
33 effects of these actions are described below.

- 34 ● *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
35 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect
36 nontidal freshwater perennial emergent wetland natural community. These reservoirs do not
37 support significant stands of freshwater emergent wetlands. Changes in releases that would
38 influence downstream river flows are discussed below.
- 39 ● *Modified river flows upstream of and within the study area and reduced diversions from south*
40 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
41 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
42 channels (associated with Operational Scenario A) would not result in the permanent reduction
43 in acreage of the nontidal freshwater perennial emergent wetland natural community in the

1 study area. The majority of this wetland type exists outside of the levees of the larger rivers and
 2 would not be affected by flow changes in river or Delta channels. Similarly, increased diversions
 3 of Sacramento River flows in the north Delta would not result in a permanent reduction in
 4 nontidal freshwater perennial emergent wetland community downstream of these diversions.
 5 Nontidal wetlands below the diversions are not directly connected to the rivers, as this reach of
 6 the river is tidally influenced. Reduced diversions from the south Delta channels would not
 7 create a reduction in this natural community.

- 8 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
 9 conveyance facilities and levees associated with the BDCP actions have the potential to require
 10 removal of adjacent vegetation and could entail earth and rock work in nontidal freshwater
 11 perennial emergent wetland habitats. This activity could lead to increased soil erosion, turbidity
 12 and runoff entering nontidal freshwater perennial habitats. These activities would be subject to
 13 normal erosion, turbidity and runoff control management practices, including those developed
 14 as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
 15 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic
 16 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation
 17 of disturbed surfaces. Proper implementation of these measures would avoid permanent
 18 adverse effects on this community.
- 19 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical
 20 treatment, would be a periodic activity associated with the long-term maintenance of water
 21 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
 22 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
 23 nontidal freshwater perennial emergent wetland natural community at or adjacent to treated
 24 areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of
 25 contaminated stormwater onto the natural community, or direct discharge of herbicides to
 26 nontidal perennial wetland areas being treated for invasive species removal. Environmental
 27 commitments and *AMM5 Spill Prevention, Containment and Countermeasure Plan* have been
 28 made part of the BDCP to reduce hazards to humans and the environment from use of various
 29 chemicals during maintenance activities, including the use of herbicides. These commitments
 30 are described in Appendix 3B, including the commitment to prepare and implement spill
 31 prevention, containment, and countermeasure control plans and stormwater pollution
 32 prevention plans. Best management practices, including control of drift and runoff from treated
 33 areas, and use of herbicides approved for use in aquatic environments would also reduce the
 34 risk of affecting natural communities adjacent to water conveyance features and levees
 35 associated with restoration activities.

36 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
 37 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
 38 The treatment activities would be conducted in concert with the California Department of
 39 Boating and Waterways' invasive species removal program. Eliminating large stands of water
 40 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
 41 by removing cover for nonnative predators, improving water flow and removing barriers to
 42 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
 43 benefit terrestrial species that use tidal and nontidal freshwater perennial emergent wetland
 44 natural community for movement corridors and for foraging. Vegetation management effects on
 45 individual species are discussed in the species sections on following pages.

- 1 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
2 communities within the Plan Area (CM11). For nontidal freshwater perennial emergent wetland
3 natural community, a management plan would be prepared that specifies actions to improve the
4 value of the habitats for covered species. Actions would include control of invasive nonnative
5 plant and animal species, fire management, restrictions on vector control and application of
6 herbicides, and maintenance of infrastructure that would allow for movement through the
7 community. The enhancement efforts would improve the long-term value of this community for
8 both special-status and common species.

9 The various operations and maintenance activities described above could alter acreage of nontidal
10 freshwater perennial emergent wetland natural community in the study area through changes in
11 flow patterns and changes in water quality. Activities could also introduce sediment and herbicides
12 that would reduce the value of this community to common and sensitive plant and wildlife species.
13 Other periodic activities associated with the Plan, including management, protection and
14 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
15 *CM11 Natural Communities Enhancement and Management*, would be undertaken to enhance the
16 value of the community. While some of these activities could result in small changes in acreage,
17 these changes would be greatly offset by restoration activities planned as part of *CM10 Nontidal*
18 *Marsh Restoration* and protection actions associated with *CM3 Natural Communities Protection and*
19 *Restoration*. The management actions associated with levee repair and control of invasive plant
20 species would also result in a long-term benefit to the species associated with nontidal freshwater
21 perennial emergent wetland habitats by improving water movement.

22 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
23 Alternative 1B would not result in a net permanent reduction in the nontidal freshwater perennial
24 emergent wetland natural community within the study area. Therefore, there would be no adverse
25 effect on this natural community.

26 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would
27 have the potential to create minor changes in total acreage of nontidal freshwater perennial
28 emergent wetland natural community in the study area, and could create temporary increases in
29 turbidity and sedimentation. The activities could also introduce herbicides periodically to control
30 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and
31 AMM5 would minimize these impacts, and other operations and maintenance activities, including
32 management, protection and enhancement actions associated with *CM3 Natural Communities*
33 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
34 create positive effects, including improved water movement in and adjacent to these habitats. Long-
35 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and protection actions
36 associated with *CM3 Natural Communities Protection and Restoration* would greatly expand this
37 natural community in the study area. Ongoing operation, maintenance and management activities
38 would not result in a net permanent reduction in this sensitive natural community within the study
39 area. Therefore, there would be a less-than-significant impact.

40 **Alkali Seasonal Wetland Complex**

41 Construction, operation, maintenance, and management associated with the conservation
42 components of Alternative 1B would have no long-term adverse effects on the habitats associated
43 with the alkali seasonal wetland complex natural community. Initial development and construction
44 of CM2 and CM4 would result in permanent removal of this community (see Table 12-1B-7). Full

1 implementation of Alternative 1B would also include the following conservation actions over the
2 term of the BDCP to benefit the alkali seasonal wetland natural community.

- 3 • Protect 150 acres of alkali seasonal wetland in Conservation Zones 1, 8 and/or 11 among a
4 mosaic of protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with
5 CM3).
- 6 • Restore or create alkali seasonal wetlands in Conservation Zones 1, 8, and/or 11 to achieve no
7 net loss of wetted acres (up to 72 acres of alkali seasonal wetland complex restoration)
8 (Objective ASWNC1.2, associated with CM3 and CM9).
- 9 • Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali
10 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).

11 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
12 3.3 that would improve the value of alkali seasonal wetland natural community for terrestrial
13 species. As explained below, with the protection, restoration, and enhancement of the amounts of
14 habitat listed in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural
15 community would not be adverse for NEPA purposes and would be less than significant for CEQA
16 purposes.

17 **Table 12-1B-7. Changes in Alkali Seasonal Wetland Complex Natural Community Associated with**
18 **Alternative 1B (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	0	0
CM2	45	45	0	0	264-744	0
CM4	13	27	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	58	72	0	0	264-744	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

19
20 **Impact BIO-18: Changes in Alkali Seasonal Wetland Complex Natural Community as a Result**
21 **of Implementing BDCP Conservation Measures**

22 Construction, land grading and habitat restoration activities that would accompany the
23 implementation of CM2 and CM4 would permanently eliminate an estimated 72 acres of alkali

1 seasonal wetland complex natural community in the study area. These modifications represent
2 approximately 2% of the 3,723 acres of the community that is mapped in the study area. Most of the
3 losses (58 acres or 80%) would occur during the first 10 years of Alternative 1B implementation, as
4 Yolo Bypass improvements and habitat restoration is initiated. Alkali seasonal wetland complex
5 protection (120 acres) and restoration (an estimated 58 acres, but determined by actual level of
6 effect) would be initiated during the same period; when combined, these actions would offset the
7 losses. By the end of the Plan period, 150 acres of this natural community would be protected and
8 up to 72 acres would be restored. The BDCP beneficial effects analysis for this community (BDCP
9 Chapter 5, Section 5.4.7.2) states that Alternative 4 would protect 150 acres of alkali seasonal
10 wetland in Conservation Zones 1, 8, or 11, in a mosaic of protected grasslands and vernal pool
11 complex. This would protect currently unprotected high-value alkali seasonal wetland complex in
12 the Plan Area. The same conservation actions would be implemented for Alternative 1B.

13 The individual effects of each relevant conservation measure are addressed below. A summary
14 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
15 conservation measure discussions.

- 16 ● *CM1 Water Facilities and Operation:* Construction of the Alternative 1B water conveyance
17 facilities would not directly affect alkali seasonal wetland complex natural community.

18 The construction activity associated with CM1 has the potential to lead to increased nitrogen
19 deposition in alkali seasonal wetland habitats in the vicinity of Clifton Court Forebay. A
20 significant number of cars, trucks, and land grading equipment involved in construction would
21 emit small amounts of atmospheric nitrogen from fuel combustion; this material could be
22 deposited in sensitive alkali seasonal wetland areas that are located west of the major
23 construction areas at Clifton Court Forebay. Nitrogen deposition can pose a risk of adding a
24 fertilizer to nitrogen-limited soils and their associated plants. Nonnative invasive species can be
25 encouraged by the added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-*
26 *Related Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has
27 been concluded that this potential deposition would pose a low risk of changing the alkali
28 seasonal wetland complex in the construction area because the construction would occur
29 primarily downwind of the natural community and the construction would contribute a
30 negligible amount of nitrogen to regional projected emissions. No adverse effect is expected.

- 31 ● *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
32 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
33 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
34 Sacramento Weir improvements. Realignment of Putah Creek could involve excavation and
35 grading in alkali seasonal wetland complex as a new channel is constructed. Based on
36 hypothetical construction footprints, a total of 45 acres could be permanently lost. This complex
37 is located immediately south of the existing Putah Creek channel within the bypass, and is a
38 relatively large, moderate to high value, contiguous expanse of this community. This loss would
39 occur in the near-term timeframe.

- 40 ● *CM3 Natural Communities Protection and Restoration:* CM3 proposes to protect at least 150 acres
41 of alkali seasonal wetland complex in CZ 1, CZ 8 and CZ 11 (BDCP Objective ASWNC1.1). The
42 protection would occur in areas containing a mosaic of grassland and vernal pool complex in
43 unfragmented natural landscapes supporting a diversity of native plant and wildlife species.
44 These areas would be both protected and enhanced to increase the cover of alkali seasonal
45 wetland plants relative to nonnative species.

- 1 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
2 footprints, implementation of CM4 would permanently inundate or remove 13 acres of alkali
3 seasonal wetland complex in the near-term and inundate or remove 27 acres by the end of the
4 Plan timeframe. The losses would be expected to occur in the Cache Slough and Suisun Marsh
5 ROAs established for tidal restoration (see Figure 12-1). The largest losses would likely occur in
6 the Lindsay Slough area and on the northern fringes of Suisun Marsh, north of the Potrero Hills.
7 These losses would not fragment the alkali seasonal wetland communities adjacent to these
8 sloughs because the losses would occur on the edges of the existing habitat.
- 9 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: CM9 includes both vernal
10 pool complex and alkali seasonal wetland complex restoration goals. The intent of the
11 conservation measure is to match the acreage of restoration with the actual acreage lost to other
12 conservation measures (primarily CM2 and CM4). The current estimate for alkali seasonal
13 wetland complex restoration is 58 acres in the near-term and a total of 72 acres by the end of
14 the BDCP's restoration period. The goal is for no net loss of this natural community, consistent
15 with BDCP Objective ASWNC1.2. Restoration in the Lindsay Slough area of the Cache Slough ROA
16 and the northern region of the Suisun Marsh ROA would be consistent with essential habitat
17 connectivity goals mapped in Figure 12-2 and described in Table 3.2-3 of BDCP Chapter 3.

18 The following paragraphs summarize the combined effects discussed above and describe other
19 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
20 also included.

21 ***Near-Term Timeframe***

22 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would
23 affect the alkali seasonal wetland complex natural community through CM2 construction losses (45
24 acres). These losses would occur in the Yolo Bypass south of Putah Creek. Approximately 13 acres of
25 the inundation and construction-related losses in habitat from CM4 would occur in the near-term.
26 These losses would occur primarily in the Cache Slough and Suisun Marsh ROAs mapped in Figure
27 12-1.

28 The construction losses of this special-status natural community would represent an adverse effect
29 if they were not offset by avoidance and minimization measures and restoration actions associated
30 with BDCP conservation components. Loss of alkali seasonal wetland complex natural community
31 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
32 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland
33 complex as part of CM3 and the restoration of up to 58 acres of this community as part of CM9
34 during the first 10 years of BDCP implementation would offset this near-term loss, avoiding any
35 adverse effect. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration)
36 would indicate 116 acres of protection and 58 acres of restoration would be needed to offset (i.e.,
37 mitigate) the 58 acres of loss.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*
41 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting
42 habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and
43 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
44 EIR/EIS.

1 **Late Long-Term Timeframe**

2 Implementation of Alternative 1B as a whole would result in 2% losses of alkali seasonal wetland
3 natural community in the study area. These losses (72 acres) would be largely associated with
4 construction of Yolo Bypass fish improvements (CM2) and inundation during tidal marsh
5 restoration (CM4). Inundation losses would occur during the course of the Plan's restoration
6 activities, primarily in the Cache Slough and Suisun Marsh ROAs.

7 **NEPA Effects:** In the first 10 years of implementing Alternative 1B conservation measures, 120 acres
8 of alkali seasonal wetland complex would be protected and up to 58 acres would be restored. These
9 conservation actions would offset the near-term losses associated with construction and restoration
10 actions of CM2 and CM4, avoiding any adverse effect. By the end of the Plan timeframe, a total of 150
11 acres of this natural community would be protected (BDCP Objective ASWCNC 1.1 and CM3) and an
12 estimated 72 acres would be restored (BDCP Objective ASWNC1.2 and CM9). The protection and
13 restoration would occur primarily in CZ 1, CZ 8, and/or CZ 11, in the Cache Slough, Suisun Marsh
14 and Clifton Court Forebay areas. Therefore, Alternative 1B would not have an adverse effect on this
15 natural community.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Alternative 1B would result in the permanent loss of approximately 58 acres of alkali seasonal
19 wetland complex natural community due to construction of fish passage improvements (CM2) and
20 inundation during tidal marsh restoration (CM4). The construction losses would occur primarily in
21 the area just south of Putah Creek in the Yolo Bypass, while inundation losses would occur in the
22 Cache Slough and Suisun Marsh ROAs. The losses would be spread across a 10-year near-term
23 timeframe.

24 The construction losses of this special-status natural community would represent an adverse effect
25 if they were not offset by avoidance and minimization measures and other actions associated with
26 BDCP conservation components. Loss of alkali seasonal wetland complex natural community would
27 be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
28 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland
29 complex as part of CM3 and the restoration of up to 58 acres of this community as part of CM9
30 during the first 10 years of BDCP implementation would offset this near-term loss, avoiding any
31 significant impact. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration)
32 would indicate 116 acres of protection and 58 acres of restoration would be needed to offset (i.e.,
33 mitigate) the 58 acres of loss. AMM1, AMM2, AMM3, AMM4, and AMM10 would also be implemented
34 to minimize impacts. Because of the offsetting protection and restoration activities and AMMs,
35 impacts would be less than significant.

36 **Late Long-Term Timeframe**

37 At the end of the Plan period, 72 acres of alkali seasonal wetland complex natural community would
38 be permanently removed by conservation actions, 150 acres would be protected and up to 72 acres
39 would be restored. The restoration acres actually developed would depend on the number of acres
40 affected during Plan implementation. There would be no net permanent reduction in the acreage of
41 this natural community within the study area. Therefore, Alternative 1B would have a less-than-
42 significant impact on this natural community.

1 **Impact BIO-19: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
2 **Alkali Seasonal Wetland Complex Natural Community**

3 BDCP conservation measure CM2 would modify the inundation/flooding regime of the Yolo Bypass,
4 a man-made waterway. CM2, which is designed to improve fish passage and shallow flooded habitat
5 for Delta fishes in the Yolo Bypass, would increase periodic inundation of alkali seasonal wetland
6 complex natural community at scattered locations in the central and southern sections of the
7 bypass.

8 Operation of the Yolo Bypass under Alternative 1B would result in an increase in the frequency and
9 duration of inundation on an estimated 264–744 acres of alkali seasonal wetland complex natural
10 community. The methods used to estimate these inundation acreages are described in BDCP
11 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected
12 by inundation would vary with the flow volume that would pass through the newly-constructed
13 notch in the Fremont Weir. The 264-acre increase in inundation would be associated with a notch
14 flow of 1,000 cubic feet per second (cfs), and the 744-acre increase would result from a notch flow of
15 4,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in 30% of the
16 years. The alkali seasonal wetland complex natural community occurs primarily in the central and
17 southern reaches of the bypass, south of Putah Creek. The stands in this location are relatively large,
18 with moderate to high value for associated plant and wildlife species. The anticipated change in
19 management of flows in the Yolo Bypass includes more frequent releases in flows into the bypass
20 from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in spring
21 months (April and May).

22 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with
23 Alternative 1B would not adversely affect alkali seasonal wetland complex habitats, as they have
24 persisted under similar high flows and extended flooding periods. There is the potential for some
25 change in plant species composition as a result of longer inundation periods, but the natural
26 community would persist.

27 **CEQA Conclusion:** An estimated 264–744 acres of alkali seasonal wetland complex natural
28 community in the Yolo Bypass would be subjected to more frequent inundation as a result of
29 implementing CM2 under Alternative 1B. This natural community is conditioned to periodic
30 inundation; the slight increase in periodic inundation would not result in a net permanent reduction
31 in the acreage of this community in the study area, although some change in plant species
32 composition could occur. Increasing periodic inundation of alkali seasonal wetland complex natural
33 community in the Yolo Bypass would have a less-than-significant impact on this community. The
34 effects of this inundation on terrestrial wildlife and plant species are described in detail in later
35 sections of this chapter.

36 **Impact BIO-20: Modification of Alkali Seasonal Wetland Complex Natural Community from**
37 **Ongoing Operation, Maintenance and Management Activities**

38 Once the physical facilities associated with Alternative 1B are constructed and the stream flow
39 regime associated with changed water management is in effect, there would be new ongoing and
40 periodic actions associated with operation, maintenance and management of the water conveyance
41 facilities and conservation lands that could affect alkali seasonal wetland complex natural
42 community in the study area. The ongoing actions include the diversion of Sacramento River flows
43 in the north Delta, reduced diversions from south Delta channels, and recreation in and adjacent to
44 Plan reserves. These actions are associated with CM1 and CM11 (see the impact discussion above

1 for effects associated with CM2). The periodic actions would involve access road and conveyance
2 facility repair, vegetation management at the various water conveyance facilities and habitat
3 restoration sites (CM11), levee repair and replacement of levee armoring, channel dredging, and
4 habitat enhancement in accordance with natural community management plans. The potential
5 effects of these actions are described below.

- 6 • *Modified river flows upstream of and within the study area and reduced diversions from south*
7 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
8 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
9 channels (associated with Operational Scenario A) would not affect alkali seasonal wetland
10 natural community. This natural community does not exist within or adjacent to the active
11 Sacramento River system channels and Delta waterways that would be affected by modified
12 flow levels.
- 13 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
14 conveyance facilities and levees associated with the BDCP actions have the potential to require
15 removal of adjacent vegetation and could entail earth and rock work in or adjacent to alkali
16 seasonal wetland complex habitats. This activity could lead to increased soil erosion and runoff
17 entering these habitats. These activities would be subject to normal erosion and runoff control
18 management practices, including those developed as part of *AMM2 Construction Best*
19 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
20 vegetation removal or earthwork adjacent to or within alkali seasonal wetland complex habitats
21 would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces
22 as required by *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper
23 implementation of these measures would avoid permanent adverse effects on this community.
- 24 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
25 treatment, would be a periodic activity associated with the long-term maintenance of water
26 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
27 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
28 alkali seasonal wetland complex natural community at or adjacent to treated areas. The hazard
29 could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
30 stormwater onto the natural community, or direct discharge of herbicides to alkali seasonal
31 wetland complex areas being treated for invasive species removal. Environmental commitments
32 and *AMM5 Spill Prevention, Containment and Countermeasure Plan* have been made part of the
33 BDCP to reduce hazards to humans and the environment from use of various chemicals during
34 maintenance activities, including the use of herbicides. These commitments are described in
35 Appendix 3B, including the commitment to prepare and implement spill prevention,
36 containment, and countermeasure plans and stormwater pollution prevention plans. Best
37 management practices, including control of drift and runoff from treated areas, and use of
38 herbicides approved for use in terrestrial environments would also reduce the risk of affecting
39 natural communities adjacent to water conveyance features and levees associated with
40 restoration activities.
- 41 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
42 communities within the Plan Area (CM11). For the alkali seasonal wetland complex natural
43 community, a management plan would be prepared that specifies actions to improve the value
44 of the habitats for covered species. Actions would include control of invasive nonnative plant
45 and animal species, fire management, restrictions on vector control and application of
46 herbicides, and maintenance of infrastructure that would allow for movement through the

1 community. The enhancement efforts would improve the long-term value of this community for
2 both special-status and common species.

- 3 • **Recreation.** The BDCP would allow for certain types of recreation in and adjacent to alkali
4 seasonal wetland natural community in the reserve system. The activities could include wildlife
5 and plant viewing and hiking. *CM11 Natural Communities Enhancement and Management* (BDCP
6 Chapter 3, Section 3.4.11) describes this program and identifies applicable restrictions on
7 recreation that might adversely affect alkali seasonal wetland habitat. BDCP also includes an
8 avoidance and minimization measure (AMM37) that further dictates limits on recreation
9 activities that might affect this natural community. Most recreation would be docent-led wildlife
10 and botanical tours, using existing trails and roads in the vicinity of the reserves. No new trails
11 would be constructed.

12 The various operations and maintenance activities described above could alter acreage of alkali
13 seasonal wetland complex natural community in the study area. Activities could introduce sediment
14 and herbicides that would reduce the value of this community to common and sensitive plant and
15 wildlife species. Other periodic activities associated with the Plan, including management,
16 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
17 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
18 enhance the value of the community. While some of these activities could result in small changes in
19 acreage, these changes would be offset by protection and restoration activities planned as part of
20 *CM3 Natural Communities Protection and Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
21 *Wetland Complex Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, AMM10,
22 and AMM37. The management actions associated with control of invasive plant species would also
23 result in a long-term benefit to the species associated with alkali seasonal wetland complex habitats
24 by eliminating competitive, invasive species of plants.

25 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
26 Alternative 1B would not result in a net permanent reduction in this natural community within the
27 study area. Therefore, there would be no adverse effect on the community.

28 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would
29 have the potential to create minor changes in total acreage of alkali seasonal wetland complex
30 natural community in the study area, and could create temporary increases sedimentation. The
31 activities could also introduce herbicides periodically to control nonnative, invasive plants.
32 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10, and AMM37
33 would minimize these impacts, and other operations and maintenance activities, including
34 management, protection and enhancement actions associated with *CM3 Natural Communities*
35 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
36 create positive effects, including reduced competition from invasive, nonnative plants in these
37 habitats. Long-term restoration activities associated with *CM9 Vernal Pool and Alkali Seasonal*
38 *Wetland Complex Restoration* and protection actions associated with *CM3 Natural Communities*
39 *Protection and Restoration* would ensure that the acreage of this natural community would not
40 decrease in the study area. Ongoing operation, maintenance and management activities would not
41 result in a net permanent reduction in this natural community within the study area. Therefore,
42 there would be a less-than-significant impact.

Vernal Pool Complex

Construction, operation, maintenance and management associated with the Alternative 1B conservation components would have no long-term adverse effects on the habitats associated with the vernal pool complex natural community. Initial development and construction of CM4 would result in permanent removal of 1 acre of this community (see Table 12-1B-8). Full implementation of Alternative 1B would also include the following conservation actions over the term of the BDCP to benefit the vernal pool complex natural community.

- Protect 600 acres of existing vernal pool complex in Conservation Zones 1, 8, and 11, primarily in core vernal pool recovery areas (Objective VPNC1.1, associated with CM3).
- Restore vernal pool complex in Conservation Zones 1, 8, and/or 11 to achieve no net loss of vernal pool acreage (up to 67 acres of vernal pool complex restoration, assuming that all anticipated impacts [10 wetted acres] occur and that the restored vernal pool complex has 15% density of vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).

There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section 3.3 that would improve the value of vernal pool complex natural community for terrestrial species. As explained below, with the protection, restoration and enhancement of the amounts of habitat listed in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural community would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1B-8. Changes in Vernal Pool Complex Natural Community Associated with Alternative 1B (acres)^a

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	4	4	0	0	0	0
CM2	0	0	0	0	0-4	0
CM4	201	372	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	205	376	0	0	0-4	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

1 **Impact BIO-21: Changes in Vernal Pool Complex Natural Community as a Result of**
2 **Implementing BDCP Conservation Measures**

3 Construction, land grading and habitat restoration activities that would accompany the
4 implementation of CM1 and CM4 would permanently eliminate an estimated 376 acres of vernal
5 pool complex natural community in the study area. This modification represents approximately 3%
6 of the 12,133 acres of the community that is mapped in the study area. These acreages are based on
7 the proposed location of the CM1 construction footprint and a theoretical footprint for CM4 tidal
8 marsh restoration activities. An estimated 205 acres of this loss would occur during the first 10
9 years of Alternative 1B implementation, as water conveyance facilities are constructed and tidal
10 marsh restoration is initiated. Vernal pool complex protection (400 acres) and restoration (an
11 estimated 40 acres, with actual restoration based on level of effect) would be initiated during the
12 first 10 years of Alternative 1B implementation to counteract the loss of habitat. By the end of the
13 Plan period, 600 acres of this natural community would be protected and up to 67 acres would be
14 restored. Because of the high sensitivity of this natural community and its shrinking presence in the
15 Plan Area, avoidance and minimization measures have been built into the BDCP to eliminate the
16 majority of this potential loss. The BDCP beneficial effect analysis (BDCP Chapter 5, Section 5.4.8.2)
17 indicates that implementation of Alternative 4 would protect at least 600 acres of vernal pool
18 complex in Conservation Zones 1, 8, and 11 and additional vernal pool complex would be restored to
19 achieve no net loss of this community. These conservation activities would also be implemented
20 under Alternative 1B.

21 The individual effects of the relevant conservation measure are addressed below. A summary
22 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
23 conservation measure discussions.

- 24 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1B water conveyance
25 facilities would permanently remove 4 acres of vernal pool complex natural community. The
26 loss would occur from construction of Alternative 1B's expanded forebay, immediately adjacent
27 to Clifton Court Forebay at its southwest corner (see Figure 12-1 and Terrestrial Biology
28 Mapbook). The habitat here is isolated hydrologically from other vernal pool complex by the
29 existing forebay, the California Aqueduct and agricultural operations. The habitat is of low value
30 and is made up of degraded vernal pool complex with ruderal herbaceous grasses and forbs, and
31 patches of iodine bush.

32 Because of the close proximity of construction activity to adjacent vernal pool complex, both
33 near Clifton Court Forebay and Stone Lakes National Wildlife Refuge, there is also the potential
34 for indirect loss or damage to vernal pools from changes in pool hydrology or deposition of
35 construction-related sediment. These potential indirect effects are discussed in detail in the
36 vernal pool crustaceans impact analysis later in this chapter.

37 The construction activity associated with CM1 also has the potential to lead to increased
38 nitrogen deposition in vernal pool complex habitats in the vicinity of Clifton Court Forebay and
39 Stone Lakes National Wildlife Refuge. A significant number of cars, trucks, and land grading
40 equipment involved in construction would emit small amounts of atmospheric nitrogen from
41 fuel combustion; this material could be deposited in sensitive vernal pool areas that are located
42 west of the major construction areas at Clifton Court Forebay and east of the construction areas
43 adjacent to Stone Lakes NWR. Nitrogen deposition can pose a risk of adding a fertilizer to
44 nitrogen-limited soils and their associated plants. Nonnative invasive species can be encouraged
45 by the added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related*

1 *Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been
2 concluded that this potential deposition would pose a low risk of changing the vernal pool
3 complex in the construction areas because the construction would contribute a negligible
4 amount of nitrogen to regional projected emissions. Also, the construction at Clifton Court
5 Forebay would occur primarily downwind of the natural community. At Stone Lakes National
6 Wildlife Refuge, the USFWS refuge management undertakes active invasive species control,
7 including use of grazing. No adverse effect is expected.

- 8 ● *CM3 Natural Communities Protection and Restoration*: CM3 proposes to protect at least 600 acres
9 of vernal pool complex in CZ 1, CZ 8, and CZ 11 (BDCP Objective VPNC1.1). The protection would
10 occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented
11 natural landscapes supporting a diversity of native plant and wildlife species. These areas would
12 be both protected and enhanced to increase the cover of vernal pool complex plants relative to
13 nonnative species.
- 14 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
15 footprints, implementation of CM4 tidal marsh restoration in CZs 1 and 11 (Cache Slough and
16 Suisun Marsh ROAs; see Figure 12-1) could permanently inundate or remove 201 acres of vernal
17 pool complex in the near-term timeframe. By the end of the Plan period, a total of 372 acres
18 could be affected. The principal areas likely to be affected include the Cache Slough drainage just
19 west of the Yolo Bypass and the Nurse Slough drainage just east of the Potrero Hills.
- 20 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: CM9 includes both vernal
21 pool complex and alkali seasonal wetland complex restoration goals. The current estimate for
22 vernal pool and alkali seasonal wetland complex restoration is 40 acres in the near-term and up
23 to 67 acres by the end of the BDCP's restoration period. This restoration conservation measure
24 includes the "no net loss" policy normally applied to this natural community (BDCP Objective
25 VPNC1.2).

26 The following paragraphs summarize the combined effects discussed above and describe other
27 BDCP conservation actions that would offset or avoid these effects. NEPA and CEQA impact
28 conclusions are also included.

29 ***Near-Term Timeframe***

30 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would
31 affect 205 acres of vernal pool complex natural community through inundation or construction-
32 related losses in habitat from CM1 and CM4 activities. This loss would likely occur in the Cache
33 Slough or Suisun Marsh ROAs mapped in Figure 12-1, and in the vicinity of Clifton Court Forebay
34 (see the Terrestrial Biology Mapbook).

35 The construction or inundation loss of this special-status natural community would represent an
36 adverse effect if it were not offset by avoidance and minimization measures and restoration actions
37 associated with BDCP conservation components. Loss of vernal pool complex natural community
38 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
39 defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex as part of
40 CM3 and the restoration of up to 40 acres of this community (including a commitment to keep pace
41 with actual losses) as part of CM9 during the first 10 years of Alternative 1B implementation would
42 partially offset this near-term loss. The Plan focuses this protection in the core vernal pool areas
43 identified in the USFWS vernal pool recovery plan (U.S. Fish and Wildlife Service 2005). The core
44 areas exist in CZ 1, CZ 8 and CZ 11 (see Figure 12-1). Typical project-level mitigation ratios (2:1 for

1 protection and 1:1 for restoration) would indicate 410 acres of protection and 205 acres of
2 restoration would be needed to offset (i.e., mitigate) the 205 acres of loss. Without additional
3 avoidance and minimization measures to reduce the potential effect, the proposed protection and
4 restoration would not meet the typical mitigation for vernal pool complex losses.

5 To avoid this adverse effect, the Plan also includes commitments to implement *AMM1 Worker*
6 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*
7 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM10 Restoration*
8 *of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM30*
9 *Transmission Line Design and Alignment Guidelines*. All of these AMMs include elements that avoid or
10 minimize the risk of affecting habitats at work areas. AMM12 limits the direct removal of vernal pool
11 crustacean habitat to no more than 10 wetted acres and the indirect effect to no more than 20
12 wetted acres through the life of the Plan. This is equivalent to approximately 67 acres of direct loss
13 and 134 acres of indirect loss of vernal pool complex natural community. BDCP Appendix 3.C
14 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
15 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. With these AMMs in place, and
16 the commitment to have restoration keep pace with actual vernal pool complex loss, Alternative 1B
17 would not adversely affect vernal pool complex natural community in the near-term.

18 **Late Long-Term Timeframe**

19 The late long-term effect on vernal pool complex natural community would be 376 acres of
20 permanent loss. These losses would be associated with the construction of CM1 facilities in the
21 vicinity of Clifton Court Forebay and the ongoing restoration of tidal wetland in the Cache Slough
22 and Suisun Marsh ROAs. However, 600 acres would be protected (CM3) and up to 67 acres would be
23 restored (CM9) through the course of the Alternative 1B implementation. In addition, the avoidance
24 and minimization measures listed above would reduce the actual loss of this community to no more
25 than 10 wetted acres of vernal pool crustacean habitat from direct activities and 20 acres of habitat
26 from indirect effects.

27 **NEPA Effects:** The conservation measures associated with Alternative 1B include protection of 400
28 acres (BDCP Objective VPNC 1.1 and CM3) and restoration of an estimated 40 acres (BDCP Objective
29 VPNC1.2 and CM9) of vernal pool complex in the near-term time frame. The Plan focuses the
30 protection in the core vernal pool areas identified in the USFWS vernal pool recovery plan (U.S. Fish
31 and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8 and CZ 11 (see Figure 12-1). In
32 addition, Alternative 1B includes AMM12 which limits the removal of vernal pool crustacean habitat
33 to no more than 10 wetted acres and the indirect effect to no more than 20 wetted acres through the
34 life of the Plan. This is equivalent to approximately 67 acres of direct loss and 134 acres of indirect
35 loss of vernal pool complex natural community. With this and other AMMs in place, Alternative 1B
36 would not adversely affect vernal pool complex natural community in the near-term. With these
37 conservation measures and AMMs in effect through the entire Plan period, Alternative 1B would not
38 have an adverse effect on the vernal pool complex natural community in the long term.

39 **CEQA Conclusion:**

40 **Near-Term Timeframe**

41 During the 10-year near-term time frame, Alternative 1B could result in the direct loss of
42 approximately 205 acres of vernal pool complex natural community due to construction of water
43 conveyance facilities (CM1) and inundation during tidal marsh restoration (CM4). The losses would

1 occur adjacent to Clifton Court Forebay and in the Cache Slough or Suisun Marsh ROAs. The loss
2 would occur in the 10-year near-term timeframe.

3 The construction- and inundation-related loss of this special-status natural community would
4 represent a significant impact if it were not offset by avoidance and minimization measures and
5 other actions associated with BDCP conservation components. Loss of vernal pool complex natural
6 community would be considered both a loss in acreage of a sensitive natural community and a loss
7 of wetland as defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex
8 as part of CM3 and the restoration of an estimated 40 acres of this community (with a commitment
9 to have restoration keep pace with actual losses) as part of CM9 during the first 10 years of
10 Alternative 1B implementation would partially offset this near-term loss. Typical project-level
11 mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 410 acres of protection
12 and 205 acres of restoration would be needed to offset (i.e., mitigate) the 205 acre of loss. Without
13 additional avoidance and minimization measures to reduce the potential impact, the proposed
14 protection and restoration would not meet the typical mitigation for vernal pool complex losses.
15 However, Alternative 1B also includes AMM1, AMM2, AMM3, AMM4, AMM10, AMM12 and AMM30
16 to minimize impacts. AMM12 places a strict limit on the acres of wetted vernal pool crustacean
17 habitat that can be lost to conservation actions (10 acres of direct and 20 acres of indirect loss;
18 equivalent to approximately 67 acres of direct and 134 acres of indirect loss of vernal pool complex
19 natural community). Because of the offsetting protection and restoration activities and
20 implementation of AMMs, impacts would be less than significant.

21 ***Late Long-Term Timeframe***

22 At the end of the Plan period, 376 acres of vernal pool complex natural community could be
23 permanently removed. Through CMs 3 and 9, 600 acres of vernal pool complex natural community
24 would be protected and up to 67 acres would be restored. In addition, AMM12 would limit the acres
25 of wetted vernal pool crustacean habitat loss to 10 acres from direct actions and 20 acres from
26 indirect actions. There would be no net permanent reduction in the acreage of this natural
27 community within the study area. Alternative 1B would have a less-than-significant impact on this
28 natural community.

29 **Impact BIO-22: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 30 **Vernal Pool Complex Natural Community**

31 CM2 would modify the inundation/flooding regime of the Yolo Bypass, a man-made waterway. CM2,
32 which is designed to improve fish passage and shallow flooded habitat for Delta fishes in the Yolo
33 Bypass, could increase periodic inundation of a small acreage of vernal pool complex natural
34 community in the southern section of the bypass, south of Putah Creek.

35 Operation of the Yolo Bypass under Alternative 1B would result in an increase in the frequency,
36 magnitude and duration of inundation on an estimated 0–4 acres of vernal pool complex natural
37 community. The methods used to estimate this inundation acreage are described in BDCP Appendix
38 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected by
39 inundation would vary with the flow volume that would pass through the newly-constructed notch
40 in the Fremont Weir. The 4-acre increase in inundation would only occur at the highest modeled
41 flow regime, 8,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in
42 30% of the years. The vernal pool complex natural community that would likely be affected occurs
43 in the southern reaches of the bypass, south of Putah Creek. There are several relatively large,

1 contiguous areas of vernal pools on the western edge of the bypass in this area. The anticipated
2 change in management of flows in the Yolo Bypass includes more frequent releases in flows into the
3 bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in
4 spring months (April and May).

5 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with
6 Alternative 1B water operations would not adversely affect vernal pool complex habitats, as they
7 have persisted under similar high flows and extended flow periods. There is the potential, however,
8 for some change in plant species composition as a result of longer inundation periods.

9 **CEQA Conclusion:** An estimated 0–4 acres of vernal pool complex natural community in the Yolo
10 Bypass would be subjected to more frequent inundation as a result of implementing CM2 under
11 Alternative 1B. This natural community is conditioned to periodic inundation; the slight increase in
12 periodic inundation would not result in a net permanent reduction in the acreage of this community
13 in the study area, although some change in plant species composition could occur. Increasing
14 periodic inundation of vernal pool complex natural community in the Yolo Bypass would have a less-
15 than-significant impact on the community.

16 **Impact BIO-23: Modification of Vernal Pool Complex Natural Community from Ongoing** 17 **Operation, Maintenance and Management Activities**

18 Once the physical facilities associated with Alternative 1B are constructed and the stream flow
19 regime associated with changed water management is in effect, there would be new ongoing and
20 periodic actions associated with operation, maintenance and management of the water conveyance
21 facilities and conservation lands that could affect vernal pool complex natural community in the
22 study area. The ongoing actions include the diversion of Sacramento River flows in the north Delta,
23 reduced diversions from south Delta channels, and recreation activities in Plan reserves. These
24 actions are associated with CM1 and CM11 (see Impact BIO-22 for effects associated with CM2). The
25 periodic actions would involve access road and conveyance facility repair, vegetation management
26 at the various water conveyance facilities and habitat restoration sites (CM11), levee repair and
27 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with
28 natural community management plans. The potential effects of these actions are described below.

- 29 • *Modified river flows upstream of and within the study area and reduced diversions from south*
30 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
31 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
32 channels (associated with Operational Scenario A) would not affect vernal pool complex natural
33 community. This natural community does not exist within or adjacent to the active Sacramento
34 River system channels and Delta waterways.
- 35 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
36 conveyance facilities and levees associated with the BDCP actions have the potential to require
37 removal of adjacent vegetation and could entail earth and rock work adjacent to vernal pool
38 complex habitats. This activity could lead to increased soil erosion and runoff entering these
39 habitats. These activities would be subject to normal erosion and runoff control management
40 practices, including those developed as part of *AMM2 Construction Best Management Practices*
41 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or
42 earthwork adjacent to vernal pool complex habitats would require use of sediment barriers, soil
43 stabilization and revegetation of disturbed surfaces (*AMM10 Restoration of Temporarily Affected*

1 *Natural Communities*). Proper implementation of these measures would avoid permanent
2 adverse effects on this community.

- 3 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical
4 treatment, would be a periodic activity associated with the long-term maintenance of water
5 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
6 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
7 vernal pool complex natural community at or adjacent to treated areas. The hazard could be
8 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
9 onto the natural community, or direct discharge of herbicides to vernal pool complex areas
10 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
11 *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce
12 hazards to humans and the environment from use of various chemicals during maintenance
13 activities, including the use of herbicides. These commitments are described in Appendix 3B,
14 including the commitment to prepare and implement spill prevention, containment, and
15 countermeasure plans and stormwater pollution prevention plans. Best management practices,
16 including control of drift and runoff from treated areas, and use of herbicides approved for use
17 in terrestrial or aquatic environments would also reduce the risk of affecting natural
18 communities adjacent to water conveyance features and levees associated with restoration
19 activities.
- 20 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural
21 communities within the Plan Area (CM11). For the vernal pool complex natural community, a
22 management plan would be prepared that specifies actions to improve the value of the habitats
23 for covered species. Actions would include control of invasive nonnative plant and animal
24 species, fire management, restrictions on vector control and application of herbicides, and
25 maintenance of infrastructure that would allow for movement through the community. The
26 enhancement efforts would improve the long-term value of this community for both special-
27 status and common species.
- 28 ● *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to vernal pool
29 complexes in the reserve system. The activities could include wildlife and plant viewing and
30 hiking. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section
31 3.4.11) describes this program and identifies applicable restrictions on recreation that might
32 adversely affect vernal pool habitat. BDCP also includes an avoidance and minimization measure
33 (AMM37) that further dictates limits on recreation activities that might affect vernal pools.
34 Recreational trails would be limited to existing trails and roads. New trail construction would be
35 prohibited within the vernal pool complex reserves. It is expected that most activities would be
36 docent-led tours of reserves, minimizing adverse effects.

37 The various operations and maintenance activities described above could alter acreage of vernal
38 pool complex natural community in the study area. Activities could introduce sediment and
39 herbicides that would reduce the value of this community to common and sensitive plant and
40 wildlife species. Other periodic activities associated with the Plan, including management,
41 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
42 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
43 enhance the value of the community. While some of these activities could result in small changes in
44 acreage, these changes would be greatly offset by restoration activities planned as part of *CM9*
45 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by implementation of
46 AMM2, AMM4, AMM5, AMM10, AMM12, AMM30, and AMM37. The management actions associated

1 with control of invasive plant species would also result in a long-term benefit to the species
2 associated with vernal pool complex habitats by eliminating competitive, invasive species of plants.

3 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
4 Alternative 1B would not result in a net permanent reduction in the vernal pool complex natural
5 community within the study area. Therefore, there would be no adverse effect on this natural
6 community.

7 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would
8 have the potential to create minor changes in total acreage of vernal pool complex natural
9 community in the study area, and could create temporary increases in sedimentation or damage
10 from recreational activity. The activities could also introduce herbicides periodically to control
11 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4,
12 AMM5, AMM10, AMM12, AMM30, and AMM37 would minimize these impacts, and other operations
13 and maintenance activities, including management, protection and enhancement actions associated
14 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*
15 *Enhancement and Management*, would create positive effects, including reduced competition from
16 invasive, nonnative plants in these habitats. Long-term restoration activities associated with *CM9*
17 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and protection actions associated with
18 *CM3 Natural Communities Protection and Restoration* would ensure that the acreage of this natural
19 community would not decrease in the study area. Ongoing operation, maintenance and management
20 activities would not result in a net permanent reduction in this natural community within the study
21 area. Therefore, there would be a less-than-significant impact.

22 **Managed Wetland**

23 The conservation components of Alternative 1B would reduce the acreage of managed wetland
24 currently found in the study area. Initial development and construction of CM1, CM2, CM4, and CM6
25 would result in both permanent and temporary removal of this community (see Table 12-1B-9). Full
26 implementation of Alternative 1B would also include the following conservation action over the
27 term of the BDCP to benefit the managed wetland natural community.

- 28 ● Protect and enhance 8,100 acres of managed wetland, at least 1,500 acres of which are in the
29 Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3)
- 30 ● Create 320 acres of managed wetlands consisting of greater sandhill crane roosting habitat in
31 minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in
32 Conservation Zones 3, 4, 5, or 6, with consideration of sea level rise and local seasonal flood
33 events (Objective GSHC1.3, associated with CM10).
- 34 ● Create two wetland complexes within the SLNWR refuge boundary. Each complex will consist of
35 at least three wetlands totaling 90 acres of greater sandhill crane roosting habitat. One of the
36 wetland complexes may be replaced by 180 acres of cultivated lands that are flooded following
37 harvest for crane roosting and foraging habitat (Objective GSHC1.4, associated with CM10).

38 In addition to this conservation action, creation of similar habitat values by restoring tidal brackish
39 emergent wetland and tidal freshwater emergent wetland as part of CM4 would further offset the
40 losses of managed wetland. The net effect would be a substantial decrease in the amount of
41 managed wetlands, but an increase in similar habitat value for special-status and common species as
42 the managed wetland is converted to tidal marsh. Impacts on this natural community would not be
43 adverse for NEPA purposes and would be less than significant for CEQA purposes. Refer to Impacts

1 BIO-178 through BIO-183 in the *Shorebirds and Waterfowl* discussion at the end of this section
 2 (Section 12.3.3.3) for further consideration of the effects of removing managed wetland natural
 3 community.

4 **Table 12-1B-9. Changes in Managed Wetland Associated with Alternative 1B (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	6	6	18	18	0	0
CM2	24	24	44	44	931-2,612	0
CM4	5,718	13,746	0	0	0	0
CM5	0	0	0	0	0	6
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	5,748	13,776	60	60	931-2,612	6

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

5

6 **Impact BIO-24: Changes in Managed Wetland Natural Community as a Result of Implementing**
 7 **BDCP Conservation Measures**

8 Construction, land grading and habitat restoration activities that would accompany the
 9 implementation of CM1, CM2, CM4, and CM6 would permanently eliminate an estimated 13,776
 10 acres of managed wetland in the study area. This modification represents approximately 19% of the
 11 70,798 acres of managed wetland that is mapped in the study area. This loss would occur through
 12 the course of the BDCP restoration program, as construction activity and tidal marsh restoration
 13 proceeds. Managed wetland protection (8,100 acres) and restoration (500 acres) would take place
 14 over the same period, but would not replace the acreage lost. The BDCP beneficial effects analysis
 15 for Alternative 4 (BDCP Chapter 5, Section 5.4.9.2) states that at least 8,100 acres of managed
 16 wetlands would be protected, of which at least 1,500 acres would be located within the Grizzly
 17 Island marsh complex, consistent with the U.S. Fish and Wildlife Service salt marsh harvest mouse
 18 recovery plan. Although the primary purpose of the 1,500 acres of protection is to protect and
 19 enhance habitat for the salt marsh harvest mouse, it is also expected to benefit the managed wetland
 20 natural community and the diversity of species that use it, including migratory waterfowl and the
 21 western pond turtle. These same conservation actions would be implemented for Alternative 1B.

22 The individual effects of the relevant conservation measure are addressed below. A summary
 23 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
 24 conservation measure discussions.

- 1 ● *CM1 Water Facilities and Operation*: Construction of the Alternative 1B water conveyance
2 facilities would permanently remove 6 acres and temporarily remove 18 acres of managed
3 wetland community. The permanent losses would occur where the new canal would overlay
4 small bands of managed wetland in the vicinity of Lambert Road, at a bridge crossing of the
5 canal at Guard Road just west of Stockton, and on the canal corridor just south of its crossing of
6 the San Joaquin River. The temporary losses would also occur where small patches or stringers
7 of managed wetland would be removed for siphon construction at Beaver Slough, Hog Slough,
8 White Slough, and Railroad Cut. A small area would be temporarily affected by transmission line
9 construction adjacent to Old River near its junction with Victoria Canal (see Terrestrial Biology
10 Mapbook). These losses would take place during the near-term construction period.
- 11 ● *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
12 construction activities that could permanently or temporarily remove managed wetland,
13 including west side channels modifications, Putah Creek realignment activities, Lisbon Weir
14 modification and Sacramento Weir improvements. All of these activities could involve
15 excavation and grading in managed wetland areas to improve passage of fish through the
16 bypasses. Based on hypothetical construction footprints, a total of 24 acres could be
17 permanently removed and 44 acres could be temporarily removed. This activity would occur
18 primarily in the near-term timeframe.
- 19 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
20 footprints, implementation of CM4 would permanently inundate or remove 13,746 acres of
21 managed wetland community. These losses would be expected to occur primarily in the Suisun
22 Marsh ROA, but could also occur in the Cache Slough and West Delta ROAs (see Figure 12-1).
23 These acres of managed wetland would be converted to natural wetland, including large
24 acreages of tidal brackish emergent wetland and tidal freshwater emergent wetland. These
25 natural wetlands provide comparable or improved habitat for the special-status species that
26 occupy managed wetland. The newly created tidal marsh would not create a barrier or result in
27 fragmentation of managed wetland, as most species are capable of utilizing both communities.
28 An estimated 500 acres of managed wetland would be restored and 8,100 acres would be
29 enhanced and protected through *CM3 Natural Communities Protection and Restoration*, as
30 established by BDCP Objective MWNC1.1. All of the restoration and 4,800 acres of the protection
31 would occur during the first 10 years of Alternative 1B implementation, which would coincide
32 with the timeframe of water conveyance facilities construction and early implementation of
33 CM4. The remaining restoration would be spread over the following 30 years. Managed wetland
34 restoration is expected to include at least 320 acres in CZ 3, CZ 4, CZ 5, and CZ 6 (Figure 12-1) to
35 benefit sandhill crane, as stated in BDCP Objective GSHC1.3. The enhancement and protection
36 would be focused in Suisun Marsh, but could also occur in CZs with existing managed wetland
37 (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and CZ 7).
- 38 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
39 of small amounts of managed wetland habitat along 20 miles of river and sloughs. The extent of
40 this loss cannot be quantified at this time, but the majority of the enhancement activity would
41 occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.
42 Managed wetland adjacent to these tidal areas could be affected. The improvements would
43 occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers,
44 and along Steamboat and Sutter Sloughs.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
3 also included.

4 ***Near-Term Timeframe***

5 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would
6 permanently remove 5,748 acres and temporarily remove 60 acres of managed wetland through
7 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. Six acres of
8 the permanent loss and 18 acres of the temporary loss would be associated with construction of the
9 water conveyance facilities (CM1). These near-term losses would occur in various locations, but the
10 majority of the near-term loss would occur in Suisun Marsh and the lower Yolo Bypass as tidal
11 marsh is restored.

12 The construction or inundation loss of this special-status natural community would represent an
13 adverse effect if it were not offset by other conservation actions. Loss of managed wetland natural
14 community would be considered both a loss in acreage of a sensitive natural community and
15 potentially a loss of wetland as defined by Section 404 of the CWA. Many managed wetland areas are
16 interspersed with small natural wetlands that would be regulated under Section 404. The
17 restoration of 500 acres (CM10) and protection and enhancement of 4,800 acres (CM3) of managed
18 wetland during the first 10 years of Alternative 1B implementation would fully offset the losses
19 associated with CM1, but would only partially offset the total near-term loss. Typical project-level
20 mitigation ratios (1:1 for protection) would indicate 24 acres of protection would be needed to
21 offset the 24 acres of loss associated with CM1; a total of 5,808 acres of protection would be needed
22 to offset (i.e., mitigate) the 5,808 acres of permanent and temporary loss from all near-term actions.
23 The combined protection and restoration proposed for managed wetland in the near-term would
24 fall 508 acres short of full replacement. However, the CM4 marsh restoration activities that would be
25 creating this loss would be simultaneously creating 2,000 acres of tidal brackish emergent wetland
26 and 8,850 acres of tidal freshwater emergent wetland in place of the managed wetland in the near-
27 term. This acreage would significantly exceed the number of acres of managed wetland lost.
28 Mitigation measures would also be implemented to reduce the effects of managed wetland loss on
29 waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the Yolo and Delta basins (Mitigation
30 Measure 179b) if the protection and enhancement actions of CM3 and CM10 were not sufficient to
31 replace the value of managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial*
32 *Biology Effects* discussion later in this section (Section 12.3.3.3).

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*
36 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting
37 habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and
38 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
39 EIR/EIS.

40 In spite of the managed wetland protection, restoration and avoidance measures contained in
41 Alternative 1B, there would be a net reduction in the acreage of this special-status natural
42 community in the near-term. This would be an adverse effect when judged by the significance
43 criteria listed earlier in this chapter. However, the conversion of these managed habitats to natural
44 tidal wetland types that support similar ecological functions (2,000 acres of tidal brackish emergent

1 wetland and 8,850 acres of tidal freshwater emergent wetland) would offset this adverse effect.
2 Also, there are other conservation actions contained in the BDCP (CM3 and CM11) that would
3 improve management and enhance existing habitat values, further offsetting the effects of managed
4 wetland loss on covered and noncovered special-status terrestrial species and on common species
5 that rely on this natural community for some life phase. As a result, there would be no adverse
6 effect.

7 ***Late Long-Term Timeframe***

8 At the end of the Plan period, 13,776 acres of managed wetland natural community would be
9 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would
10 be restored. There would be a net permanent reduction in the acreage of this special-status natural
11 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal
12 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this
13 managed wetland.

14 ***NEPA Effects:*** Alternative 1B would result in a loss 13,776 acres of managed wetland within the
15 study area; however, it would also protect and enhance 8,100 acres and restore 500 acres of this
16 habitat. In addition, Alternative 1B would restore 6,000 acres of tidal brackish emergent wetland
17 and 24,000 acres of tidal freshwater emergent wetland that support similar ecological functions to
18 those of managed wetland. Therefore, there would be no adverse effect on managed wetland natural
19 community.

20 ***CEQA Conclusion:***

21 ***Near-Term Timeframe***

22 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would
23 permanently remove 5,748 acres and temporarily remove 60 acres of managed wetland through
24 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. Six acres of
25 the permanent loss and 18 acres of the temporary loss would be associated with construction of the
26 water conveyance facilities (CM1). These losses would occur in various locations, but the majority of
27 the near-term loss would occur in Suisun Marsh and the lower Yolo Bypass as tidal marsh is
28 restored.

29 The construction or inundation loss of this special-status natural community would represent a
30 significant impact if it were not offset by other conservation actions. Loss of managed wetland
31 natural community would be considered both a loss in acreage of a sensitive natural community and
32 potentially a loss of wetland as defined by Section 404 of the CWA. The restoration of 500 acres and
33 protection and enhancement of 4,800 acres of managed wetland as part of CM3 and CM10 during
34 the first 10 years of Alternative 1B implementation would fully offset the losses associated with
35 CM1, but would only partially offset the total near-term loss. Typical project-level mitigation ratios
36 (1:1 for protection) would indicate 24 acres of protection would be needed to offset the 24 acres of
37 loss associated with CM1; a total of 5,808 acres of protection would be needed to offset (i.e.,
38 mitigate) the 5,808 acres of permanent and temporary loss from all near-term actions. The
39 combined protection and restoration proposed for managed wetland in the near-term would fall
40 508 acres short of full replacement. However, the CM4 marsh restoration activities that would be
41 creating this loss would be simultaneously creating 2,000 acres of tidal brackish emergent wetland
42 and 8,850 acres of tidal freshwater emergent wetland in place of the managed wetland in the near-
43 term. This acreage would significantly exceed the number of acres of managed wetland lost.

Mitigation measures would also be implemented to reduce the effects of managed wetland loss on waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the Yolo and Delta basins (Mitigation Measure 179b) if the protection and enhancement actions of CM3 and CM10 were not sufficient to replace the value of managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial Biology Effects* discussion later in this section.

The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

In spite of the managed wetland protection, restoration and avoidance measures contained in Alternative 1B, there would be a net reduction in the acreage of this special-status natural community in the near-term. This would be a significant impact when judged by the significance criteria listed earlier in this chapter. However, the conversion of these managed habitats to natural tidal wetland types that support similar ecological functions (2,000 acres of tidal brackish emergent wetland and 8,850 acres of tidal freshwater emergent wetland) would offset this significant impact. Also, there are other conservation actions contained in the BDCP (CM3 and CM11) that would improve management and enhance existing habitat values, further offsetting the impacts of managed wetland loss on covered and noncovered special-status terrestrial species and on common species that rely on this natural community for some life phase. As a result, there would be a less-than-significant impact.

Late Long-Term Timeframe

At the end of the Plan period, 13,776 acres of managed wetland natural community would be permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would be restored. There would be a net permanent reduction in the acreage of this special-status natural community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this managed wetland. Because these natural wetlands support similar ecological functions to those of managed wetland, there would be a less-than-significant impact.

Impact BIO-25: Increased Frequency, Magnitude and Duration of Periodic Inundation of Managed Wetland Natural Community

Two Alternative 1B conservation measures would modify the inundation/flooding regimes of both natural and man-made waterways in the study area. CM2, which is designed to improve fish passage and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation of managed wetland on wildlife management areas and duck clubs scattered up and down the central and southern bypass. CM5 would expose this community to additional inundation as channel margins are modified and levees are set back to improve fish habitat along some of the major rivers and waterways in the south Delta.

- *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1B would result in an increase in the frequency, magnitude and duration of inundation of 931-2,612 acres of managed wetland natural community. The methods used to estimate these inundation

1 acres are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and*
 2 *Plants*. The area more frequently affected by inundation would vary with the flow volume that
 3 would pass through the newly-constructed notch in the Fremont Weir. The 931-acre increase in
 4 inundation would be associated with a notch flow of 8,000 cubic feet per second (cfs), and the
 5 2,612-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow
 6 through Fremont Weir would be expected in 30% of the years. Based on the theoretical
 7 modeling that has been completed to-date, the largest acreages would be associated with the
 8 Sacramento Bypass Wildlife Area, the Yolo Bypass Wildlife Area, and private managed wetlands
 9 south of Putah Creek. The anticipated change in management of flows in the Yolo Bypass
 10 includes more frequent releases in flows into the bypass from the Fremont and Sacramento
 11 Weirs, and in some years, later releases into the bypass in spring months (April and May). With
 12 larger flows, the water depths may also increase over Existing Conditions. While the managed
 13 wetlands of the Yolo Bypass are conditioned to periodic inundation events, the more frequent
 14 and extended inundation periods may make it more difficult to actively manage the areas for
 15 maximum food production for certain species (waterfowl primarily) and may alter the plant
 16 assemblages in some years. The effects of this periodic inundation on birds and other terrestrial
 17 species are discussed later in this chapter. The additional inundation would not be expected to
 18 reduce the acreage of managed wetland on a permanent basis. The extended inundation would
 19 be designed to expand foraging and spawning habitat for Delta fishes.

- 20 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
 21 increase in the frequency, magnitude and duration of inundation of an estimated 6 acres of
 22 managed wetland. Specific locations for this restoration activity have not been identified, but
 23 they would likely be focused in the south Delta area, along the major rivers and Delta channels.
 24 The connection of these wetlands to stream flooding events would be beneficial to the ecological
 25 function of managed wetlands, especially as they relate to BDCP target aquatic species. Foraging
 26 activity and refuge sites would be expanded into areas currently unavailable or infrequently
 27 available to some aquatic species. The more frequent flooding would periodically interfere with
 28 management activities associated with terrestrial species (primarily waterfowl) and may result
 29 in changes in plant composition and management strategies over time.

30 In summary, 937–2,618 acres of managed wetland community in the study area would be subjected
 31 to more frequent inundation as a result of implementing two Alternative 1B conservation measures
 32 (CM2 and CM5).

33 ***NEPA Effects***: Managed wetland community would not be adversely affected because much of the
 34 acreage affected is conditioned to periodic inundation. The more frequent inundation could create
 35 management problems associated with certain species, especially waterfowl, and result in changes
 36 over time in plant species composition. The total acreage of managed wetland would not be
 37 expected to change permanently as a result of the periodic inundation.

38 ***CEQA Conclusion***: An estimated 937–2,618 acres of managed wetland community in the study area
 39 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under
 40 Alternative 1B. Managed wetland community would not be significantly impacted because periodic
 41 inundation is already experienced by most of the land that would be affected. There could be
 42 increased management problems and a long-term shift in plant species composition. The periodic
 43 inundation would not be expected to result in a net permanent reduction in the acreage of this
 44 community in the study area. Therefore, there would be a less-than-significant impact on the
 45 community.

1 **Impact BIO-26: Modification of Managed Wetland Natural Community from Ongoing**
2 **Operation, Maintenance and Management Activities**

3 Once the physical facilities associated with Alternative 1B are constructed and the stream flow
4 regime associated with changed water management is in effect, there would be new ongoing and
5 periodic actions associated with operation, maintenance and management of the water conveyance
6 facilities and conservation lands that could affect managed wetland natural community in the study
7 area. The ongoing actions include the diversion of Sacramento River flows in the north Delta,
8 reduced diversions from south Delta channels, and recreational use of reserve areas. These actions
9 are associated with CM1 and CM11 (see the above impact discussion for effects associated with
10 CM2). The periodic actions would involve access road and conveyance facility repair, vegetation
11 management at the various water conveyance facilities and habitat restoration sites (CM11), levee
12 and canal repair and replacement of levee armoring, channel dredging, and habitat enhancement in
13 accordance with natural community management plans. The potential effects of these actions are
14 described below.

- 15 • *Modified river flows upstream of and within the study area and reduced diversions from south*
16 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
17 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
18 channels (associated with Operational Scenario A) would not result in the reduction in acreage
19 of the managed wetland natural community in the study area. Flow levels in the upstream rivers
20 would not change to the degree that water levels in adjacent managed wetlands would be
21 altered. Similarly, increased diversions of Sacramento River flows in the north Delta would not
22 result in a permanent reduction in the managed wetland community downstream of these
23 diversions. The majority of the managed wetlands below the diversions is not directly connected
24 to the rivers. Reduced diversions from the south Delta channels would not create a reduction in
25 this natural community.
- 26 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
27 conveyance facilities and levees associated with the BDCP actions have the potential to require
28 removal of adjacent vegetation and could entail earth and rock work in managed wetland
29 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering
30 managed wetlands. These activities would be subject to normal erosion, turbidity and runoff
31 control management practices, including those developed as part of *AMM2 Construction Best*
32 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
33 vegetation removal or earthwork adjacent to or within managed wetland habitats would require
34 use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces.
35 Proper implementation of these measures would avoid permanent adverse effects on this
36 community.
- 37 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
38 treatment, would be a periodic activity associated with the long-term maintenance of water
39 conveyance facilities and the levees associated with restoration sites (*CM11 Natural*
40 *Communities Enhancement and Management*). Use of herbicides to control nuisance vegetation
41 could pose a long-term hazard to managed wetland natural community at or adjacent to treated
42 areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of
43 contaminated stormwater onto the community, or direct discharge of herbicides to managed
44 wetland areas being treated for invasive species removal. Environmental commitments and
45 *AMM5 Spill Prevention, Containment and Countermeasure Plan* have been made part of the BDCP
46 to reduce hazards to humans and the environment from use of various chemicals during

1 maintenance activities, including the use of herbicides. These commitments are described in
2 Appendix 3B, including the commitment to prepare and implement spill prevention,
3 containment, and countermeasure plans and stormwater pollution prevention plans. Best
4 management practices, including control of drift and runoff from treated areas, and use of
5 herbicides approved for use in aquatic and terrestrial environments would also reduce the risk
6 of affecting natural communities adjacent to water conveyance features and levees associated
7 with restoration activities.

8 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
9 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
10 The treatment activities would be conducted in concert with the California Department of
11 Boating and Waterways' invasive species removal program. Eliminating large stands of water
12 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
13 by removing cover for nonnative predators, improving water flow and removing barriers to
14 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
15 benefit terrestrial species that use managed wetland natural community for movement
16 corridors and for foraging. Vegetation management effects on individual species are discussed in
17 the species sections on following pages.

- 18 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural
19 communities within the Plan Area (CM11). For the managed wetland natural community, a
20 management plan would be prepared that specifies actions to improve the value of the habitats
21 for covered species. Actions would include control of invasive nonnative plant and animal
22 species, fire management, restrictions on vector control and application of herbicides, and
23 maintenance of infrastructure that would allow for movement through the community. The
24 enhancement efforts would improve the long-term value of this community for both special-
25 status and common species.
- 26 ● *Recreation.* The BDCP would allow hunting, fishing and hiking in managed wetland reserve
27 areas. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section
28 3.4.11) describes this program and identifies applicable restrictions on recreation that might
29 adversely affect managed wetland habitat. BDCP also includes an avoidance and minimization
30 measure (AMM37) that further dictates limits on recreation activities that might affect this
31 natural community. Hunting would be the dominant activity in fall and winter months, while
32 fishing and hiking would be allowed in non-hunting months.

33 The various operations and maintenance activities described above could alter acreage of managed
34 wetland natural community in the study area through facilities maintenance, vegetation
35 management and recreation. Activities could also introduce sediment and herbicides that would
36 reduce the value of this community to common and sensitive plant and wildlife species. Other
37 periodic activities associated with the Plan, including management, protection and enhancement
38 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural
39 Communities Enhancement and Management*, would be undertaken to enhance the value of the
40 community. While some of these activities could result in small changes in acreage, these changes
41 would be offset by restoration activities planned as part of *CM10 Nontidal Marsh Restoration*, *CM4
42 Tidal Natural Communities Restoration*, and protection and restoration actions associated with *CM3
43 Natural Communities Protection and Restoration*. Recreation activity effects would be minimized by
44 AMM37 (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). The management actions
45 associated with levee repair and control of invasive plant species would also result in a long-term
46 benefit to the species associated with managed wetland habitats by improving water movement.

1 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
2 Alternative 1B would not result in a net permanent reduction in acreage of managed wetland
3 natural community within the study area. Therefore, there would be no adverse effect on this
4 natural community.

5 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would
6 have the potential to create minor changes in total acreage of managed wetland natural community
7 in the study area, and could create temporary increases in turbidity and sedimentation. The
8 activities could also introduce herbicides periodically to control nonnative, invasive plants. Hunting
9 could intermittently reduce the availability of this community to special-status and common wildlife
10 species. Implementation of environmental commitments and AMM2, AMM4, AMM5 and AMM37
11 would minimize these impacts, and other operations and maintenance activities, including
12 management, protection and enhancement actions associated with *CM3 Natural Communities*
13 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
14 create positive effects, including improved water movement in and adjacent to these habitats. Long-
15 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and *CM4 Tidal Natural*
16 *Communities Restoration* and protection and restoration actions associated with *CM3 Natural*
17 *Communities Protection and Restoration* would greatly expand the ecological functions of this natural
18 community in the study area. Ongoing operation, maintenance and management activities would not
19 result in a net permanent reduction in this sensitive natural community within the study area.
20 Therefore, there would be a less-than-significant impact.

21 **Other Natural Seasonal Wetland**

22 The other natural seasonal wetlands natural community encompasses all the remaining natural (not
23 managed) seasonal wetland communities other than vernal pools and alkali seasonal wetlands.
24 These areas mapped by CDFW (Hickson and Keeler-Wolf 2007) and ICF biologists (the western area
25 of additional analysis; see Figure 12-1) consist of seasonally ponded, flooded, or saturated soils
26 dominated by grasses, sedges, or rushes. The largest segments of this community in the study area
27 are located along the Cosumnes River northeast of Thornton, and in the western extension of the
28 study area northwest of Rio Vista. Most of the smaller mapped areas are located in the Suisun Marsh
29 ROA on the western edge of the Montezuma Hills and in the interior of the Potrero Hills. There are
30 also other natural seasonal wetlands mapped along Old River and Middle River in CZ 7 (Figure 12-
31 1). The only Alternative 1B conservation component that would potentially affect this natural
32 community is the seasonally inundated floodplain restoration conservation measure (CM5) (see
33 Table 12-1B-10).

1 **Table 12-1B-10. Changes in Other Natural Seasonal Wetland Associated with Alternative 1B**
2 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0	0
CM4	0	0	0	0	0	0
CM5	0	0	0	0	0	2
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-27: Modification of Other Natural Seasonal Wetland Natural Community as a**
5 **Result of Implementing BDCP Conservation Measures**

6 Based on theoretical footprints for this activity, BDCP conservation measure *CM5 Seasonally*
7 *Inundated Floodplain Restoration* could expose 2 acres of other natural seasonal wetland community
8 to additional flooding as channel margins are modified and levees are set back to improve fish
9 habitat along some of the major rivers and waterways throughout the study area. Specific locations
10 for this restoration activity have not been identified, but they would likely be focused in the south
11 Delta area, along the major rivers and Delta channels, including the channels of Old River and Middle
12 River. Several small patches of other natural seasonal wetland natural community are mapped along
13 these waterways. The exposure of these seasonal wetlands to increased but infrequent episodes of
14 stream flooding would not alter their ecological function or species composition. Their value to
15 special-status and common plants and wildlife in the study area would not be affected. The effects of
16 this inundation on wildlife and plant species are described in detail in later sections of this chapter.

17 **NEPA Effects:** Alternative 1B conservation actions would not adversely affect other natural seasonal
18 wetland natural community because the small increase in periodic flooding of up to 2 acres would
19 not alter its function or general species makeup.

20 **CEQA Conclusion:** An estimated 2 acres of other natural seasonal wetland community in the study
21 area would be subjected to more frequent inundation from flood flows as a result of implementing
22 CM5 under Alternative 1B. This community would not be significantly impacted because a small
23 increase in periodic flooding would not alter its ecological function or species composition. The
24 periodic inundation would not result in a net permanent reduction in the acreage of this community

1 in the study area. Therefore, there would be no substantial adverse effect on the community. The
2 impact would be less than significant.

3 **Impact BIO-28: Modification of Other Natural Seasonal Wetland Natural Community from**
4 **Ongoing Operation, Maintenance and Management Activities**

5 Once the physical facilities associated with Alternative 1B are constructed and the stream flow
6 regime associated with changed water management is in effect, there would be new ongoing and
7 periodic actions associated with operation, maintenance and management of the water conveyance
8 and conservation lands that could affect other natural seasonal wetland natural community in the
9 study area. The ongoing actions include the diversion of Sacramento River flows in the north Delta,
10 and reduced diversions from south Delta channels. These actions are associated with CM1. The
11 periodic actions would involve access road and conveyance facility repair, vegetation management
12 at the various water conveyance facilities and habitat restoration sites (CM11), levee repair and
13 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with
14 natural community management plans. The potential effects of these actions are described below.

- 15 • *Modified river flows upstream of and within the study area and reduced diversions from south*
16 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
17 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
18 channels (associated with Operational Scenario A) would not affect other natural seasonal
19 wetland natural community. The small areas mapped in the study area are not in or adjacent to
20 streams that would experience changes in water levels as a result of these operations.
- 21 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
22 conveyance facilities and levees associated with the BDCP actions have the potential to require
23 removal of adjacent vegetation and could entail earth and rock work in other natural seasonal
24 wetland habitats. This activity could lead to increased soil erosion and runoff entering these
25 habitats. These activities would be subject to normal erosion and runoff control management
26 practices, including those developed as part of *AMM2 Construction Best Management Practices*
27 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or
28 earthwork adjacent to or within other natural seasonal wetland habitats would require use of
29 sediment barriers, soil stabilization and revegetation of disturbed surfaces as required by
30 *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper implementation of
31 these measures would avoid permanent adverse effects on this community.
- 32 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
33 treatment, would be a periodic activity associated with the long-term maintenance of water
34 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
35 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
36 the other natural seasonal wetland natural community at or adjacent to treated areas. The
37 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
38 stormwater onto the natural community, or direct discharge of herbicides to wetland areas
39 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
40 *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce
41 hazards to humans and the environment from use of various chemicals during maintenance
42 activities, including the use of herbicides. These commitments are described in Appendix 3B,
43 including the commitment to prepare and implement spill prevention, containment, and
44 countermeasure plans and stormwater pollution prevention plans. Best management practices,
45 including control of drift and runoff from treated areas, and use of herbicides approved for use

1 in terrestrial or aquatic environments would also reduce the risk of affecting natural
2 communities adjacent to water conveyance features and levees associated with restoration
3 activities.

- 4 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
5 communities within the Plan Area (CM11). For the other natural seasonal wetland natural
6 community, a management plan would be prepared that specifies actions to improve the value
7 of the habitats for covered species. Actions would include control of invasive nonnative plant
8 and animal species, fire management, restrictions on vector control and application of
9 herbicides, and maintenance of infrastructure that would allow for movement through the
10 community. The enhancement efforts would improve the long-term value of this community for
11 both special-status and common species.

12 The various operations and maintenance activities described above could alter acreage of other
13 natural seasonal wetland natural community in the study area. Activities could introduce sediment
14 and herbicides that would reduce the value of this community to common and sensitive plant and
15 wildlife species. Other periodic activities associated with the Plan, including management,
16 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
17 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
18 enhance the value of the community. While some of these activities could result in small changes in
19 acreage, these changes would be minor when compared with the restoration activities planned as
20 part of *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by
21 implementation of AMM2, AMM4, AMM5, and AMM10. The vernal pool complex conservation
22 measure includes restoration of 139 acres of seasonal wetlands with similar ecological values as the
23 other natural seasonal wetland community. The management actions associated with control of
24 invasive plant species would also result in a long-term benefit to the species associated with other
25 natural seasonal wetland habitats by eliminating competitive, invasive species of plants.

26 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
27 Alternative 1B would not result in a net permanent reduction in the other natural seasonal wetland
28 natural community within the study area. Therefore, there would be no adverse effect on this
29 natural community.

30 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would
31 have the potential to create minor changes in total acreage of other natural seasonal wetland natural
32 community in the study area, and could create temporary increases sedimentation. The activities
33 could also introduce herbicides periodically to control nonnative, invasive plants. Implementation of
34 environmental commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts,
35 and other operations and maintenance activities, including management, protection and
36 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
37 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
38 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration
39 activities associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and
40 protection actions associated with *CM3 Natural Communities Protection and Restoration* would
41 ensure that the ecological values provided by this small natural community would not decrease in
42 the study area. Ongoing operation, maintenance and management activities would not result in a net
43 permanent reduction in this natural community within the study area. Therefore, there would be a
44 less-than-significant impact.

1 **Grassland**

2 Construction, operation, maintenance and management associated with the conservation
3 components of Alternative 1B would have no long-term adverse effects on the habitats associated
4 with the grassland natural community. Initial development and construction of CM1, CM2, CM4,
5 CM5, CM6, CM7, CM11 and CM18 would result in both permanent and temporary removal of this
6 community (see Table 12-1B-11). Full implementation of Alternative 1B would also include the
7 following conservation actions over the term of the BDCP to benefit the grassland natural
8 community.

- 9 ● Protect 8,000 acres of grassland with at least 2,000 acres protected in Conservation Zone 1, at
10 at least 1,000 acres protected in Conservation Zone 8, and at least 2,000 acres protected in
11 Conservation Zone 11 (Objective GNC1.1, associated with CM3).
- 12 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland and to
13 provide upland habitat adjacent to riparian, tidal, and nontidal natural communities for wildlife
14 foraging and upland refugia (Objective GNC1.2, associated with CM3 and CM8).
- 15 ● Of the 8,000 acres of grassland protected and at least 2,000 acres of grassland restored, protect
16 or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide 200 feet
17 of adjacent grasslands beyond the sea level rise accommodation (Objective GNC1.4, associated
18 with CM3 and CM8).

19 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
20 3.3 that would improve the value of grassland natural community for terrestrial species. As
21 explained below, with the protection, restoration and enhancement of the amounts of habitat listed
22 in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural community
23 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-11. Changes in Grassland Natural Community Associated with Alternative 1B (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	400	400	358	358	0	0
CM2	388	388	239	239	385–1,277	0
CM4	448	1,122	0	0	0	0
CM5	0	51	0	32	0	514
CM6	Unk.	Unk.	Unk.	Unk.	0	0
CM7	4	410	0	0	0	0
CM11	13	50	0	0	0	0
CM18	35	35	0	0	0	0
	0	0	0	0	0	0
TOTAL IMPACTS	1,288	2,456	597	629	385–1,277	514

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

2

3 **Impact BIO-29: Changes in Grassland Natural Community as a Result of Implementing BDCP**
4 **Conservation Measures**

5 Construction, land grading and habitat restoration activities that would accompany the
6 implementation of CM1, CM2, CM4, CM5, CM6, CM7, CM11 and CM18 would permanently eliminate
7 an estimated 2,456 acres and temporarily remove 629 acres of grassland natural community in the
8 study area. These modifications represent approximately 4% of the 78,047 acres of the community
9 that is mapped in the study area. Approximately 61% (1,885 acres) of the permanent and temporary
10 losses would occur during the first 10 years of Alternative 1B implementation, as water conveyance
11 facilities are constructed and habitat restoration is initiated. Grassland protection (2,000 acres),
12 restoration (1,140 acres) and enhancement would be initiated during the same period. By the end of
13 the Plan period, 2,000 acres of this natural community would be restored and 8,000 acres would be
14 protected. The BDCP beneficial effects analysis for grassland for Alternative 4 (BDCP Chapter 5,
15 Section 5.4.11.2) indicates that 8,000 acres of grasslands would be protected in Conservation Zones
16 1, 2, 4, 5, 7, 8, and 11, and 2,000 acres of grassland would be restored. Grassland protection and
17 restoration would improve connectivity among habitat areas in and adjacent to the Plan Area,
18 improve genetic interchange among native species’ populations, and contribute to the long-term
19 conservation of grassland-associated covered species. These same conservation actions would be
20 implemented for Alternative 1B.

1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1B water conveyance
5 facilities would permanently remove 400 acres and temporarily remove 358 acres of grassland
6 natural community. The permanent losses would occur at various locations along the new canal
7 route and at the intake sites along the Sacramento River. The principal losses would occur at
8 intakes 1 and 5; and along the canal east and south of Hood, south of Lambert Road, north of
9 Lost Slough, north of White Slough, and at the San Joaquin River near its junction with Fourteen
10 Mile Slough. These grassland areas are dominated by ruderal herbaceous grasses and forbs.
11 Large permanent losses of annual grassland would also occur at the new forebay site just south
12 of Clifton Court Forebay. The temporary losses would occur at intake sites and at siphon or
13 tunnel work areas where the canal would cross the slough that connects Snodgrass Slough with
14 the south end of Stone Lakes, Lost Slough, Beaver Slough, Hog Slough, Sycamore Slough, White
15 Slough, Disappointment Slough, San Joaquin River, Railroad Cut, Middle River near its junction
16 with Victoria Canal, and Old River just south of Clifton Court Forebay (see the Terrestrial
17 Biology Mapbook for locations). These losses would take place during the near-term
18 construction period.

19 The construction activity associated with CM1 also has the potential to lead to increased
20 nitrogen deposition in grassland habitats in the vicinity of Clifton Court Forebay. A significant
21 number of cars, trucks, and land grading equipment involved in construction in and around the
22 forebay would emit small amounts of atmospheric nitrogen from fuel combustion; this material
23 could be deposited in sensitive grassland areas that are located west of the major construction
24 areas at Clifton Court Forebay. Nitrogen deposition can pose a risk of adding a fertilizer to
25 nitrogen-limited soils and their associated plants. Nonnative invasive species can be encouraged
26 by the added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related*
27 *Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been
28 concluded that this potential deposition would pose a low risk of changing the grassland in and
29 adjacent to the construction areas because the construction would contribute a negligible
30 amount of nitrogen to regional projected emissions and the existing grassland is dominated by
31 nonnative invasive species of plants. Also, the construction at Clifton Court Forebay would occur
32 primarily downwind of the natural community. No adverse effect is expected.

- 33 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 would involve a number of
34 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
35 stilling basin improvements, Putah Creek realignment activities, Toe Drain/Tule Canal and
36 Lisbon Weir modification and Sacramento Weir improvements. All of these activities could
37 involve excavation and grading in grassland areas to improve passage of fish through the
38 bypasses. Based on hypothetical construction footprints, a total of 388 acres could be
39 permanently lost and another 239 acres could be temporarily removed. Most of the grassland
40 losses would occur at the north end of the bypass below Fremont Weir where a large expanse of
41 grassland is present, along the Toe Drain/Tule Canal, and along the west side channels. These
42 grasslands are composed primarily of upland annual grassland and forbs. Some of this grassland
43 removal along the side channels of the bypass could pose barriers to grassland species moving
44 within the bypass. These losses would occur primarily in the near-term timeframe.

- 1 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
2 footprint, implementation of CM4 would permanently inundate or remove 448 acres of
3 grassland in the near-term and inundate or remove 1,122 acres of grassland by the end of the
4 Plan timeframe. The losses would occur in a number of ROAs established for tidal restoration
5 (see Figure 12-1). The largest losses would likely occur in the vicinity of Cache Slough, on
6 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
7 bands adjacent to waterways in the South Delta ROA. Most of this grassland is ruderal and
8 herbaceous vegetation with low habitat value; some of the larger patches of grassland in the
9 Cache Slough ROA are annual grassland with higher values.
- 10 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
11 would permanently remove 51 acres and temporarily remove 32 acres of grassland natural
12 community. The construction-related losses would be considered a permanent removal of the
13 habitats. These losses would be expected to occur along the San Joaquin River and other major
14 waterways in CZ 7 (see Figure 12-1). The grassland in this area is primarily composed of narrow
15 bands and small patches of ruderal herbaceous grasses and forbs. This activity is scheduled to
16 start following construction of water conveyance facilities, which is expected to take 10 years.
- 17 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
18 removal of small amounts of grassland natural community along 20 miles of river and sloughs.
19 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
20 activity would occur along waterway margins where grassland habitat stringers exist, including
21 along levees and channel banks. The improvements would occur within the study area on
22 sections of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter
23 Sloughs.
- 24 ● *CM7 Riparian Natural Community Restoration*; Riparian natural community restoration would
25 occur in a variety of settings in the Plan Area, with an emphasis on improving connectivity of
26 existing riparian areas and stream/river corridors, to benefit the movement and interchange of
27 special-status and common species that use these areas. Large tracts would be restored in
28 concert with floodplain restoration (CM5), while narrower bands would be developed as part of
29 channel margin enhancement (CM6) and tidal marsh restoration (CM4). In the process of
30 expanding woody riparian habitat, existing nonnative grassland would be removed. While
31 specific locations for these restoration activities have not been fully developed, use of
32 theoretical footprints for this activity indicate that up to 410 acres of grassland could be lost
33 through the course of Plan implementation. A majority of this activity would occur in the South
34 Delta and Cosumnes/Mokelumne ROAs (see Figure 12-1).
- 35 ● *CM8 Grassland Natural Community Restoration*: The grassland natural community would be
36 restored primarily on the fringes of the Delta, where upland areas merge with Delta wetland and
37 agricultural lands. Restoration would focus on CZ 1, CZ 8, and CZ 11, as proposed in BDCP
38 Objective GNC1.1 (Figure 12-1), with a goal of improving habitat connectivity and increasing the
39 diversity of grassland species (BDCP Objective GNC1.2). Some of the planned 2,000 acres of
40 restoration would occur around existing populations of giant garter snake in the east Delta and
41 the Yolo Bypass area.
- 42 ● *CM11 Natural Communities Enhancement and Management*: Natural communities enhancement
43 and management would include a wide range of activities designed to improve habitat
44 conditions in restored and protected lands associated with the BDCP. This measure also
45 promotes sound use of pesticides, vector control activities, invasive species control and fire

1 management in preserve areas. To improve the public's ability to participate in recreational
2 activities in and adjacent to restored and protected habitats, a system of trails is proposed. The
3 location and extent of this system are not yet known, so the analysis of this activity is
4 programmatic. At the current level of planning, it is assumed that the trail system would be
5 located entirely in grassland habitats and would include up to 50 acres of habitat loss.

- 6 • *CM18. Conservation Hatcheries:* The BDCP includes a proposal to design and construct a
7 conservation hatchery to maintain populations of delta smelt and longfin smelt. The location of
8 this facility is not yet firmly established, but for planning purposes it has been assumed that it
9 would be constructed in the vicinity of Rio Vista and would be located in grassland habitat. The
10 grassland in the Rio Vista area includes both California annual grassland and ruderal herbaceous
11 grasses and forbs. The current estimate of the land needed for this facility is 35 acres.

12 The following paragraphs summarize the combined effects discussed above and describe other
13 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
14 also included.

15 ***Near-Term Timeframe***

16 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1B would
17 affect the grassland natural community through CM1 construction losses (400 acres permanent and
18 358 acres temporary), CM2 construction losses (388 acres permanent and 239 acres temporary),
19 CM7 riparian habitat restoration (4 acres permanent), CM11 recreational trail construction (13
20 acres permanent), and CM18 fish hatchery construction (35 acres permanent). These losses would
21 occur along the eastern bank of the Sacramento River at intake sites, at various locations along the
22 east canal corridor, at currently unspecified sites for hatchery and recreational trail construction
23 and restoration, at the southern forebay, in the northern Yolo Bypass, and along the east and west
24 channels within the Yolo Bypass. Approximately 448 acres of the inundation and construction-
25 related losses in habitat from CM4 would occur in the near-term throughout the ROAs mapped in
26 Figure 12-1.

27 The construction losses of this natural community would not represent an adverse effect based on
28 the significance criteria used for this chapter because grassland is not considered a special-status or
29 sensitive natural community. Most Central Valley grasslands are dominated by nonnative annual
30 grasses and herbs. However, the importance of grassland as a habitat that supports life stages of
31 numerous special-status plants and wildlife is well documented (see BDCP Chapter 3, *Conservation*
32 *Strategy*). The significance of losses in grassland habitat is, therefore, discussed in more detail in
33 species analyses later in this chapter. The combination of restoring 1,140 acres (CM8) and
34 protecting 2,000 acres (CM3) of grassland natural community during the first 10 years of
35 Alternative 1B implementation, and the commitment to restore temporarily affected grassland (597
36 acres) to its pre-project condition within one year of completing construction as required by *AMM10*
37 *Restoration of Temporarily Affected Natural Communities* would not completely offset this near-term
38 loss and avoid any loss in the availability of this habitat for special-status species. Typical project-
39 level mitigation ratios (2:1 for protection) would indicate that 3,770 acres of protection would be
40 needed to offset (i.e., mitigate) the 1,885 acres of loss. The restoration and protection measures
41 contained in Alternative 1B would fall short of complete mitigation by 33 acres in the near-term.
42 Because grassland is not considered a special-status natural community, this effect would not be
43 adverse. The Plan also includes commitments to implement *AMM1 Worker Awareness Training*,
44 *AMM2 Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*,

1 and *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or minimize the
2 risk of affecting habitats at work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
3 which have since been updated and which are provided in Appendix 3B, *Environmental*
4 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

5 ***Late Long-Term Timeframe***

6 Implementation of Alternative 1B as a whole would result in 4% losses of grassland natural
7 community in the study area. These losses (2,456 acres of permanent and 629 acres of temporary
8 loss) would be largely associated with construction of the water conveyance facilities (CM1),
9 construction of Yolo Bypass fish improvements (CM2), and inundation during tidal marsh
10 restoration (CM4). Inundation losses would occur during the course of the Plan's restoration
11 activities at various tidal restoration sites throughout the study area.

12 ***NEPA Effects:*** By the end of the Plan timeframe, a total of 2,000 acres of this natural community
13 would be restored (CM8) and 8,000 acres would be protected (CM3). The restoration would occur
14 primarily in CZ 1, CZ 8, and CZ 11, in the Cache Slough, Suisun Marsh and Clifton Court Forebay
15 areas. Temporarily affected grassland would also be restored following construction activity. The
16 2,000 acres of restoration associated with CM8, and the restoration of temporarily affected
17 grassland required by AMM10 (629 acres for Alternative 1B) would not totally replace the grassland
18 acres lost through the Plan timeframe (3,085 acres). There would be a permanent loss of 456 acres
19 of grassland in the study area. However, the combination of restoration, protection and
20 enhancement of grassland associated with Alternative 1B would improve the habitat value of this
21 community in the study area; there would not be an adverse effect on the grassland natural
22 community.

23 ***CEQA Conclusion:***

24 ***Near-Term Timeframe***

25 Alternative 1B would result in the loss of approximately 1,885 acres of grassland natural community
26 due to construction of the water conveyance facilities (CM1), fish passage improvements (CM2),
27 inundation during tidal marsh restoration (CM4), riparian habitat restoration (CM7), recreational
28 trail construction (CM11), and fish hatchery construction (CM18). These losses would occur at
29 Sacramento River intake sites, at various locations along the east canal corridor, at the southern
30 forebay, in the northern Yolo Bypass, at as yet undetermined recreational trail and fish hatchery
31 construction sites, at riparian habitat restoration sites, along the east and west channels within the
32 Yolo Bypass, and at inundation sites at various tidal restoration sites throughout the study area. The
33 construction losses would be spread across a 10-year near-term timeframe.

34 The construction losses of this natural community would not represent a significant impact based
35 on the significance criteria used for this chapter because grassland is not considered a special-status
36 or sensitive natural community. These losses would not be totally offset by planned restoration of
37 1,140 acres and protection of 2,000 acres of grassland natural community scheduled for the first 10
38 years of Alternative 1B implementation, and the restoration of temporarily affected grassland (597
39 acres under Alternative 1B) as dictated by AMM10. Typical project-level mitigation ratios (2:1 for
40 protection) would indicate that 3,770 acres of protection would be needed to offset (i.e., mitigate)
41 the 1,885 acres of loss. The restoration and protection would fall 33 acres short in the near-term.
42 Also, AMM1, AMM2, AMM6, and AMM7 would be implemented to minimize impacts. Because of

1 these offsetting near-term restoration and protection activities and AMMs, and because grassland is
2 not a special-status natural community, the impacts would be less-than-significant.

3 **Late Long-Term Timeframe**

4 At the end of the Plan period, 3,085 acres of grassland natural community would be permanently or
5 temporarily removed by conservation actions, 2,000 acres would be restored and 8,000 acres would
6 be protected. Temporarily affected areas would also be restored (629 acres for Alternative 1B).
7 While there would be a net permanent reduction in the acreage of this natural community within
8 the study area (total loss of 456 acres), there would be an increase in the value of grassland for
9 special-status and common species in the study area through the combination of conservation
10 actions (CM3 and CM8) and avoidance and minimization measures (AMM1, AMM2, AMM6, AMM7,
11 and AMM10). Therefore, Alternative 1B would have a less-than-significant impact on this natural
12 community.

13 **Impact BIO-30: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 14 **Grassland Natural Community**

15 Two Alternative 1B conservation measures would modify the inundation/flooding regimes of both
16 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
17 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
18 of grassland natural community at scattered locations, while CM5 would expose this community to
19 additional inundation as channel margins are modified and levees are set back to improve fish
20 habitat along some of the major rivers and waterways of the study area.

- 21 ● *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1B
22 would result in an increase in the frequency, magnitude and duration of inundation of 385–
23 1,277 acres of grassland natural community. The methods used to estimate this inundation
24 acreage are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*.
25 The area more frequently affected by inundation would vary with the flow volume that would
26 pass through the newly-constructed notch in the Fremont Weir. The 385-acre increase in
27 inundation would occur at the 1,000 cfs flow regime, while the 1,277-acre increase would occur
28 at the 4,000 cfs flow regime. Plan-related increases in flow through Fremont Weir would be
29 expected in 30% of the years. The grassland community occurs throughout the bypass, including
30 a large acreage just below Fremont Weir in the north end of the bypass, in stringers along the
31 internal waterways of the bypass and in larger patches in the lower bypass. The anticipated
32 change in management of flows in the Yolo Bypass includes more frequent releases in flows into
33 the bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the
34 bypass in spring months (April and May). The modification of periodic inundation events would
35 not adversely affect grassland habitats, as they have persisted under similar high flows and
36 extended inundation periods. There is the potential for some change in grass species
37 composition as a result of longer inundation periods. The effects of this inundation on wildlife
38 and plant species are described in detail in later sections of this chapter.
- 39 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
40 increase in the frequency and duration of inundation of 514 acres of grassland habitats. Specific
41 locations for this restoration activity have not been identified, but they would likely be focused
42 in the south Delta area, along the major rivers and Delta channels in CZ 7 (see Figure 3-1). The
43 increase in periodic stream flooding events would not adversely affect the habitat values and
44 functions of grassland natural community.

1 In summary, 899–1,790 acres of grassland natural community in the study area would be subjected
2 to more frequent inundation as a result of implementing CM2 and CM5 under Alternative 1B. The
3 grassland community is conditioned to periodic inundation; therefore, periodic inundation would
4 not result in a net permanent reduction in the acreage of this community in the study area.

5 **NEPA Effects:** Increasing periodic inundation of grassland natural community in the Yolo Bypass
6 and along south Delta waterways would not constitute an adverse effect.

7 **CEQA Conclusion:** An estimated 899–1,791 acres of grassland natural community in the study area
8 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under
9 Alternative 1B. The grassland natural community is conditioned to periodic inundation; therefore,
10 periodic inundation would not result in a net permanent reduction in the acreage of this community
11 in the study area. Increasing periodic inundation of grassland natural community in the Yolo Bypass
12 and along south Delta waterways would have a less-than-significant impact on the community.

13 **Impact BIO-31: Modification of Grassland Natural Community from Ongoing Operation,** 14 **Maintenance and Management Activities**

15 Once the physical facilities associated with Alternative 1B are constructed and the stream flow
16 regime associated with changed water management is in effect, there would be new ongoing and
17 periodic actions associated with operation, maintenance and management of the BDCP facilities and
18 conservation lands that could affect grassland natural community in the study area. The ongoing
19 actions include the diversion of Sacramento River flows in the north Delta, and reduced diversions
20 from south Delta channels. These actions are associated with CM1 (see Impact BIO-30 for effects
21 associated with CM2). The periodic actions would involve access road and conveyance facility
22 repair, vegetation management at the various water conveyance facilities and habitat restoration
23 sites (CM13), levee repair and replacement of levee armoring, channel dredging, and habitat
24 enhancement in accordance with natural community management plans. The potential effects of
25 these actions are described below.

- 26 • *Modified river flows upstream of and within the study area and reduced diversions from south*
27 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
28 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
29 channels (associated with Operational Scenario A) would not result in the permanent reduction
30 in acreage of grassland natural community in the study area. Flow levels in the upstream rivers
31 would not change such that the acreage of this community would be reduced on a permanent
32 basis. The grassland along rivers upstream of planned north Delta diversions is primarily
33 ruderal vegetation on levee banks and is dependent on winter and spring rains for germination
34 and growth rather than on river levels. Similarly, increased diversions of Sacramento River
35 flows in the north Delta would not result in a permanent reduction in grassland natural
36 community downstream of these diversions. The reductions in flows below the intakes would
37 occur primarily in the wet months when the existing nonnative annual grasslands along river
38 levees are dormant, and like upstream grassland, this community is dependent on winter and
39 spring rains for germination and growth in the winter and spring months, not on river stage.
40 Anticipated small changes in river salinity in the west Delta and Suisun Marsh would not create
41 a substantial change in grassland acreage in these areas. Reduced diversions from south Delta
42 channels would not create a reduction in this natural community.
- 43 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
44 conveyance facilities and levees associated with the BDCP actions have the potential to require

1 removal of adjacent vegetation and could entail earth and rock work in grassland habitats. This
 2 activity could lead to increased soil erosion and runoff entering these habitats. These activities
 3 would be subject to normal erosion and runoff control management practices, including those
 4 developed as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4*
 5 *Erosion and Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within
 6 grassland habitats would require use of sediment barriers, soil stabilization and revegetation of
 7 disturbed surfaces (*AMM10 Restoration of Temporarily Affected Natural Communities*). Proper
 8 implementation of these measures would avoid permanent adverse effects on this community.

- 9 ● *Vegetation management*. Vegetation management, in the form of physical removal and chemical
 10 treatment, would be a periodic activity associated with the long-term maintenance of water
 11 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
 12 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
 13 grassland natural community at or adjacent to treated areas. The hazard could be created by
 14 uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater onto the
 15 natural community, or direct discharge of herbicides to grassland areas being treated for
 16 invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment*
 17 *and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and
 18 the environment from use of various chemicals during maintenance activities, including the use
 19 of herbicides. These commitments are described in Appendix 3B, including the commitment to
 20 prepare and implement spill prevention, containment, and countermeasure plans and
 21 stormwater pollution prevention plans. Best management practices, including control of drift
 22 and runoff from treated areas, and use of herbicides approved for use in terrestrial
 23 environments would also reduce the risk of affecting natural communities adjacent to water
 24 conveyance features and levees associated with restoration activities.
- 25 ● *Channel dredging*. Long-term operation of the Alternative 1B intakes on the Sacramento River
 26 would include periodic dredging of sediments that might accumulate in front of intake screens.
 27 The dredging could occur adjacent to grassland natural community. This activity should not
 28 permanently reduce the acreage of grassland natural community because it is periodic in
 29 nature; the grassland in the vicinity of the proposed intakes is ruderal grasses and herbs with
 30 low habitat value.
- 31 ● *Habitat enhancement*. The BDCP includes a long-term management element for the natural
 32 communities within the Plan Area (CM11). For the grassland natural community, a management
 33 plan would be prepared that specifies actions to improve the value of the habitats for covered
 34 species. Actions would include control of invasive nonnative plant and animal species, fire
 35 management, restrictions on vector control and application of herbicides, and maintenance of
 36 infrastructure that would allow for movement through the community. The enhancement efforts
 37 would improve the long-term value of this community for both special-status and common
 38 species.

39 The various operations and maintenance activities described above could alter acreage of grassland
 40 natural community in the study area through changes in flow patterns and changes in periodic
 41 inundation of this community. Activities could also introduce sediment and herbicides that would
 42 reduce the value of this community to common and sensitive plant and wildlife species. Other
 43 periodic activities associated with the Plan, including management, protection and enhancement
 44 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
 45 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
 46 community. While some of these activities could result in small changes in acreage, these changes

1 would be greatly offset by restoration activities planned as part of *CM8 Grassland Natural*
2 *Community Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, and AMM10. The
3 management actions associated with levee repair, periodic dredging and control of invasive plant
4 species would also result in a long-term benefit to the species associated with grassland habitats by
5 improving water movement in adjacent waterways and by eliminating competitive, invasive species
6 of plants.

7 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
8 Alternative 1B would not result in a net permanent reduction in the grassland natural community
9 within the study area. Therefore, there would be no adverse effect on this natural community.

10 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1B would
11 have the potential to create minor changes in total acreage of grassland natural community in the
12 study area, and could create temporary increases sedimentation. The activities could also introduce
13 herbicides periodically to control nonnative, invasive plants. Implementation of environmental
14 commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts, and other
15 operations and maintenance activities, including management, protection and enhancement actions
16 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
17 *Communities Enhancement and Management*, would create positive effects, including reduced
18 competition from invasive, nonnative plants in these habitats. Long-term restoration activities
19 associated with *CM8 Grassland Natural Community Restoration* and protection actions associated
20 with *CM3 Natural Communities Protection and Restoration* would increase the value of this natural
21 community in the study area. Ongoing operation, maintenance and management activities would not
22 result in a net permanent reduction in this natural community within the study area. Therefore,
23 there would be a less-than-significant impact.

24 **Inland Dune Scrub**

25 The inland dune scrub natural community is composed of vegetated, stabilized sand dunes
26 associated with river and estuarine systems. In the study area, the inland dune scrub community
27 includes approximately 20 acres of remnants of low-lying ancient stabilized dunes related to the
28 Antioch Dunes formation located near the town of Antioch (CZ 10; see Figure 12-1b). While the
29 inland dune scrub natural community is within the BDCP Plan Area, none of the Alternative 1B
30 conservation measures or covered actions are expected to affect this community.

31 **Cultivated Lands**

32 Cultivated lands is the major land-cover type in the study area (487,106 acres, see Table 12-1). The
33 Delta, the Yolo Bypass and the Cache Slough drainage are dominated by various types of agricultural
34 activities, with crop production the dominant element (see Figure 12-1). Major crops and cover
35 types in agricultural production include grain and hay crops (wheat, oats and barley), field crops
36 (corn, beans and safflower), truck crops (tomatoes, asparagus and melons), pasture (alfalfa, native
37 and nonnative pasture), rice, orchards, and vineyards. Tables 12-2 and 12-3 list special-status
38 wildlife species supported by cultivated lands.

39 The effects of Alternative 1B on cultivated lands are discussed from various perspectives in this
40 document. Chapter 14, *Agricultural Resources*, includes a detailed analysis of cropland conversion as
41 it relates to agricultural productivity. Many of the discussions of individual terrestrial plant and
42 wildlife species in this chapter also focus on the relevance of cultivated land loss. Because cultivated
43 lands is not a natural community and because the effects of its loss are captured in the individual

1 species analyses below, there is no separate analysis of this land cover type presented here. Table
 2 14-8 in Chapter 14, *Agricultural Resources*, provides a comparison of important farmland losses that
 3 would result from construction of CM1 water conveyance facilities for each alternative, and Table
 4 14A-1 in Appendix 14A, *Individual Crop Effects as a Result of BDCP Water Conveyance Facility*
 5 *Construction*, provides a similar comparison for losses of individual crops. Table 12-ES-1 in this
 6 chapter's Summary of Effects identifies the total cultivated lands loss for all project alternatives. For
 7 Alternative 1B, the total temporary and permanent loss is estimated to be 72,778 acres. The
 8 majority of the permanent loss would be associated with habitat restoration activities, including
 9 Yolo Bypass fisheries enhancement (CM2; 629 acres), tidal marsh restoration (CM4; 39,565 acres),
 10 floodplain restoration (CM5; 2,087 acres), riparian natural community restoration (CM7; 960 acres),
 11 grassland restoration (CM8; 2,000 acres) and nontidal marsh restoration (CM10; 1,950 acres).
 12 Construction of the eastern canal alignment water conveyance facilities (CM1) would permanently
 13 remove 7,451 acres of cultivated land.

14 **Developed Lands**

15 Additional lands in the study area that were not designated with a natural community type have
 16 been characterized here as developed lands. Developed lands include lands with residential,
 17 industrial, and urban land uses, as well as landscaped areas, riprap, road surfaces and other
 18 transportation facilities. Developed lands support some common plant and wildlife species, whose
 19 abundance and species richness vary with the intensity of development. One special-status species,
 20 the giant garter snake, is closely associated with a small element of developed lands; specifically,
 21 embankments and levees near water that are covered with riprap provide habitat for giant garter
 22 snake. There are approximately 90,660 acres of developed lands in the study area.

23 As with cultivated lands, no effort has been made to analyze the effects of BDCP covered actions on
 24 this land cover type. It is not a natural community. The effects of its conversion are discussed in
 25 Chapter 13, *Land Use*. Where the loss of developed lands may affect individual special-status species
 26 or common species, the impact analysis is contained in that species discussion.

27 **Wildlife Species**

28 **Vernal Pool Crustaceans**

29 This section describes the effects of Alternative 1B, including water conveyance facilities
 30 construction and implementation of other conservation components, on vernal pool crustaceans
 31 (California linderiella, Conservancy fairy shrimp, longhorn fairy shrimp, midvalley fairy shrimp,
 32 vernal pool fairy shrimp, and vernal pool tadpole shrimp). The habitat model used to assess effects
 33 for the vernal pool crustaceans consists of: vernal pool complex, which consists of vernal pools and
 34 uplands that display characteristic vernal pool and swale visual signatures that have not been
 35 significantly affected by agricultural or development practices; alkali seasonal wetlands in CZ 8; and
 36 degraded vernal pool complex, which consists of low-value ephemeral habitat ranging from areas
 37 with vernal pool and swale visual signatures that display clear evidence of significant disturbance
 38 due to plowing, disking, or leveling to areas with clearly artificial basins such as shallow agricultural
 39 ditches, depressions in fallow fields, and areas of compacted soils in pastures. For the purpose of the
 40 effects analysis, vernal pool complex is categorized as high-value for vernal pool crustaceans and
 41 degraded vernal pool complex is categorized as low-value for these species. Alkali seasonal wetlands
 42 in CZ 8 were included in the model as high-value habitat for vernal pool crustaceans. Also included
 43 as low-value habitat for vernal pool crustaceans are areas along the eastern boundary of CZ 11 that

1 are mapped as vernal pool complex because they flood seasonally and support typical vernal pool
2 plants. These areas do not include topographic depressions that are characteristic of vernal pool
3 crustacean habitat and, thus, are considered to have a lower value for the species.

4 Construction and restoration associated with Alternative 1B conservation measures would result in
5 permanent losses (see Table 12-1B-12) and indirect conversions of vernal pool crustacean modeled
6 habitat. The majority of the losses would take place over an extended period of time as tidal marsh is
7 restored in the Plan Area. Full implementation of the BDCP would also include the following
8 conservation actions over the term of the BDCP to benefit vernal pool crustaceans (BDCP Chapter 3,
9 *Conservation Strategy*).

- 10 ● Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool
11 recovery areas (Objective VPNC1.1, associated with CM3).
- 12 ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool
13 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective
14 VPNC1.2, associated with CM9).
- 15 ● Increase size and connectivity of protected vernal pool complexes in plan area and increase
16 connectivity with complexes outside the Plan Area (Objective VPNC1.3).
- 17 ● Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective
18 VPNC1.4).
- 19 ● Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for
20 supporting and sustaining vernal pool species (Objective VPNC2.1).
- 21 ● Protect one currently unprotected occurrence of conservancy fairy shrimp (Objective VPC1.1)

22 As explained below, with the restoration or protection of these amounts of habitat, in addition to
23 implementation of AMMs, impacts on vernal pool crustaceans would not be adverse for NEPA
24 purposes and would be less than significant for CEQA purposes.

1
2

Table 12-1B-12. Changes in Vernal Pool Crustacean Modeled Habitat Associated with Alternative 1B (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1 ^c	High-value	1	1	0	0	NA	NA
	Low-value	3	3	0	0	NA	NA
Total Impacts CM1		4	4	0	0	NA	NA
CM2–CM18 ^c	High-value	0	0	0	0	0–4	0
	Low-value	201	372	0	0	0	0
Total Impacts CM2–CM18		201	372	0	0	0–4	0
TOTAL IMPACTS		205	376	0	0	0–4	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-32: Loss or Conversion of Habitat for and Direct Mortality of Vernal Pool**
5 **Crustaceans**

6 Alternative 1B conservation measures would result in the direct, permanent loss of up to 376 acres
7 of modeled vernal pool crustacean habitat from conveyance facility construction (CM1) and tidal
8 natural communities restoration (CM4). In addition, the conservation measures could result in the
9 indirect conversion due to hydrological changes of an additional 149 acres of vernal pool crustacean
10 habitat (91 acres of high-value habitat and 58 acres of low-value habitat) from conveyance
11 construction (CM1) and based on the hypothetical footprints for tidal restoration (CM4).
12 Construction of the water conveyance facilities and restoration activities may result in the
13 modification of hardpan and changes to the perched water table, which could lead to alterations in
14 the rate, extent, and duration of inundation of nearby vernal pool crustacean habitat. USFWS
15 typically considers construction within 250 feet of vernal pool crustacean habitat to constitute and a
16 possible conversion of crustacean habitat unless more detailed information is provided to further
17 refine the limits of any such effects. For the purposes of this analysis, the 250-foot buffer was
18 applied to the water conveyance facilities work areas where surface and subsurface disturbance
19 activities would take place and to restoration hypothetical footprints. Habitat enhancement and
20 management activities (CM11), which include disturbance or removal of nonnative vegetation, could
21 result in local adverse habitat effects.

22 Alternative 1B would also result in impacts on critical habitat for Conservancy fairy shrimp (248
23 acres), vernal pool fairy shrimp (270 acres), and vernal pool tadpole shrimp (270 acres) from the

1 hypothetical tidal restoration (CM4) footprints in CZ 11. *AMM12 Vernal Pool Crustaceans* would
2 ensure that there would be no adverse modification of the primary constituent elements of critical
3 habitat for these species.

4 Because the estimates of habitat loss resulting from tidal inundation are based on projections of
5 where restoration may occur, actual effects are expected to be lower because sites would be selected
6 and restoration projects designed to minimize or avoid effects on the covered vernal pool
7 crustaceans. As specified in *AMM12 Vernal Pool Crustaceans* and *CM9 Vernal Pool and Alkali Seasonal*
8 *Wetland Complex Restoration*, the BDCP Implementation Office would ensure that tidal restoration
9 projects and other covered activities would be designed such that no more than a total of 10 wetted
10 acres of vernal pool crustacean habitat are permanently lost. *AMM12* would also ensure that no
11 more than 20 wetted acres of vernal pool crustacean habitat are indirectly affected by alterations to
12 hydrology resulting from adjacent BDCP covered activities. The term *wetted acres* refers to an area
13 that would be defined by the three parameter wetland delineation method used by the U.S. Army
14 Corps of Engineers to determine the limits of a wetland, which involves an evaluation of wetland
15 soil, vegetation, and hydrology characteristics. This acreage differs from vernal pool complex
16 acreages in that a vernal pool complex is composed of individual wetlands (vernal pools) and those
17 upland areas that are in between and surrounding them, which provide the supporting hydrology
18 (surface runoff and groundwater input), organic and nutrient inputs, and refuge for the terrestrial
19 phase of some vernal pool species.

20 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the
21 individual conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would
23 result in the permanent loss of 4 acres of vernal pool crustacean habitat, composed of 1 acre of
24 high-value habitat and 3 acres of low-value vernal pool crustacean habitat. These impacts would
25 occur from the construction of a new bridge on Hood Franklin Road where it crosses a large
26 canal just before the town of Hood and from construction around Clifton Court Forebay. The
27 bridge expansion area has a record for California linderiella and there are records for vernal
28 pool fairy shrimp and vernal pool tadpole shrimp just to the east on this property. There are
29 records of vernal pool fairy shrimp adjacent to the impact areas around Clifton Court forebay. In
30 addition, 14 acres of vernal pool crustacean habitat (2 acres of high-value habitat and 12 acres
31 of low-value habitat) could be indirectly affected by the construction around Clifton Court
32 Forebay and the construction of the aforementioned bridge.
- 33 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
34 in the permanent loss of approximately 372 acres of low-value vernal pool crustacean habitat,
35 which consists of degraded vernal pool complex. The BDCP describes degraded vernal pool
36 complex as areas of low-value ephemeral habitat ranging from areas with vernal pool and swale
37 visual signatures that display clear evidence of significant disturbance due to plowing, disking,
38 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions
39 in fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or
40 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery
41 found that these habitats appear to generally have low densities. However, areas mapped as
42 degraded vernal pool complex may still provide habitat for vernal pool crustaceans as evidenced
43 by records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella
44 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Game
45 2012). Helm (1998) notes that many vernal pool crustaceans can occur in degraded vernal pool

1 habitats and artificial habitats. In CZ 2 and CZ 4, there are several records of covered vernal pool
 2 crustaceans occurring outside of modeled habitat in areas that appear to be road side ditches. So
 3 though degraded vernal pool complexes may not represent botanically diverse vernal pools they
 4 still can provide habitat for vernal pool crustaceans and thus the loss of 372 acres of degraded
 5 vernal pool complex may result in the loss of occupied vernal pool crustacean habitat. In
 6 addition, tidal restoration could result in the indirect conversion of 135 acres of vernal pool
 7 crustacean habitat, which consist of 90 acres of high-value and 45 acres of low-value habitat.
 8 The hypothetical restoration footprints overlap with a CNDDDB record for vernal pool fairy
 9 shrimp near the current edge of Suisun Marsh. Tidal natural community restoration under
 10 Alternative 1B would also result in impacts on critical habitat for Conservancy fairy shrimp (248
 11 acres), vernal pool tadpole shrimp (270 acres), and vernal pool fairy shrimp (270 acres). *AMM12*
 12 *Vernal Pool Crustaceans* would ensure that there would be no adverse modification of the
 13 primary constituent elements of critical habitat for these species.

- 14 ● *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,
 15 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of
 16 vernal pool complex would benefit vernal pool crustaceans (Table 12-1B-12). A variety of
 17 habitat management actions included in CM11 that are designed to enhance wildlife values in
 18 BDCP-protected habitats may result in localized ground disturbances that could temporarily
 19 affect vernal pool crustacean habitat. Ground-disturbing activities, such as removal of nonnative
 20 vegetation and road and other infrastructure maintenance, are expected to have minor effects
 21 on vernal pool crustacean habitat and are expected to result in overall improvements to and
 22 maintenance of vernal pool crustacean habitat values over the term of the BDCP. Human
 23 presence for recreation activities could result in the injury, mortality of, and degradation of
 24 habitat for vernal pool crustaceans through trampling pool edges, increased turbidity,
 25 unauthorized collection, and introduction of trash. These effects cannot be quantified, but are
 26 expected to be minimal and would be avoided and minimized by the AMMs listed below.

27 The following paragraphs summarize the combined effects discussed above and describe other
 28 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
 29 also included. NEPA and CEQA impact conclusions are also included. Table 12-1B-13 was prepared
 30 to further analyze BDCP effects on vernal pool crustaceans using wetted acres of vernal pools in
 31 order to compare to the effects of this alternative with the effect limits established in BDCP Chapter
 32 3, Section 3.3, *Biological Goals and Objectives*, which are measured in wetted acres of vernal pools.
 33 Wetted acres were estimated by using the BDCP's assumption that restored vernal pool complexes
 34 Pools would have a 15% density of vernal pools (i.e., of 100 acres of vernal pool complex, 15 acres
 35 would constitute vernal pools and the remaining 85 acres supporting uplands). Based on an
 36 informal evaluation of aerial photographs of the Plan Area it is likely that the actual densities within
 37 the Plan Area are approximately 10%, but the 15% density value was chosen as a conservative
 38 estimate for determining effects.

1 **Table 12-1B-13. Estimated Effects on Wetted Vernal Pool Crustacean Habitat under Alternative 1B**
2 **(acres)^a**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit ^a		5	10	10	20
Alternative 1B Impact ^b	CM1	0.6	0.6	2.1	2.1
	CM4 ^c	30.2	55.8	11.0	20.4
Total		30.8	56.4	13.1	22.5

^a Because roughly half of the impacts occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

^b These acreages were generated by assuming that the modeled habitat identified in Table 12-1B-12 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.

^c These impacts are based on the hypothetical restoration footprints and will likely be lower based on the BDCP's commitment to minimize and avoid effects on vernal pool crustacean habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

3

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
7 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
8 the effects of such conveyance facility construction would not be adverse under NEPA and would be
9 less than significant under CEQA. Table 12-1B-12 above lists the impacts on modeled vernal pool
10 crustacean habitat that is based on the natural community mapping done within the study area. The
11 impacts from tidal natural communities restoration (CM4) are based on hypothetical footprints and
12 do not reflect actual impacts on vernal pool crustacean habitat considering the BDCP's commitment
13 to design restoration projects to minimize or avoid effects on covered vernal pool crustaceans. As
14 seen in Table 12-1B-13, the effects of CM1 alone would be well within the near-term limits. As seen
15 in Table 12-1B-13, Alternative 1B would not meet the Plan's near-term biological goals and
16 objectives for direct loss and indirect conversion unless near-term tidal restoration projects are
17 designed to ensure that they do not exceed these impact limits.

18 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
19 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are
20 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.6
21 wetted acre of vernal pool crustacean habitat (or 4 acres of vernal pool complex) should be restored
22 and 5.4 wetted acres of vernal pool crustacean habitat (or 36 acres of vernal pool complex) should
23 be protected to mitigate the CM1 direct and indirect effects on vernal pool crustacean habitat.
24 Assuming that the BDCP would apply the impact limits presented in Table 12-1B-13, the effects of
25 tidal restoration in the near-term could not exceed 4.4 wetted acres direct and 7.9 wetted acres
26 indirect. The impacts based on the hypothetical tidal restoration footprints would exceed these
27 limits. When and if these limits are met, the BDCP would need to restore up to 5 wetted acres (33
28 acres of vernal pool complex) and protect up to 30 wetted acres (200 acres of vernal pool complex)
29 in the near-term to offset the effects of CM1 and CM4.

1 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
2 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
3 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
4 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
5 restoration would be determined during implementation based on the following criteria.

- 6 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to
7 impacts, then 1.0 wetted acre of vernal pools will be restored for each wetted acre directly
8 affected (1:1 ratio).
- 9 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
10 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
11 acres of vernal pools will be restored for each wetted acre directly affected (1.5:1 ratio).

12 The species-specific biological goals and objectives would also inform the near-term protection and
13 restoration efforts. These Plan goals represent performance standards for considering the
14 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
15 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean
16 habitat.

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
18 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
20 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
21 *Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM37 Recreation*. All of these AMMs
22 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
23 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
24 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

25 ***Late Long-Term Timeframe***

26 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
27 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
28 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-1B-13, the effects of CM1 alone
29 would be well within the near-term limits, but overall Alternative 1B would not meet the Plan's late
30 long-term biological goals and objectives for direct and indirect effects unless tidal restoration
31 projects are designed to ensure that that they do not exceed these impact limits.

32 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in
33 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
34 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
35 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
36 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection
37 and restoration would be achieved using the criteria presented above as well as by following the
38 other specific biological goals and objectives, which include:

- 39 • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 40 • Protecting the range of inundation characteristics that are currently represented by vernal pool
41 throughout the Plan Area (Objective VPNC1.4)

- 1 • Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective
2 VPC1.1)

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
4 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
5 restoration and protection of alkali seasonal wetlands that could overlap with the species model,
6 could result in the restoration of 51 acres and the protection of 608 acres of modeled habitat for
7 vernal pool crustaceans.

8 **NEPA Effects:** The near-term loss of vernal pool crustacean habitat under Alternative 1B would not
9 be adverse under NEPA because the BDCP has committed to avoiding and minimizing effects from
10 tidal restoration and to restoring and protecting an acreage that meets or exceeds the typical
11 mitigation ratios described above. In the absence of other conservation actions, the modification of
12 vernal pool crustacean habitat and potential mortality of a special-status species resulting from
13 Alternative 1B in the late long-term would represent an adverse effect. However, the BDCP has
14 committed to impact limits for vernal pool crustacean habitat and to habitat protection, restoration,
15 management, and enhancement associated with CM3, CM9, and CM11. This habitat protection,
16 restoration, management and enhancement would be guided by species-specific goals and
17 objectives and by AMM1-AMM6, AMM10, AMM12, and AMM37, which would be in place throughout
18 the period of construction. Considering these commitments, losses and conversion of vernal pool
19 crustacean habitat and potential mortality under Alternative 1B would not be an adverse effect on
20 vernal pool crustaceans.

21 **CEQA Conclusion:**

22 **Near-Term Timeframe**

23 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
24 the near-term BDCP conservation strategy has been evaluated to determine whether it would
25 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
26 effects of construction would be less than significant. Table 12-1B-12 above lists the impacts on
27 modeled vernal pool crustacean habitat that is based on the natural community mapping done
28 within the study area. The impacts from tidal natural communities restoration (CM4) are based on
29 hypothetical footprints and do not reflect actual impacts on vernal pool crustacean habitat
30 considering the BDCP's commitment to design restoration projects to minimize or avoid effects on
31 covered vernal pool crustaceans. As seen in Table 12-1B-13, the impacts of CM1 alone would be well
32 within the near-term limits. As seen in Table 12-1B-13, Alternative 1B would not meet the Plan's
33 near-term biological goals and objectives for direct and indirect effects unless near-term tidal
34 restoration projects are designed to ensure that they do not exceed these impact limits.

35 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
36 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are
37 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.6
38 wetted acre of vernal pool crustacean habitat (or 4 acres of vernal pool complex) should be restored
39 and 5.4 wetted acres of vernal pool crustacean habitat (or 36 acres of vernal pool complex) should
40 be protected to mitigate the CM1 direct and indirect effects on vernal pool crustacean habitat.
41 Assuming that the BDCP would apply the impact limits presented in Table 12-1B-13, the near-term
42 effects of tidal restoration could not exceed 4.4 wetted acres direct and 7.9 wetted acres indirect.
43 The impacts based on the hypothetical tidal restoration footprints would exceed these limits. When
44 and if these limits are met, the BDCP would need to restore up to 5 wetted acres (33 acres of vernal

1 pool complex) and protect up to 30 wetted acres (200 acres of vernal pool complex) in the near-
2 term to offset the effects of CM1 and CM4.

3 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
4 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
5 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
6 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
7 restoration would be determined during implementation based on the following criteria.

- 8 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to
9 impacts, then 1.0 wetted acre of vernal pools will be restored for each wetted acre directly
10 affected (1:1 ratio).
- 11 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
12 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
13 acres of vernal pools will be restored for each wetted acre directly affected (1.5:1 ratio).

14 The species-specific biological goals and objectives would also inform the near-term protection and
15 restoration efforts. These Plan goals represent performance standards for considering the
16 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
17 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean
18 habitat.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
23 *Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM37 Recreation*. All of these AMMs
24 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
25 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
26 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

27 The above natural community restoration and protection activities are expected to be concluded in
28 the first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts
29 to constitute adequate mitigation for CEQA purposes. These commitments, implemented together
30 with the AMMs and the biological goals and objectives, are more than sufficient to support the
31 conclusion that the near-term effects of Alternative 1B on vernal pool crustaceans would be less
32 than significant under CEQA.

33 **Late Long-Term Timeframe**

34 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
35 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
36 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-1B-13, the effects of CM1 alone
37 would be well within the near-term limits, but overall Alternative 1B would not meet the Plan's late
38 long-term biological goals and objectives for direct and indirect effects unless tidal restoration
39 projects are designed to ensure that that they do not exceed these impact limits.

40 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in
41 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
42 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre

1 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
2 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection
3 and restoration would be achieved using the criteria presented above as well as by the following the
4 other specific biological goals and objectives.

- 5 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3).
- 6 ● Protecting the range of inundation characteristics that are currently represented by vernal pool
7 throughout the Plan Area (Objective VPNC1.4).
- 8 ● Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective
9 VPC1.1).

10 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
11 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
12 restoration and protection of alkali seasonal wetlands that could overlap with the species model,
13 could result in the restoration of 51 acres and the protection of 608 acres of modeled habitat for
14 vernal pool crustaceans.

15 Alternative 1B would result in substantial habitat modifications to vernal pool crustacean habitat in
16 the absence of other conservation actions. However, the BDCP has committed to impact limits for
17 vernal pool crustacean habitat and to habitat protection, restoration, management, and
18 enhancement associated with CM3, CM9, and CM11. These conservation activities would be guided
19 by species-specific goals and objectives and by AMM1-AMM6, AMM10, AMM12, and AMM37, which
20 would be in place throughout the construction phase. Considering these commitments, Alternative
21 1B over the term of the BDCP would not result in a substantial adverse effect through habitat
22 modifications and would not substantially reduce the number or restrict the range of vernal pool
23 crustaceans. Therefore, Alternative 1B would have a less-than-significant impact on vernal pool
24 crustaceans.

25 **Impact BIO-33: Indirect Effects of Plan Implementation on Vernal Pool Crustaceans**

26 Construction and maintenance activities associated with water conveyance facilities, and restoration
27 actions could indirectly affect vernal pool crustaceans and their habitat in the vicinity of
28 construction and restoration areas, and maintenance activities. These potential effects would be
29 minimized or avoided through AMM1-AMM6, AMM10, and AMM12, which would be in effect
30 throughout the Plan's construction phase.

31 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly
32 affect vernal pool crustaceans and their habitat in the vicinity of construction areas. Ground-
33 disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment could
34 result in the inadvertent release of sediment and hazardous substances into this habitat. These
35 potential effects would be avoided and minimized through AMM1-AMM6, which would be in effect
36 throughout the Plan's construction phase. Vernal pool crustaceans and their habitat could be
37 periodically indirectly affected by maintenance activities at water conveyance facilities.
38 Embankment maintenance activities around Clifton Court Forebay could result in the inadvertent
39 discharge of sediments and hazardous materials into vernal pool crustacean habitat that occurs
40 along the southern and western boundaries of the forebays. These potential effects would be
41 avoided and minimized through AMM1-AMM6, which would be in effect throughout the term of the
42 Plan. The indirect effects of Alternative 1B implementation would not be adverse under NEPA.

1 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance
2 facilities, and restoration actions could indirectly impact vernal pool crustaceans and their habitat in
3 the vicinity of construction and restoration areas, and maintenance activities. These potential
4 impacts would be minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would
5 be in effect throughout the construction phase. The indirect impacts of Alternative 1B would be less-
6 than significant under CEQA.

7 **Impact BIO-34: Periodic Effects of Inundation of Vernal Pool Crustacean Habitat as a Result of**
8 **Implementation of Conservation Components**

9 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect 0
10 to 4 acres of modeled vernal pool crustacean habitat (Table 12-1B-12). There would be no periodic
11 effects from *CM5 Seasonally Inundated Floodplain Restoration*.

12 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the
13 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,
14 periodic inundation could affect vernal pool crustaceans occupying areas ranging from 0 acres of
15 habitat during most notch flows to an estimated 4 acres during a notch flow of 6,000 cfs. BDCP-
16 associated inundation of areas that would not otherwise have been inundated is expected to occur in
17 no more than 30% of all years, because Fremont Weir is expected to overtop the remaining 70% of
18 all years, and during those years notch operations would not typically affect the maximum extent of
19 inundation. In more than half of all years under Existing Conditions, an area greater than the BDCP-
20 related inundation area already inundates in the bypass. Yolo Bypass flooding is expected to have a
21 minimal effect on vernal pool crustaceans and would not be adverse under NEPA.

22 **CEQA Conclusion:** Alternative 1B would periodically inundate no more than 4 acres of vernal pool
23 crustacean habitat during the maximum flows over the Fremont Weir. The periodic inundation is
24 not anticipated to result in a conversion of vernal pool crustacean habitat into different wetland
25 habitat. BDCP-associated inundation of areas that would not otherwise have been inundated is
26 expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop
27 the remaining 70% of all years, and during those years notch operations would not typically affect
28 the maximum extent of inundation. In more than half of all years under Existing Conditions, an area
29 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass
30 flooding is expected to have a minimal effect on vernal pool crustaceans and would thus result in
31 less-than-significant impacts on the species.

32 **Valley Elderberry Longhorn Beetle**

33 This section describes the effects of Alternative 1B, including water conveyance facilities
34 construction and implementation of other conservation measures, on the valley elderberry longhorn
35 beetle. That habitat model used to assess the effects for valley elderberry longhorn beetle is based
36 on riparian habitat and nonriparian habitat (channels and grasslands within 200 feet of channels).
37 Construction and restoration associated with Alternative 1B conservation measures would result in
38 both temporary and permanent losses of valley elderberry longhorn beetle modeled habitat as
39 indicated in Table 12-1B-14. The majority of the losses would take place over an extended period of
40 time as the restoration conservation measures are being implemented. In addition, an estimated 23
41 elderberry shrubs could be impacted by the Alternative 1B conveyance alignment (CM1). Full
42 implementation of Alternative 1B would also include the following conservation actions over the

1 term of the BDCP to benefit valley elderberry longhorn beetle (BDCP Chapter 3, *Conservation*
2 *Strategy*).

- 3 • Mitigate impacts on elderberry shrubs consistent with USFWS conservation guidelines for the
4 species (Objective VELB1.1).
- 5 • Site elderberry longhorn beetle habitat restoration adjacent to occupied habitat (Objective
6 VELB1.2).
- 7 • Restore 5,000 acres of valley/foothill riparian (Objective VFRNC1.1, associated with CM7).
- 8 • Protect 750 acres of valley/foothill riparian (Objective VFRNC1.2, associated with CM3).
- 9 • Maintain or increase the abundance and distribution of rare or uncommon vegetation alliances,
10 such as *Sambuca nigra* (blue elderberry stands) alliance (Objective VFRNC3.1, associated with
11 CM7 and CM11).

12 As explained below, with the restoration or protection of these amounts of habitat, impacts on valley
13 elderberry longhorn beetle would not be adverse for NEPA purposes and would be less than
14 significant for CEQA purposes.

15 **Table 12-1B-14. Changes in Valley Elderberry Longhorn Beetle Modeled Habitat Associated with**
16 **Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	51	51	39	39	NA	NA
	Non-riparian	158	158	88	88	NA	NA
Total Impacts CM1		209	209	127	127	NA	NA
CM2–CM18	Riparian	381	678	76	111	44–80	266
	Non-riparian	142	311	94	108	103–244	287
Total Impacts CM2–CM18		523	989	170	219	161–325	553
TOTAL IMPACTS		732	1,198	297	346	161–325	553

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

17

1 **Impact BIO-35: Loss of Valley Elderberry Longhorn Beetle Habitat**

2 Alternative 1B conservation measures would result in the permanent and temporary loss combined
3 of up to 1,544 acres of modeled valley elderberry longhorn beetle habitat (879 acres of riparian
4 habitat and 665 acres of nonriparian habitat), and an estimated 23 elderberry shrubs, which
5 represent potential habitat for the species (Table 12-1B-14). Due to the limitation of the habitat
6 suitability model, all of these effects are assumed to be a large overestimate of the true effect on
7 potential valley elderberry longhorn beetle habitat. Conservation measures that would result in
8 these losses are conveyance facilities and transmission line construction, and establishment and use
9 of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat
10 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management
11 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could
12 result in local adverse habitat effects. In addition, maintenance activities associated with the long-
13 term operation of the water conveyance facilities and other BDCP physical facilities could degrade
14 or eliminate valley elderberry longhorn beetle habitat. Timely implementation of the near-term
15 habitat protection and restoration contained in the Plan and implementation of AMMs committed to
16 in the Plan would result in no adverse effects under NEPA and less-than-significant impacts under
17 CEQA. Each of these activities is described below.

- 18 ● *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would
19 result in the permanent and temporary combined loss of approximately 336 acres of modeled
20 valley elderberry longhorn beetle habitat, composed of 90 acres of riparian habitat and 246
21 acres of nonriparian habitat (Table 12-1B-14). In addition, an estimated 23 shrubs could be
22 potentially removed as a result of conveyance facility construction. The exact number of shrubs
23 to be impacted would be determined during pre-construction surveys of the footprints of the
24 conveyance facility and associated work areas as part of the implementation of *AMM15 Valley*
25 *Elderberry Longhorn Beetle*. Most of these impacts are associated with the intake and forebay
26 construction in the north delta. There are no records of valley elderberry longhorn beetle within
27 these impact areas. The portion of the above impacts that result from temporary habitat loss
28 includes 127 acres of modeled valley elderberry longhorn beetle habitat (39 acres riparian and
29 88 acres nonriparian habitat). Elderberry shrubs could be affected from ground-disturbing
30 activities associated with conveyance construction footprints, temporary access roads, and
31 staging areas.
- 32 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction activity associated with fisheries
33 improvements in the Yolo Bypass would result in the permanent and temporary removal of
34 approximately 295 acres of modeled valley elderberry longhorn beetle habitat, composed of 159
35 acres of riparian habitat and 136 acres of nonriparian habitat. Approximately 125 acres of
36 permanent impacts (83 acres of riparian and 41 acres of nonriparian) would mostly occur at the
37 north end of the Yolo Bypass from Fremont Weir improvements. The 170 acres of temporary
38 impacts (76 acres of riparian and 94 acres of nonriparian) would mostly be from work on the
39 Fremont Weir, the Sacramento Weir, and levees along the Bypass. Elderberry shrubs could be
40 affected from ground-disturbing activities associated with the re-contouring of surface
41 topography, excavation or modification of channels, levee modification, and removal of riprap
42 and other protections from channel banks.
- 43 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
44 in the permanent loss of approximately 813 acres of modeled valley elderberry longhorn beetle
45 habitat, composed of 552 acres of riparian and 260 acres of nonriparian habitat. The majority of
46 these impacts would be associated with tidal restoration in the Delta and only 42 acres of these

1 impacts (all nonriparian) would be from tidal restoration in Suisun Marsh. Elderberry shrubs
2 could be affected from ground-disturbing activities associated with the re-contouring of surface
3 topography, excavation or modification of channels, type conversion from riparian and
4 grasslands to tidal habitat, levee removal and modification, and removal of riprap and other
5 protections from channel banks.

- 6 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
7 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
8 approximately 101 acres of valley elderberry longhorn beetle habitat, composed of 78 acres of
9 riparian and 23 acres of nonriparian. Approximately half of these impacts (52 acres) would be
10 permanent impacts from levee construction and the other half (49 acres) would be temporary
11 impacts associated with the levee construction. There is one CNDDDB record of valley elderberry
12 longhorn beetle occurring in CZ 7 just west of Middle River on Union Island. This record and
13 other elderberry shrubs could be affected from ground-disturbing activities associated with the
14 re-contouring of surface topography, excavation or modification of channels, levee removal and
15 modification, and removal of riprap and other protections from channel banks.
- 16 • *CM11 Natural Communities Enhancement and Management*: Activities associated with natural
17 communities enhancement and management, such as grazing practices and ground disturbance
18 or herbicide use in the control of nonnative vegetation, intended to maintain and improve
19 habitat functions of BDCP protected habitats for covered species could result in loss of
20 elderberry shrubs and the potential for injury or mortality to beetles. These effects cannot be
21 quantified, but are expected to be minimal and would be avoided and minimized by the AMMs
22 discussed below.
- 23 • *Operations and maintenance*: Postconstruction operation and maintenance of the above-ground
24 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
25 disturbances that could affect valley elderberry beetle. Maintenance activities would include
26 vegetation management, levee and structure repair, and re-grading of roads and permanent
27 work areas could potentially affect elderberry shrubs occupied by the species. These effects,
28 however, would be reduced by AMMs described below.

29 The following paragraphs summarize the combined effects discussed above and describe other
30 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
31 also included.

32 ***Near-Term Timeframe***

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
36 effects of construction would not be adverse under NEPA and would be less than significant under
37 CEQA. Alternative 1B would result in permanent and temporary impacts on 1,029 acres of modeled
38 habitat (547 acres of riparian and 482 acres of nonriparian) for valley elderberry longhorn beetle in
39 the study area in the near-term. These effects would result from the construction of the water
40 conveyance facilities (CM1, 90 acres of riparian and 246 acres of nonriparian), and implementing
41 other conservation measures (Yolo Bypass fisheries improvements [CM2] and tidal restoration
42 [CM4], 693 acres of modeled habitat). The other conservation measures account for 457 of the 547
43 acres (84%) of impacts on riparian habitat. Based on limited DWR survey data of the Conveyance
44 Planning Area (see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*

1 *Data Report*), an estimated 23 elderberry shrubs would be impacted in the near-term by CM1 (see
2 Section 12.3.2.3 for a discussion on the methods used to make this estimate).

3 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
4 CM1 and that are identified as habitat for valley elderberry longhorn beetle in Chapter 3 of the BDCP
5 would be 1:1 for restoration and 1:1 for protection for riparian habitat. Using these typical ratios
6 would indicate that 90 acres of the riparian habitat should be restored/created and 90 acres of
7 existing riparian should be protected to mitigate the CM1 losses of valley elderberry longhorn beetle
8 habitat. The near-term effects of other conservation actions would require 457 acres of riparian
9 restoration and 457 acres of riparian protection using the same typical NEPA and CEQA ratios (1:1
10 for restoration and 1:1 for protection).

11 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800
12 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same
13 timeframe as the construction and early restoration losses, thereby minimizing adverse effects on
14 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB1.1 and 1.2, which call for
15 implementing the USFWS (1999) conservation guidelines for valley elderberry longhorn beetle
16 (transplanting elderberry shrubs and planting elderberry seedlings and associated natives) and
17 siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites
18 confirmed to be occupied by valley elderberry longhorn beetle. These objectives would be met
19 through the implementation of CM7 *Riparian Natural Community Restoration*. CM7 *Riparian Natural*
20 *Community Restoration* specifically calls for the planting of elderberry shrubs in large, contiguous
21 clusters with a mosaic of associated natives as part of riparian restoration consistent with USFWS
22 conservation guidelines (U.S. Fish and Wildlife Service 1999a). These Plan goals represent
23 performance standards for considering the effectiveness of restoration actions. The acres of
24 protection and restoration contained in the near-term Plan goals and the additional species specific
25 measures within CM7 satisfy the typical mitigation that would be applied to the project-level effects
26 of CM1, as well as mitigating the near-term effects of the other conservation measures.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily*
31 *Affected Natural Communities*, and *AMM15 Valley Elderberry Longhorn Beetle*. AMM15 requires
32 surveys for elderberry shrubs within 100 feet of any ground disturbing activities, the
33 implementation avoidance and minimize measures for any shrubs that are identified within this
34 100-foot buffer, and transplanting shrubs that can't be avoided. All of these AMMs include elements
35 that avoid or minimize the risk of affecting habitats and species adjacent to work areas and RTM
36 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
37 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

38 ***Late Long-Term Timeframe***

39 Based on modeled habitat, the study area supports approximately 34,456 acres of modeled habitat
40 (17,786 acres of riparian and 16,670 acres of nonriparian) for valley elderberry longhorn beetle.
41 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 1,544
42 acres of modeled valley elderberry longhorn beetle habitat (879 acres of riparian habitat and 665
43 acres of nonriparian habitat) during the term of the Plan (approximately 5% of the modeled habitat
44 in the study area). The locations of these losses are described above in the analyses of individual

1 conservation measures. These losses would not fragment any known populations of valley
2 elderberry longhorn beetle. The Plan includes a commitment to protect 750 acres of riparian habitat
3 and restoring/creating 5,000 acres of riparian habitat in the Plan Area. According to Objective
4 VELB1.2, the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied
5 habitat, which would provide connectivity between occupied and restored habitats and improve the
6 species' ability to disperse within and outside the Plan Area. Other factors relevant to effects on
7 valley elderberry longhorn beetle include are listed below.

- 8 ● Habitat loss is widely dispersed throughout the study area and would not be concentrated in
9 any one location.
- 10 ● There would be a temporal loss of riparian habitat during the near-term evaluation period
11 because most of the affected riparian vegetation would be removed during the near-term
12 timeframe, while large quantities of riparian habitat would not be restored until the early and
13 late long-term timeframes. Effects on valley elderberry longhorn beetle of this temporal loss of
14 riparian vegetation are expected to be minimal because much of the riparian habitat in the Plan
15 Area is not known to be currently occupied by the species, because all elderberry shrubs that
16 are suitable for transplantation would be moved to conservation areas in the Plan Area, and
17 because most of the affected community is composed of small patches of riparian scrub and
18 herbaceous vegetation that are fragmented and distributed across the agricultural landscape of
19 the Plan Area and thus are likely to provide no or low-value habitat for the beetle.
- 20 ● Temporarily disturbed areas would be restored within 1 year following completion of
21 construction and management activities. Under AMM10, a restoration and monitoring plan
22 would be developed prior to initiating any construction-related activities associated with the
23 conservation measures or other covered activities that would result in temporary effects on
24 natural communities.

25 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
26 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as other
27 actions that overlap with the nonriparian portions of the species model, could result in the
28 restoration of 4,857 acres (riparian) and the protection of 2,363 acres (729 acres of riparian and
29 1,634 acres of nonriparian channels and grassland) of modeled habitat for valley elderberry
30 longhorn beetle.

31 **NEPA Effects:** The near-term loss of valley elderberry longhorn beetle habitat under Alternative 1B
32 would not be adverse because the BDCP has committed to restoring and protecting an acreage that
33 exceeds the typical mitigation ratios described above, in addition to avoiding impacts on shrubs and
34 transplanting those that can't be avoided. In the absence of other conservation actions, the losses of
35 valley elderberry longhorn beetle habitat and potential for direct mortality of a special-status
36 species associated with Alternative 1B in the late long-term would represent an adverse effect.
37 However, with habitat protection and restoration associated with CM7, guided by species-specific
38 goals and objectives and by AMM1–AMM6, AMM10, and AMM15, which would be in place
39 throughout the construction period, the effects of Alternative 1B as a whole on valley elderberry
40 longhorn beetle would not be adverse under NEPA.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 6 impacts of construction would be less than significant. Alternative 1B would result in permanent
 7 and temporary impacts on 1,029 acres of modeled habitat (547 acres of riparian and 482 acres of
 8 nonriparian) for valley elderberry longhorn beetle in the study area in the near-term. These impacts
 9 would result from the construction of the water conveyance facilities (CM1, 90 acres of riparian and
 10 246 acres of nonriparian), and implementation of other conservation measures (Yolo Bypass
 11 fisheries improvements [CM2] and tidal restoration [CM4], 693 acres of modeled habitat). The other
 12 conservation measures account for 457 of the 547 acres (84%) of impacts on riparian habitat. Based
 13 on limited DWR survey data of the Conveyance Planning Area (see Appendix 12C, *2009 to 2011 Bay
 14 Delta Conservation Plan EIR/EIS Environmental Data Report*), an estimated 23 elderberry shrubs
 15 would be impacted in the near-term by CM1 (see Section 12.3.2.3 for a discussion on the methods
 16 used to make this estimate).

17 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
 18 CM1 and that are identified in the biological goals and objectives for valley elderberry longhorn
 19 beetle in Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection for riparian
 20 habitat. Using these typical ratios would indicate that 90 acres of the riparian habitat should be
 21 restored/created and 90 acres of existing riparian should be protected to mitigate the CM1 losses of
 22 valley elderberry longhorn beetle habitat. The near-term effects of other conservation actions would
 23 require 457 acres of riparian restoration and 457 acres of riparian protection using the same typical
 24 NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

25 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800
 26 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same
 27 timeframe as the construction and early restoration losses, thereby minimizing adverse effects on
 28 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB1.1 and 1.2, which call for
 29 implementing the USFWS conservation guidelines for valley elderberry longhorn beetle
 30 (transplanting elderberry shrubs and planting elderberry seedlings and associated natives) and
 31 siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites
 32 confirmed to be occupied by valley elderberry longhorn beetle (U.S. Fish and Wildlife Service 1999).
 33 These objectives would be met through the implementation of *CM7 Riparian Natural Community
 34 Restoration*. CM7 specifically calls for the planting of elderberry shrubs in large, contiguous clusters
 35 with a mosaic of associated natives as part of riparian restoration consistent with USFWS
 36 conservation guidelines (U.S. Fish and Wildlife Service 1999a).

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2
 38 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention
 39 Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and
 40 Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily
 41 Affected Natural Communities*, and *AMM15 Valley Elderberry Longhorn Beetle*. AMM15 requires
 42 surveys for elderberry shrubs within 100 feet of any ground disturbing activities, the
 43 implementation avoidance and minimize measures for any shrubs that are identified within this
 44 100-foot buffer, and transplanting shrubs that can't be avoided. All of these AMMs include elements

1 that avoid or minimize the risk of affecting habitats and species adjacent to work areas and RTM
2 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
3 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

4 The natural community restoration and protection activities are expected to be concluded in the
5 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts to
6 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with
7 the AMMs, are more than sufficient to support the conclusion that the near-term effects of
8 Alternative 1B would be less than significant under CEQA.

9 **Late Long-Term Timeframe**

10 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 1,544
11 acres of modeled valley elderberry longhorn beetle habitat (879 acres of riparian habitat and 665
12 acres of nonriparian habitat) during the term of the Plan (approximately 5% of the modeled habitat
13 in the study area). The locations of these losses are described above in the analyses of individual
14 conservation measures. These losses would not fragment any known populations of valley
15 elderberry longhorn beetle. The Plan includes a commitment to protect 750 acres of riparian habitat
16 and restoring/creating 5,000 acres of riparian habitat in the Plan Area. According to Objective
17 VELB1.2, the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied
18 habitat, which would provide connectivity between occupied and restored habitats and improve the
19 species' ability to disperse within and outside the Plan Area. The BDCP also includes a number of
20 AMMs (AMM1–AMM6, AMM10, and AMM15) directed at minimizing or avoiding potential impacts
21 on valley elderberry longhorn beetle. The large acreages of conservation would adequately
22 compensate for the modeled habitats lost to construction and restoration activities.

23 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
24 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as other
25 actions that overlap with the nonriparian portions of the species model, could result in the
26 restoration of 4,857 acres (riparian) and the protection of 2,363 acres (729 acres of riparian and
27 1,634 acres of nonriparian channels and grassland) of modeled habitat for valley elderberry
28 longhorn beetle.

29 Considering these protection and restoration provisions, which would provide acreages of new or
30 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction
31 and restoration activities, implementation of Alternative 1B as a whole would not result in a
32 substantial adverse effect through habitat modifications and would not substantially reduce the
33 number or restrict the range of the species. Therefore, the alternative would have a less-than-
34 significant impact on valley elderberry longhorn beetle.

35 **Impact BIO-36: Indirect Effects on Valley Elderberry Longhorn Beetle and its Habitat**

36 Construction activities associated with water conveyance facilities, conservation components and
37 ongoing habitat enhancement, as well as operation and maintenance of above-ground water
38 conveyance facilities, including the transmission facilities, could result in ongoing periodic
39 postconstruction disturbances with localized impacts on valley elderberry longhorn beetle over the
40 term of the BDCP. Construction related effects could result from ground-disturbing activities,
41 stockpiling of soils, and maintenance and refueling of heavy equipment could result in dust and the
42 inadvertent release of hazardous substances in areas where elderberry shrubs occur. A GIS analysis
43 (see Section 12.3.2.3 for a discussion on the methods used to make this estimate) estimates that

1 approximately 15 shrubs could be indirectly affected by conveyance facilities construction (CM1).
2 Restoration activities could result in excavation or modification of channels, type conversion from
3 riparian and grasslands to tidal habitat, levee removal and modification, and removal of riprap and
4 other protections from channel banks that occur within 100 feet of an elderberry shrubs. These
5 potential effects would be minimized or avoided through AMM1–AMM6, AMM10, and AMM15,
6 which would be in effect throughout the Plan’s construction phase.

7 **NEPA Effects:** The indirect effects on valley elderberry longhorn beetle as a result of implementing
8 Alternative 1B conservation actions would not have an adverse effect on valley elderberry longhorn
9 beetle.

10 **CEQA Conclusion:** Ground-disturbing activities, stockpiling of soils, and the potential release of dust
11 and hazardous substances would accompany construction of the water conveyance facilities. An
12 estimated 15 shrubs could be indirectly affected by conveyance facilities construction (CM1). In
13 addition, ground-disturbing activities associated with the re-contouring of surface topography,
14 excavation or modification of channels, type conversion from riparian and grasslands to tidal
15 habitat, levee removal and modification, and removal of riprap and other protections from channel
16 banks could indirectly affected elderberry shrubs that occur within 100 feet of these restoration
17 activities. With the implementation of AMM1–AMM6, AMM10, and AMM15 as part of Alternative 1B
18 construction, operation, and maintenance, the BDCP would avoid the potential for substantial
19 adverse indirect effects on valley elderberry longhorn beetle in that the Plan would not result in a
20 substantial reduction in numbers or a restriction in the range of valley elderberry longhorn beetle.
21 Indirect effects of Alternative 1B implementation would not have a significant impact on valley
22 elderberry longhorn beetle.

23 **Impact BIO-37: Periodic Effects of Inundation of Valley Elderberry Longhorn Beetle Habitat**
24 **as a Result of Implementation of Conservation Components**

25 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
26 161 to 325 acres of modeled valley elderberry longhorn beetle habitat (Table 12-1B-14).

27 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 553 acres of modeled
28 valley elderberry longhorn beetle habitat (Table 12-1B-14).

29 It is unknown at this time how much of the modeled habitat that would be inundated as a result of
30 CM2 and CM5 actually contains elderberry shrubs. Elderberry shrubs have been found to be
31 intolerant of long periods of inundation and there is evidence that they die very quickly after even
32 short periods of flooding (River Partners 2008). During monitoring of a restoration project at the
33 San Joaquin River National Wildlife Refuge, River Partners found that nearly all (99% to 100%) of
34 the 4-year-old elderberry shrubs in restoration plots died after 15–17 weeks of inundation, and
35 River Partners noted in general that the shrubs died very quickly after even short periods of
36 flooding (River Partners 2008). Talley et al (2006) in their report assisting the USFWS 5-year review
37 of the species, note that elderberry shrubs respond negatively to saturated soil conditions and that
38 they can only tolerate temporary root crown inundation. Therefore, in the areas that would be
39 periodically inundated by the implementation of CM2 it is likely that there are few, if any, mature
40 shrubs in these areas because under current conditions they would be inundated in about 50% of all
41 years for approximately 7 weeks. The areas affected by CM5 are not currently inundated and thus
42 elderberry shrubs could present in these areas.

1 The periodic effects on modeled habitat for valley elderberry longhorn beetle associated with
2 implementing Alternative 1B could adversely affect valley elderberry longhorn beetle habitat
3 (elderberry shrubs) and make modeled habitat there unsuitable for future elderberry
4 establishment. Based on the information presented above, the current conditions in those areas that
5 would be periodically inundated in Yolo Bypass (CM2) are not likely very suitable for elderberry
6 shrubs and thus CM2 would likely have minimal effects, if any, on the species. The modeled habitat
7 that would be periodically inundated from the implementation of CM5 could result in adverse effects
8 on valley elderberry longhorn beetle.

9 **NEPA Effects:** Periodic effects of the inundation of valley elderberry longhorn beetle habitat as a
10 result of implementing Alternative 1B conservation actions would not be adverse when taking into
11 consideration CM7 habitat protection and restoration. This habitat protection and restoration would
12 be guided by species-specific goals and objectives and by AMM1–AMM6, AMM10, and AMM15,
13 which would be in place throughout the period when periodic effects would occur.

14 **CEQA Conclusion:** Alternative 1B (CM2 and CM5) would have periodic impacts on modeled valley
15 elderberry longhorn beetle habitat. The periodic inundation of between 161 and 325 acres (CM2)
16 and 553 acres (CM5) of modeled habitat could result in the death of elderberry shrubs that may
17 occur there and thus potentially impact valley elderberry longhorn beetle. The Plan includes the
18 restoration of 5,000 acres of riparian habitat and the protection of 750 acres riparian habitat (CM7)
19 would include areas for elderberry restoration and protection. The BDCP also includes AMM1–
20 AMM6, AMM10, and AMM15, which would minimize and avoid impacts on valley elderberry
21 longhorn beetle prior to Yolo Bypass fisheries enhancement and floodplain restoration activities.
22 AMM15, which includes a measure for following the USFWS (U.S. Fish and Wildlife Service 1999a)
23 conservation guidelines for valley elderberry longhorn beetle, would be used to identify shrubs for
24 transplanting to conservation areas that otherwise could be adversely affected by periodic
25 inundation in Yolo Bypass and floodplain restoration areas. These conservation actions would
26 compensate for the periodic impacts on valley elderberry longhorn beetle.

27 Considering these protection and restoration provisions and avoidance and minimization measures,
28 implementation of Alternative 1B as a whole would not result in a substantial adverse effect through
29 habitat modifications and would not substantially reduce the number or restrict the range of the
30 species. Therefore, periodic effects of inundation resulting from Alternative 1B would have a less-
31 than-significant impact on valley elderberry longhorn beetle.

32 **Nonlisted Vernal Pool Invertebrates**

33 This section describes the effects of Alternative 1B, including water conveyance facilities
34 construction and implementation of other conservation components, on nonlisted vernal pool
35 invertebrates that are not covered by the Plan (Blennosperma vernal pool andrenid bee, hairy water
36 flea, Ricksecker’s water scavenger beetle, curved-foot hygrotus beetle, molestan blister beetle).
37 Little is known about the range of these species so it is assumed that they have potential to occur in
38 the same areas described by the vernal pool crustacean modeled habitat. That habitat model
39 consists of: vernal pool complex, which consists of vernal pools and uplands that display
40 characteristic vernal pool and swale visual signatures that have not been significantly affected by
41 agricultural or development practices; alkali seasonal wetlands in CZ 8; and degraded vernal pool
42 complex, which consists of low-value ephemeral habitat ranging from areas with vernal pool and
43 swale visual signatures that display clear evidence of significant disturbance due to plowing, disking,
44 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in

1 fallow fields, and areas of compacted soils in pastures. For the purpose of the effects analysis, vernal
2 pool complex is categorized as high-value and degraded vernal pool complex is categorized as low-
3 value for these species. Alkali seasonal wetlands in CZ 8 were also included as high-value habitat for
4 vernal pool crustaceans in the model. Also included as low-value for vernal pool habitat are areas
5 along the eastern boundary of CZ 11 that are mapped as vernal pool complex because they flood
6 seasonally and support typical vernal pool plants. These areas do not include topographic
7 depressions that are characteristic of vernal pools and, thus, are considered to have a lower value
8 for the species.

9 Construction and restoration associated with Alternative 1B conservation measures would result in
10 permanent losses of habitat for nonlisted vernal pool invertebrates as indicated in Table 12-1B-15
11 and indirect conversion of vernal pool habitat. The majority of the losses would take place over an
12 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of
13 Alternative 1B would also include the following conservation actions over the term of the BDCP that
14 would benefit nonlisted vernal pool invertebrates (BDCP Chapter 3, *Conservation Strategy*).

- 15 ● Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool
16 recovery areas (Objective VPNC1.1, associated with CM3).
- 17 ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool
18 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective
19 VPNC1.2, associated with CM9).
- 20 ● Increase size and connectivity of protected vernal pool complexes in plan area and increase
21 connectivity with complexes outside the Plan Area (Objective VPNC1.3)
- 22 ● Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective
23 VPNC1.4)
- 24 ● Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for
25 supporting and sustaining vernal pool species (Objective VPNC2.1)

26 As explained below, with the restoration or protection of these amounts of habitat, impacts on
27 nonlisted vernal pool invertebrates would not be adverse for NEPA purposes and would be less-than
28 significant for CEQA purposes.

1 **Table 12-1B-15 Changes in Nonlisted Vernal Pool Invertebrate Habitat Associated with Alternative**
2 **1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	1	1	0	0	NA	NA
	Low-value	3	3	0	0	NA	NA
Total Impacts CM1		4	4	0	0	NA	NA
CM2-CM18	High-value	0	0	0	0	0-4	0
	Low-value	201	372	0	0	0	0
Total Impacts CM2-CM18		201	372	0	0	0-4	0
TOTAL IMPACTS		205	376	0	0	0-4	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. Yolo periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-38: Loss or Conversion of Habitat for and Direct Mortality of Nonlisted Vernal**
5 **Pool Invertebrates**

6 Alternative 1B conservation measures would result in the direct permanent loss of up to 376 acres
7 of vernal pool habitat from conveyance facility construction (CM1) and tidal natural communities
8 restoration (CM4). In addition, the conservation measures could result in the indirect conversion
9 due to hydrologic changes of an additional 149 acres of vernal pool habitat (91 high-value habitat
10 and 58 acres of low-value habitat) from conveyance construction (CM1) and based on the
11 hypothetical footprints for tidal restoration (CM4). Construction of the water conveyance facilities
12 and restoration activities may result in the modification of hardpan and changes to the perched
13 water table, which could lead to alterations in the rate, extent, and duration of inundation of nearby
14 vernal pool habitat. USFWS typically considers construction within 250 feet of vernal pool habitat to
15 constitute a possible conversion of the habitat unless more detailed information is provided to
16 further refine the limits of any such effects. For the purposes of this analysis, the 250-foot buffer was
17 applied to the water conveyance facilities work areas where surface and subsurface disturbance
18 activities would take place and to restoration hypothetical footprints. Habitat enhancement and
19 management activities (CM11), which include disturbance or removal of nonnative vegetation, could
20 result in local adverse habitat effects.

21 Because the estimates of habitat loss resulting from tidal inundation are based on projections of
22 where restoration may occur, actual effects are expected to be lower because sites would be selected
23 and restoration projects designed to minimize or avoid effects on the vernal pools. As specified in

1 the BDCP, the BDCP Implementation Office would ensure that tidal restoration projects and other
2 covered activities would be designed such that no more than a total of 10 wetted acres of vernal
3 pool habitat are permanently lost. *AMM12 Vernal Pool Crustaceans* would ensure that no more than
4 20 wetted acres of vernal pool habitat are indirectly affected by alterations to hydrology resulting
5 from adjacent BDCP covered activities, in particular tidal restoration. The term *wetted acres* refers
6 to an area that would be defined by the three parameter wetland delineation method used by the
7 U.S. Army Corps of Engineers to determine the limits of a wetland, which involves an evaluation of
8 wetland soil, vegetation, and hydrology characteristics. This acreage differs from vernal pool
9 complex acreages in that a vernal pool complex is comprised of individual wetlands (vernal pools)
10 and those upland areas that are in between and surrounding them, which provide the supporting
11 hydrology (surface runoff and groundwater input), organic and nutrient inputs, and refuge for the
12 terrestrial phase of some vernal pool species.

13 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the
14 individual conservation measure discussions.

- 15 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would
16 result in the permanent loss of 4 acres of vernal pool habitat, composed of 1 acre of high-value
17 habitat and 3 acres of low-value vernal pool habitat. These impacts would occur from the
18 construction of a new bridge on Hood Franklin Road where it crosses a large canal just before
19 the town of Hood and from construction around Clifton Court Forebay. In addition, 14 acres of
20 vernal pool habitat (2 acres of high-value habitat and 12 acres of low-value habitat) could be
21 indirectly affected by the construction around Clifton Court Forebay and the construction of the
22 aforementioned bridge.
- 23 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
24 in the permanent loss of approximately 372 acres of low-value vernal pool habitat, which
25 consists of degraded vernal pool complex. The BDCP describes degraded vernal pool complex as
26 areas of low-value ephemeral habitat ranging from areas with vernal pool and swale visual
27 signatures that display clear evidence of significant disturbance due to plowing, disking, or
28 leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in
29 fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or
30 other aquatic features in these areas is unknown but from a 2012 review of Google Earth
31 imagery found that these habitats appear to generally have low densities. However, areas
32 mapped as degraded vernal pool complex may still provide habitat for nonlisted vernal pool
33 invertebrates. So though degraded vernal pool complexes may not represent botanically diverse
34 vernal pools they still can provide habitat for nonlisted vernal pool invertebrates and thus the
35 loss of 372 acres of degraded vernal pool complex may result in the loss of occupied nonlisted
36 vernal pool invertebrate habitat. In addition, tidal restoration could result in the indirect
37 conversion of 135 acres of vernal pool habitat, which consist of 90 acres of high-value and 45
38 acres of low-value habitat. No records of nonlisted vernal pool invertebrates would be directly
39 impacted by CM4.
- 40 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,
41 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of
42 vernal pool complex would benefit nonlisted vernal pool invertebrates (Table 12-1B-15). A
43 variety of habitat management actions included in CM11 that are designed to enhance wildlife
44 values in BDCP-protected habitats may result in localized ground disturbances that could
45 temporarily affect vernal pool habitat. Ground-disturbing activities, such as removal of

1 nonnative vegetation and road and other infrastructure maintenance, are expected to have
 2 minor effects on vernal pool habitat and are expected to result in overall improvements to and
 3 maintenance of vernal pool habitat values over the term of the BDCP. These effects cannot be
 4 quantified, but are expected to be minimal and would be avoided and minimized by the AMMs
 5 listed below.

6 The following paragraphs summarize the combined effects discussed above and describe other
 7 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
 8 also included. NEPA and CEQA impact conclusions are also included. Table 12-1B-16 was prepared
 9 to further analyze BDCP effects on nonlisted vernal pool invertebrates using wetted acres of vernal
 10 pools in order to compare the effects of this alternative with the effect limits established in BDCP
 11 Chapter 3, Section 3.3, *Biological Goals and Objectives*, which are measured in wetted acres of vernal
 12 pools. Wetted acres were estimated by using the BDCP's assumption that vernal pool and degraded
 13 vernal pool complexes would have a 15% density of vernal pools (i.e., of 100 acres of vernal pool
 14 complex 15 acres would constitute vernal pools and the remaining 85 acres supporting uplands).
 15 Based on an informal evaluation of aerial photographs of the Plan Area it is likely that the actual
 16 densities within the Plan Area are approximately 10%, but the 15% density value was chosen as a
 17 conservative estimate for determining effects.

18 **Table 12-1B-16. Estimated Effects on Wetted Vernal Pool Crustacean Habitat under Alternative 1B**
 19 **(acres)^a**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit ^a		5	10	10	20
Alternative 1B Impact ^b	CM1	0.6	0.6	2.1	2.1
	CM4 ^c	30.2	55.8	11.0	20.4
Total		30.8	56.4	13.1	22.5

^a Because roughly half of the impacts occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

^b These acreages were generated by assuming that the modeled habitat identified in Table 12-1B-15 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.

^c These impacts are based on the hypothetical restoration footprints and will likely be lower based on the BDCP's commitment to minimize and avoid effects on vernal pool habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

20
21 ***Near-Term Timeframe***

22 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 23 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 24 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 25 effects of construction would not be adverse under NEPA and would be less than significant under
 26 CEQA. Table 12-1B-15 above lists the effects on habitat for nonlisted vernal pool invertebrates that
 27 is based on the natural community mapping done within the study area. The impacts from tidal
 28 natural communities restoration (CM4) are based on hypothetical footprints and do not reflect
 29 actual impacts on vernal pool habitat considering the BDCP's commitment to design restoration

1 projects to minimize or avoid effects on vernal pool. As seen in Table 12-1B-16, the effects of CM1
2 alone would be well within the near-term limits. As seen in Table 12-1B-16, Alternative 1B would
3 not meet the Plan's near-term biological goals and objectives for direct and indirect effects unless
4 near-term tidal restoration projects are designed to ensure that they do not exceed these impact
5 limits.

6 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
7 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are
8 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.6
9 wetted acre of nonlisted vernal pool species habitat (or 4 acres of vernal pool complex) should be
10 restored and 5.4 wetted acres of nonlisted vernal pool species habitat (or 36 acres of vernal pool
11 complex) should be protected to mitigate the CM1 direct and indirect effects on nonlisted vernal
12 pool invertebrate habitat. Assuming that the BDCP would apply the impact limits presented in Table
13 12-1B-16, the near-term effects of tidal restoration in the near-term could not exceed 4.4 wetted
14 acres direct and 7.9 wetted acres indirect. The impacts based on the hypothetical tidal restoration
15 footprints would exceed these limits. When and if these limits are met, the BDCP would need to
16 restore up to 5 wetted acres (33 acres of vernal pool complex) and protect up to 30 wetted acres
17 (200 acres of vernal pool complex) in the near-term to offset the effects of CM1 and CM4.

18 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
19 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
20 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
21 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
22 restoration would be determined during implementation based on the following criteria.

- 23 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to
24 impacts, then 1.0 wetted acre of vernal pools will be restored for each wetted acre directly
25 affected (1:1 ratio).
- 26 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
27 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
28 acres of vernal pools will be restored for each wetted acre directly affected (1.5:1 ratio).

29 The species-specific biological goals and objectives would also inform the near-term protection and
30 restoration efforts. These Plan goals represent performance standards for considering the
31 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
32 term Plan goals would keep pace with the loss of habitat and effects nonlisted vernal pool
33 invertebrates.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
38 *Natural Communities*, and *AMM37 Recreation*. *AMM12 Vernal Pool Crustaceans*, though developed for
39 vernal pool crustaceans, includes measures to avoid and minimize direct and indirect effects on
40 vernal pools and would thus be applicable to nonlisted vernal pool invertebrates as well. All of these
41 AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to
42 work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
43 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
3 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
4 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-1B-16, the effects of CM1 alone
5 would be well within the near-term limits, but overall Alternative 1B would not meet the Plan's late
6 long-term biological goals and objectives for direct and indirect effects unless tidal restoration
7 projects are designed to ensure that that they do not exceed these impact limits.

8 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in
9 Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective VPNC1.1) by
10 protecting at least 2 wetted acres of vernal pools protected for each wetted acre directly or
11 indirectly affected. The Plan also includes a commitment to restore or create vernal pools such that
12 the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection and
13 restoration would be achieved using the criteria presented above as well as by following these other
14 specific biological goals and objectives.

- 15 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3).
- 16 ● Protecting the range of inundation characteristics that are currently represented by vernal pool
17 throughout the Plan Area (Objective VPNC1.4).

18 **NEPA Effects:** The near-term loss of vernal pool habitat under Alternative 1B would not be adverse
19 because the BDCP has committed to avoiding and minimizing effects from tidal restoration and to
20 restoring and protecting an acreage that meets or exceeds the typical mitigation ratios described
21 above. In the absence of other conservation actions, the potential modification of vernal pool habitat
22 and potential mortality of special-status species resulting from Alternative 1B in the late long-term
23 would represent an adverse effect. However, the BDCP has committed to impact limits for vernal
24 pool habitat and to habitat protection, restoration, management, and enhancement associated with
25 CM3, CM9, and CM11. This habitat protection, restoration, management, and enhancement would be
26 guided by species-specific goals and objectives and by AMM1-AMM6, AMM10, AMM12, and AMM37,
27 which would be in place throughout the time period of construction. Considering these
28 commitments, losses and conversions of nonlisted vernal pool invertebrates habitat and potential
29 mortality under Alternative 1B would not be an adverse effect.

30 **CEQA Conclusion:**

31 **Near-Term Timeframe**

32 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
33 the near-term BDCP conservation strategy has been evaluated to determine whether it would
34 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
35 impacts of construction be less than significant. Table 12-1B-15 lists the impacts on vernal pool
36 habitat that is based on the natural community mapping done within the study area. The impacts
37 from tidal natural communities restoration (CM4) are based on hypothetical footprints and do not
38 reflect actual impacts on nonlisted vernal pool invertebrate habitat considering the BDCP's
39 commitment to design restoration projects to minimize or avoid effects on vernal pools. As seen in
40 Table 12-1B-16, the effects of CM1 alone would be well within the near-term limits. As seen in Table
41 12-1B-16, Alternative 1B would not meet the Plan's near-term biological goals and objectives for
42 direct and indirect effects unless near-term tidal restoration projects are designed to ensure that
43 they do not exceed these impact limits.

1 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
2 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are
3 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 0.6
4 wetted acre of nonlisted vernal pool species habitat (or 4 acres of vernal pool complex) should be
5 restored and 5.4 wetted acres of nonlisted vernal pool species habitat (or 36 acres of vernal pool
6 complex) should be protected to mitigate the CM1 direct and indirect effects on nonlisted vernal
7 pool invertebrate habitat. Assuming that the BDCP would apply the impact limits presented in Table
8 12-1B-16, the near-term effects of tidal restoration could not exceed 4.4 wetted acres direct and 7.9
9 wetted acres indirect. The impacts based on the hypothetical tidal restoration footprints would
10 exceed these limits. When and if these limits are met, the BDCP would need to restore up to 5 wetted
11 acres (33 acres of vernal pool complex) and protect up to 30 wetted acres (200 acres of vernal pool
12 complex) in the near-term to offset the effects of CM1 and CM4.

13 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
14 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
15 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
16 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
17 restoration would be determined during implementation based on the following criteria.

- 18 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to
19 impacts, then 1.0 wetted acre of vernal pools will be restored for each wetted acre directly
20 affected (1:1 ratio).
- 21 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
22 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
23 acres of vernal pools will be restored for each wetted acre directly affected (1.5:1 ratio).

24 The species-specific biological goals and objectives would also inform the near-term protection and
25 restoration efforts. These Plan goals represent performance standards for considering the
26 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
27 term Plan goals would keep pace with the loss of habitat and effects on vernal pool habitat.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
32 *Natural Communities*, and *AMM37 Recreation*. *AMM12 Vernal Pool Crustaceans*, though developed for
33 vernal pool crustaceans, includes measures to avoid and minimize direct and indirect effects on
34 vernal pools and would thus be applicable to nonlisted vernal pool invertebrates as well. All of these
35 AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to
36 work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
37 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

38 The above natural community restoration and protection activities are expected to be concluded in
39 the first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts
40 to constitute adequate mitigation for CEQA purposes. These commitments, implemented together
41 with the AMMs and the biological goals and objectives, are more than sufficient to support the
42 conclusion that the near-term impacts of Alternative 1B on nonlisted vernal pool invertebrates
43 would be less than significant under CEQA.

1 **Late Long-Term Timeframe**

2 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
3 and no more than 20 wetted acres of indirect effects on vernal pools by the late long-term (see
4 Objective VPNC1.2 and AMM12). As seen in Table 12-1B-16, the effects of CM1 alone would be well
5 within the near-term limits, but overall Alternative 1B would not meet the Plan's late long-term
6 biological goals and objectives for direct and indirect effects unless tidal restoration projects are
7 designed to ensure that that they do not exceed these impact limits.

8 The Plan has committed to a late long-term goal of protecting 600 acres of vernal pool complex in
9 Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective VPNC1.1) by
10 protecting at least 2 wetted acres of vernal pools protected for each wetted acre directly or
11 indirectly affected. The Plan also includes a commitment to restore or create vernal pools such that
12 the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection and
13 restoration would be achieved using the criteria presented above as well as by following these other
14 specific biological goals and objectives.

- 15 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3).
- 16 ● Protecting the range of inundation characteristics that are currently represented by vernal pool
17 throughout the Plan Area (Objective VPNC1.4).

18 Alternative 1B would result in substantial habitat modifications to vernal pool habitat in the absence
19 of other conservation actions. However, the BDCP has committed to impact limits for vernal pool
20 habitat and to habitat protection, restoration, management, and enhancement associated with CM3,
21 CM9, and CM11. These conservation activities would be guided by goals and objectives and by
22 AMM1–AMM6, AMM10, AMM12, and AMM37, which would be in place throughout the time period
23 of construction, Alternative 1B over the term of the BDCP would not result in a substantial adverse
24 effect through habitat modifications and would not substantially reduce the number or restrict the
25 range of nonlisted vernal pool invertebrates. Therefore, Alternative 1B would have a less-than-
26 significant impact on nonlisted vernal pool invertebrates.

27 **Impact BIO-39: Indirect Effects of Plan Implementation on Nonlisted Vernal Pool**
28 **Invertebrates**

29 Construction and maintenance activities associated with water conveyance facilities, and restoration
30 actions could indirectly affect nonlisted vernal pool invertebrates and their habitat in the vicinity of
31 construction and restoration areas, and maintenance activities. These potential effects would be
32 minimized or avoided through AMM1–AMM6 AMM10, and AMM12 which would be in effect
33 throughout the Plan's construction phase.

34 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly
35 affect nonlisted vernal pool invertebrates and their habitat in the vicinity of construction areas.
36 Ground-disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment
37 could result in the inadvertent release of sediment and hazardous substances into this habitat.
38 These potential effects would be avoided and minimized through AMM1–AMM6, which would be in
39 effect throughout the Plan's construction phase. Nonlisted vernal pool invertebrates and their
40 habitat could be periodically indirectly affected by maintenance activities at water conveyance
41 facilities. Embankment maintenance activities around Clifton Court Forebay could result in the
42 inadvertent discharge of sediments and hazardous materials into vernal pool habitat that occurs
43 along the southern and western boundaries of the forebays. These potential effects would be

1 avoided and minimized through AMM1–AMM6 and AMM10 which would be in effect throughout the
2 term of the Plan. The indirect effects of Plan implementation under Alternative 1B would not be
3 adverse.

4 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance
5 facilities, and restoration actions could indirectly impact nonlisted vernal pool invertebrates and
6 their habitat in the vicinity of construction and restoration areas, and maintenance activities. These
7 potential impacts would be minimized or avoided through AMM1–AMM6 and AMM10, which would
8 be in effect throughout the Plan’s construction phase. These indirect effects of Alternative 1B would
9 have a less-than significant impact on nonlisted vernal pool invertebrates.

10 **Impact BIO-40: Periodic Effects of Inundation of Nonlisted Vernal Pool Invertebrates’ Habitat** 11 **as a Result of Implementation of Conservation Components**

12 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect 0
13 to 4 acres of modeled habitat for nonlisted vernal pool invertebrates (Table 12-1B-15). There would
14 be no periodic effects from *CM5 Seasonally Inundated Floodplain Restoration*.

15 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the
16 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,
17 periodic inundation could affect nonlisted vernal pool invertebrates occupying areas ranging from 0
18 acres of habitat during most notch flows to an estimated 4 acres during a notch flow of 6,000 cfs.
19 BDCP-associated inundation of areas that would not otherwise have been inundated is expected to
20 occur in no more than 30% of all years, because Fremont Weir is expected to overtop the remaining
21 70% of all years, and during those years notch operations will not typically affect the maximum
22 extent of inundation. In more than half of all years under Existing Conditions, an area greater than
23 the BDCP-related inundation area already inundates in the bypass. Yolo Bypass flooding is expected
24 to have a minimal effect on nonlisted vernal pool invertebrates and would not be adverse.

25 **CEQA Conclusion:** Alternative 1B would periodically inundate at most 4 acres of nonlisted vernal
26 pool invertebrates’ habitat during the maximum flows over the Fremont Weir. The periodic
27 inundation is not anticipated to result in a conversion of nonlisted vernal pool invertebrates’ habitat
28 into different wetland habitat. BDCP-associated inundation of areas that would not otherwise have
29 been inundated is expected to occur in no more than 30% of all years, because Fremont Weir is
30 expected to overtop the remaining 70% of all years, and during those years notch operations will
31 not typically affect the maximum extent of inundation. In more than half of all years under Existing
32 Conditions, an area greater than the BDCP-related inundation area already inundates in the bypass.
33 Yolo Bypass flooding is expected to have a minimal effect on nonlisted vernal pool invertebrates and
34 would thus result in less-than-significant impacts on the species.

35 **Sacramento and Antioch Dunes Anthicid Beetles**

36 Potential habitat for Sacramento and Antioch Dunes anthicid beetles in the study area consists of the
37 inland dune scrub habitat at Antioch Dunes NWR, sand bars along the Sacramento and San Joaquin
38 Rivers, and sandy dredge spoil piles (California Department of Fish and Game 2006c and 2006d).

39 The construction, and operations and maintenance of the water conveyance facilities under
40 Alternative 1B would not likely affect Sacramento and Antioch Dunes anthicid beetles. The
41 construction of the water conveyance structure and associated infrastructure would generally avoid
42 affects to channel margins where sand bars are likely to form. Conveyance facilities construction

1 would not affect inland dune scrub habitat at Antioch Dunes NWR. No dredge spoil areas that could
2 potentially be occupied by Sacramento anthicid beetle were identified within conveyance facilities
3 footprints during a review of Google Earth imagery. Also, a review of the locations of the Alternative
4 1B water intake facilities on Google Earth imagery did not reveal any sandbars along the channel
5 margins. These portions of the Sacramento River have steep, riprap lined channel banks that are
6 likely not conducive to the formation of sandbars.

7 Implementation of BDCP restoration based conservation measures could affect habitat for
8 Sacramento and Antioch Dunes anthicid beetles. Both species are known to utilize interior sand
9 dunes and sandbar habitat. The only interior sand dune habitat within the Plan Area is at Antioch
10 Dunes, which would not be impacted by the Alternative 1B conservation measures. Both species are
11 known to occur along the Sacramento River and San Joaquin Rivers. The implementation of BDCP
12 restoration actions, and other covered activities could affect habitat for Sacramento and Antioch
13 Dunes anthicid beetles along channels throughout the Plan Area; however the extent of these
14 habitats in the Plan Area is unknown because these areas were not identified at the scale of mapping
15 done within the study area. Because of current and historic channel modifications (channel
16 straightening and dredging) and levee construction throughout the Delta, sandbar habitat is likely
17 very limited and restricted to channel margins. The implementation of *CM4 Tidal Natural*
18 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM6 Channel Margin*
19 *Enhancement* could impact sandbar habitat along the river channels and possibly sandy dredge piles
20 on Delta islands.

21 Over the term of the BDCP, Alternative 1B would likely result in beneficial effects on Sacramento and
22 Antioch Dunes anthicid beetles. The following Alternative 1B objectives would generally increase
23 opportunities for the formation of sandbars in the Plan Area.

- 24 ● Restore 10,000 acres of seasonally inundated floodplain (Objective L2.11, associated with CM5).
- 25 ● Enhance 20 miles of channel margin habitat (Objective L2.12, associated with CM6).
- 26 ● Restore 5,000 acres of riparian habitat, with at least 3,000 acres occurring on restored
27 seasonally inundated floodplain. (VFRNC1.1, associated with CM7).

28 These measures would improve shoreline conditions by creating benches along levees, shallow
29 habitat along margins and in floodplains, and increasing shoreline vegetation, all of which would
30 likely contribute to the formation of sandbars along Delta river channels where these measures
31 would be implemented. Increasing the structural diversity of Delta river channel margins and
32 floodplains would create opportunities for sand to be deposited and for sandbars to subsequently
33 form. As explained below, potential impacts on Sacramento and Antioch Dunes anthicid beetles
34 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-17. Changes in Sacramento Anthicid Beetle and Antioch Dunes Anthicid Beetle**
2 **Habitat Associated with Alternative 1B (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2-CM18	0	0	0	0	0	0
	0	0	0	0	0	0
Total Impacts CM2-CM18	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-41: Loss or Conversion of Habitat for and Direct Mortality of Sacramento and**
5 **Antioch Dunes Anthicid Beetles**

6 Implementation of Alternative 1B conservation measures could potentially affect Sacramento and
7 Antioch Dunes anthicid beetles and their habitat. As mentioned above, the extent of this habitat in
8 the study area is unknown but it is assumed that sand bars likely occur along to some degree along
9 the Sacramento and San Joaquin Rivers and that some islands in the Delta may contain sandy dredge
10 spoil piles. A 2012 review of Google Earth imagery of the north Delta did identify three general areas
11 that appear to have accumulations of sandy soils (with some vegetation), possibly from dredge
12 disposal, are Decker Island, the western portion of Bradford Island, and the southwestern tip of
13 Grand Island. A review of Google Earth imagery of the south Delta did identify sandbar habitat along
14 the San Joaquin River from the southern end of the Plan Area downstream to an area just west of
15 Lathrop. An additional area along Paradise Cut was identified just north of I-5. Conservation
16 measures that could result in impacts on Sacramento and Antioch Dunes anthicid beetles are tidal
17 natural communities restoration (CM4), seasonally inundated floodplain restoration (CM5), and
18 channel margin enhancement (CM6). In addition, maintenance activities associated with the long-
19 term operation of the water conveyance facilities and other BDCP physical facilities could degrade
20 or eliminate habitat for Sacramento and Antioch Dunes anthicid beetles. Each of these individual
21 activities is described below. A summary statement of the combined impacts and NEPA and CEQA
22 conclusions follows the individual conservation measure discussions.

- 23 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration could
24 potentially impact the areas of sandy soils identified from aerial photographs on Decker Island,
25 the western portion of Bradford Island, and on the southwestern tip of Grand Island because

1 these areas fall within the West Delta Restoration Opportunity Area (ROA). The West Delta ROA
2 has been identified in the BDCP (BDCP Chapter 3, *Conservation Strategy*, Section 3.4.4) as
3 providing opportunities for creating subtidal aquatic and tidal marsh habitats. The methods and
4 techniques identified in BDCP Chapter 3, Section 3.4.4.3.3 that may be used for tidal restoration
5 include the recontouring of lands so that they have elevations suitable for the establishment of
6 marsh plains and the eventual breaching of levees. There are three CNDDDB records of
7 Sacramento anthicid beetle (just north of Rio Vista, one just south of Rio Vista along the west
8 shore of the Sacramento River, and one on Grand Island) and one CNDDDB record of Antioch
9 Dunes anthicid beetle (just north of Rio Vista) that fall within the West Delta ROA (California
10 Department of Fish and Wildlife 2013). Tidal restoration actions in the West Delta ROA may
11 eliminate potential habitat and impact occupied habitat of both Sacramento and Antioch Dunes
12 anthicid beetles.

- 13 ● *CM5 Seasonally Inundated Floodplain Restoration*: Seasonally inundated floodplain restoration
14 could potentially impact areas with sandbars that were identified in a review of aerial
15 photographs. The sandbars identified along the San Joaquin River and Paradise Cut are within
16 the conceptual corridors (Corridors 1a, 1b, 2a, and 4) identified in Figure 3.4-20 of the BDCP.
17 There are four CNDDDB records for Sacramento anthicid beetle in the conceptual corridor along
18 the San Joaquin River (California Department of Fish and Wildlife 2013). Floodplain restoration
19 actions in these conceptual corridors could impact potential habitat for both these species and
20 occupied habitat of Sacramento anthicid beetle.
- 21 ● *CM6 Channel Margin Enhancement*: Channel margin enhancement could result in impacts on 20
22 miles of channel margin that could contain sandbars.

23 The following paragraphs summarize the combined effects discussed above and describe other
24 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
25 also included.

26 The BDCP could result in substantial affects to Sacramento and Antioch Dunes anthicid beetles
27 because all of the habitat identifiable from aerial photo review falls within either the West Delta
28 ROA, which is being considered for tidal restoration (CM4), or within three of the conceptual
29 corridors being considered for floodplain restoration (CM5). Furthermore, all seven of the records
30 for Sacramento anthicid beetle within the study area fall within areas being considered for
31 restoration (CM4 and CM5), which represent over half of the extant records for this species range
32 wide (7 of 13), and the only extant record for Antioch Dunes anthicid beetle, which represent one of
33 five extant records range wide, falls within the West Delta ROA that is just north of Rio Vista. These
34 occurrences could be affected by restoration if these areas are chosen as restoration projects.
35 However, over the term of the BDCP, implementation of conservation components would likely
36 benefit Sacramento and Antioch Dunes anthicid beetles. Alternative 1B conservation measures CM5,
37 CM6, and CM7, would generally contribute to the formation of sandbar habitat in the Plan Area.
38 These measures would improve shoreline conditions by creating benches along levees (CM6),
39 creating shallow margin and floodplain habitat (CM5), and increasing shoreline vegetation (CM7),
40 all of which would likely contribute to the formation of sandbars along Delta river channels where
41 these measures would be implemented. Increasing the structural diversity of Delta river channel
42 margins would create areas of slow water that would allow for sand to be deposited and for
43 sandbars to subsequently form. Other factors relevant to effects on Sacramento and Antioch Dunes
44 anthicid beetles are listed below.

- 45 ● The actual extent of suitable and occupied habitat for these species in the plan is unknown.

- 1 • The sandbar habitat occupied by Sacramento anthicid beetle along the San Joaquin River would
2 likely not be directly impacted where floodplain restoration occurs because the physical
3 disturbance would be to adjacent levees and agricultural areas. Though these actions would
4 change hydrologic conditions that could overtime remove the existing sandbars, the expanded
5 floodplain would create conditions suitable for the formation of new and possibly larger
6 sandbars.
- 7 • Floodplain restoration would be phased over a period of 30 years so that not all sandbar habitat
8 within these areas would be affected at once. Furthermore, as floodplain restoration is being
9 implemented new sandbar habitat would likely be forming prior and/or concurrent with future
10 floodplain restoration projects that may affect sandbar habitat on the San Joaquin River and/or
11 Paradise Cut.

12 **NEPA Effects:** In the absence of other conservation actions, the potential effects on Sacramento and
13 Antioch Dunes anthicid beetles associated with Alternative 1B would represent an adverse effect as
14 a result of habitat modification of a special-status species and potential for direct mortality.
15 However, with implementation of restoration associated with CM5, CM6, and CM7, which would be
16 phased throughout the construction phase, the effects of Alternative 1B as a whole on Sacramento
17 and Antioch Dunes anthicid beetles would not be adverse under NEPA.

18 **CEQA Conclusion:** Alternative 1B would impact Sacramento and Antioch Dunes anthicid beetles
19 habitat and could potentially impact seven occurrences of Sacramento anthicid beetle and one
20 occurrence of Antioch Dunes anthicid beetle. However, over the term of the BDCP, implementation
21 of conservation components would likely benefit Sacramento and Antioch Dunes anthicid beetles.
22 BDCP conservation components, particularly conservation measures CM5, CM6, and CM7, would
23 generally contribute to the formation of sandbar habitat in the Plan Area. Floodplain restoration
24 (CM5) would be phased over a period of 30 years so that not all sandbar habitat within these areas
25 would be affected at once. Furthermore, as floodplain restoration is being implemented new
26 sandbar habitat would likely be forming prior and/or concurrent with future floodplain restoration
27 projects that may affect sandbar habitat on the San Joaquin River and/or Paradise Cut.

28 Considering that floodplain (CM5), channel margin enhancement (CM6), and riparian restoration
29 (CM7) would contribute to the replacement of and possible expansion of sandbar habitat in the
30 Delta and be phased throughout the time period when the impacts would be occurring, the
31 implementation of Alternative 1B as a whole would not result in a substantial adverse effect though
32 habitat modification and would not substantially reduce the number or restrict the range of these
33 species. Therefore, the alternative would have a less-than significant impact on Sacramento and
34 Antioch Dunes anthicid beetles.

35 **Delta Green Ground Beetle**

36 Suitable habitat in the study area would be vernal pool complexes and annual grasslands in the
37 general Jepson Prairie area. The construction, and operations and maintenance of the water
38 conveyance facilities under Alternative 1B would not affect delta green ground beetle because the
39 facilities and construction area are outside the known range of the species. Implementation of
40 Alternative 1B could potentially affect delta green ground beetle through the protection of
41 grasslands and vernal pool complex (CM3) in the vicinity of Jepson Prairie and the subsequent
42 implementation of habitat enhancement and management actions and recreational trail
43 construction (CM11) in these areas. In addition, tidal natural communities restoration (CM4) and
44 vernal pool and alkali seasonal wetland complex restoration (CM9) could result in potential impacts

on delta green ground beetle and its habitat. Full implementation of Alternative 1B would likely result in beneficial effects on delta green ground beetle through the following conservation actions.

- Protect 2,000 acres of grassland in CZ 1 (Objective GNC1.1, associated with CM3).
- Protect 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective VPNC1.1, associated with CM3).
- Restore up to 67 acres of vernal pool complex in CZs 1, 8, and/or 11 (Objective VPNC1.2, associated with CM9).

These areas could contain currently occupied habitat for delta green ground beetle and/or create conditions suitable for eventual range expansion. As explained below, potential impacts on delta green ground beetle would be adverse for NEPA purposes and would be significant for CEQA purposes. Mitigation Measure BIO-42 would reduce the effects under NEPA and reduce the impacts to a less-than-significant level under CEQA.

Table 12-1B-18. Changes in Delta Green Ground Beetle Habitat Associated with Alternative 1B (acres)^a

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2-CM18	0	0	0	0	0	0
	0	0	0	0	0	0
Total Impacts CM2-CM18	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-42: Loss or Conversion of Habitat for and Direct Mortality of Delta Green Ground Beetle

Alternative 1B conservation measures could result in the conversion of habitat for and direct mortality of delta green ground beetle. Conservation measures that could affect delta green ground beetle are tidal natural communities habitat restoration (CM4), vernal pool and alkali seasonal wetland complex restoration (CM9), and habitat enhancement and management activities (CM11) in CZ 1. CZ 1 is the only portion of the Plan Area that contains occupied and potential habitat for delta

1 green ground beetle. The range of the delta green ground beetle is currently believed to be generally
2 bound by Travis Air Force Base to the west, Highway 113 to the east, Hay Road to the north, and
3 Creed Road to the south (Arnold and Kavanaugh 2007; U.S. Fish and Wildlife Service 2009a). Further
4 discussion of this potential effect is provided below, and NEPA and CEQA conclusions follow.

- 5 • *CM4 Tidal Natural Communities Restoration*: Tidal restoration in the Cache Slough ROA could
6 result in the loss of delta green ground beetle habitat if restoration is planned in areas known to
7 be or potentially occupied by the species. CM4 identifies at least 5,000 acres of freshwater tidal
8 natural communities restoration in the Cache Slough ROA and Lindsey Slough and Calhoun Cut
9 have been identified as areas suitable for restoration. Lindsey Slough is just east of Jepson
10 Prairie, and Calhoun Cut, which is off of Lindsey Slough (see Figure 12-1), goes into the general
11 Jepson Prairie area and is adjacent to areas of potential habitat for delta green ground beetle.
12 The tidal restoration methods and techniques identified in CM4 (see BDCP Chapter 3, Section
13 3.4.4.3.3) includes excavating channels; modifying ditches, cuts, and levees to encourage tidal
14 circulation; and scalping higher elevation areas to create marsh plains. These disturbances could
15 affects delta green ground beetle through habitat modification, either directly or indirectly
16 through hydrologic modifications, and/or result in direct mortality to the species. No CNDDDB
17 records for delta green ground beetle are intersected by the hypothetical tidal restoration
18 footprints being used by the BDCP.
- 19 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Vernal pool restoration may
20 occur in CZ 1 and could result in disturbance to delta green ground beetle habitat if restoration
21 is planned in areas known to be or potentially occupied by the species. These restoration
22 activities would most likely take place in areas that were historically vernal pool complexes that
23 have since been highly degraded, but which are suitable for vernal pool restoration. These areas
24 would not likely provide habitat for delta green ground beetle. However, if these activities do
25 take place in suitable habitat, then disturbances could result in direct mortality of the species.
26 Still, restoration ultimately would expand habitat available to the species.
- 27 • *CM11 Natural Communities Enhancement and Management*: As described in *CM3 Natural*
28 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in
29 CZ 1 and a portion of the 600 acres of protection and possibly some of the up to 10 wetted acres
30 of vernal pool restoration could also occur in CZ 1. Potential effects from CM11 could include
31 direct mortality to larvae and adults from the implementation of grassland management
32 techniques, which may include livestock grazing, prescribed burning, and mowing. In addition to
33 these grassland and vernal pool complex management actions, CM11 also includes guidelines
34 and techniques for invasive plant control, which may include manual control (hand-pulling and
35 digging), mechanical control (large equipment), and chemical control, though some of these
36 methods would be restricted in areas where rare plants occur or in critical habitat for vernal
37 pool species. The creation of new recreation trails as part of CM11 would result in impacts on
38 15.5 acres of grasslands within CZ 1, which could affect delta green ground beetle if present.

39 **NEPA Effects:** The protection of 2,000 acres of grassland in CZ 1 (CM3) and the protection of 600
40 acres of vernal pool complex and up 10 wetted acres of vernal pool complex restoration, some of
41 which could occur in CZ 1 (CM3 and CM9), could benefit delta green ground beetle if these areas
42 occur within the range of the species. Tidal natural communities restoration (CM4), vernal pool and
43 alkali seasonal wetland complex restoration (CM9), and recreational trail construction and
44 subsequent enhancement and management actions (CM11) could impact delta green ground
45 beetle. The management of these grasslands and vernal pool complexes according to *CM11 Natural*
46 *Communities Enhancement and Management* and the construction of recreational trails in CZ 1 has a

1 potential to affect this species. *AMM37 Recreation* would ensure that new trails in vernal pool
2 complexes are sited at least 250 feet from wetland features, or closer if site-specific information
3 indicates that local watershed surrounding a vernal pools would not be adversely affected. Direct
4 mortality and/or the affects on delta green ground beetle habitat would be an adverse effect under
5 NEPA. Mitigation Measure BIO-42, *Avoid Impacts on Delta Green Ground Beetle and its Habitat*, would
6 be available to reduce this effect.

7 **CEQA Conclusion:** The implementation of grassland and vernal pool complex protection (CM3), tidal
8 natural communities restoration (CM4), vernal pool and alkali seasonal wetland complex
9 restoration (CM9), recreational trail construction, and subsequent enhancement and management
10 actions (CM11) could potentially impact delta green ground beetle. Tidal restoration projects
11 around Calhoun Cut and possibly Lindsey Slough could affect habitat and result in direct mortality of
12 the species from excavating channels; modifying ditches, cuts, and levees to encourage tidal
13 circulation; and scalping higher elevation areas to create marsh plains. Potential impacts from CM11
14 could include direct mortality of larvae and adults resulting from the implementation of recreation
15 trail construction in 15.5 acres of grassland in CZ 1 and from grassland management techniques,
16 which may include livestock grazing, prescribed burning, and mowing. AMM37 would ensure that
17 new trails in vernal pool complexes are sited at least 250 feet from wetland features, or closer if site-
18 specific information indicates that local watershed surrounding a vernal pools is not adversely
19 affected. CM11 also includes guidelines and techniques for invasive plant control, which may include
20 manual control (hand-pulling and digging), mechanical control (large equipment), and chemical
21 control, though some of these methods would be restricted in areas where rare plants occur and in
22 critical habitat for vernal pool species. These actions could result in adverse effects through habitat
23 modification and a possible reduction in the number of the species or restrict its range, and,
24 therefore, could result in significant impacts on delta green ground beetle. Implementation of
25 Mitigation Measure BIO-42, *Avoid Impacts on Delta Green Ground Beetle and its Habitat*, would
26 reduce these potential impacts to a less-than-significant level.

27 **Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat**

28 As part of the design and development of management plans for conservation areas in the area
29 of Jepson Prairie, BDCP proponents will implement the following measures to avoid effects on
30 delta green ground beetle.

- 31 ● If habitat restoration or protection is planned for the lands adjacent to Calhoun Cut and
32 noncultivated lands on the western side of Lindsey Slough, these area will be evaluated by a
33 USFWS approved biologist for potential delta green ground beetle habitat (large playa pools,
34 or other similar aquatic features, with low growing vegetation or bare soils around the
35 perimeter). The biologist will have previous experience with identifying suitable habitat
36 requirements for delta green ground beetle.
- 37 ● Any suitable habitat identified by the biologist (with previous experience with delta green
38 ground beetle) within the species current range will be considered potentially occupied and
39 all ground disturbing covered activities in these areas will be avoided, which for the Plan
40 Area is generally the area west of State Route 113.
- 41 ● Any other areas identified as suitable habitat outside of the current range of the species will
42 be surveyed by a biologist with previous experience in surveying for and identifying delta
43 green ground beetle. No ground disturbing covered activities will occur in areas identified as
44 occupied by delta green ground beetle.

- 1 • Based on the results of the habitat evaluations and surveys, site-specific restoration and
2 management plans will be developed so that they don't conflict with the recovery goals for
3 delta green ground beetle in the USFWS's 2005 Recovery Plan for Vernal Pool Ecosystems of
4 California and Southern Oregon (U.S. Fish and Wildlife Service 2005). Plans will include
5 measures to protect and manage for delta green ground beetle so that they continue to
6 support existing populations or allow for future colonization.

7 **Callippe Silverspot Butterfly**

8 Suitable habitats for callippe silverspot butterfly are typically in areas influenced by coastal fog with
9 hilltops that support the specie's host-plant, Johnny jump-ups. Preferred nectar flowers used by
10 adults include thistles, blessed milk thistle, and coyote wild mint. Other native nectar sources
11 include hairy false goldenaster, coast buckwheat, mourning bride, and California buckeye. The
12 construction, and operations and maintenance of the water conveyance facilities under Alternative
13 1B would not result in impacts on callippe silverspot butterfly or its habitat. If Cordelia Hills and
14 Potrero Hills are identified for grassland protection opportunities as part of *CM3 Natural*
15 *Communities Protection and Restoration*, the subsequent implementation of *CM11 Natural*
16 *Communities Enhancement and Management* could potentially affect callippe silverspot butterfly.
17 Callippe silverspot butterfly has been documented in the western most portion of the Plan Area (CZ
18 11) in the Cordelia Hills (Solano County Water Agency 2009). Potential habitat for the species
19 (grassy hills with *Viola pedunculata*) is present in the Potrero Hills, but it has not been observed
20 there (EDAW 2005, California Department of Fish and Wildlife 2013). Though CZ 11 has been
21 identified as potential area for grassland restoration in *CM8 Grassland Natural Community*
22 *Restoration*, the primary goal there is to restore small patches of grassland to connect to Jepson
23 Prairie and/or the restoration of upland grasses adjacent to tidal brackish emergent wetland in
24 Suisun Marsh, both of which would not be areas suitable for callippe silverspot butterfly. The full
25 implementation of Alternative 1B would protect up to 2,000 acres of grassland in CZ 11 (Objective
26 GNC1.1, associated with CM3), some of which may contain habitat for callippe silverspot butterfly.
27 As explained below, potential impacts on callippe silverspot would be adverse for NEPA purposes
28 and would be significant for CEQA purposes. Mitigation Measure BIO-43, *Avoid and Minimize Loss of*
29 *Callippe Silverspot Butterfly Habitat*, would reduce the effects under NEPA and reduce the impacts to
30 a less-than-significant level under CEQA.

1 **Table 12-1B-19. Changes in Callippe Silverspot Butterfly Habitat Associated with Alternative 1B**
2 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2-CM18	0	0	0	0	0	0
	0	0	0	0	0	0
Total Impacts CM2-CM18	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-43: Loss or Conversion of Habitat for and Direct Mortality of Callippe Silverspot**
5 **Butterfly**

6 Alternative 1B conservation measures could result in the conversion of habitat and/or direct
7 mortality to Callippe silverspot butterfly. Only one conservation measure was identified as
8 potentially affecting callippe silverspot butterfly, *CM11 Natural Communities Enhancement and*
9 *Management*, which could result in the disturbance of callippe silverspot butterfly habitat if such
10 areas are acquired as part of grassland protection under *CM3 Natural Communities Protection and*
11 *Restoration*. Further discussion of this potential effect is provided below and NEPA and CEQA
12 conclusions follow.

13 *CM11 Natural Communities Enhancement and Management*: As described in *CM3 Natural*
14 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in CZ
15 11. If areas chosen for protection include Cordelia Hills or Potrero Hills, where there is known and
16 potential habitat, respectively, then grassland enhancement and management actions could affect
17 the callippe silverspot butterfly. Potential effects from CM11 could include the loss of larval host and
18 nectar sources and direct mortality to larvae and adults from the installation of artificial nesting
19 burrows and structures and the implementation of grassland management techniques, which may
20 include livestock grazing, prescribed burning, and mowing. In addition to these grassland
21 management actions, CM11 also includes guidelines and techniques for invasive plant control, which
22 may include manual control (hand-pulling and digging), mechanical control (large equipment), and
23 chemical control. Several of the preferred nectar sources are thistles, some of which have been

1 identified by the California Invasive Plant Council as having limited to moderate ecological impacts
2 (California Invasive Plant Council 2006).

3 **NEPA Effects:** The protection of 2,000 acres of grassland within CZ 11 could benefit callippe
4 silverspot butterfly if these protected areas include occupied and potential habitat on the hill tops in
5 Cordelia Hills and Potrero Hills. The management of these grasslands according to CM11 has
6 potential to adversely affect this species. Direct mortality and/or the removal of larval host plants
7 and nectar sources for adults would be an adverse effect under NEPA. Implementation of Mitigation
8 Measure BIO-43, *Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat*, would ensure the
9 effect is not adverse.

10 **CEQA Conclusion:** If grasslands within the Cordelia Hills and Potrero Hills are protected as part of
11 *CM3 Natural Communities Protection and Restoration*, then the subsequent management of these
12 grasslands according to *CM11 Natural Communities Enhancement and Management* has the potential
13 to affect this species. Potential impacts from CM11 could include the loss of larval host and nectar
14 sources and direct mortality of larvae and adults resulting from the installation of artificial nesting
15 burrows and structures and the implementation of grassland management techniques, which may
16 include livestock grazing, prescribed burning, and mowing. In addition to these grassland
17 management actions, CM11 also includes guidelines and techniques for invasive plant control that
18 may include manual control (hand-pulling and digging), mechanical control (large equipment), and
19 chemical control, which could result in direct and indirect effects on larval host plants and nectar
20 plants. These actions could result in adverse effects through habitat modification and a possible
21 reduction in the number of the species or restrict its range and would, therefore, result in a
22 significant impact on the species. However, over the term of the BDCP, callippe silverspot butterfly
23 could benefit from the protection of occupied and potential habitat for the species with the
24 implementation of Mitigation Measure BIO-43, which would avoid and minimize effects from
25 management actions and reduce the potential impact to a less-than-significant level.

26 **Mitigation Measures BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly** 27 **Habitat**

28 As part of the development of site-specific management plans on protected grasslands in the
29 Cordelia Hills and/or Potrero Hills, BDCP proponents will implement the following measures to
30 avoid and minimize the loss of callippe silverspot habitat.

- 31 • Hilltops in Cordelia Hills and Potrero Hills will be surveyed for callippe silverspot larval host
32 plants (Johnny jump-ups) by a biologist familiar with identifying this plant species. These
33 surveys should occur during the plant's blooming period (typically early January through
34 April)
- 35 • If larval host plants are present, then presence/absence surveys for callippe silverspot
36 butterfly larvae will be conducted according to the most recent USFWS approved survey
37 methods by a biologist with previous experience in surveying for and identifying callippe
38 larvae and/or signs of larval presence. These surveys should be conducted prior to the adult
39 flight season, which usually starts in mid-May.
- 40 • If larvae are detected then no further surveys are necessary. If larvae are not detected then
41 surveys for adults will be conducted by a biologist familiar with surveying for and
42 identifying callippe silverspot. Surveys typically start in mid-May and continue weekly for 8
43 to 10 weeks.

- 1 • If callippe silverspot butterflies are detected, then the site-specific management plans will
2 be written to include measures to protect and manage for larval host plants and nectar
3 sources so that they continue to support existing populations and/or allow for future
4 colonization. Mapping of both larval host plants and nectar sources will be incorporated into
5 the management plans.

6 **California Red-Legged Frog**

7 Modeled California red-legged frog habitat in the study area is restricted to freshwater aquatic and
8 grassland habitat, and immediately adjacent cultivated lands along the study area's southwestern
9 edge in CZ 7, CZ 8, CZ 9, and CZ 11. Pools in perennial and seasonal streams and stock ponds provide
10 potential aquatic habitat for this species. While stock ponds are underrepresented as a modeled
11 habitat, none is expected to be affected by BDCP actions. Construction and restoration associated
12 with Alternative 1B conservation measures would result in both temporary and permanent losses of
13 California red-legged frog modeled habitat as indicated in Table 12-1B-20. Factors considered in
14 assessing the value of affected habitat for the California red-legged frog, to the extent that
15 information is available, are presence of limiting habitat (aquatic breeding habitat), known
16 occurrences and clusters of occurrences, proximity of the affected habitat to existing protected
17 lands, and the overall degraded or fragmented nature of the habitat. The study area represents the
18 extreme eastern edge of the species' coastal range, and species' occurrences are reported only from
19 CZ 8 and CZ 11. Full implementation of Alternative 1B would also include the following biological
20 objectives over the term of the BDCP to benefit the California red-legged frog (BDCP Chapter 3,
21 *Conservation Strategy*).

- 22 • Increase native species diversity and relative cover of native plant species, and reduce the
23 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11,
24 CM13, and CM20).
- 25 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 26 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic
27 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with
28 CM3)
- 29 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
30 CM11).
- 31 • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and
32 duration and suitable composition of vegetative cover to support breeding for covered
33 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

34 As explained below, with the restoration and protection of these amounts of habitat, in addition to
35 implementation of AMMs, impacts on California red-legged frog would not be adverse for NEPA
36 purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-20. Changes in California Red-Legged Frog Modeled Habitat Associated with**
2 **Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic	1	1	0	0	NA	NA
	Upland	5	5	154	154	NA	NA
Total Impacts CM1		6	6	154	154	NA	NA
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	8	24	0	0	0	0
Total Impacts CM2-CM18		8	24	0	0	0	0
TOTAL IMPACTS		14	30	154	154	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-44: Loss or Conversion of Habitat for and Direct Mortality of California Red-**
5 **Legged Frog**

6 Alternative 1B conservation measures would result in the permanent and temporary loss combined
7 of up to 1 acre of modeled aquatic habitat and 183 acres of modeled upland habitat for California
8 red-legged frog (Table 12-1B-20). There are no California red-legged frog occurrences that overlap
9 with the Plan footprint. Conservation measures that would result in these losses are conveyance
10 facilities and transmission line construction (CM1) and recreational facility construction for CM11.
11 Construction activities associated with the water conveyance facilities and recreational facilities,
12 including operation of construction equipment, could result in temporary effects on, as well as
13 injury and mortality of, California red-legged frogs. In addition, natural enhancement and
14 management activities (CM11), which include ground disturbance or removal of nonnative
15 vegetation, could result in local adverse habitat effects. In addition, maintenance activities
16 associated with the long-term operation of the water conveyance facilities and other BDCP physical
17 facilities could degrade or eliminate California red-legged frog habitat including injury and mortality
18 of California red-legged frogs. Each of these individual activities is described below. A summary
19 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual
20 conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B, including transmission line
22 construction, would result in the permanent loss of up to 1 acre of aquatic habitat and 5 acres of
23 upland habitat for California red-legged frog in CZ 8 (Table 12-1B-20). Permanent effects would
24 be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension and
25 installation of cross culverts, installation of structural hardscape, and installation and relocation

1 of utilities. Construction-related effects would temporarily disturb 154 acres of upland habitat
2 for the California red-legged frog (Table 12-1B-20).

- 3 • *CM11 Natural Communities Enhancement and Management*: Based on the recreation
4 assumptions described in BDCP Chapter 4, *Covered Activities and Associated Federal Actions*, an
5 estimated 24 acres of upland cover and dispersal habitat for the California red-legged frog
6 would be removed as a result of constructing trails and associated recreational facilities. Passive
7 recreation in the reserve system could result in trampling and disturbance of egg masses in
8 water bodies, degradation of water quality through erosion and sedimentation, and trampling of
9 sites adjacent to upland habitat used for cover and movement. However, *AMM37 Recreation*
10 requires protection of water bodies from recreational activities and requires trail setbacks from
11 wetlands. With these restrictions, recreation-related effects on California red-legged frog are
12 expected to be minimal.

13 Activities associated with natural communities enhancement and management in protected
14 California red-legged frog habitat, such as ground disturbance or herbicide use to control
15 nonnative vegetation, could result in local adverse habitat effects on, and injury or mortality of,
16 California red-legged frogs. These effects would be avoided and minimized with implementation
17 of the AMMs listed below. Herbicides would only be used in California red-legged frog habitat in
18 accordance with the written recommendation of a licensed, registered pest control advisor and
19 in conformance with label precautions and federal, state, and local regulations in a manner that
20 avoids or minimizes harm to the California red-legged frog.

- 21 • *Critical habitat*: Several conservation measures would be implemented in California red-legged
22 frog habitat and designated critical habitat in CZ 8 and CZ 11. Approximately 2,460 acres of
23 designated critical habitat for the California red-legged frog overlaps with the study area along
24 the western edge of CZ 11 in critical habitat unit SOL-1. An additional 862 acres of designated
25 critical habitat is also present along the western edge of CZ 8 in critical habitat unit ALA-2.
26 Conservation actions to protect and enhance grassland habitat for covered species, including
27 California red-legged frog, in CZ 8 could include acquisition and enhancement of designated
28 critical habitat for the California red-legged frog and California tiger salamander. Any habitat
29 enhancement actions for these species in designated critical habitat are expected to enhance the
30 value of any affected designated critical habitat for conservation of California red-legged frog.
31 These actions would result in an overall benefit to California red-legged frog within the study
32 area through protection and management of grasslands with associated intermittent stream
33 habitat and through restoration of vernal pool complex habitat and its associated grassland
34 habitat.
- 35 • *Operations and maintenance*: Ongoing water conveyance facilities operation and maintenance is
36 expected to have little if any adverse effect on the California red-legged frog. Postconstruction
37 operation and maintenance of the above-ground water conveyance facilities could result in
38 ongoing but periodic postconstruction disturbances that could affect California red-legged frog
39 use of the surrounding habitat. Operation of maintenance equipment, including vehicle use
40 along transmission corridors in CZ 8, could also result in injury or mortality of California red-
41 legged frogs if present in work sites. Implementation conservation actions described below and
42 AMM1–AMM6, AMM10, AMM14, and AMM37 would reduce these effects.
- 43 • *Injury and direct mortality*: Construction activities associated with the water conveyance
44 facilities, vernal pool complex restoration, and habitat and management enhancement-related
45 activities, including operation of construction equipment, could result in injury or mortality of

1 California red-legged frogs. Breeding, foraging, dispersal, and overwintering behavior may be
2 altered during construction activities, resulting in injury or mortality of California red-legged
3 frog. Frogs occupying burrows could be trapped and crushed during ground-disturbing
4 activities. Degradation and loss of estivation habitat is also anticipated to result from the
5 removal of vegetative cover and collapsing of burrows. Injury or mortality would be avoided and
6 minimized through implementation of seasonal constraints and preconstruction surveys in
7 suitable habitat, collapsing unoccupied burrows, and relocating frogs outside of the construction
8 area as described in AMM1–AMM6, AMM10, AMM14, and AMM37.

9 The following paragraphs summarize the combined effects discussed above and describe other
10 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
11 also included.

12 ***Near-Term Timeframe***

13 Because the water conveyance facility construction (CM1) is being evaluated at the project level, the
14 near-term BDCP conservation strategy has been evaluated to determine whether it would provide
15 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
16 conveyance facilities construction would not be adverse under NEPA.

17 Alternative 1B would permanently remove approximately 1 acre of aquatic habitat and 167 acres of
18 upland terrestrial cover habitat for California red-legged frog. The effects would result from
19 construction of the water conveyance facilities (CM11, 60 acres) and recreational facilities (CM11, 8
20 acres).

21 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
22 and that are identified in the biological goals and objectives for California’s red-legged frog in
23 Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and
24 2:1 for protection of grassland habitats. Using these ratios would indicate that 1 acre of aquatic
25 habitat should be restored, 1 acre of aquatic habitat should be protected, and 334 acres of grassland
26 should be protected for California red-legged frog to mitigate the near-term losses.

27 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area
28 (Table 3-4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8, west of Byron
29 Highway, would benefit California red-legged frog by providing habitat in the portion of the Plan
30 Area with the highest long-term conservation value for the species based on known species
31 occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with Objective
32 GNC1.3, ponds and other aquatic features within the grasslands would be protected to provide
33 aquatic habitat for this species, and surrounding grassland would provide dispersal and aestivation
34 habitat which would compensate for the loss of 1 acre of aquatic habitat. In addition, aquatic
35 features in grasslands would be maintained and enhanced to provide suitable inundation depth and
36 duration to support breeding habitat for covered amphibians (Objective GNC2.5).

37 These conservation actions would occur in the same timeframe as the construction losses, thereby
38 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives
39 represent performance standards for considering the effectiveness of CM3 protection and
40 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
41 and the additional detail in the biological objectives for California red-legged frog satisfy the typical
42 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-
43 term effects of the other conservation measures.

1 The plan also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM10 Restoration of Temporarily Affected*
5 *Natural Communities, AMM14 California Red-Legged Frog, and AMM37 Recreation.* These AMMs
6 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
7 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
8 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
9 EIR/EIS.

10 **Late Long-Term Timeframe**

11 The habitat model indicates that the study area supports approximately 159 acres of aquatic and
12 7,766 acres of upland habitat for California red-legged frog. Alternative 1B as a whole would result
13 in the permanent loss of and temporary effects on 1 acre of aquatic habitat and 183 acres of upland
14 habitat for California red-legged frog for the term of the plan (less than 1% of the total aquatic
15 habitat in the study area and 2% of the total upland habitat in the study area). The 1 acre of aquatic
16 habitat that would be permanently lost is not known to be used for breeding. Most of the California
17 red-legged frog upland habitat that would be removed consists of naturalized grassland or
18 cultivated land in a highly disturbed or modified setting on lands immediately adjacent to Clifton
19 Court Forebay. The removed upland cover and dispersal habitat is within 0.5 mile of a cluster of
20 known California red-legged frog occurrences to the west. However, this habitat consists mostly of
21 cultivated lands and small patches of grasslands, and past and current surveys in this area have not
22 found any evidence that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta*
23 *Conservation Plan EIR/EIS Environmental Data Report*).

24 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
25 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would
26 benefit the California red-legged frog by providing habitat in the portion of the study area with the
27 highest long-term conservation value for the species based on known species occurrences and large,
28 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other
29 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,
30 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in
31 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation
32 depth and duration and suitable composition of vegetative cover to support breeding California red-
33 legged frogs (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and other
34 measures would be implemented as described in CM11 to promote growth of aquatic vegetation
35 with appropriate cover characteristics favorable to California red-legged frogs. Lands protected in
36 CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP* and the
37 extensive Los Vaqueros watershed lands, including grassland areas supporting this species. This
38 objective would ensure that California red-legged frog upland and associated aquatic habitats would
39 be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat within
40 and adjacent to the Plan Area.

41 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
42 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
43 restoration of tidal freshwater emergent wetland, grassland, valley/foothill riparian, and vernal pool
44 complex that could overlap with the species model, would result in the restoration of 16 acres of
45 aquatic and 351 acres of upland modeled habitat for California red-legged frog. In addition,

1 protection of managed wetland, grassland, valley/foothill riparian, and vernal pool complex could
2 overlap with the species model and would result in the protection of 3 acres of aquatic and 1,047
3 acres of upland California red-legged frog modeled habitat.

4 **NEPA Effects:** In the near-term, the loss of California red-legged frog habitat under Alternative 1B
5 would be not be adverse because the BDCP has committed to protecting and restoring the acreage
6 required to meet the typical mitigation ratios described above. In the late long-term, the losses of
7 California red-legged frog aquatic and upland habitat associated with Alternative 1B, in the absence
8 of other conservation actions, would represent an adverse effect as a result of habitat modification
9 and potential direct mortality of a special-status species. However, with habitat protection and
10 restoration associated with the conservation components, guided by landscape-scale goals and
11 objectives and by AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative 1B as a
12 whole on California red-legged frog would not be adverse.

13 **CEQA Conclusion:**

14 **Near-Term Timeframe**

15 Because the water conveyance facility construction is being evaluated at the project level, the near-
16 term BDCP conservation strategy has been evaluated to determine whether it would provide
17 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impact of
18 conveyance facilities construction would be less than significant under CEQA.

19 Alternative 1B would permanently remove approximately 1 acre of aquatic habitat and 167 acres of
20 upland terrestrial cover habitat for California red-legged frog. The effects would result from
21 construction of the water conveyance facilities (CM11, 60 acres) and recreational facilities (CM11, 8
22 acres).

23 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
24 and that are identified in the biological goals and objectives for California's red-legged frog in
25 Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and
26 2:1 for protection of grassland habitats. Using these ratios would indicate that 1 acre of aquatic
27 habitat should be restored, 1 acre of aquatic habitat should be protected, and 334 acres of grassland
28 should be protected for California red-legged frog to mitigate the near-term losses.

29 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area
30 (Table 3-4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8, west of Byron
31 Highway, would benefit California red-legged frog by providing habitat in the portion of the Plan
32 Area with the highest long-term conservation value for the species based on known species
33 occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with Objective
34 GNC1.3, ponds and other aquatic features within the grasslands would be protected to provide
35 aquatic habitat for this species, and surrounding grassland would provide dispersal and aestivation
36 habitat which would compensate for the loss of 1 acre of aquatic habitat. In addition, aquatic
37 features in grasslands would be maintained and enhanced to provide suitable inundation depth and
38 duration to support breeding habitat for covered amphibians (Objective GNC2.5).

39 These conservation actions would occur in the same timeframe as the construction losses, thereby
40 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives
41 represent performance standards for considering the effectiveness of CM3 protection and
42 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
43 and the additional detail in the biological objectives for California red-legged frog satisfy the typical

1 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-
2 term effects of the other conservation measures.

3 The BDCP also contains commitments to implement AMM1-AMM6, AMM10, AMM14, and AMM37.
4 These AMMs include elements that avoid or minimize the risk of affecting individuals and species
5 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
6 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
7 *AMMs, and CMs*, of the Final EIR/EIS. These commitments are more than sufficient to support the
8 conclusion that the near-term effects of Alternative 1B on California red-legged frog would be less
9 than significant, because the number of acres required to meet the typical ratios described above
10 would be only 1 acre of aquatic habitat restored, 1 acre of aquatic habitat protected, and 183 acres
11 of upland communities protected.

12 ***Late Long-Term Timeframe***

13 The habitat model indicates that the study area supports approximately 159 acres of aquatic and
14 7,766 acres of upland habitat for California red-legged frog. Alternative 1B as a whole would result
15 in the permanent loss of and temporary effects on 1 acre of aquatic habitat and 183 acres of upland
16 habitat for California red-legged frog for the term of the plan (less than 1% of the total aquatic
17 habitat in the study area and 2% of the total upland habitat in the study area). The 1 acre of aquatic
18 habitat that would be permanently lost is not known to be used for breeding. Most of the California
19 red-legged frog upland habitat that would be removed consists of naturalized grassland or cultivated
20 land in a highly disturbed or modified setting on lands immediately adjacent to Clifton Court Forebay.
21 The removed upland cover and dispersal habitat is within 0.5 mile of a cluster of known California
22 red-legged frog occurrences to the west. However, this habitat consists mostly of cultivated lands
23 and small patches of grasslands, and past and current surveys in this area have not found any
24 evidence that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
25 *EIR/EIS Environmental Data Report*).

26 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
27 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would
28 benefit the California red-legged frog by providing habitat in the portion of the study area with the
29 highest long-term conservation value for the species based on known species occurrences and large,
30 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other
31 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,
32 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in
33 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation
34 depth and duration and suitable composition of vegetative cover to support breeding California red-
35 legged frogs (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and other
36 measures would be implemented as described in CM11 to promote growth of aquatic vegetation
37 with appropriate cover characteristics favorable to California red-legged frogs. Lands protected in
38 CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP* and the
39 extensive Los Vaqueros Watershed lands, including grassland areas supporting this species. This
40 objective would ensure that California red-legged frog upland and associated aquatic habitats would
41 be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat within
42 and adjacent to the Plan Area.

43 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
44 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the

1 restoration of tidal freshwater emergent wetland, grassland, valley/foothill riparian, and vernal pool
2 complex that could overlap with the species model, would result in the restoration of 16 acres of
3 aquatic and 351 acres of upland modeled habitat for California red-legged frog. In addition,
4 protection of managed wetland, grassland, valley/foothill riparian, and vernal pool complex could
5 overlap with the species model and would result in the protection of 3 acres of aquatic and 1,047
6 acres of upland California red-legged frog modeled habitat.

7 In the absence of other conservation actions, the losses of California red-legged frog aquatic and
8 upland habitat associated with Alternative 1B would represent an adverse effect as a result of
9 habitat modification and potential direct mortality of a special-status species. However, with habitat
10 protection and restoration associated with the conservation components, guided by landscape-scale
11 goals and objectives and by AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative
12 1B would be less than significant.

13 **Impact BIO-45: Indirect Effects of Plan Implementation on California Red-Legged Frog**

14 Noise and visual disturbance including artificial nighttime lighting outside the project footprint but
15 within 500 feet of construction activities are indirect effects that could temporarily affect the use of
16 California red-legged frog habitat, all of which is upland cover and dispersal habitat. The areas to be
17 affected are near Clifton Court Forebay, and no California red-legged frogs were detected during
18 recent surveys conducted in this area (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
19 *EIR/EIS Environmental Data Report*).

20 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment
21 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability
22 of California red-legged frog habitat downstream of the construction area by filling in pools and
23 smothering eggs. Accidental spills of toxic fluids also could result in the subsequent loss of California
24 red-legged frog if these materials enter the aquatic system. Hydrocarbon and heavy metal pollutants
25 associated with roadside runoff also have the potential to enter the aquatic system, affecting water
26 quality and California red-legged frog.

27 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM14, and AMM37 as part of
28 implementing Alternative 1B would avoid the potential for substantial adverse effects on California
29 red-legged frogs, either indirectly or through habitat modifications. These AMMs would also avoid
30 and minimize effects that could substantially reduce the number of California red-legged frogs, or
31 restrict the species' range. Therefore, the indirect effects of Alternative 1B would not have an
32 adverse effect on California red-legged frog.

33 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance, as well
34 as construction-related noise and visual disturbances including artificial nighttime lighting, could
35 impact California red-legged frog in aquatic and upland habitats. The use of mechanical equipment
36 during construction could cause the accidental release of petroleum or other contaminants that
37 could impact California red-legged frog or its prey. The inadvertent discharge of sediment or
38 excessive dust adjacent to California red-legged frog habitat could also have a negative impact on the
39 species or its prey. With implementation of AMM1–AMM6, AMM10, AMM14, and AMM37,
40 construction, operation, and maintenance under Alternative 1B would avoid the potential for
41 substantial adverse effects on California red-legged frog, either indirectly or through habitat
42 modifications, and would not result in a substantial reduction in numbers or a restriction in the
43 range of California red-legged frogs. The indirect effects of Alternative 1B would have a less-than-
44 significant impact on California red-legged frogs.

1 **California Tiger Salamander**

2 Modeled California tiger salamander habitat in the study area contains two habitat types: terrestrial
3 cover and aestivation habitat, and aquatic breeding habitat and is restricted to CZ 1, CZ 2, CZ 4, CZ 5,
4 CZ 7, CZ 8, and CZ 11 (Figure 12-14). Modeled terrestrial cover and aestivation habitat contains all
5 grassland types and alkali seasonal wetland with a minimum patch size of 100 acres and within a
6 geographic area defined by species records and areas most likely to support the species. Patches of
7 grassland that were below the 100-acre minimum patch size but were contiguous with grasslands
8 outside of the study area boundary were included. Modeled aquatic breeding habitat for the
9 California tiger salamander includes vernal pools and seasonal and perennial ponds.

10 Factors considered in assessing the value of affected habitat for California tiger salamander, to the
11 extent that information is available, include presence of limiting habitat (aquatic breeding habitat),
12 known occurrences and clusters of occurrences, proximity of the affected habitat to existing
13 protected lands, and the overall degraded or fragmented nature of the habitat. While conservation
14 measures implemented in other CZs could have potential effects on California tiger salamander,
15 those activities in CZ 8 and CZ 11 are considered to have a proportionately larger effect due to their
16 closer proximity to known occurrences of the species.

17 Alternative 1B is expected to result in the temporary, permanent, and periodic removal of upland
18 habitat that California tiger salamander uses for cover and dispersal (Table 12-1B-21). Potential
19 aquatic habitat for this species would not be affected. While stock ponds are underrepresented as a
20 modeled habitat, none is expected to be affected by BDCP actions. Full implementation of Alternative
21 1B would also include the following biological objectives over the term of the BDCP to benefit the
22 California tiger salamander (BDCP Chapter 3, *Conservation Strategy*).

- 23 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
24 between existing conservation lands (Objective L1.6, associated with CM3).
- 25 ● Increase native species diversity and relative cover of native plant species, and reduce the
26 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 27 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to
28 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
29 associated with CM3, CM8, and CM11).
- 30 ● Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
31 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 32 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali
33 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).
- 34 ● Increase burrow availability for burrow-dependent species in grasslands surrounding alkali
35 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective
36 ASWNC2.3, associated with CM11).
- 37 ● Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and CZ 11, primarily in core
38 vernal pool recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of
39 California and Southern Oregon* (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,
40 associated with CM3).
- 41 ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool acreage
42 (up to 67 acres of vernal pool complex restoration, assuming that all anticipated impacts [10

wetted acres] occur and that the restored vernal pool complex has 15% density of vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).

- Increase the size and connectivity of protected vernal pool complex within the Plan Area and increase connectivity with protected vernal pool complex adjacent to the Plan Area (Objective VPNC1.3, associated with CM3).
- Protect the range of inundation characteristics that are currently represented by vernal pools throughout the Plan Area (Objective VPNC1.4, associated with CM3).
- Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective GNC1.2, associated with CM3 and CM8).
- Protect stock ponds and other aquatic features within protected grasslands to provide aquatic breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with CM3).
- Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with CM11).
- Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and duration and suitable composition of vegetative cover to support breeding for covered amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

As explained below, with the restoration or protection of these amounts of habitat, in addition to the implementation of AMMs, impacts on California tiger salamander would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1B-21. Changes in California Tiger Salamander Modeled Habitat Associated with Alternative 1B (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic	0	0	0	0	NA	NA
	Upland	13	13	154	154	NA	NA
Total Impacts CM1		13	13	154	154	NA	NA
CM2–CM18	Aquatic	0	0	0	0	0	0
	Upland	292	634	0	0	191–639	0
Total Impacts CM2–CM18		292	634	0	0	191–639	0
TOTAL IMPACTS		305	647	154	154	191–639	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-46: Loss or Conversion of Habitat for and Direct Mortality of California Tiger**
2 **Salamander**

3 Alternative 1B conservation measures would result in the permanent and temporary loss combined
4 of up to 801 acres of modeled upland habitat for California tiger salamander (Table 12-1B-21).
5 There are no California tiger salamander occurrences that overlap with the Plan footprint.
6 Conservation measures that would result in these losses are conveyance facilities and transmission
7 line construction, and establishment and use of RTM, borrow, and spoils areas (CM1), Fremont
8 Weir/Yolo Bypass improvements (CM2), tidal natural community restoration (CM4), construction of
9 recreational facilities (CM11), and construction of a conservation fish hatchery (CM18). Habitat
10 enhancement and management activities (CM11), which include ground disturbance or removal of
11 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities
12 associated with the long-term operation of the water conveyance facilities and other BDCP physical
13 facilities could degrade or eliminate California tiger salamander habitat. Each of these individual
14 activities is described below. A summary statement of the combined impacts and a NEPA effects and
15 a CEQA conclusion follows the individual conservation measure discussions.

- 16 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities,
17 including transmission lines, would result in the permanent loss of 13 acres of upland habitat
18 for California tiger salamander habitat, primarily in CZ 8 (Table 12-1B-21). Permanent effects
19 would be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension
20 and installation of cross culverts, installation of structural hardscape, and installation and
21 relocation of utilities. Construction-related effects would temporarily disturb 154 acres of
22 upland habitat for the California tiger salamander (Table 12-1B-21). The area that would be
23 affected by conveyance facilities construction is south of Clifton Court Forebay, where modeled
24 California tiger salamander habitat is of relatively low value in that it consists of fragmented
25 patches of primarily terrestrial habitat surrounded by actively cultivated lands. The highest
26 concentration of California tiger salamander occurrences are in CZ 8 and west of the conveyance
27 facilities alignment, while lands to the east consist primarily of actively cultivated lands that are
28 not suitable for the species. Habitat loss in this area is not expected to contribute to habitat
29 fragmentation or impede important California tiger salamander dispersal.
- 30 • *CM2 Yolo Bypass Fisheries Enhancement:* Improvements in the Yolo Bypass would result in the
31 permanent removal of approximately 42 acres of terrestrial cover and aestivation habitat for the
32 California tiger salamander in the late-longterm. The modeled habitat in the Yolo Bypass is of
33 low potential for California tiger salamander: There have been no observations of California
34 tiger salamander in this area based on the results of a number of surveys for vernal pool
35 invertebrates and plants and the bypass lacks vernal pool complexes with large, deep pools or
36 large grassland areas with stock ponds and similar aquatic features that hold water long enough
37 to provide potential breeding habitat for this species.
- 38 • *CM4 Tidal Natural Communities Restoration:* This activity would result in the permanent
39 removal of approximately 517 acres of terrestrial cover and aestivation habitat in the study area
40 in the late longterm. Tidal restoration in the Cache Slough area would result in habitat loss along
41 the edges of Lindsey Slough and Duck Slough, and adjacent to cultivated land along the eastern
42 edge of a block of modeled habitat. The modeled aquatic breeding habitat nearby the
43 hypothetical tidal restoration footprint is of relatively high value, consisting of vernal pool
44 complex along Lindsey Slough within the Jepson Prairie area in and near open space. The Jepson
45 Prairie area includes numerous California tiger salamander CNDDDB recorded occurrences and
46 overlaps with Critical Habitat Unit 2, Jepson Prairie Unit, for this species, however, the

1 hypothetical tidal restoration footprint does not overlap with critical habitat or recorded
2 occurrences in this area. The tidal restoration at Lindsey Slough would occur along the
3 northeastern edge of the Jepson Prairie block of habitat and would not contribute to
4 fragmentation. Because the estimates of habitat loss resulting from tidal inundation are based
5 on projections of where restoration may occur, actual effects are expected to be lower because
6 of the ability to select sites that minimize effects on California tiger salamander.

- 7 ● *CM11 Natural Communities Enhancement and Management*: Based on the recreation
8 assumptions described in BDCP Chapter 4, *Covered Activities and Associated Federal Actions*, an
9 estimated 40 acres of terrestrial cover and aestivation habitat for the California tiger
10 salamander would be removed as a result of constructing trails and associated recreational
11 facilities. Passive recreation in the reserve system could result in trampling and disturbance of
12 eggs and larvae in water bodies, degradation of water quality through erosion and
13 sedimentation, and trampling of sites adjacent to upland habitat used for cover and movement.
14 However, AMM37 requires protection of water bodies from recreational activities and requires
15 trail setbacks from wetlands. With these restrictions, recreation related effects on California
16 tiger salamander are expected to be minimal.

17 Habitat enhancement- and management-related activities in protected California tiger
18 salamander habitats would result in overall improvements to and maintenance of California
19 tiger salamander habitat values over the term of the BDCP. Activities associated with natural
20 communities enhancement and management over the term of the BDCP in protected California
21 tiger salamander habitat, such as ground disturbance or herbicide use to control nonnative
22 vegetation, could result in local adverse habitat effects and injury or mortality of California tiger
23 salamander and disturbance effects if individuals are present in work sites. Implementation of
24 AMM1–AMM6, AMM10, AMM13, and AMM37 would reduce these effects. Herbicides would only
25 be used in California tiger salamander habitat in accordance with the written recommendation
26 of a licensed, registered Pest Control Advisor and in conformance with label precautions and
27 federal, state, and local regulations in a manner that avoids or minimizes harm to the California
28 tiger salamander.

- 29 ● *CM18 Conservation Hatcheries*: This activity could result in the permanent removal of
30 approximately 35 acres of terrestrial cover and aestivation habitat for California tiger
31 salamander in the Yolo Bypass area (CZ 2). The specifications and operations of this facility have
32 not been developed, although the facility is expected to be constructed near Rio Vista on
33 cultivated lands in low-value habitat for the species
- 34 ● *Critical habitat*: Approximately 1,781 acres of designated Critical Habitat Unit 2, Jepson Prairie
35 Unit, for California tiger salamander overlap the study area in CZ 1. While this area is located
36 within the Cache Slough Complex, it is not expected to be affected by BDCP tidal habitat
37 restoration actions. Tidal habitat would be restored approximately 2 miles east of SR 113, with
38 some restoration taking place along the Barker and Lindsey Slough channels west to
39 approximately SR 113 and a small amount (0.4 acre) taking place along the Lindsey Slough
40 Channel west of SR 113 into Critical Habitat Unit 2.
- 41 ● *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have
42 little if any adverse effect on the California tiger salamander. Postconstruction operation and
43 maintenance of the above-ground water conveyance facilities could result in ongoing but
44 periodic disturbances that could affect California tiger salamander use of the surrounding
45 habitat. Operation of maintenance equipment, including vehicle use along transmission

1 corridors in CZ 8, could also result in injury or mortality of California tiger salamanders if
2 present in work sites. These effects, however, would be minimized with implementation of the
3 California tiger salamander measures described in AMM1–AMM6, AMM10, AMM13, and
4 AMM37.

- 5 • Injury and direct mortality: Construction activities associated with the water conveyance
6 facilities, vernal pool complex restoration, and habitat and management enhancement-related
7 activities, including operation of construction equipment, could result in injury or mortality of
8 California tiger salamanders. Foraging, dispersal, and overwintering behavior may be altered
9 during construction activities, resulting in injury or mortality of California tiger salamander if
10 the species is present. Salamanders occupying burrows could be trapped and crushed during
11 ground-disturbing activities. Degradation and loss of estivation habitat is also anticipated to
12 result from the removal of vegetative cover and collapsing of burrows. Injury or mortality would
13 be avoided and minimized through implementation of seasonal constraints and preconstruction
14 surveys in suitable habitat, collapsing unoccupied burrows, and relocating salamanders outside
15 of the construction area as described in AMM1–AMM6, AMM10, AMM13, and AMM37.

16 The following paragraphs summarize the combined effects discussed above and describe other
17 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are
18 also included.

19 ***Near-Term Timeframe***

20 Because the water conveyance facilities construction is being evaluated at the project level, the near-
21 term BDCP conservation strategy has been evaluated to determine whether it would provide
22 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
23 construction effects would not be adverse under NEPA.

24 Alternative 1B would permanently remove approximately 459 acres of upland terrestrial cover
25 habitat for California tiger salamander. The effects would result from construction of the water
26 conveyance facilities (CM1, 167 acres), Yolo Bypass improvements (CM2, 42 acres), tidal habitat
27 restoration (CM4, 203 acres), and construction of recreational facilities (CM11, 12 acres), and
28 construction of conservation hatcheries (CM18, 35 acres).

29 Typical NEPA project-level mitigation ratios of 2:1 for protected grassland habitats would indicate
30 that 918 acres of grassland should be protected in the near-term for California tiger salamander to
31 mitigate the near-term losses.

32 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective
33 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic habitat
34 (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective GNC1.1).
35 The landscape-scale goals and objectives would inform the near-term protection and restoration
36 efforts. The natural community restoration and protection activities are expected to be concluded
37 during the first 10 years of Plan implementation, which is close enough in time to the occurrence of
38 impacts to constitute adequate mitigation for NEPA purposes.

39 In addition, the plan contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
43 *Natural Communities*, *AMM13 California Tiger Salamander*, and *AMM37 Recreation*. These AMMs

1 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
2 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
3 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
4 EIR/EIS.

5 ***Late Long-Term Timeframe***

6 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and
7 29,459 acres of upland habitat for California tiger salamander. Alternative 1B as a whole would
8 result in the permanent loss of and temporary effects on 801 acres of upland habitat for California
9 tiger salamander for the term of the plan (less than 3% of the total upland habitat in the study area).
10 The location of these losses is described above in the discussions of CM1, CM2, CM4, CM11, and
11 CM18.

12 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
13 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would
14 benefit the California tiger salamander by providing habitat in the portion of the study area with the
15 highest long-term conservation value for the species based on known species occurrences and large,
16 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other
17 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,
18 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in
19 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation
20 depth and duration and suitable composition of vegetative cover to support breeding California tiger
21 salamanders (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and
22 other measures would be implemented as described in CM11 to promote growth of aquatic
23 vegetation with appropriate cover characteristics favorable to California tiger salamanders. Lands
24 protected in CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP*
25 and the extensive Los Vaqueros Watershed lands, including grassland areas supporting this species.
26 This objective would ensure that California tiger salamander upland and associated aquatic habitats
27 would be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat
28 within and adjacent to the study area.

29 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
30 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
31 restoration of alkali seasonal wetland complex, vernal pool complex, and grassland that could
32 overlap with the species model, would result in the restoration of 88 acres of aquatic and 598 acres
33 of upland modeled habitat for California tiger salamander. In addition, protection of alkali seasonal
34 wetland complex, vernal pool complex, and grassland that could overlap with the species model,
35 would result in the protection of 750 acres of aquatic and 5,000 acres of upland California tiger
36 salamander modeled habitat.

37 ***NEPA Effects:*** In the near-term, the loss of California tiger salamander habitat under Alternative 1B
38 would be not be adverse because the BDCP has committed to protecting the acreage required to
39 meet the typical mitigation ratios described above. In the late long-term, the losses of California tiger
40 salamander upland habitat associated with Alternative 1B, in the absence of other conservation
41 actions, would represent an adverse effect as a result of habitat modification and potential direct
42 mortality of a special-status species. However, with habitat protection and restoration associated
43 with the conservation components, guided by landscape-scale goals and objectives and by AMM1–

1 AMM6, AMM10, AMM13, and AMM37, the effects of Alternative 1B as a whole on California tiger
2 salamander would not be adverse.

3 ***CEQA Conclusion:***

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction is being evaluated at the project level, the near-
6 term BDCP conservation strategy has been evaluated to determine whether it would provide
7 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
8 construction impacts would be less than significant.

9 Alternative 1B would permanently remove approximately 459 acres of upland terrestrial cover
10 habitat for California tiger salamander. The effects would result from construction of the water
11 conveyance facilities (CM1, 167 acres), Yolo Bypass improvements (CM2, 42 acres), tidal habitat
12 restoration (CM4, 203 acres), and construction of recreational facilities (CM11, 12 acres), and
13 construction of conservation hatcheries (CM18, 35 acres).

14 Typical CEQA project-level mitigation ratios of 2:1 for protected grassland habitats would indicate
15 that 918 acres of grassland should be protected in the near-term for California tiger salamander to
16 mitigate the near-term losses.

17 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective
18 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic habitat
19 (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective GNC1.1).
20 The landscape-scale goals and objectives would inform the near-term protection and restoration
21 efforts. The natural community restoration and protection activities are expected to be concluded
22 during the first 10 years of Plan implementation, which is close enough in time to the occurrence of
23 impacts to constitute adequate mitigation.

24 In addition, the plan contains commitments to implement AMM1–AMM6, AMM10, AMM13, and
25 AMM37 which include elements that avoid or minimize the risk of affecting habitats and species
26 adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since
27 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
28 of the Final EIR/EIS. These commitments are more than sufficient to support the conclusion that the
29 near-term impacts of Alternative 1B on California tiger salamander would be less than significant,
30 because the number of acres required to meet the typical ratios described above would be only 918
31 acres of upland communities protected.

32 ***Late Long-Term Timeframe***

33 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and
34 29,459 acres of upland habitat for California tiger salamander. Alternative 1B as a whole would
35 result in the permanent loss of and temporary effects on 801 acres of upland habitat for California
36 tiger salamander for the term of the plan (less than 3% of the total upland habitat in the study area).
37 The location of these losses is described above in the discussions of CM1, CM2, CM4, CM11, and
38 CM18.

39 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
40 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would
41 benefit the California tiger salamander by providing habitat in the portion of the study area with the

1 highest long-term conservation value for the species based on known species occurrences and large,
2 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other
3 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,
4 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in
5 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation
6 depth and duration and suitable composition of vegetative cover to support breeding California tiger
7 salamanders (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and
8 other measures would be implemented as described in CM11 to promote growth of aquatic
9 vegetation with appropriate cover characteristics favorable to California tiger salamanders. Lands
10 protected in CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP*
11 and the extensive Los Vaqueros Watershed lands, including grassland areas supporting this species.
12 This objective would ensure that California tiger salamander upland and associated aquatic habitats
13 would be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat
14 within and adjacent to the study area.

15 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
16 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
17 restoration of alkali seasonal wetland complex, vernal pool complex, and grassland that could
18 overlap with the species model, would result in the restoration of 88 acres of aquatic and 598 acres
19 of upland modeled habitat for California tiger salamander. In addition, protection of alkali seasonal
20 wetland complex, vernal pool complex, and grassland that could overlap with the species model,
21 would result in the protection of 750 acres of aquatic and 5,000 acres of upland California tiger
22 salamander modeled habitat.

23 In the absence of other conservation actions, the losses of California tiger salamander upland habitat
24 associated with Alternative 1B would represent an adverse effect as a result of habitat modification
25 and potential direct mortality of a special-status species. However, with habitat protection and
26 restoration associated with the conservation components, guided by landscape-scale goals and
27 objectives and by AMM1–AMM6, AMM10, AMM13, and AMM37, which would be in place throughout
28 the construction phase, the impacts of Alternative 1B as a whole on California tiger salamander
29 would be less than significant.

30 **Impact BIO-47: Indirect Effects of Plan Implementation on California Tiger Salamander**

31 Indirect effects could occur outside of the construction footprint but within 500 feet of California
32 tiger salamander habitat. Activities associated with conservation component construction and
33 ongoing habitat enhancement, as well as operation and maintenance of above-ground water
34 conveyance facilities, including the transmission facilities, could result in ongoing but periodic
35 postconstruction disturbances with localized effects on California tiger salamander and its habitat,
36 and temporary noise and visual disturbances, including artificial nighttime lighting, over the term of
37 the BDCP. Most of the areas indirectly affected are associated with the construction of Byron
38 Forebay and its borrow and spoil areas in CZ 8.

39 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment
40 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability
41 of California tiger salamander habitat downstream of the construction area by filling in pools and
42 smothering eggs. Accidental spills of toxic fluids into the aquatic system could result in the
43 subsequent loss of California tiger salamander habitat. Hydrocarbon and heavy metal pollutants

1 associated with roadside runoff also have the potential to enter the aquatic system, affecting water
2 quality and California tiger salamander.

3 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 under Alternative 1B
4 would avoid or minimize the potential for substantial adverse effects on California tiger
5 salamanders, either indirectly or through habitat modifications. These AMMs would also avoid and
6 minimize effects that could substantially reduce the number of California tiger salamanders or
7 restrict the species’ range. Therefore, the indirect effects of Alternative 1B would not have an
8 adverse effect on California tiger salamander.

9 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
10 as construction-related noise and visual disturbances including artificial nighttime lighting could
11 impact California tiger salamander in aquatic and upland habitats. The use of mechanical equipment
12 during construction could cause the accidental release of petroleum or other contaminants that
13 could impact California tiger salamander or its prey. The inadvertent discharge of sediment or
14 excessive dust adjacent to California tiger salamander habitat could also have a negative impact on
15 the species or its prey. With implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 as part
16 of Alternative 1B, the BDCP would avoid the potential for substantial adverse effects on California
17 tiger salamander, either indirectly or through habitat modifications, and would not result in a
18 substantial reduction in numbers or a restriction in the range of California tiger salamanders. The
19 indirect effects of Alternative 1B would have a less-than-significant impact on California tiger
20 salamander.

21 **Impact BIO-48: Periodic Effects of Inundation of California Tiger Salamander Habitat as a** 22 **Result of Implementation of Conservation Components**

23 *CM2 Yolo Bypass Fisheries Enhancement* is the only conservation measure expected to result in
24 periodic inundation of California tiger salamander habitat. Periodic inundation could affect from an
25 estimated 191 acres of terrestrial habitat during a notch flow of 1,000 cfs, to an estimated 639 acres
26 of terrestrial habitat in Yolo Bypass during a notch flow of 4,000 cfs in CZ 1 (Table 12-1B-21). This
27 effect would only occur during an estimated maximum of 30% of years, in areas that are already
28 inundated in more than half of all years; therefore, these areas are expected to provide only
29 marginal terrestrial habitat for the California tiger salamander under Existing Conditions. No aquatic
30 breeding habitat would be affected (Table 12-1B-21). The modeled habitat in the Yolo Bypass in the
31 vicinity of terrestrial habitat is of low value in that there are no California tiger salamander records
32 in this area and the bypass lacks vernal pool complexes with large, deep pools, or large grassland
33 areas with stock ponds and similar aquatic features that provide the habitat of highest value for this
34 species. Therefore, the terrestrial habitat that would be affected has a small likelihood of supporting
35 California tiger salamanders, and Yolo Bypass operations are expected to have a minimal effect on
36 the species, if any.

37 **NEPA Effects:** The effects of periodic inundation from Alternative 1B would not have an adverse
38 effect on California tiger salamander.

39 **CEQA Conclusion:** Flooding of the Yolo Bypass from Fremont Weir operations would periodically
40 increase the frequency and duration of inundation of 191–639 acres of terrestrial habitat for
41 California tiger salamander. Because this area is considered low-value habitat and there are no
42 California tiger salamander records in the area, and because of the lack of suitable breeding habitat
43 in this area, the effects of periodic inundation of California tiger salamander habitat would have a
44 less-than-significant impact.

1 **Giant Garter Snake**

2 This section describes the effects of Alternative 1B, including water conveyance facilities
 3 construction and implementation of other conservation components, on the giant garter snake. The
 4 habitat model used to assess effects for the giant garter snake is based on aquatic habitat and upland
 5 habitat. Modeled aquatic habitat is composed of tidal perennial aquatic (except in Suisun Marsh),
 6 tidal freshwater perennial emergent wetland, nontidal freshwater emergent wetland, and nontidal
 7 perennial aquatic natural communities; rice fields; and artificial canals and ditches. Modeled upland
 8 habitat is composed of all nonwetland and nonaquatic natural communities (primarily grassland
 9 and cropland) within 200 feet of modeled aquatic habitat features. The modeled upland habitat is
 10 ranked as high-, moderate-, or low-value based on giant garter snake associations between
 11 vegetation and cover types (U.S. Fish and Wildlife Service 2012) and historical and recent
 12 occurrence records (*Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*
 13 *Data Report*; Hansen 2011), and presence of features necessary to fulfill the species' life cycle
 14 requirements. Modeled habitat is expressed in acres for aquatic and upland habitats, and in miles for
 15 linear movement corridors in aquatic habitat. Other factors considered in assessing the value of
 16 affected habitat for the giant garter snake, to the extent that information is available, are proximity
 17 to conserved lands and recorded occurrences of the species, proximity to giant garter snake
 18 subpopulations (Yolo Basin/Willow Slough and Coldani Marsh/White Slough) in the study area that
 19 are identified in the draft recovery plan for this species (U.S. Fish and Wildlife Service 1999b), and
 20 contribution to connectivity between giant garter snake subpopulations.

21 Construction and restoration associated with Alternative 1B conservation measures would result in
 22 both temporary and permanent losses of giant garter snake modeled habitat as indicated in Table
 23 12-1B-22. Full implementation of Alternative 1B would also include the following biological
 24 objectives over the term of the BDCP to benefit the giant garter snake (BDCP Chapter 3, *Conservation*
 25 *Strategy*).

- 26 ● Increase native species diversity and relative cover of native plant species, and reduce the
 27 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 28 ● Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of
 29 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective
 30 TFEWNC1.1, associated with CM3 and CM4).
- 31 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
 32 and nontidal freshwater emergent wetland natural communities, with suitable habitat
 33 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,
 34 associated with CM3 and CM10).
- 35 ● Protect 48,625 acres of cultivated lands that provide suitable habitat for covered and other
 36 native wildlife species (Objective CLNC1.1, associated with CM3 and CM11).
- 37 ● Target cultivated land conservation to provide connectivity between other conservation lands
 38 (Objective CLNC1.2, associated with CM3).
- 39 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
 40 lands that occur in cultivated lands within the reserve system, including isolated valley oak
 41 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
 42 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
 43 with CM3 and CM11).

- 1 ● Of the at least 1,200 acres of nontidal marsh created under (Objective NFEW/NPANC1.1), create
2 600 acres of aquatic habitat giant garter snake aquatic habitat that is connected to the 1,500
3 acres of rice land or equivalent-value habitat described below in Objective GGS1.4 (Objective
4 GGS1.1, associated with CM3, CM4, and CM10).
- 5 ● Of the 8,000 acres of grassland protected under Objective GNC1.1 and 2,000 acres restored
6 under Objective GNC1.2, create or protect 200 acres of high-value upland giant garter snake
7 habitat adjacent to the at least 600 acres of nontidal perennial habitat being restored and/or
8 created in CZ 4 and/or CZ 5 (Objective GGS1.2, associated with CM3 and CM8).
- 9 ● Protect giant garter snakes on restored and protected nontidal marsh and adjacent uplands
10 (Objectives GGS1.1 and GGS1.2) from incidental injury or mortality by establishing 200-foot
11 buffers between protected giant garter snake habitat and roads (other than those roads
12 primarily used to support adjacent cultivated lands and levees). Establish giant garter snake
13 reserves at least 2,500 feet from urban areas or areas zoned for urban development (Objective
14 GGS1.3, associated with CM3).
- 15 ● Create connections from the White Slough population to other areas in the giant garter snake's
16 historical range in the Stone Lakes vicinity by protecting, restoring, and/or creating at least
17 1,500 acres of rice land or equivalent-value habitat (e.g., perennial wetland) for the giant garter
18 snake in CZ 4 and/or CZ 5. Any portion of the 1,500 acres may consist of tidal freshwater
19 emergent wetland and may overlap with the 24,000 acres of tidally restored freshwater
20 emergent wetland if it meets specific giant garter snake habitat criteria described in CM4. Up to
21 500 (33%) of the 1,500 acres may consist of suitable uplands adjacent to protected or restored
22 aquatic habitat (Objective GGS1.4, associated with CM3 and CM4).
- 23 ● Of the at least 1,200 acres of nontidal marsh created under Objective NFEW/NPANC1.1, create
24 600 acres of connected aquatic giant garter snake habitat outside the Yolo Bypass in CZ 2
25 (Objective GGS2.1, associated with CM3 and CM10).
- 26 ● Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres restored
27 under Objective GNC1.2, create or protect 200 acres of high-value upland habitat adjacent to the
28 600 acres of nontidal marsh created in CZ 2 outside of Yolo Bypass (GGS2.1) (Objective GGS2.2,
29 associated with CM3 and CM8).
- 30 ● To expand upon and buffer the newly restored/created nontidal perennial habitat in CZ 2,
31 protect 700 acres of cultivated lands, with 500 acres consisting of rice land and the remainder
32 consisting of compatible cultivated land that can support giant garter snakes. The cultivated
33 lands may be a subset of lands protected for the cultivated lands natural community and other
34 covered species (Objective GGS2.3, associated with CM3).
- 35 ● Protect giant garter snakes on created nontidal marsh (Objective GGS2.1) and created or
36 protected adjacent uplands (Objective GGS2.2) from incidental injury or mortality by
37 establishing 200-foot buffers between protected giant garter snake habitat and roads, and
38 establishing giant garter snake reserves at least 2,500 feet from urban areas or areas zoned for
39 urban development (Objective GGS2.4, associated with CM3).
- 40 ● Protect, restore, and/or create 2,740 acres of rice land or equivalent-value habitat (e.g.,
41 perennial wetland) for the giant garter snake in CZ 1, CZ 2, CZ 4, or CZ 5. Up to 500 acres may
42 consist of tidal freshwater emergent wetland and may overlap with the at least 5,000 acres of
43 tidally restored freshwater emergent wetland in the Cache Slough ROA if this portion meets
44 giant garter snake habitat criteria specified in CM4. Up to 1,700 acres may consist of rice fields

1 in the Yolo Bypass if this portion meets the criteria specified in CM3, *Reserve Design*
 2 *Requirements by Species*. Any remaining acreage will consist of rice land or equivalent-value
 3 habitat outside the Yolo Bypass. Up to 915 (33%) of the 2,740 acres may consist of suitable
 4 uplands adjacent to protected or restored aquatic habitat (Objective GGS3.1, associated with
 5 CM3, CM4, and CM10).

6 As explained below, with the restoration or protection of these amounts of habitat, in addition to the
 7 implementation of AMMs, impacts on giant garter snake would not be adverse for NEPA purposes
 8 and would be less than significant for CEQA purposes.

9 **Table 12-1B-22. Changes in Giant Garter Snake Modeled Habitat Associated with Alternative 1B^a**

Conservation Measure ^b	Habitat Type ^c	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT ^c	CM2	CM5
CM1	Aquatic (acres)	120	120	146	146	NA	NA
	Upland (acres)	401	401	273	273	NA	NA
	Aquatic (miles)	21	21	32	32	NA	NA
Total Impacts CM1 (acres)		521	521	419	419		
CM2–CM18	Aquatic (acres)	179	498	15	38	NA	NA
	Upland (acres)	1,467	2,443	219	261	582–1,402	606
	Aquatic (miles)	49	189	9	10	NA	NA
Total Impacts CM2–CM18 (acres)		1,646	2,941	234	299	582–1,402	606
TOTAL IMPACTS CM1-CM18 (acres)		2,167	3,462	653	718	582–1,402	606

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c Aquatic acres represent tidal and nontidal habitat combined, and upland acres represent low-, moderate-, and high-value acreages combined.

^d LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^e Periodic effects were estimated for the late long-term only. CM2 periodic impacts on upland habitats only are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

10

11 **Impact BIO-49: Loss or Conversion of Habitat for and Direct Mortality of Giant Garter Snake**

12 Alternative 1B conservation measures would result in the permanent and temporary loss combined
 13 of up to 802 acres of modeled aquatic habitat (tidal and nontidal combined), up to 3,378 acres of
 14 modeled upland habitat, and up to 252 miles of channels providing aquatic movement habitat for
 15 the giant garter snake (Table 12-1B-22). There is one giant garter snake occurrence that overlaps
 16 with the Plan footprint. Conservation measures that would result in these losses are conveyance
 17 facilities and transmission line construction, and establishment and use of RTM (CM1), Fremont

1 Weir/Yolo Bypass improvements (CM2), tidal natural communities restoration (CM4), floodplain
2 restoration (CM5), and construction of a conservation fish hatchery (CM18). Habitat enhancement
3 and management activities (CM11), which include ground disturbance or removal of nonnative
4 vegetation, could result in local adverse habitat effects. In addition, maintenance activities
5 associated with the long-term operation of the water conveyance facilities and other BDCP physical
6 facilities could degrade or eliminate giant garter snake habitat. Each of these individual activities is
7 described below. A summary statement of the combined impacts and NEPA effects and a CEQA
8 conclusion follow the individual conservation measure discussions.

- 9 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would
10 result in the permanent loss of approximately 521 acres of modeled giant garter snake habitat,
11 composed of 120 acres of aquatic habitat and 401 acres of upland habitat (Table 12-1B-22). The
12 401 acres of upland habitat that would be removed for the construction of the conveyance
13 facilities consists of 166 acres of high-, 218 acres of moderate-, and 17 acres of low-value
14 habitat. In addition, approximately 21 miles of channels providing giant garter snake movement
15 habitat would be removed as a result of conveyance facilities construction. Development of the
16 water conveyance facilities would also result in the temporary removal of 419 acres including
17 146 acres of giant garter snake aquatic habitat and up to 273 acres of adjacent upland habitat in
18 areas near construction in CZ 4, CZ 5, CZ 6, and CZ 8 (see Table 12-1B-22 and Terrestrial Biology
19 Map Book). In addition, approximately 32 miles of channels providing giant garter snake
20 movement habitat would be temporarily removed as a result of conveyance facilities
21 construction.

22 Most of the habitat that would be lost is located in the eastern Delta, in CZ 4, CZ 5, CZ 6, and CZ 8.
23 Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1B construction
24 locations. Water facilities construction and operation is expected to have low to moderate
25 potential for adverse effects on giant garter snake aquatic habitat in CZ 6 and CZ 8 which
26 consists primarily of agricultural fields but is not located near or between subpopulations
27 identified in the draft recovery plan. The aquatic habitat that would be affected in CZ 4 and CZ 5
28 is of moderate to high value because portions of it are approximately 0.7 to 1.5 miles west of 3
29 recorded CNDDDB giant garter snake occurrences which are part of the Coldani Marsh/White
30 Slough subpopulation identified in the draft recovery plan.

- 31 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries
32 improvements in the Yolo Bypass would result in the permanent and temporary removal of
33 approximately 83 acres of aquatic habitat and 458 acres of upland habitat for the giant garter
34 snake in the late long-term. Approximately 14 miles (less than 1% of total miles in Plan Area) of
35 channels providing giant garter snake habitat for movements would be removed as a result of
36 Fremont Weir/Yolo Bypass Improvements. Most of this habitat removal would occur at the
37 north end of the Yolo Bypass, near Fremont Weir. Construction is expected to have adverse
38 effects on giant garter snake aquatic habitat in the Yolo Bypass area because it is near the Yolo
39 Basin/Willow Slough subpopulation. The upland habitat that would be removed is composed of
40 336 acres of high-value, 121 acres of moderate-value, and 1 acre of low-value habitat.

41 In addition to habitat loss from construction related activities in Yolo Bypass, late season
42 flooding in the bypass may result in loss of rice habitat by precluding the preparation and
43 planting of rice fields. The methods for estimating loss of rice in the bypass and results are
44 provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter
45 Snake Summer Foraging Habitat in the Yolo Bypass*. This analysis concludes that the estimated
46 loss of rice is 1,662 acres.

- 1 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
2 in the permanent loss of approximately 395 acres of aquatic habitat and 2,123 acres of upland
3 habitat for the giant garter snake to tidal marsh in the late long-term. The upland habitat
4 affected by tidal inundation includes 594 acres of high-value, 1,375 acres of moderate-value, and
5 154 acres of low-value habitat. In addition, approximately 138 miles of channels providing giant
6 garter snake movement habitat would be removed as a result of tidal natural communities
7 restoration.

8 Most of the effects of tidal natural communities restoration would occur in the Cache Slough and
9 Yolo Bypass areas (CZ 1 and CZ 2). This aquatic habitat is of low to moderate value: it is in and
10 near Category 1 open space but is not near any giant garter snake occurrences and is not near or
11 between giant garter snake subpopulations identified in the draft recovery plan. Tidal natural
12 communities restoration is expected to have little to no adverse effects on giant garter snake
13 aquatic or upland habitat in the Cache Slough ROA. There are no giant garter snake occurrences
14 in this area, which is already tidally influenced so it has limited value for the giant garter snake
15 (giant garter snakes may occur in tidally muted areas but are not likely to use aquatic areas with
16 a strong tidal influence).

- 17 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
18 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
19 approximately 60 acres of aquatic habitat and 89 acres of upland habitat for giant garter snake.
20 The upland habitat to be removed is composed of 51 acres of moderate-value and 38 acres of
21 low-value upland habitat. Approximately 2 miles of channels providing giant garter snake
22 movement habitat would be removed as a result of floodplain restoration. Seasonally inundated
23 floodplain restoration is expected to have little to no adverse effects on giant garter snake
24 aquatic habitat because the site is not located near or between giant garter snake populations
25 identified in the draft recovery plan. As with CM4, the estimates of the effect of seasonal
26 floodplain levee construction and inundation are based on projections of where restoration may
27 occur. Actual effects are expected to be lower because sites would be selected to minimize
28 effects on giant garter snake habitat.

- 29 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
30 actions included in CM11 that are designed to enhance wildlife values in BDCP-protected
31 habitats may result in localized ground disturbances that could temporarily remove small
32 amounts of giant garter snake habitat. Ground-disturbing activities, such as removal of
33 nonnative vegetation and road and other infrastructure maintenance, are expected to have
34 minor effects on available giant garter snake habitat and are expected to result in overall
35 improvements to and maintenance of giant garter snake habitat values over the term of the
36 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
37 and minimized by the AMMs listed below.

38 Passive recreation in the reserve system could result in human disturbance of giant garter
39 snakes basking in upland areas and compaction of upland burrow sites used for brumation.
40 However, AMM37 requires setbacks for trails in giant garter snake habitat (see Appendix 3B,
41 *Environmental Commitments, AMMs, and CMs*). With this measure in place, recreation-related
42 effects on giant garter snake are expected to be minimal,

- 43 ● *CM18 Conservation Hatcheries*: Construction for conservation hatcheries could result in the
44 permanent removal of 35 acres of moderate-value upland habitat for the giant garter snake in
45 the Yolo Bypass area (CZ 2).

- 1 • Operations and maintenance: Postconstruction operation and maintenance of the above-ground
2 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
3 disturbances that could affect giant garter snake use of the surrounding habitat in the Yolo
4 Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, CZ 7,
5 and CZ 8). Maintenance activities would include vegetation management, levee and structure
6 repair, and regrading of roads and permanent work areas. These effects, however, would be
7 reduced by AMMs and conservation actions as described below.
- 8 • Injury and direct mortality: Construction vehicle activity may cause injury or mortality of the
9 giant garter snake. If snakes reside where activities take place (most likely in the vicinity of the
10 two subpopulations: Yolo Basin/Willow Slough [CZ 2] and the Coldani Marsh/White Slough [CZ
11 4]), the operation of equipment for land clearing, construction, conveyance facilities operation
12 and maintenance, and habitat restoration, enhancement, and management could result in injury
13 or mortality of giant garter snakes. This risk is highest from late fall through early spring, when
14 the snakes are dormant. Increased vehicular traffic associated with BDCP actions could
15 contribute to a higher incidence of road kill. However, preconstruction surveys would be
16 implemented after the project planning phase and prior to any ground-disturbing activity. Any
17 disturbance to suitable aquatic and upland sites in or near the project footprint would be
18 avoided to the extent feasible, and the loss of aquatic habitat and grassland vegetation would be
19 minimized through adjustments to project design, as practicable. Construction monitoring, and
20 other measures would be implemented to avoid and minimize injury or mortality of this species
21 during construction, as described in *AMM16 Giant Garter Snake*.

22 The following paragraphs summarize the combined effects discussed above and describe other
23 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
24 also included.

25 ***Near-Term Timeframe***

26 Because the water conveyance facilities construction is being evaluated at the project level, the near-
27 term BDCP conservation strategy has been evaluated to determine whether it would provide
28 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
29 construction would not be adverse under NEPA.

30 Alternative 1B would permanently and temporarily remove 460 acres of aquatic habitat and 2,360
31 acres of upland habitat for giant garter snake in the study area during the near-term. These effects
32 would result from the construction of the water conveyance facilities (CM1, 266 acres of aquatic and
33 674 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458
34 acres of upland habitat), from tidal restoration. (CM4, 111 acres of aquatic and 1,193 acres of upland
35 habitat), and conservation hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses
36 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat
37 losses would occur in cropland and grassland communities. In addition, approximately 111 miles of
38 irrigation and drainage channels providing giant garter snake movement habitat would be removed.
39 The habitat model likely overestimates the relative value of irrigation and drainage canals in the
40 vicinity of White Slough and south due to its proximity to records that likely represent single
41 displaced snakes, not viable populations.

42 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
43 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the
44 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection

1 of upland habitats. Using these ratios would indicate that 460 acres of aquatic habitat should be
2 restored, 460 acres of aquatic habitat should be protected, and 4,720 acres of upland habitat should
3 be protected for giant garter snake to mitigate the near-term losses. The BDCP has committed to
4 near-term restoration of up to 8,100 acres of aquatic habitat and up to 1,140 acres of upland habitat,
5 and to protection of at least 16,900 acres of upland habitat. Lands to be protected and restored in
6 the near term specifically for the giant garter snake total 3,900 acres (400 acres nontidal marsh, 400
7 acres of grassland, 700 acres of cultivated lands including at least 500 acres of rice in CZ 2, and acres
8 of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5. Additionally, 2,400 acres of rice or
9 habitat equivalent (1,500 acres under Objective GGS1.4 and 900 acres under Objective GGS3.1)
10 would be restored or protected to create connections from the Coldani Marsh/White Slough
11 population to other areas in the giant garter snake historical range. Additionally, 900 of the 2,400
12 acres of rice land or habitat of equivalent value would be protected and restored for the giant garter
13 snake to achieve a 1:1 ratio of habitat conserved to habitat affected (habitat affected includes
14 uplands periodically flooded and rice lost due to late season flooding in Yolo Bypass as a result of
15 CM2) (Objective GGS3.1). An unknown number of irrigation and drainage ditches located in
16 cultivated lands and suitable for giant garter snake movement would be maintained and protected
17 within the reserve system, which would include isolated valley oak trees, trees and shrubs along
18 field borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
19 grasslands, ponds, and wetlands (Objective CLNC1.3).

20 These habitat protection and restoration measures would benefit the giant garter snake and the
21 plan's species-specific biological goals and objectives would inform the near-term protection and
22 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and
23 providing connectivity between protected areas, is considered the most effective approach to giant
24 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
25 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and
26 are identified as important for the recovery of the species in the draft recovery plan for the species
27 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat
28 would focus on these two important subpopulations.

29 The species-specific biological goals and objectives would inform the near-term protection and
30 restoration efforts. The natural community restoration and protection activities are expected to be
31 concluded during the first 10 years of Plan implementation, which is close enough in time to the
32 occurrence of impacts to constitute adequate mitigation for NEPA purposes. These commitments are
33 more than sufficient to support the conclusion that the near-term effects of Alternative 1B would be
34 not be adverse under NEPA, because the number of acres required to meet the typical ratios
35 described above would be only 460 acres of aquatic communities restored, 460 acres of aquatic
36 communities protected, and 4,720 acres of upland communities protected.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
38 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
39 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
40 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Barge Operations Plan*, *AMM10 Restoration*
41 *of Temporarily Affected Natural Communities*, *AMM16 Giant Garter Snake*, and *AMM37 Recreation*. All
42 of these AMMs include elements that avoid or minimize the risk of BDCP activities affecting habitats
43 and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
44 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
45 *AMMs, and CMs*, of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 Based on modeled habitat, the study area supports approximately 31,281 acres of aquatic and
 3 53,285 acres of upland habitat for giant garter snake. Alternative 1B as a whole would result in the
 4 permanent loss of and temporary effects on 802 acres of aquatic habitat and 3,378 acres of upland
 5 habitat for giant garter snake during the term of the plan (2% of the total aquatic habitat in the
 6 study area and 6% of the total upland habitat in the study area). The locations of these losses are
 7 described above in the analyses of individual conservation measures.

8 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands
 9 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of
 10 grasslands in the study area. Lands to be protected and restored specifically for the giant garter
 11 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated
 12 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ
 13 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under Objective
 14 GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create
 15 connections from the Coldani Marsh/White Slough population to other areas in the giant garter
 16 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under
 17 Objective GGS3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of
 18 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice
 19 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of
 20 high value habitat targeted specifically for giant garter snake, the protection and restoration of other
 21 natural communities is expected to provide additional restoration of 4,430 acres and protection of
 22 3,733 acres of garter snake habitat.

23 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter
 24 snake by providing connectivity and maintaining irrigation and drainage channels that provide
 25 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake
 26 movement habitat on the protected cultivated lands is proportional to the modeled habitat on
 27 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support
 28 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by
 29 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

30 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the
 31 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter
 32 snake. Protecting and expanding existing giant garter snake subpopulations, and providing
 33 connectivity between protected areas, is considered the most effective approach to giant garter
 34 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
 35 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area
 36 and are identified as important for the recovery of the species in the draft recovery plan for the
 37 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake
 38 habitat would focus on these two important subpopulations.

39 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
 40 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
 41 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal
 42 perennial aquatic, tidal freshwater emergent wetland, alkali seasonal wetland, grassland, and vernal
 43 pool complex that could overlap with the species model, would result in the restoration of 3,450
 44 acres of aquatic and 980 acres of upland modeled habitat for giant garter snake. In addition,
 45 protection of cultivated land, grassland, alkali seasonal wetland, and vernal pool complex could

1 overlap with the species model and would result in the protection of 1,547 acres of aquatic and
2 2,185 acres of upland giant garter snake modeled habitat.

3 **NEPA Effects:** In the near-term, the loss of giant garter snake habitat under Alternative 1B would not
4 be adverse because the BDCP has committed to protecting and restoring the acreage required to
5 meet the typical mitigation ratios described above. In the late long-term, the losses of giant garter
6 snake associated with Alternative 1B, in the absence of other conservation actions, would represent
7 an adverse effect as a result of habitat modification and potential direct mortality of a special-status
8 species. However, with habitat protection and restoration associated with the conservation
9 components, guided by landscape-scale goals and objectives and by AMM1–AMM7, AMM10, AMM16,
10 and AMM37, the effects of Alternative 1B as a whole on giant garter snake would not be adverse.

11 **CEQA Conclusion:**

12 **Near-Term Timeframe**

13 Because the water conveyance facilities construction is being evaluated at the project level, the near-
14 term BDCP conservation strategy has been evaluated to determine whether it would provide
15 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
16 construction would be less than significant under CEQA.

17 Alternative 1B would permanently and temporarily remove 460 acres of aquatic habitat and 2,360
18 acres of upland habitat for giant garter snake in the study area during the near-term. These effects
19 would result from the construction of the water conveyance facilities (CM1, 266 acres of aquatic and
20 674 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458
21 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres of upland
22 habitat), and Conservation Hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses
23 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat
24 losses would occur in cropland and grassland communities. In addition, approximately 111 miles of
25 irrigation and drainage channels providing giant garter snake movement habitat would be removed.
26 The habitat model likely overestimates the relative value of irrigation and drainage canals in the
27 vicinity of White Slough and south due to its proximity to records that likely represent single
28 displaced snakes, not viable populations.

29 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
30 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the
31 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection
32 of upland habitats. Using these ratios would indicate that 460 acres of aquatic habitat should be
33 restored, 460 acres of aquatic habitat should be protected, and 4,720 acres of upland habitat should
34 be protected for giant garter snake to mitigate the near-term losses.

35 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to
36 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to
37 be protected and restored in the near-term specifically for the giant garter snake total 3,900 acres
38 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least
39 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.
40 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900
41 acres under Objective GGS3.1) would be restored or protected to create connections from the
42 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.
43 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected

1 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected
2 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in
3 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage
4 ditches located in cultivated lands and suitable for giant garter snake movement would be
5 maintained and protected within the reserve system, which would include isolated valley oak trees,
6 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water
7 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

8 These habitat protection and restoration measures would benefit the giant garter snake and the
9 plan's species-specific biological goals and objectives would inform the near-term protection and
10 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and
11 providing connectivity between protected areas, is considered the most effective approach to giant
12 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
13 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and
14 are identified as important for the recovery of the species in the draft recovery plan for the species
15 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat
16 would focus on these two important subpopulations.

17 The natural community restoration and protection activities are expected to be concluded during
18 the first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts
19 to constitute adequate mitigation for CEQA purposes. These commitments are more than sufficient
20 to support the conclusion that the near-term effects of Alternative 1B would be less than significant,
21 because the number of acres required to meet the typical ratios described above would be only 460
22 acres of aquatic communities restored, 460 acres of aquatic communities protected, and 4,720 acres
23 of upland communities protected.

24 The Plan also includes commitments to implement AMM1-AMM7, AMM10, AMM16, and AMM37. All
25 of these AMMs include elements that avoid or minimize the risk of BDCP activities affecting habitats
26 and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
27 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
28 *AMMs, and CMs*, of the Final EIR/EIS.

29 ***Late Long-Term Timeframe***

30 Based on modeled habitat, the study area supports approximately 31,281 acres of aquatic and
31 53,285 acres of upland habitat for giant garter snake. Alternative 1B as a whole would result in the
32 permanent loss of and temporary effects on 802 acres of aquatic habitat and 3,378 acres of upland
33 habitat for giant garter snake during the term of the plan (2% of the total aquatic habitat in the
34 study area and 6% of the total upland habitat in the study area). The locations of these losses are
35 described above in the analyses of individual conservation measures.

36 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands
37 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of
38 grasslands in the study area. Lands to be protected and restored specifically for the giant garter
39 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated
40 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ
41 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under Objective
42 GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create
43 connections from the Coldani Marsh/White Slough population to other areas in the giant garter
44 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under

1 Objective GGS3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of
2 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice
3 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of
4 high value habitat targeted specifically for giant garter snake, the protection and restoration of other
5 natural communities is expected to provide additional restoration of 4,430 acres and protection of
6 3,733 acres of garter snake habitat.

7 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter
8 snake by providing connectivity and maintaining irrigation and drainage channels that provide
9 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake
10 movement habitat on the protected cultivated lands is proportional to the modeled habitat on
11 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support
12 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by
13 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

14 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the
15 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter
16 snake. Protecting and expanding existing giant garter snake subpopulations, and providing
17 connectivity between protected areas, is considered the most effective approach to giant garter
18 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
19 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area
20 and are identified as important for the recovery of the species in the draft recovery plan for the
21 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake
22 habitat would focus on these two important subpopulations.

23 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
24 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
25 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal
26 perennial aquatic, tidal freshwater emergent wetland, alkali seasonal wetland, grassland, and vernal
27 pool complex that could overlap with the species model, would result in the restoration of 3,450
28 acres of aquatic and 980 acres of upland modeled habitat for giant garter snake. In addition,
29 protection of cultivated land, grassland, alkali seasonal wetland, and vernal pool complex could
30 overlap with the species model and would result in the protection of 1,547 acres of aquatic and
31 2,185 acres of upland giant garter snake modeled habitat.

32 The BDCP also includes AMM1–AMM7, AMM10, AMM16, and AMM37, all of which are directed at
33 minimizing or avoiding potential impacts on adjacent habitats during construction and operation of
34 the conservation measures. Considering the protection and restoration provisions, which would
35 provide acreages of new or enhanced habitat in amounts greater than necessary to compensate for
36 habitats lost to construction and restoration activities, implementation of Alternative 1B as a whole
37 would not result in a substantial adverse effect through habitat modifications and would not
38 substantially reduce the number or restrict the range of the species. Therefore, the loss of giant
39 garter snake habitat and potential mortality of snakes would have a less-than-significant impact on
40 giant garter snake.

41 **Impact BIO-50: Indirect Effects of Plan Implementation on Giant Garter Snake**

42 Construction activities outside the project footprint but within 200 feet of construction associated
43 with water conveyance facilities, conservation components and ongoing habitat enhancement, as
44 well as operation and maintenance of above-ground water conveyance facilities, including the

1 transmission facilities, could result in ongoing periodic postconstruction disturbances with localized
2 effects on giant garter snake habitat, and temporary noise and visual disturbances over the term of
3 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM7, AMM10,
4 AMM16, and AMM37, which would be in effect throughout the plan’s construction phase.

5 The use of mechanical equipment during water conveyance facilities construction could cause the
6 accidental release of petroleum or other contaminants that could affect giant garter snake or its
7 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to giant garter snake
8 habitat could also have a negative effect on the species or its prey. AMM1–AMM6 would minimize
9 the likelihood of such spills and would ensure measures are in place to prevent runoff from the
10 construction area and potential effects of sediment or dust on giant garter snake or its prey. Covered
11 activities have the potential to exacerbate bioaccumulation of mercury in covered species that feed
12 on aquatic species, including giant garter snake. The operational impacts of new flows under CM1
13 were analyzed to assess potential effects on mercury concentration and bioavailability. Results
14 indicated that changes in total mercury levels in water and fish tissues due to future operational
15 conditions were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

16 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to
17 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
18 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
19 floodplains. Thus, BDCP restoration activities that create newly inundated areas could increase
20 bioavailability of mercury. Increased methylmercury associated with natural community and
21 floodplain restoration may indirectly affect giant garter snake, which feeds on small fishes, tadpoles,
22 and small frogs, especially introduced species, such as small bullfrogs (*Rana catesbeiana*) and their
23 larvae, carp (*Cyprinus carpio*), and mosquitofish (*Gambusia affinis*). In general, the highest
24 methylation rates are associated with high tidal marshes that experience intermittent wetting and
25 drying and associated anoxic conditions (Alpers et al. 2008). Along with avoidance and minimization
26 measures and adaptive management and monitoring, *CM12 Methylmercury Management* is expected
27 to reduce the amount of methylmercury resulting from the restoration of natural communities and
28 floodplains.

29 Extant populations of giant garter snake within the study area are known only from the upper Yolo
30 Basin and at the Coldani Marsh/White Slough area. Davis et al. (2007) found mercury
31 concentrations in fish at White Slough (and the Central Delta in general) to be relatively low
32 compared to other areas of the Delta. No restoration activities involving flooding (and subsequent
33 methylation of mercury) are planned within the known range of the Coldani Marsh/White Slough
34 giant garter snake population. Effects on giant garter snake from increased methylmercury
35 exposures is more likely in the Yolo Basin, where some of the highest concentrations of mercury and
36 methylmercury have been documented (Foe et al. 2008). Effects from exposure to methylmercury
37 may include decreased predator avoidance, reduced success in prey capture, difficulty in shedding,
38 and reduced ability to move between shelter and foraging or thermoregulation areas (Wylie et al.
39 2009). Planned floodplain restoration activities in the Yolo Basin are expected to seasonally increase
40 methylmercury production, although production would be minimized by *CM12 Methylmercury*
41 *Mitigation*. Further, the periods of production and increased exposure to methylmercury do not
42 overlap with giant garter snake seasonal activity periods. This seasonal trend should help to
43 decrease risk to the giant garter snake, although snakes could prey on individuals that have been
44 exposed to methylmercury during the previous season.

1 The potential mobilization or creation of methylmercury within the study area varies with site-
2 specific conditions and will need to be assessed at the project level. *CM12 Methylmercury*
3 *Management* includes provisions for project-specific Mercury Management Plans. Along with
4 avoidance and minimization measures and adaptive management and monitoring, CM12 is expected
5 to reduce the effects of methylmercury resulting from BDCP natural communities and floodplain
6 restoration on giant garter snake.

7 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1B
8 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or
9 through habitat modifications and fragmentation. These AMMs would also avoid and minimize
10 effects that could substantially reduce the number of giant garter snakes or restrict the species'
11 range. Therefore, the indirect effects of Alternative 1B would not have an adverse effect on giant
12 garter snake.

13 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
14 as construction-related noise and visual disturbances could impact giant garter snake in aquatic and
15 upland habitats. The use of mechanical equipment during construction could cause the accidental
16 release of petroleum or other contaminants that could impact giant garter snake or its prey. The
17 inadvertent discharge of sediment or excessive dust adjacent to giant garter snake habitat could also
18 have a negative impact on the species or its prey. With implementation of AMM1-AMM7, AMM10,
19 AMM16, and AMM37 as part of Alternative 1B construction, operation and maintenance, the BDCP
20 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or
21 through habitat modifications and fragmentation. Alternative 1B would not result in a substantial
22 reduction in numbers or a restriction in the range of giant garter snakes. Therefore, the indirect
23 effects of Alternative 1B would have a less-than-significant impact on giant garter snakes.

24 Giant garter snake could experience indirect effects from increased exposure to methylmercury as a
25 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects
26 of methylmercury would not result in a substantial reduction in numbers or a restriction in the
27 range of giant garter snakes, and, therefore, would have a less-than-significant impact on giant
28 garter snakes.

29 **Impact BIO-50a: Loss of Connectivity among Giant Garter Snakes in the Coldani Marsh/White** 30 **Slough Subpopulation, Stone Lakes National Wildlife Refuge, and the Delta**

31 Construction of Alternative 1B water conveyance facilities would create a substantial barrier to
32 movement for the Coldani Marsh/White Slough subpopulation of giant garter snake. The facilities
33 would eliminate Coldani Marsh/White Slough subpopulation connectivity with areas containing
34 current or previous occurrences of giant garter snake, specifically in the vicinity of Stone Lakes NWR
35 to the north and in the Delta to the southwest (Figure 12-15B). An unknown number of small
36 agricultural ditches and drains between Disappointment Slough and Stone Lakes would be lost,
37 rerouted, or directed into culverts and affect species' movements and connectivity. Siphons would
38 be constructed underneath sloughs (Disappointment Slough, White Slough, Sycamore Slough, Hog
39 Slough, and Beaver Slough) and Stone Lakes Drain, and a tunnel would be constructed under the
40 Lost Slough/Mokelumne River area that connects with Snodgrass Slough. These sloughs and drains
41 would still provide aquatic habitat and opportunities for movement and connectivity between giant
42 garter snakes in the vicinity of Stone Lakes NWR and the Coldani Marsh/White Slough
43 subpopulation. In addition, although Upland Canal, an important aquatic habitat for giant garter
44 snakes adjacent to the Coldani Marsh, would be cut off from White Slough by the new canal it would

1 still retain connectivity through Dredger Cut to the south (Figure 12-15B). Maintaining connectivity
2 between major sloughs in the vicinity of White Slough is important for the long-term survival and
3 conservation of the giant garter snake in the Plan Area.

4 The Coldani Marsh/White Slough giant garter snake subpopulation is located within the White
5 Slough Wildlife Area (WSWA) managed by CDFW for hunting and fishing. In 2009 and 2010, Eric
6 Hansen (consulting environmental biologist and giant garter snake expert) surveyed this area as
7 part of a status survey to provide information for USFWS' 5-year review of giant garter snake. Mr.
8 Hansen captured a total of 27 individual giant garter snakes in the Upland Canal along the west and
9 southwest edges of the Coldani Marsh (Hansen 2011). Giant garter snakes were not captured or
10 observed in any of the ponds or in any of the emergent tidal marshes adjacent to Dredger Cut at
11 WSWA despite the close proximity and connectivity among habitats (Hansen 2011). This might be
12 partially due to the fact that Coldani Marsh provides more suitable habitat for giant garter snakes
13 because the tidal influence is strongly muted, allowing for consistent water supply unlike some of
14 the emergent tidal marshes adjacent to Dredger Cut, and there is limited access for large aquatic
15 predators such as largemouth and striped bass in contrast to adjacent ponds. Mr. Hansen noted that
16 while he did not have access to conduct surveys, several locations near Coldani Marsh and Upland
17 Canal, including Disappointment Slough, eastern Sycamore Slough, Dredger Cut, and Hog Slough,
18 contain promising habitat in the study area (Hansen pers. comm.). In addition, Mr. Hansen stated
19 that there have been recent sightings of giant garter snake in the vicinity of Little Connection Slough
20 and Empire Tract approximately 6 miles southwest of the Coldani Marsh/White Slough population
21 (Figure 12-15B).

22 Protecting and expanding existing giant garter snake subpopulations, and providing connectivity
23 among protected areas, are considered the most effective approaches to giant garter snake
24 conservation in the study area. The Plan calls for restoration and protection activities for giant
25 garter snakes in the vicinity of Coldani Marsh/White Slough and Stone Lakes NWR to protect,
26 conserve, and expand giant garter snake populations. Restoration and protection activities would
27 occur in the vicinity of the Coldani Marsh/White Slough subpopulation, including the creation of 600
28 acres of aquatic habitat for the giant garter snake that is adjacent to the 1,500 acres of rice land or
29 equivalent-value habitat (Objective GGS1.1). Objective GGS1.2 would be to create or protect 200
30 acres of high-value upland giant garter snake habitat adjacent to the at least 600 acres of aquatic
31 habitat restored or created in CZ 4 and CZ 5. The Plan also calls for creation of connections from the
32 Coldani Marsh/White Slough subpopulation to other areas in the giant garter snake's range in the
33 vicinity of Stone Lakes NWR by protecting, restoring, and/or creating at least 1,500 acres of rice
34 land or equivalent-value habitat for the giant garter snake in CZ 4 and/or CZ 5 (Objective GGS1.4).
35 Up to 500 of the 1,500 acres may consist of suitable uplands adjacent to protected or restored
36 aquatic habitat.

37 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter
38 snake by providing connectivity and maintaining irrigation and drainage channels that provide
39 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake
40 movement habitat on the protected cultivated lands is proportional to the modeled habitat on
41 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support
42 approximately 281 miles of movement habitat for the giant garter snake. A portion of this would
43 occur in CZ 4 and CZ 5 and in the vicinity of the Coldani Marsh/White Slough subpopulation.

44 **NEPA Effects:** Restoration and protection of aquatic and upland habitat in CZ 4 and CZ 5 would
45 improve and create giant garter snake connectivity within the study area; however, construction of

1 Alternative 1B water conveyance facilities would reduce the effectiveness of these habitats by
2 creating a barrier to movement that extends from Stone Lakes NWR south towards the Coldani
3 Marsh/White Slough subpopulation, and by creating a barrier to the Delta southwest of Coldani
4 Marsh/White Slough. The creation of a substantial barrier and loss of movement corridors among
5 giant garter snake subpopulations would have an adverse effect on giant garter snake.
6 Implementation of Mitigation Measure BIO-50a, *Provide Connectivity among Coldani Marsh/White*
7 *Slough, Stone Lakes Wildlife Refuge, and the Delta*, would avoid the potential for substantial adverse
8 effects on giant garter snake by providing connectivity and maintaining irrigation and drainage
9 channels that provide aquatic habitat for the snake. Mitigation measure implementation would also
10 avoid and minimize effects that could substantially reduce the number of giant garter snakes or
11 restrict the species' range. Therefore, with implementation of Mitigation Measure BIO-50a, the loss
12 of habitat connectivity resulting from Alternative 1B would not have an adverse effect on giant
13 garter snake.

14 **CEQA Conclusion:** Alternative 1B water conveyance facilities would create a substantial barrier to
15 the movement of giant garter snake in the area between the Coldani Marsh/White Slough
16 subpopulation and Stone Lakes NWR, as well as between the Coldani Marsh/White Slough
17 subpopulation and the Delta to the southwest. Restoration and protection activities would occur in
18 the vicinity of the Coldani Marsh/White Slough subpopulation, including the creation or protection
19 of 200 acres of high-value upland giant garter snake habitat adjacent to the at least 600 acres of
20 aquatic habitat restored or created in CZ 4 and CZ 5 (Objective GGS1.2). The Plan also calls for
21 creation of connections between the Coldani Marsh/White Slough subpopulation and other areas
22 near the giant garter snake's range in vicinity of Stone Lakes NWR by protecting, restoring, and/or
23 creating at least 1,500 acres of rice land or equivalent-value habitat for the giant garter snake in CZ 4
24 and/or CZ 5. While restoration and protection of aquatic and upland habitat in CZ 4 and CZ 5 would
25 improve and create giant garter snake movement corridors within the study area, construction of
26 Alternative 1B water conveyance facilities would reduce the effectiveness of these habitats by
27 creating a substantial barrier between Stone Lakes NWR and the Coldani Marsh/White Slough
28 subpopulation, and a barrier between the Coldani Marsh/White Slough population and the Delta to
29 the southwest.

30 The Alternative 1B conveyance facilities would result in a significant impact on connections among
31 giant garter snakes in the Coldani Marsh/White Slough subpopulation, Stone Lakes NWR, and the
32 Delta. This impact would be reduced to a less-than-significant level with the implementation of
33 Mitigation Measure BIO-50a, *Provide Connectivity among Coldani Marsh/White Slough, Stone Lakes*
34 *National Wildlife Refuge, and the Delta*.

35 **Mitigation Measure BIO-50a: Provide Connectivity among Coldani Marsh/White Slough,**
36 **Stone Lakes National Wildlife Refuge, and the Delta**

37 DWR will protect, create, and restore aquatic and upland habitats with the specific goal of
38 providing connectivity among giant garter snakes in the Coldani Marsh/White Slough
39 subpopulation, Stone Lakes NWR, south Delta, and the Delta. Of the 6,540 acres of high-value
40 habitat targeted specifically for the giant garter snake DWR will ensure that connectivity is
41 maintained by focusing restoration/protection on high ground on the eastern side of the canal
42 to promote connectivity in the areas noted above. DWR will provide irrigation and drainage
43 channels or possibly toe drains along the Alternative 1B water conveyance facilities that could
44 provide aquatic habitat for the giant garter snake through the protection and management of
45 cultivated lands in these areas (CM3 and CM11). These irrigation and drainage channels and

1 ditches would connect to those sloughs described above that would be siphoned or tunneled
 2 under and would still provide aquatic habitat and connectivity for giant garter snakes within the
 3 study area. Providing aquatic habitat would be especially important in CZ 4 and CZ 5 where the
 4 Alternative 1B water conveyance facilities would disrupt smaller waterways preferred by giant
 5 garter snakes. In addition, DWR will work with CDFW to manage the White Slough Wildlife Area
 6 ponds and adjacent upland for giant garter snake. Management activities could include
 7 removing large aquatic predators and creating more emergent marsh and upland areas to
 8 provide escape cover and foraging opportunities.

9 **Impact BIO-51: Periodic Effects of Inundation of Giant Garter Snake Habitat as a Result of**
 10 **Implementation of Conservation Components**

11 *CM2 Yolo Bypass Fisheries Enhancement:* The proposed changes in Fremont Weir operations would
 12 occur intermittently from as early as mid-November through as late as mid-May. The core
 13 operations would occur during the winter/spring period, which corresponds mostly with the giant
 14 garter snake's inactive season. During this time, snakes are overwintering underground. Giant garter
 15 snakes that occur in the bypass during the active season could potentially overwinter in the bypass
 16 during the inactive season: these snakes may be vulnerable to inundation of the bypass and could be
 17 drowned or displaced from overwintering sites. However, most typically, Fremont Weir "notch"
 18 operations would occur on the shoulders of time periods in which the Sacramento River rises
 19 enough for Fremont Weir to overtop passively, without the proposed project. Project-associated
 20 inundation of areas that would not otherwise have been inundated is expected to occur in no more
 21 than 30% of all years, since Fremont Weir is expected to overtop the remaining estimated 70% of all
 22 years, and during those years notch operations would not typically affect the maximum extent of
 23 inundation. Currently, in more than half of all years, an area greater than the area that would be
 24 inundated as a result of covered activities is already inundated during the snake's inactive season
 25 (Kirkland pers. comm.). Duration of inundation may also be an important factor determining effects
 26 on overwintering giant garter snakes. Radiotelemetry studies have revealed giant garter snakes
 27 surviving in burrows that had been inundated for 2 to 3 weeks, but it is unknown what duration of
 28 inundation the snakes can survive while overwintering in their burrows.

29 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, provides the method used to
 30 estimate periodic inundation effects in the Yolo Bypass. Based on this method, periodic inundation
 31 could affect giant garter snakes overwintering in upland areas ranging from an estimated 582 acres
 32 of upland habitat during notch flow of 1,000 cfs to an estimated 1,402 acres during a 4,000-cfs notch
 33 flow. The 4,000-cfs notch flow would affect an estimated 888 acres of high value habitat and 514
 34 acres of moderate value habitat.

35 As noted above under the discussion of habitat loss from construction-related activities in Yolo
 36 Bypass, late season flooding in the bypass may result in loss of rice habitat (considered aquatic
 37 habitat for giant garter snake) by precluding the preparation and planting of a maximum of 1,662
 38 acres of rice fields (BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter*
 39 *Snake Summer Foraging Habitat in the Yolo Bypass*). This analysis concludes that the estimated loss
 40 of rice is 1,662 acres which was considered to occur late long-term. Restoration and protection of
 41 2,740 acres of rice land or habitat of equivalent value for the giant garter snake would achieve a 1:1
 42 ratio of habitat conserved to habitat affected (habitat affected includes uplands periodically flooded
 43 and rice lost due to late season flooding in Yolo Bypass as a result of CM2). *CM5 Seasonally Inundated*
 44 *Floodplain Restoration* would periodically inundate 606 acres of upland habitat for the giant garter
 45 snake in the south Delta (CZ 7). The upland habitat to be inundated contains 432 acres of moderate-

1 value and 174 acres of low-value habitat. The area between existing levees would be breached and
2 the newly constructed setback levees would be inundated through seasonal flooding. The restored
3 floodplain will include a range of elevations from low-lying areas that flood frequently (e.g., every 1
4 to 2 years) to high-elevation areas that flood infrequently (e.g., every 10 years or more). There are
5 no records of giant garter snakes in the vicinity of where floodplain restoration is expected to occur.

6 Based on modeled habitat for the giant garter snake, the study area supports approximately 53,285
7 acres of upland habitat for giant garter snake. Approximately 2,008 acres of giant garter snake
8 upland habitat (4% of total upland habitat in the study area) may be adversely affected by periodic
9 flooding as a consequence of floodplain restoration and the operation of the Fremont Weir.

10 **NEPA Effects:** Periodic effects on upland habitat for giant garter snake associated with
11 implementing Alternative 1B are not expected to result in substantial adverse effects on giant garter
12 snakes, either directly or through habitat modifications, as it would not result in a substantial
13 reduction in numbers or a restriction in the range of giant garter snakes. Therefore, periodic
14 inundation of giant garter snake habitat under Alternative 1B would not adversely affect the species.

15 **CEQA Conclusion:** Flooding of the Yolo Bypass from CM2 and creation of seasonally inundated
16 floodplain in various parts of the study area (CM5) would periodically affect a total of approximately
17 2,008 acres of upland habitat for giant garter snake. The inundation could affect overwintering
18 snakes. Project-associated inundation of areas that would not otherwise have been inundated is
19 expected to occur in no more than 30% of all years, since Fremont Weir is expected to overtop the
20 remaining estimated 70% of all years, and during those years notch operations would not typically
21 affect the maximum extent of inundation. Currently, in more than half of all years, an area greater
22 than the area that will be inundated as a result of covered activities is already inundated during the
23 snake's inactive season (Kirkland pers. comm.).

24 Therefore, increased inundation in the Yolo Bypass as a result of BDCP is expected to have a minimal
25 effect on the Yolo Basin/Willow Slough population. Therefore, implementing Alternative 1B,
26 including AMM1-AMM7, AMM10, and AMM16, would not be expected to result in substantial
27 adverse effects on giant garter snakes, either directly or through habitat modifications, because it
28 would not result in a substantial reduction in numbers or a restriction in the range of giant garter
29 snakes. Periodic inundation under Alternative 1B would have a less-than-significant impact on the
30 species.

31 **Western Pond Turtle**

32 The habitat model used to assess effects on the western pond turtle is based on aquatic and upland
33 nesting and overwintering habitat. Further details regarding the habitat model, including
34 assumptions on which the model is based, are provided in BDCP Appendix 2.A, Section 2A.30
35 *Western Pond Turtle*. The model quantified two types of upland nesting and overwintering habitat,
36 including upland habitat in natural communities as well as upland in agricultural areas adjacent to
37 aquatic habitats. Both of these upland habitat types are combined for this analysis. Factors
38 considered in assessing the value of affected aquatic habitat are natural community type and
39 availability of adjacent nesting and overwintering habitat. The highest value aquatic habitat types in
40 the study area consist of nontidal freshwater perennial emergent wetlands and ponds adjacent to
41 suitable nesting and overwintering habitat (Patterson pers. comm.). Less detail is provided on
42 effects on dispersal habitat because, although dispersal habitat is important for maintaining and
43 increasing distribution and genetic diversity, turtles have been known to travel over many different
44 land cover types; therefore, this habitat type is not considered limiting. The value of dispersal

1 habitat depends less on the habitat type itself than on the proximity of that habitat type to high-
2 value aquatic and nesting and overwintering habitat.

3 Construction and restoration associated with Alternative 1B conservation measures would result in
4 both temporary and permanent losses of western pond turtle modeled habitat, as indicated in Table
5 12-1B-23. The majority of these losses would take place over an extended period of time as tidal
6 marsh is restored in the study area. Full implementation of Alternative 1B would also include the
7 following biological objectives over the term of the BDCP to benefit the western pond turtle (BDCP
8 Chapter 3, *Conservation Strategy*).

- 9 ● Protect or restore 142,200 acres of high-value natural communities and covered species
10 habitats (Objective L1.1, associated with CM3).
- 11 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
12 accommodate sea level rise. Minimum restoration targets for tidal natural communities in
13 each ROA are 7,000 acres in Suisun Marsh ROA, 5,000 acres in Cache Slough ROA, 1,500 acres in
14 Cosumnes/Mokelumne ROA, 2,100 acres in West Delta ROA, and 5,000 acres in South Delta ROA
15 (Objective L1.3, associated with CM2, CM3, and CM4).
- 16 ● Within the 65,000 acres of tidal natural communities and transitional uplands (Objective L1.3),
17 include sufficient transitional uplands along the fringes of restored brackish and freshwater
18 tidal emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow
19 for the future upslope establishment of tidal emergent wetland communities (Objective L1.7,
20 associated with CM3, CM4, and CM8).
- 21 ● Allow floods to promote fluvial processes, such that bare mineral soils are available for natural
22 recolonization of vegetation, desirable natural community vegetation is regenerated, and
23 structural diversity is promoted, or implement management actions that mimic those natural
24 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 25 ● Allow lateral river channel migration (Objective L2.2, associated with CM3 and CM5).
- 26 ● Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of
27 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective
28 TFEWNC1.1, associated with CM3 and CM4).
- 29 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
30 and nontidal freshwater emergent wetland natural communities, with suitable habitat
31 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,
32 associated with CM3 and CM10).
- 33 ● Protect and enhance 8,100 acres of managed wetland, 1,500 acres of which are in the Grizzly
34 Island Marsh Complex (Objective MWNC1.1, associated with CM3 and CM11).
- 35 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 36 ● Protect stock ponds and other aquatic features within protected grasslands to provide aquatic
37 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with
38 CM3).
- 39 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
40 lands that occur in cultivated lands within the reserve system, including isolated valley oak
41 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,

1 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
2 with CM3 and CM11).

3 As explained below, with the restoration and protection of these amounts of habitat, in addition to
4 implementation of AMMs, impacts on western pond turtle would not be adverse for NEPA purposes
5 and would be less than significant for CEQA purposes.

6 **Table 12-1B-23. Changes in Western Pond Turtle Modeled Habitat Associated with Alternative 1B^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic (acres)	48	48	103	103	NA	NA
	Upland ^e (acres)	190	190	86	86	NA	NA
	Aquatic (miles)	19	19	24	24	NA	NA
Total Impacts CM1 (acres)		238	238	189	189		
CM2-CM18	Aquatic (acres)	82	114	23	44	NA	NA
	Upland (acres)	414	1,028	119	136	283-798	331
	Aquatic (miles)	25	109	3	4	NA	NA
Total Impacts CM2-CM18 (acres)		496	1,142	142	180	283-798	331
TOTAL IMPACTS CM1-CM18 (acres)		734	1,380	331	369	283-798	331

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

^e Upland acres represent upland nesting and overwintering habitat acreages combined for both natural communities and agricultural lands adjacent to aquatic habitats.

NT = near-term

LLT = late long-term

NA = not applicable

7

8 **Impact BIO-52: Loss or Conversion of Habitat for and Direct Mortality of Western Pond Turtle**

9 Alternative 1B conservation measures would result in the permanent and temporary loss of up to
10 309 acres of aquatic habitat and 1,440 acres of upland nesting and overwintering habitat (Table 12-
11 1B-23). There are 3 western pond turtle occurrences that overlap with the CM1 footprint and a
12 number of additional occurrences within the vicinity (Figure 12-16). Activities that would result in
13 the temporary and permanent loss of western pond turtle modeled habitat are conveyance facilities
14 and transmission line construction, and establishment and use of RTM, borrow, and spoils areas
15 (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), seasonally inundated
16 floodplain restoration (CM5), and riparian restoration (CM7). Habitat enhancement and
17 management activities (CM11), such as ground disturbance or removal of nonnative vegetation,

1 could result in local adverse habitat effects. In addition, maintenance activities associated with the
 2 long-term operation of the water conveyance facilities and other BDCP physical facilities could
 3 degrade or eliminate western pond turtle habitat. The activity accounting for most (80%) of the
 4 habitat loss or conversion would be *CM4 Tidal Natural Communities Restoration*. Each of these
 5 individual activities is described below. A summary statement of the combined impacts and NEPA
 6 effects and a CEQA conclusion follow the individual conservation measure discussions.

- 7 ● *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would
 8 result in the permanent loss of approximately 48 acres of aquatic habitat and 190 acres of
 9 upland nesting and overwintering habitat for the western pond turtle in the study area (Table
 10 12-1B-23). Development of the water conveyance facilities would also result in the temporary
 11 removal of up to 103 acres of aquatic habitat and 86 acres of nesting and overwintering habitat
 12 for the western pond turtle in the study area (see Table 12-1B-23). Approximately 19 miles of
 13 channels providing western pond turtle movement habitat would be removed and 24 miles
 14 would be temporarily disturbed. There are three western pond turtle occurrences that overlap
 15 with the CM1 footprint in CZ 2 around Clifton Court Forebay and in CZ 5 scattered throughout
 16 the Delta. The majority of the permanent loss of aquatic habitat and nesting and overwintering
 17 habitat would be near Clifton Court Forebay in CZ 8. Refer to the Terrestrial Biology Map Book
 18 for a detailed view of Alternative 1B construction locations. The aquatic habitat in the Clifton
 19 Court Forebay area is considered to be of reasonably high value because it consists of
 20 agricultural ditches in or near known species occurrences. The nesting and overwintering and
 21 dispersal habitat that would be lost consists primarily of cultivated lands with some small
 22 portion of ruderal grassland habitat. Except for remnant, uncultivated patches, the cultivated
 23 lands are not suitable for nesting and overwintering unless left fallow. Construction of the water
 24 conveyance facilities would also affect dispersal habitat, which is primarily cultivated lands.
 25 While there are western pond turtle occurrences scattered throughout CZ 3, CZ 4, CZ 5, and CZ 6,
 26 this effect is widely dispersed because of the long, linear nature of the canal footprint.
- 27 ● *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the
 28 permanent and temporary removal of approximately 60 acres of aquatic habitat and 249 acres of
 29 upland nesting and overwintering habitat for the western pond turtle. Approximately 4 miles of
 30 channels providing western pond turtle movement habitat would be permanently or
 31 temporarily removed as a result of Yolo Bypass improvements. Although there are no CNDDDB
 32 occurrences for western pond turtle in the Yolo Bypass, the species is known to be present in
 33 the Yolo Bypass Wildlife Area (California Department of Fish and Wildlife 2013).
- 34 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural community restoration would result
 35 in the conversion of approximately 45 acres of aquatic habitat and 872 acres of upland nesting
 36 and overwintering habitat for western pond turtle to tidal marsh. Approximately 106 miles of
 37 channels providing western pond turtle movement habitat would be removed as a result of
 38 restoration. Tidal habitat restoration is expected to change existing salinity and flow conditions
 39 rather than lead to complete loss of aquatic habitat. Restoration of tidal flow where habitat
 40 consists of the calm waters of managed freshwater ponds and wetlands could have an adverse
 41 effect on the western pond turtle. Tidal restoration outside Suisun Marsh is likely to create
 42 suitable, slow-moving freshwater slough and marsh habitat.

43 Although the aquatic habitat model includes all tidal perennial aquatic, tidal brackish emergent
 44 wetland, and managed wetland as habitat, most of the Suisun Marsh pond turtle observations
 45 have been in the interior drainage ditches or near water control structures not hydrologically
 46 connected to Suisun Marsh (Patterson pers. comm.). While the model does not include an

1 aquatic class type called drainage ditches and therefore an effect on this habitat type cannot be
2 calculated, it is likely that this general type of habitat accounts for a very small portion of the
3 total modeled aquatic effects; almost certainly less than 5%, or less than 287 acres of the
4 modeled aquatic habitat affected by tidal restoration. The suitable nesting and overwintering
5 habitat that would be affected in the interior of Suisun Marsh is limited, because the levees likely
6 function as the primary nesting and overwintering habitat. The nesting and overwintering
7 habitat of highest value to be affected is on the fringe of the marsh where the aquatic habitat is
8 adjacent to undeveloped grassland habitat. The habitat affected in the interior Delta (West Delta
9 and South Delta) is of low value, consisting of levees and intensively farmed cultivated lands,
10 while the Cache Slough and Cosumnes-Mokelumne ROAs are less intensively farmed and have
11 higher-value habitat for the turtle

12 Because the estimates of the effect of tidal inundation are based on projections of where
13 restoration may occur, actual effects are expected to be lower because sites would be selected to
14 minimize effects on western pond turtle habitat (see AMM17 in Appendix 3B, *Environmental*
15 *Commitments, AMMs, and CMs*).

- 16 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
17 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
18 approximately 53 acres of aquatic habitat 33 acres of upland habitat for western pond turtle.
19 Approximately 3 miles of channels providing western pond turtle movement habitat would be
20 removed as a result of floodplain restoration. Although there are no CNDDDB occurrences of the
21 western pond turtle in the areas where floodplain restoration is likely to occur, the species is
22 known to occur along the San Joaquin River to the south in the San Joaquin River National
23 Wildlife Refuge. As with CM4, the estimates of the effect of seasonal floodplain levee
24 construction and inundation are based on projections of where restoration may occur. Actual
25 effects are expected to be lower because sites would be selected to minimize effects on western
26 pond turtle habitat.
- 27 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration that is part of tidal natural
28 communities restoration in CZ 1 and CZ 2, would result in the permanent removal of 10 acres of
29 upland nesting and overwintering habitat for western pond turtle.
- 30 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
31 actions included in CM11 that are designed to enhance wildlife values in BDCP-protected
32 habitats may result in localized ground disturbances that could temporarily remove small
33 amounts of western pond turtle habitat. Ground-disturbing activities, such as removal of
34 nonnative vegetation and road and other infrastructure maintenance, are expected to have
35 minor adverse effects on available western pond turtle habitat and are expected to result in
36 overall improvements to and maintenance of western pond turtle habitat values over the term
37 of the BDCP. In addition, effects would be avoided and minimized by the AMMs listed below.
- 38 ● Management of the 6,600 acres of managed wetlands to be protected for waterfowl and
39 shorebirds is not expected to result in overall adverse effects for the western pond turtle.
40 Management actions that would improve wetland quality and diversity on managed wetlands
41 include control and eradication of invasive plants; maintenance of a diversity of vegetation types
42 and elevations, including upland areas to provide flood refugia; water management and leaching
43 to reduce salinity; and enhancement of water management infrastructure (improvements to
44 enhance drainage capacity, levee maintenance). These management actions could benefit the
45 western pond turtle. The 6,600 acres of protected managed wetlands would be monitored and

1 adaptively managed to ensure that management options are implemented to avoid adverse
2 effects on the western pond turtle.

- 3 ● Operations and maintenance: Ongoing maintenance of BDCP facilities is expected to have little if
4 any adverse effect on the western pond turtle. Postconstruction operation and maintenance of
5 the above-ground water conveyance facilities and restoration infrastructure could result in
6 ongoing but periodic disturbances that could affect western pond turtle use where there is
7 suitable habitat in the study area. Maintenance activities would include vegetation management,
8 levee and structure repair, and regrading of roads and permanent work areas. These effects,
9 however, would be minimized by AMMs and conservation actions described below.
- 10 ● Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
11 western pond turtles. If turtles reside where conservation measures are implemented (most
12 likely in the vicinity of aquatic habitats in the study area), the operation of equipment for land
13 clearing, construction, conveyance facilities operation and maintenance, and habitat restoration,
14 enhancement, and management could result in injury or mortality of western pond turtles.
15 However, to avoid injury or mortality, preconstruction surveys would be conducted in suitable
16 aquatic upland habitat for the western pond turtle, and turtles found would be relocated outside
17 the construction areas, as required by the AMMs listed below.

18 The following paragraphs summarize the combined effects discussed above and describe other
19 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
20 also included.

21 ***Near-Term Timeframe***

22 Because the water conveyance facilities construction is being evaluated at the project level, the near-
23 term BDCP conservation strategy has been evaluated to determine whether it would provide
24 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
25 construction would not be adverse under NEPA.

26 Alternative 1B would remove 256 acres of aquatic habitat and 809 acres of upland nesting and
27 overwintering habitat for western pond turtle in the near-term. These effects would result from
28 water conveyance facilities construction (CM1, 151 acres of aquatic and 276 acres of upland
29 habitat), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of upland habitat), tidal
30 habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland habitat), and riparian
31 restoration (CM7, 4 acres of upland habitat). Typical project-level mitigation ratios for those natural
32 communities that would be affected and that are identified in the biological goals and objectives for
33 western pond turtle in Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection of
34 aquatic habitats and 2:1 for protection of upland habitats. Using these ratios would indicate that 256
35 acres of aquatic habitat should be restored, 256 acres of aquatic habitat should be protected, and
36 1,618 acres of upland habitat should be protected for western pond turtle to mitigate the near-term
37 losses.

38 The conservation strategy for western pond turtle involves restoration and protection of aquatic
39 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
40 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
41 addressed at the landscape and natural community levels. The BDCP has committed to near-term
42 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,
43 Objective NFEW/NPANC1.1, MWNC1.1) and up to 2,000 acres of upland habitat (Objective GNC1.1).

1 In addition, the protection and management of existing managed wetland habitat in Suisun Marsh
2 may increase the value of aquatic habitat. The most beneficial restoration would occur in freshwater
3 emergent wetland consisting of slow-moving slough and marsh adjacent to protected, undisturbed
4 grassland. Additionally, basking platforms will be installed as needed in restored freshwater marsh
5 to benefit the western pond turtle.

6 The natural community restoration and protection activities would be concluded in the first 10
7 years of Plan implementation, which is close enough in time to the impacts of construction to
8 constitute adequate mitigation. Because the number of acres required to meet the typical ratios
9 described above would be only 256 acres of aquatic communities protected, 256 acres restored, and
10 1,618 acres of upland communities protected, the 24,350 acres of aquatic and 2,000 acres of upland
11 habitats restored or created in the near-term Plan goals, and the additional detail in the biological
12 goals for western pond turtle, are more than sufficient to support the conclusion that the near-term
13 impacts of habitat loss and direct mortality under Alternative 1B on western pond turtles would not
14 be adverse.

15 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
19 *Natural Communities*, and *AMM17 Western Pond Turtle*. These AMMs include elements that would
20 avoid or minimize the risk of affecting habitats and species adjacent to work areas and storage sites.
21 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in
22 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

23 **Late Long-Term Timeframe**

24 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and
25 28,864 acres of upland habitat for giant garter snake. Alternative 1B would remove 309 acres of
26 aquatic habitat and 1,440 acres of upland nesting and overwintering habitat for western pond turtle
27 in the late long--term.

28 Implementation of Alternative 1B as a whole would increase the extent and distribution of high-
29 value aquatic and upland nesting and overwintering habitat for western pond turtle in the study
30 area. While the extent of dispersal habitat is expected to be reduced by approximately 9%, this
31 habitat is abundant in the study area (composed primarily of cultivated lands), is not believed to be
32 a factor limiting the turtle, and would be replaced with higher-value habitats for western pond
33 turtle.

34 The conservation strategy for western pond turtle involves restoration and protection of aquatic
35 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
36 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
37 addressed at the landscape and natural community levels. The BDCP has committed to late long-
38 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective
39 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) and up to 8,000 acres of upland habitat (Objective
40 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun
41 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in
42 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,
43 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are
44 preserved and managed as part of the 48,625 acres of protected cultivated lands described above for

1 giant garter snake are also expected to benefit the species. Additionally, basking platforms will be
2 installed as needed in restored freshwater marsh to benefit the western pond turtle.

3 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and
4 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow
5 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species
6 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to
7 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat
8 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle
9 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident
10 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the
11 rabbit.

12 The study area represents only a small portion of the range of the western pond turtle in California
13 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and
14 temporary loss or conversion of habitat for the western pond turtle, and other effects described
15 above, are not expected to result in an adverse effect on the long-term survival and recovery of
16 western pond turtle because for the following reasons.

- 17 • The study area represents a small portion of the species' entire range.
- 18 • Only 1% of the habitat in the study area would be removed or converted.

19 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
20 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
21 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal
22 perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland, grassland,
23 valley foothill riparian, that could overlap with the species model, would result in the restoration of
24 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western pond turtle. In
25 addition, protection of cultivated land, managed wetland, grassland, and valley/foothill riparian
26 could overlap with the species model and would result in the protection of 1,281 acres of aquatic
27 and 4,993 acres of upland western pond turtle modeled habitat.

28 **NEPA Effects:** In the near-term, the loss of western pond turtle habitat under Alternative 1B would
29 not be adverse because the BDCP has committed to protecting and restoring the acreage required to
30 meet the typical mitigation ratios described above. In the late long-term, the losses of western pond
31 turtle habitat associated with Alternative 1B, in the absence of other conservation actions, would
32 represent an adverse effect as a result of habitat modification and potential direct mortality of a
33 special-status species. However, with habitat protection and restoration associated with the
34 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,
35 AMM10, and AMM17, the effects of Alternative 1B as a whole on western pond turtle would not be
36 adverse.

37 **CEQA Conclusion:**

38 **Near-Term Timeframe**

39 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
40 the near-term BDCP conservation strategy has been evaluated to determine whether it would
41 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
42 impacts of construction would be less than significant.

1 Alternative 1B would remove 256 acres of aquatic habitat and 809 acres of upland nesting and
2 overwintering habitat for western pond turtle in the near-term. These effects would result from
3 water conveyance facilities construction (CM1, 151 acres of aquatic and 276 acres of upland
4 habitat), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of upland habitat), tidal
5 habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland habitat), and riparian
6 restoration (CM7, 4 acres of upland habitat). Typical CEQA project-level mitigation ratios for those
7 natural communities that would be affected and that are identified in the biological goals and
8 objectives for western pond turtle in Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for
9 protection of aquatic habitats and 2:1 for protection of upland habitats. Using these ratios would
10 indicate that 256 acres of aquatic habitat should be restored, 256 acres of aquatic habitat should be
11 protected, and 1,618 acres of upland habitat should be protected for western pond turtle to mitigate
12 the near-term losses.

13 The conservation strategy for western pond turtle involves restoration and protection of aquatic
14 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
15 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
16 addressed at the landscape and natural community levels. The BDCP has committed to near-term
17 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,
18 Objective NFEW/NPANC1.1, MWNC1.1) and up to 2,000 acres of upland habitat (Objective GNC1.1).
19 In addition, the protection and management of existing managed wetland habitat in Suisun Marsh
20 may increase the value of aquatic habitat. The most beneficial restoration would occur in freshwater
21 emergent wetland consisting of slow-moving slough and marsh adjacent to protected, undisturbed
22 grassland. Additionally, basking platforms will be installed as needed in restored freshwater marsh
23 to benefit the western pond turtle.

24 The natural community restoration and protection activities would be concluded in the first 10
25 years of Plan implementation, which is close enough in time to the impacts of construction to
26 constitute adequate mitigation for CEQA purposes. Because the number of acres required to meet
27 the typical ratios described above would be only 256 acres of aquatic communities protected, 256
28 acres restored, and 1,618 acres of upland communities protected, the 24,350 acres of aquatic and
29 2,000 acres of upland habitats restored or created in the near-term Plan goals, and the additional
30 detail in the biological goals for western pond turtle, are more than sufficient to support the
31 conclusion that the near-term impacts of habitat loss and direct mortality under Alternative 1B on
32 western pond turtles would be less than significant.

33 In addition, the plan also contains commitments to implement AMM1–AMM6, AMM10, and AMM17,
34 which include elements that would avoid or minimize the risk of directly and indirectly affecting
35 habitats and species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes
36 the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
37 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

38 **Late Long-Term Timeframe**

39 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and
40 28,864 acres of upland habitat for giant garter snake. Alternative 1B would remove 309 acres of
41 aquatic habitat and 1,440 acres of upland nesting and overwintering habitat for western pond turtle
42 in the late long--term.

43 Implementation of Alternative 1B as a whole would increase the extent and distribution of high-
44 value aquatic and upland nesting and overwintering habitat for western pond turtle in the study

1 area. While the extent of dispersal habitat is expected to be reduced by approximately 9%, this
2 habitat is abundant in the study area (composed primarily of cultivated lands), is not believed to be
3 a factor limiting the turtle, and would be replaced with higher-value habitats for western pond
4 turtle.

5 The conservation strategy for western pond turtle involves restoration and protection of aquatic
6 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
7 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
8 addressed at the landscape and natural community levels. The BDCP has committed to late long-
9 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective
10 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) and up to 8,000 acres of upland habitat (Objective
11 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun
12 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in
13 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,
14 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are
15 preserved and managed as part of the 48,625 acres of protected cultivated lands described above for
16 giant garter snake are also expected to benefit the species. Additionally, basking platforms will be
17 installed as needed in restored freshwater marsh to benefit the western pond turtle.

18 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and
19 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow
20 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species
21 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to
22 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat
23 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle
24 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident
25 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the
26 rabbit.

27 The study area represents only a small portion of the range of the western pond turtle in California
28 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and
29 temporary loss or conversion of habitat for the western pond turtle, and other effects described
30 above, are not expected to result in an adverse effect on the long-term survival and recovery of
31 western pond turtle because for the following reasons.

- 32 ● The study area represents a small portion of the species' entire range.
- 33 ● Only 1% of the habitat in the study area would be removed or converted.

34 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
35 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
36 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal
37 perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland, grassland,
38 valley foothill riparian, that could overlap with the species model, would result in the restoration of
39 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western pond turtle. In
40 addition, protection of cultivated land, managed wetland, grassland, and valley/foothill riparian
41 could overlap with the species model and would result in the protection of 1,281 acres of aquatic
42 and 4,993 acres of upland western pond turtle modeled habitat.

43 The loss of western pond turtle habitat associated with Alternative 1B would represent an adverse
44 effect as a result of special-status species habitat modification and the potential direct mortality of

1 turtles. However, considering the habitat restoration and protection associated with the
2 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,
3 AMM10, and AMM17, which would be in place throughout the construction phase, the loss of habitat
4 and potential mortality would not have an adverse effect on western pond turtle. Therefore, the loss
5 of western pond turtle habitat and potential mortality of turtles from Alternative 1B would be less
6 than significant.

7 **Impact BIO-53: Indirect Effects of Plan Implementation on Western Pond Turtle**

8 Indirect effects on western pond turtle within 200 feet of construction activities could temporarily
9 affect the use of aquatic habitat and upland nesting, overwintering, and dispersal habitat for the
10 western pond turtle. Construction activities outside the construction footprint but within 200 feet of
11 water conveyance facilities, conservation components and ongoing habitat enhancement, as well as
12 operation and maintenance of above-ground water conveyance facilities, including the transmission
13 facilities, could result in ongoing periodic postconstruction disturbances with localized impacts on
14 western pond turtle habitat, and temporary noise and visual disturbances over the term of the
15 BDCP.

16 The use of mechanical equipment during water conveyance facilities construction could cause the
17 accidental release of petroleum or other contaminants that could affect western pond turtle or its
18 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond
19 turtle aquatic habitat could also have a negative effect on the species or its prey. AMM1–AMM6, and
20 AMM10 would minimize the likelihood of such spills and would ensure measures are in place to
21 prevent runoff from the construction area and potential effects of sediment or dust on western pond
22 turtle or its prey.

23 Water operations would affect salinity gradients in Suisun Marsh. This effect mechanism cannot be
24 disaggregated from tidal natural community restoration in Suisun Marsh. It is expected that the
25 salinity of water in Suisun Marsh would generally increase as a result of water operations and
26 operation of salinity control gates to mimic a more natural water flow. Results of modeling for full
27 implementation of the BDCP show salinity to double by the late long-term compared with current
28 conditions during late fall and winter months. Changes in salinity would not be uniform across
29 Suisun Marsh, as salinity would likely be more pronounced in some tidal channels and sloughs than
30 others, and most of the salinity increase would occur during the fall and winter. Western pond
31 turtles are primarily a freshwater species, although they can also be found in brackish marsh, and
32 could respond negatively to increased salinity in Suisun Marsh. However, most of the Suisun Marsh
33 pond turtle observations have been in the interior drainage ditches or near water control structures
34 not connected to tidal channels and sloughs in Suisun Marsh which is where increases in salinity
35 would occur. Therefore, the potential effects associated with changes in salinity are not expected to
36 adversely affect western pond turtles.

37 **NEPA Effects:** With implementation of AMM1–AMM6, AMM10, and AMM17 as part of Alternative 1B,
38 the BDCP would avoid the potential for adverse effects on western pond turtles, either directly or
39 through habitat modifications. These AMMs would also avoid and minimize effects that could
40 substantially reduce the number of western pond turtles or restrict the species range. Therefore, the
41 indirect effects of Alternative 1B would not have an adverse effect on western pond turtle.

42 **CEQA Conclusion:** Indirect effects resulting from conservation measure operations and maintenance
43 as well as construction-related noise and visual disturbances could impact western pond turtle in
44 aquatic and upland habitats. The use of mechanical equipment during construction could cause the

1 accidental release of petroleum or other contaminants that could affect western pond turtle or its
 2 prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond turtle
 3 habitat could also have a negative effect on the species or its prey. Changes in water salinity would
 4 have a less-than-significant impact on western pond turtles because most of the salinity increases
 5 would occur in areas not used extensively by western pond turtles. With implementation of AMM1–
 6 AMM6, AMM10, and AMM17 as part of Alternative 1B construction, operation, and maintenance, the
 7 BDCP would avoid the potential for substantial adverse effects on western pond turtles, either
 8 indirectly or through habitat modifications, and would not result in a substantial reduction in
 9 numbers or a restriction in the range of western pond turtles. The indirect effects of Alternative 1B
 10 would have a less-than-significant impact on western pond turtles.

11 **Impact BIO-54: Periodic Effects of Inundation of Western Pond Turtle Habitat as a Result of**
 12 **Implementation of Conservation Components**

13 *CM2 Yolo Bypass Fisheries Enhancement* would result in periodic inundation that could affect
 14 western pond turtle and its upland habitat. BDCP Appendix 5.J, *Effects on Natural Communities,*
 15 *Wildlife, and Plants*, provides the method used to estimate periodic inundation effects in the Yolo
 16 Bypass. Based on this method, periodic inundation could affect from an estimated 283 acres of
 17 habitat during 1,000 cfs notch flow to an estimated 798 acres of habitat during 4,000 cfs notch flow
 18 (Table 12-1B-23). This effect would occur during an estimated maximum of 30% of years, in areas
 19 that are already inundated in more than half of all years; therefore, these areas are expected to
 20 provide only marginal overwintering habitat for the western pond turtle under Existing Conditions.
 21 Furthermore, Yolo Bypass inundation is not expected to affect nesting western pond turtles because
 22 operations would not occur during the nesting season (approximately May through October).
 23 Therefore, Yolo Bypass operations are expect to have a minimal effect, if any, on western pond
 24 turtles in the Yolo Bypass.

25 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 331 acres of upland
 26 habitat for the western pond turtle in the south Delta (CZ 7 Seasonal flooding in restored floodplains
 27 is not expected to adversely affect aquatic and dispersal habitat, because these habitat functions are
 28 expected to remain in the seasonally inundated floodplains). Floodplains are not expected to be
 29 inundated during the nesting season; however, turtle hatchlings may overwinter in the nest and
 30 could be affected by flooding. Restored floodplains would transition for areas that flood frequently
 31 (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more); adverse
 32 effects on turtle hatchlings are most likely at the lower elevations of the restored floodplain, where
 33 frequent flooding occurs.

34 **NEPA Effects:** Periodic inundation of upland habitat for western pond turtle from CM2 and CM5
 35 associated with implementing Alternative 1B is not expected to result in adverse effects either
 36 directly or through habitat modifications, as it would not result in a substantial reduction in
 37 numbers or a restriction in the range of western pond turtles. Therefore, periodic inundation of
 38 western pond turtle habitat under Alternative 1B would not adversely affect the species.

39 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in
 40 various parts of the study area would periodically affect a total of up to 283-798 acres from CM2 and
 41 approximately 331 acres from CM5 of upland habitat for western pond turtle These acreages
 42 represent only 1% of the total upland western pond turtle habitat in the study area. Most of the
 43 increase in inundation would occur in the winter and early spring months, when western pond
 44 turtles may be in the water or overwintering and occupying upland habitats. Therefore,

1 implementing Alternative 1B, including AMM1–AMM6, AMM10, and AMM17, would not be expected
2 to result in substantial adverse effects on western pond turtle, either directly or through habitat
3 modifications, because it would not result in a substantial reduction in numbers or a restriction in
4 the range of western pond turtles. Periodic inundation under Alternative 1B would have a less-than-
5 significant impact on the species.

6 **Silvery Legless Lizard, San Joaquin Coachwhip, and Blainville’s Horned Lizard**

7 This section describes the effects of Alternative 1B on the silvery legless lizard, San Joaquin
8 coachwhip and Blainville’s horned lizard (special-status reptiles). The habitat types used to assess
9 effects on silvery legless lizard are limited to inland sand dunes near Antioch (CZ 9 and CZ 10),
10 which would not be affected by construction or restoration activities. This species is not discussed
11 any further.

12 The habitat types used to assess effects on the San Joaquin coachwhip are alkali seasonal wetland
13 complex, grassland, and inland dune scrub west of Byron Highway (CZ 7) and west of Old River and
14 West Canal (CZ 8). The habitat types used to assess effects on the Blainville’s horned lizard are the
15 same as those for the whipsnake in CZ 7 and CZ 8. There is also potential habitat for the horned
16 lizard to occur in grassland habitat around Stone Lake (CZ 4) Although the expected range for San
17 Joaquin coachwhip and Blainville’s horned lizard extends into the study area, there are no records
18 for either of these species within the study area (California Department of Fish and Wildlife 2013).
19 In addition, historic museum records show that Blainville’s horned lizard occurrences could have been
20 extirpated within the study area (Jennings and Hayes 1994).

21 Alternative 1B is expected to result in the temporary and permanent removal of habitat that special-
22 status reptiles uses for cover and dispersal (Table 12-1B-24). BDCP actions that could affect this
23 habitat are limited to construction and maintenance of the water conveyance facilities in the vicinity
24 of Clifton Court Forebay, and grassland restoration, protection and management. Full
25 implementation of Alternative 1B would also include the following biological objectives over the
26 term of the BDCP that would also benefit special-status reptiles (BDCP Chapter 3, *Conservation*
27 *Strategy*).

- 28 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
29 between existing conservation lands (Objective L1.6, associated with CM3).
- 30 ● Increase native species diversity and relative cover of native plant species, and reduce the
31 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 32 ● Protect and improve habitat linkages that allow native terrestrial species to move between
33 protected habitats within and adjacent to the Plan Area (Objective L3.1, associated with CM3,
34 CM8, and CM11).
- 35 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 36 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland
37 (Objective GNC1.2, associated with CM3 and CM8).

38 As explained below, with the restoration or protection of these amounts of habitat, in addition to
39 implementation of AMMs, impacts on special-status reptiles would not be adverse for NEPA
40 purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-24. Changes in Special-Status Reptile Habitat Associated with Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Grassland	170	170	165	165	NA	NA
Total Impacts CM1		170	170	165	165	NA	NA
CM2–CM18	Grassland	0	0	0	0	0	0
Total Impacts CM2–CM18		0	0	0	0	0	0
TOTAL IMPACTS CYL/SJW		170	170	165	165	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-55: Loss or Conversion of Habitat for and Direct Mortality of Special-Status**
4 **Reptiles**

5 Alternative 1B conservation measures would result in the permanent and temporary loss of 335
6 acres of potential habitat for special-status reptiles (Table 12-1B-24). Water conveyance facilities
7 and transmission line construction, including establishment and use of RTM, borrow and spoils
8 areas, (CM1) would cause the loss of special-status reptile habitat. In addition, habitat enhancement
9 and management activities (CM11), such as ground disturbance or removal of nonnative vegetation,
10 could result in local adverse habitat effects for special-status reptiles. For purposes of this analysis,
11 the acres of total effect are considered the same for both San Joaquin coachwhip and Blainville’s
12 horned lizard, even though this would result in slightly more acres of permanent effect on the San
13 Joaquin coachwhip resulting from water conveyance facilities activities in CZ 4 where it does not
14 occur.

15 In addition to habitat loss and conversion, construction activities, such as grading, the movement of
16 construction vehicles or heavy equipment, and the installation of water conveyance facilities
17 components and new transmission lines, may result in the direct mortality, injury, or harassment of
18 special-status reptiles, including the potential crushing of individuals and disruption of essential
19 behaviors. Construction of access roads could fragment suitable habitat, potentially impede upland
20 movements in some areas, and increase the risk of road mortality. Construction activities related to
21 conservation components could have similar affects. Each of these individual activities is described
22 below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion
23 follow the individual conservation measure discussions.

- 24 • *CM1 Water Facilities and Operation*: Development of the conveyance facilities would result in the
25 permanent loss of approximately 170 acres of potential habitat for special-status reptiles in the

1 vicinity of Clifton Court Forebay and Stone Lakes. Construction-related effects would
2 temporarily disturb 165 acres for both species in the study area.

- 3 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
4 actions included in *CM11* that are designed to enhance wildlife values in BDCP-protected
5 habitats may result in localized ground disturbances that could temporarily remove small
6 amounts of special-status reptile habitat. Ground-disturbing activities, such as removal of
7 nonnative vegetation and road and other infrastructure maintenance, are expected to have
8 minor adverse effects on available special-status reptile habitat and are expected to result in
9 overall improvements to and maintenance of species habitat values over the term of the BDCP.
10 These effects cannot be quantified, but are expected to be minimal and would be reduced
11 through implementation of Mitigation Measure BIO-55, *Conduct Preconstruction Surveys for*
12 *Noncovered Special-Status Reptiles and Implement Applicable AMMs*.
- 13 ● Operations and maintenance: Ongoing facilities operation and maintenance is expected to have
14 little if any adverse effect on special-status reptiles. Postconstruction operation and
15 maintenance of the above-ground water conveyance facilities could result in ongoing but
16 periodic disturbances that could affect special-status reptiles' use of suitable habitat in the study
17 area. These effects, however, would be minimized with implementation of Mitigation Measure
18 BIO-55.
- 19 ● Injury and direct mortality: Construction vehicles may cause injury to or mortality of special-
20 status reptiles. The operation of equipment for land clearing, construction, operation and
21 maintenance, and restoration, enhancement, and management activities could result in injury or
22 mortality. This risk is highest from late fall through early spring, when special-status reptiles are
23 not as active. However, the risk of crushing Blainville's horned lizard would not necessarily be
24 lower during the active season, because the species uses crypsis to hide from predators and
25 would be hard to spot from a moving vehicle. Seasonal risk reduction may be more appropriate
26 for the coachwhip, but there is still a risk of crushing the horned lizard during the active season.
27 In addition, both species would not be active under conditions of extreme temperatures and
28 could be taking cover in burrows or crevices or under structures such as rocks or logs (Morey
29 2000). They could also burrow beneath the soil and be crushed by vehicles. *P. blainvillii* may
30 only be active during the early morning and evening hours in the summer (Morey 2000).
31 Increased vehicular traffic associated with BDCP actions could contribute to a higher incidence
32 of road kill. However, conducting construction during the late-spring through early fall periods
33 when feasible, and when temperatures are 67–100 degrees F, and implementation of Mitigation
34 Measure BIO-55 would avoid and minimize injury or mortality of special-status reptiles during
35 construction.

36 The following paragraphs summarize the combined effects discussed above and describe other
37 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
38 also included.

39 ***Near-Term Timeframe***

40 Because the water conveyance facilities construction is being evaluated at the project level, the near-
41 term BDCP conservation strategy has been evaluated to determine whether it would provide
42 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
43 construction effects would not be adverse under NEPA.

1 Alternative 1B would remove 335 acres of grassland habitat for California horned lizard and 341
2 acres of grassland habitat for San Joaquin whipsnake under CM1. The typical NEPA mitigation ratio
3 (2:1 for protection) for this natural community would indicate that up to 670 acres should be
4 protected for both species in the near-term to offset CM1 losses.

5 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection
6 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all
7 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and
8 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

9 Considering the BDCP conservation strategy and the implementation of Mitigation Measure BIO-55.
10 to avoid and minimize injury or mortality of special-status reptiles during construction, the
11 permanent and temporary loss of special-status reptile habitat and the potential mortality of either
12 species from Alternative 1B would not be an adverse effect.

13 ***Late Long-Term Timeframe***

14 Alternative 1B as a whole would result in the permanent loss of up to 335 acres of special-status
15 reptile habitat over the life of the plan.

16 Effects of water conveyance facilities construction would be offset through the plan's long-term
17 commitment to protect 8,000 acres of grassland, and grassland associated with alkali seasonal
18 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the Plan area.
19 Grassland protection would focus in particular on acquiring the largest remaining contiguous
20 patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (Objective
21 GNC1.1). This area connects to more than 620 acres of existing habitat that is protected under the
22 East Contra Costa County HCP/NCCP.

23 Other effects would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*
24 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable AMMs*. The
25 plan as a whole is expected to benefit special-status reptiles that could be present by protecting
26 potential habitat from loss or degradation that otherwise could occur with future changes in existing
27 land use. To the extent that grassland habitat is restored in CZ 8, restoration would remove
28 unsuitable special-status reptile habitat, such as cultivated land, and replace it with high-value
29 cover, foraging, and dispersal habitat. The overall effect would be beneficial because the Alternative
30 1B would result in a net increase in acreage of grassland habitat in the Plan Area.

31 BDCP's commitment to protect the largest remaining contiguous habitat patches (including
32 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in
33 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities
34 construction.

35 ***NEPA Effects:*** In the near-term and late long-term, the loss of special-status reptile habitat under
36 Alternative 1B would be not be adverse because the BDCP has committed to protecting the acreage
37 required to meet the typical mitigation ratios described above. In addition, Mitigation Measure BIO-
38 55 would be available to address effects of habitat loss.

39 ***CEQA Conclusion:***

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-
3 term BDCP conservation strategy has been evaluated to determine whether it would provide
4 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
5 construction impacts would be less than significant.

6 Alternative 1B would remove 335 acres of special-status reptile habitat as a result of CM1.

7 The typical CEQA mitigation ratio (2:1 for protection) for this natural community would indicate
8 that up to 670 acres should be protected for both species in the near-term to offset CM1 losses.

9 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection
10 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all
11 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and
12 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

13 The natural community restoration and protection activities are expected to be concluded during
14 the first 10 years of Plan implementation, which is close enough to the timing of construction
15 impacts to constitute mitigation for CEQA purposes. Considering the BDCP conservation strategy
16 and the implementation of Mitigation Measure BIO-55, the permanent and temporary loss of
17 special-status reptile habitat and the potential mortality of either species would be a less-than-
18 significant impact.

19 **Late Long-Term Timeframe**

20 Alternative 1B as a whole would result in the permanent loss of up to 335 acres of special-status
21 reptile habitat over the life of the plan. Effects of water conveyance facilities construction would be
22 offset through the plan's long-term commitment to protect up to 8,000 acres of grassland, and
23 grassland associated with alkali seasonal wetlands and vernal pool complexes, and to restore 2,000
24 acres of grassland in the Plan area (Objective GNC1.1 and Objective GNC1.2). Grassland protection
25 would focus in particular on acquiring the largest remaining contiguous patches of unprotected
26 grassland habitat, which are located south of SR 4 in CZ 8 (Objective GNC1.1). This area connects to
27 more than 620 acres of existing habitat that is protected under the East Contra Costa County
28 HCP/NCCP.

29 Other impacts would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*
30 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable AMMs*. The
31 plan as a whole is expected to benefit special-status reptiles that could be present by protecting
32 potential habitat from loss or degradation that otherwise could occur with future changes in existing
33 land use. To the extent that grassland habitat is restored in CZ 8, restoration would remove
34 unsuitable special-status reptile habitat, such as cultivated land, and replace it with high-value
35 cover, foraging, and dispersal habitat. The overall impact would be beneficial because Alternative 1B
36 would result in a net increase in acreage of grassland habitat in the study area.

37 BDCP's commitment to protect the largest remaining contiguous habitat patches (including
38 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in
39 CZ 8 would sufficiently offset the impacts resulting from water conveyance facilities construction.
40 Considering the BDCP conservation strategy and the implementation of Mitigation Measure BIO-55,
41 the permanent and temporary loss of special-status reptile habitat and the potential mortality of
42 either species under Alternative 1B would not result in a significant impact.

1 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**
2 **Status Reptiles and Implement Applicable AMMs**

3 DWR will retain a qualified biologist to conduct a habitat assessment in construction and
4 restoration areas that are relatively undisturbed or have a moderate to high potential to support
5 noncovered special-status reptiles (Blainville's horned lizard and San Joaquin coachwhip) in CZ
6 4, CZ 7, and CZ 8. The qualified biologist will survey for noncovered special-status reptiles in
7 areas of suitable habitat concurrent with the preconstruction surveys for covered species in CZ
8 4, CZ 7, and CZ 8. If special-status reptiles are found in work area, the biologist will first attempt
9 to allow these species to move out of the work area on their own but if conditions do not allow
10 this, individuals will be captured by the biologist and relocated to the nearest suitable
11 habitat outside of the work area as determined in consultation with CDFW. To the extent
12 feasible, work in areas of suitable habitat for Blainville's horned lizard and San Joaquin
13 coachwhip should not be conducted during periods of cold and hot temperatures (below 67
14 degrees F and above 100 degrees F), because both species would be relatively inactive during
15 these periods and could be taking cover in loose soil, in burrows or crevices, or under structures
16 such as rocks or logs (Morey 2000). This would reduce the impact of being crushed by vehicles
17 and equipment.

18 In addition, *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices*
19 *and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
20 *Affected Natural Communities* would be implemented for all noncovered special-status reptiles
21 adversely affected by the BDCP to avoid, minimize, or compensate for impacts.

22 **Impact BIO-56: Indirect Effects of Plan Implementation on Special-Status Reptile Species**

23 Construction activities associated with water conveyance facilities, conservation components and
24 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
25 conveyance facilities, including the transmission facilities, could result in ongoing periodic
26 postconstruction disturbances and noise with localized effects on special-status reptiles and their
27 habitat over the term of the BDCP. In addition, construction activities could indirectly affect special-
28 status reptiles if construction resulted in the introduction of invasive weeds that create vegetative
29 cover that is too dense for the species to navigate. Construction vehicles and equipment can
30 transport in their tires and various parts under the vehicles invasive weed seeds and vegetative
31 parts from other regions to construction sites, resulting in habitat degradation. These potential
32 effects would be reduced through implementation of *AMM10 Restoration of Temporarily Affected*
33 *Natural Communities*.

34 Water conveyance facilities operations and maintenance activities would include vegetation and
35 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
36 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance
37 activities are not expected to remove special-status reptile habitat, operation of equipment could
38 disturb small areas of vegetation around maintained structures and could result in injury or
39 mortality of individual special-status reptiles, if present.

40 **NEPA Effects:** Implementation of Mitigation Measure BIO-55, *Conduct Preconstruction Surveys for*
41 *Noncovered Special-Status Reptiles and Implement Applicable AMMs*, would avoid the potential for
42 substantial adverse effects on these species, either indirectly or through habitat modifications. The
43 mitigation measures would also avoid and minimize effects that could substantially reduce the

1 number of special-status reptiles, or restrict either species' range. Therefore, with implementation
2 of Mitigation Measure BIO-55, the indirect effects of Alternative 1B on special-status reptiles would
3 not be an adverse effect under NEPA.

4 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
5 as construction-related noise and visual disturbances could impact special-status reptiles. In
6 addition, construction activities could indirectly affect special-status reptiles if construction resulted
7 in the introduction of invasive weeds that create vegetative cover that is too dense for the species to
8 navigate. Water conveyance facilities operations and maintenance activities, such as vegetation and
9 weed control, and road maintenance, are not expected to remove special-status reptile habitat, but
10 operation of equipment could disturb small areas of vegetation around maintained structures and
11 could result in injury or mortality of individual special-status reptiles, if present. With
12 implementation of Mitigation Measure BIO-55 as part of Alternative 1B construction, operation, and
13 maintenance, the BDCP would avoid the potential for significant effects on special-status reptile
14 species, either indirectly or through habitat modifications, and would not result in a substantial
15 reduction in numbers or a restriction in the range of either species. With implementation of
16 Mitigation Measure BIO-55, the indirect effects of Alternative 1B would have a less-than-significant
17 impact on special-status reptiles.

18 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**
19 **Status Reptiles and Implement Applicable AMMs**

20 See description of Mitigation Measure BIO-55 under Impact BIO-55.

21 **California Black Rail**

22 This section describes the effects of Alternative 1B, including water conveyance facilities
23 construction and implementation of other conservation components, on California black rail. The
24 habitat model used to assess effects on the California black rail is based on primary breeding habitat
25 and secondary habitat. Primary (breeding) habitat for this species within the Delta consists of all
26 *Schoenoplectus* and *Typha*-dominated tidal and nontidal freshwater emergent wetland in patches
27 greater than 0.55 acre (essentially, instream islands of the San Joaquin River and its tributaries and
28 White Slough Wildlife Area). In Suisun Marsh, primary habitat consists of all *Schoenoplectus* and
29 *Typha*-dominated, and *Salicornia*-dominated patches greater than 0.55 acre, with the exception that
30 all low marsh habitats dominated by *Schoenoplectus acutus* and *S. californicus* and all managed
31 wetlands, in general, are considered secondary habitat with lesser ecological value. Upland
32 transitional zones, providing refugia during high tides, within 150 feet of the tidal wetland edge
33 were also included as secondary habitat. Secondary habitats generally provide only a few ecological
34 functions such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland
35 transition zones), while primary habitats provide multiple functions, including breeding, effective
36 predator cover, and valuable foraging opportunities.

37 Construction and restoration associated with Alternative 1B conservation measures would result in
38 both temporary and permanent losses of California black rail modeled habitat as indicated in Table
39 12-1B-25. Full implementation of Alternative 1B would also include the following conservation
40 actions over the term of the BDCP to benefit the California black rail (BDCP Chapter 3, Section 3.3,
41 *Biological Goals and Objectives*).

- 1 • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11, including at
2 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
3 with CM4).
- 4 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
5 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 6 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
7 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 8 • Create 1,700 acres of black rail habitat between restored tidal freshwater emergent wetlands
9 and transitional uplands to provide upland refugia (Objective CBR1.1, associated with CM4).
- 10 • Create topographic heterogeneity in restored tidal brackish and freshwater emergent wetlands
11 (Objectives TBEWNC1.4 and TFEWNC2.2, associated with CM4).
- 12 • Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
13 natural community within the reserve system (Objective TBEWNC2.1, associated with CM11).

14 As explained below, with the restoration and protection of these amounts of habitat, in addition to
15 natural community enhancement and management commitments (including CM12 *Methylmercury*
16 *Management*) and implementation of AMM1–AMM7, AMM38 *California Black Rail*, and AMM27
17 *Selenium Management*, impacts on the California black rail would not be adverse for NEPA purposes
18 and would be less than significant for CEQA purposes.

19 **Table 12-1B-25. Changes in California Black Rail Modeled Habitat Associated with Alternative 1B**
20 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0	0	3	3	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		0	0	3	3	NA	NA
CM2–CM18	Primary	76	84	0	0	0	0
	Secondary	986	3,044	0	0	0	0
Total Impacts CM2–CM18		1,062	3,128	0	0	0	0
TOTAL IMPACTS		1,062	3,128	3	3	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-57: Loss or Conversion of Habitat for and Direct Mortality of California Black Rail

Alternative 1B conservation measures would result in the combined permanent and temporary loss of up to 87 acres of modeled primary habitat and up to 3,044 acres of modeled secondary habitat for California black rail (Table 12-1B-25). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1) and tidal natural communities restoration (CM4). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate California black rail habitat. Each of these individual activities is described below. A summary statement of the combined NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would result in the temporary loss of up to 3 acres of modeled primary California black rail habitat (Table 12-1B-25). Activities that would impact modeled habitat consist of consists of potential temporary siphon work areas at White Slough and south of King Island in CZ 5 and a proposed temporary transmission line east of the new forebay in CZ 8. The CM1 footprint intersects with one California black rail occurrence south of Sycamore Slough, from the footprint of a temporary work area. The implementation of *AMM38 California Black Rail* would minimize the effects of construction on rails if present in the area (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations. These losses would take place within the first 10 years of Alternative 1B implementation.
- *CM2 Yolo Bypass Fisheries Enhancement:* Construction or channel modification from fish passage improvements associated with the Yolo Bypass would result in the permanent removal of approximately 5 acres of primary California black rail habitat in CZ 2. The loss would be expected to occur during the first 10 years of Alternative 1B implementation. There are no occurrences of California black rail that intersect with the CM2 footprint.
- *CM4 Tidal Natural Communities Restoration:* California black rail modeled habitat would be affected by tidal marsh restoration. Some California black rail modeled habitat would be permanently lost such that it no longer serves as habitat, while other modeled habitat would change value through conversion from one habitat type to another. Tidal habitat restoration site preparation and inundation would result in the permanent loss of 79 acres of primary habitat and 3,044 acres of secondary habitat for California black rail. Of the 79 acres of primary habitat lost, an estimated 76 acres would be converted to low marsh, or secondary habitat, for the species due to increased water elevations.

The majority of the effects of tidal natural communities restoration would occur in Suisun Marsh (CZ 11). Much of the natural wetland habitat that would be removed occurs in isolated patches and would be replaced by larger continuous areas of tidal wetlands that are expected to support higher habitat functions for the rail than the impacted wetlands. As described in the BDCP, restoration of up to 24,000 acres of tidal freshwater emergent wetland in the Delta and at least 6,000 acres of tidal brackish emergent wetland natural communities in CZ 11 by the late long-term would benefit California black rail. The primary habitat for the species in the Delta consists of inchannel islands, which are in areas that are most vulnerable to the effects of sea level rise in the study area. Tidal restoration under CM4 would ensure that land is protected adjacent to

1 current habitat in the delta with the consideration of sea level rise. Tidal restoration projects
2 would include an ecotone between wetlands and transitional uplands which would provide
3 upland refugia for the species.

4 The tidal natural communities restoration would be phased through the course of the BDCP
5 restoration program to allow for recovery of some areas before the initiation of restoration
6 actions in other areas. However, California black rails have a greater use of mature tidal marshes
7 and, therefore, it would be years before the newly restored marshes provided suitable habitat
8 for the species. In the long-term, tidal natural communities restoration is expected to have little
9 to no adverse effects on California black rail habitat because the habitat removed would be
10 replaced by a greater acreage of high-value tidal wetland and, thus, is expected to provide a
11 benefit for California black rail.

- 12 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
13 actions contained in CM11 that are designed to enhance wildlife values in restored and
14 protected tidal wetland habitats may result in localized ground disturbances that could
15 temporarily remove small amounts of California black rail habitat. Ground-disturbing activities,
16 such as removal of nonnative vegetation and road and other infrastructure maintenance
17 activities, are expected to have minor adverse effects on available California black rail habitat
18 and are expected to result in overall improvements and maintenance of California black rail
19 habitat values over the term of the BDCP. Noise and visual disturbances during implementation
20 of habitat management actions could also result in temporary disturbances that affect California
21 black rail use of the surrounding habitat. These effects cannot be quantified, but would be
22 avoided and minimized by the AMMs listed below. Additional actions under CM11 include the
23 control of nonnative predators to reduce nest predation as needed.
- 24 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
25 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
26 disturbances that could affect California black rail use of the surrounding habitat in Suisun and
27 the central Delta. Maintenance activities would include vegetation management, levee and
28 structure repair, and re-grading of roads and permanent work areas. These effects, however,
29 would be reduced by AMMs and conservation actions as described below.
- 30 ● *Injury and Direct Mortality*: Construction vehicle activity may cause injury or mortality to
31 California black rail. If rails are present adjacent to covered activities, the operation of
32 equipment for land clearing, construction, conveyance facilities operation and maintenance, and
33 habitat restoration, enhancement, and management could result in injury or mortality of
34 California black rail. Increased vehicular traffic associated with BDCP actions could contribute to
35 a higher incidence of road kill. However, conducting construction outside of the breeding season
36 where feasible (reducing the risk of impacting active nests), construction monitoring, and other
37 measures would be implemented to avoid and minimize injury or mortality of the species during
38 construction, as required by AMM1–AMM7 and *AMM38 California Black Rail*.

39 The following paragraphs summarize the combined effects discussed above and describe other
40 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
41 included.

42 ***Near-Term Timeframe***

43 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
44 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
2 effects of construction would not be adverse under NEPA. With Alternative 1B implementation,
3 there would be a loss of 1,065 acres of modeled habitat for California black rail in the study area in
4 the near-term. These effects would result from the construction of the water conveyance facilities
5 (CM1, 3 acres of primary habitat), and implementing other conservation measures (*CM2 Yolo Bypass*
6 *Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration*—76 acres of primary
7 habitat, 986 acres of secondary habitat).

8 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
9 be affected and that are identified in the biological goals and objectives for California black rail in
10 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such
11 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.
12 Using this ratio would indicate that 3 acres of tidal natural communities should be restored/created
13 to compensate for the CM1 losses of California black rail habitat. The near-term effects of other
14 conservation actions would remove 1,062 acres of tidal natural communities, therefore requiring
15 1,062 acres of tidal natural communities restoration using the same typical NEPA and CEQA ratio
16 (1:1 for restoration).

17 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
18 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in
19 the Plan Area (Table 3-4 in Chapter 3). These conservation actions are all associated with CM4 and
20 would occur in the same timeframe as the construction and early restoration losses, thereby
21 avoiding adverse effects of habitat loss on California black rail. The tidal brackish emergent wetland
22 would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the Suisun
23 Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex (Objective
24 TBEWNC1.1, BDCP Chapter 3, *Conservation Strategy*) and the tidal freshwater emergent wetland
25 would be restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition,
26 tidal brackish and tidal freshwater emergent wetlands would be restored in a way that creates
27 topographic heterogeneity and in areas that increase connectivity among protected lands
28 (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of managed wetland
29 protected and enhanced in CZ 11 would benefit the California black rail through the enhancement of
30 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists
31 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-
32 American bulrush plant associations (Objective MWNC1.1). These Plan objectives represent
33 performance standards for considering the effectiveness of CM4 restoration actions. The acres of
34 restoration and protection contained in the near-term Plan goals and the additional detail in the
35 biological objectives for California black rail satisfy the typical mitigation that would be applied to
36 the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation
37 measures.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
41 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM38*
42 *California Black Rail*. All of these AMMs include elements that would avoid or minimize the risk of
43 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
44 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
45 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary
 3 habitat for California black rail. Alternative 1B as a whole would result in the permanent loss of and
 4 temporary effects on 87 acres of primary habitat and 3,044 acres of secondary habitat for California
 5 black rail during the term of the Plan (1% of the total primary habitat in the study area and 17% of
 6 the total secondary habitat in the study area). The locations of these losses are described above in
 7 the analyses of individual conservation measures. The Plan includes conservation commitments
 8 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000 acres of tidal
 9 brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres of tidal
 10 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). These tidal
 11 wetlands would be restored as a mosaic of large, interconnected and biologically diverse patches,
 12 and at least 1,500 acres of restored marsh would consist of middle-and high-marsh vegetation with
 13 dense, tall stands of pickleweed and bulrush cover serving as primary habitat for California black
 14 rail in Suisun Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for
 15 California black rail would be created between the restored tidal freshwater emergent wetlands and
 16 transitional uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and
 17 CBR1.1). Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of
 18 *CM3 Natural Communities Protection and Restoration* would benefit the California black rail through
 19 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
 20 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
 21 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional
 22 pressures on the species such as loss of habitat from invasive species and mortality from nest
 23 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes
 24 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more
 25 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11
 26 (TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if
 27 necessary through *CM11 Natural Communities Enhancement and Management*.

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
 29 *Plant Species*) estimates that the restoration and protection actions discussed above would result in
 30 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for
 31 California black rail and the protection of 275 acres of secondary habitat for the species.

32 **NEPA Effects:** The loss of California black rail habitat and potential direct mortality of this special-
 33 status species under Alternative 1B would represent an adverse effect in the absence of other
 34 conservation actions. However, with habitat protection and restoration associated with CM4, guided
 35 by the biological objectives for the species and by *AMM1 Worker Awareness Training, AMM2*
 36 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
 37 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 38 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM38*
 39 *California Black Rail*, which would be in place throughout the construction period, the effects of
 40 Alternative 1B as a whole on California black rail would not be adverse under NEPA.

41 **CEQA Conclusion:**

42 **Near-Term Timeframe**

43 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 44 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
2 effects of construction would be less than significant under CEQA. With Alternative 1B
3 implementation, there would be a loss of 1,065 acres of modeled habitat for California black rail in
4 the study area in the near-term. These effects would result from the construction of the water
5 conveyance facilities (CM1, 3 acres of primary habitat), and implementing other conservation
6 measures (*CM2 Yolo Bypass Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration*–
7 76 acres of primary habitat, 986 acres of secondary habitat).

8 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
9 be affected and that are identified in the biological goals and objectives for California black rail in
10 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such
11 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.
12 Using this ratio would indicate that 3 acres of tidal natural communities should be restored/created
13 to mitigate the CM1 losses of California black rail habitat. The near-term effects of other
14 conservation actions would remove 1,062 acres of tidal natural communities, therefore requiring
15 1,062 acres of tidal natural communities restoration using the same typical NEPA and CEQA ratio
16 (1:1 for restoration).

17 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
18 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in
19 the Plan Area (Table 3-4 in Chapter 3). These conservation actions are all associated with CM4 and
20 would occur in the same timeframe as the construction and early restoration losses, thereby
21 avoiding adverse effects of habitat loss on California black rail. The tidal brackish emergent wetland
22 would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the Suisun
23 Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex (Objective
24 TBEWNC1.1) and the tidal freshwater emergent wetland would be restored in CZ 1, CZ 2, CZ 4, CZ 5,
25 CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition, tidal brackish and tidal freshwater emergent
26 wetlands would be restored in a way that creates topographic heterogeneity and in areas that
27 increase connectivity among protected lands (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of
28 the 4,800 acres of managed wetland protected and enhanced in CZ 11 would benefit the California
29 black rail through the enhancement of degraded areas (such as areas of bare ground or marsh where
30 the predominant vegetation consists of invasive species such as perennial pepperweed) to
31 vegetation such as pickleweed-alkali heath-American bulrush plant associations (Objective
32 MWNC1.1). These Plan objectives represent performance standards for considering the
33 effectiveness of CM4 restoration actions.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM38*
38 *California Black Rail*. All of these AMMs include elements that would avoid or minimize the risk of
39 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
40 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
41 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

42 The natural community restoration and protection activities would be concluded in the first 10
43 years of Plan implementation, which is close enough in time to the occurrence of impacts to
44 constitute adequate mitigation for CEQA purposes. In addition, *AMM38 California Black Rail* and
45 *AMM1–AMM7* would avoid and minimize potential impacts on the species from construction-related

1 habitat loss and noise and disturbance. Because the number of acres required to meet the typical
 2 mitigation ratio described above would be only 3,608 acres of restored/created tidal natural
 3 communities, the 10,850 acres of tidal brackish and tidal freshwater emergent wetland restoration
 4 and the 4,100 acres of managed wetland protection and enhancement contained in the near-term
 5 Plan goals, and the additional detail in the biological objectives for California black rail, are more
 6 than sufficient to support the conclusion that the near-term impacts of habitat loss and direct
 7 mortality under Alternative 1B would be less than significant under CEQA.

8 ***Late Long-Term Timeframe***

9 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary
 10 habitat for California black rail. Alternative 1B as a whole would result in the permanent loss of and
 11 temporary effects on 87 acres of primary habitat and 3,044 acres of secondary habitat for California
 12 black rail during the term of the Plan (1% of the total primary habitat in the study area and 17% of
 13 the total secondary habitat in the study area). The locations of these losses are described above in
 14 the analyses of individual conservation measures. The Plan includes conservation commitments
 15 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000 acres of tidal
 16 brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres of tidal
 17 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (TFEWNC1.1). These tidal wetlands would
 18 be restored as a mosaic of large, interconnected and biologically diverse patches and much of the
 19 restored marsh would consist of middle-and high-marsh vegetation with dense, tall stands of
 20 pickleweed and bulrush cover, serving as primary habitat for California black rail in Suisun Marsh
 21 (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for California black rail
 22 would be created between the restored tidal freshwater emergent wetlands and transitional
 23 uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and CBR1.1).
 24 Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of *CM3*
 25 *Natural Communities Protection and Restoration* would benefit the California black rail through the
 26 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
 27 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
 28 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional
 29 pressures on the species such as loss of habitat from invasive species and mortality from nest
 30 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes
 31 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more
 32 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11
 33 (TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if
 34 necessary through *CM11 Natural Communities Enhancement and Management*.

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 36 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 37 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 38 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM38*
 39 *California Black Rail*. All of these AMMs include elements that would avoid or minimize the risk of
 40 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
 41 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
 42 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

43 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
 44 *Plant Species*) estimates that the restoration and protection actions discussed above would result in

1 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for
2 California black rail and the protection of 275 acres of secondary habitat for the species.

3 Considering these protection and restoration provisions, which would provide acreages of new or
4 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction
5 and restoration activities, loss of habitat or direct mortality through implementation of Alternative
6 1B would not result in a substantial adverse effect through habitat modifications and would not
7 substantially reduce the number or restrict the range of the species. Therefore, the alternative
8 would have a less-than-significant impact on California black rail.

9 **Impact BIO-58: Effects on California Black Rail Associated with Electrical Transmission** 10 **Facilities**

11 New transmission lines would increase the risk for bird-power line strikes, which could result in
12 injury or mortality of California black rail. A variety of rail species are known to suffer mortality
13 from transmission line collision, likely associated with migration and flights between foraging areas
14 (Eddleman et al 1994). Due to their wing shape and body size, rails have low to moderate flight
15 maneuverability (Bevanger 1998), increasing susceptibility to collision mortality. However, there
16 are relatively few records of California black rail collisions with overhead wires. California black
17 rails exhibit daytime site fidelity and a lack of long-distance night migration, two factors which are
18 associated with low collision risk in avian species (Eddleman et al. 1994). California black rail
19 movements in the study area are likely short, seasonal, and at low altitudes, typically less than 16
20 feet (5 meters) (Eddleman et al 1994). However, although the species may have low to moderate
21 flight maneuverability, the bird's behavior (e.g., sedentary, nonmigratory, ground-nesting and
22 foraging, solitary, no flocking, secretive) reduces potential exposure to overhead wires and
23 vulnerability to collision mortality (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird*
24 *Collisions at Proposed BDCP Powerlines*). Marking transmission lines with flight diverters that make
25 the lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
26 Drewien 1995). For example, Yee (2008) estimated that marking devices in the Central Valley could
27 reduce avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new project
28 transmission lines would be fitted with flight diverters, which would eliminate any potential for
29 mortality of California black rail individuals from powerline collisions.

30 Transmission line poles and towers also provide perching substrate for raptors, which are predators
31 on California black rail. Although there is potential for transmission lines constructed in the Delta to
32 increase perching opportunities for raptors and result in increased predation pressure on local
33 black rails, little is currently known about the seasonal movements of black rails or the potential for
34 increased predation on rails near power poles. Therefore, because of the limited area over which
35 poles would be installed relative to the amount of California black rail habitat in the Delta, it is
36 assumed that the increase in predation risk on California black rail from an increase in raptor
37 perching opportunities would be negligible.

38 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
39 adverse effect because the risk of bird strike is considered to be minimal based on the species' flight
40 behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike
41 diverters on all new powerlines and select existing powerlines, which would minimize the risk of
42 bird strike for California black rails in the Delta. The increase in predation risk on California black
43 rail from an increase in raptor perching opportunities is considered negligible because of the limited
44 area over which poles would be installed relative to the amount of California black rail habitat in the

1 Delta. Therefore, the construction and operation of new transmission lines would not result in an
2 adverse effect on California black rail.

3 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
4 significant impact on California black rail because the risk of bird strike is considered to be minimal
5 based on the species' flight behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the
6 commitment to place bird strike diverters on all new powerlines, which would minimize the risk of
7 bird strike for California black rails in the Delta. The increase in predation risk on California black
8 rail from an increase in raptor perching opportunities is considered negligible because of the limited
9 area over which poles would be installed relative to the amount of California black rail habitat in the
10 Delta. Therefore, the construction and operation of new transmission lines under Alternative 1B
11 would result in a less-than-significant impact on California black rail.

12 **Impact BIO-59: Indirect Effects of Plan Implementation on California Black Rail**

13 **Indirect Construction-Related Effects:** Both primary and secondary habitat for California black
14 rail within the vicinity of proposed construction areas could be indirectly affected by construction
15 activities. Indirect effects associated with construction include noise, dust, and visual disturbance
16 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
17 footprint but within 500 feet from the construction edge. Construction noise above background
18 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
19 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
20 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
21 the extent to which these noise levels could affect California black rail. The use of mechanical
22 equipment during water conveyance facilities construction could cause the accidental release of
23 petroleum or other contaminants that could affect California black rail in the surrounding habitat.
24 The inadvertent discharge of sediment or excessive dust adjacent to California black rail habitat
25 could also affect the species.

26 If construction occurs during the nesting season, these indirect effects could result in the loss or
27 abandonment of nests, and mortality of any eggs and/or nestlings. However, there is a commitment
28 in AMM38 that preconstruction surveys of potential breeding habitat would be conducted within
29 700 feet of project activities, and a 500-foot no-disturbance buffer would be established around any
30 territorial call-centers during the breeding season (see Appendix 3B, *Environmental Commitments*,
31 *AMMs*, and *CMs*). In addition, construction would be avoided altogether if breeding territories cannot
32 be accurately delimited.

33 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients
34 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would
35 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh
36 would generally increase as a result of water operations and operations of salinity-control gates to
37 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland
38 plant communities tolerant of more brackish environments, which should be beneficial to California
39 black rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

40 **Methylmercury Exposure:**

41 The modeled primary habitat for California black rail includes tidal brackish emergent wetland and
42 tidal freshwater emergent wetland in Suisun Marsh and the Delta west of Sherman Island, and
43 instream islands and White Slough Wildlife Area in the central Delta. Black rails typically occur in

1 the high marsh zone near the upper limit of tidal flooding in salt and brackish habitats. Low marsh,
2 managed wetlands, and the upland fringe are considered secondary habitat. California black rails are
3 a top predator in the benthic food chain; they nest and forage in dense vegetation and prey on
4 isopods, insects and arthropods from the surface of mud and vegetation They also consume insects
5 and seeds from bulrushes (*Schoenoplectus* spp.) and cattails (*Typha* spp.) (Eddleman et al. 1994).

6 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, Substantive BDCP
7 Revisions). Results of the quantitative modeling of mercury effects on largemouth bass as a
8 surrogate species would overestimate the effects on black rail. Organisms feeding within pelagic-
9 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
10 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
11 segregation (Grimaldo et al. 2009). Modeled effects of mercury concentrations from changes in
12 water operations under CM1 on largemouth bass did not differ substantially from existing
13 conditions; therefore, results also indicate that black rail mercury tissue concentrations would not
14 measurably increase as a result of CM1 implementation.

15 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
16 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
17 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
18 mercury. In general, the highest methylation rates are associated with high tidal marshes (primary
19 black rail habitat) that experience intermittent wetting and drying and associated anoxic conditions
20 (Alpers et al. 2008); however, the majority of the overlap between restoration areas and black rail
21 habitat is within Suisun Marsh, where conversion of managed wetlands to tidal wetlands is expected
22 to result in an overall reduction in mercury methylation. Mercury is generally elevated throughout
23 the Delta, and restoration of the lower potential areas in total may result in generalized, very low
24 level increases of mercury. Given that some species have elevated mercury tissue levels pre-BDCP,
25 these low level increases could result in some level of effects. Conservation Measure CM 12,
26 described below, will be implemented to address this risk of low level increases in methylmercury
27 which could add to the current elevated tissue concentrations.

28 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
29 into the foodweb, *CM12 Methylmercury Management*, is included to provide for site-specific
30 evaluation for each restoration project. If a project is identified where there is a high potential for
31 methylmercury production that could not be fully addressed through restoration design and
32 adaptive management, alternate restoration areas would be considered. CM12 would be
33 implemented in coordination with other similar efforts to address mercury in the Delta, and
34 specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
35 would include the following actions.

- 36 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
37 mercury methylation and bioavailability
- 38 ● Define design elements that minimize conditions conducive to generation of methylmercury in
39 restored areas.
- 40 ● Define adaptive management strategies that can be implemented to monitor and minimize
41 actual postrestoration creation and mobilization of methylmercury.

42 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
43 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
44 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,

1 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
2 2009). The effect of selenium toxicity differs widely between species and also between age and sex
3 classes within a species. In addition, the effect of selenium on a species can be confounded by
4 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
5 2009).

6 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
7 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
8 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
9 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
10 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
11 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
12 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
13 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
14 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
15 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
16 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
17 levels of selenium have a higher risk of selenium toxicity.

18 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
19 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
20 exacerbate bioaccumulation of selenium in avian species, including California black rail. Marsh (tidal
21 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
22 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP
23 restoration activities that create newly inundated areas could increase bioavailability of selenium
24 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
25 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
26 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
27 increases in selenium concentrations in water in the Delta under any alternative. However, it is
28 difficult to determine whether the effects of potential increases in selenium bioavailability
29 associated with restoration-related conservation measures (CM4–CM5) would lead to adverse
30 effects on California black rail.

31 Because of the uncertainty that exists at this programmatic level of review, there could be a
32 substantial effect on California black rail from increases in selenium associated with restoration
33 activities. This effect would be addressed through the implementation of AMM27, *Selenium*
34 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
35 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
36 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
37 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
38 separately for each restoration effort as part of design and implementation. This avoidance and
39 minimization measure would be implemented as part of the tidal habitat restoration design
40 schedule.

41 **NEPA Effects:** Noise and visual disturbances related to construction-related activities from
42 conservation measures could disturb California black rail habitat adjacent to work sites. Potential
43 effects of noise and visual disturbances on California black rail would be minimized with *AMM38*
44 *California Black Rail*. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
45 *Monitoring*, would minimize the likelihood of spills from occurring and ensure that measures were

1 in place to prevent runoff from the construction area and to avoid negative effects of dust on the
2 species.

3 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
4 habitat restoration are expected to increase water salinity in Suisun Marsh, which would be
5 expected to establish tidal marsh similar to historic conditions. Tidal habitat restoration could result
6 in increased exposure of California black rail to selenium. This effect would be addressed through
7 the implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
8 restoration design elements to reduce the potential for bioaccumulation of selenium and its
9 bioavailability in tidal habitats.

10 Changes in water operations under CM1 would not be expected to result in increased mercury
11 bioavailability or exposures to Delta foodwebs. Restoration Actions that would create high and low
12 tidal marsh, which is Black Rail habitat, could provide biogeochemical conditions for methylation of
13 mercury in the newly inundated soils. There is potential for increased exposure of the foodwebs to
14 methylmercury in these areas, with the level of exposure dependent on the amounts of mercury
15 available in the soils and the biogeochemical conditions. However, the planned ROA's do not overlap
16 with the areas of highest mercury concentrations, which are in the in Yolo Bypass. Also, the
17 conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected to reduce the
18 overall production of methylmercury, resulting in a net benefit to species. Implementation of CM12
19 which contains measures to assess the amount of mercury before project development, followed by
20 appropriate design and adaptation management, would minimize the potential for increased
21 methylmercury exposure, and would result in no adverse effect on the species.

22 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities and other
23 conservation measures could disturb primary and secondary California black rail habitat adjacent to
24 work sites. *AMM38 California Black Rail* would avoid and minimize impacts on California black rail
25 from noise and visual disturbance. The use of mechanical equipment during water conveyance
26 facilities construction could cause the accidental release of petroleum or other contaminants that
27 could affect California black rail in the surrounding habitat. The inadvertent discharge of sediment
28 or excessive dust adjacent to California black rail habitat could also affect the species. These impacts
29 on California black rail would be less than significant with the incorporation of AMM1-AMM7,
30 including *AMM2 Construction Best Management Practices and Monitoring*, into the BDCP.

31 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
32 habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity gradient
33 changes should have a beneficial impact on California black rail through the establishment of tidal
34 marsh similar to historic conditions.

35 Tidal habitat restoration could result in increased exposure of California black rail to selenium. This
36 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
37 would provide specific tidal habitat restoration design elements to reduce the potential for
38 bioaccumulation of selenium and its bioavailability in tidal habitats. With implementation of
39 *AMM27*, potential for increased selenium exposure would result in no adverse effect on the species.

40 Changes in water operations under CM1 would not be expected to result in increased mercury
41 bioavailability or exposures to Delta foodwebs. Restoration Actions that would create high and low
42 tidal marsh, which is black rail habitat, could provide biogeochemical conditions for methylation of
43 mercury in the newly inundated soils. There is potential for increased exposure of the foodwebs to
44 methylmercury in these areas, with the level of exposure dependent on the amounts of mercury

1 available in the soils and the biogeochemical conditions. However, the planned ROA's do not overlap
2 with the areas of highest mercury concentrations, which are in the in Yolo Bypass. Also, the
3 conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected to reduce the
4 overall production of methylmercury, resulting in a net benefit to species. Implementation of CM12
5 which contains measures to assess the amount of mercury before project development, followed by
6 appropriate design and adaptation management, would minimize the potential for increased
7 methylmercury exposure, and would result in no adverse effect on the species.

8 With these measures in place, indirect effects of plan implementation would not result in a
9 substantial adverse effect on the species through habitat modification or potential mortality of a
10 special-status species. Therefore, the indirect effects of Alternative 1B implementation would have a
11 less-than-significant impact on California black rail. No mitigation would be required.

12 **Impact BIO-60: Fragmentation of California Black Rail Habitat as a Result of Conservation** 13 **Component Implementation**

14 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create
15 temporary barriers to California black rail movements. Grading, filling, contouring and other initial
16 ground-disturbing activities could remove habitat along movement corridors used by individuals
17 and could temporarily reduce access to adjacent habitat areas. The temporary adverse effects of
18 fragmentation of tidal brackish emergent wetland habitat for California black rail or restoration
19 activities resulting in barriers to movement would be minimized through sequencing of *CM4 Tidal*
20 *Natural Community Restoration* activities. The tidal natural communities restoration would be
21 phased through the course of the BDCP restoration program to allow for recovery of some areas
22 before restoration actions are initiated in other areas. In addition, *AMM38 California Black Rail*
23 would avoid and minimize effects on California black rail.

24 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to
25 movement would not represent an adverse effect on California black rail as a result of habitat
26 modification of a special-status species because *CM4 Tidal Natural Communities Restoration* would
27 be phased to allow for the recovery of some areas before restoration actions are initiated in other
28 areas. In addition, *AMM38 California Black Rail* would avoid and minimize effects on California black
29 rail.

30 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to
31 movement would represent a less-than-significant impact on California black rail as a result of
32 habitat modification of a special-status species because *CM4 Tidal Natural Communities Restoration*
33 would be phased to allow for the recovery of some areas before restoration actions are initiated in
34 other areas. In addition, *AMM38 California Black Rail* would avoid and minimize impacts on
35 California black rail.

36 **Impact BIO-61: Periodic Effects of Inundation of California Black Rail Habitat as a Result of** 37 **Implementation of Conservation Components**

38 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would not result in the
39 periodic inundation of modeled habitat for California black rail. There are no records for California
40 black rails in the Yolo Bypass, although the species is highly secretive and the extent to which the
41 area has been surveyed for California black rails is unknown. Therefore, there is potential for the
42 species to occur in the Yolo Bypass. In addition, rails may occur in the bypass after restoration

1 activities are completed. However, periodic inundation would not result in permanent habitat loss
2 and would not prevent use of the bypass by current or future rail populations.

3 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,
4 construction of setback levees could result in increased magnitude, frequency and duration of
5 periodic inundation by up to 6 acres of modeled California black rail habitat in CZ 7. The risk of
6 changes in inundation frequency, magnitude, and duration through CM2 and CM5 affecting
7 California black rail are considered to be low, and would not be expected to result in adverse effects
8 on the species.

9 **NEPA Effects:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*
10 *Seasonally Inundated Floodplain Restoration* would not represent an adverse effect on California
11 black rail as a result of habitat modification of a special-status species because periodic inundation
12 would not result in permanent habitat loss and would not prevent use of the bypass by current or
13 future rail populations. The risk of changes in inundation frequency and duration through CM2 and
14 CM5 affecting California black rail is considered to be low.

15 **CEQA Conclusion:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*
16 *Seasonally Inundated Floodplain Restoration* would represent a less-than-significant impact on
17 California black rail because periodic inundation would not result in permanent habitat loss and
18 would not prevent use of the bypass by current or future rail populations. The risk of changes in
19 inundation frequency and duration as a result of CM2 and CM5 affecting California black rail is
20 considered to be low

21 **California Clapper Rail**

22 This section describes the effects of Alternative 1B, including water conveyance facilities
23 construction and implementation of other conservation components, on California clapper rail.
24 California clapper rail habitat includes mostly middle marsh habitat with select emergent wetland
25 plant alliances. Secondary habitats generally provide only a few ecological functions such as foraging
26 (low marsh) or high-tide refuge (upland transition zones), while primary habitats provide multiple
27 functions including breeding, effective predator cover, and forage. Further details regarding the
28 habitat model, including assumptions on which the model is based, are provided in BDCP Appendix
29 2.A, *Covered Species Accounts*.

30 Construction and restoration associated with Alternative 1B conservation measures would result in
31 both temporary and permanent losses of California clapper rail modeled habitat as indicated in
32 Table 12-1B-26. Full implementation of Alternative 1B would also include the following
33 conservation actions over the term of the BDCP to benefit the California clapper rail (BDCP Chapter
34 3, Section 3.3, *Biological Goals and Objectives*).

- 35 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at
36 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
37 with CM4).

38 As explained below, with the restoration and protection of these amounts of habitat, in addition to
39 natural community enhancement and management commitments (including *CM12 Methylmercury*
40 *Management*) and implementation of AMM1–AMM7, AMM19 *California Clapper Rail*, and AMM27
41 *Selenium Management*, impacts on the California clapper rail would not be adverse for NEPA
42 purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-26. Changes to California Clapper Rail Modeled Habitat Associated with Alternative**
2 **1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2-CM18	Primary	26	27	0	0	0	0
	Secondary	50	50	0	0	0	0
Total Impacts CM2-CM18		76	77	0	0	0	0
TOTAL IMPACTS		76	77	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-62: Loss or Conversion of Habitat for and Direct Mortality of California Clapper**
5 **Rail**

6 Alternative 1B conservation measures would result in the total loss or conversion of up to 35 acres
7 of modeled clapper rail habitat consisting of 27 acres of primary habitat and 50 acres of secondary
8 habitat (Table 12-1B-26). The conservation measure that would result in these losses is *CM4 Tidal*
9 *Natural Communities Restoration*. Habitat enhancement and management activities (CM11), which
10 include ground disturbance or removal of nonnative vegetation, could also result in local adverse
11 habitat effects. Each of these individual activities is described below. A summary statement of the
12 combined impacts and NEPA effects, and a CEQA conclusion follow the individual conservation
13 measure discussions.

- 14 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would convert
15 approximately 77 acres of modeled California clapper rail habitat (27 acres of primary habitat,
16 50 acres of secondary habitat), the majority of which would occur in CZ 11. The tidal marsh
17 restoration action would not result in the permanent loss of any California clapper rail habitat in
18 the study area. However, approximately 27 acres of primary habitat would be converted to
19 secondary low marsh habitat and 50 acres of secondary habitat would be converted to middle or
20 high marsh. Full implementation of CM4 would restore or create at least 6,000 acres of tidal
21 brackish emergent wetland in CZ 11. Tidal wetlands would be restored as a mosaic of large,
22 interconnected, and biologically diverse patches that supported a natural gradient extending
23 from subtidal to the upland fringe. Much of the restored tidal brackish emergent wetland would
24 meet the primary habitat requirements of the California clapper rail, including development of
25 mid- and high-marsh vegetation with dense, tall stands of pickleweed cover. Restoration would

1 be sequenced and spaced in a manner that minimizes any temporary, initial loss of habitat and
2 habitat fragmentation.

- 3 ● *CM11 Natural Communities Enhancement and Management*: Because the entire California
4 clapper rail population is restricted to the San Francisco Bay Area estuary, BDCP enhancement
5 and restoration actions would be expected to benefit the species by creating the potential for
6 extending its abundance and distribution in Suisun Marsh. Occupied California clapper rail
7 habitat would be monitored to determine if there is a need for predator control actions. If
8 implemented, nonnative predators would be controlled as needed to reduce nest predation and
9 to help maintain species abundance. A variety of habitat management actions included in *CM11*
10 *Natural Communities Enhancement and Management* that are designed to enhance wildlife
11 values in restored and protected tidal wetland habitats could result in localized ground
12 disturbances that could temporarily remove small amounts of California clapper rail habitat.
13 Ground-disturbing activities, such as removal of nonnative vegetation and road and other
14 infrastructure maintenance activities, would be expected to have minor adverse effects on
15 available California clapper rail habitat. These potential effects are currently not quantifiable,
16 but would be minimized with implementation *AMM19 California Clapper Rail* (see Appendix 3B,
17 *Environmental Commitments, AMMs, and CMs*).
- 18 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration
19 infrastructure could result in ongoing but periodic disturbances that could affect California
20 clapper rail use of the surrounding habitat in Suisun. Maintenance activities could include
21 vegetation management, and levee repair. These effects, however, would be reduced by AMMs
22 and conservation actions as described below.
- 23 ● *Injury and Direct Mortality*: Construction vehicle activity may cause injury or mortality to
24 California black rail. If rails are present adjacent to covered activities, the operation of
25 equipment for land clearing, and habitat restoration, enhancement, and management could
26 result in injury or mortality of California clapper rail. Operation of construction equipment could
27 result in injury or mortality of California clapper rails. Risk would be greatest to eggs and
28 nestlings susceptible to land clearing activities, nest abandonment, or increased exposure to the
29 elements or to predators. Injury to adults and fledged juveniles is less likely as these individuals
30 are expected to avoid contact with construction equipment. However, nest sites would be
31 avoided during the nesting season as required by AMM1–AMM7 and *AMM19 California Clapper*
32 *Rail*.

33 The following paragraphs summarize the combined effects discussed above and describe other
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
35 included.

36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would
39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
40 effects of construction would not be adverse under NEPA. There would be no impacts resulting from
41 the construction of the water conveyance facilities (CM1). However, there would be a loss of 76
42 acres of modeled habitat for California clapper rail in the study area in the near-term. These effects
43 would result from implementing *CM4 Tidal Natural Communities Restoration* (26 acres of primary
44 and 50 acres of secondary habitat).

1 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
 2 CM4 and that are identified in the biological goals and objectives for California clapper rail in
 3 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
 4 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be
 5 restored/created to compensate for the CM4 losses of California clapper rail habitat.

6 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
 7 wetland in the Plan Area (Table 3-4 in Chapter 3). These conservation actions are associated with
 8 CM4 and would occur in the same timeframe as the early restoration losses, thereby avoiding
 9 adverse effects on California clapper rail. The tidal brackish emergent wetland would be restored in
 10 CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough
 11 Marsh Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1) and
 12 would be restored in a way that creates topographic heterogeneity and in areas that increase
 13 connectivity among protected lands (Objectives TBEWNC1.4). These biological goals and objectives
 14 would inform the near-term restoration efforts and represent performance standards for
 15 considering the effectiveness of restoration actions. These Plan objectives represent performance
 16 standards for considering the effectiveness of CM4 restoration actions. The acres of restoration
 17 contained in the near-term Plan goals satisfy the typical mitigation that would be applied to the
 18 near-term effects of tidal restoration.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
 23 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
 24 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
 25 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
 26 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

27 ***Late Long-Term Timeframe***

28 The habitat model indicates that the study area supports approximately 296 acres of primary and
 29 6,420 acres of secondary habitat for California clapper rail. Alternative 1B as a whole would result in
 30 the permanent loss of and temporary effects on 27 acres of primary habitat and 50 acres of
 31 secondary habitat for California clapper rail during the term of the Plan (9% of the total primary
 32 habitat in the study area and less than 1% of the total secondary habitat in the study area). The
 33 locations of these losses are described above in the analyses of individual conservation measures.
 34 The Plan includes a commitments through *CM4 Tidal Natural Communities Restoration* to restore or
 35 create at least 6,000 acres of tidal brackish emergent wetlands for California clapper rail in Suisun
 36 Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would be restored as a mosaic of large,
 37 interconnected and biologically diverse patches and at least 1,500 acres of the restored marsh
 38 would consist of middle-and high-marsh vegetation, serving as primary habitat for California
 39 clapper rail in Suisun Marsh (Objectives TBEWNC1.1 and TBEWNC1.2). Additional pressures on the
 40 species such as loss of habitat from invasive species and mortality from nest predators would also
 41 be addressed through the BDCP. Perennial pepperweed, which outcompetes suitable clapper rail
 42 habitat (such as pickleweed) would be reduced to no more than 10% cover in the tidal brackish
 43 emergent wetland natural community within CZ 11 (Objective TBEWNC2.1). In addition, nonnative
 44 predators would be controlled to reduce nest predation if necessary through *CM11 Natural*
 45 *Communities Enhancement and Management*.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, *Effects Analysis*) estimates that the
2 restoration and protection actions discussed above, would result in the restoration of 1,500 acres of
3 primary habitat and 4,500 acres of secondary habitat for California clapper rail.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
8 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
9 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
10 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
11 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

12 **NEPA Effects:** The loss of California clapper rail habitat associated with Alternative 1B would
13 represent an adverse effect as a result of habitat modification of a special-status species and
14 potential for direct mortality in the absence of other conservation actions. However, with habitat
15 protection and restoration associated with CM4, guided by biological goals and objectives and by
16 *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*,
17 *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*
18 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge*
19 *Operations Plan*, and *AMM19 California Clapper Rail*, which would be in place throughout the
20 construction period, the effects of Alternative 1B as a whole on California clapper rail would not be
21 adverse under NEPA.

22 **CEQA Conclusion:**

23 **Near-Term Timeframe**

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
27 effects of construction would be less than significant under CEQA. There would be no impacts
28 resulting from the construction of the water conveyance facilities (CM1). However, there would be a
29 loss of 76 acres of modeled habitat for California clapper rail in the study area in the near-term from
30 the implementation of *CM4 Tidal Natural Communities Restoration* (26 acres of primary and 50 acres
31 of secondary habitat).

32 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
33 CM4 and that are identified in the biological goals and objectives for California clapper rail in
34 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
35 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be
36 restored/created to mitigate the CM4 losses of California clapper rail habitat.

37 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
38 wetland in the study area. These conservation actions are associated with CM4 and would occur in
39 the same timeframe as the early restoration losses, thereby avoiding adverse effects on California
40 clapper rail. The tidal brackish emergent wetland would be restored in CZ 11 among the Western
41 Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse
42 Slough/Denverton Marsh complex (Objective TBEWNC1.1) and would be restored in a way that

1 creates topographic heterogeneity and in areas that increase connectivity among protected lands
2 (Objectives TBEWNC1.4).

3 These biological goals and objectives would inform the near-term restoration efforts and represent
4 performance standards for considering the effectiveness of restoration actions. These Plan
5 objectives represent performance standards for considering the effectiveness of CM4 restoration
6 actions.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
11 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
12 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
13 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
14 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

15 The natural community restoration and protection activities would be concluded in the first 10
16 years of Plan implementation, which is close enough in time to the occurrence of restoration impacts
17 to constitute adequate mitigation for CEQA purposes. In addition, *AMM19 California Clapper Rail* and
18 *AMM1–AMM7* would avoid and minimize potential impacts on the species from construction-related
19 habitat loss and noise and disturbance. Because the number of acres required to meet the typical
20 mitigation ratio described above would be only 76 acres of restored tidal natural communities, the
21 2,000 acres of tidal brackish emergent wetland restoration contained in the near-term Plan goals,
22 and the additional detail in the biological objectives for California clapper rail, are more than
23 sufficient to support the conclusion that the near-term impacts of habitat loss and direct mortality
24 under Alternative 1B would be less than significant under CEQA.

25 ***Late Long-Term Timeframe***

26 The habitat model indicates that the study area supports approximately 296 acres of primary and
27 6,420 acres of secondary habitat for California clapper rail. Alternative 1B as a whole would result in
28 the permanent loss of and temporary effects on 27 acres of primary habitat and 8 acres of secondary
29 habitat for California clapper rail during the term of the Plan (9% of the total primary habitat in the
30 study area and less than 1% of the total secondary habitat in the study area). The locations of these
31 losses are described above in the analyses of individual conservation measures. The Plan includes a
32 commitment to restore or create at least 6,000 acres of tidal brackish emergent wetlands for
33 California clapper rail in Suisun Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would
34 be restored as a mosaic of large, interconnected and biologically diverse patches and much of the
35 restored marsh would consist of middle-and high-marsh vegetation with dense, tall stands of
36 pickleweed, serving as primary habitat for clapper rail in Suisun Marsh (Objective TBEWNC1.1).
37 Additional pressures on the species such as loss of habitat from invasive species and mortality from
38 nest predators would also be addressed through the BDCP. Perennial pepperweed, which
39 outcompetes suitable clapper rail habitat (such as pickleweed) would be reduced to no more than
40 10% cover in the tidal brackish emergent wetland natural community within CZ 11 (Objective
41 TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if
42 necessary through *CM11 Natural Communities Enhancement and Management*.

43 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
44 *Plant Species*) estimates that the restoration and protection actions discussed above, would result in

1 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat for California
2 clapper rail.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
7 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
8 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
9 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
10 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

11 Considering these protection and restoration provisions, which would provide acreages of new or
12 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction
13 and restoration activities, loss of habitat or direct mortality through implementation of Alternative
14 1B would not result in a substantial adverse effect through habitat modifications and would not
15 substantially reduce the number or restrict the range of the species. Therefore, the alternative
16 would have a less-than-significant impact on California clapper rail.

17 **Impact BIO-63: Indirect Effects of Plan Implementation on California Clapper Rail**

18 **Indirect Construction-Related Effects:** California clapper rail habitat within the vicinity of
19 proposed restoration areas could be indirectly affected by construction activities. Indirect effects
20 associated with construction include noise, dust, and visual disturbance caused by grading, filling,
21 contouring, and other ground-disturbing operations outside the project footprint but within 500
22 feet from the construction edge. Construction noise above background noise levels (greater than 50
23 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,
24 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
25 *Crane*, Table 4), although there are no available data to determine the extent to which these noise
26 levels could affect California clapper rail. The use of mechanical equipment during construction-
27 related restoration activities could cause the accidental release of petroleum or other contaminants
28 that could affect clapper rail in the surrounding habitat. The inadvertent discharge of sediment or
29 excessive dust adjacent to California clapper rail habitat could also affect the species. If construction
30 occurs during the nesting season, these indirect effects could result in the loss or abandonment of
31 nests, and mortality of any eggs and/or nestlings. However, there is a commitment in *AMM19*
32 *California Clapper Rail* that preconstruction surveys of potential breeding habitat would be
33 conducted within 500 feet of project activities, and a 500-foot no-disturbance buffer would be
34 established around any territorial call-centers during the breeding season (see Appendix 3B,
35 *Environmental Commitments, AMMs, and CMs*). In addition, construction would be avoided altogether
36 if breeding territories cannot be accurately delimited.

37 Preconstruction surveys conducted under *AMM19 California Clapper Rail* would ensure
38 construction-related noise and visual disturbances would not have an adverse effect on California
39 clapper rail. *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and*
40 *Monitoring*, would minimize the likelihood of such spills from occurring and ensure measures were
41 in place to prevent runoff from the construction area and to avoid negative effects of dust on the
42 species. Therefore, with the implementation of *AMM1-AMM7* and *AMM19 California Clapper Rail*,
43 there would be no adverse effect on California clapper rail.

1 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients
2 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would
3 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh
4 would generally increase as a result of water operations and operations of salinity-control gates to
5 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland
6 plant communities tolerant of more brackish environments, which would be beneficial to California
7 clapper rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

8 **Methylmercury Exposure:** California clapper rail modeled habitat includes primarily middle marsh
9 habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is also used if it is
10 of high value, and low marsh provides foraging habitat for the species. California clapper rails are a
11 top predator in the benthic food chain; they forage by probing their beaks into the mud (Zembal and
12 Fancher 1988) and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects
13 (Eddleman and Conway 1998).

14 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
15 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
16 species would overestimate the effects on California clapper rail. Organisms feeding within pelagic-
17 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
18 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
19 segregation (Grimaldo et al. 2009).

20 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
21 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
22 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
23 mercury. Concentrations of methylmercury known to be toxic to bird embryos have been found in
24 the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003); however, currently,
25 it is unknown how much of the sediment-derived methylmercury enters the food chain in Suisun
26 Marsh or what tissue concentrations are actually harmful to the California clapper rail. In general,
27 the highest methylation rates are associated with high tidal marshes that experience intermittent
28 wetting and drying and associated anoxic conditions (Alpers et al. 2008). In Suisun Marsh, the
29 conversion of managed wetlands to tidal wetlands is expected to result in an overall reduction in
30 mercury methylation. Due to the complex and very site-specific factors that will determine if
31 mercury becomes mobilized into the foodweb, *CM12 Methylmercury Management*, is included to
32 provide for site-specific evaluation for each restoration project. If a project is identified where there
33 is a high potential for methylmercury production that could not be fully addressed through
34 restoration design and adaptive management, alternate restoration areas would be considered.
35 CM12 would be implemented in coordination with other similar efforts to address mercury in the
36 Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This conservation
37 measure would include the following actions.

- 38 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
39 mercury methylation and bioavailability
- 40 ● Define design elements that minimize conditions conducive to generation of methylmercury in
41 restored areas.

42 Define adaptive management strategies that can be implemented to monitor and minimize actual
43 postrestoration creation and mobilization of methylmercury.

1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
5 2009). The effect of selenium toxicity differs widely between species and also between age and sex
6 classes within a species. In addition, the effect of selenium on a species can be confounded by
7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
8 2009).

9 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
10 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
11 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
12 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
13 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
14 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
15 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
16 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
17 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
18 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
19 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
20 levels of selenium have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
22 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
23 exacerbate bioaccumulation of selenium in avian species, including California clapper rail. Marsh
24 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
25 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
26 BDCP restoration activities that create newly inundated areas could increase bioavailability of
27 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
28 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
29 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
30 long-term increases in selenium concentrations in water in the Delta under any alternative.
31 However, it is difficult to determine whether the effects of potential increases in selenium
32 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
33 lead to adverse effects on California clapper rail.

34 Because of the uncertainty that exists at this programmatic level of review, there could be a
35 substantial effect on California clapper rail from increases in selenium associated with restoration
36 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
37 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
38 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
39 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
40 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
41 separately for each restoration effort as part of design and implementation. This avoidance and
42 minimization measure would be implemented as part of the tidal habitat restoration design
43 schedule.

44 **NEPA Effects:** Noise and visual disturbances related to construction-related activities from
45 conservation measures could disturb California clapper rail habitat adjacent to work sites. Potential

1 effects of noise and visual disturbances on California clapper rail would be minimized with *AMM19*
2 *California Clapper Rail*. *AMM1–AMM7*, including *AMM2 Construction Best Management Practices and*
3 *Monitoring*, would minimize the likelihood of spills from occurring and ensure that measures were
4 in place to prevent runoff from the construction area and to avoid negative effects of dust on the
5 species.

6 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
7 habitat restoration are expected to increase water salinity in Suisun Marsh, which would be
8 expected to establish tidal marsh similar to historic conditions. Tidal habitat restoration could result
9 in increased exposure of California clapper rail to selenium. This effect would be addressed through
10 the implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
11 restoration design elements to reduce the potential for bioaccumulation of selenium and its
12 bioavailability in tidal habitats.

13 Restoration Actions that would create tidal marsh could provide biogeochemical conditions for
14 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
15 the California clapper rail foodweb to methylmercury in these areas, with the level of exposure
16 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
17 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
18 to reduce the overall production of methylmercury, resulting in a net benefit to species.
19 Implementation of *CM12* which contains measures to assess the amount of mercury before project
20 development, followed by appropriate design and adaptation management, would minimize the
21 potential for increased methylmercury exposure, and would result in no adverse effect on the
22 species.

23 The indirect effects associated with noise and visual disturbances, potential spills of hazardous
24 material, changes in salinity, and increased exposure to selenium from Alternative 1B
25 implementation would not have an adverse effect on California clapper rail.

26 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities from the
27 conservation measures could disturb California clapper rail habitat adjacent to work sites. *AMM19*
28 *California Clapper Rail* would avoid and minimize impacts on California clapper rail from noise and
29 visual disturbance. The use of mechanical equipment during restoration activities or the inadvertent
30 discharge of sediment or excessive dust adjacent to California clapper rail habitat could also affect
31 the species. These impacts on California clapper rail would be less than significant with the
32 incorporation of *AMM1–AMM7* into the BDCP.

33 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
34 habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity gradient
35 changes should have a beneficial impact on California clapper rail through the establishment of tidal
36 marsh similar to historic conditions.

37 Tidal habitat restoration could result in increased exposure of California clapper rail to selenium.
38 This effect would be addressed through the implementation of *AMM27 Selenium Management* which
39 would provide specific tidal habitat restoration design elements to reduce the potential for
40 bioaccumulation of selenium and its bioavailability in tidal habitats.

41 Restoration Actions that would create tidal marsh could provide biogeochemical conditions for
42 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
43 the California clapper rail foodweb to methylmercury in these areas, with the level of exposure

1 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
2 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
3 to reduce the overall production of methylmercury, resulting in a net benefit to species.
4 Implementation of CM12 which contains measures to assess the amount of mercury before project
5 development, followed by appropriate design and adaptation management, would minimize the
6 potential for increased methylmercury exposure, and would result in no adverse effect on the
7 species.

8 With these measures in place, indirect effects of plan implementation would not result in a
9 substantial adverse effect on the species through habitat modification or potential mortality of a
10 special-status species. Therefore, the indirect effects of Alternative 1B implementation would have a
11 less-than-significant impact on California clapper rail.

12 **Impact BIO-64: Effects on California Clapper Rail Associated with Electrical Transmission** 13 **Facilities**

14 Isolated patches of suitable California clapper rail habitat may occur in the study area as far east as
15 (but not including) Sherman Island. Home range and territory of the California clapper rail is not
16 known, but in locations outside of California, clapper rail territory ranges 0.3 acre to 8 acres (0.1 to
17 3.2 hectares) (Rush et al. 2012), indicating that known occurrences are not likely to intersect with
18 the proposed lines (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at*
19 *Proposed BDCP Transmission Lines*). The location of the current population and suitable habitat for
20 the species make collision with the proposed transmission lines highly unlikely.

21 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse
22 effect on California clapper rail because the location of the current population and suitable habitat
23 for the species would make collision with the proposed transmission lines highly unlikely.

24 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
25 significant impact on California clapper rail because the location of the current population and
26 suitable habitat for the species would make collision with the proposed transmission lines highly
27 unlikely.

28 **Impact BIO-65: Fragmentation of California Clapper Rail Habitat as a Result of Conservation** 29 **Component Implementation**

30 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create
31 temporary barriers to movements of California clapper rail. Grading, filling, contouring and other
32 initial ground-disturbing activities could remove habitat along movement corridors used by
33 individuals and, thus, temporarily reduce access to adjacent habitat areas. The temporary adverse
34 effects of fragmentation of tidal brackish emergent wetland habitat for California clapper rail or
35 restoration activities resulting in barriers to movement would be minimized through sequencing of
36 restoration activities to minimize effects of temporary habitat loss. The tidal natural communities
37 restoration would be phased through the course of the BDCP restoration program to allow for
38 recovery of some areas before restoration actions are initiated in other areas. In addition, *AMM19*
39 *California Clapper Rail* would avoid and minimize effects on California clapper rail.

40 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to
41 movement would not represent an adverse effect on California clapper rail as a result of special-
42 status species habitat modification because *CM4 Tidal Natural Communities Restoration* would be

1 phased to allow for the recovery of some areas before restoration actions are initiated in other
2 areas. In addition, *AMM19 California Clapper Rail* would avoid and minimize effects on California
3 clapper rail.

4 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to
5 movement would represent a less-than-significant impact on California clapper rail as a result of
6 habitat modification of a special status species because Tidal Natural Communities Restoration
7 (CM4) would be phased to allow for the recovery of some areas before initiating restoration actions
8 in other areas. In addition, *AMM19 California Clapper Rail* would avoid and minimize
9 effects on California clapper rail.

10 **California Least Tern**

11 This section describe the effects of Alternative 1B, including water conveyance facilities construction
12 and implementation of other conservation components on California least tern. California least tern
13 modeled habitat identifies foraging habitat as all tidal perennial aquatic natural community in the
14 study area. Breeding habitat is not included in the model because most of the natural shoreline in
15 the study area that historically provided nesting sites has been modified or removed.

16 Construction and restoration associated with Alternative 1B conservation measures would result in
17 both temporary and permanent losses of California least tern modeled habitat as indicated in Table
18 12-1B-27. Full implementation of Alternative 1B would also include the following conservation
19 actions over the term of the BDCP to benefit California least tern (BDCP Chapter 3, Section 3.3,
20 *Biological Goals and Objectives*).

- 21 ● Restore and protect at least 65,000 acres of tidal natural communities and transitional uplands
22 to accommodate sea level rise (Objective L1.3, associated with CM4).
- 23 ● Within the at least 65,000 acres of tidal natural communities and transitional uplands, restore or
24 create tidal perennial aquatic natural community as necessary when creating tidal emergent
25 wetland (Objective TPANC1.1, associated with CM4).
- 26 ● Control invasive aquatic vegetation that adversely affects native fish habitat (Objective
27 TPANC2.1, associated with CM13).

28 Least terns currently nest on artificial fill adjacent to tidal perennial aquatic habitat in the vicinity of
29 Suisun Marsh and west Delta, and additional nesting could occur at the edge of tidal perennial
30 waters whenever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy
31 or gravelly substrates with sparse vegetation).

32 As explained below, with the restoration and protection of tidal perennial aquatic foraging habitat,
33 in addition to natural community enhancement and management commitments (including CM12
34 *Methylmercury Management*) and implementation of AMM1–AMM7, *AMM27 Selenium Management*,
35 and mitigation to avoid impacts on terns should they nest in the study area, impacts on the
36 California least tern would not be adverse for NEPA purposes and would be less than significant for
37 CEQA purposes.

1 **Table 12-1B-27. Changes in California Least Tern Modeled Habitat Associated with Alternative 1B**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Foraging	33	33	145	145	NA	NA
Total Impacts CM1		33	33	145	145	NA	NA
CM2–CM18	Foraging	38	46	11	16	NA	NA
Total Impacts CM2–CM18		38	46	11	16	NA	NA
TOTAL IMPACTS		71	79	156	161	NA	NA

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-66: Loss or Conversion of Habitat for and Direct Mortality of California Least Tern**

5 Alternative 1B conservation measures would result in the combined permanent and temporary loss
6 of up to 215 acres of modeled foraging habitat for California least tern (Table 12-1B-27). The
7 conservation measures that would result in these losses are construction of water conveyance
8 facilities and operation (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4),
9 and floodplain restoration (CM5). Habitat enhancement and management activities (CM11), which
10 include ground disturbance or removal of nonnative vegetation, could also result in local adverse
11 habitat effects. In addition, maintenance activities associated with the long-term operation of the
12 water conveyance facilities and other BDCP physical facilities could degrade or eliminate California
13 least tern foraging habitat. Each of these individual activities is described below. A summary
14 statement of the combined impacts, NEPA effects, and a CEQA conclusion follow the individual
15 conservation measure discussions.

- 16 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would
17 result in the combined permanent and temporary loss of up to 178 acres of modeled California
18 least tern aquatic foraging habitat (Table 12-1B-27). Of the 178 acres of modeled habitat that
19 would be removed for the construction of the conveyance facilities, 145 acres would be a
20 temporary loss. Most of the permanent loss would occur where Intakes 1–5 encroach on the
21 Sacramento River’s east bank between Freeport and Courtland. The temporary effects on
22 California least tern habitat would occur at numerous locations, including in the Sacramento
23 River at Intakes 1–5, and at temporary siphon construction work areas where the canal would
24 cross Beaver Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment Slough and
25 Middle River just southeast of Victoria Canal. Tunnel work areas and transmission construction
26 sites at the junction of the new canal and the new Byron Court Forebay would also temporarily
27 affect foraging habitat in West Canal, Grant Line Canal and Old River just south of Clifton Court

1 Forebay. The CM1 footprint does not overlap with any California least tern occurrences.
2 However, Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and*
3 *Indirect Effects on Colonies Will Be Minimized*, (described below) would be available to minimize
4 potential effects on terns if they were to nest in or adjacent to the construction footprint. Refer
5 to the Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations.
6 These losses would take place during the first 10 years of Alternative 1B implementation.

- 7 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancement
8 would result in the permanent loss of 8 acres and the temporary loss of 11 acres of modeled
9 aquatic foraging habitat for California least tern in CZ 2. The loss would be expected to occur
10 during the first 10 years of Alternative 1B implementation.
- 11 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration actions would result in the
12 permanent loss of 36 acres of modeled aquatic foraging habitat for California least tern. An
13 estimated 65,000 acres of tidal wetlands would be restored during tidal habitat restoration,
14 consistent with BDCP Objective L1.3. Of these acres, an estimated 27,000 acres of tidal perennial
15 aquatic would be restored, based on modeling conducted by ESAPWA (refer to Table 5 in BDCP
16 Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). This restoration is consistent with
17 BDCP Objective TPANC1.1. Tidal perennial aquatic restoration would be expected to
18 substantially increase the primary productivity of fish, increasing the prey base for California
19 least tern. Approximately 3,400 acres of the restoration would happen during the first 10 years
20 of BDCP implementation, which would coincide with the timeframe of water conveyance
21 facilities construction. The remaining restoration would be phased over the following 30 years.
22 Some of the restoration would occur in the lower Yolo Bypass, but restoration would also be
23 spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.
- 24 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
25 seasonally inundated floodplain would result in the permanent loss of 2 acres and the
26 temporary loss of 5 acres of modeled aquatic foraging habitat for California least tern. This
27 activity is scheduled to start following construction of water conveyance facilities, which is
28 expected to take 10 years. Specific locations for the floodplain restoration have not been
29 identified, but it is expected that much of the activity would occur in the south Delta along the
30 major rivers.
- 31 ● *CM11 Natural Communities Enhancement and Management*: Noise and visual disturbances
32 during implementation of habitat management actions could result in temporary disturbances
33 that affect California least tern use of the surrounding habitat. These effects cannot be
34 quantified, but are expected to be minimal because few management activities would be
35 implemented in aquatic habitat and because terns are not expected to nest on protected lands.
36 Surveys would be conducted prior to ground disturbance in any areas that have suitable nesting
37 substrate for California least tern (flat, unvegetated areas near aquatic foraging habitat) and
38 injury mortality and noise and visual disturbance of nesting terns would be avoided and
39 minimized by the AMMs and Mitigation Measure BIO-66, *California Least Tern Nesting Colonies*
40 *Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, described below.
- 41 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
42 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
43 post construction disturbances, localized impacts on California least tern foraging habitat, and
44 temporary noise and disturbances over the term of the BDCP. Maintenance activities would
45 include vegetation management, levee and structure repair, and re-grading of roads and

1 permanent work areas which could be adjacent to California least tern foraging habitat. These
2 effects, however, would be reduced by AMMs described below.

3 Injury and Direct Mortality: California least terns currently nest in the vicinity of potential
4 restoration sites in Suisun Marsh and west Delta area (CZ 10 and CZ 11). New nesting colonies
5 could establish if suitable nesting habitat is created during restoration activities (e.g., placement
6 of unvegetated fill to raise surface elevations prior to breaching levees during restoration
7 efforts). If nesting occurs where covered activities are undertaken, the operation of equipment
8 for land clearing, construction, conveyance facilities operation and maintenance, and habitat
9 restoration, enhancement, and management could result in injury or mortality of California least
10 tern. Risk of injury or disturbance would be greatest to eggs and nestlings susceptible to land-
11 clearing activities, abandonment of nests and nesting colonies, or increased exposure to the
12 elements or to predators. Injury to adults or fledged juveniles is less likely as these individuals
13 would be expected to avoid contact with construction equipment. However, injury or mortality
14 would be avoided through planning and preconstruction surveys to identify nesting colonies,
15 the design of projects to avoid locations with least tern colonies, and the provision for 500-foot
16 buffers as required by Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be*
17 *Avoided and Indirect Effects on Colonies Will Be Minimized.*

18 The following paragraphs summarize the combined effects discussed above, describe other BDCP
19 conservation actions that offset or avoid these effects. NEPA and CEQA conclusions area also
20 included.

21 ***Near-Term Timeframe***

22 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
23 the near-term BDCP conservation strategy has been evaluated to determine whether it would
24 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
25 the effects of construction would not be adverse under NEPA. With Alternative 1B implementation,
26 there would be a loss of 227 acres of modeled foraging habitat for California least tern in the study
27 area in the near-term. These effects would result from the construction of the water conveyance
28 facilities (CM1, 178 acres), and implementing other conservation measures (Yolo Bypass fisheries
29 improvements [CM2], and tidal habitat restoration [CM4]—49 acres). All modeled foraging habitat
30 impacts would occur in tidal perennial aquatic natural communities.

31 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
32 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would
33 indicate that 178 acres of the tidal perennial aquatic natural community should be restored/created
34 to compensate for the CM1 losses of California least tern foraging habitat. The near-term effects of
35 other conservation actions would remove 49 acres of tidal perennial aquatic habitat, and therefore
36 require 49 acres of tidal perennial aquatic natural community restoration using the same typical
37 NEPA and CEQA ratio (1:1 for restoration).

38 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities
39 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3). This
40 conservation action would result in the creation of approximately 3,400 acres of high quality tidal
41 perennial aquatic natural community, based on modeling conducted by ESAPWA (refer to Table 5 in
42 BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). Tidal perennial aquatic restoration
43 would occur in the same timeframe as the construction and early restoration losses, thereby
44 avoiding adverse effects on California least tern from loss of foraging habitat.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats at or adjacent to work areas and storage sites. BDCP Appendix 3.C describes the
7 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
8 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

9 The California least tern is not a species that is covered under the BDCP. Although nesting by
10 California least tern is not expected to occur, restoration sites could attract individuals wherever
11 disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly
12 substrates with sparse vegetation). If nesting were to occur, construction activities could have an
13 adverse effect on California least tern. Mitigation Measure BIO-66, *California Least Tern Nesting*
14 *Colonies Shall be Avoided and Indirect Effects on Colonies will be Minimized*, would be available to
15 address this effect on nesting California least terns.

16 **Late Long-Term Timeframe**

17 The habitat model indicates that the study area supports approximately 86,263 acres of foraging
18 habitat for California least tern. Alternative 1B as a whole would result in the permanent loss of and
19 temporary effects on 240 acres of foraging habitat during the term of the Plan (less than 1% of the
20 total habitat in the study area). The locations of these losses are described above in the analyses of
21 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*
22 *Natural Communities Restoration* would restore an estimated 27,000 acres of high quality tidal
23 perennial aquatic natural community would be restored (estimated from Table 5 in BDCP Appendix
24 3.B, *BDCP Tidal Habitat Evolution Assessment*). The restoration would occur over a wide region of
25 the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South
26 Delta ROAs (see Figure 12-1).

27 **NEPA Effects:** The loss of California least tern foraging habitat and potential direct mortality
28 associated with Alternative 1B would represent an adverse effect in the absence of other
29 conservation actions. Although nesting by California least tern is not expected to occur in the study
30 area, restoration sites could attract individuals wherever disturbed or artificial sites mimic habitat
31 conditions sought for nesting (i.e., sandy or gravelly substrates with sparse vegetation). If nesting
32 were to occur, construction activities could have an adverse effect on California least tern. Mitigation
33 Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on*
34 *Colonies Will be Minimized*, would be available to address this effect on nesting California least terns.
35 With habitat restoration associated with CM4 and guided by *AMM1 Worker Awareness Training,*
36 *AMM2 Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution*
37 *Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
38 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*, which
39 would be in place throughout the construction period, the effects of Alternative 1B as a whole on
40 California least tern would not be adverse under NEPA.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
6 the effects of construction would be less than significant under CEQA. With Alternative 1B
7 implementation, there would be a loss of 227 acres of modeled foraging habitat for California least
8 tern in the study area in the near-term. These effects would result from the construction of the
9 water conveyance facilities (CM1, 178 acres), and implementing other conservation measures (Yolo
10 Bypass fisheries improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled
11 foraging habitat impacts would occur in tidal perennial aquatic natural communities.

12 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
13 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would
14 indicate that 178 acres of the tidal perennial aquatic natural community should be restored/created
15 to compensate for the CM1 losses of California least tern foraging habitat. The near-term effects of
16 other conservation actions would remove 49 acres of tidal perennial aquatic habitat, and therefore
17 require 49 acres of tidal perennial aquatic natural community restoration using the same typical
18 NEPA and CEQA ratio (1:1 for restoration).

19 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities
20 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3).
21 Modeling conducted by ESA PWA indicates that this conservation action would result in the creation
22 of approximately 3,400 acres of high-value tidal perennial aquatic natural community (refer to Table
23 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). Tidal perennial aquatic
24 restoration would occur in the same timeframe as the construction and early restoration losses,
25 thereby avoiding adverse effects on California least tern.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
27 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
28 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
29 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
30 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
31 species habitats at or adjacent to work areas and storage sites. BDCP Appendix 3.C describes the
32 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
33 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

34 Although nesting by California least tern is not expected to occur, restoration sites could attract
35 individuals wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e.,
36 sandy or gravelly substrates with sparse vegetation). If nesting were to occur, construction activities
37 could have an adverse effect on California least tern. Implementation of Mitigation Measure BIO-66,
38 *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies Will Be*
39 *Minimized*, would reduce the impact on nesting California least terns to a less-than-significant level.

40 The natural community restoration and protection activities would be concluded in the first 10
41 years of Plan implementation, which is close enough in time to the occurrence of impacts to
42 constitute adequate mitigation for CEQA purposes. In addition, AMM1–AMM7 and Mitigation
43 Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on*

1 *Colonies Will Be Minimized*, would avoid and minimize potential impacts on the species from
2 construction-related habitat loss and noise and disturbance. Because the number of acres required
3 to meet the typical mitigation ratio described above would be only 227 acres of restored tidal
4 perennial aquatic habitat, the 3,400 acres of tidal perennial aquatic restoration estimated in the
5 near-term, are more than sufficient to support the conclusion that the near-term impacts of habitat
6 loss and direct mortality under Alternative 1B would be less than significant under CEQA.

7 ***Late Long-Term Timeframe***

8 The habitat model indicates that the study area supports approximately 86,263 acres of foraging
9 habitat for California least tern. Alternative 1B as a whole would result in the permanent loss of and
10 temporary effects on 240 acres of foraging habitat during the term of the Plan (less than 1% of the
11 total habitat in the study area). The locations of these losses are described above in the analyses of
12 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*
13 *Natural Communities Restoration* to restore an estimated 27,000 acres of high-value tidal perennial
14 aquatic natural community (estimated from Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat*
15 *Evolution Assessment*). The restoration would occur over a wide region of the study area, including
16 within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure
17 12-1).

18 In the absence of other conservation actions, the loss of California least tern foraging habitat and
19 potential direct mortality associated with Alternative 1B would represent an adverse effect as a
20 result of habitat modification of a special-status species and potential for direct mortality. Although
21 nesting by California least tern is not expected to occur, restoration sites could attract individuals
22 wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or
23 gravelly substrates with sparse vegetation). If nesting were to occur, construction activities could
24 have a significant impact on California least tern. The loss of California least tern foraging habitat
25 and potential direct mortality associated with Alternative 1B would represent a significant impact in
26 the absence of other conservation actions. However, with habitat restoration associated with CM4
27 and guided by *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices*
28 *and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control*
29 *Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of*
30 *Spoils*, *AMM7 Barge Operations Plan*, which would be in place throughout the construction period,
31 and the implementation of Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall*
32 *Be Avoided and Indirect Effects on Colonies Will Be Minimized*, the loss of habitat or mortality under
33 this alternative would have a less-than-significant impact on California least tern.

34 **Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and**
35 **Indirect Effects on Colonies Will Be Minimized**

36 If suitable nesting habitat for California least tern (flat unvegetated areas near aquatic foraging
37 habitat is identified during planning level surveys), at least three preconstruction surveys for
38 this species will be conducted during the nesting season by a qualified biologist with experience
39 observing the species and its nests. Projects will be designed to avoid the loss of California least
40 tern nesting colonies. No construction will take place within 500 feet California least tern nests
41 during the nesting season (April 15 to August 15 or as determined through surveys). Only
42 inspection, maintenance, research, or monitoring activities may be performed during the least
43 tern breeding season in areas within or adjacent to least tern breeding habitat with USFWS and
44 CDFW approval under the supervision of a qualified biologist.

1 **Impact BIO-67: Indirect Effects of Plan Implementation on California Least Tern**

2 **Indirect Construction- and Operation-Related Effects:** Indirect effects associated with
 3 construction that could affect California least tern include noise, dust, and visual disturbance caused
 4 by grading, filling, contouring, and other ground-disturbing operations outside the project footprint
 5 but within 500 feet from the construction edge. Construction noise above background noise levels
 6 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
 7 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
 8 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
 9 which these noise levels could affect California least tern. The use of mechanical equipment during
 10 water conveyance facilities construction could cause the accidental release of petroleum or other
 11 contaminants that could affect California least tern or their prey species in the surrounding habitat.
 12 The inadvertent discharge of sediment or excessive dust adjacent to foraging habitat could also
 13 affect the species. Noise and visual disturbance is not expected to have an adverse effect on
 14 California least tern foraging behavior. As described in Mitigation Measure BIO-66, *California Least*
 15 *Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, if least tern
 16 nests were found during planning or preconstruction surveys, no construction would take place
 17 within 500 feet of active nests. In addition, AMM1–AMM7, including construction best management
 18 practices, would minimize the likelihood of spills or excessive dust being created during
 19 construction. Should a spill occur, implementation of these AMMs would greatly reduce the
 20 likelihood of individuals being affected.

21 **Methylmercury Exposure:** Covered activities have the potential to exacerbate the bioaccumulation
 22 of mercury in the California least tern. The operational impacts of new flows under CM1 were
 23 analyzed using a DSM-2 based model to assess potential effects on mercury concentration and
 24 bioavailability. Largemouth bass were used as a surrogate species for this analysis and results would
 25 be expected to be similar or lower for the California least tern. Results indicated that changes in total
 26 mercury levels in water and large mouth bass tissues were insignificant (see BDCP Appendix 5.D,
 27 Tables 5D.4-3, 5D.4-4, and 5D.4-5).

28 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to
 29 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
 30 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
 31 flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase
 32 bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).
 33 Increased methylmercury associated with natural community and floodplain restoration may
 34 indirectly affect California least tern, via uptake through consumption of prey (as described in BDCP
 35 Appendix 5.D, *Contaminants*). In general, the highest methylation rates are associated with high tidal
 36 marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers
 37 et al. 2008). The potential mobilization or creation of methylmercury within the Plan Area varies
 38 with site-specific conditions and would need to be assessed at the project level.

39 Schwarzbach and Adelsbach (2003) investigated mercury exposure in 15 species of birds inhabiting
 40 the Bay-Delta ecosystem. Among the species studied, the highest concentrations of mercury were
 41 found in the eggs of piscivorous birds (terns and cormorants) that bioaccumulate mercury from
 42 their fish prey. The very highest concentrations were found in Caspian and Forster’s terns, especially
 43 those inhabiting South San Francisco Bay. Based on three California least tern eggs collected from
 44 Alameda Naval Air Station in the San Francisco Central Bay, concentrations in California least tern
 45 eggs were a third (0.3 ppm) those of the eggs of the other two terns. Because of the small sample

1 size, there is a high degree of uncertainty regarding the levels of mercury that may be present in
2 California least tern eggs. If the mercury levels measured at Alameda Naval Air Station are
3 representative of the population in the San Francisco Bay, they would not be expected to result in
4 adverse effects on tern hatchlings. Hatching and fledging success were not reduced in common tern
5 eggs in Germany with mercury concentrations of 6.7 ppm (Hothem and Powell 2000).

6 Mercury is generally elevated throughout the Delta, and restoration of the lower potential areas in
7 total may result in generalized, very low level increases of mercury. Given that some species have
8 elevated mercury tissue levels pre-BDCP, these low level increases could result in some level of
9 effects. CM12, described below, will be implemented to address this risk of low level increases in
10 methylmercury which could add to the current elevated tissue concentrations.

- 11 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
12 mercury methylation and bioavailability
- 13 ● Define design elements that minimize conditions conducive to generation of methylmercury in
14 restored areas.
- 15 ● Define adaptive management strategies that can be implemented to monitor and minimize
16 actual postrestoration creation and mobilization of methylmercury.

17 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
18 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
19 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
20 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
21 2009). The effect of selenium toxicity differs widely between species and also between age and sex
22 classes within a species. In addition, the effect of selenium on a species can be confounded by
23 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
24 2009).

25 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
26 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
27 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
28 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
29 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
30 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
31 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
32 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
33 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
34 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
35 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
36 levels of selenium have a higher risk of selenium toxicity.

37 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
38 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
39 exacerbate bioaccumulation of selenium in avian species, including California least tern. Marsh (tidal
40 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
41 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP
42 restoration activities that create newly inundated areas could increase bioavailability of selenium
43 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
44 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to

1 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
2 increases in selenium concentrations in water in the Delta under any alternative. However, it is
3 difficult to determine whether the effects of potential increases in selenium bioavailability
4 associated with restoration-related conservation measures (CM4–CM5) would lead to adverse
5 effects on California least tern.

6 Because of the uncertainty that exists at this programmatic level of review, there could be a
7 substantial effect on California least tern from increases in selenium associated with restoration
8 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
9 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
10 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
11 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
12 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
13 separately for each restoration effort as part of design and implementation. This avoidance and
14 minimization measure would be implemented as part of the tidal habitat restoration design
15 schedule.

16 **NEPA Effects:** Noise and visual disturbances within 500 feet of construction-related activities from
17 the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation
18 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*
19 *Colonies Will Be Minimized*, would be available to address this effect. AMM1–AMM7, including *AMM2*
20 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of spills
21 from occurring and ensure that measures were in place to prevent runoff from the construction area
22 and to avoid negative effects of dust on the species.

23 Tidal habitat restoration could result in increased exposure of California least tern to selenium. This
24 effect would be addressed through the implementation of *AMM27 Selenium Management* which
25 would provide specific tidal habitat restoration design elements to reduce the potential for
26 bioaccumulation of selenium and its bioavailability in tidal habitats.

27 Changes in water operations under CM1 would not be expected to result in increased mercury
28 bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased
29 exposure of California least tern to methylmercury. There is potential for increased exposure of the
30 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
31 mercury available in the soils and the biogeochemical conditions. However, it is unknown what
32 concentrations of methylmercury are harmful to the species, and the potential for increased
33 exposure varies substantially within the study area. Implementation of CM12 which contains
34 measures to assess the amount of mercury before project development, followed by appropriate
35 design and adaptation management, would minimize the potential for increased methylmercury
36 exposure, and would result in no adverse effect on the species.

37 **CEQA Conclusion:** Noise and visual disturbances within 500 feet of construction-related activities
38 could disturb California least tern foraging habitat adjacent to work sites. Mitigation Measure BIO-
39 66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be*
40 *Minimized*, would avoid this potential adverse effect.

41 AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would
42 minimize the likelihood of spills from occurring and ensure that measures were in place to prevent
43 runoff from the construction area and to avoid negative effects of dust on the species.

1 Tidal habitat restoration could result in increased exposure of California least tern to selenium. This
2 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
3 would provide specific tidal habitat restoration design elements to reduce the potential for
4 bioaccumulation of selenium and its bioavailability in tidal habitats.

5 Changes in water operations under CM1 would not be expected to result in increased mercury
6 bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased
7 exposure of California least tern to methylmercury. There is potential for increased exposure of the
8 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
9 mercury available in the soils and the biogeochemical conditions. However, it is unknown what
10 concentrations of methylmercury are harmful to the species, and the potential for increased
11 exposure varies substantially within the study area. Implementation of CM12 which contains
12 measures to assess the amount of mercury before project development, followed by appropriate
13 design and adaptation management, would minimize the potential for increased methylmercury
14 exposure, and would result in no adverse effect on the species.

15 With AMM1–AMM7, AMM12, AMM27, and CM12 in place, in addition to the implementation of
16 Mitigation Measure BIO-66, the indirect effects of plan implementation would not result in a
17 substantial adverse effect on the species through habitat modification or potential mortality of a
18 special-status species. Therefore, the indirect effects of Alternative 1B implementation would have a
19 less-than-significant impact on California least tern.

20 **Mitigation Measure BIO-66, California Least Tern Nesting Colonies Shall Be Avoided and**
21 **Indirect Effects on Colonies Will Be Minimized**

22 See Mitigation Measure BIO-66 under Impact BIO-66.

23 **Impact BIO-68: Effects on California Least Tern Associated with Electrical Transmission**
24 **Facilities**

25 The risk of mortality of California least tern from the construction of new transmission lines is
26 considered to be minimal based on tern flight behaviors and its unlikely use of habitats near the
27 transmission line corridors. Terns exhibit low wing loading and high aspect-ratio wings and as a
28 result can maneuver relatively quickly around an obstacle such as a transmission line. Their wing
29 structure and design allows for rapid flight and quick, evasive actions (see BDCP Appendix 5.J,
30 Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). Marking
31 transmission lines with flight diverters that make the lines more visible to birds has been shown to
32 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
33 marking devices in the Central Valley could reduce avian mortality by 60%. All new project
34 transmission lines would be fitted with flight diverters. Bird flight diverters would make
35 transmission lines highly visible to California least terns and would substantially reduce the
36 potential for powerline collisions.

37 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
38 adverse effect on California least tern as a result of direct mortality of a special-status species
39 because they are uncommon in the vicinity of proposed transmission lines and because the
40 probability of bird-powerline strikes is highly unlikely due to tern flight behaviors. All new
41 transmission lines constructed as a result of the project would be fitted with bird diverters, which
42 have been shown to reduce avian mortality by 60%. With implementation of *AMM20 Greater*

1 *Sandhill Crane*, the construction and operation of transmission lines would not result in an adverse
2 effect on California least tern.

3 **CEQA Conclusion:** The construction and presence of new transmission lines would represent a less-
4 than-significant impact on California least tern as a result of direct mortality of a special-status
5 species because they are uncommon in the vicinity of proposed transmission lines and because the
6 probability of bird-powerline strikes is highly unlikely due to tern flight behaviors. All new
7 transmission lines constructed as a result of the project would be fitted with bird diverters, which
8 have been shown to reduce avian mortality by 60%. With implementation of *AMM20 Greater*
9 *Sandhill Crane*, the construction and operation of transmission lines would result in a less-than-
10 significant impact on California least tern.

11 **Greater Sandhill Crane**

12 This section describes the effects of Alternative 1B, including water conveyance facilities
13 construction and implementation of other conservation components, on greater sandhill crane.
14 Greater sandhill cranes in the study area are almost entirely dependent on privately owned
15 agricultural lands for foraging. Long-term sustainability of the species is thus dependent on
16 providing a matrix of compatible crop types that afford suitable foraging habitat and maintaining
17 compatible agricultural practices, while sustaining and increasing the extent of other essential
18 habitat elements such as night roosting habitat. The habitat model for greater sandhill crane
19 includes “roosting and foraging” and “foraging” habitat. These habitat types include certain
20 agricultural types, specific grassland types, irrigated pastures and hay crops, managed seasonal
21 wetland, and other natural seasonal wetland. Roosting and foraging habitat includes known,
22 traditional roost sites that also provide foraging habitat (BDCP Appendix 2.A *Covered Species*
23 *Accounts*). Both temporary and permanent roost sites were identified for greater Sandhill crane.
24 Permanent roosting and foraging sites are those used regularly, year after year, while temporary
25 roosting and foraging sites are those used in some years. Factors included in assessing the loss of
26 foraging habitat for the greater sandhill crane includes the relative habitat value of specific crop or
27 land cover types, and proximity to known roost sites. Foraging habitat for greater sandhill crane
28 included crop types and natural communities up to 4 miles from known roost sites, within the
29 boundary of the winter crane use area (BDCP Appendix 2.A, *Covered Species Accounts*).

30 Construction and restoration associated with Alternative 1B conservation measures would result in
31 both temporary and permanent losses of foraging and roosting habitat for greater sandhill crane as
32 indicated in Table 12-1B-28. Full implementation of Alternative 1B would also include the following
33 conservation actions over the term of the BDCP to benefit the greater sandhill crane (BDCP Chapter
34 3, Section 3.3, *Biological Goals and Objectives*).

- 35 ● Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at
36 least 80% maintained in very high-value types in any given year. This protected habitat will be
37 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
38 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
39 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective
40 GSHC1.1, associated with CM3).
- 41 ● To create additional high-value greater sandhill crane winter foraging habitat, 10% of the
42 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or
43 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be
44 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and

1 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
2 habitat loss (Objective GSHC1.2, associated with CM3).

- 3 ● Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the
4 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise
5 and local seasonal flood events. The wetlands will be located within 2 miles of existing
6 permanent roost sites and protected in association with other protected natural community
7 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide
8 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 9 ● Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge
10 project boundary. The complexes will be no more than 2 miles apart and will help provide
11 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each
12 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane
13 roosting habitat, and will be protected in association with other protected natural community
14 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,
15 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be
16 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
17 support roosting cranes and provide highest-value foraging habitat, provided such substitution
18 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for
19 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
- 20 ● Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost
21 sites. The habitat will consist of active cornfields that are flooded following harvest to support
22 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least
23 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will
24 be sited with consideration of the location of roosting habitat loss and will be in place prior to
25 roosting habitat loss (Objective GSCH1.5, associated with CM3).
- 26 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
27 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 28 ● Target cultivated land conservation to provide connectivity between other conservation lands
29 (Objective CLNC1.2, associated with CM3).
- 30 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
31 lands that occur in cultivated lands within the reserve system, including, water conveyance
32 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

33 As explained below, with the restoration and protection of these amounts of habitat, in addition to
34 natural community enhancement and management commitments (including *CM12 Methylmercury*
35 *Management*) and implementation of AMM1–AMM7, AMM20 *Greater Sandhill Crane*, AMM27
36 *Selenium Management*, AMM30 *Transmission Line Design and Alignment Guidelines*, and Mitigation
37 Measures BIO-69a and BIO-69b, impacts on the greater sandhill crane would not be adverse for
38 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-28. Changes in Greater Sandhill Crane Modeled Habitat Associated with Alternative 1B**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	0	0	NA	NA
	Roosting and Foraging - Temporary	148	148	733	733		
	Foraging	3,265	3,265	4,632	4,632	NA	NA
Total Impacts CM1		3,413	3,413	5,365	5,365		
CM2-CM10	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	2,776	4,367	0	0	0	0
Total Impacts CM2-CM18		2,776	4,408	0	0	0	0
Total Roosting and Foraging		148	189	733	733	0	0
Total Foraging		6,041	7,632	4,632	4,632	0	0
TOTAL IMPACTS		6,189	7,821	5,365	5,365	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-69: Loss or Conversion of Habitat for and Direct Mortality of Greater Sandhill**
5 **Crane**

6 Alternative 1B conservation measures would result in the combined permanent and temporary loss
7 of up to 922 acres of temporary roosting and foraging habitat (189 acres of permanent loss, 733
8 acres of temporary loss) and 12,264 acres of foraging habitat for greater sandhill crane (7,632 acres
9 of permanent loss, 4,632 acres of temporary loss, Table 12-1B-28). Conservation measures that
10 would result in these losses are conveyance facilities and transmission line construction, and
11 establishment and use of borrow and spoil areas from *CM1 Water Facilities and Operation*, *CM4 Tidal*
12 *Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM10 Nontidal*
13 *Marsh Restoration*, and *CM11 Natural Communities Enhancement and Management*. The majority of
14 habitat loss would result from conversion to tidal natural communities through CM4. Habitat
15 enhancement and management activities (CM11), which include ground disturbance or removal of
16 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities
17 associated with the long-term operation of the water conveyance facilities and other BDCP physical

1 facilities could degrade or eliminate greater sandhill crane modeled habitat. Each of these individual
2 activities is described below. A summary statement of the combined impacts, NEPA effects and a
3 CEQA conclusion follow the individual conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities as they
5 are currently designed would result in the combined permanent and temporary loss of up to
6 8,778 acres of modeled greater sandhill crane habitat. This would consist of the permanent
7 removal of 148 acres of roosting and foraging habitat, and 3,771 acres of foraging habitat.
8 Foraging habitat that would be permanently impacted by CM1 would consist of 949 acres of
9 very high-value, 566 acres of high-value, and 789 acres of medium-value foraging habitat (Table
10 12-1B-29). In addition, 733 acres of temporary roosting and foraging habitat and 4,632 acres of
11 foraging habitat would be temporarily removed (Table 12-1B-28). The temporarily removed
12 habitat would consist primarily of cultivated lands and it would be restored within one year
13 following construction. However, it would not necessarily be restored to its original topography
14 and it could be restored as grasslands in the place of cultivated lands. CM1 activities that would
15 result in temporary impacts would include temporary access roads, borrow and spoil sites, and
16 work areas for construction.

17 The temporary roost sites that would be permanently impacted are located on Zaccharias
18 Island, Shin Kee Tract, and Ringe Tract and impacts would occur from the construction of the
19 canal and the proposed permanent transmission line footprint. Temporary impacts on
20 temporary roosting and foraging habitat would occur from temporary work areas associated
21 with the construction of the canal and borrow and spoil areas. Approximately 642 acres of
22 temporary impact on temporary roosting and foraging sites would occur from the footprint of
23 the borrow and spoil areas associated with the construction of the canal. Indirect effects of
24 construction of the canal adjacent to Stone Lakes National Wildlife Refuge could result in the
25 abandonment of roost sites adjacent to the CM1 footprint. Indirect effects of noise and visual
26 disturbance are addressed under Impact BIO-71.

27 The implementation of *AMM20 Greater Sandhill Crane* would require that all CM1 activities be
28 designed to avoid direct loss of crane roost sites. Avoidance of crane roost sites would be
29 accomplished either by siting activities outside of identified roost sites or by relocating the roost
30 site if it consisted of cultivated lands. Relocated roost sites would be established prior to
31 construction activities affecting the original roost site (as described in *AMM20 Greater Sandhill
32 Crane*, in Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Therefore, there would be
33 no loss of crane roosting and foraging habitat as a result of water conveyance facility
34 construction once the facilities were fully designed.

35 Traditional roosting and foraging sites on Bract Tract (east of Staten Island) are among the
36 highest crane use areas in the Delta. Impacts on Bract Tract include the construction of the
37 canal, proposed permanent and temporary transmission lines, potential borrow and spoil areas,
38 and temporary work areas. Construction within or adjacent to this important crane use area
39 would be adverse in the absence of other conservation measures. The proposed permanent
40 transmission line alignment would occur east of The potential for injury and direct mortality
41 from electrical transmission facilities is addressed below under Impact BIO-70. The
42 transmission line alignment under Alternative 1B is not fully designed and the final
43 transmission line design would be determined in coordination with USFWS, CDFW, and a
44 qualified crane biologist to achieve a performance standard of no net increase in bird strike
45 hazard to greater sandhill cranes in the Plan Area (*AMM20 Greater Sandhill Crane*). Mitigation
46 Measure BIO-69b, *BDCP-Related Construction Will Not Result in a Net Decrease in Crane Use Days*

1 on Bract Tract, would be available to address the effects of construction activities on or adjacent
2 to Bract Tract.

3 Permanent and temporary impacts on foraging habitat would occur throughout the Delta from
4 the construction of Intakes 1-5, construction of the canal, and associated borrow and spoil and
5 RTM storage areas along the canal alignment. Approximately 3,479 acres of temporary impact
6 on foraging habitat would result from the footprint of the borrow and spoil areas associated
7 with the construction of the intakes and the canal. Approximately 223 acres of the permanent
8 loss of foraging habitat would be from the storage of reusable tunnel material. This material
9 would likely be moved to other sites for use in levee build-up and restoration, and the affected
10 area would likely eventually be restored. While this effect is categorized as permanent because
11 there is no assurance that the material would eventually be moved, the effect would likely be
12 temporary. The actual footprint of the storage areas required for reusable tunnel material is
13 flexible, and the actual acreage of habitat affected by this activity could be reduced based on the
14 height of the storage piles in addition to other considerations. The implementation of *AMM6*
15 *Disposal and Reuse of Spoils* would require that the areas used for reusable tunnel material
16 storage be minimized in crane foraging habitat and completely avoid crane roost sites. Refer to
17 the Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations.
18 Impacts from CM1 would occur within the first 10 years of Plan implementation.

19 **Table 12-1B-29. Total Amount of Affected Greater Sandhill Crane Foraging Habitat**

Foraging Habitat Value Class	Land Cover Type	Acres Affected by CM1 permanent [temporary] (acres)	Acres Affected by CM2–CM18 permanent (temporary) acres
Very high	Corn, rice	949 (1,845)	1,155 (0)
High	Wheat, managed wetlands,	0 (2)	489 (0)
Medium	Alfalfa and alfalfa mixtures, irrigated mixed pasture, irrigated native pasture, irrigated pasture, irrigated other pasture, grain and hay crops, miscellaneous grain and hay, mixed grain and hay, nonirrigated mixed grain and hay, other grain crops, sudan, miscellaneous grasses, grassland, alkali seasonal wetlands, vernal pool complex	1,027 (1,487)	1,403 (0)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry), native vegetation	1,288 (1,298)	1,320 (0)
Total		3,265 (4,632)	4,367

20

- 1 ● *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration
2 footprint, this activity would result in the permanent loss or conversion of approximately 2,754
3 acres of greater sandhill crane habitat, consisting of 41 acres of temporary roosting and foraging
4 habitat and 2,713 acres of foraging habitat. Loss of foraging habitat from CM4 would consist of
5 716 acres of very high-value, 304 acres of high value, 873 acres of medium-value, and 821 acres
6 of low-value foraging habitat. This loss would occur in the Cosumnes-Mokelumne River and
7 West Delta ROAs. Tidal wetland restoration in CZ 4 could occur between the high crane use
8 areas of the central Delta and the Cosumnes River Preserve. However, the conversion of
9 grasslands and cultivated lands to tidal wetlands would not prohibit crane movement or reduce
10 use of these areas. In CZ 5, loss of modeled habitat would occur along the western edge of the
11 greater sandhill crane winter use area and therefore would not result in fragmentation of
12 traditional crane habitats. Therefore fragmentation of habitat from tidal restoration activities
13 would be expected to be minimal. Approximately 1,951 acres of foraging habitat would be
14 impacted within the first 10 years of Plan implementation.
- 15 ● *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands that
16 provide foraging habitat for greater sandhill crane would be converted to grassland by the late
17 long-term timeframe. No roosting/foraging habitat would be impacted by grassland restoration
18 activities. The restored grasslands would continue to provide foraging habitat value for the
19 greater sandhill crane. Approximately 257 acres would be impacted within the first 10 years of
20 Plan implementation.
- 21 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent
22 conversion of approximately 1,350 acres of modeled foraging habitat for the greater sandhill
23 crane. A portion of the restored nontidal marsh would be expected to continue to provide
24 roosting and foraging habitat value for the greater sandhill crane. However, some of this
25 restored marsh would be unsuitable as it would lack emergent vegetation and consist of open
26 water that would be too deep to provide suitable roosting or foraging habitat. Approximately
27 567 acres of habitat would be converted to nontidal marsh within the first 10 years of Plan
28 implementation.
- 29 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
30 actions included in CM11 that are designed to enhance wildlife values in restored or protected
31 habitats could result in localized ground disturbances that could temporarily remove small
32 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
33 vegetation and road and other infrastructure maintenance activities, would be expected to have
34 minor adverse effects on available habitat and would be expected to result in overall
35 improvements to and maintenance of habitat values over the term of the BDCP. The potential for
36 these activities to result in direct mortality of greater sandhill crane would be minimized with
37 the implementation of *AMM20 Greater Sandhill Crane*. CM11 would also include the construction
38 of recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP
39 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead
40 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
41 disturbed areas when and where possible. If new ground disturbance was necessary, greater
42 sandhill crane habitat would be avoided, with the exception of a permanent loss of 4 acres of
43 grassland foraging habitat (1 acre of which would be impacted within the first 10 years of plan
44 implementation).
- 45 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
46 water conveyance facilities and restoration infrastructure could result in ongoing but periodic

1 disturbances that could affect greater sandhill crane use of the surrounding habitat.
2 Maintenance activities would include vegetation management, levee and structure repair, and
3 re-grading of roads and permanent work areas. These effects, could be adverse as sandhill
4 cranes are sensitive to disturbance. However, effects of operations and maintenance on sandhill
5 cranes would be reduced by AMMs, and conservation actions as described below.

- 6 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
7 direct mortality of greater sandhill crane if they were present in the study area, because they
8 would be expected to avoid contact with construction and other equipment. Effects would be
9 avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*. The
10 potential for injury and direct mortality from electrical transmission facilities is discussed below
11 under Impact BIO-70.

12 The following paragraphs summarize the combined effects discussed above and describe other
13 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
14 included.

15 ***Near-Term Timeframe***

16 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
17 the near-term BDCP conservation strategy has been evaluated to determine whether it would
18 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
19 effects of construction would not be adverse under NEPA. Based on current design footprints, the
20 Plan would remove 881 acres roosting and foraging habitat (148 acres of permanent loss, 733 acres
21 of temporary loss) in the study area in the near-term. These effects would result from the
22 construction of the water conveyance facilities (CM1). In addition, 10,673 acres of foraging habitat
23 would be removed or converted in the near-term (CM1, 7,897 acres; *CM4 Tidal Natural Communities*
24 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural Communities*
25 *Enhancement and Management—2,776 acres*). Of these near-term acres of foraging habitat impact,
26 7,245 acres would be moderate- to very high-value habitat (CM1, 5,310 acres, CM4-11, 1,935 acres).

27 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
28 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in
29 Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1
30 protection of high- to very high-value foraging habitat for loss of moderate- to very high-value
31 foraging habitat. Using these ratios would indicate that 881 acres of greater roosting habitat should
32 be restored/created and 881 acres should be protected to compensate for the CM1 losses of greater
33 sandhill crane roosting and foraging habitat. In addition, 5,310 acres of high- to very high-value
34 foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane moderate-
35 to very high-value foraging habitat. The near-term effects of other conservation actions would
36 remove 1,935 acres of moderate- to very high-value foraging habitat, and therefore require 1,935
37 acres of protection of high- to very high-value foraging habitat using the same typical NEPA and
38 CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1
39 protection for the loss of foraging habitat).

40 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane
41 roost sites were directly impacted by CM1 covered activities (including transmission lines and their
42 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
43 result of water conveyance facility construction once the facilities were fully designed, which would
44 avoid the CM1 impact on 881 acres of roosting and foraging habitat once the project design was

1 final. Methods to avoid direct impacts on crane roost sites are described in *AMM20 Greater Sandhill*
2 *Crane*. Traditional roosting and foraging sites on Bract Tract (east of Staten Island) are among the
3 highest crane use areas in the Delta. Impacts on Bract Tract include the construction of the canal,
4 proposed permanent and temporary transmission lines, potential borrow and spoil areas, and
5 temporary work areas. Construction within or adjacent to this important crane use area would be
6 adverse in the absence of other conservation measures. Mitigation Measure BIO-69b, *BDCP-Related*
7 *Construction Will Not Result in a Net Decrease in Crane Use Days on Bract Tract* would be available to
8 address the effects of construction activities on or adjacent to Bract Tract.

9 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
10 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These
11 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as
12 the construction and early restoration losses.

13 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
14 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
15 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
16 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
17 Sandhill Crane Winter Use Area, and would be in place prior to construction. Of the 500 acres of
18 managed wetlands to be created for roosting habitat, 320 acres would be created in minimum patch
19 sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective
20 GSHC1.3). Restoration sites would be identified with consideration of sea level rise and local
21 seasonal flood events. These wetlands would be created within 2 miles of existing permanent roost
22 sites and protected in association with other protected natural community types at a ratio of 2:1
23 upland to wetland habitat to provide buffers that will protect cranes from the types of disturbances
24 that would otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual
25 disturbance, lighting). The remaining 180 acres of crane roosting habitat would be constructed
26 within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be
27 designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill crane
28 populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would provide
29 additional conservation to address the threats of vineyard conversion, urbanization to the east, and
30 sea level rise to the west of greater sandhill crane wintering habitat.

31 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
32 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
33 BIO-69a, *Compensate for the Loss of Medium- to Very High-Value Greater Sandhill Crane Foraging*
34 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the
35 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were
36 compensated for with appropriate crop types and natural communities.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
38 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
39 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
40 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
41 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
42 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
43 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
44 of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676
3 acres of foraging habitat for greater sandhill crane. Alternative 1B as a whole would result in the
4 permanent loss of and temporary effects on 922 acres of roosting and foraging habitat (4% of the
5 total habitat in the study area) and 12,264 acres of foraging habitat (7% of the total habitat in the
6 study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost by
7 the late long-term timeframe would consist of 8,357 acres of medium- to very high-value foraging
8 habitat. The locations of these losses are described above in the analyses of individual conservation
9 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites
10 were directly affected by water conveyance facilities including transmission lines and associated
11 footprints. In addition, temporarily removed habitat would be restored within 1 year following
12 construction. However, it would not necessarily be restored to its original topography and it could
13 result in the conversion of cultivated lands to grasslands.

14 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
15 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
16 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
17 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
18 GSHC1.1).

19 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
20 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
21 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
22 and local seasonal flood events. These wetlands would be created within 2 miles of existing
23 permanent roost sites and protected in association with other protected natural community types at
24 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
25 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
26 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
27 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and
28 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
29 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
30 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The
31 large patch sizes of these wetland complexes would provide additional conservation to address the
32 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
33 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
34 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
35 active cornfields that are flooded following harvest to support roosting cranes and also provide the
36 highest-value foraging habitat for the species. Individual fields would be at least 40 acres and could
37 shift locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with
38 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat
39 loss.

40 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
41 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
42 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
43 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
44 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
45 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives

1 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
2 economically driven agricultural practices, protecting crane habitat would provide enhanced
3 stability to agricultural habitat value within the crane use area that does not currently exist.
4 Mitigation-Measure BIO-69a would be available to ensure that the loss of 9,219 acres of moderate-
5 to very high-value crop types was compensated for with sufficient acres of high- to very high-value
6 crop types by the late long-term timeframe. Mitigation Measure BIO-69b would be available to
7 reduce effects from CM1 activities on or adjacent to Bract Tract.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
12 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
13 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
14 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
15 of the Final EIR/EIS.

16 Considering habitat protection, restoration, management, and enhancement would be guided by
17 performance standards, and the aforementioned AMMs, which would be in place throughout the
18 period of construction, greater sandhill crane habitat losses and conversions under Alternative 1B
19 would not be an adverse effect under NEPA in the late long-term.

20 **CEQA Conclusion:**

21 **Near-Term Timeframe**

22 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
23 the near-term BDCP conservation strategy has been evaluated to determine whether it would
24 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
25 effects of construction would be less than significant under CEQA. Based on current design
26 footprints, the Plan would remove 881 acres roosting and foraging habitat (148 acres of permanent
27 loss, 733 acres of temporary loss) in the study area in the near-term. These effects would result from
28 the construction of the water conveyance facilities (CM1). In addition, 10,673 acres of foraging
29 habitat would be removed or converted in the near-term (CM1, 7,897 acres; *CM4 Tidal Natural*
30 *Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*
31 *Communities Enhancement and Management—2,776 acres*). Of these near-term acres of foraging
32 habitat impact, 7,245 acres would be moderate- to very high-value habitat (CM1, 5,310 acres, *CM4-*
33 *11*, 1,935 acres).

34 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
35 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in
36 Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1
37 protection of high- to very high-value foraging habitat for loss of moderate- to very high-value
38 foraging habitat. Using these ratios would indicate that 881 acres of greater roosting habitat should
39 be restored/created and 881 acres should be protected to compensate for the CM1 losses of greater
40 sandhill crane roosting and foraging habitat. In addition, 5,310 acres of high- to very high-value
41 foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane moderate-
42 to very high-value foraging habitat. The near-term effects of other conservation actions would
43 remove 1,935 acres of moderate- to very high-value foraging habitat, and therefore require 1,935
44 acres of protection of high- to very high-value foraging habitat using the same typical NEPA and

1 CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1
2 protection for the loss of foraging habitat).

3 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane
4 roost sites were directly impacted by CM1 covered activities (including transmission lines and their
5 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
6 result of water conveyance facility construction once the facilities were fully designed, which would
7 avoid the CM1 impact on 881 acres of roosting and foraging habitat once the project design was
8 final. Methods to avoid direct impacts on crane roost sites are described in *AMM20 Greater Sandhill
9 Crane*. Traditional roosting and foraging sites on Bract Tract (east of Staten Island) are among the
10 highest crane use areas in the Delta. Impacts on Bract Tract include the construction of the canal,
11 proposed permanent and temporary transmission lines, potential borrow and spoil areas, and
12 temporary work areas. Construction within or adjacent to this important crane use area would be a
13 significant impact in the absence of other conservation measures. Implementation of Mitigation
14 Measure BIO-69b, *BDCP-Related Construction Will Not Result in a Net Decrease in Crane Use Days on
15 Bract Tract*, would reduce the impact of construction activities on or adjacent to Bract Tract to a
16 less-than-significant level.

17 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
18 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These
19 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as
20 the construction and early restoration losses. Up to 95 acres of roosting habitat would be created
21 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
22 active cornfields that are flooded following harvest to support roosting cranes and also provide the
23 highest-value foraging habitat for the species. Individual fields would be at least 40 acres, could shift
24 locations throughout the Greater Sandhill Crane Winter Use Area, and would be in place prior to
25 construction. Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres
26 would be created in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use
27 Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3). Restoration sites would be identified with
28 consideration of sea level rise and local seasonal flood events. These wetlands would be created
29 within 2 miles of existing permanent roost sites and protected in association with other protected
30 natural community types at a ratio of 2:1 upland to wetland habitat to provide buffers that will
31 protect cranes from the types of disturbances that would otherwise result from adjacent roads and
32 developed areas (e.g., roads, noise, visual disturbance, lighting). The remaining 180 acres of crane
33 roosting habitat would be constructed within the Stone Lakes NWR project boundary (BDCP
34 Chapter 3, Figure 3.3-6) and would be designed to provide connectivity between the Stone Lakes
35 and Cosumnes greater sandhill crane populations (Objective GSHC1.4). The large patch sizes of
36 these wetland complexes would provide additional conservation to address the threats of vineyard
37 conversion, urbanization to the east, and sea level rise to the west of greater sandhill crane
38 wintering habitat.

39 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
40 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
41 BIO-69a would guide the near-term protection of cultivated lands to ensure that the near-term
42 impacts of moderate- to very high-value habitat for greater sandhill crane were compensated for
43 with appropriate crop types and natural communities.

44 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2
45 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
3 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
4 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
5 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
6 of the Final EIR/EIS.

7 **Late Long-Term Timeframe**

8 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676
9 acres of foraging habitat for greater sandhill crane. Alternative 1B as a whole would result in the
10 permanent loss of and temporary effects on 922 acres of roosting and foraging habitat (4% of the
11 total habitat in the study area) and 12,264 acres of foraging habitat (7% of the total habitat in the
12 study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost by
13 the late long-term timeframe would consist of 8,357 acres of medium- to very high-value foraging
14 habitat. The locations of these losses are described above in the analyses of individual conservation
15 measures.

16 The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites were
17 directly affected by water conveyance facilities including transmission lines and associated
18 footprints. In addition, temporarily removed habitat would be restored within 1 year following
19 construction. However, it would not necessarily be restored to its original topography and it could
20 result in the conversion of cultivated lands to grasslands.

21 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
22 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
23 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
24 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
25 GSHC1.1).

26 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
27 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
28 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
29 and local seasonal flood events. These wetlands would be created within 2 miles of existing
30 permanent roost sites and protected in association with other protected natural community types at
31 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
32 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
33 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
34 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and
35 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
36 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
37 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The
38 large patch sizes of these wetland complexes would provide additional conservation to address the
39 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
40 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
41 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
42 active cornfields that are flooded following harvest to support roosting cranes and also provide the
43 highest-value foraging habitat for the species. Individual fields would be at least 40 acres and could
44 shift locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with

1 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat
2 loss.

3 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
4 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
5 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
6 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
7 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
8 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives
9 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
10 economically driven agricultural practices, protecting crane habitat would provide enhanced
11 stability to agricultural habitat value within the crane use area that does not currently exist.
12 Mitigation-Measure BIO-69a would be available to ensure that the loss of 9,219 acres of moderate-
13 to very high-value crop types was compensated for with sufficient acres of high- to very high-value
14 crop types by the late long-term timeframe.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
19 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
20 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
21 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
22 of the Final EIR/EIS.

23 In the absence of other conservation actions, the effects on greater sandhill crane habitat from
24 Alternative 1B would represent an adverse effect as a result of habitat modification of a special-
25 status species and potential for direct mortality. Considering Alternative 1B's protection and
26 restoration provisions, in addition to Mitigation Measure BIO-69a, which would compensate for the
27 loss of medium- to very high-value foraging habitat at a ratio of 1:1, and Mitigation Measure BIO-
28 69b, which would require no loss of crane use on Bract Tract habitat, habitat loss and direct
29 mortality through implementation of Alternative 1B would not result in a substantial adverse effect
30 through habitat modifications and would not substantially reduce the number or restrict the range
31 of the species. Therefore, the alternative would have a less-than-significant impact on greater
32 sandhill crane.

33 **Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value** 34 **Greater Sandhill Crane Foraging Habitat**

35 DWR will compensate for the loss of greater sandhill crane medium- to very high-value foraging
36 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan
37 Area. Compensation must occur prior to or concurrent within the impacts to minimize the
38 effects of habitat loss. The crop types and natural communities that are included in foraging
39 habitat value categories are listed in Table 12-1B-29. Foraging habitat conservation must occur
40 within the greater sandhill crane winter use area and the location of protected habitat or
41 conservation easements must be preapproved by USFWS and CDFW.

1 **Mitigation Measure BIO-69b: BDCP-Related Construction Will Not Result in a Net**
2 **Decrease in Crane Use Days on Bract Tract**

3 Because of the density of greater sandhill cranes wintering on and adjacent to Bract Tract and
4 the importance of Staten Island to the sustainability of the greater sandhill crane population in
5 the Plan Area, DWR will minimize, to the extent practicable, the final placement of conveyance
6 facilities on Bract Tract. BDCP-related construction shall not result in a net decrease in crane use
7 on Bract Tract as determined by deriving greater sandhill crane use days for the entire winter
8 period (see *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental Commitments, AMMs,*
9 *and CMs*, for a description of how loss of crane use will be estimated). This standard shall be
10 achieved through some combination of the following (and including the avoidance and
11 minimization measures for CM1 required under *AMM20 Greater Sandhill Crane*).

- 12 • Minimize and/or shift the footprint of activities on Bract Tract
- 13 • Minimize noise, lighting, and visual disturbances during construction
- 14 • Minimize construction activity during the crane wintering season to the extent practicable
- 15 • Supplemental feeding/foraging habitat enhancement: The enhanced habitat will consist of
16 corn fields that will not be harvested, and will be managed to maximize food availability to
17 greater sandhill cranes. A management plan for the enhanced habitat will be completed
18 prior to establishing the habitat, in coordination with a qualified crane biologist (with at
19 least 5 years of experience managing greater sandhill crane habitat on cultivated lands, or
20 experience directing such management). The enhanced habitat will be located outside the
21 construction related 50 dBA L_{eq} (1 hour) noise contour and within 1 mile of the affected
22 habitat.
- 23 • Maintain flooding and irrigation capacity. Stage CM1 activities on Bract Tract such that they
24 do not disrupt flooding and irrigation to the extent that greater sandhill crane habitat will be
25 reduced during the crane wintering season.

26 Prior to construction on Bract Tract, a qualified, wildlife agency approved crane biologist will
27 coordinate with DWR to develop a strategy for achieving the Bract Tract performance standard
28 (no net decrease in crane use on Bract Tract) using a combination of the measures described
29 above, and prepare a plan based on the final construction design on Bract Tract that includes all
30 conservation measures necessary for achieving the performance standard. This plan will be
31 subject to review and approval by the USFWS and CDFW prior to its implementation. All
32 conservation measures will be in place, consistent with the plan, prior to project construction on
33 or adjacent to Bract Tract.

34 **Impact BIO-70: Effects on Greater Sandhill Crane Associated with Electrical Transmission**
35 **Facilities**

36 Greater sandhill cranes are susceptible to collision with power lines and other structures during
37 periods of inclement weather and low visibility (Avian Power Line Interaction Committee 1994,
38 Brown and Drewien 1995, Manville 2005). There are extensive existing transmission and
39 distribution lines in the sandhill crane winter use area. These include a network of distribution lines
40 that are between 11- and 22-kV. In addition, there are two 115-kV lines that cross the study area,
41 one that overlaps with the greater sandhill crane winter use area between Antioch and I-5 east of
42 Hood, and one that crosses the northern tip of the crane winter use area north of Clarksburg. There
43 are 69-kv lines within the study area that parallel Twin Cities Road, Herzog Road, Lambert Road,

1 and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes National Wildlife Refuge. At the
2 south end of the winter use area, there are three 230-kV transmission lines that follow I-5, and then
3 cut southwest through Holt, and two 500-kV lines cross the southwestern corner of the winter use
4 area. This existing network of power lines in the study currently poses a collision and electrocution
5 risk for sandhill cranes, because they cross over or surround sandhill crane roost sites in the study
6 area.

7 Both permanent and temporary electrical transmission lines would be constructed to supply
8 construction and operational power to Alternative 1B facilities as described below. The potential for
9 birdstrikes could also be exacerbated by construction-related effects, especially in low-visibility
10 conditions.

11 The potential mortality of greater sandhill crane in the area of the proposed transmission lines
12 under Alternative 1B was estimated using collision mortality rates by Brown and Drewien (1995)
13 and an estimate of potential crossings along the proposed lines (methods are described in BDCP
14 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*).
15 This analysis concluded that mortality risk could be substantially reduced by marking new
16 transmission lines to increase their visibility to sandhill cranes.

17 Typically, higher-voltage (230-kilovolt [kV]) lines vary in height from 90 to 110 feet, while “sub”
18 transmission (69-kV) lines vary from 50 to 70 feet (Avian Power Line Interaction Committee 2006).
19 The Alternative 1B alignment would require the installation of approximately 53 miles of permanent
20 transmission line (16 miles of 230-kV lines and 37 miles of 69-kV lines) extending north and south,
21 through much of the crane use area. The temporary transmission lines would total approximately 47
22 miles (14 miles of 69-kV line and 33 miles of 12-kV line). Temporary lines would be removed after
23 construction of the water conveyance facilities, within 10 years. The proposed permanent and
24 temporary transmission lines that would be constructed through Bract Tract as they are currently
25 designed would have the potential to substantially affect greater sandhill cranes as this is a high-use
26 area for cranes in the Delta.

27 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
28 transmission line alignment, such as co-locating transmission lines when it would minimize effects
29 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. After the
30 Draft EIR/EIS was issued in December 2013, additional avoidance features were added to *AMM20*
31 *Greater Sandhill Crane*. *AMM20 Greater Sandhill Crane* requires that Alternative 1B meet the
32 performance standard of no mortality of greater sandhill crane associated with the new facilities.
33 This would be achieved by implementing one or any combination of the following: 1) siting new
34 transmission lines in lower bird strike risk zones; 2) removing, relocating or undergrounding
35 existing lines where feasible; 3) using natural gas generators in lieu of installing transmission lines
36 in high-risk zones of the greater sandhill crane winter use area; 4) undergrounding new lines in
37 high-risk zones of the greater sandhill crane winter use area; 5) permanently installing flight
38 diverters on existing lines over lengths equal to or greater than the length of the new transmission
39 lines in the crane winter use area; 6) for areas outside of the Stone Lakes NWR project boundary,
40 shifting locations of flooded areas that provide crane roosts to lower risk areas. These measures are
41 described in detail in *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental Commitments,*
42 *AMMs, and CMs*.

43 The implementation of the measures described above under *AMM20 Greater Sandhill Crane* would
44 substantially reduce the potential for crane collisions with transmission lines. Potential measures

1 that would eliminate this risk include using natural gas generators in lieu of transmission lines or
2 undergrounding new lines in high-risk zones in the greater sandhill crane winter use area. Marking
3 transmission lines with flight diverters that make the lines more visible to birds has been shown to
4 reduce the incidence of bird mortality, including for sandhill cranes (Brown and Drewien 1995). Yee
5 (2008) estimated that marking devices in the Central Valley could reduce avian mortality by 60%.
6 All new transmission lines would be fitted with flight diverters. The installation of flight diverters on
7 existing permanent lines would be prioritized in the highest risk zones for greater sandhill crane (as
8 described in BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*
9 *BDCP Powerlines*) and diverters would be installed in a configuration that research indicates would
10 reduce bird strike risk by at least 60%. The length of existing line to be fitted with bird strike
11 diverters will be equal to the length of new transmission lines constructed as a result of the project,
12 in an area with the same or higher greater sandhill crane strike risk to provide a net benefit to the
13 species. For optimum results, the recommended spacing distance for bird flight diverters is 15 to
14 16.5 feet (4.5 to 5 meters) (Avian Power Line Interaction Committee 1994). Placing diverters on
15 existing lines would be expected to reduce existing mortality in the Plan Area and therefore result in
16 a net benefit to the greater sandhill crane population because these flight diverters would be
17 maintained in perpetuity.

18 **NEPA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
19 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
20 current proposed transmission line alignment under Alternative 1B is not fully designed, and line
21 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the
22 final transmission line alignment avoided crane roost sites and achieve the performance standard of
23 no mortality of greater sandhill crane associated with the new facilities. *AMM30 Transmission Line*
24 *Design and Alignment Guidelines* would require design features for the transmission line alignment,
25 such as co-locating transmission lines when it would minimize effects on sandhill cranes, to avoid
26 impacts on sensitive habitats to the maximum extent feasible. All new transmission lines
27 constructed as a result of the project would be fitted with bird diverters, which have been shown to
28 reduce avian mortality by 60%. By incorporating *AMM30 Transmission Line Design and Alignment*
29 *Guidelines* and one or a combination of the measures to greatly reduce the risk of bird strike
30 described in *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines
31 under Alternative 1B would not result in an adverse effect on greater sandhill crane.

32 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
33 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
34 current proposed transmission line alignment under Alternative 1B is not fully designed, and line
35 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the
36 final transmission line alignment avoided crane roost sites and achieve the performance standard of
37 no mortality of greater sandhill crane associated with the new facilities. *AMM30 Transmission Line*
38 *Design and Alignment Guidelines* would require design features for the transmission line alignment,
39 such as co-locating transmission lines when it would minimize effects on sandhill cranes, to avoid
40 impacts on sensitive habitats to the maximum extent feasible. All new transmission lines
41 constructed for the project would be fitted with bird diverters, which have been shown to reduce
42 avian mortality by 60%. By incorporating *AMM30 Transmission Line Design and Alignment Guidelines*
43 and one or a combination of the measures to greatly reduce the risk of bird strike described in
44 *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines under
45 Alternative 1B would have a less-than-significant impact on greater sandhill crane.

Impact BIO-71: Indirect Effects of Plan Implementation on Greater Sandhill Crane

Indirect Construction- and Operation-Related Effects: Sandhill cranes are sensitive to disturbance. Noise and visual disturbances from the construction of water conveyance facilities and other conservation measures could reduce greater sandhill crane use of modeled habitat adjacent to work areas. Indirect effects associated with construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations outside the project footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise and visual disturbances that could affect greater sandhill crane use of surrounding habitat. These effects could result from periodic vehicle use along the conveyance corridor, inspection and maintenance of aboveground facilities, and similar activities. These potential effects would be minimized with implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*.

The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would result from the construction of the Alternative 4 water conveyance facilities on greater sandhill crane (BDCP Appendix 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*). The same methods were employed to address the potential noise effects on cranes from Alternative 1B and to determine that as much as 7,746–17,967 acres of crane habitat could be affected by general construction noise above baseline level (50–60 dBA). This would include 109–576 acres of permanent crane roosting habitat, 904–2,078 acres of temporary crane roosting habitat, and 6,733–15,314 acres of crane foraging habitat. In addition, 252–950 acres of permanent crane roosting habitat, 471–1,623 acres of temporary crane roosting habitat, and 1,623–18,043 acres of crane foraging habitat could be affected by noise from pile driving that would be above baseline level (50–60dBA, Table 12-1B-30). The analysis was conducted based on the assumption that there would be direct line-of-sight from sandhill crane habitat areas to the construction site, and, therefore, provides a worst-case estimate of effects. In many areas the existing levees would partially or completely block the line-of-sight and would function as effective noise barriers, substantially reducing noise transmission. However, there is insufficient data to assess the effects that increased noise levels would have on sandhill crane behavior.

Table 12-1B-30. Greater Sandhill Crane Habitat Affected by General Construction and Pile Driving Noise Under Alternative 1B (acres)

Habitat Type	General Construction		Pile Driving	
	Above 60 dBA	Above 50 dBA	Above 60 dBA	Above 50 dBA
Permanent Roosting	109	576	252	950
Temporary Roosting	904	2,078	471	1,623
Foraging	6,733	15,314	1,623	18,043
Total Habitat	7,746	17,967	2,347	20,616

Evening and nighttime construction activities would require the use of extremely bright lights. Nighttime construction could also result in headlights flashing into roost sites when construction vehicles are turning onto or off of construction access routes. Proposed surge towers would require the use of safety lights that would alert low-flying aircraft to the presence of these structures because of their height. Little data is available on the effects of impact of artificial lighting on roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes

1 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP
2 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to
3 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting
4 include a reduction in the cranes' quality of nocturnal rest, and effects on their sense of photo-period
5 which might cause them to shift their physiology towards earlier migration and breeding (BDCP
6 Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes' overall
7 fitness and reproductive success (which could in turn have population-level impacts). A change in
8 photo-period interpretation could also cause cranes to fly out earlier from roost sites to forage and
9 might increase their risk of power line collisions if they were to leave roosts before dawn (BDCP
10 Chapter 5, *Effects Analysis*).

11 The effects of noise and visual disturbance on greater sandhill crane would be minimized through
12 the implementation of *AMM20 Greater Sandhill Crane* (see Appendix 3B, *Environmental*
13 *Commitments, AMMs, and CMs*). Activities within 0.75 mile of crane roosting habitat would reduce
14 construction noise during night time hours (from one hour before sunset to one hour after sunrise)
15 such that construction noise levels do not exceed 50 dBA L_{eq} (1 hour) at the nearest temporary or
16 permanent roosts during periods when the roost sites are available (flooded). In addition, the area
17 of crane foraging habitat that would be affected during the day (from one hour after sunrise to one
18 hour before sunset) by construction noise exceeding 50 dBA L_{eq} (1 hour) would also be minimized.
19 Unavoidable noise related effects would be compensated for by the enhancement of 0.1 acre of
20 foraging habitat for every acre indirectly affected within the 50 dBA L_{eq} (1 hour) construction noise
21 contour. With these measures in place, indirect effects of noise and visual disturbance from
22 construction activities would not be expected to reduce the greater sandhill crane population in the
23 study area.

24 The use of mechanical equipment during water conveyance facilities construction could cause the
25 accidental release of petroleum or other contaminants that could affect greater sandhill crane in the
26 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to greater
27 sandhill crane habitat could also affect the species. AMM1–AMM7, including *AMM2 Construction Best*
28 *Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that
29 measures were in place to prevent runoff from the construction area and negative effects of dust on
30 foraging habitat.

31 **Methylmercury Exposure:** Largemouth bass was used as a surrogate species for analysis
32 (Appendix 11F, *Substantive BDCP Revisions*). Results of the quantitative modeling of mercury effects
33 on largemouth bass as a surrogate species would overestimate the effects on greater sandhill crane.
34 Organisms feeding within pelagic-based (algal) foodwebs have been found to have higher
35 concentrations of methylmercury than those in benthic or epibenthic foodwebs; this has been
36 attributed to food chain length and dietary segregation (Grimaldo et al. 2009). Therefore, potential
37 indirect effects of increased mercury exposure is likely low for greater sandhill crane because they
38 primarily forage on cultivated crops. Modeled effects of mercury concentrations from changes in
39 water operations under CM1 on largemouth bass did not differ substantially from existing
40 conditions; therefore, results also indicate that greater sandhill crane tissue concentrations would
41 not measurably increase as a result of CM1 implementation.

1 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
2 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
3 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
4 mercury. Increased methylmercury associated with natural community and floodplain restoration
5 may indirectly affect greater sandhill crane via uptake in lower trophic levels (see Appendix 5.D,
6 *Contaminants*, of the BDCP). Mercury is generally elevated throughout the Delta, and restoration of
7 the lower potential areas in total may result in generalized, very low level increases of mercury.
8 Given that some species have elevated mercury tissue levels pre-BDCP, these low level increases
9 could result in some level of effects.

10 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
11 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
12 each restoration project. If a project is identified where there is a high potential for methylmercury
13 production that could not be fully addressed through restoration design and adaptive management,
14 alternate restoration areas would be considered. CM12 would be implemented in coordination with
15 other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury
16 Monitoring and Analysis Section. This conservation measure would include the following actions.

- 17 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
18 mercury methylation and bioavailability
- 19 ● Define design elements that minimize conditions conducive to generation of methylmercury in
20 restored areas.

21 Define adaptive management strategies that can be implemented to monitor and minimize actual
22 postrestoration creation and mobilization of methylmercury.

23 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
24 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
25 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
26 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
27 2009). The effect of selenium toxicity differs widely between species and also between age and sex
28 classes within a species. In addition, the effect of selenium on a species can be confounded by
29 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
30 2009).

31 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
32 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
33 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
34 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
35 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
36 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
37 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
38 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
39 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
40 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
41 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
42 levels of selenium have a higher risk of selenium toxicity.

1 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
2 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
3 exacerbate bioaccumulation of selenium in avian species, including greater sandhill crane. Marsh
4 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
5 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
6 BDCP restoration activities that create newly inundated areas could increase bioavailability of
7 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
8 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
9 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
10 long-term increases in selenium concentrations in water in the Delta under any alternative.
11 However, it is difficult to determine whether the effects of potential increases in selenium
12 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to
13 adverse effects on greater sandhill crane.

14 Because of the uncertainty that exists at this programmatic level of review, there could be a
15 substantial effect on greater sandhill crane from increases in selenium associated with restoration
16 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
17 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
18 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
19 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
20 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
21 separately for each restoration effort as part of design and implementation. This avoidance and
22 minimization measure would be implemented as part of the tidal habitat restoration design
23 schedule.

24 **NEPA Effects:** Crane habitat could potentially be affected by general construction noise above
25 baseline level (50–60 dBA). Construction in certain areas would take place 7 days a week and 24
26 hours a day and evening and nighttime construction activities would require the use of extremely
27 bright lights, which could adversely affect roosting cranes by impacting their sense of photo-period
28 and by exposing them to predators. Effects of noise and visual disturbance could substantially alter
29 the suitability of habitat for greater sandhill crane. *AMM20 Greater Sandhill Crane* would include
30 requirements (described above) to minimize the effects of noise and visual disturbance on greater
31 sandhill cranes and to mitigate effects on habitat.

32 Tidal habitat restoration could result in increased exposure of greater sandhill crane to selenium
33 which could result in the potential mortality of a special-status species. This effect would be
34 addressed through the implementation of *AMM27 Selenium Management*, which would provide
35 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
36 selenium and its bioavailability in tidal habitats.

37 The implementation of tidal natural communities restoration or floodplain restoration could result
38 in increased exposure of greater sandhill crane to methylmercury. The potential indirect effects of
39 increased mercury exposure is likely low for greater sandhill crane because they primarily forage on
40 cultivated crops. Implementation of CM12 which contains measures to assess the amount of
41 mercury before project development, followed by appropriate design and adaptation management,
42 would minimize the potential for increased methylmercury exposure, and would result in no
43 adverse effect on the species.

1 **CEQA Conclusion:** Crane foraging habitat could be affected by general construction noise and pile
2 driving above baseline level (50–60 dBA). Construction in certain areas would take place 7 days a
3 week and 24 hours a day and evening and nighttime construction activities would require the use of
4 extremely bright lights, which could adversely affect roosting cranes by impacting their sense of
5 photo-period and by exposing them to predators. Effects of noise and visual disturbance could
6 substantially alter the suitability of habitat for greater sandhill crane. This would be a significant
7 impact. *AMM20 Greater Sandhill Crane* would include requirements (described above) to minimize
8 the effects of noise and visual disturbance on greater sandhill cranes and to mitigate impacts on
9 habitat.

10 Tidal habitat restoration could result in increased exposure of greater sandhill crane to selenium
11 which could result in the potential mortality of a special-status species. This would be a significant
12 impact. This effect would be addressed through the implementation of *AMM27 Selenium*
13 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
14 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

15 Methylmercury tissue concentrations in greater sandhill cranes would not be expected to
16 measurably increase as a result of water operations under CM1 compared to the No Action
17 Alternative. The implementation of tidal natural communities restoration or floodplain restoration
18 could result in increased exposure of greater sandhill crane to methylmercury. This would be a
19 significant impact. The potential indirect effects of increased mercury exposure is likely low for
20 greater sandhill crane because they primarily forage on cultivated crops. Implementation of CM12
21 which contains measures to assess the amount of mercury before project development, followed by
22 appropriate design and adaptation management, would minimize the potential for increased
23 methylmercury exposure, and would result in no adverse effect on the species.

24 With AMM1-AMM7, AMM20, AMM27, and CM12 in place, the indirect effects of plan implementation
25 under Alternative 1B would not substantially reduce the number or restrict the range of greater
26 sandhill cranes. Therefore, the indirect effects of Alternative 1B implementation would have a less-
27 than-significant impact on greater sandhill crane.

28 **Lesser Sandhill Crane**

29 This section describes the effects of Alternative 1B, including water conveyance facilities
30 construction and implementation of other conservation components, on lesser sandhill crane. Lesser
31 sandhill cranes in the study area are almost entirely dependent on privately owned agricultural
32 lands for foraging. Long-term sustainability of the lesser sandhill crane is thus dependent on
33 providing a matrix of compatible crop types that afford suitable foraging habitat and maintaining
34 compatible agricultural practices, while sustaining and increasing the extent of other essential
35 habitat elements such as night roosting habitat. The habitat model for lesser sandhill crane includes
36 “roosting and foraging” and “foraging” habitat. These habitat types include suitable foraging and
37 roosting habitat in the study area as certain agricultural types, specific grassland types, irrigated
38 pastures and hay crops, managed seasonal wetland, and other natural seasonal wetland. Roosting
39 and foraging habitat includes traditional roost sites that are known to be used by sandhill cranes
40 (both greater and lesser) and also provide foraging habitat. Detail regarding the roosting and
41 foraging modeled habitat for both subspecies of sandhill crane is included in the BDCP (BDCP
42 Appendix 2.A *Covered Species Accounts*). Both temporary and permanent roost sites were identified
43 for sandhill cranes. Permanent roosting and foraging sites are those used regularly, year after year,
44 while temporary roosting and foraging sites are those used in some years. Factors included in

1 assessing the loss of foraging habitat for the lesser sandhill crane considers the relative habitat value
2 of specific crop or land cover types. Although both the greater and the lesser Sandhill crane use
3 similar crop or land cover types, these provide different values of foraging habitat for the two
4 subspecies based on proportional use of these habitats. Lesser sandhill cranes are less traditional
5 than greater sandhill cranes and are more likely to move between different roost site complexes and
6 different wintering regions (Ivey pers. comm.). The wintering range is ten times larger than the
7 greater sandhill crane and their average foraging flight radius from roost sites is twice that of
8 greater sandhill cranes. Because of this higher mobility, lesser sandhill cranes are more flexible in
9 their use of foraging areas than the greater sandhill crane.

10 Construction and restoration associated with Alternative 1B conservation measures would result in
11 both temporary and permanent losses of foraging and roosting habitat for lesser sandhill crane as
12 indicated in Table 12-1B-31. Full implementation of Alternative 1B would include the following
13 conservation actions over the term of the BDCP for the greater sandhill crane (BDCP Chapter 3,
14 Section 3.3, *Biological Goals and Objectives*) that would also benefit the lesser sandhill crane.

- 15 ● Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at
16 least 80% maintained in very high-value types in any given year. This protected habitat will be
17 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
18 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
19 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective
20 GSHC1.1, associated with CM3).
- 21 ● To create additional high-value greater sandhill crane winter foraging habitat, 10% of the
22 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or
23 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be
24 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
25 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
26 habitat loss (Objective GSHC1.2, associated with CM3).
- 27 ● Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the
28 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise
29 and local seasonal flood events. The wetlands will be located within 2 miles of existing
30 permanent roost sites and protected in association with other protected natural community
31 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide
32 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 33 ● Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge
34 project boundary. The complexes will be no more than 2 miles apart and will help provide
35 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each
36 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane
37 roosting habitat, and will be protected in association with other protected natural community
38 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,
39 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be
40 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
41 support roosting cranes and provide highest-value foraging habitat, provided such substitution
42 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for
43 greater sandhill crane. (Objective GSHC1.4, associated with CM10).

- 1 ● Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost
2 sites. The habitat will consist of active cornfields that are flooded following harvest to support
3 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least
4 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will
5 be sited with consideration of the location of roosting habitat loss and will be in place prior to
6 roosting habitat loss (Objective GSCH1.5, associated with CM3).
- 7 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
8 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 9 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
10 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value
11 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 12 ● Target cultivated land conservation to provide connectivity between other conservation lands
13 (Objective CLNC1.2, associated with CM3).
- 14 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
15 lands that occur in cultivated lands within the reserve system, including, water conveyance
16 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

17 As explained below, with the restoration and protection of these amounts of habitat, in addition to
18 natural community enhancement and management commitments (including *CM12 Methylmercury*
19 *Management*) and implementation of AMM1–AMM7, *AMM20 Greater Sandhill Crane*, *AMM27*
20 *Selenium Management*, *AMM30 Transmission Line Design and Alignment Guidelines*, and Mitigation
21 Measures BIO-72 and BIO-69b, impacts on the lesser sandhill crane would be less than significant
22 for CEQA purposes.

1 **Table 12-1B-31. Changes in Lesser Sandhill Crane Modeled Habitat Associated with Alternative 1B**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	0	0	NA	NA
	Roosting and Foraging - Temporary	148	148	733	733	NA	NA
	Foraging	4,002	4,002	6,806	6,806	NA	NA
Total Impacts CM1		4,150	4,150	7,539	7,539	NA	NA
CM2-CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	3,610	12,131	0	0	0	0
Total Impacts CM2-CM18		3,610	12,172	0	0	0	0
Roosting and Foraging - Permanent		0	0	0	0	0	0
Roosting and Foraging - Temporary		148	189	733	733	0	0
Foraging		7,612	16,133	6,806	6,806	0	0
TOTAL IMPACTS		7,760	16,322	7,539	7,539	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

^e Restored/created and protected habitat acreages represent planned conservation activities that would be implemented over the lifetime of the BDCP (see BDCP Chapter 3, *Conservation Strategy*, for specifics).

NT = near-term

LLT = late long-term

NA = not applicable

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4 **Impact BIO-72: Loss or Conversion of Habitat for and Direct Mortality of Lesser Sandhill**
5 **Crane**

6 Alternative 1B conservation measures would result in the combined permanent and temporary loss
7 of up to 922 acres of modeled roosting and foraging habitat (189 acres of permanent loss and 733
8 acres of temporary loss) and 19,892 acres of foraging habitat (15,372 acres of permanent loss and
9 4,520 acres of temporary loss) for lesser sandhill crane (Table 12-1B-31). Conservation measures
10 that would result in these losses are conveyance facilities and transmission line construction, and

1 establishment and use of borrow and spoil areas (CM1), Yolo Bypass Fisheries Improvements
 2 (CM2), Tidal Natural Communities Restoration (CM4), Grassland Natural Community Restoration
 3 (CM8), Nontidal Marsh Natural Community Restoration (CM10), and Natural Communities
 4 Enhancement and Management (CM11). The majority of habitat loss would result from water
 5 conveyance facility construction and conversion of habitat to tidal natural communities through
 6 CM4. Habitat enhancement and management activities through CM11, which include ground
 7 disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. In
 8 addition, maintenance activities associated with the long-term operation of the water conveyance
 9 facilities and other BDCP physical facilities could degrade or eliminate lesser sandhill crane modeled
 10 habitat. Each of these individual activities is described below. A summary statement of the combined
 11 impacts, NEPA effects and a CEQA conclusion follow the individual conservation measure
 12 discussions.

- 13 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities as they
 14 are currently designed would result in the combined permanent and temporary loss of up to
 15 10,808 acres of modeled lesser sandhill crane habitat. This would consist of the permanent
 16 removal of 148 acres of roosting and foraging habitat, and 4,002 acres of foraging habitat.
 17 Foraging habitat that would be permanently impacted by CM1 would consist of 2,001 acres of
 18 very high-value, 157 acres of high-value, and 789 acres of medium-value foraging habitat (Table
 19 12-1B-32). In addition, 733 acres of temporary roosting and foraging habitat and 6,806 acres of
 20 foraging habitat would be temporarily removed (Table 12-1B-31). The temporarily removed
 21 habitat would consist primarily of cultivated lands and it would be restored within one year
 22 following construction. However, it would not necessarily be restored to its original topography
 23 and it could be restored as grasslands in the place of cultivated lands. CM1 activities that would
 24 result in temporary impacts would include temporary access roads, borrow and spoil sites, and
 25 work areas for construction.

26 The temporary roost sites that would be permanently impacted are located on Zaccharias
 27 Island, Shin Kee Tract, and Ringe Tract and impacts would occur from the construction of the
 28 canal and the proposed permanent transmission line footprint. Temporary impacts on
 29 temporary roosting and foraging habitat would occur from temporary work areas associated
 30 with the construction of the canal and borrow and spoil areas. Approximately 642 acres of
 31 temporary impact on temporary roosting and foraging sites would occur from the footprint of
 32 the borrow and spoil areas associated with the construction of the canal. Indirect effects of
 33 construction of the canal adjacent to Stone Lakes National Wildlife Refuge could result in the
 34 abandonment of roost sites adjacent to the CM1 footprint. Indirect effects of noise and visual
 35 disturbance are addressed under Impact BIO-71.

36 The implementation of *AMM20 Greater Sandhill Crane* would require that all CM1 activities be
 37 designed to avoid direct loss of crane roost sites. Avoidance of crane roost sites would be
 38 accomplished either by siting activities outside of identified roost sites or by relocating the roost
 39 site if it consisted of cultivated lands. Relocated roost sites would be established prior to
 40 construction activities affecting the original roost site (as described in *AMM20 Greater Sandhill
 41 Crane* in Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Therefore, there would be
 42 no loss of crane roosting and foraging habitat as a result of water conveyance facility
 43 construction once the facilities were fully designed.

1 Traditional roosting and foraging sites on Bract Tract (east of Staten Island) are among the
2 highest crane use areas in the Delta. Impacts on Bract Tract include the construction of the
3 canal, proposed permanent and temporary transmission lines, potential borrow and spoil areas,
4 and temporary work areas. Construction within or adjacent to this important crane use area
5 would have an adverse effect in the absence of other conservation measures. The potential for
6 injury and direct mortality from electrical transmission facilities is addressed below under
7 Impact BIO-70. The transmission line alignment under Alternative 1B is not fully designed and
8 the final transmission line design would be determined in coordination with USFWS, CDFW, and
9 a qualified crane biologist to achieve a performance standard of no net increase in bird strike
10 hazard to greater sandhill cranes in the Plan Area (*AMM20 Greater Sandhill Crane*). Mitigation
11 Measure BIO-69b, *BDCP-Related Construction Will Not Result in a Net Decrease in Crane Use Days*
12 *on Bract Tract* would be available to address the effects of construction activities on or adjacent
13 to Bract Tract on greater sandhill cranes. Measures to meet the performance standards of no net
14 increase in bird strike hazard to greater sandhill cranes in the Plan Area and no net decrease in
15 crane use days on Bract Tract would also reduce effects on lesser sandhill cranes.

16 Permanent and temporary impacts on foraging habitat would occur throughout the Delta from
17 the construction of Intakes 1-5, construction of the canal, and associated borrow and spoil and
18 RTM storage areas along the canal alignment. Approximately 5,456 acres of temporary impact
19 on foraging habitat would result from the footprint of the borrow and spoil areas associated
20 with the construction of the intakes and the canal. Approximately 223 acres of the permanent
21 loss of foraging habitat would be from the storage of reusable tunnel material. This material
22 would likely be moved to other sites for use in levee build-up and restoration, and the affected
23 area would likely eventually be restored. While this effect is categorized as permanent because
24 there is no assurance that the material would eventually be moved, the effect would likely be
25 temporary. The actual footprint of the storage areas required for reusable tunnel material is
26 flexible, and the actual acreage of habitat affected by this activity could be reduced based on the
27 height of the storage piles in addition to other considerations. The implementation of *AMM6*
28 *Disposal and Reuse of Spoils* would require that the areas used for reusable tunnel material
29 storage be minimized in crane foraging habitat and completely avoid crane roost sites. Refer to
30 the Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations.
31 Impacts from CM1 would occur within the first 10 years of Plan implementation.

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Table 12-1B-32. Total Amount of Affected Lesser Sandhill Crane Foraging Habitat

Foraging Habitat Value Class	Land Cover Type	CM1 Permanent (Temporary)	CM2-CM18 Permanent (Temporary)
Very high	Corn, alfalfa and alfalfa mixtures	2,001 (4,497)	4,083 (0)
High	Mixed pasture, native pasture, other pasture, irrigated pasture, native vegetation, rice	157 (186)	2,058 (0)
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, non-irrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, wheat, other grain crops, managed wetlands	789 (659)	2,220 (2)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	969 (1,421)	3,745 (2)
None	Vineyards, orchards	85 (43)	23 (0)

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- CM2 Yolo Bypass Fisheries Enhancement*: Construction under CM2 would result in a permanent loss of 267 acres and a temporary loss of 2 acres of lesser sandhill crane foraging habitat in CZ 2. Lesser sandhill crane use in this area is less common than in the central Delta. Construction impacts from CM2 would occur within the first 10 years of Plan implementation.
- CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration footprint, this activity would result in the permanent loss or conversion of approximately 10,248 acres of lesser sandhill crane habitat, consisting of 41 acres of temporary roosting and foraging habitat and 10,207 acres of foraging habitat. Loss of foraging habitat from CM4 would consist of 3,642 acres of very high-value, 1,529 acres of high value, 2,040 acres of medium-value, and 2,983 acres of low-value foraging habitat (Table 12-1B-32). Habitat loss would primarily occur in the Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ 4 could occur between the high crane use areas of the central Delta and the Cosumnes River Preserve. However, the conversion of grasslands and cultivated lands to tidal wetlands would not prohibit crane movement or reduce use of these areas. Lesser sandhill cranes are less traditional than greater sandhill cranes and would be more adaptable to changes in land use. Approximately 2,516 acres of foraging habitat would be removed within the first 10 years of Plan implementation.
- CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees would result in the loss of 2 acres of low-value lesser sandhill crane foraging habitat (1 acre of permanent loss, 1 acres of temporary loss). This impact would occur after the first 10 years of Plan implementation.
- CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands (foraging habitat) would be converted to grassland. No roosting/foraging habitat would be

1 impacted by grassland restoration activities. The restored grasslands would continue to provide
2 foraging habitat value for the lesser sandhill crane. Approximately 257 acres would be impacted
3 within the first 10 years of plan implementation.

- 4 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent
5 conversion of approximately 1,350 acres of modeled foraging habitat for the lesser sandhill
6 crane. A portion of the restored nontidal marsh would be expected to continue to provide
7 roosting and foraging habitat value for the lesser sandhill crane. However, some of this restored
8 marsh would be unsuitable as it would lack emergent vegetation and consist of open water that
9 would be too deep to provide suitable roosting or foraging habitat. Approximately 567 acres of
10 habitat would be converted to nontidal marsh within the first 10 years of Plan implementation.
- 11 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
12 actions included in *CM11* that are designed to enhance wildlife values in restored or protected
13 habitats could result in localized ground disturbances that could temporarily remove small
14 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
15 vegetation and road and other infrastructure maintenance activities, would be expected to have
16 minor adverse effects on available habitat and would be expected to result in overall
17 improvements to and maintenance of habitat values over the term of the BDCP. The potential for
18 these activities to result in direct mortality of lesser sandhill crane would be minimized with the
19 implementation of *AMM20 Greater Sandhill Crane*. *CM11* would also include the construction of
20 recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP
21 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead
22 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
23 disturbed areas when and where possible. If new ground disturbance was necessary, sandhill
24 crane habitat would be avoided, with the exception of a permanent loss of 4 acres of grassland
25 foraging habitat (1 acre of which would be impacted within the first 10 years of plan
26 implementation).
- 27 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
28 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
29 disturbances that could affect lesser sandhill crane use of the surrounding habitat. Maintenance
30 activities would include vegetation management, levee and structure repair, and re-grading of
31 roads and permanent work areas. These effects, could be adverse as sandhill cranes are
32 sensitive to disturbance. However, potential impacts would be reduced by AMMs, and
33 conservation actions as described below.
- 34 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
35 direct mortality of lesser sandhill crane if they were present in the study area, because they
36 would be expected to avoid contact with construction and other equipment. Potential effects
37 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.
38 Injury and mortality from electrical transmission facilities are described below under Impact
39 BIO-73.

40 The following paragraphs summarize the combined effects discussed above and describe other
41 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
42 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-
3 term BDCP conservation strategy has been evaluated to determine whether it would provide
4 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
5 effects of construction would not be adverse under NEPA. Based on current design footprints, the
6 Plan would remove 881 acres roosting and foraging habitat (148 acres of permanent loss, 733 acres
7 of temporary loss) in the study area in the near-term. These effects would result from the
8 construction of the water conveyance facilities (CM1). In addition, 14,420 acres of foraging habitat
9 would be removed or converted in the near-term (CM1, 10,807 acres; *CM4 Tidal Natural*
10 *Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*
11 *Communities Enhancement and Management*—3,612 acres). Of these near-term acres of foraging
12 habitat impact, 10,795 acres would be moderate- to very high-value habitat (CM1, 8,289 acres, CM4-
13 11, 2,507 acres).

14 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
15 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging
16 habitat. Using these ratios would indicate that 881 acres of lesser sandhill crane roosting habitat
17 should be restored/created and 881 acres should be protected to compensate for the CM1 losses of
18 lesser sandhill crane roosting and foraging habitat. In addition, 8,289 acres of high- to very high-
19 value foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane
20 medium- to very high-value foraging habitat. The near-term effects of other conservation actions
21 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require
22 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA
23 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1
24 protection for the loss of foraging habitat).

25 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost
26 sites were directly impacted by CM1 covered activities (including transmission lines and their
27 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
28 result of water conveyance facility construction once the facilities were fully designed, which would
29 avoid the CM1 impact on 881 acres of roosting and foraging habitat once the project design is final.
30 Methods to avoid direct impacts on crane roost sites are described in *AMM20 Greater Sandhill Crane*.
31 Traditional roosting and foraging sites on Bract Tract (east of Staten Island) are among the highest
32 crane use areas in the Delta. Impacts on Bract Tract include the construction of the canal, proposed
33 permanent and temporary transmission lines, potential borrow and spoil areas, and temporary
34 work areas. Construction within or adjacent to this important crane use area would be adverse in
35 the absence of other conservation measures. Mitigation Measure BIO-69b, *BDCP-Related*
36 *Construction Will Not Result in a Net Decrease in Crane Use Days on Bract Tract* would be available to
37 address the potential effects of construction activities on or adjacent to Bract Tract.

38 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
39 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These
40 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as
41 the construction and early restoration losses.

42 The BDCP also includes the following objectives for the greater sandhill crane which would also
43 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
44 winter use areas.

1 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
 2 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
 3 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
 4 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
 5 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting
 6 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed
 7 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of
 8 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).
 9 Restoration sites would be identified with consideration of sea level rise and local seasonal flood
 10 events. These wetlands would be created within 2 miles of existing permanent roost sites and
 11 protected in association with other protected natural community types at a ratio of 2:1 upland to
 12 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would
 13 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,
 14 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone
 15 Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be designed to provide
 16 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Objective
 17 GSHC1.4). The large patch sizes of these wetland complexes would provide additional conservation
 18 to address the threats of vineyard conversion, urbanization to the east, and sea level rise to the west
 19 of greater sandhill crane wintering habitat.

20 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
 21 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
 22 BIO-72, *Compensate for the Loss of Medium- to Very High-Value Lesser Sandhill Crane Foraging*
 23 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the
 24 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were
 25 compensated for with appropriate crop types and natural communities.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 30 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 31 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 32 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 33 of the Final EIR/EIS.

34 ***Late Long-Term Timeframe***

35 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475
 36 acres of foraging habitat for lesser sandhill crane. Alternative 1B as a whole would result in the
 37 permanent loss of and temporary effects on 952 acres of roosting and foraging habitat (4% of the
 38 total habitat in the study area) and 22,940 acres of foraging habitat (10% of the total habitat in the
 39 study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by the
 40 late long-term timeframe would consist of 16,652 acres of medium- to very high-value foraging
 41 habitat. The locations of these losses are described above in the analyses of individual conservation
 42 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites
 43 were directly affected by water conveyance facilities including transmission lines and associated
 44 footprints. In addition, temporarily removed habitat would be restored within 1 year following

1 construction. However, it would not necessarily be restored to its original topography and it could
2 result in the conversion of cultivated lands to grasslands.

3 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
4 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
5 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
6 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
7 GSHC1.1). These croptypes would also provide high- to very high-value habitat for the lesser
8 sandhill crane.

9 The BDCP also includes the following objectives for the greater sandhill crane which would also
10 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
11 winter use areas.

12 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
13 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
14 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
15 and local seasonal flood events. These wetlands would be created within 2 miles of existing
16 permanent roost sites and protected in association with other protected natural community types at
17 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
18 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
19 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
20 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and
21 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
22 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
23 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The
24 large patch sizes of these wetland complexes would provide additional conservation to address the
25 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
26 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
27 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
28 active cornfields that are flooded following harvest to support roosting cranes and also provide the
29 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
30 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with
31 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat
32 loss.

33 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
34 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
35 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
36 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
37 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
38 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives
39 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
40 economically driven agricultural practices, protecting crane habitat would provide enhanced
41 stability to agricultural habitat value within the crane use area that does not currently exist.
42 Although lesser sandhill cranes are less traditional in their use of roost sites in the Delta, these
43 objectives for the greater sandhill crane would also benefit the lesser sandhill crane. Mitigation-
44 Measure BIO-72 would be available to ensure that the loss of 16,652 acres of moderate- to very
45 high-value crop types was compensated for with sufficient acres of high- to very high-value crop

1 types by the late long-term timeframe. Mitigation Measure BIO-69b would be available to reduce
2 adverse effects from CM1 activities on or adjacent to Bract Tract.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
7 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
8 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
9 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
10 of the Final EIR/EIS.

11 **NEPA Effects:** The loss of lesser sandhill crane habitat and potential for direct mortality of this
12 special status species under Alternative 1B would represent an adverse effect in the absence of
13 other conservation actions. However, with habitat protection and restoration associated with *CM3*
14 *Natural Communities Protection and Restoration* and *CM10 Nontidal Marsh Restoration*, guided by
15 biological goals and objectives for the species and by AMM1–AMM7 and *AMM20 Greater Sandhill*
16 *Crane*, which would be in place throughout the construction period, and with implementation of
17 Mitigation Measure BIO-69b and Mitigation Measure BIO-72, which would be available to
18 compensate for loss of medium- to very high-value foraging habitat, the effects of habitat loss and
19 potential mortality on lesser sandhill crane would not be adverse under NEPA.

20 **CEQA Conclusion:**

21 **Near-Term Timeframe**

22 Because the water conveyance facilities construction is being evaluated at the project level, the near-
23 term BDCP conservation strategy has been evaluated to determine whether it would provide
24 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
25 effects of construction would be less than significant under CEQA. Based on current design
26 footprints, the Plan would remove 881 acres roosting and foraging habitat (148 acres of permanent
27 loss, 733 acres of temporary loss) in the study area in the near-term. These effects would result from
28 the construction of the water conveyance facilities (CM1). In addition, 14,420 acres of foraging
29 habitat would be removed or converted in the near-term (CM1, 10,807 acres; *CM4 Tidal Natural*
30 *Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*
31 *Communities Enhancement and Management*—3,612 acres). Of these near-term acres of foraging
32 habitat impact, 10,795 acres would be moderate- to very high-value habitat (CM1, 8,289 acres, *CM4-*
33 *11*, 2,507 acres).

34 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
35 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging
36 habitat. Using these ratios would indicate that 881 acres of lesser sandhill crane roosting habitat
37 should be restored/created and 881 acres should be protected to compensate for the CM1 losses of
38 lesser sandhill crane roosting and foraging habitat. In addition, 8,289 acres of high- to very high-
39 value foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane
40 medium- to very high-value foraging habitat. The near-term effects of other conservation actions
41 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require
42 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA
43 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1
44 protection for the loss of foraging habitat).

1 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost
2 sites were directly impacted by CM1 covered activities (including transmission lines and their
3 associated footprints). Therefore, there would be no loss of crane roosting and foraging habitat as a
4 result of water conveyance facility construction once the facilities were fully designed, which would
5 avoid the CM1 impact on 881 acres of roosting and foraging habitat once the project design is final.
6 Methods to avoid direct impacts on crane roost sites are described in *AMM20 Greater Sandhill Crane*.
7 Traditional roosting and foraging sites on Bract Tract (east of Staten Island) are among the highest
8 crane use areas in the Delta. Impacts on Bract Tract include the construction of the canal, proposed
9 permanent and temporary transmission lines, potential borrow and spoil areas, and temporary
10 work areas. Construction within or adjacent to this important crane use area would be adverse in
11 the absence of other conservation measures. Implementation of Mitigation Measure BIO-69b, *BDCP-
12 Related Construction Will Not Result in a Net Decrease in Crane Use Days on Bract Tract*, (see Impact
13 BIO-69) would address the impact of construction activities on or adjacent to Bract Tract.

14 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
15 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These
16 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as
17 the construction and early restoration losses.

18 The BDCP also includes the following objectives for the greater sandhill crane which would also
19 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
20 winter use areas.

21 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
22 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
23 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
24 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
25 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting
26 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed
27 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of
28 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).
29 Restoration sites would be identified with consideration of sea level rise and local seasonal flood
30 events. These wetlands would be created within 2 miles of existing permanent roost sites and
31 protected in association with other protected natural community types at a ratio of 2:1 upland to
32 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would
33 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,
34 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone
35 Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be designed to provide
36 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Objective
37 GSHC1.4). The large patch sizes of these wetland complexes would provide additional conservation
38 to address the threats of vineyard conversion, urbanization to the east, and sea level rise to the west
39 of greater sandhill crane wintering habitat.

40 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
41 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
42 BIO-72 would be available to guide the near-term protection of cultivated lands to ensure that the
43 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were
44 compensated for with appropriate crop types and natural communities.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
8 of the Final EIR/EIS.

9 ***Late Long-Term Timeframe***

10 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475
11 acres of foraging habitat for lesser sandhill crane. Alternative 1B as a whole would result in the
12 permanent loss of and temporary effects on 952 acres of roosting and foraging habitat (4% of the
13 total habitat in the study area) and 22,940 acres of foraging habitat (10% of the total habitat in the
14 study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by the
15 late long-term timeframe would consist of 16,652 acres of medium- to very high-value foraging
16 habitat. The locations of these losses are described above in the analyses of individual conservation
17 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites
18 were directly affected by water conveyance facilities including transmission lines and associated
19 footprints. In addition, temporarily removed habitat would be restored within 1 year following
20 construction. However, it would not necessarily be restored to its original topography and it could
21 result in the conversion of cultivated lands to grasslands.

22 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
23 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
24 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
25 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
26 GSHC1.1). These croptypes would also provide high- to very high-value habitat for the lesser
27 sandhill crane.

28 The BDCP also includes the following objectives for the greater sandhill crane which would also
29 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
30 winter use areas.

31 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
32 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
33 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
34 and local seasonal flood events. These wetlands would be created within 2 miles of existing
35 permanent roost sites and protected in association with other protected natural community types at
36 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
37 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
38 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
39 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and
40 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
41 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
42 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The
43 large patch sizes of these wetland complexes would provide additional conservation to address the
44 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater

1 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
2 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
3 active cornfields that are flooded following harvest to support roosting cranes and also provide the
4 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
5 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with
6 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat
7 loss.

8 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
9 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
10 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
11 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
12 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
13 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives
14 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
15 economically driven agricultural practices, protecting crane habitat would provide enhanced
16 stability to agricultural habitat value within the crane use area that does not currently exist.
17 Although lesser sandhill cranes are less traditional in their use of roost sites in the Delta, these
18 objectives for the greater sandhill crane would also benefit the lesser sandhill crane. Mitigation-
19 Measure BIO-72 would be available to ensure that the loss of 16,652 acres of moderate- to very
20 high-value crop types was compensated for with sufficient acres of high- to very high-value crop
21 types by the late long-term timeframe. Implementation of Mitigation Measure BIO-69b would
22 reduce impacts resulting from CM1 activities on or adjacent to Bract Tract to a less-than-significant
23 level.

24 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
25 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
26 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
27 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
28 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
29 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
30 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
31 of the Final EIR/EIS.

32 Considering Alternative 1B's protection and restoration provisions, in addition to Mitigation
33 Measure BIO-69b, which would reduce significant impacts from CM1 activities on Bract Tract, and
34 Mitigation Measure BIO-72, which would compensate for the loss of medium- to very high-value
35 foraging habitat at a ratio of 1:1, loss of habitat or direct mortality through implementation of
36 Alternative 1B would not result in a substantial adverse effect through habitat modifications and
37 would not substantially reduce the number or restrict the range of the species. Therefore, the
38 alternative would have a less-than-significant impact on lesser sandhill crane.

39 **Mitigation Measure BIO-69b: BDCP-Related Construction Will Not Result in a Net**
40 **Decrease in Crane Use Days on Bract Tract**

41 See description of Mitigation Measure BIO-69b under Impact BIO-69.

1 **Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value**
2 **Lesser Sandhill Crane Foraging Habitat**

3 DWR must compensate for the loss of lesser sandhill crane medium- to very high-value foraging
4 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan
5 Area. Compensation must occur prior to or concurrent with the impacts to minimize the effects
6 of habitat loss. The crop types and natural communities that are included in foraging value
7 categories are listed in Table 12-1B-32. Foraging habitat conservation must occur within 10
8 kilometers of traditional sandhill crane roost sites and the location of protected habitat or
9 conservation easements must be preapproved by CDFW.

10 **Impact BIO-73: Effects on Lesser Sandhill Crane Associated with Electrical Transmission**
11 **Facilities**

12 Sandhill cranes are susceptible to collision with power lines and other structures during periods of
13 inclement weather and low visibility (Avian Power Line Interaction Committee 1994, Brown and
14 Drewien 1995, Manville 2005). There are extensive existing transmission and distribution lines in
15 the sandhill crane winter use area. These include a network of distribution lines that are between
16 11- and 22-kV. In addition, there are two 115-kV lines that cross the study area, one that overlaps
17 with the greater sandhill crane winter use area between Antioch and I-5 east of Hood, and one that
18 crosses the northern tip of the crane winter use area north of Clarksburg. There are 69-kV lines
19 within the study area that parallel Twin Cities Road, Herzog Road, Lambert Road, and the Southern
20 Pacific Dredge Cut in the vicinity of Stone Lakes National Wildlife Refuge. At the south end of the
21 winter use area, there are three 230-kV transmission lines that follow I-5, and then cut southwest
22 through Holt, and two 500-kV lines cross the southwestern corner of the winter use area. This
23 existing network of power lines in the study currently poses a collision and electrocution risk for
24 sandhill cranes, because they cross over or surround sandhill crane roost sites in the study area.

25 Both permanent and temporary electrical transmission lines would be constructed to supply
26 construction and operational power to Alternative 1B facilities as described below. The potential
27 mortality of greater sandhill crane in the area of the proposed transmission lines under Alternative
28 1B was estimated using collision mortality rates by Brown and Drewien (1995) and an estimate of
29 potential crossings along the proposed lines (methods are described in BDCP Appendix 5.J,
30 Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). This analysis
31 concluded that mortality risk could be substantially reduced by marking new transmission lines to
32 increase their visibility to sandhill cranes. Mortality risk would be similarly reduced for lesser
33 sandhill cranes by marking new transmission lines.

34 Typically, higher-voltage (230-kilovolt [kV]) lines vary in height from 90 to 110 feet, while “sub”
35 transmission (69-kV) lines vary from 50 to 70 feet (Avian Power Line Interaction Committee 2006).
36 The Alternative 1B alignment would require the installation of approximately 53 miles of permanent
37 transmission line (16 miles of 230-kV lines and 37 miles of 69-kV lines) extending north and south,
38 through much of the crane use area. The temporary transmission lines would total approximately 47
39 miles (14 miles of 69-kV line and 33 miles of 12-kV line). Temporary lines would be removed after
40 construction of the water conveyance facilities, within 10 years. The proposed permanent and
41 temporary transmission lines that would be constructed through Bract Tract as they are currently
42 designed would have the potential to substantially affect lesser sandhill cranes as this is a high-use
43 area for cranes in the Delta.

1 After the Draft EIR/EIS was issued in December 2013, additional avoidance features were added to
2 *AMM20 Greater Sandhill Crane*. *AMM20 Greater Sandhill Crane* requires that Alternative 1B meets
3 the performance standard of no mortality of greater sandhill crane associated with the new
4 facilities. This would be achieved by implementing one or any combination of the following: 1) siting
5 new transmission lines in lower bird strike risk zones; 2) removing, relocating or undergrounding
6 existing lines where feasible; 3) using natural gas generators in lieu of installing transmission lines
7 in high-risk zones of the greater sandhill crane winter use area; 4) undergrounding new lines in
8 high-risk zones of the greater sandhill crane winter use area; 5) permanently installing flight
9 diverters on existing lines over lengths equal to or greater than the length of the new transmission
10 lines in the crane winter use area; 6) for areas outside of the Stone Lakes NWR project boundary,
11 shifting locations of flooded areas that provide crane roosts to lower risk areas. These measures are
12 described in detail in *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental Commitments,*
13 *AMMs, and CMs.*

14 The implementation of the measures described above under *AMM20 Greater Sandhill Crane* would
15 substantially reduce the potential for lesser sandhill crane collisions with transmission lines.
16 Potential measures that would eliminate this risk include using natural gas generators in lieu of
17 transmission lines or undergrounding new lines in high-risk zones in the greater sandhill crane
18 winter use area. Marking transmission lines with flight diverters that make the lines more visible to
19 birds has been shown to reduce the incidence of bird mortality, including for sandhill cranes (Brown
20 and Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce
21 avian mortality by 60%. All new transmission lines would be fitted with flight diverters. The
22 installation of flight diverters on existing permanent lines would be prioritized in the highest risk
23 zones for greater sandhill crane (as described in BDCP Appendix 5J.C, *Analysis of Potential Bird*
24 *Collisions at Proposed BDCP Powerlines*) and diverters would be installed in a configuration that
25 research indicates would reduce bird strike risk by at least 60%. The length of existing line to be
26 fitted with bird strike diverters will be equal to the length of new transmission lines constructed as a
27 result of the project, in an area with the same or higher greater sandhill crane strike risk to provide
28 a net benefit to the species. For optimum results, the recommended spacing distance for bird flight
29 diverters is 15 to 16.5 feet (4.5 to 5 meters) (Avian Power Line Interaction Committee 1994).
30 Placing diverters on existing lines would be expected to reduce existing lesser and greater sandhill
31 crane mortality in the Plan Area and therefore result in a net benefit to the lesser sandhill crane
32 population because these flight diverters would be maintained in perpetuity.

33 ***NEPA Effects:***

34 Sandhill cranes are known to be susceptible to collision with overhead wires. The existing network
35 of power lines in the study area currently poses a risk for sandhill cranes. The current proposed
36 transmission line alignment under Alternative 1B is not fully designed, and line locations are not
37 final. The implementation of *AMM20 Greater Sandhill Crane* would require that the final
38 transmission line alignment avoid crane roost sites and achieve the performance standard of no
39 mortality of greater sandhill crane associated with the new facilities, which would also benefit the
40 lesser sandhill crane. All new transmission lines constructed as a result of the project would be
41 fitted with bird diverters, which have been shown to reduce avian mortality by 60%. By
42 incorporating one or a combination of the measures to greatly reduce the risk of bird strike
43 described in *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines
44 under Alternative 1B would not result in an adverse effect on lesser sandhill crane.

1 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
2 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
3 current proposed transmission line alignment under Alternative 1B is not fully designed, and line
4 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the
5 final transmission line alignment avoid crane roost sites and achieve the performance standard of
6 no mortality of greater sandhill crane associated with the new facilities, which would also benefit
7 lesser sandhill crane. All new transmission lines constructed as a result of the project would be
8 fitted with bird diverters, which have been shown to reduce avian mortality by 60%. By
9 incorporating one or a combination of the measures to greatly reduce the risk of bird strike
10 described in *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines
11 under Alternative 1B would have a less-than-significant impact on lesser sandhill crane.

12 **Impact BIO-74: Indirect Effects of Plan Implementation on Lesser Sandhill Crane**

13 **Indirect Construction-Related Effects:** Sandhill cranes are sensitive to disturbance. Noise and
14 visual disturbances from the construction of water conveyance facilities and other conservation
15 measures could reduce lesser sandhill crane use of modeled habitat adjacent to work areas. Indirect
16 effects associated with construction include noise, dust, and visual disturbance caused by grading,
17 filling, contouring, and other ground-disturbing operations outside the project footprint but within
18 1,300 feet of the construction edge. Furthermore, maintenance of the aboveground water
19 conveyance facilities could result in ongoing but periodic postconstruction noise and visual
20 disturbances that could affect lesser sandhill crane use of surrounding habitat. These effects could
21 result from periodic vehicle use along the conveyance corridor, inspection and maintenance of
22 aboveground facilities, and similar activities. These potential effects would be minimized with
23 implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3B, *Environmental*
24 *Commitments, AMMs, and CMs*.

25 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would
26 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill
27 crane (BDCP Appendix 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*
28 *Sandhill Crane*). The same methods were employed to address the potential noise effects on
29 cranes from Alternative 1B and to determine that as much as 7,746-17,967 acres of crane
30 habitat could be affected by general construction noise above baseline level (50-60 dBA). This
31 would include 109 - 576 acres of permanent crane roosting habitat, 904 - 2,078 acres of temporary
32 crane roosting habitat, and 6,733 - 15,314 acres of crane foraging habitat. In addition, 252 - 950
33 acres of permanent crane roosting habitat, 471 - 1,623 acres of temporary crane roosting habitat,
34 and 1,623 - 18,043 acres of crane foraging habitat could be affected by noise from pile driving that
35 would be above baseline level (50-60dBA, Table 12-1B-32, see Impact BIO-71). The analysis was
36 conducted based on the assumption that there would be direct line-of-sight from sandhill crane
37 habitat areas to the construction site, and, therefore, provides a worst-case estimate of effects. In
38 many areas the existing levees would partially or completely block the line-of-sight and would
39 function as effective noise barriers, substantially reducing noise transmission. However, there is
40 insufficient data to assess the effects that increased noise levels would have on sandhill crane
41 behavior. Similar acreages of lesser sandhill crane habitat would be expected to be indirectly
42 affected. However, lesser sandhill cranes are less traditional in their winter roost sites and may be
43 more likely to travel away from disturbed areas to roost and forage in more suitable habitat.

44 Evening and nighttime construction activities would require the use of extremely bright lights.
45 Nighttime construction could also result in headlights flashing into roost sites when construction

1 vehicles are turning onto or off of construction access routes. Proposed surge towers would require
 2 the use of safety lights that would alert low-flying aircraft to the presence of these structures
 3 because of their height. Little data is available on the effects of impact of artificial lighting on
 4 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes
 5 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP
 6 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to
 7 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting
 8 include a reduction in the cranes' quality of nocturnal rest, and effects on their "sense of photo-
 9 period which might cause them to shift their physiology towards earlier migration and breeding."
 10 (BDCP Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes'
 11 overall fitness and reproductive success (which could in turn have population-level impacts). A
 12 change in photo-period interpretation could also cause cranes to fly out earlier from roost sites to
 13 forage and might increase their risk of power line collisions if they were to leave roosts before dawn
 14 (BDCP Chapter 5, *Effects Analysis*).

15 The effects of noise and visual disturbance on lesser sandhill crane would be minimized through the
 16 implementation of AMM20 (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*).
 17 Activities within 0.75 mile of crane roosting habitat would reduce construction noise during night
 18 time hours (from one hour before sunset to one hour after sunrise) such that construction noise
 19 levels do not exceed 50 dBA L_{eq} (1 hour) at the nearest temporary or permanent roosts during
 20 periods when the roost sites are available (flooded). In addition, the area of crane foraging habitat
 21 that would be affected during the day (from one hour after sunrise to one hour before sunset) by
 22 construction noise exceeding 50 dBA L_{eq} (1 hour) would also be minimized. Unavoidable noise
 23 related effects would be compensated for by the enhancement of 0.1 acre of foraging habitat for
 24 every acre indirectly affected within the 50 dBA L_{eq} (1 hour) construction noise contour. With these
 25 measures in place, indirect effects of noise and visual disturbance from construction activities are
 26 not expected to reduce the lesser sandhill crane population in the study area.

27 The use of mechanical equipment during water conveyance facilities construction could cause the
 28 accidental release of petroleum or other contaminants that could affect lesser sandhill cranes in the
 29 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to lesser
 30 sandhill crane habitat could also affect the subspecies. AMM1–AMM7, including *AMM2 Construction*
 31 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure
 32 that measures were in place to prevent runoff from the construction area and negative effects of
 33 dust on foraging habitat.

34 **Methylmercury Exposure:**

35 Covered activities have the potential to exacerbate bioaccumulation of mercury in lesser sandhill
 36 cranes. Largemouth bass was used as a surrogate species for analysis (Appendix 11F, *Substantive*
 37 *BDCP Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a
 38 surrogate species would overestimate the effects on lesser sandhill crane as they primarily forage on
 39 cultivated crops and invertebrates. Organisms feeding within pelagic-based (algal) foodwebs have
 40 been found to have higher concentrations of methylmercury than those in benthic or epibenthic
 41 foodwebs; this has been attributed to food chain length and dietary segregation (Grimaldo et al.
 42 2009). Modeled effects of mercury concentrations from changes in water operations under CM1 on
 43 largemouth bass did not differ substantially from existing conditions; therefore, results also indicate
 44 that lesser sandhill crane tissue concentrations would not measurably increase as a result of CM1
 45 implementation.

1 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
2 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
3 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
4 mercury. Increased methylmercury associated with natural community and floodplain restoration
5 may indirectly affect lesser sandhill crane via uptake in lower trophic levels (see BDCP Appendix
6 5.D, *Contaminants*). Mercury is generally elevated throughout the Delta, and restoration of the lower
7 potential areas in total may result in generalized, very low level increases of mercury. Given that
8 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in
9 some level of effects.

10 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
11 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
12 each restoration project. If a project is identified where there is a high potential for methylmercury
13 production that could not be fully addressed through restoration design and adaptive management,
14 alternate restoration areas would be considered. CM12 would be implemented in coordination with
15 other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury
16 Monitoring and Analysis Section. This conservation measure would include the following actions.

- 17 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
18 mercury methylation and bioavailability
- 19 ● Define design elements that minimize conditions conducive to generation of methylmercury in
20 restored areas.
- 21 ● Define adaptive management strategies that can be implemented to monitor and minimize
22 actual postrestoration creation and mobilization of methylmercury.

23 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
24 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
25 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
26 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
27 2009). The effect of selenium toxicity differs widely between species and also between age and sex
28 classes within a species. In addition, the effect of selenium on a species can be confounded by
29 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
30 2009).

31 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
32 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
33 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
34 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
35 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
36 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
37 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
38 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
39 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
40 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
41 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
42 levels of selenium have a higher risk of selenium toxicity.

43 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
44 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to

1 exacerbate bioaccumulation of selenium in avian species, including the lesser sandhill crane. Marsh
 2 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
 3 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
 4 BDCP restoration activities that create newly inundated areas could increase bioavailability of
 5 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
 6 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
 7 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
 8 long-term increases in selenium concentrations in water in the Delta under any alternative.
 9 However, it is difficult to determine whether the effects of potential increases in selenium
 10 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to
 11 adverse effects on lesser sandhill crane.

12 Because of the uncertainty that exists at this programmatic level of review, there could be a
 13 substantial effect on lesser sandhill crane from increases in selenium associated with restoration
 14 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
 15 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
 16 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
 17 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
 18 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
 19 separately for each restoration effort as part of design and implementation. This avoidance and
 20 minimization measure would be implemented as part of the tidal habitat restoration design
 21 schedule.

22 **NEPA Effects:** Crane foraging habitat could be affected by general construction noise and pile
 23 driving above baseline level (50–60 dBA). However, lesser sandhill cranes are less traditional in
 24 their winter roost sites than greater sandhill cranes and may be more likely to travel away from
 25 disturbed areas to roost in more suitable habitat. Construction in certain areas would take place 7
 26 days a week and 24 hours a day and evening and nighttime construction activities would require the
 27 use of extremely bright lights, which could adversely affect roosting cranes by impacting their sense
 28 of photo-period and by exposing them to predators. Effects of noise and visual disturbance could
 29 substantially alter the suitability of habitat for lesser sandhill crane. *AMM20 Greater Sandhill Crane*,
 30 which would include requirements (described above) to minimize the effects of noise and visual
 31 disturbance on sandhill cranes and to mitigate for affected habitat. Tidal habitat restoration could
 32 result in increased exposure of lesser sandhill crane to selenium which could result in the mortality
 33 of a special-status species. This effect would be addressed through the implementation of *AMM27*
 34 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 35 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

36 The implementation of tidal natural communities restoration or floodplain restoration could result
 37 in increased exposure of lesser sandhill crane to methylmercury. The potential indirect effects of
 38 increased mercury exposure is likely low for lesser sandhill crane because they primarily forage on
 39 cultivated crops and associated invertebrates. Implementation of CM12 which contains measures to
 40 assess the amount of mercury before project development, followed by appropriate design and
 41 adaptation management, would minimize the potential for increased methylmercury exposure, and
 42 would result in no adverse effect on the species.

43 **CEQA Conclusion:** Crane foraging habitat could be affected by general construction noise and pile
 44 driving above baseline level (50–60 dBA). However, lesser sandhill cranes are less traditional in
 45 their winter roost sites than greater sandhill cranes and may be more likely to travel away from

1 disturbed areas to roost in more suitable habitat. Construction in certain areas would take place 7
2 days a week and 24 hours a day and evening and nighttime construction activities would require the
3 use of extremely bright lights, which could adversely affect roosting cranes by impacting their sense
4 of photo-period and by exposing them to predators.

5 Effects of noise and visual disturbance could substantially alter the suitability of habitat for lesser
6 sandhill crane. This would be a significant impact. With *AMM20 Greater Sandhill Crane* in place,
7 which would include requirements (described above) to minimize the effects of noise and visual
8 disturbance on sandhill cranes and to mitigate effects on habitat, there would not be an adverse
9 effect on lesser sandhill crane.

10 Tidal habitat restoration could result in increased exposure of lesser sandhill crane to selenium
11 which could result in the potential mortality of a special-status species. This would be a significant
12 impact. This effect would be addressed through the implementation of *AMM27 Selenium*
13 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
14 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

15 Methylmercury tissue concentrations in lesser sandhill crane would not be expected to measurably
16 increase as a result of water operations under CM1 compared to the No Action Alternative. The
17 implementation of tidal natural communities restoration or floodplain restoration could result in
18 increased exposure of lesser sandhill crane to methylmercury. This would be a significant impact.
19 The potential indirect effects of increased mercury exposure is likely low for lesser sandhill crane
20 because they primarily forage on cultivated crops and associated invertebrates. Implementation of
21 CM12 which contains measures to assess the amount of mercury before project development,
22 followed by appropriate design and adaptation management, would minimize the potential for
23 increased methylmercury exposure, and would result in no adverse effect on lesser sandhill crane.

24 With AMM1–AMM7, AMM20, AMM27, and CM12 in place, the indirect effects of plan implementation
25 under Alternative 1B would not substantially reduce the number or restrict the range of lesser
26 sandhill cranes. Therefore, the indirect effects of Alternative 1B implementation would have a less-
27 than-significant impact on lesser sandhill crane.

28 **Least Bell's Vireo and Yellow Warbler**

29 This section describes the effects of Alternative 1B, including water conveyance facilities
30 construction and implementation of other conservation components, on the least Bell's vireo and
31 yellow warbler. Least Bell's vireo and yellow warbler modeled habitat identifies suitable nesting and
32 migratory habitat as those plant alliances from the valley/foothill riparian modeled habitat that
33 contain a dense shrub component, including all willow-dominated alliances.

34 Construction and restoration associated with Alternative 1B conservation measures would result in
35 both temporary and permanent losses of least Bell's vireo and yellow warbler modeled habitat as
36 indicated in Table 12-1B-33. Full implementation of Alternative 1B would also include the following
37 conservation actions over the term of the BDCP to benefit least Bell's vireo and yellow warbler
38 (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 39 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community with at least
40 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
41 associated with CM7).

- 1 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
- 2 10 (Objective VFRNC1.2, associated with CM7).
- 3 • Maintain and enhance structural heterogeneity (Objective VFRNC2.1, associated with CM7).
- 4 • Maintain at least 1,000 acres of early- to mid-successional vegetation (Objective VFRNC2.2,
- 5 associated with CM7).
- 6 • Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,
- 7 associated with CM3 and CM7).
- 8 • Maintain the at least 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion
- 9 of the early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a
- 10 minimum patch size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4,
- 11 associated with CM3 and CM7).

12 As explained below, with the restoration and protection of these amounts of habitat, in addition to
 13 natural community enhancement and management commitments and implementation of AMM1–
 14 AMM7, AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell’s Vireo, Western Yellow-Billed
 15 Cuckoo, and mitigation to minimize potential effects, impacts on least Bell’s vireo and yellow warbler
 16 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

17 **Table 12-1B-33. Changes in Least Bell’s Vireo and Yellow Warbler Modeled Habitat Associated**
 18 **with Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Migratory and Breeding	24	24	30	30	NA	NA
Total Impacts CM1		24	24	30	30	NA	NA
CM2–CM18	Migratory and Breeding	382	656	88	109	48–85	148
Total Impacts CM2–CM18		382	656	88	109	48–85	148
TOTAL IMPACTS		406	680	118	139	48–85	148

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

19

Impact BIO-75: Loss or Conversion of Habitat for and Direct Mortality of Least Bell's Vireo and Yellow Warbler

Alternative 1B conservation measures would result in the combined permanent and temporary loss of up to 819 acres of modeled habitat (680 acres of permanent loss and 139 acres of temporary loss) for least Bell's vireo and yellow warbler (Table 12-1B-33). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2), tidal natural communities restoration (CM4), and seasonally inundated floodplain restoration (CM5). Habitat enhancement and management activities (CM11) which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate least Bell's vireo and yellow warbler habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follows the individual conservation measure discussions.

- CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would result in the combined permanent and temporary loss of up to 54 acres of modeled least Bell's vireo and yellow warbler habitat (Table 12-1B-33). Of the 54 acres of modeled habitat that would be removed for the construction of the conveyance facilities, 24 acres would be a permanent loss and 30 acres would be a temporary loss of habitat. The habitat would be removed at multiple locations from the north Delta to the east Delta and in the vicinity of Clifton Court Forebay. Almost all of the losses would occur on the borders of waterways. In the north Delta, most of the permanent loss would occur where Intakes 1–5 encroach on the Sacramento River's east bank between Freeport and Courtland. The riparian areas here are very small patches, some dominated by valley oak and others by nonnative trees and scrub vegetation. In the east Delta, small permanent losses would occur from canal construction just south of Twin Cities Road and just north of Walnut Grove Road. A small area of riparian habitat (mostly blackberries) would be permanently removed in the south Delta at the new forebay construction site. The temporary riparian losses would occur at the intake sites along the Sacramento River and at temporary siphon work areas where the canal would cross Beaver Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment Slough, Railroad Canal, and Middle River just south of Victoria Canal. Tunnel construction at Old River just south of Victoria Canal would also temporarily remove mixed willows and brambles. Temporarily affected areas would be restored as riparian habitat within 1 year following completion of construction activities as described in *AMM10 Restoration of Temporarily Affected Natural Communities*. Although the effects are considered temporary, the restored riparian habitat would require at least four years for ecological succession to occur and for restored riparian habitat to functionally replace habitat that has been affected. However, restored riparian vegetation can have the habitat structure to support breeding vireos within 3 to 5 years, particularly if the restored vegetation is adjacent to established riparian areas (Kus 2002), and similar habitat would be suitable for yellow warbler. The majority of the riparian vegetation to be temporarily removed is early- to mid-successional; therefore, the replaced riparian vegetation would be expected to have structural components comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial restoration activities are complete. There are no occurrences of least Bell's vireo or yellow warbler that intersect with the CM1 footprint. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations.

- 1 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancements
2 (CM2) would permanently remove approximately 83 acres and temporarily remove 88 acres of
3 modeled least Bell's vireo and yellow warbler habitat in the Yolo Bypass in CZ 2. The loss is
4 expected to occur during the first 10 years of Alternative 1B implementation.
- 5 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
6 inundation would permanently remove an estimated 545 acres of modeled least Bell's vireo and
7 yellow warbler habitat.
- 8 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
9 seasonally inundated floodplain would permanently remove approximately 28 acres and
10 temporarily remove 21 acres of modeled least Bell's vireo and yellow warbler habitat. Based on
11 the riparian habitat restoration assumptions, a minimum of 3,000 acres of valley/foothill
12 riparian habitat would be restored as a component of seasonally inundated floodplain
13 restoration actions.

14 The actual number of acres of valley/foothill riparian habitat that CM4 and CM5 would restore
15 may differ from these estimates, depending on how closely the actual outcome of tidal habitat
16 restoration approximates the assumed outcome. However, riparian restoration from CM4 and
17 CM5 would increase the extent of least Bell's vireo and yellow warbler habitat within the Plan
18 Area once the restored riparian vegetation has developed habitat functions for these species.

- 19 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
20 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
21 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
22 activity would occur along waterway margins where riparian habitat stringers exist, including
23 levees and channel banks. The improvements would occur within the study area on sections of
24 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 25 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
26 activities that could be implemented in protected least Bell's vireo and yellow warbler habitats
27 are expected to maintain and improve the functions of the habitat over the term of the BDCP.
28 Least Bell's vireo and yellow warbler would be expected to benefit from the increase in
29 protected habitat, which would maintain conditions favorable for future species establishment
30 in the Plan Area. If least Bell's vireo and yellow warbler established breeding populations in
31 restored riparian habitats in the Plan Area, occupied habitat would be monitored to determine if
32 there were a need to implement controls on brood parasites (brown-headed cowbird) or nest
33 predators. If implemented, these actions would be expected to benefit the least Bell's vireo and
34 yellow warbler by removing a potential stressor that could, if not addressed, adversely affect the
35 stability of newly established populations.

36 Habitat management- and enhancement-related activities could disturb least Bell's vireo and
37 yellow warbler nests. If either species were to nest in the vicinity of a worksite, equipment
38 operation could destroy nests, and noise and visual disturbances could lead to their
39 abandonment, resulting in mortality of eggs and nestlings. The potential for these activities to
40 result in direct mortality of least Bell's vireo or yellow warbler would be minimized with the
41 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
42 *Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
43 *Surveys and Avoid Disturbance of Nesting Birds*.

- 1 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
2 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
3 disturbance that could affect least Bell's vireo and yellow warbler use of the surrounding
4 habitat. Maintenance activities would include vegetation management, levee and structure
5 repair, and re-grading of roads and permanent work areas. These effects, however, would be
6 reduced by AMMs and conservation actions as described below.
- 7 • Injury and Direct Mortality: Although least Bell's vireo nesting has not been confirmed in the
8 Plan Area, recent occurrences in the Yolo Bypass and at the San Joaquin River National Wildlife
9 Refuge suggest that the reestablishment of a breeding population is a possibility over the
10 duration of the BDCP. If present in the study area, construction -related activities would not be
11 expected to result in direct mortality of least Bell's vireo or yellow warbler because adults and
12 fledged young would be expected to avoid contact with construction and other equipment. If
13 either species were to nest in the construction area, equipment operation, noise and visual
14 disturbances could destroy nests or lead to their abandonment, resulting in mortality of eggs
15 and nestlings. These effects would be avoided and minimized with the implementation of
16 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
17 *Cuckoo*. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
18 *Disturbance of Nesting Birds*, would be available to address effects on nesting yellow warblers.

19 The following paragraphs summarize the combined effects discussed above and describe other
20 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
21 included.

22 ***Near-Term Timeframe***

23 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
24 the near-term BDCP conservation strategy has been evaluated to determine whether it would
25 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
26 effects of construction would not be adverse under NEPA. The Plan would remove 524 acres of
27 modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-term. These
28 effects would result from the construction of the water conveyance facilities (CM1, 54 acres of
29 habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements
30 [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5], 470 acres of
31 habitat).

32 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
33 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter
34 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby
35 successional valley/foothill riparian habitat. Using these ratios would indicate that 54 acres of
36 valley/foothill riparian habitat should be restored/created and 54 acres should be protected to
37 compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects
38 of other conservation actions would remove 470 acres of modeled habitat, and therefore require
39 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using
40 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

41 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
42 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These
43 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as
44 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on

1 least Bell's vireo and yellow warbler. The majority of the riparian restoration acres would occur in
2 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill
3 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*
4 *Strategy*). This restoration would provide the large contiguous patches needed for suitable least
5 Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for riparian
6 restoration also include the restoration, maintenance and enhancement of structural heterogeneity
7 with adequate vertical and horizontal overlap among vegetation components and over adjacent
8 riverine channels, freshwater emergent wetlands, and grasslands (Objective VFRNC2.1). These Plan
9 objectives represent performance standards for considering the effectiveness of CM7 restoration
10 and CM3 protection actions. The acres of protection contained in the near-term Plan goals and the
11 additional detail in the biological objectives for least Bell's vireo satisfy the typical mitigation ratios
12 that would be applied to the project-level effects of CM1, as well as mitigate the near-term effects of
13 the other conservation measures. The restored riparian habitat could require 5 years to several
14 decades, for ecological succession to occur and for restored riparian habitat to functionally replace
15 habitat that has been affected. However, because the modeled habitat impacted largely consists of
16 small patches of blackberry, willow, and riparian scrub, and because least Bell's vireo and yellow
17 warbler are not known to be established breeders in the study area, BDCP actions would not be
18 expected to have an adverse population-level effect on either species.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
23 *Restoration of Temporarily Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-*
24 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements
25 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
26 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
27 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
28 EIR/EIS. The yellow warbler is not a species that is covered under the BDCP. Although
29 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest
30 in the study area over the course of the BDCP), in order to have a less than adverse effect on
31 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
32 yellow warbler nests were detected and avoided. Mitigation Measure BIO-75 would be available to
33 address adverse effects on nesting yellow warblers.

34 **Late Long-Term Timeframe**

35 The habitat model indicates that the study area supports approximately 14,850 acres of modeled
36 habitat for least Bell's vireo and yellow warbler. Alternative 1B as a whole would result in the
37 permanent loss of and temporary effects on 819 acres of habitat for these species during the term of
38 the Plan (6% of the total habitat in the study area). These losses would occur from the construction
39 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4*
40 *Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The
41 locations of these losses would be in fragmented riparian habitat throughout the study area.

42 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
43 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
44 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
45 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be

1 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
2 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives
3 in the Plan for riparian restoration also include the maintenance and enhancement of structural
4 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for
5 the least Bell's vireo and yellow warbler.

6 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
7 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
8 the restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo,
9 which would also be suitable habitat for the yellow warbler.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
11 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
12 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
13 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, AMM10*
14 *Restoration of Temporarily Affected Natural Communities, and AMM22 Suisun Song Sparrow, Yellow-*
15 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo. All of these AMMs include elements*
16 *that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work*
17 *areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and*
18 *which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs, of the Final*
19 *EIR/EIS.*

20 **NEPA Effects:** The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality
21 of these special-status species under Alternative 1B would represent an adverse effect in the
22 absence of other conservation actions. However, neither species is an established breeder in the
23 study area and impacts would likely be limited to loss of migratory habitat. In addition, with habitat
24 protection and restoration associated with CM3 and CM7, guided by biological goals and objectives
25 and by *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and*
26 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan,*
27 *AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils,*
28 *AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural Communities, and*
29 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,*
30 *which would be in place during all project activities, the effects of habitat loss and potential*
31 *mortality on least Bell's vireo, and the effect of habitat loss on yellow warbler would not be adverse*
32 *under Alternative 1B. The yellow warbler is not a species that is covered under the BDCP and the*
33 *potential for mortality would be adverse without preconstruction surveys to ensure that nests are*
34 *detected and avoided. Mitigation Measure BIO-75 would be available to address this adverse effect.*

35 **CEQA Conclusion:**

36 **Near-Term Timeframe**

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would
39 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
40 the impacts of construction would be less than significant under CEQA. The Plan would remove 524
41 acres of modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-term.
42 These effects would result from the construction of the water conveyance facilities (CM1, 54 acres of
43 habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements

1 [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5], 470 acres of
2 habitat).

3 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
4 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter
5 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby
6 successional valley/foothill riparian habitat. Using these ratios would indicate that 54 acres of
7 valley/foothill riparian habitat should be restored/created and 54 acres should be protected to
8 compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects
9 of other conservation actions would remove 470 acres of modeled habitat, and therefore require
10 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using
11 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

12 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
13 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These
14 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as
15 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
16 least Bell's vireo and yellow warbler. The majority of the riparian restoration acres would occur in
17 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill
18 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*
19 *Strategy*). This restoration would provide the large contiguous patches needed for suitable least
20 Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for riparian
21 restoration also include the restoration, maintenance and enhancement of structural heterogeneity
22 with adequate vertical and horizontal overlap among vegetation components and over adjacent
23 riverine channels, freshwater emergent wetlands, and grasslands (Objective VFRNC2.1). These Plan
24 objectives represent performance standards for considering the effectiveness of CM7 restoration
25 and CM3 protection actions. biological goals and objectives would inform the near-term protection
26 and restoration efforts and represent performance standards for considering the effectiveness of
27 restoration actions. The acres of protection contained in the near-term Plan goals and the additional
28 detail in the biological objectives for least Bell's vireo satisfy the typical mitigation ratios that would
29 be applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other
30 conservation measures. The restored riparian habitat could require 5 years to several decades, for
31 ecological succession to occur and for restored riparian habitat to functionally replace habitat that
32 has been affected. However, because the modeled habitat impacted largely consists of small patches
33 of blackberry, willow, and riparian scrub, and because least Bell's vireo and yellow warbler are not
34 known to be established breeders in the study area, BDCP actions would not be expected to have an
35 adverse population-level effect on either species.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
40 *Restoration of Temporarily Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-*
41 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements
42 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
43 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
44 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
45 EIR/EIS. The yellow warbler is not a species that is covered under the BDCP. Although
46 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest

1 in the Plan Area over the course of the BDCP), in order to have a less than adverse effect on
2 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
3 yellow warbler nests are detected and avoided. Mitigation Measure BIO-75 would reduce the
4 potential impact on nesting yellow warblers to a less-than-significant impact, should they become
5 established in the Plan Area. Considering the conservation actions described above, and AMM1–
6 AMM7, AMM 22, and Mitigation Measure BIO-75, Alternative 1B over the term of the BDCP would
7 not result in a substantial adverse effect through habitat modifications and would not substantially
8 reduce the number or restrict the range of either species. Therefore, Alternative 1B would have a
9 less-than-significant impact on least Bell’s vireo and yellow warbler.

10 ***Late Long-Term Timeframe***

11 The habitat model indicates that the study area supports approximately 14,850 acres of modeled
12 habitat for least Bell’s vireo and yellow warbler. Alternative 1B as a whole would result in the
13 permanent loss of and temporary effects on 819 acres of habitat for these species during the term of
14 the Plan (6% of the total habitat in the study area). These losses would occur from the construction
15 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4*
16 *Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain Restoration*. The
17 locations of these losses would be in fragmented riparian habitat throughout the study area.

18 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
19 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
20 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
21 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
22 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
23 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives
24 in the Plan for riparian restoration also include the maintenance and enhancement of structural
25 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for
26 the least Bell’s vireo and yellow warbler. The restored riparian habitat could require 5 years to
27 several decades, for ecological succession to occur and for restored riparian habitat to functionally
28 replace habitat that has been affected. Therefore, there would be a time-lag before the restored
29 habitat would benefit either species. However, neither species are established breeders in the study
30 area and impacts would likely be limited to loss of migratory habitat for least Bell’s vireo and yellow
31 warbler.

32 The BDCP’s beneficial effects analysis (BDCP Chapter 5.6, *Effects on Covered Wildlife and Plant*
33 *Species*) estimates that the restoration and protection actions discussed above could result in the
34 restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell’s vireo, which
35 would also be suitable habitat for the yellow warbler.

36 The loss of least Bell’s vireo and yellow warbler habitat and potential direct mortality of these
37 special-status species under Alternative 1B would represent an adverse effect in the absence of
38 other conservation actions. However, neither species is an established breeder in the study area, and
39 impacts would likely be limited to loss of migratory habitat for least Bell’s vireo and yellow warbler.
40 In addition, with habitat protection and restoration associated with CM3 and CM7, guided by
41 biological goals and objectives and by *AMM1 Worker Awareness Training, AMM2 Construction Best*
42 *Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion*
43 *and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6*
44 *Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily*

1 *Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
2 *Vireo, Western Yellow-Billed Cuckoo*, which would be in place during all construction activities, the
3 effects of habitat loss and potential mortality on least Bell's vireo under Alternative 1B would be less
4 than significant. The yellow warbler is not a species that is covered under the BDCP. Although
5 preconstruction surveys for least Bell's vireo may also detect nesting yellow warblers, in order for
6 the BDCP to have a less-than-significant impact on individuals, preconstruction surveys for
7 noncovered avian species would be required to ensure that yellow warbler nests are detected and
8 avoided. Mitigation Measure BIO-75 would reduce this potential impact on nesting yellow warblers,
9 if present in the study area, to a less-than-significant level.

10 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 11 **Disturbance of Nesting Birds**

12 To reduce impacts on nesting birds, DWR will implement the measures listed below prior to
13 construction and operations and maintenance activities.

- 14 • To the maximum extent feasible, vegetation removal and trimming will be scheduled during
15 the nonbreeding season of birds (September 1–January 31). If vegetation removal cannot be
16 removed in accordance with this timeframe, preconstruction/preactivity surveys for nesting
17 birds and additional protective measures will be implemented as described below.
- 18 • A qualified wildlife biologist with knowledge of the relevant species will conduct nesting
19 surveys before the start of construction. A minimum of three separate surveys will be
20 conducted within 30 days prior to construction, with the last survey within 3 days prior to
21 construction. Surveys will include a search of all suitable nesting habitat in the construction
22 area. In addition, a 500-foot radius around the construction area, where accessible, will be
23 surveyed for nesting raptors and species of special concern (except the Modesto song
24 sparrow), and an area within 50 feet of construction will be surveyed for other non-special
25 status nesting birds or birds protect by the MBTA. If no active nests are detected during
26 these surveys, no additional measures are required.
- 27 • If active nests are found in the survey area, no-disturbance buffers will be established
28 around the nest sites to avoid disturbance or destruction of the nest site until the end of the
29 breeding season (approximately September 1) or until a qualified wildlife biologist
30 determines that the young have fledged and moved out of the project area (this date varies
31 by species). A qualified wildlife biologist will monitor construction activities in the vicinity
32 of the nests to ensure that construction activities do not affect nest success. The extent of the
33 buffers will be determined by DWR biologists in consultation with USFWS and CDFW and
34 will depend on the level of noise or construction disturbance, line-of-sight between the nest
35 and the disturbance, ambient levels of noise and other disturbances, and other
36 topographical or artificial barriers. Suitable buffer distances may vary between species.

37 **Impact BIO-76: Fragmentation of Least Bell's Vireo and Yellow Warbler Habitat**

38 Grading, filling, contouring, and other initial ground-disturbing operations may temporarily
39 fragment modeled least Bell's vireo and yellow warbler habitat. This could temporarily reduce the
40 affected habitat's extent and functions, including exposure to cowbird parasitism, a nest parasite of
41 both species. Preconstruction surveys under *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
42 *Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, Conduct
43 Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would identify any

1 nesting pairs and the potential for habitat fragmentation to affect either species. If a nesting pairs of
2 either species were detected where fragmentation has occurred, nests would be monitored for edge
3 effects or other effects caused by the disturbance. The habitat would be adaptively managed to avoid
4 or minimize impacts (e.g., cowbird control) under CM11, which includes the control of nonnative
5 predators through habitat manipulation techniques or trapping to reduce nest predation.

6 **NEPA Effects:** Because there are only two recent occurrences of least Bell's vireo within the study
7 area, and no occurrences of yellow warbler breeding in the study area, habitat fragmentation
8 resulting from ground-disturbing operations is not expected to affect either species. If nesting pairs
9 of either species were detected where fragmentation has occurred, nests would be monitored for
10 edge effects or other effects caused by the disturbance. The habitat would be adaptively managed to
11 avoid or minimize impacts (e.g., cowbird control) under CM11. Therefore, habitat fragmentation
12 would not have an adverse effect on least Bell's vireo or yellow warbler.

13 **CEQA Conclusion:** Because there are only two recent occurrences of least Bell's vireo within the Plan
14 Area, and no occurrences of yellow warbler breeding in the Plan Area, habitat fragmentation
15 resulting from ground-disturbing operations would not be expected to substantially modify habitat
16 or result in the direct mortality of special status species. If nesting pairs of either species were
17 detected where fragmentation has occurred, nests would be monitored for edge effects or other
18 effects caused by the disturbance. The habitat would be adaptively managed to avoid or minimize
19 impacts (e.g., cowbird control) under CM11. Therefore, habitat fragmentation as a result of
20 Alternative 1B would have a less-than-significant impact on least Bell's vireo and yellow warbler.

21 **Impact BIO-77: Effects on Least Bell's Vireo and Yellow Warbler Associated with Electrical** 22 **Transmission Facilities**

23 Both least Bell's vireo and yellow warbler typically occur in early to mid-successional riparian
24 habitat, which is used to meet all of its life requisites. Least Bell's vireo are rarely observed in open
25 habitats away from riparian vegetation. Neither species form flocks and individuals generally
26 remain at or below the riparian canopy, below the height of proposed transmission lines (see
27 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*, of
28 the BDCP). The behavior and habitat requirements of least Bell's vireo and yellow warbler make
29 collision with the proposed transmission lines unlikely. *AMM30 Transmission Line Design and*
30 *Alignment Guidelines* would ensure that the transmission lines, poles, and towers are designed to
31 avoid sensitive terrestrial habitats (including riparian) to the maximum extent feasible, which would
32 minimize the potential for collision. Marking transmission lines with flight diverters that make the
33 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
34 Drewien 1995). For example, Yee (2008) estimated that marking devices in the Central Valley could
35 reduce avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new project
36 transmission lines would be fitted with flight diverters, which would substantially reduce any
37 potential for mortality of least Bell's vireo or yellow warbler individuals from powerline collisions.

38 **NEPA Effects:** Installation and presence of new transmission lines would not result in an adverse
39 effect on least Bell's vireo or yellow warbler because the probability of bird-powerline strikes is
40 unlikely due to the behavior and habitat requirements of these species. *AMM30 Transmission Line*
41 *Design and Alignment Guidelines* would avoid impacts on riparian habitat to the maximum extent
42 feasible, which would minimize the potential for collision. *AMM20 Greater Sandhill Crane* contains
43 the commitment to place bird strike diverters on all new powerlines, which would substantially
44 reduce the risk of mortality from bird strike for least Bell's vireo and yellow warbler as a result of

1 the project. Therefore, the construction and operation of new transmission lines would not result in
2 an adverse effect on least Bell's vireo or yellow warbler.

3 **CEQA Conclusion:** Installation and presence of new transmission lines would result in less-than-
4 significant impact on least Bell's vireo or yellow warbler because the probability of bird-powerline
5 strikes is unlikely due to the behavior and habitat requirements of these species. *AMM30*
6 *Transmission Line Design and Alignment Guidelines* would avoid impacts on riparian habitat to the
7 maximum extent feasible, which will minimize the potential for collision. *AMM20 Greater Sandhill*
8 *Crane* contains the commitment to place bird strike diverters on all new powerlines, which would
9 substantially reduce the risk of mortality from bird strike for least Bell's vireo and yellow warbler as
10 a result of the project. Therefore, the construction and operation of new transmission lines would
11 result in a less-than-significant impact on least Bell's vireo or yellow warbler.

12 **Impact BIO-78: Indirect Effects of Plan Implementation on Least Bell's Vireo and Yellow** 13 **Warbler**

14 **Indirect Construction- and Operation-Related Effects:** If least Bell's vireo or yellow warbler were
15 to nest in or adjacent to work areas, construction and subsequent maintenance-related noise and
16 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
17 functions of suitable nesting habitat for these species. Construction noise above background noise
18 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
19 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
20 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
21 the extent to which these noise levels could affect least Bell's vireo or yellow warbler. *AMM22 Suisun*
22 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would reduce
23 the potential for adverse effects of construction-related activities on survival and productivity of
24 nesting least Bell's vireo and a 500 foot no-disturbance buffer would be established around the
25 active nest. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
26 *Disturbance of Nesting Birds*, would be available to reduce the potential for adverse effects of
27 construction-related activities on nesting yellow warbler. The use of mechanical equipment during
28 water conveyance facilities construction could cause the accidental release of petroleum or other
29 contaminants that could affect least Bell's vireo and yellow warbler in the surrounding habitat. The
30 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an
31 adverse effect on these species. *AMM2 Construction Best Management Practices and Monitoring*
32 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff
33 from the construction area and negative effects of dust on active nests.

34 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
35 mercury in avian species, including the least Bell's vireo and yellow warbler. Marsh (tidal and
36 nontidal) and floodplain restoration have the potential to increase exposure to methylmercury.
37 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
38 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains
39 (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas could
40 increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of
41 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of
42 uncertainty with respect to species-specific effects. Increased methylmercury associated with
43 natural community and floodplain restoration could indirectly affect least Bell's vireo and yellow
44 warbler, via uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

1 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
 2 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
 3 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
 4 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
 5 adaptive management as described in CM12 would be available to address the uncertainty of
 6 methylmercury levels in restored tidal marsh and potential impacts on least Bell's vireo and yellow
 7 warbler.

8 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 9 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 10 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 11 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 12 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 13 classes within a species. In addition, the effect of selenium on a species can be confounded by
 14 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 15 2009).

16 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
 17 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
 18 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
 19 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
 20 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
 21 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
 22 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
 23 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
 24 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
 25 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
 26 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
 27 have a higher risk of selenium toxicity.

28 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 29 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 30 exacerbate bioaccumulation of selenium in avian species, including least Bell's vireo and yellow
 31 warbler. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
 32 selenium, and, therefore, increase avian exposure from ingestion of prey items with elevated
 33 selenium levels. Thus, Alternative 1B restoration activities that create newly inundated areas could
 34 increase bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of
 35 restoration). Changes in selenium concentrations are analyzed in Chapter 8, *Water Quality*, which
 36 concludes that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
 37 in substantial, long-term increases in selenium concentrations in water in the Delta under any
 38 alternative. However, it is difficult to determine whether the effects of potential increases in
 39 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)
 40 would lead to adverse effects on least Bell's vireo and yellow warbler.

41 Because of the uncertainty that exists at this programmatic level of review, there could be a
 42 substantial effect on least Bell's vireo and yellow warbler from increases in selenium associated with
 43 restoration activities. This effect would be addressed through the implementation of *AMM27*
 44 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 45 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see

1 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
2 selenium management to reduce selenium concentrations and/or bioaccumulation would be
3 evaluated separately for each restoration effort as part of design and implementation. This
4 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
5 design schedule.

6 **NEPA Effects:** Impacts of noise, the potential for hazardous spills, increased dust and sedimentation,
7 and operations and maintenance of the water conveyance facilities on least Bell's vireo would not be
8 adverse with the implementation of AMM1–AMM7, and AMM22 *Suisun Song Sparrow, Yellow-*
9 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct*
10 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
11 address potential effects on nesting yellow warblers.

12 Tidal habitat restoration could result in increased exposure of least Bell's vireo and yellow warbler
13 to selenium. This effect would be addressed through the implementation of AMM27 *Selenium*
14 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
15 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

16 The implementation of tidal natural communities restoration or floodplain restoration could result
17 in increased exposure of least Bell's vireo or yellow warbler to methylmercury, should they begin to
18 nest in the study area. However, it is unknown what concentrations of methylmercury are harmful
19 to these species. Site-specific restoration plans that address the creation and mobilization of
20 mercury, as well as monitoring and adaptive management as described in CM12 *Methylmercury*
21 *Management*, would be available to address the uncertainty of methylmercury levels in restored
22 tidal marsh and potential effects of methylmercury on least Bell's vireo and yellow warbler.

23 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
24 operations and maintenance of the water conveyance facilities would have a less-than-significant
25 impact on least Bell's vireo and yellow warbler with the implementation of AMM2 *Construction Best*
26 *Management Practices and Monitoring*, AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least*
27 *Bell's Vireo, Western Yellow-Billed Cuckoo*, and Mitigation Measure BIO-75, *Conduct Preconstruction*
28 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*.

29 Tidal habitat restoration could result in increased exposure of least Bell's vireo and yellow warbler
30 to selenium. This effect would be addressed through the implementation of AMM27 *Selenium*
31 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
32 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

33 The implementation of tidal natural communities restoration or floodplain restoration could result
34 in increased exposure of least Bell's vireo or yellow warbler to methylmercury, should they begin to
35 nest in the study area. However, it is unknown what concentrations of methylmercury are harmful
36 to these species. Sites-specific restoration plans that address the creation and mobilization of
37 mercury, as well as monitoring and adaptive management as described in CM12 *Methylmercury*
38 *Management*, would be available to address the uncertainty of methylmercury levels in restored
39 tidal marsh and potential impacts on least Bell's vireo and yellow warbler.

40 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
41 **Disturbance of Nesting Birds**

42 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-79: Periodic Effects of Inundation of Least Bell's Vireo and Yellow Warbler**
2 **Habitat as a Result of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
4 duration of inundation of approximately 48-85 acres of modeled least Bell's vireo and yellow
5 warbler habitat in CZ 2. No adverse effects of increased inundation frequency on least Bell's vireo,
6 yellow warbler, or their habitat would be expected, because riparian vegetation supporting habitat
7 has persisted under the existing Yolo Bypass flooding regime and changes to frequency and
8 inundation would be within the tolerance of these vegetation types.

9 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,
10 construction of setback levees could result in periodic inundation of up to 148 acres of modeled
11 least Bell's vireo and yellow warbler habitat in CZ 7. Inundation of restored floodplains would not be
12 expected to affect least Bell's vireo, yellow warbler, or their habitat because the breeding period is
13 outside the period when floodplains would likely be inundated. Additionally, periodic inundation of
14 floodplains would be expected to restore a more natural flood regime in support of riparian
15 vegetation types that support least Bell's vireo and yellow warbler habitat. The overall effect of
16 seasonal inundation in existing riparian natural communities would be beneficial, because,
17 historically, flooding was the main natural disturbance regulating ecological processes in riparian
18 areas, and flooding promotes the germination and establishment of many native riparian plants.

19 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85 acres
20 (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler. However,
21 periodic effects of inundation would not result in an adverse effect on least Bell's vireo or yellow
22 warbler because inundation would occur primarily during the nonbreeding season and would
23 promote a more natural flood regime in support of habitat for these species.

24 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85
25 acres (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler.
26 However, periodic effects of inundation would have a less-than-significant impact on least Bell's
27 vireo or yellow warbler because inundation would occur during the nonbreeding season and would
28 not be expected to adversely modify habitat or result in direct mortality of either species. Flooding
29 promotes the germination and establishment of many native riparian plants. Therefore, the overall
30 impact of seasonal inundation in existing riparian natural communities would be beneficial for least
31 Bell's vireo and yellow warbler.

32 **Suisun Song Sparrow and Saltmarsh Common Yellowthroat**

33 This section describes the effects of Alternative 1B on Suisun song sparrow and saltmarsh common
34 yellowthroat. The habitat model used to assess effects for these species is based on primary
35 breeding habitat and secondary habitat. Suisun song sparrow primary breeding habitat consists of
36 all *Salicornia*-dominated tidal brackish emergent wetland and all *Typha*-, *Scirpus*-, and *Juncus*-
37 dominated tidal freshwater emergent wetland in the Plan Area west of Sherman Island, with the
38 exception that *Scirpus acutus* and *S. californicus* plant communities (low marsh) and all of the plant
39 communities listed below that occur in managed wetlands were classified as secondary habitat.
40 Upland transitional zones, providing refugia during high tides, within 150 feet of the wetland edge
41 were also included as secondary habitat. Secondary habitats generally provide only a few ecological
42 functions such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland
43 transition zones), while primary habitats provide multiple functions, including breeding, effective
44 predator cover, and valuable forage. Construction and restoration associated with Alternative 1B

conservation measures would result in both temporary and permanent losses of Suisun song sparrow and saltmarsh common yellowthroat modeled habitat as indicated in Table 12-1B-34. The majority of the losses would take place over an extended period of time as tidal marsh is restored in the study area. Full implementation of Alternative 1B would also include the following conservation actions over the term of the BDCP to benefit the Suisun song sparrow (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated with CM4).
- Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3)
- Protect at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective GNC1.4, associated with CM3)

As explained below, with the restoration and protection of these amounts of habitat, in addition to natural community enhancement and management commitments (including *CM12 Methylmercury Management*) and implementation of AMM1–AMM7, *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, and mitigation to minimize potential effects, impacts on Suisun song sparrow and saltmarsh common yellowthroat would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1B-34. Changes in Suisun Song Sparrow Saltmarsh Common Yellowthroat Modeled Habitat Associated with Alternative 1B (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2–CM18	Primary	54	55	0	0	0	0
	Secondary	1,098	3,633	0	0	0	0
Total Impacts CM2–CM18		1,152	3,688	0	0	0	0
TOTAL IMPACTS		1,152	3,688	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-80: Loss or Conversion of Habitat for and Direct Mortality of Suisun Song Sparrow and Saltmarsh Common Yellowthroat

Alternative 1B conservation measures would result in the permanent loss of up to 3,688 acres of Suisun song sparrow and saltmarsh common yellowthroat habitat, which would include the conversion of 55 acres of primary habitat to secondary low marsh, and the conversion of 123 acres of secondary habitat to middle or high marsh (Table 12-1B-34). The only conservation measure that would affect modeled habitat for Suisun song sparrow and saltmarsh common yellowthroat is *CM4 Tidal Natural Communities Restoration*. Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follows the individual conservation measure discussions.

- CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would permanently remove approximately 3,510 acres of modeled secondary Suisun song sparrow and saltmarsh common yellowthroat habitat from CZ 11 (Table 12-1B-34). In addition, 55 acres of primary habitat would be converted to secondary low marsh, and 123 acres of secondary habitat would be converted to middle or high marsh. Most areas proposed for removal would be managed wetlands that serve as relatively marginal habitat for Suisun song sparrow and saltmarsh common yellowthroat, which primarily use brackish tidal wetlands. Approximately 2% of primary habitat for these species would be converted to foraging habitat. Full implementation of CM4 would restore or create at least 6,000 acres of tidal brackish emergent wetland natural community in CZ 11, which would be expected to support Suisun song sparrow and saltmarsh common yellowthroat habitat. It is expected that restoring tidal wetland communities that are self-sustaining and not reliant on ongoing management actions necessary to maintain the existing managed wetland habitats would better ensure the long-term viability of these populations. Furthermore, effects of tidal habitat restoration on sparrow and yellowthroat abundance and distribution would be monitored, and the restoration of tidal habitat would be sequenced and located in a manner that minimizes effects on occupied habitats until functional habitats were restored (see BDCP Chapter 3, Section 3.4.4, *Conservation Measure 4 Tidal Natural Communities Restoration*, and Section 3.6, *Adaptive Management and Monitoring Program*).
- CM11 Natural Communities Enhancement and Management*: Control of nonnative Suisun song sparrow and saltmarsh common yellowthroat predators, if deemed necessary, would be expected to reduce predation loss of nests and, consequently, increase and maintain the abundance of Suisun song sparrow and saltmarsh common yellowthroat in restored tidal habitats over the term of the BDCP. Habitat management- and enhancement-related activities could disturb Suisun song sparrow or saltmarsh common yellowthroat nests if they are located near work sites. The potential for these activities to have an adverse effect on Suisun song sparrow would be avoided and minimized through *AMM22 Suisun Song Sparrow, Yellow-breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address these effects on saltmarsh common yellowthroat. A variety of *CM11 Natural Communities Enhancement and Management* habitat management actions that are designed to enhance wildlife values in restored and protected tidal wetland habitats may result in localized ground disturbances that could temporarily remove small amounts of Suisun song sparrow and saltmarsh common yellowthroat habitat in CZ 11. Ground-disturbing activities,

1 such as removal of nonnative vegetation and road and other infrastructure maintenance
2 activities, are expected to have minor adverse effects on available species' habitat.

- 3 ● Operations and Maintenance: Postconstruction operation and maintenance of the restoration
4 infrastructure could result in ongoing but periodic disturbances that could affect Suisun song
5 sparrow and saltmarsh common yellowthroat use of the surrounding habitat in Suisun.
6 Maintenance activities could include vegetation management, and levee repair. These effects,
7 however, would be reduced by AMMs and conservation actions as described below.
- 8 ● Construction-related activities could result in nest destruction or disturbance resulting in
9 mortality of eggs and nestlings if restoration activities took place within the nesting period for
10 these species. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
11 *Yellow-Billed Cuckoo* would minimize these potential effects on Suisun song sparrow. Mitigation
12 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
13 *Birds*, would be available to address these effects on saltmarsh common yellowthroat. Grading,
14 filling, contouring, and other initial ground-disturbing operations during restoration activities
15 could temporarily fragment existing modeled tidal brackish emergent wetland habitat for
16 Suisun song sparrow and saltmarsh common yellowthroat which could temporarily reduce the
17 extent and functions of the affected habitat. These temporary effects would be minimized
18 through sequencing of restoration activities and through *AMM22 Suisun Song Sparrow, Yellow-*
19 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75.

20 The following paragraphs summarize the combined effects discussed above and describe other
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are
22 included.

23 ***Near-Term Timeframe***

24 Under Alternative 1B, there would be no impacts resulting from the construction of the water
25 conveyance facilities (CM1). However, there would be a permanent loss of 1,152 acres of modeled
26 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in
27 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging
28 habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would
29 provide primary nesting habitat for these species. Although there would be a temporal lag in these
30 conversions, there would be no net loss of primary habitat in the near-term. These effects would
31 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun
32 Marsh in CZ 11.

33 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
34 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in
35 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
36 Using this ratio would indicate that 1,152 acres of tidal brackish emergent wetland should be
37 restored/created to compensate for the near-term losses of Suisun song sparrow and saltmarsh
38 common yellowthroat habitat.

39 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent
40 wetland and 4,800 acres of managed wetland in the study area. These conservation actions are
41 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early
42 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and
43 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11

1 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh
2 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in BDCP Chapter
3 3, *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and
4 in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the
5 4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh
6 common yellowthroat through the enhancement of degraded areas to provide dense native
7 vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal
8 wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.
9 Larger and more interconnected patches of suitable habitat would be expected to reduce the effects
10 of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would
11 be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
12 Restoration would be sequenced over the term of the Plan and occur in a manner that would
13 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and
14 protection contained in the near-term Plan goals, and the incorporation of the additional measures
15 in the biological goals and objectives (BDCP Chapter 3) would be sufficient to mitigate the near-term
16 effects of tidal restoration.

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
18 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
20 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
21 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
22 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
23 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
24 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
25 of the Final EIR/EIS. The saltmarsh common yellowthroat is not a species that is covered under the
26 BDCP. Although preconstruction surveys for Suisun song sparrow would likely also detect nesting
27 saltmarsh common yellowthroat, in order to avoid adverse effects on individuals, preconstruction
28 surveys for noncovered avian species would be required to ensure that saltmarsh common
29 yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would be available to
30 address the effect of construction activities on nesting saltmarsh common yellowthroat.

31 ***Late Long-Term Timeframe***

32 The habitat model indicates that the study area supports approximately 3,722 acres of primary and
33 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.
34 Alternative 1B as a whole would result in the permanent loss of 3,688 acres of habitat (15% of the
35 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*
36 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary
37 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

38 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or
39 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)
40 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse
41 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh
42 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for
43 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,
44 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to
45 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This

1 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise
2 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be
3 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more
4 interconnected patches of suitable habitat would be expected to reduce the effects of habitat
5 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be
6 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
7 Restoration would be sequenced over the term of the Plan and occur in a manner that would
8 minimize any temporary, initial loss and fragmentation of habitat.

9 The BDCP's beneficial effects analysis (BDCP Chapter 5.6, *Effects on Covered Wildlife and Plant*
10 *Species*) estimates that the restoration and protection actions discussed above could result in the
11 restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat in addition to the
12 protection of 384 acres of secondary habitat for Suisun song sparrow, which would also benefit the
13 saltmarsh common yellowthroat.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
15 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
16 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
17 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
18 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
19 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
20 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
21 which have since been updated and which are provided in Appendix 3B, *Environmental*
22 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

23 **NEPA Effects:** The loss of Suisun song sparrow and saltmarsh common yellowthroat habitat and
24 potential direct mortality of these special status species under Alternative 1B would represent an
25 adverse effect in the absence of other conservation actions. However, with habitat protection and
26 restoration associated with CM4, with the management and enhancement actions (CM11), and the
27 incorporation of the additional measures in the biological goals and objectives, AMMs1-7 and
28 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*,
29 which would be in place throughout the construction period, the effects of habitat loss and potential
30 mortality under Alternative 1B on Suisun song sparrow would not be adverse under NEPA, the
31 effects of habitat loss and conversion from Alternative 1B on Suisun song sparrow would not be
32 adverse under NEPA. The saltmarsh common yellowthroat is not a species that is covered under the
33 BDCP. Although preconstruction surveys for Suisun song sparrow would likely also detect nesting
34 saltmarsh common yellowthroat, in order to avoid adverse effects on individuals, preconstruction
35 surveys for noncovered avian species would be required to ensure that saltmarsh common
36 yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would be available to
37 address this effect.

38 **CEQA Conclusion:**

39 **Near-Term Timeframe**

40 Under Alternative 1B, there would be no impacts resulting from the construction of the water
41 conveyance facilities (CM1). However, there would be a permanent loss of 1,152 acres of modeled
42 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in
43 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging
44 habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would

1 provide primary nesting habitat for these species. Although there would be a temporal lag in these
2 conversions, there would be no net loss of primary habitat in the near-term. These effects would
3 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun
4 Marsh in CZ 11.

5 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
6 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in
7 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
8 Using this ratio would indicate that 1,152 acres of tidal brackish emergent wetland should be
9 restored/created to mitigate the near-term losses of Suisun song sparrow and saltmarsh common
10 yellowthroat habitat.

11 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent
12 wetland and 4,800 acres of managed wetland in the study area. These conservation actions are
13 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early
14 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and
15 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11
16 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh
17 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in BDCP Chapter
18 3, *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and
19 in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the
20 4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh
21 common yellowthroat through the enhancement of degraded areas to provide dense native
22 vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal
23 wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.
24 Larger and more interconnected patches of suitable habitat would be expected to reduce the effects
25 of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would
26 be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
27 Restoration would be sequenced over the term of the Plan and occur in a manner that would
28 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and
29 protection contained in the near-term Plan goals, and the incorporation of the additional measures
30 in the biological goals and objectives (BDCP Chapter 3) would be sufficient to mitigate the near-term
31 effects of tidal restoration.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
36 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
37 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
38 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
39 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
40 of the Final EIR/EIS. The saltmarsh common yellowthroat is not a species that is covered under the
41 BDCP. Although preconstruction surveys for Suisun song sparrow would likely also detect nesting
42 saltmarsh common yellowthroat, in order to avoid adverse effects on individuals, preconstruction
43 surveys for noncovered avian species would be required to ensure that saltmarsh common
44 yellowthroat nests are detected and avoided. Implementation of Mitigation Measure BIO-75 would
45 reduce the impact of construction activities on nesting saltmarsh common yellowthroat to a less-
46 than-significant level.

1 Because the number of acres required to meet the typical mitigation ratio described above would be
2 only 3,590 acres of restored/created tidal natural communities, the 6,000 acres of tidal brackish and
3 tidal freshwater emergent wetland restoration and the 4,100 acres of managed wetland protection
4 and enhancement contained in the near-term Plan goals, and the additional detail in the biological
5 objectives for Suisun song sparrow, are more than sufficient to support the conclusion that the near-
6 term impacts of habitat loss and direct mortality of Suisun song sparrow or saltmarsh common
7 yellowthroat under Alternative 1B would be less than significant under CEQA.

8 ***Late Long-Term Timeframe***

9 The habitat model indicates that the study area supports approximately 3,722 acres of primary and
10 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.
11 Alternative 1B as a whole would result in the permanent loss of 3,688 acres of habitat (15% of the
12 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*
13 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary
14 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

15 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or
16 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)
17 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse
18 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh
19 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for
20 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,
21 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to
22 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This
23 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise
24 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be
25 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more
26 interconnected patches of suitable habitat would be expected to reduce the effects of habitat
27 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be
28 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
29 Restoration would be sequenced over the term of the Plan and occur in a manner that would
30 minimize any temporary, initial loss and fragmentation of habitat.

31 The BDCP's beneficial effects analysis (BDCP Chapter 5.6, *Effects on Covered Wildlife and Plant*
32 *Species*) estimates that the restoration and protection actions discussed above could result in the
33 restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat in addition to the
34 protection of 384 acres of secondary habitat for Suisun song sparrow, which would also benefit the
35 saltmarsh common yellowthroat.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
40 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
41 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
42 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
43 which have since been updated and which are provided in Appendix 3B, *Environmental*
44 *Commitments, AMMs, and CMs*, of the Final EIR/EIS. The saltmarsh common yellowthroat is not a

1 covered species under the BDCP. Although preconstruction surveys for Suisun song sparrow may
2 detect nesting saltmarsh common yellowthroat, in order to have a less-than-significant impact on
3 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
4 saltmarsh common yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would
5 reduce this potential impact on nesting saltmarsh common yellowthroat to a less-than-significant
6 level.

7 Considering these restoration provisions, which would replace low-value secondary habitat with
8 high-value tidal brackish emergent habitat, including both foraging and primary habitat, and provide
9 upland refugia for Suisun song sparrow and saltmarsh common yellowthroat, the acreages of
10 restoration would be sufficient to mitigate habitats lost to construction and restoration activities.
11 Loss of habitat or direct mortality through implementation of Alternative 1B, with the
12 implementation of AMM1–AMM7, AMM22, and Mitigation Measure BIO-75, *Conduct Preconstruction*
13 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would not result in a substantial adverse
14 effect through habitat modifications and would not substantially reduce the number or restrict the
15 range of the species. Therefore, the loss of habitat or potential mortality under this alternative
16 would have a less-than-significant impact on Suisun song sparrow and saltmarsh common
17 yellowthroat.

18 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
19 **Disturbance of Nesting Birds**

20 See Mitigation Measure BIO-75 under Impact BIO-75.

21 **Impact BIO-81: Indirect Effects of Plan Implementation on Suisun Song Sparrow and**
22 **Saltmarsh Common Yellowthroat**

23 **Indirect Construction-Related Effects:** If Suisun song sparrow or saltmarsh common yellowthroat
24 were to nest in or adjacent to work areas, construction and subsequent maintenance-related noise
25 and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
26 functions of suitable nesting habitat for these species. Suisun song sparrow and saltmarsh common
27 yellowthroat habitat adjacent to restoration work areas could be affected by such disturbances,
28 which could temporarily result in diminished use of habitat. Construction noise above background
29 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
30 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
31 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
32 the extent to which these noise levels could affect either species. If construction occurred during the
33 nesting season, these indirect effects could result in the loss or abandonment of nests and mortality
34 of any eggs and/or nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*
35 *Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
36 *Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse effects of
37 construction-related activities on survival and productivity of Suisun song sparrow and saltmarsh
38 common yellowthroat by requiring preconstruction surveys and, if nests are present, the
39 establishment of a no-disturbance buffer within 250 feet of a nest site. The use of mechanical
40 equipment during water conveyance facilities construction could cause the accidental release of
41 petroleum or other contaminants that could affect species in the surrounding habitat. The
42 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an
43 adverse effect on Suisun song sparrow and saltmarsh common yellowthroat. *AMM2 Construction*
44 *Best Management Practices and Monitoring* would minimize the likelihood of such spills and ensure

1 that measures are in place to prevent runoff from the construction area and any adverse effects of
2 dust on active nests.

3 **Salinity:** Water conveyance facilities operations would have an effect on salinity gradients in Suisun
4 Marsh; however, these effects cannot be reasonably disaggregated from effects resulting from tidal
5 habitat restoration. It is expected that the salinity of water in Suisun Marsh would generally increase
6 as a result of water conveyance facilities operations and operations of salinity control gates to mimic
7 a more natural water flow. This would likely encourage the establishment of tidal wetland plant
8 communities tolerant of more saline environments, which should have a beneficial effect on Suisun
9 song sparrow and saltmarsh common yellowthroat because their historical natural Suisun Marsh
10 habitat is brackish tidal marsh. However, the degree to which salinity changes in all tidal channels
11 and sloughs in and around Suisun Marsh would be highly variable.

12 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
13 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
14 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
15 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
16 newly inundated areas could increase bioavailability of mercury. Although tidal habitat restoration
17 might increase methylation of mercury export to other habitats, restoration is unlikely to
18 significantly increase the exposure of methylmercury to Suisun song sparrow or saltmarsh common
19 yellowthroat, as they currently reside in tidal marshes where elevated methylmercury levels exist.
20 Robinson et al. (2011) found toxic levels of methylmercury levels in song sparrow populations from
21 southern San Francisco Bay, although populations near Suisun Marsh (i.e., San Pablo and Simas
22 Creeks) were much lower. The potential mobilization or creation of methylmercury within the study
23 area varies with site-specific conditions and would need to be assessed at the project level. The
24 Suisun Marsh Plan anticipates that restored tidal wetlands would generate less methylmercury than
25 the existing managed wetlands to be restored (Bureau of Reclamation et al. 2010).

26 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
27 into the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
28 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
29 project-specific basis, where high potential for methylmercury production is identified that
30 restoration design and adaptive management cannot fully address while also meeting restoration
31 objectives, alternate restoration areas will be considered. CM12 would be implemented in
32 coordination with other similar efforts to address mercury in the Delta, and specifically with the
33 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
34 following actions.

- 35 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
36 mercury methylation and bioavailability
- 37 ● Define design elements that minimize conditions conducive to generation of methylmercury in
38 restored areas.
- 39 ● Define adaptive management strategies that can be implemented to monitor and minimize
40 actual postrestoration creation and mobilization of methylmercury.

41 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
42 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
43 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
44 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz

2009). The effect of selenium toxicity differs widely between species and also between age and sex classes within a species. In addition, the effect of selenium on a species can be confounded by interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium have a higher risk of selenium toxicity.

Selenium toxicity in avian species can result from the mobilization of naturally high concentrations of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to exacerbate bioaccumulation of selenium in avian species, including Suisun song sparrow and saltmarsh common yellowthroat. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and, therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, Alternative 1B restoration activities that create newly inundated areas could increase bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases in selenium concentrations in water in the Delta under any alternative. However, it is difficult to determine whether the effects of potential increases in selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse effects on Suisun song sparrow and saltmarsh common yellowthroat.

Because of the uncertainty that exists at this programmatic level of review, there could be a substantial effect on Suisun song sparrow and saltmarsh common yellowthroat from increases in selenium associated with restoration activities. This effect would be addressed through the implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium management to reduce selenium concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as part of design and implementation. This avoidance and minimization measure would be implemented as part of the tidal habitat restoration design schedule.

NEPA Effects: Noise and visual disturbances would not have an adverse effect on Suisun song sparrow with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects of noise and visual disturbance on saltmarsh common yellowthroat. AMM1-AMM7, including *AMM2*

1 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of spills, and
2 ensure that measures were in place to prevent runoff from the construction area and to avoid
3 negative effects of dust on the species. Implementation of Operational Scenario A, including
4 operation of salinity-control gates, and tidal habitat restoration would be expected to increase water
5 salinity in Suisun Marsh, which would be expected to establish tidal marsh similar to historic
6 conditions.

7 Tidal habitat restoration is unlikely to have a substantial impact on Suisun song sparrow and
8 saltmarsh common yellowthroat through increased exposure to methylmercury, as these species
9 currently reside in tidal marshes where elevated methylmercury levels exist. However, it is
10 unknown what concentrations of methylmercury are harmful to the species and the potential for
11 increased exposure varies substantially within the study area. Implementation of CM12 which
12 contains measures to assess the amount of mercury before project development, followed by
13 appropriate design and adaptation management, would minimize the potential for increased
14 methylmercury exposure, and would result in no adverse effect on Suisun song sparrow and
15 saltmarsh common yellowthroat.

16 Tidal habitat restoration could result in increased exposure of Suisun song sparrow and saltmarsh
17 common yellowthroat to selenium. This effect would be addressed through the implementation of
18 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
19 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
20 habitats.

21 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
22 sedimentation, and operations and maintenance of the water conveyance facilities would be less
23 than significant with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
24 *Least Bell's Vireo, Western Yellow-Billed Cuckoo,* Mitigation Measure BIO-75, *Conduct Preconstruction*
25 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds,* and *AMM2 Construction Best*
26 *Management Practices and Monitoring.* Changes in salinity gradients would be expected to have a
27 beneficial impact on Suisun song sparrow and saltmarsh common yellowthroat through the
28 establishment of tidal marsh similar to historic conditions.

29 The implementation of tidal natural communities restoration (CM4) is unlikely to significantly
30 increase the exposure of methylmercury to Suisun song sparrow or saltmarsh common
31 yellowthroat, as they currently reside in tidal marshes where elevated methylmercury levels exist.
32 However, it is unknown what concentrations of methylmercury are harmful to these species.
33 Implementation of CM12 which contains measures to assess the amount of mercury before project
34 development, followed by appropriate design and adaptation management, would minimize the
35 potential for increased methylmercury exposure, and would result in no adverse effect on Suisun
36 song sparrow and saltmarsh common yellowthroat. With these additional avoidance and
37 minimization measures, Mitigation Measure BIO-75, and *CM12 Methylmercury Management*, indirect
38 effects of Plan implementation would have a less-than-significant impact on Suisun song sparrow
39 and saltmarsh common yellowthroat.

40 Tidal habitat restoration could result in increased exposure of Suisun song sparrow and saltmarsh
41 common yellowthroat to selenium. With implementation of *AMM27 Selenium Management*, which
42 would provide specific tidal habitat restoration design elements to reduce the potential for
43 bioaccumulation of selenium and its bioavailability in tidal habitats, the impact of increased
44 selenium exposure would be less than significant.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 See Mitigation Measure BIO-75 under Impact BIO-75.

4 **Impact BIO-82: Effects on Suisun Song Sparrow and Saltmarsh Common Yellowthroat**
5 **Associated with Electrical Transmission Facilities**

6 The range of the Suisun song sparrow extends eastward into the study area to approximately
7 Kimball Island. There are several reported occurrences from Kimball Island, Browns Island, and in
8 the Suisun Marsh in the western portion of the study area. The easternmost range of the saltmarsh
9 common yellowthroat also ends in Suisun Marsh. These species ranges, along with areas of suitable
10 habitat, are far from the proposed transmission line routes (BDCP Appendix 5.J, Attachment 5J.C,
11 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Location of the current
12 populations, species ranges, and suitable habitat in the study area make collision with the proposed
13 transmission lines highly unlikely. Therefore the construction and presence of new transmission
14 lines would not have an adverse effect on Suisun song sparrow and saltmarsh common
15 yellowthroat.

16 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse
17 effect on Suisun song sparrow and saltmarsh common yellowthroat because the location of the
18 current populations, species ranges, and suitable habitat for the species make collision with the
19 proposed transmission lines highly unlikely.

20 **CEQA Conclusion:** The construction and presence of new transmission lines would not be expected
21 to have an adverse effect on Suisun song sparrow and saltmarsh common yellowthroat because the
22 location of the current populations, species ranges, and suitable habitat for the species make
23 collision with the proposed transmission lines highly unlikely. Therefore, the construction and
24 presence of new transmission lines under Alternative 1B would have a less-than-significant impact
25 on Suisun song sparrow and saltmarsh common yellowthroat.

26 **Swainson's Hawk**

27 This section describes the effects of Alternative 1B, including water conveyance facilities
28 construction and implementation of other conservation components, on Swainson's hawk. The
29 habitat model used to assess impacts on Swainson's hawk includes plant alliances and land cover
30 types associated with Swainson's hawk nesting and foraging habitat. Construction and restoration
31 associated with Alternative 1B conservation measures would result in both temporary and
32 permanent losses of Swainson's hawk modeled habitat as indicated in Table 12-1B-35. The majority
33 of the losses would take place over an extended period of time as tidal marsh is restored in the study
34 area. Although protection and restoration for the loss of nesting and foraging habitat would be
35 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)
36 for restored habitats to replace the functions of habitat lost. This time lag between impacts and
37 restoration of habitat function would be minimized through specific requirements of *AMM18*
38 *Swainson's Hawk*, including transplanting mature trees in the near-term time period. Full
39 implementation of Alternative 1B would also include the following conservation actions over the
40 term of the BDCP to benefit the Swainson's hawk (BDCP Chapter 3, Section 3.3, *Biological Goals and*
41 *Objectives*).

- 1 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
2 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
3 associated with CM7)
- 4 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
5 10 (Objective VFRNC1.2, associated with CM3).
- 6 ● Plant and maintain native trees along roadsides and field borders within protected cultivated
7 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 8 ● Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey
9 populations throughout protected cultivated lands (Objective SH2.2, associated with CM11).
- 10 ● Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,
11 VPNC2.5, and GNC2.4, associated with CM11).
- 12 ● Conserve at least 1 acre of Swainson's hawk foraging habitat for each acre of lost foraging
13 habitat (Objective SH1.1, associated with CM3).
- 14 ● Protect at least 42,275 acres of cultivated lands as Swainson's hawk foraging habitat with at
15 least 50% in very high-value habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated
16 with CM3).
- 17 ● Of the at least 42,275 acres of cultivated lands protected as Swainson's hawk foraging habitat
18 under Objective SH1.2, up to 1,500 acres can occur in CZs 5 and 6, and must have land surface
19 elevations greater than -1 foot NAVD88 (Objective SH1.3, associated with CM3).
- 20 ● Protect at least 10,750 acres of grassland, vernal pool, and alkali seasonal wetland as Swainson's
21 hawk foraging habitat (Objective SH1.4, associated with CM3).
- 22 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
23 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 24 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
25 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
26 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
27 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3 and CM11).

28 As explained below, with the restoration or protection of these amounts of habitat, in addition to
29 management activities that would enhance these natural communities for the species and
30 implementation of AMM1-AMM7 and *AMM18 Swainson's Hawk*, impacts on Swainson's hawk would
31 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-35. Changes in Swainson’s Hawk Modeled Habitat Associated with Alternative 1B**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	34	34	23	23	NA	NA
	Foraging	5,494	5,494	9,640	9,640	NA	NA
Total Impacts CM1		5,528	5,528	9,663	9,663	NA	NA
CM2–CM18	Nesting	252	412	54	85	41–70	189
	Foraging	8,903	48,511	504	1,540	3,025–6,635	8,008
Total Impacts CM2–CM18		9,155	48,923	558	1,625	3,066–6,705	8,197
Total Nesting		286	446	77	108	41–70	189
Total Foraging		14,397	54,005	10,144	11,180	3,025–6,635	8,008
TOTAL IMPACTS		14,683	54,451	10,221	11,288	3,066–6,705	8,197

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-83: Loss or Conversion of Habitat for and Direct Mortality of Swainson’s Hawk**

5 Alternative 1B conservation measures would result in the combined permanent and temporary loss
6 of up to 65,739 acres of modeled habitat (554 acres of nesting habitat and 65,185 acres of foraging
7 habitat) for Swainson’s hawk (Table 12-1B-35). Conservation measures that would result in these
8 losses are conveyance facilities and transmission line construction, and establishment and use of
9 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration
10 (CM4), floodplain restoration (CM5), riparian restoration, (CM7), grassland restoration (CM8),
11 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of
12 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which
13 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.
14 In addition, maintenance activities associated with the long-term operation of the water conveyance
15 facilities and other BDCP physical facilities could affect Swainson’s hawk modeled habitat. Each of
16 these individual activities is described below. A summary statement of the combined impacts and
17 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B water conveyance facilities
19 would result in the combined permanent and temporary loss of up to 54 acres of Swainson’s
20 hawk nesting habitat (34 acres of permanent loss and 23 acres of temporary loss). The habitat
21 would be removed at multiple locations from the north Delta to the east Delta and in the vicinity

of Clifton Court Forebay. Almost all of the losses would occur on the borders of waterways. In the north Delta, most of the permanent loss would occur where Intakes 1–5 encroach on the Sacramento River’s east bank between Freeport and Courtland. The riparian areas here are very small patches, some dominated by valley oak and others by nonnative trees and scrub vegetation. Other small patches or narrow bands of riparian vegetation dominated by valley oak, willow, cottonwood or mixed brambles would be permanently removed by canal construction adjacent to Intake 1, between Intakes 2 and 4, and just south of Lambert Road. In the east Delta, small permanent losses would occur from canal construction just south of Twin Cities Road and just north of Walnut Grove Road. The temporary riparian losses would occur at the intake sites along the Sacramento River and at temporary siphon work areas where the canal would cross Beaver Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment Slough, Railroad Canal, and Middle River just south of Victoria Canal.

In addition, 15,134 acres of foraging habitat would be removed (5,494 acres of permanent loss and 9,640 acres of temporary loss; Table 12-1B-36). Permanent foraging habitat impacts from CM1 include 1,678 acres of impact on very high-value foraging habitat (alfalfa; Table 12-1B-36). The permanent and temporary losses would occur at various locations along the new canal route from the construction of the canal and the associated borrow and spoil sites and at the intake sites along the Sacramento River. Permanent and temporary losses of foraging habitat would also occur at the new forebay site just south of Clifton Court Forebay and associated borrow and spoil sites. There are 12 occurrences of Swainson’s hawk that intersect with the permanent construction footprint for CM1. In addition, 13 occurrences intersect with temporary impacts from the CM1 footprint. The implementation of *AMM18 Swainson’s Hawk* would require preconstruction surveys and the establishment of no-disturbance buffers and would minimize potential effects on nesting Swainson’s hawks present within or adjacent to construction areas. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations.

Table 12-1B-36. Acres of Impacted Swainson’s Hawk Foraging Habitat by Value Classes

Foraging Habitat Value Class	Cultivated Land and Other Land Cover Types	CM1 Permanent (temporary)	CM2–CM18 Permanent (temporary)
Very high	Alfalfa hay	1,678 (3,365)	13,898 (432)
Moderate	Irrigated pasture, other hay crops, tomatoes, grain crops (wheat, barley, oats), fallow fields	1,257 (1,711)	15,136 (477)
Low	Other irrigated field and truck crops, dry pasture, grasslands, alkali seasonal wetlands, vernal pool complex, sudan	1,115 (1,414)	10,535 (349)
Very low	Safflower, sunflower, corn, grain sorghum, managed wetlands	1,444 (3,152)	8,943 (281)

- *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement would result in the combined permanent and temporary loss of up to 133 acres of nesting habitat (79 acres of permanent loss, 54 acres of temporary loss) in the Yolo Bypass in CZ 2. In addition, 1,500 acres of foraging habitat would be removed (996 acres of permanent loss, 554 acres of temporary loss). Activities through CM2 could involve excavation and grading in

1 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
2 riparian losses would occur at the north end of Yolo Bypass where major fish passage
3 improvements are planned. Excavation to improve water movement in the Toe Drain and in the
4 Sacramento Weir would also remove Swainson's hawk habitat. The loss is expected to occur
5 during the first 10 years of Plan implementation.

- 6 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
7 inundation would permanently remove an estimated 295 acres of Swainson's hawk nesting
8 habitat and 37,359 acres of foraging habitat. The majority of the acres lost would consist of
9 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity
10 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,
11 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
12 directly impact and fragment grassland just north of Rio Vista in and around French and
13 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
14 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
15 the northern fringes of Suisun Marsh. Impacts on foraging habitat from CM4 would consist of
16 10,757 acres of very high-value (alfalfa), 11,706 acres of moderate-value, and 7,973 acres of
17 low-value habitat (See Table 12-1B-36 for land cover types classified by habitat value). Because
18 the species is highly mobile and wide-ranging, habitat fragmentation is not expected to reduce
19 the use of remaining cultivated lands or preclude access to surrounding lands. However, the
20 conversion of cultivated lands to tidal wetlands over fairly broad areas within the tidal
21 restoration footprints could result in the removal or abandonment of nesting territories that
22 occur within or adjacent to the restoration areas. Trees would not be actively removed but tree
23 mortality would be expected over time as areas became tidally inundated. Depending on the
24 extent and value of remaining habitat, this could reduce the local nesting population. There are
25 at least 27 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for
26 CM4, suggesting that numerous nest sites could be directly affected by inundation from tidal
27 restoration activities.
- 28 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
29 seasonally inundated floodplain and riparian restoration actions would remove approximately
30 69 acres of Swainson's hawk nesting habitat (38 acres of permanent loss, 31 acres of temporary
31 loss) and 2,856 acres of foraging habitat (1,820 acres of permanent loss, 1,036 acres of
32 temporary loss). These losses would be expected after the first 10 years of Alternative 1B
33 implementation along the San Joaquin River and other major waterways in CZ 7.
- 34 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
35 approximately 953 acres of Swainson's hawk foraging habitat as part of tidal restoration and
36 3,991 acres as part of seasonal floodplain restoration through CM7. There are at least 27
37 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for CM7.
- 38 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
39 implemented on agricultural lands and would result in the conversion of 1,849 acres of
40 Swainson's hawk agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,
41 and 11. If agricultural lands supporting higher value foraging habitat than the restored
42 grassland were removed, there would be a loss of Swainson's hawk foraging habitat value.
- 43 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would
44 result in the permanent removal of 1,440 acres of Swainson's hawk foraging habitat in CZ 2 and

1 CZ 4. Small patches of riparian vegetation that support Swainson's hawk nesting habitat may
2 develop along the margins of restored nontidal marsh if appropriate site conditions are present.

- 3 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
4 enhancement-related activities could disturb Swainson's hawk nests if they were present near
5 work sites. A variety of habitat management actions that are designed to enhance wildlife values
6 in BDCP-protected habitats may result in localized ground disturbances that could temporarily
7 remove small amounts of Swainson's hawk habitat and reduce the functions of habitat until
8 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
9 and road and other infrastructure maintenance, are expected to have minor effects on available
10 Swainson's hawk habitat and are expected to result in overall improvements to and
11 maintenance of habitat values over the term of the BDCP. These effects cannot be quantified, but
12 are expected to be minimal and would be avoided and minimized by the AMMs listed below.
13 CM11 would also include the construction of recreational-related facilities including trails,
14 interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal*
15 *Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms,
16 etc. would be placed on existing, disturbed areas when and where possible. However,
17 approximately 50 acres of Swainson's hawk grassland foraging habitat would be lost from the
18 construction of trails and facilities.

- 19 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
20 Swainson's hawk foraging habitat for the development of a delta and longfin smelt conservation
21 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.

22 Permanent and temporary nesting habitat losses from the above conservation measures, would
23 primarily consist of small, fragmented riparian stands. Temporarily affected nesting habitat
24 would be restored as riparian habitat within 1 year following completion of construction
25 activities. The restored riparian habitat would require 1 to several decades to functionally
26 replace habitat that has been affected and for trees to attain sufficient size and structure suitable
27 for nesting by Swainson's hawks. *AMM18 Swainson's Hawk* contains actions described below to
28 reduce the effect of temporal loss of nesting habitat, including the transplanting of mature trees
29 and planting of trees near high-value foraging habitat. The functions of cultivated lands and
30 grassland communities that provide foraging habitat for Swainson's hawk are expected to be
31 restored relatively quickly.

- 32 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
33 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
34 disturbances that could affect Swainson's hawk use of the surrounding habitat. Maintenance
35 activities would include vegetation management, levee and structure repair, and re-grading of
36 roads and permanent work areas. These effects, however, would be reduced by AMM1-AMM7
37 and *AMM18 Swainson's Hawk*, in addition to conservation actions as described below.
- 38 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
39 direct mortality of adult or fledged Swainson's hawk if they were present in the Plan Area,
40 because they would be expected to avoid contact with construction and other equipment.
41 However, if Swainson's hawk were to nest in the construction area, construction-related
42 activities, including equipment operation, noise and visual disturbances could affect nests or
43 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects
44 would be avoided and minimized with the incorporation of *AMM18 Swainson's Hawk* into the
45 BDCP.

1 The following paragraphs summarize the combined effects discussed above and describe other
 2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
 3 included.

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 7 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
 8 the effect of construction would not be adverse under NEPA. The Plan would remove 363 acres (286
 9 permanent, 77 temporary) of Swainson’s hawk nesting habitat in the study area in the near-term.
 10 These effects would result from the construction of the water conveyance facilities (CM1, 57 acres),
 11 and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal*
 12 *Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7*
 13 *Riparian Natural Community Restoration*—306 acres). In addition, 24,451 acres of Swainson’s hawk
 14 foraging habitat would be removed or converted in the near-term (CM1, 15,134 acres; *CM2 Yolo*
 15 *Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5, Seasonally*
 16 *Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland*
 17 *Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration,*
 18 *CM11 Natural Communities Enhancement and Management and CM18 Conservation Hatcheries*—
 19 9,407 acres).

20 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and
 21 those that are identified in the biological goals and objectives for Swainson’s hawk in Chapter 3 of
 22 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
 23 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 57
 24 acres of nesting habitat should be restored/created and 57 acres should be protected to compensate
 25 for the CM1 losses of Swainson’s hawk nesting habitat. In addition, 15,134 acres of foraging habitat
 26 should be protected to mitigate the CM1 losses of Swainson’s hawk foraging habitat. The near-term
 27 effects of other conservation actions would remove 306 acres of modeled nesting habitat, and
 28 therefore require 306 acres of restoration and 306 acres of protection of nesting habitat. Similarly,
 29 the near-term effects of other conservation actions would remove 9,407 acres of modeled foraging
 30 habitat, and therefore require 9,407 acres of protection of foraging habitat using the same typical
 31 NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting habitat; 1:1
 32 protection for the loss of foraging habitat).

33 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
 34 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
 35 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
 36 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
 37 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3). These
 38 conservation actions are associated with CM3, CM5, CM7, and CM8, and would occur in the same
 39 timeframe as the construction and early restoration losses.

40 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
 41 system with extensive wide bands or large patches of valley/foothill riparian natural community
 42 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
 43 restoration would expand the patches of existing riparian forest in order to support nesting habitat
 44 for the species. The distribution and abundance of potential Swainson’s hawk nest trees would be

1 increased by planting and maintaining native trees along roadsides and field borders within
 2 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small
 3 but essential nesting habitat for Swainson’s hawk associated with cultivated lands would also be
 4 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
 5 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

6 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 7 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
 8 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
 9 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
 10 provide foraging habitat for Swainson’s hawk and reduce the effects of current levels of habitat
 11 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
 12 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
 13 Foraging opportunities would also be improved by enhancing prey populations through the
 14 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
 15 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
 16 would also be protected and maintained as part of the cultivated lands reserve system which would
 17 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
 18 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
 19 components) that dry during the spring would also serve as foraging habitat for Swainson’s hawks
 20 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
 21 would inform the near-term protection and restoration efforts and represent performance
 22 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated
 23 lands that provide habitat for covered and other native wildlife species would be protected in the
 24 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the
 25 late long-term time period would be in very high- and high-value crop types for Swainson’s hawk
 26 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated
 27 lands protected in the near-term time period which would provide high-value habitat for Swainson’s
 28 hawk. The acres of restoration and protection contained in the near-term Plan goals and the
 29 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
 30 the project-level effects of CM1 on Swainson’s hawk foraging habitat, as well as mitigate the near-
 31 term effects of the other conservation measures.

32 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
 33 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
 34 other near-term impacts on Swainson’s hawk nesting habitat. The 800 acres of restored riparian
 35 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
 36 require one to several decades to functionally replace habitat that has been affected and for trees to
 37 attain sufficient size and structure suitable for nesting by Swainson’s hawks. This time lag between
 38 the removal and restoration of nesting habitat could have a substantial impact on Swainson’s hawk
 39 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting
 40 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
 41 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat
 42 would further reduce this limited resource and could reduce or restrict the number of active
 43 Swainson’s hawk nests within the Plan Area until restored riparian habitat is sufficiently developed.

44 *AMM18 Swainson’s Hawk* would implement a program to plant large mature trees, including
 45 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson’s hawk
 46 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)

1 within the 125-acre block are removed. These mature trees would be supplemented with additional
2 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
3 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
4 addition, at least 5 trees (five gallon container size) would be planted within the BDCP reserve
5 system for every tree removed by construction during the near-term period that was suitable for
6 nesting by Swainson's hawks (20 feet or taller). A variety of native tree species would be planted to
7 provide trees with differing growth rates, maturation, and life span. Trees would be planted within
8 the BDCP reserve system in areas that support high value Swainson's hawk foraging habitat to
9 increase nest sites, or within riparian plantings as a component of the riparian restoration (CM5,
10 CM7) where they are in close proximity to suitable foraging habitat. Replacement trees that were
11 incorporated into the riparian restoration would not be clustered in a single region of the study
12 area, but would be distributed throughout the lands protected as foraging habitat for Swainson's
13 hawk.

14 Swainson's hawk foraging habitat would be protected within 3 miles of a known Swainson's hawk
15 nest tree and within 50 miles of the project footprint on land not subject to threat of seasonal
16 flooding, construction disturbances, or other conditions that would reduce the foraging value of the
17 land. With this program in place, Alternative 1B would not have a substantial adverse effect on
18 Swainson's hawk in the near-term timeframe, either through direct mortality or through habitat
19 modifications. Further details of AMM18 are provided in Appendix 3B, *Environmental Commitments,*
20 *AMMs, and CMs,* of the Final EIR/EIS.

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
22 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
23 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
24 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
25 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
26 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
27 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs,*
28 of the Final EIR/EIS.

29 ***Late Long-Term Timeframe***

30 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of
31 modeled foraging habitat for Swainson's hawk. Alternative 1B as a whole would result in the
32 permanent loss of and temporary effects on 554 acres of potential nesting habitat (6% of the
33 potential nesting habitat in the study area) and 65,185 acres of foraging habitat (14% of the foraging
34 habitat in the study area).

35 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
36 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community*
37 *Restoration, and CM8 Grassland Natural Community Restoration* to restore or create at least 5,000
38 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000
39 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool
40 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed
41 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
42 species (Table 3-4 in Chapter 3).

43 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
44 system with extensive wide bands or large patches of valley/foothill riparian natural community

1 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
2 restoration would expand the patches of existing riparian forest in order to support nesting habitat
3 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be
4 increased by planting and maintaining native trees along roadsides and field borders within
5 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but
6 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be
7 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
8 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

9 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
10 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
11 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
12 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
13 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat
14 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
15 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
16 Foraging opportunities would also be improved by enhancing prey populations through the
17 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
18 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would
19 also be protected and maintained as part of the cultivated lands reserve system which would
20 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
21 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
22 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks
23 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
24 would inform the near-term protection and restoration efforts and represent performance
25 standards for considering the effectiveness of restoration actions. Foraging habitat would be
26 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that
27 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which
28 would be in very high-value habitat production in CZs 1-4, 7- 9, and 11 (Objective SH1.2).

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
33 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
34 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
35 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
36 of the Final EIR/EIS.

37 **NEPA Effects:** The loss of Swainson's hawk habitat and potential for direct mortality of this special-
38 status species under Alternative 1B would represent an adverse effect in the absence of other
39 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,
40 CM9, and CM11, guided by biological goals and objectives and by AMM1-AMM7 and *AMM18*
41 *Swainson's Hawk*, which would be in place throughout the construction period, the effects of habitat
42 loss and potential mortality on Swainson's hawk under Alternative 1B would not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
6 the effect of construction would be less than significant under CEQA. The Plan would remove 363
7 acres (286 permanent, 77 temporary) of Swainson's hawk nesting habitat in the study area in the
8 near-term. These effects would result from the construction of the water conveyance facilities (CM1,
9 57 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,
10 *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*
11 *Riparian*, and *CM7 Natural Community Restoration*—306 acres). In addition, 24,451 acres of
12 Swainson's hawk foraging habitat would be removed or converted in the near-term (CM1, 15,134
13 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5*
14 *Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8*
15 *Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*
16 *Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation*
17 *Hatcheries*—9,407 acres).

18 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and
19 those that are identified in the biological goals and objectives for Swainson's hawk in Chapter 3 of
20 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
21 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 57
22 acres of nesting habitat should be restored/created and 57 acres should be protected to compensate
23 for the CM1 losses of Swainson's hawk nesting habitat. In addition, 15,134 acres of foraging habitat
24 should be protected to mitigate the CM1 losses of Swainson's hawk foraging habitat. The near-term
25 effects of other conservation actions would remove 306 acres of modeled nesting habitat, and
26 therefore require 306 acres of restoration and 306 acres of protection of nesting habitat. Similarly,
27 the near-term effects of other conservation actions would remove 9,407 acres of modeled foraging
28 habitat, and therefore require 9,407 acres of protection of foraging habitat using the same typical
29 NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting habitat; 1:1
30 protection for the loss of foraging habitat).

31 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
32 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
33 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
34 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
35 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3). These
36 conservation actions are associated with CM3, CM5, CM7, and CM8, and would occur in the same
37 timeframe as the construction and early restoration losses.

38 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
39 system with extensive wide bands or large patches of valley/foothill riparian natural community
40 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
41 restoration would expand the patches of existing riparian forest in order to support nesting habitat
42 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be
43 increased by planting and maintaining native trees along roadsides and field borders within
44 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small

1 but essential nesting habitat for Swainson’s hawk associated with cultivated lands would also be
 2 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
 3 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

4 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 5 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
 6 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
 7 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
 8 provide foraging habitat for Swainson’s hawk and reduce the effects of current levels of habitat
 9 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
 10 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
 11 Foraging opportunities would also be improved by enhancing prey populations through the
 12 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
 13 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
 14 would also be protected and maintained as part of the cultivated lands reserve system which would
 15 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
 16 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
 17 components) that dry during the spring would also serve as foraging habitat for Swainson’s hawks
 18 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
 19 would inform the near-term protection and restoration efforts and represent performance
 20 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated
 21 lands that provide habitat for covered and other native wildlife species would be protected in the
 22 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the
 23 late long-term time period would be in very high- and high-value crop types for Swainson’s hawk
 24 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated
 25 lands protected in the near-term time period which would provide high-value habitat for Swainson’s
 26 hawk. The acres of restoration and protection contained in the near-term Plan goals and the
 27 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
 28 the project-level effects of CM1 on Swainson’s hawk foraging habitat, as well as mitigate the near-
 29 term effects of the other conservation measures.

30 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
 31 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
 32 other near-term impacts on Swainson’s hawk nesting habitat. The 800 acres of restored riparian
 33 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
 34 require one to several decades to functionally replace habitat that has been affected and for trees to
 35 attain sufficient size and structure suitable for nesting by Swainson’s hawks. This time lag between
 36 the removal and restoration of nesting habitat could have a substantial impact on Swainson’s hawk
 37 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting
 38 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
 39 trees, and ornamental trees near rural residences and the removal of nest trees or nesting habitat
 40 would further reduce this limited resource and could reduce or restrict the number of active
 41 Swainson’s hawk within the Plan Area until restored riparian habitat is sufficiently developed.

42 *AMM18 Swainson’s Hawk* would implement a program to plant large mature trees, including
 43 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson’s hawk
 44 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
 45 within the 125-acre block are removed. These mature trees would be supplemented with additional
 46 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The

1 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
2 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
3 system for every tree removed by construction during the near-term period that was suitable for
4 nesting by Swainson's hawks (20 feet or taller). A variety of native tree species would be planted to
5 provide trees with differing growth rates, maturation, and life span. Trees would be planted within
6 the BDCP reserve system in areas that support high value foraging habitat to increase nest sites, or
7 within riparian plantings as a component of the riparian restoration (CM5, CM7) where they are in
8 close proximity to suitable foraging habitat. Replacement trees that are incorporated into the
9 riparian restoration would not be clustered in a single region of the Plan Area, but would be
10 distributed throughout the lands protected as foraging habitat for Swainson's hawk.

11 Swainson's hawk foraging habitat would be protected within 3 miles of a known Swainson's hawk
12 nest tree and within 50 miles of the project footprint on land not subject to threat of seasonal
13 flooding, construction disturbances, or other conditions that would reduce the foraging value of the
14 land. With this program in place, Alternative 1B would not have a substantial adverse effect on
15 Swainson's hawk in the near-term timeframe, either through direct mortality or through habitat
16 modifications. Further details of AMM18 are provided in Appendix 3B, *Environmental Commitments,*
17 *AMMs, and CMs*, of the Final EIR/EIS.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
19 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
20 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
21 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
22 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
23 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
24 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs,*
25 of the Final EIR/EIS.

26 ***Late Long-Term Timeframe***

27 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of
28 modeled foraging habitat for Swainson's hawk. Alternative 1B as a whole would result in the
29 permanent loss of and temporary effects on 554 acres of potential nesting habitat (6% of the
30 potential nesting habitat in the study area) and 65,185 acres of foraging habitat (14% of the foraging
31 habitat in the study area).

32 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
33 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community*
34 *Restoration, and CM8 Grassland Natural Community Restoration, to restore or create at least 5,000*
35 *acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000*
36 *acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool*
37 *complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed*
38 *wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife*
39 *species (Table 3-4 in Chapter 3).*

40 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
41 system with extensive wide bands or large patches of valley/foothill riparian natural community
42 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
43 restoration would expand the patches of existing riparian forest in order to support nesting habitat
44 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be

1 increased by planting and maintaining native trees along roadsides and field borders within
2 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but
3 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be
4 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
5 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

6 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
7 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
8 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
9 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
10 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat
11 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
12 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
13 Foraging opportunities would also be improved by enhancing prey populations through the
14 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
15 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would
16 also be protected and maintained as part of the cultivated lands reserve system which would
17 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
18 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
19 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks
20 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
21 would inform the near-term protection and restoration efforts and represent performance
22 standards for considering the effectiveness of restoration actions. Foraging habitat would be
23 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of Swainson's hawk foraging
24 habitat would be protected within of the 45,405 acres of cultivated lands protected by the late long-
25 term, 50% of which would be in very high-value habitat production in CZs 1-4, 7- 9, and 11
26 (Objective SH1.2).

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
31 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
32 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
33 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
34 of the Final EIR/EIS.

35 Considering Alternative 1B's protection and restoration provisions, which would provide acreages
36 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of
37 restoring riparian and foraging habitats lost to construction and restoration activities, and
38 implementation of AMM1-AMM7 and *AMM18 Swainson's Hawk*, the loss of habitat or direct
39 mortality through implementation of Alternative 1B would not result in a substantial adverse effect
40 through habitat modifications and would not substantially reduce the number or restrict the range
41 of the species. Therefore, the loss of habitat or potential mortality under this alternative would have
42 a less-than-significant impact on Swainson's hawk.

1 **Impact BIO-84: Effects on Swainson’s Hawk Associated with Electrical Transmission Facilities**

2 New transmission lines would increase the risk that Swainson’s hawks could be subject to power
3 line strikes, which could result in injury or mortality of Swainson’s hawks. This species would be at
4 low risk of bird strike mortality based on factors assessed in the bird strike vulnerability analysis
5 (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP*
6 *Transmission Lines*). Factors analyzed include the height of the new transmission lines and the flight
7 behavior of the species. The existing network of transmission lines in the Plan Area currently poses
8 the same small risk for Swainson’s hawk, and any incremental risk associated with the new power
9 line corridors would also be expected to be low. Marking transmission lines with flight diverters that
10 make the lines more visible to birds has been shown to reduce the incidence of bird mortality
11 (Brown and Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could
12 reduce avian mortality by 60%. All new project transmission lines would be fitted with flight
13 diverters. Bird flight diverters would make transmission lines highly visible to Swainson’s hawks
14 and would further reduce any potential for powerline collisions.

15 **NEPA Effects:** New transmission lines would minimally increase the risk for Swainson’s hawk power
16 line strikes. All new transmission lines constructed as a result of the project would be fitted with
17 bird diverters, which have been shown to reduce avian mortality by 60%. With implementation of
18 *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines would not
19 result in an adverse effect on Swainson’s hawk.

20 **CEQA Conclusion:** New transmission lines would minimally increase the risk for Swainson’s hawk
21 power line strikes. All new transmission lines constructed as a result of the project would be fitted
22 with bird diverters, which have been shown to reduce avian mortality by 60%. With implementation
23 of *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines would result
24 in a less-than-significant impact on Swainson’s hawk.

25 **Impact BIO-85: Indirect Effects of Plan Implementation on Swainson’s Hawk**

26 Noise and visual disturbances from the construction of water conveyance facilities and other
27 conservation measures could reduce Swainson’s hawk use of modeled habitat adjacent to work
28 areas. Construction noise above background noise levels (greater than 50 dBA) could extend 1,900
29 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*
30 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there
31 are no available data to determine the extent to which these noise levels could affect Swainson’s
32 hawk. Moreover, operation and maintenance of the water conveyance facilities, including the
33 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could
34 affect Swainson’s hawk use of the surrounding habitat. These construction activities would include
35 water conveyance construction, tidal restoration activities, floodplain restoration, and Fremont
36 Weir/Yolo Bypass Enhancements. Swainson’s hawks are seasonally abundant across much of the
37 study area wherever adequate nest trees occur within a cultivated landscape that supports suitable
38 foraging habitat. There would be a potential for noise and visual disturbances associated with BDCP
39 actions to temporarily displace Swainson’s hawks and temporarily reduce the use of suitable habitat
40 adjacent to construction areas. These adverse effects would be minimized with the implementation
41 of *AMM18 Swainson’s Hawk*.

1 The use of mechanical equipment during water conveyance facilities construction could cause the
2 accidental release of petroleum or other contaminants that could affect Swainson's hawk foraging in
3 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
4 suitable habitat could also have an adverse effect on these species. *AMM2 Construction Best*
5 *Management Practices and Monitoring* would minimize the likelihood of such spills and ensure that
6 measures are in place to prevent runoff from the construction area and negative effects of dust on
7 habitat.

8 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
9 could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover, operation
10 and maintenance of the water conveyance facilities, including the transmission facilities, could result
11 in ongoing but periodic postconstruction disturbances that could affect Swainson's hawk use of the
12 surrounding habitat. The effects of noise, the potential for hazardous spills, increased dust and
13 sedimentation, and operations and maintenance of the water conveyance facilities would not have
14 an adverse effect on Swainson's hawk with the implementation of AMM1-AMM7, AMM10, and
15 *AMM18 Swainson's Hawk*.

16 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
17 facilities could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover,
18 operation and maintenance of the water conveyance facilities, including the transmission facilities,
19 could result in ongoing but periodic postconstruction disturbances that could affect Swainson's
20 hawk use of the surrounding habitat. The effects of noise, the potential for hazardous spills,
21 increased dust and sedimentation, and operations and maintenance of the water conveyance
22 facilities would result in a less-than-significant impact on Swainson's hawk with the implementation
23 of AMM1-AMM7, AMM10, and *AMM18 Swainson's Hawk*.

24 **Impact BIO-86: Periodic Effects of Inundation of Swainson's Hawk Nesting and Foraging** 25 **Habitat as a Result of Implementation of Conservation Components**

26 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
27 *Enhancement*) would increase the frequency and duration of inundation on approximately 3,066-
28 6,706 acres of modeled Swainson's hawk habitat (consisting of approximately 41-70 acres of
29 nesting habitat and 3,025-6,635 acres of foraging habitat; Table 12-1B-36). However, project-
30 associated inundation of areas that would not otherwise have been inundated would be expected to
31 occur in no more than 30% of all years, since Fremont Weir is expected to overtop the remaining
32 estimated 70% of all years, and during those years notch operations would not typically affect the
33 maximum extent of inundation. In more than half of all years under Existing Conditions, an area
34 greater than the project-related inundation area already inundates in the bypass. Therefore, habitat
35 conditions in the bypass would not be expected to change substantially as a result of Yolo Bypass
36 operations. However, increased duration of inundation during years of Fremont Weir operation,
37 may delay the period for which foraging habitat is available to Swainson's hawks by up to several
38 weeks.

39 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
40 *Restoration* could result in the periodic inundation of up to approximately 8,197 acres of modeled
41 Swainson's hawk habitat (Table 12-1B-35), consisting of 189 acres of nesting and 8,008 acres of
42 foraging habitat. Floodplain restoration would be expected to restore a more natural flood regime
43 and sustain riparian vegetation types that support regeneration of Swainson's hawk nesting habitat.
44 The restored floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years)

1 to areas that flood infrequently (e.g., every 10 years or more). Foraging habitat that is inundated
2 after Swainson's hawks arrive in the Central Valley in mid-March could result in a periodic loss of
3 available foraging habitat due to the reduction in available prey. Inundated habitats would be
4 expected to recover following draw-down and provide suitable foraging conditions until the
5 following inundation period. Thus, this is considered a periodic and short term effect that is unlikely
6 to affect Swainson's hawk distribution and abundance, or foraging use of the study area.

7 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
8 sites because trees in which nest sites are situated already withstand floods, the increase in
9 inundation frequency and duration is expected to remain within the range of tolerance of riparian
10 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically
11 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.
12 This would be considered a short-term effect that would not result in an adverse effect on
13 Swainson's hawk.

14 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
15 nest sites because trees in which nest sites are situated already withstand floods, the increase in
16 inundation frequency and duration is expected to remain within the range of tolerance of riparian
17 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically
18 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.
19 This would be considered a short-term effect that would not have a significant impact on Swainson's
20 hawk.

21 **Tricolored Blackbird**

22 This section describes the effects of Alternative 1B, including water conveyance facilities
23 construction and implementation of other conservation components, on tricolored blackbird. The
24 habitat model used to assess effects for tricolored blackbird is based on breeding habitat and
25 nonbreeding habitat. Although nesting colonies have been documented along the fringe of Suisun
26 Marsh, in the Yolo Bypass and along the southwestern perimeter of the Plan Area, breeding colonies
27 are uncommon in the Plan Area. Modeled breeding habitat includes bulrush/cattail wetlands and
28 shrub communities that may provide suitable nesting substrate, and adjacent high-value foraging
29 areas that occur within 5 miles of nesting colonies documented in the Plan Area. The foraging
30 component includes cultivated lands and noncultivated land cover types known to support
31 abundant insect populations such as grasslands, pasturelands (including alfalfa), natural seasonal
32 wetlands, and sunflower croplands. The Delta is recognized as a major wintering area for tricolored
33 blackbird (Hamilton 2004, Beedy 2008). Modeled nonbreeding habitat includes emergent wetlands
34 and shrub stands that provide suitable roosting habitat, as well as cultivated lands and
35 noncultivated lands that provide foods sought by tricolored blackbirds during the winter. Outside of
36 the breeding season, tricolored blackbirds are primarily granivores that forage opportunistically
37 across the Plan Area in grasslands, pasturelands, croplands, dairies, and livestock feed lots. Factors
38 considered in assessing the value of affected habitat for the tricolored blackbird, include patch size,
39 suitability of vegetation, and proximity to recorded occurrences.

40 Construction and restoration associated with Alternative 1B conservation measures would result in
41 both temporary and permanent losses of tricolored blackbird modeled habitat as indicated in Table
42 12-1B-37. Full implementation of Alternative 1B would also include the following conservation
43 actions over the term of the BDCP to benefit the tricolored blackbird (BDCP Chapter 3, Section 3.3,
44 *Biological Goals and Objectives*).

- 1 ● Protect and manage at least 50 acres of occupied or recently occupied (within the last 15 years)
2 tricolored blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs
3 1, 2, 8, or 11. (Objective TRBL1.1).
- 4 ● Protect at least 26,300 acres of moderate-, high-, or very high-value cultivated lands as
5 nonbreeding foraging habitat, 50% of which is of high or very high value (Objective TRBL1.2).
- 6 ● Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat within 5 miles
7 of occupied or recently occupied (within the last 15 years) tricolored blackbird nesting habitat
8 in CZs 1, 2, 3, 4, 7, 8, or 11. At least 1,000 acres of which will be within 5 miles of the at least 50
9 acres of nesting habitat protected under Objective TRBL1.1 (Objective TRBL1.3).
- 10 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
11 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
12 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
13 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 14 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
15 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
16 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 17 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 18 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
19 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 20 ● Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,
21 VPNC2.5, and GNC2.4, associated with CM11).

22 As explained below, with the restoration or protection of these amounts of habitat, in addition to
23 management activities that would enhance these natural communities for the species and
24 implementation of AMM1–AMM7 and AMM21 *Tricolored Blackbird*, impacts on tricolored blackbird
25 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-37. Changes to Tricolored Modeled Habitat Associated with Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d		
		NT	LLT	NT	LLT	CM2	CM5	
CM1	Breeding	Nesting	7	7	3	3	NA	NA
		Foraging - cultivated	1,005	1,005	1,197	1,197	NA	NA
		Foraging - noncultivated	198	198	183	183	NA	NA
	Nonbreeding	Roosting	16	16	35	35	NA	NA
		Foraging - cultivated	2,993	2,993	6,032	6,032	NA	NA
		Foraging - noncultivated	202	202	175	175	NA	NA
Total Impacts CM1		4,421	4,421	7,625	7,625			
CM2-CM18	Breeding	Nesting	13	72	75	77	11-26	30
		Foraging - cultivated	1,657	9,525	84	359	1,837-2,598	2,124
		Foraging - noncultivated	704	1,991	155	184	600-1,689	355
	Nonbreeding	Roosting	570	1,642	0	1	0-4	29
		Foraging - cultivated	3,747	23,955	54	420	222-1,057	2,506
		Foraging - noncultivated	459	1,341	0	3	42-191	158
Total Impacts CM2-CM18		7,150	38,526	368	1,044	2,711	5,766	
Total Breeding		3,584	12,798	1,697	2,003	2,447-4,312	2,509	
Total Nonbreeding		7,987	30,149	6,296	6,666	263-1,252	2,694	
TOTAL IMPACTS		11,571	42,947	7,993	8,669	2,711	5,766	

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

Impact BIO-87: Loss or Conversion of Habitat for and Direct Mortality of Tricolored Blackbird

Alternative 1B conservation measures would result in the combined permanent and temporary loss of up to 51,616 acres of modeled habitat (14,801 acres of breeding habitat and up to 36,815 acres of nonbreeding habitat) for tricolored blackbird (Table 12-1B-37). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate tricolored blackbird habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure discussions.

- *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would result in the permanent loss of 1,210 acres of tricolored blackbird breeding habitat (7 acres nesting habitat, 1,005 acres of cultivated lands, and 198 acres of noncultivated lands suitable for foraging) and 3,211 acres of nonbreeding habitat (16 acres roosting habitat, 2,993 acres of cultivated lands, and 202 acres of noncultivated lands suitable for foraging; Table 12-1B-37). In addition, 1,383 acres of breeding habitat (3 acres of roosting, 1,197 acres of cultivated lands, and 183 acres of noncultivated lands suitable for foraging) and 6,242 acres of nonbreeding habitat (35 acres of roosting, 6,032 acres of cultivated lands, and 175 acres of noncultivated lands suitable for foraging) would be temporarily removed. Most of the habitat that would be lost is located in the central Delta, from CZs 3-6 and CZ 8. Nesting and roosting habitat would be removed as a result of the construction of the canal, and temporary work areas associated with construction. Foraging habitat losses would occur along the canal alignment primarily from the construction of the canal and the associated borrow and spoil sites. Foraging habitat would also be lost as a result of the construction of the new forebay in CZ 8. There are no occurrences of tricolored blackbird that overlap with the construction footprint for CM1. However, records exist throughout the study area. The implementation of *AMM21 Tricolored Blackbird* would minimize potential effects on tricolored blackbirds if they were to nest adjacent to construction areas (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations.
- *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries improvements in the Yolo Bypass would permanent loss of 595 acres of tricolored blackbird breeding habitat (13 acres nesting habitat, 477 acres of cultivated lands, and 105 acres of noncultivated lands suitable for foraging) and 8 acres of nonbreeding habitat (consisting entirely of roosting habitat). In addition, CM2 construction would result in the temporary removal of 314 acres of breeding habitat (75 acres nesting habitat, 84 acres of cultivated lands, and 155 acres of noncultivated lands suitable for foraging) and 54 acres of nonbreeding habitat (consisting entirely of cultivated lands). The loss is expected to occur during the first 10 years of Plan implementation.
- *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration would result in the inundation of approximately 3,937 acres of tricolored blackbird breeding habitat (21 acres of nesting, 2,814 acres of cultivated lands, and 1,102 acres of noncultivated lands suitable for foraging) and 10,794 acres of nonbreeding habitat (1,633 acres of roosting, 18,489 acres of

1 cultivated lands, and 672 acres of noncultivated lands suitable for foraging). An estimated
2 13,692 acres of the 28,424 acres to be permanently lost would be expected to convert to tidal
3 emergent wetland communities that could provide nonbreeding season roosting habitat for
4 tricolored blackbirds, depending on future vegetation density and composition. Conversion
5 would result in the loss of an estimated 4,316 acres of tricolored blackbird breeding habitat (34
6 acres of nesting habitat; plus 3,635 acres of cultivated lands and 647 acres of noncultivated
7 habitats suitable for foraging) and 9,375 acres of nonbreeding habitat (8,716 acres of cultivated
8 lands and 659 acres of noncultivated habitats suitable for foraging). These habitat losses and
9 conversions would occur in CZs 1, 2, 4, 5, 6, 7, 8, and 11. Although considered to be a permanent
10 loss, due to the uncertainty of the quantity of restored suitable habitat, any areas that develop
11 into riparian scrub-shrub could provide suitable nesting and roosting habitat for tricolored
12 blackbird.

- 13 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction and riparian restoration
14 associated with floodplain restoration in the south Delta (CZ 7) would result in the permanent
15 removal of up to 554 acres of tricolored blackbird breeding habitat (4 acres of nesting habitat,
16 503 acres of cultivated lands, and 47 acres of noncultivated habitats suitable for foraging) and
17 656 acres of nonbreeding habitat (1 acre of roosting habitat, 652 acres of cultivated lands, and 3
18 acres of noncultivated habitats suitable for foraging) in CZ 7. Patches of riparian scrub
19 associated with the restoration of approximately 1,000 acres of valley/foothill riparian habitat
20 managed as early- to mid-successional habitats (as a component of CM5) could provide suitable
21 nesting, roosting or foraging habitat for tricolored blackbird once these restored habitats have
22 developed habitat functions for the species.
- 23 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland would result in the
24 permanent removal of 1,521 acres of tricolored breeding habitat and 210 acres of nonbreeding
25 habitat. Grassland restoration would be implemented on cultivated lands and would therefore
26 result in the conversion of tricolored blackbird cultivated foraging habitat to high-value
27 grassland foraging habitat in CZs 2, 4, and 5.
- 28 ● *CM10 Nontidal Marsh Restoration*: Marsh restoration activities would result in the permanent
29 removal or conversion of approximately 568 acres of tricolored blackbird breeding habitat and
30 945 acres of nonbreeding habitat (all cultivated lands suitable for foraging). About two-thirds of
31 the restored nontidal marsh would be open water, and the remainder would support emergent
32 wetland vegetation that could provide low-value roosting habitat for tricolored blackbird
33 depending on vegetation density and composition.
- 34 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
35 actions that are designed to enhance wildlife values in BDCP-protected habitats could result in
36 localized ground disturbances that could temporarily remove small amounts of tricolored
37 blackbird habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
38 road and other infrastructure maintenance, would be expected to have minor effects on
39 available tricolored blackbird habitat and are expected to result in overall improvements to and
40 maintenance of tricolored blackbird habitat values over the term of the BDCP. These effects
41 cannot be quantified, but are expected to be minimal and would be avoided and minimized by
42 the AMMs listed below. CM11 would also include the construction of recreational-related
43 facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities*
44 *and Associated Federal Actions*). Trailhead facilities, signs, staging areas, picnic areas, bathrooms,
45 etc. would be placed on existing, disturbed areas when and where possible. However,
46 approximately 43.5 acres of breeding habitat and 6.5 acres of nonbreeding habitat (all grassland

1 suitable for foraging) would be lost as a result of construction of trails and facilities. Impacts
2 from recreation facilities that would occur within the first 10 years of Plan implementation
3 would include a loss of 13 acres of breeding habitat.

- 4 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
5 tricolored blackbird grassland foraging habitat in CZ 1.
- 6 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
7 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
8 disturbances that could affect tricolored blackbird use of the surrounding habitat in or adjacent
9 to work areas. Maintenance activities would include vegetation management, levee and
10 structure repair, and re-grading of roads and permanent work areas. These effects, however,
11 would be reduced by AMMs and conservation actions as described below.
- 12 ● *Injury and Direct Mortality*: Operation of construction equipment may cause injury to or
13 mortality of tricolored blackbirds. Risk would be greatest to eggs and nestlings susceptible to
14 land clearing activities, nest abandonment, or increased exposure to the elements or to
15 predators. Injury to or mortality of adults and fledged juveniles would not be expected as
16 individuals would be expected to avoid contact with construction equipment. Construction
17 activities could temporarily fragment existing tricolored blackbird habitat during grading, filling,
18 contouring, and other initial ground-disturbing operations that could temporarily reduce the
19 extent and functions supported by the affected habitat. To the maximum extent practicable,
20 construction activity will be avoided up to 1,300 feet, but not less than a minimum of 250 feet,
21 from an active tricolored blackbird nesting colony. If monitoring determines an activity is
22 adversely affecting a nesting colony, construction will be modified, as practicable, by either
23 delaying construction until the colony site is abandoned or until the end of the breeding season,
24 whichever occurs first, by temporarily relocating staging areas, or temporarily rerouting access
25 to the construction site. Construction and restoration projects would also be designed, in
26 consultation with CDFW, to avoid construction activity within at least 300 feet from occupied
27 active tricolored blackbird roosting habitat. These measures to avoid injury or mortality of
28 nesting and roosting tricolored blackbirds are described in *AMM21 Tricolored Blackbird* (see
29 Appendix 3B, *Environmental Commitments, AMMs, and CMs*).

30 The following paragraphs summarize the combined effects discussed above and describe other
31 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
32 included.

33 ***Near-Term Timeframe***

34 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
35 the near-term BDCP conservation strategy has been evaluated to determine whether it would
36 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
37 effects of construction would not be adverse under NEPA. The Plan would remove 5,281 acres of
38 breeding habitat (98 acres of nesting, 3,943 acres of cultivated lands, and 1,240 acres of
39 noncultivated lands suitable for foraging) and 14,283 acres of nonbreeding habitat (621 acres of
40 roosting, 12,826 acres of cultivated lands, and 836 acres of noncultivated lands suitable for foraging)
41 for tricolored blackbird in the study area in the near-term. These effects would result from the
42 construction of the water conveyance facilities (CM1, 2,593 acres of breeding, 9,453 acres of
43 nonbreeding), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
44 *Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*

1 *Restoration, and CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres
2 of nonbreeding).

3 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and
4 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of
5 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1
6 protection for the loss of cultivated lands.

7 Using these ratios would indicate that the compensation for loss or conversion of tricolored
8 blackbird habitat from CM1 would require 10 acres of restoration and 10 acres of protection of
9 nesting habitat, 51 acres of restoration and 51 acres of protection of roosting habitat, 1,436 acres of
10 protection of noncultivated lands that provide foraging habitat, 2,202 acres of protection of
11 cultivated lands suitable for foraging during the breeding season, and 9,025 acres of cultivated lands
12 that provide foraging habitat during the nonbreeding season. The near-term effects of other
13 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting
14 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that
15 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the
16 nonbreeding season. Compensation for these losses from other conservation measures would
17 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of
18 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of
19 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands
20 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide
21 foraging habitat during the nonbreeding season using the same typical NEPA and CEQA ratios.

22 Total compensation for near-term loss or conversion of tricolored blackbird required using the
23 typical ratios above would be 98 acres of restoration and 98 acres of protection for nesting habitat,
24 621 acres of restoration and 621 acres of protection for roosting habitat, 4,152 acres of protection of
25 noncultivated foraging habitat, 3,943 acres of protection for cultivated lands that provide foraging
26 habitat during the breeding season, and 12,826 acres of cultivated lands that provide foraging
27 habitat during the nonbreeding season.

28 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750
29 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres
30 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool
31 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of
32 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,
33 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater
34 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3).
35 These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and would occur in
36 the same timeframe as the construction and early restoration losses. Some proportion of these
37 natural communities provide suitable habitat for tricolored blackbird as described below.

38 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding
39 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent
40 wetland, in close association with highly productive foraging areas that support abundant insect
41 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some
42 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs
43 1, 2, 8, or 11 (see Table 12-1B-38 for foraging habitat values) and would be actively managed to
44 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical

1 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*
2 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the
3 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,
4 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored
5 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of
6 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section
7 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands
8 restored in the near-term, approximately 64 acres of valley foothill riparian and 198 acres of
9 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

10 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal
11 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,
12 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial*
13 *Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the
14 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140
15 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley
16 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated
17 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of
18 valley/foothill riparian, 720 acres managed wetland).

19 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
20 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
21 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a
22 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The
23 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would
24 provide improved foraging opportunities for tricolored blackbirds during both the breeding and
25 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high
26 reproductive success in tricolored blackbirds. These natural communities are known to support
27 large insect populations, a vital food resource for successful rearing and fledging of young. Those
28 conservation lands that lie within a few miles of active nesting colonies would provide high-value
29 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*
30 *Enhancement and Management*, insect prey populations would be increased on protected lands,
31 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,
32 and GNC2.4).

33 Cultivated lands that provide habitat for covered and other native wildlife species would provide
34 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term
35 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total
36 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-
37 term. Assuming that lands would be protected proportional to the conservation objectives for
38 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat
39 consisting of cultivated lands would be protected in the near-term. These lands would be protected
40 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,
41 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late
42 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in
43 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very
44 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of
45 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the
46 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential

1 habitats for species including tricolored blackbird would also be protected that occur within the
2 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,
3 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for
4 tricolored blackbird (Objective CLNC1.3).

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
6 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
7 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
8 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
9 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
10 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
11 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs,*
12 of the Final EIR/EIS.

13 The acres of protection and restoration contained in the near-term Plan goals, in addition to the
14 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to
15 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the
16 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands
17 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the
18 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for
19 by this acreage, and temporary impacts on grassland would be restored to preproject conditions
20 (including revegetation with native vegetation if within 1 year of completion of construction) under
21 *AMM2 Construction Best Management Practices and Monitoring.* With the enhancement of grasslands
22 described above, and the restoration of temporary habitat impacts, this difference between
23 impacted and conserved grassland acreages in the near-term time period would not result in an
24 adverse effect on tricolored blackbird.

25 **Table 12-1B-38. Tricolored Blackbird Foraging Habitat Value Classes**

Foraging Habitat Value Class	Agricultural Crop Type/Habitats	
	Breeding Season ^a Foraging Habitat	Nonbreeding Season Foraging Habitat
Very high	Native pasture, nonirrigated native pasture, annual grasslands, vernal pool grasslands, alkali grasslands, unsprayed alfalfa, unsprayed sunflower, unsprayed mixed alfalfa	Livestock feed lots
High	Sunflower, alfalfa and mixed alfalfa, mixed pasture, induced high water table native pasture, nonirrigated mixed pasture, dairies,	Corn, sunflower, alfalfa and mixed alfalfa, mixed pasture, native pasture, nonirrigated native pasture, rice, dairies, annual grasslands, vernal pool grasslands, alkali grasslands
Moderate	Miscellaneous grasses, fallow lands cropped within 3 years, new lands prepped for crop production, livestock feed lots, organic rice	Miscellaneous grass pasture, nonirrigated mixed pasture, fallow lands cropped within 3 years, new lands prepped for crop production
Low	Mixed grain and hay crops, farmsteads, non-irrigated mixed grain and hay, rice	Wheat, oats, mixed grain and hay, farmsteads, unirrigated mixed grain and hay, and non-irrigated misc. grain and hay

^a Generally March through August; occasional breeding in fall (September through November).

26

1 **Late Long-Term Timeframe**

2 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093
3 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for
4 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled
5 breeding habitat available, the study area does not currently support many nesting tricolored
6 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo
7 Bypass, and along the southwestern perimeter of the study area (BDCP Chapter 5, *Effects Analysis*).
8 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 14,801
9 acres of breeding habitat and 36,815 acres of nonbreeding habitat for tricolored blackbird during
10 the term of the Plan (9% of the total breeding habitat in the study area and 14% of the total
11 nonbreeding habitat in the study area). The locations of these losses are described above in the
12 analyses of individual conservation measures.

13 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
14 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
15 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*
16 *Restoration*, to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
17 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
18 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
19 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that
20 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3). In addition,

21 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or
22 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored
23 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11
24 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-
25 1B-38. To ensure that natural community conservation benefits tricolored blackbird, the Plan
26 further specifies that cultivated lands protected for tricolored blackbird retain residual wetland,
27 grassland patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting,
28 foraging or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of
29 moderate-, high-, or very high-value cultivated lands would be conserved and managed as
30 nonbreeding foraging habitat, 50% of which would be of high- or very high-value (Objective
31 TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very high breeding foraging
32 habitat would be conserved within 5 miles of occupied or recently occupied (within the last 15
33 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of
34 the loss of breeding and nonbreeding habitat would be to cultivated lands that are abundant
35 throughout the study area, so the loss is not expected to adversely affect the population in the study
36 area.

37 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
38 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
39 the protection of an estimated 46,566 acres of tricolored blackbird habitat (16,476 acres breeding
40 habitat and 31,090 acres nonbreeding habitat) and restoration of 31,001 acres of tricolored
41 blackbird habitat (2,190 acres breeding habitat and 28,811 acres nonbreeding habitat).

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
45 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of

1 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
2 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
3 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
4 of the Final EIR/EIS.

5 **NEPA Effects:** The losses of tricolored blackbird habitat and potential for direct mortality of this
6 special-status species under Alternative 1B would represent an adverse effect in the absence of
7 other conservation actions. However, with habitat protection and restoration associated with CM3,
8 CM4, CM5, CM7, CM8, and CM11, guided by species-specific goals and objectives and by AMM1–
9 AMM7, and *AMM21 Tricolored Blackbird*, which would be in place throughout the construction
10 period, the effects of habitat loss or potential for mortality on tricolored blackbird would not be
11 adverse under Alternative 1B.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
15 the near-term BDCP conservation strategy has been evaluated to determine whether it would
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
17 effects of construction would be less than significant under CEQA. The Plan would remove 5,281
18 acres of breeding habitat (98 acres of nesting, 3,943 acres of cultivated lands, and 1,240 acres of
19 noncultivated lands suitable for foraging) and 14,283 acres of nonbreeding habitat (621 acres of
20 roosting, 12,826 acres of cultivated lands, and 836 acres of noncultivated lands suitable for foraging)
21 for tricolored blackbird in the study area in the near-term. These effects would result from the
22 construction of the water conveyance facilities (CM1, 2,593 acres of breeding, 9,453 acres of
23 nonbreeding), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
24 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
25 *Restoration*, and *CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres
26 of nonbreeding).

27 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and
28 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of
29 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1
30 protection for the loss of cultivated lands.

31 Using these ratios would indicate that the compensation for loss or conversion of tricolored
32 blackbird habitat from CM1 would require 10 acres of restoration and 10 acres of protection of
33 nesting habitat, 51 acres of restoration and 51 acres of protection of roosting habitat, 1,436 acres of
34 protection of noncultivated lands that provide foraging habitat, 2,202 acres of protection of
35 cultivated lands suitable for foraging during the breeding season, and 9,025 acres of cultivated lands
36 that provide foraging habitat during the nonbreeding season. The near-term effects of other
37 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting
38 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that
39 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the
40 nonbreeding season. Compensation for these losses from other conservation measures would
41 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of
42 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of
43 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands

1 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide
2 foraging habitat during the nonbreeding season using the same typical NEPA and CEQA ratios.

3 Total compensation for near-term loss or conversion of tricolored blackbird required using the
4 typical ratios above would be 98 acres of restoration and 98 acres of protection for nesting habitat,
5 621 acres of restoration and 621 acres of protection for roosting habitat, 4,152 acres of protection of
6 noncultivated foraging habitat, 3,943 acres of protection for cultivated lands that provide foraging
7 habitat during the breeding season, and 12,826 acres of cultivated lands that provide foraging
8 habitat during the nonbreeding season.

9 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750
10 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres
11 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool
12 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of
13 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,
14 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater
15 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3).
16 These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and would occur in
17 the same timeframe as the construction and early restoration losses. Some proportion of these
18 natural communities provide suitable habitat for tricolored blackbird as described below.

19 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding
20 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent
21 wetland, in close association with highly productive foraging areas that support abundant insect
22 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some
23 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs
24 1, 2, 8, or 11 (see Table 12-1B-38 for foraging habitat values) and would be actively managed to
25 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical
26 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities
27 Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the
28 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,
29 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored
30 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of
31 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section
32 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands
33 restored in the near-term, approximately 64 acres of valley foothill riparian and 198 acres of
34 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

35 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal
36 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,
37 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial
38 Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the
39 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140
40 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley
41 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated
42 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of
43 valley/foothill riparian, 720 acres managed wetland).

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
2 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
3 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a
4 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The
5 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would
6 provide improved foraging opportunities for tricolored blackbirds during both the breeding and
7 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high
8 reproductive success in tricolored blackbirds. These natural communities are known to support
9 large insect populations, a vital food resource for successful rearing and fledging of young. Those
10 conservation lands that lie within a few miles of active nesting colonies would provide high-value
11 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*
12 *Enhancement and Management*, insect prey populations would be increased on protected lands,
13 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,
14 and GNC2.4).

15 Cultivated lands that provide habitat for covered and other native wildlife species would provide
16 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term
17 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total
18 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-
19 term. Assuming that lands would be protected proportional to the conservation objectives for
20 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat
21 consisting of cultivated lands would be protected in the near-term. These lands would be protected
22 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,
23 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late
24 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in
25 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very
26 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of
27 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the
28 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential
29 habitats for species including tricolored blackbird would also be protected that occur within the
30 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,
31 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for
32 tricolored blackbird (Objective CLNC1.3).

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
37 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
38 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
39 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
40 of the Final EIR/EIS.

41 The acres of protection and restoration contained in the near-term Plan goals, in addition to the
42 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to
43 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the
44 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands
45 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the
46 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for

1 by this acreage, and temporary impacts on grassland would be restored to preproject conditions
2 (including revegetation with native vegetation if within 1 year of completion of construction) under
3 *AMM2 Construction Best Management Practices and Monitoring*. With the enhancement of grasslands
4 described above, and the restoration of temporary habitat impacts, this difference between
5 impacted and conserved grassland acreages in the near-term time period would not result in a
6 significant impact on tricolored blackbird.

7 ***Late Long-Term Timeframe***

8 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093
9 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for
10 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled
11 breeding habitat available, the study area does not currently support many nesting tricolored
12 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo
13 Bypass, and along the southwestern perimeter of the study area (BDCP, Chapter 5, *Effects Analysis*).
14 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 14,801
15 acres of breeding habitat and 36,815 acres of nonbreeding habitat for tricolored blackbird during
16 the term of the Plan (9% of the total breeding habitat in the study area and 14% of the total
17 nonbreeding habitat in the study area). The locations of these losses are described above in the
18 analyses of individual conservation measures. The locations of these losses are described above in
19 the analyses of individual conservation measures.

20 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
21 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
22 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*
23 *Restoration*, to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
24 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
25 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
26 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that
27 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3). In addition,

28 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or
29 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored
30 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11
31 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-
32 1B-38. To ensure that natural community conservation benefits tricolored blackbird, the Plan
33 further specifies that cultivated lands protected for tricolored blackbird retain residual wetland,
34 grassland patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting,
35 foraging or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of
36 moderate-, high-, or very high-value cultivated lands would be conserved and managed as
37 nonbreeding foraging habitat, 50% of which would be of high- or very high-value (Objective
38 TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very high breeding foraging
39 habitat would be conserved within 5 miles of occupied or recently occupied (within the last 15
40 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of
41 the loss of breeding and nonbreeding habitat would be to cultivated lands that are abundant
42 throughout the study area, so the loss is not expected to adversely affect the population in the study
43 area.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
2 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
3 the protection of an estimated 46,566 acres of tricolored blackbird habitat (16,476 acres of breeding
4 habitat and 31,090 acres of nonbreeding habitat) and restoration of 31,001 acres of tricolored
5 blackbird habitat (2,190 acres of breeding habitat and 28,811 acres of nonbreeding habitat).

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
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10 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
11 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
12 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
13 of the Final EIR/EIS.

14 Considering these protection and restoration provisions, which would provide acreages of new or
15 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction
16 and restoration activities, and with implementation of AMM1–AMM7 and *AMM21 Tricolored*
17 *Blackbird*, the loss of habitat or direct mortality through the implementation of Alternative 1B as a
18 whole would not result in a substantial adverse effect through habitat modifications and would not
19 substantially reduce the number or restrict the range of the species. Therefore, the alternative
20 would have a less-than-significant impact on tricolored blackbird. There are three other factors
21 relevant to effects on tricolored blackbird.

- 22 ● Very little loss of nesting habitat would occur (up to 84 acres of permanent loss and 90 acres of
23 temporary loss).
- 24 ● Most of the loss of breeding and nonbreeding habitat would be to cultivated lands that are
25 abundant throughout the Plan Area, so the loss is not expected to adversely affect the population
26 in the Plan Area.
- 27 ● Most temporary impacts would be on cultivated lands and grasslands that could be restored
28 relatively quickly to suitable foraging habitat after completion of construction activities.

29 Considering these protection and restoration provisions, which would provide acreages of new or
30 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction
31 and restoration activities, and implementation of AMM1–AMM7, and *AMM21 Tricolored Blackbird*,
32 the loss of habitat or direct mortality through the implementation of Alternative 1B as a whole would
33 not result in a substantial adverse effect through habitat modifications and would not substantially
34 reduce the number or restrict the range of the species. Therefore, the alternative would have a less-
35 than-significant impact on tricolored blackbird.

36 **Impact BIO-88: Effects on Tricolored Blackbird Associated with Electrical Transmission** 37 **Facilities**

38 New transmission lines would increase the risk that tricolored blackbirds could be subject to power
39 line strikes, which could result in injury or mortality of individuals. Tricolored blackbirds would
40 have the potential to intersect the proposed transmission lines largely due to winter movements
41 throughout the study area, when individuals are migrating in large flocks and dense fog is common
42 in the area). Although migratory movements and daily flights between roosting and foraging habitat
43 make may increase the risk of strike hazard, daily flights associated with winter foraging likely occur

1 in smaller flocks at heights that are lower than the transmission lines (BDCP Appendix 5.J,
2 Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Marking
3 transmission lines with flight diverters that make the lines more visible to birds has been shown to
4 reduce the incidence of bird mortality (Brown and Drewien 1995). For example, Yee (2008)
5 estimated that marking devices in the Central Valley could reduce avian mortality by 60%. As
6 described in *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted with
7 flight diverters, which would further reduce any potential for tricolored blackbird collision with
8 transmission lines.

9 Transmission line poles and towers provide perching substrate for raptors, which are predators on
10 tricolored blackbird. Although there is potential for transmission lines to result in increased
11 perching opportunities for raptors and result in increased predation pressure on tricolored
12 blackbirds, the existing network of transmission lines in the Plan Area currently poses these risks,
13 and any incremental risk associated with the new power line corridors would not be expected to
14 affect the study area population. Therefore, it is assumed that the increase in predation risk on
15 tricolored blackbird from an increase in raptor perching opportunities would be minimal.

16 **NEPA Effects:** New transmission lines would increase the risk for tricolored blackbird powerline
17 strikes, primarily during daily flights between roosting and foraging sites and during winter during
18 migration movements. *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike
19 diverters on all new powerlines, which would reduce the potential impact of the construction of new
20 transmission lines on tricolored blackbird. The increase in predation risk on tricolored blackbird
21 from an increase in raptor perching opportunities would be minimal. Therefore, the construction
22 and operation of new transmission lines under Alternative 1B would not result in an adverse effect
23 on tricolored blackbird.

24 **CEQA Conclusion:** New transmission lines would increase the risk for tricolored blackbird
25 powerline strikes, primarily during daily flights between roosting and foraging sites and during
26 winter during migration movements. *AMM20 Greater Sandhill Crane* contains the commitment to
27 place bird strike diverters on all new powerlines, which would reduce the potential impact of the
28 construction of new transmission lines on tricolored blackbird. The increase in predation risk on
29 tricolored blackbird from an increase in raptor perching opportunities would be minimal. The
30 construction and operation of new transmission lines under Alternative 1B would not substantially
31 reduce the number or restrict the range of the species and would therefore result in a less-than-
32 significant impact on tricolored blackbird.

33 **Impact BIO-89: Indirect Effects of Plan Implementation on Tricolored Blackbird**

34 **Indirect Construction- and Operation-Related Effects:** Tricolored blackbird nesting habitat
35 within the vicinity of proposed construction areas that could be indirectly affected by construction
36 activities. Construction noise above background noise levels (greater than 50 dBA) could extend
37 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D,
38 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),
39 although there are no available data to determine the extent to which these noise levels could affect
40 tricolored blackbird. Indirect effects associated with construction include noise, dust, and visual
41 disturbance caused by grading, filling, contouring, and other ground-disturbing operations outside
42 the project footprint but within 1,300 feet from the construction edge. Construction and subsequent
43 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting
44 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM21 Tricolored*

1 *Blackbird* would require preconstruction surveys, and if detected, covered activities would be
2 avoided within a minimum 250 feet of an active nesting colony and up to 1,300 feet where
3 practicable until breeding has ceased. Construction and restoration projects would also be designed,
4 in consultation with CDFW, to avoid construction activity within at least 300 feet from occupied
5 active tricolored blackbird roosting habitat. In addition, monitoring would be implemented to
6 ensure that construction does not adversely affect the nesting or roosting colony. The use of
7 mechanical equipment during water conveyance facilities construction could cause the accidental
8 release of petroleum or other contaminants that could affect tricolored blackbird in the surrounding
9 habitat. The inadvertent discharge of sediment or excessive dust adjacent to tricolored blackbird
10 habitat could also affect the species. AMM1–AMM7, including *AMM2 Construction Best Management
11 Practices and Monitoring*, would minimize the likelihood of such spills and ensure that measures are
12 in place to prevent runoff from the construction area and negative effects of dust on active nests.

13 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
14 mercury in avian species, including tricolored blackbird. Marsh (tidal and nontidal) and floodplain
15 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed
16 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to
17 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP
18 restoration activities that create newly inundated areas could increase bioavailability of mercury.

19 Breeding tricolored blackbirds are not thought to be highly susceptible to methylmercury exposure
20 because tidal wetlands are not expected to be a major foraging area for the species. Furthermore,
21 the Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
22 under the plan would generate less methylmercury than the existing managed wetlands, potentially
23 reducing the overall risk. However, species sensitivity to methylmercury differs widely and there is
24 a large amount of uncertainty with respect to species-specific effects and increased methylmercury
25 associated with natural community and floodplain restoration could indirectly affect tricolored
26 blackbird, via uptake in lower trophic levels (as described in Appendix 5.D, *Contaminants*, of the
27 BDCP).

28 A detailed review of the methylmercury issues associated with implementation of the BDCP is
29 contained in Appendix 11F, *Substantive BDCP Revisions*. This review includes an overview of the
30 BDCP-related mechanisms that could result in increased mercury in the foodweb, and how exposure
31 of individual species to mercury may occur based on feeding habits and where species habitat
32 overlaps with the areas where mercury bioavailability could increase.

33 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
34 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP
35 Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
36 project-specific basis, where high potential for methylmercury production is identified that
37 restoration design and adaptive management cannot fully address while also meeting restoration
38 objectives, alternate restoration areas will be considered. CM12 would be implemented in
39 coordination with other similar efforts to address mercury in the Delta, and specifically with the
40 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
41 following actions.

- 42 • Assess pre-restoration conditions to determine the risk that the project could result in increased
43 mercury methylation and bioavailability

- 1 • Define design elements that minimize conditions conducive to generation of methylmercury in
2 restored areas.
- 3 • Define adaptive management strategies that can be implemented to monitor and minimize
4 actual postrestoration creation and mobilization of methylmercury.

5 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
6 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
7 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
8 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
9 2009). The effect of selenium toxicity differs widely between species and also between age and sex
10 classes within a species. In addition, the effect of selenium on a species can be confounded by
11 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
12 2009).

13 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
14 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
15 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
16 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
17 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
18 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
19 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
20 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
21 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
22 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
23 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
24 levels of selenium have a higher risk of selenium toxicity.

25 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
26 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
27 exacerbate bioaccumulation of selenium in avian species, including tricolored blackbird. Marsh
28 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
29 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
30 BDCP restoration activities that create newly inundated areas could increase bioavailability of
31 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
32 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
33 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
34 long-term increases in selenium concentrations in water in the Delta under any alternative.
35 However, it is difficult to determine whether the effects of potential increases in selenium
36 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to
37 adverse effects on tricolored blackbird.

38 Because of the uncertainty that exists at this programmatic level of review, there could be a
39 substantial effect on tricolored blackbird from increases in selenium associated with restoration
40 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
41 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
42 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
43 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
44 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
45 separately for each restoration effort as part of design and implementation. This avoidance and

1 minimization measure would be implemented as part of the tidal habitat restoration design
2 schedule.

3 **NEPA Effects:** The effects of noise, potential spills of hazardous material, increased dust and
4 sedimentation, and operations and maintenance of the water conveyance facilities would not be
5 adverse with the implementation of AMM1–AMM7 and *AMM21 Tricolored Blackbird*. Tidal habitat
6 restoration could result in increased exposure of tricolored blackbird to selenium. This effect would
7 be addressed through the implementation of *AMM27 Selenium Management* which would provide
8 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
9 selenium and its bioavailability in tidal habitats. The implementation of tidal natural communities
10 restoration or floodplain restoration could result in increased exposure of tricolored blackbird to
11 methylmercury. It is unlikely that breeding tricolored blackbird would be highly susceptible to
12 methylmercury exposure because tidal wetlands are not expected to be a major foraging area for the
13 species. However, it is unknown what concentrations of methylmercury are harmful to this species
14 and the potential for increased exposure varies substantially within the study area. Implementation
15 of CM12 which contains measures to assess the amount of mercury before project development,
16 followed by appropriate design and adaptation management, would minimize the potential for
17 increased methylmercury exposure, and would result in no adverse effects.

18 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
19 sedimentation, and operations and maintenance of the water conveyance facilities would be less
20 than significant with the implementation of *AMM21 Tricolored Blackbird* and AMM1–AMM7. Tidal
21 habitat restoration could result in increased exposure of tricolored blackbird to selenium. This
22 impact would be addressed through the implementation of *AMM27 Selenium Management* which
23 would provide specific tidal habitat restoration design elements to reduce the potential for
24 bioaccumulation of selenium and its bioavailability in tidal habitats. The implementation of tidal
25 natural communities restoration or floodplain restoration could result in increased exposure of
26 tricolored blackbird to methylmercury. It is unlikely that breeding tricolored blackbird would be
27 highly susceptible to methylmercury exposure because tidal wetlands are not expected to be a major
28 foraging area for the species. However, it is unknown what concentrations of methylmercury are
29 harmful to this species. Implementation of CM12 which contains measures to assess the amount of
30 mercury before project development, followed by appropriate design and adaptation management,
31 would minimize the potential for increased methylmercury exposure, and would result in no
32 adverse effect on tricolored blackbird.

33 Therefore, with AMM1–AMM7, AMM21, AMM27, and CM12 in place, the indirect effects of
34 Alternative 1B implementation would not result in a substantial adverse effect through habitat
35 modification or potential mortality. Therefore, the indirect effects of Alternative 1B implementation
36 would have a less-than-significant impact on tricolored blackbird.

37 **Impact BIO-90: Periodic Effects of Inundation of Tricolored Blackbird Habitat as a Result of** 38 **Implementation of Conservation Components**

39 Flooding of the Yolo Bypass (CM2) would inundate 2,447–4,312 acres of breeding habitat and 263–
40 1,252 acres of nonbreeding habitat (Table 12-1B-37). Based on hypothetical floodplain restoration,
41 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in
42 periodic inundation of approximately 2,509 acres of breeding habitat (30 acres of nesting, 2,124
43 acres of cultivated lands, 355 acres of noncultivated lands suitable for foraging) and 2,694 acres of
44 nonbreeding habitat(29 acres of roosting, 2,506 acres of cultivated lands, 158 acres of noncultivated

1 lands suitable for foraging, Table 12-1B-37) resulting in the temporary loss of these habitats.
2 Tricolored blackbirds are highly nomadic during the winter and would be expected to move to
3 adjacent suitable foraging habitat when the bypass is inundated, as they do under the current
4 flooding regime. However, this inundation could reduce the availability of nesting habitat during
5 years when flooding extends into the nesting season (past March). The periodic inundation of the
6 Yolo Bypass (CM2) and of other floodplains (CM5) is expected to restore a more natural flood
7 regime in support of wetland and riparian vegetation types that support nesting habitat. There
8 would be no expected adverse effect on tricolored blackbird.

9 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and
10 foraging habitat for tricolored blackbird. Periodic inundation would not result in an adverse effect
11 on tricolored blackbird because inundation is expected to take place outside of the breeding season.
12 Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly
13 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

14 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting
15 and foraging habitat for tricolored blackbird. Periodic inundation would have a less-than-significant
16 impact on tricolored blackbird because inundation is expected to take place outside of the breeding
17 season. Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly
18 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

19 **Western Burrowing Owl**

20 This section describes the effects of Alternative 1B, including water conveyance facilities
21 construction and implementation of other conservation components, on western burrowing owl.
22 Western burrowing owl modeled habitat consisted of high- and low-value habitat for nesting and
23 foraging. High-value habitat consists of plant alliances within the grassland and vernal pool natural
24 communities and pasture. Low-value habitat includes plant alliances and crop types from managed
25 wetland, alkali seasonal wetland, and cultivated lands. Value was determined through reported
26 species use patterns from the literature.

27 Construction and restoration associated with Alternative 1B conservation measures would result in
28 both temporary and permanent losses of western burrowing owl modeled habitat as indicated in
29 Table 12-1B-39. Full implementation of Alternative 1B would also include the following
30 conservation actions over the term of the BDCP to benefit the western burrowing owl (BDCP
31 Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 32 ● Protect at least 1,000 acres of cultivated lands in CZs 1 and 11 that support high-value
33 burrowing owl habitat and are within 0.5 mile of high-value grassland habitat or occupied low-
34 value habitat (Objective WBO1.1, associated with CM3).
- 35 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
36 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
37 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 38 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 39 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
40 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 41 ● Restore or create alkali seasonal wetlands and vernal pool complex in CZs 1, 8, and/or 11 to
42 achieve no net loss of wetted acres (Objectives ASWNC1.2 and VPNC1.2, associated with CM9)

- 1 • Increase burrow availability and prey abundance and accessibility (Objectives ASWNC2.3,
2 ASWNC2.4, VPNC2.4, VPNC2.5, GNC2.3, and GNC2.4, associated with CM11)
- 3 • Protect at least 48,600 acres of cultivated lands that provide suitable habitat for covered and
4 other native wildlife species and maintain and protect the small patches of important wildlife
5 habitats associated with cultivated lands (Objectives CLNC1.1 and CLNC1.3, associated with
6 CM3)

7 As explained below, with the restoration or protection of these amounts of habitat, in addition to
8 management activities that would enhance habitat for the species and implementation of AMM1–
9 AMM7 and AMM23 *Western Burrowing Owl*, impacts on western burrowing owl would not be
10 adverse for NEPA purposes and would be less than significant for CEQA purposes.

11 **Table 12-1B-39. Changes in Western Burrowing Owl Modeled Habitat Associated with Alternative**
12 **1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	697	697	714	714	NA	NA
	Low-value	2,788	2,788	6,315	6,315	NA	NA
Total Impacts CM1		3,485	3,485	7,029	7,029	NA	NA
CM2–CM18	High-value	4,487	11,570	245	328	1,390–3,303	779
	Low-value	3,527	28,506	144	971	1,522–2,927	6,162
Total Impacts CM2–CM18		8,014	40,076	389	1,299	2,912–6,230	6,941
Total High-value		5,184	12,267	959	1,042	1,390–3,303	779
Total Low-value		6,315	31,294	6,459	7,286	1,522–2,927	6,162
TOTAL IMPACTS		11,499	43,561	7,418	8,328	2,912–6,230	6,941

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-91: Loss or Conversion of Habitat for and Direct Mortality of Western Burrowing**
2 **Owl**

3 Alternative 1B conservation measures would result in the combined permanent and temporary loss
4 of up to 51,881 acres of modeled habitat for western burrowing owl (of which 13,309 acres is of
5 high value and 38,580 acres is of low value, Table 12-1B-39). Conservation measures that would
6 result in these losses are conveyance facilities and transmission line construction, and establishment
7 and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat
8 restoration (CM4), floodplain restoration (CM5), channel margin enhancement (CM6), grassland
9 restoration (CM8), marsh restoration (CM10), and conservation hatcheries (CM18). The majority of
10 habitat loss would result from CM4. Habitat enhancement and management activities (CM11), which
11 would include ground disturbance or removal of nonnative vegetation, could result in local adverse
12 habitat effects. In addition, maintenance activities associated with the long-term operation of the
13 water conveyance facilities and other BDCP physical facilities could degrade or eliminate western
14 burrowing owl habitat. Each of these individual activities is described below. A summary statement
15 of the combined impacts, NEPA effects and a CEQA conclusion follow the individual conservation
16 measure discussions.

- 17 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would
18 result in the combined permanent and temporary loss of up to 1,411 acres of modeled
19 high-value western burrowing owl habitat (697 acres of permanent loss, 714 acres of temporary
20 loss) from CZs 3–6 and CZ 8. In addition, 9,103 acres of low-value burrowing owl habitat would
21 be removed (2,788 acres of permanent loss, 6,315 acres of temporary loss) from CZs 3–6 and CZ
22 8. Losses of high and low-value habitat would occur primarily from the construction of intakes
23 1-5, the construction of the canal and associated borrow and spoil areas, and the construction of
24 the new forebay in CZ 8. The footprint for CM1 does not overlap with any occurrences of
25 western burrowing owl. However, there is a high concentration of CNDDDB and DHCCP survey
26 records for western burrowing owls in CZ 8 to the west and the south of the Clifton Court
27 Forebay. The loss of high-value habitat from facility construction and the establishment of the
28 forebay borrow and spoils area could remove occupied habitat, displace nesting and wintering
29 owls, and fragment occupied burrowing owl habitat. The implementation of *AMM23 Western*
30 *Burrowing Owl* would minimize potential effects on western burrowing owl if they were present
31 in the construction area. Refer to the Terrestrial Biology Map Book for a detailed view of
32 Alternative 1B construction locations. Impacts from CM1 would occur within the first 10 years
33 of Alternative 1B implementation.
- 34 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
35 would result in the combined permanent and temporary loss of up to 1,127 acres of high-value
36 western burrowing owl habitat (882 acres of permanent loss, 245 acres of temporary loss) in
37 the Yolo Bypass in CZ 2. In addition, 242 acres of low-value habitat would be removed (98 acres
38 of permanent loss, 144 acres of temporary loss). The loss is expected to occur during the first 10
39 years of Alternative 1B implementation.
- 40 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and
41 inundation would permanently remove an estimated 29,668 acres of modeled western
42 burrowing owl habitat in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. The majority of removed or converted
43 acres (19,739 acres) is composed of low-value habitat. However, 9,929 acres of high-value
44 habitat would also be lost from tidal restoration actions. Tidal restoration would directly impact
45 and fragment remaining high-value grassland habitat just north of Rio Vista in and around
46 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Tidal

1 natural community restoration efforts would impact one extant record of burrowing owl just
2 northeast of Oakley along Dutch Slough and one possibly extirpated record in Suisun Marsh.

- 3 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
4 seasonally inundated floodplain would permanently and temporarily remove approximately
5 2,504 acres of modeled western burrowing owl in CZs 2, 4, and 7. This total is comprised of
6 2,279 acres of low-value habitat. Also, 225 acres of high-value grassland habitat would be
7 removed (142 permanent, 83 temporary) consisting of small patches of habitat along the San
8 Joaquin, Old, and Middle Rivers in CZ 7.
- 9 ● *CM6 Channel Margin Enhancement*: Sites for channel margin enhancement would be located
10 along levees where western burrowing owl could be present. The species is known to use often
11 the grassland edges along canals and levees in agricultural areas. The implementation of *AMM23*
12 *Western Burrowing Owl* would reduce the potential for channel margin enhancement activities
13 to disturb owls or affect active nests.
- 14 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
15 approximately 11 acres of high-value burrowing owl habitat as part of tidal restoration. In
16 addition, 960 acres of low-value habitat would be removed as a part of tidal restoration and
17 3,991 acres would be removed as part of seasonal floodplain restoration through CM7.
- 18 ● *CM8 Grassland Natural Community Restoration*: Grassland restoration would primarily be
19 implemented on agricultural lands and would result in the permanent loss of 1,676 acres (362
20 acres of high-value and 1,314 acres of low-value) of western burrowing owl habitat. The
21 conversion of 1,676 acres of low-value habitat to high-value grassland, would temporarily
22 remove available habitat but would ultimately have a beneficial effect on the western burrowing
23 owl.
- 24 ● *CM10 Nontidal Marsh Restoration*: Implementation would result in the permanent removal of
25 159 acres of high-value and 952 acres of low-value western burrowing owl habitat.
- 26 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
27 actions that are designed to enhance wildlife values in restored or protected habitats could
28 result in localized ground disturbances that could temporarily remove small amounts of
29 western burrowing owl habitat. The burrowing owl's fossorial habits make the species more
30 sensitive to the effects of ground disturbance than other raptors. Ground-disturbing activities,
31 such as removal of nonnative vegetation and road and other infrastructure maintenance
32 activities, would be expected to have minor adverse effects on available western burrowing owl
33 habitat and would be expected to result in overall improvements to and maintenance of habitat
34 values over the term of the BDCP. CM11 would also include the construction of recreational-
35 related facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered*
36 *Activities and Associated Federal Actions*). The construction of trailhead facilities, signs, staging
37 areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when and
38 where possible. However, approximately 50 acres of grassland habitat would be lost from the
39 construction of trails and facilities.

40 Habitat management- and enhancement-related activities and equipment operation could
41 destroy nests burrows, and noise and visual disturbances could lead to their abandonment,
42 resulting in mortality of eggs and nestlings. The potential for these activities to result in nest
43 failure and mortality or other adverse effects on western burrowing owl would be avoided or
44 minimized with the incorporation of *AMM23 Western Burrowing Owl* into the BDCP which would

1 require surveys to determine presence or absence and the establishment of no-disturbance
2 buffers around active sites.

- 3 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
4 value western burrowing owl habitat for the development of a delta and longfin smelt
5 conservation hatchery in CZ 1.
- 6 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
7 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
8 disturbances that could affect western burrowing owl use of the surrounding habitat.
9 Maintenance activities would include vegetation management, levee and structure repair, and
10 re-grading of roads and permanent work areas. These effects, however, would be reduced by
11 AMMs and conservation actions as described below.
- 12 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
13 western burrowing owl. However, if nest burrows were occupied in the vicinity of construction
14 activities, equipment operation could destroy nests and noise and visual disturbances could lead
15 to abandonment. *AMM23 Western Burrowing Owl* would ensure that preconstruction surveys
16 detected any occupied burrows and no-disturbance buffers would be implemented.

17 The following paragraphs summarize the combined effects discussed above and describe other
18 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
19 included.

20 ***Near-Term Timeframe***

21 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
22 the near-term BDCP conservation strategy has been evaluated to determine whether it would
23 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
24 effects of construction would not be adverse under NEPA. The Plan would remove 6,143 acres
25 (5,184 acres permanent, 959 acres temporary) of high-value habitat for western burrowing owl in
26 the study area in the near-term. These effects would result from the construction of the water
27 conveyance facilities (CM1, 1,411 acres), and implementing other conservation measures (*CM2 Yolo*
28 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*
29 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*
30 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*
31 *and CM18 Conservation Hatcheries—4,732 acres*). In addition, 12,774 acres of low-value habitat
32 would be removed or converted in the near-term (CM1, 9,103 acres; *CM2 Yolo Bypass Fisheries*
33 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community*
34 *Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*
35 *Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18*
36 *Conservation Hatcheries—3,671 acres*).

37 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
38 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the
39 loss of low-value habitat would result from conversion and enhancement to high-value habitats.
40 Using these typical ratios would indicate that 2,822 acres should be protected to compensate for the
41 loss of high-value habitat from CM1 and that 9,103 acres should be protected to compensate for the
42 loss of low-value habitat from CM1. The near-term effects of other conservation actions would
43 require 9,464 acres of protection to compensate for the loss of high-value habitat and 3,671 acres of
44 protection to compensate for the loss of low-value habitat using the same typical NEPA and CEQA

1 ratios (2:1 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value
2 habitat).

3 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
4 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
5 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
6 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
7 in the same timeframe as the construction and early restoration losses.

8 The protection of high-value grasslands is essential in order to sustain existing western burrowing
9 owl populations in the plan area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
10 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
11 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
12 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
13 pool natural communities which would provide habitat for western burrowing owl and reduce the
14 effects of current levels of habitat fragmentation. This protection would not only expand the amount
15 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl
16 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
17 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
18 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
19 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
20 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*
21 *Communities Enhancement and Management*, small mammal and insect prey populations would be
22 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
23 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected
24 natural communities by encouraging ground squirrel occupancy and expansion through the creation
25 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
26 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance
27 standards for considering the effectiveness of conservation actions.

28 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
29 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
30 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
31 CM1 and other near-term effects on western burrowing owl high-value habitat with the
32 consideration that some portion of the 15,400 acres of cultivated lands protected in the near-term
33 timeframe would be managed in suitable crop types to compensate for the loss of high-value
34 burrowing owl habitat at a ratio of 2:1. Mitigation Measure BIO-91, *Compensate for Near-Term Loss*
35 *of High-Value Western Burrowing Owl Habitat*, would be available to address the adverse effect of
36 high-value habitat loss in the near-term.

37 The compensation for the loss of low-value burrowing owl habitat from the other near-term impacts
38 would be 6,000 acres less than the typical ratio of 1:1 protection. However, 6,459 acres of all near-
39 term impacts on low-value habitat would be temporary and would be restored within 1 year of the
40 completion of construction. In addition, a proportion of the loss of low-value habitat would be a
41 result of the conversion to high-value habitat and the near-term conservation acres would be
42 sufficient to compensate for the permanent impacts on low-value habitat for the species. The
43 management and enhancement of cultivated lands and protected grasslands including prey
44 enhancement, increasing burrow availability, and reducing existing fragmentation of high-value

1 habitat, would further compensate for any potential effect from the near-term loss of low-value
2 foraging habitat on western-burrowing owl.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
7 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
8 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
9 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
10 of the Final EIR/EIS.

11 **Late Long-Term Timeframe**

12 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and
13 254,352 acres of low-value habitat for western burrowing owl. Alternative 1B as a whole would
14 result in the permanent loss of and temporary effects on 13,309 acres of high-value habitat and
15 38,580 acres of low value habitat over the term of the Plan. The locations of these losses are
16 described above in the analyses of individual conservation measures.

17 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
18 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
19 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural
20 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
21 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
22 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
23 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
24 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
25 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
26 pool natural communities which would provide habitat for western burrowing owl and reduce the
27 effects of current levels of habitat fragmentation. This protection would not only expand the amount
28 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl
29 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
30 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
31 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
32 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
33 cultivated lands can support breeding and wintering burrowing owls. To ensure that cultivated
34 lands conservation benefits western burrowing owl, the Plan's biological goals and objectives
35 further specify that, of the cultivated lands protected in the late long-term, at least 1,000 acres
36 would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are within
37 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1). Under
38 *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey
39 populations would be increased on protected lands, enhancing the foraging value of these natural
40 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would
41 be increased on protected natural communities by encouraging ground squirrel occupancy and
42 expansion through the creation of berms, mounds, edges, and through the prohibition of ground
43 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
2 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
3 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-
4 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl
5 habitat (1,642 acres high-value and 3 acres low-value habitat).

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
10 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
11 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
12 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
13 of the Final EIR/EIS.

14 **NEPA Effects:** The loss of western burrowing owl habitat and potential for mortality of this special-
15 status species under Alternative 1B would represent an adverse effect in the absence of other
16 conservation actions. However, with habitat protection and restoration associated with CM3, CM8,
17 and CM11, guided by biological goals and objectives and by AMM1–AMM7, *AMM23 Western*
18 *Burrowing Owl*, and with implementation of Mitigation Measure BIO-91, *Compensate for Near-Term*
19 *Loss of High-Value Western Burrowing Owl Habitat*, which would be available to guide the near-term
20 protection and management of cultivated lands, the effects of habitat loss and potential mortality on
21 western burrowing owl would not be adverse under Alternative 1B.

22 **CEQA Conclusion:**

23 **Near-Term Timeframe**

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
27 effects of construction would be less than significant under CEQA. The Plan would remove 6,143
28 acres (5,184 acres permanent, 959 acres temporary) of high-value habitat for western burrowing
29 owl in the study area in the near-term. These effects would result from the construction of the water
30 conveyance facilities (CM1, 1,411 acres), and implementing other conservation measures (*CM2 Yolo*
31 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*
32 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*
33 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*
34 and *CM18 Conservation Hatcheries*—4,732 acres). In addition, 12,774 acres of low-value habitat
35 would be removed or converted in the near-term (CM1, 9,103 acres; *CM2 Yolo Bypass Fisheries*
36 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community*
37 *Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*
38 *Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18*
39 *Conservation Hatcheries*—3,671 acres).

40 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
41 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the
42 loss of low-value habitat would result from conversion and enhancement to high-value habitats.
43 Using these typical ratios would indicate that 2,822 acres should be protected to compensate for the
44 loss of high-value habitat from CM1 and that 9,103 acres should be protected to compensate for the

1 loss of low-value habitat from CM1. The near-term effects of other conservation actions would
2 require 9,464 acres of protection to compensate for the loss of high-value habitat and 3,671 acres of
3 protection to compensate for the loss of low-value habitat using the same typical NEPA and CEQA
4 ratios (2:1 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value
5 habitat).

6 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
7 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
8 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
9 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
10 in the same timeframe as the construction and early restoration losses.

11 The protection of high-value grasslands is essential in order to sustain existing western burrowing
12 owl populations in the plan area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
13 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
14 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
15 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
16 pool natural communities which would provide habitat for western burrowing owl and reduce the
17 effects of current levels of habitat fragmentation. This protection would not only expand the amount
18 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl
19 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
20 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
21 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
22 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
23 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*
24 *Communities Enhancement and Management*, small mammal and insect prey populations would be
25 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
26 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected
27 natural communities by encouraging ground squirrel occupancy and expansion through the creation
28 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
29 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance
30 standards for considering the effectiveness of conservation actions.

31 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
32 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
33 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
34 CM1 and other near-term effects on western burrowing owl high-value habitat with the
35 consideration that some portion of the 15,400 acres of cultivated lands protected in the near-term
36 timeframe would be managed in suitable crop types to compensate for the loss of high-value
37 burrowing owl habitat at a ratio of 2:1. Implementation of Mitigation Measure BIO-91, *Compensate*
38 *for Near-Term Loss of High-Value Western Burrowing Owl Habitat*, would reduce the impact of high-
39 value habitat loss in the near-term.

40 The compensation for the loss of low-value burrowing owl habitat from the other near-term impacts
41 would be 6,000 acres less than the typical ratio of 1:1 protection. However, 6,459 acres of all near-
42 term impacts on low-value habitat would be temporary and would be restored within 1 year of the
43 completion of construction. In addition, a proportion of the loss of low-value habitat would be a
44 result of the conversion to high-value habitat and the near-term conservation acres would be
45 sufficient to compensate for the permanent impacts on low-value habitat for the species. The

1 management and enhancement of cultivated lands and protected grasslands including prey
2 enhancement, increasing burrow availability, and reducing existing fragmentation of high-value
3 habitat, would further compensate for any potential effect from the near-term loss of low-value
4 foraging habitat on western-burrowing owl.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
6 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
7 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
8 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
9 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
10 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
11 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
12 of the Final EIR/EIS.

13 ***Late Long-Term Timeframe***

14 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and
15 254,352 acres of low-value habitat for western burrowing owl. Alternative 1B as a whole would
16 result in the permanent loss of and temporary effects on 13,309 acres of high-value habitat and
17 38,580 acres of low value habitat over the term of the Plan. The locations of these losses are
18 described above in the analyses of individual conservation measures.

19 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
20 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
21 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural
22 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
23 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
24 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
25 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
26 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
27 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
28 pool natural communities which would provide habitat for western burrowing owl and reduce the
29 effects of current levels of habitat fragmentation. This protection would not only expand the amount
30 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl
31 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
32 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
33 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
34 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
35 cultivated lands can support breeding and wintering burrowing owls. To ensure that cultivated
36 lands conservation benefits western burrowing owl, the Plan's biological goals and objectives
37 further specify that, of the cultivated lands protected in the late long-term, at least 1,000 acres
38 would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are within
39 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1). Under
40 *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey
41 populations would be increased on protected lands, enhancing the foraging value of these natural
42 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would
43 be increased on protected natural communities by encouraging ground squirrel occupancy and
44 expansion through the creation of berms, mounds, edges, and through the prohibition of ground
45 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
2 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
3 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-
4 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl
5 habitat (1,642 acres high-value and 3 acres low-value habitat).

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
10 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
11 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
12 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
13 of the Final EIR/EIS.

14 Considering Alternative 1B's protection and restoration provisions, which would provide acreages
15 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
16 construction and restoration activities, and with implementation of AMM1-AMM7, *AMM23 Western*
17 *Burrowing Owl*, and Mitigation Measure BIO-91, *Compensate for Near-Term Loss of High-Value*
18 *Western Burrowing Owl Habitat*, which would be available to guide the near-term protection and
19 management of cultivated lands, the loss of habitat or direct mortality through implementation of
20 Alternative 1B would not result in a substantial adverse effect through habitat modifications and
21 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of
22 habitat or potential mortality under this alternative would have a less-than-significant impact on
23 western burrowing owl.

24 **Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western** 25 **Burrowing Owl Habitat**

26 Because the BDCP lacks acreage commitment for specific crop types that would be managed
27 within the 15,400 acres of cultivated lands protected in the near-term time period, DWR will
28 compensate for the loss of high-value burrowing owl habitat with high-value natural
29 communities or cultivated crop types a ratio of 2:1 in the near-term time period.

30 **Impact BIO-92: Effects on Western Burrowing Owl Associated with Electrical Transmission** 31 **Facilities**

32 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,
33 which could result in injury or mortality of western burrowing owl. The species is large-bodied but
34 with relatively long and rounded wings, making it moderately maneuverable. While burrowing owls
35 may nest in loose colonies, they do not flock or congregate in roosts or foraging groups. Collectively,
36 the species' keen eyesight and largely ground-based hunting behavior make it a relatively low-risk
37 species for powerline collision. While the species is not widespread in the study area, it may become
38 more widely distributed as grassland enhancement improves habitat for the species. Even so, the
39 risk of effects on the population are low, given the species' physical and behavioral characteristics
40 (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP*
41 *Transmission Lines*). New transmission lines would not be expected to have an adverse effect on the
42 species. Marking transmission lines with flight diverters that make the lines more visible to birds
43 has been shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008)

1 estimated that marking devices in the Central Valley could reduce avian mortality by 60%. All new
2 project transmission lines would be fitted with flight diverters. Bird flight diverters would make
3 transmission lines highly visible to western burrowing owls and would further reduce any potential
4 for powerline collisions.

5 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
6 adverse effect on western burrowing owl because the risk of bird strike is considered to be minimal
7 based on the owl's physical and behavioral characteristics. All new transmission lines constructed as
8 a result of the project would be fitted with bird diverters (*AMM20 Greater Sandhill Crane*), which
9 have been shown to reduce avian mortality by 60% and which would further reduce any potential
10 for powerline collisions.

11 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
12 significant impact on western burrowing owl because the risk of bird strike is considered to be
13 minimal based on the owl's physical and behavioral characteristics. All new transmission lines
14 constructed as a result of the project would be fitted with bird diverters (*AMM20 Greater Sandhill
15 Crane*), which have been shown to reduce avian mortality by 60% and which would further reduce
16 any potential for powerline collisions.

17 **Impact BIO-93: Indirect Effects of Plan Implementation on Western Burrowing Owl**

18 Noise and visual disturbances associated with construction-related activities could result in
19 temporary disturbances that affect western burrowing owl use of modeled habitat adjacent to
20 proposed construction areas. Indirect effects associated with construction include noise, dust, and
21 visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations.
22 Any disturbance within 250 feet of a burrow occupied by burrowing owl during the breeding season
23 (February 1–August 31) and within 160 feet during the nonbreeding season (September 1–January
24 31) could potential displace winter owls or cause abandonment of active nests. These potential
25 effects would be minimized with the implementation of *AMM23 Western Burrowing Owl* into the
26 BDCP, which would require preconstruction surveys and establish no-disturbance buffers around
27 active burrows. Construction noise above background noise levels (greater than 50 dBA) could
28 extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment
29 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),
30 although there are no available data to determine the extent to which these noise levels could affect
31 western burrowing owl.

32 The use of mechanical equipment during water conveyance facilities construction could cause the
33 accidental release of petroleum or other contaminants that could affect western burrowing owl in
34 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
35 western burrowing owl habitat could also affect the species. AMM1–AMM7 in addition to *AMM23
36 Western Burrowing Owl* would minimize the likelihood of such spills from occurring and ensure that
37 measures were in place to prevent runoff from the construction area and any adverse effects of dust
38 on active nests.

39 **NEPA Effects:** Indirect effects on western burrowing owl as a result of Alternative 1B
40 implementation could have adverse effects on this species through the modification of habitat and
41 potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential to
42 disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton Court
43 Forebay and adjacent to work area. With the implementation of AMM1–AMM7, and *AMM23 Western*

1 *Burrowing Owl*, the indirect effects from Alternative 1B implementation would not be adverse under
2 NEPA.

3 **CEQA Conclusion:** Indirect effects on western burrowing owl as a result of Alternative 1B
4 implementation could have significant impacts on these species through the modification of habitat
5 and potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential
6 to disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton
7 Court Forebay and adjacent to work areas. With the implementation of AMM1–AMM7 and AMM23
8 *Western Burrowing Owl*, the indirect effects resulting from Alternative 1B implementation would
9 have a less-than-significant impact on western burrowing owl.

10 **Impact BIO-94: Periodic Effects of Inundation on Western Burrowing Owl Habitat as a Result** 11 **of Implementation of Conservation Components**

12 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
13 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,195–
14 3,004 acres of high-value habitat and 1,522–2,927 acres of low-value habitat (Table 12-1B-39).

15 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
16 *Restoration* could result in the periodic inundation of up to approximately 6,941 acres of modeled
17 habitat (6,162 acres of which would be low-value foraging habitat; Table 12-1B-39).

18 Burrowing owls cannot use inundated areas for foraging or nesting, and increased inundation
19 frequency and duration of cultivated lands and grassland habitats may affect prey populations that
20 have insufficient time to recover following inundation events. Depending on timing, seasonal
21 inundation of western burrowing owl habitat could result in displacement from nesting burrows or
22 drowning of individuals. The potential for this effect is considered low because suitable burrow sites
23 would most likely be located along setback levees, which are expected to be subject to inundation
24 less frequently than floodplain surfaces that would be less likely to support suitable nesting
25 burrows. The periodically inundated habitat would not be expected to have an adverse effect on the
26 population.

27 **NEPA Effects:** The periodically inundated habitat would not be expected to have an adverse effect on
28 the population. The potential for direct mortality of western burrowing owl caused by inundation
29 would be low because the locations of burrows would likely be above elevations consistently subject
30 to inundation; therefore, the potential impact would not be adverse.

31 **CEQA Conclusion:** The potential for direct mortality of western burrowing owl caused by inundation
32 would be low because the locations of burrows would likely be above elevations consistently subject
33 to inundation. Therefore, periodic inundation would be expected to have a less-than-significant
34 impact on the population.

35 **Western Yellow-Billed Cuckoo**

36 This section describes the effects of Alternative 1B, including water conveyance facilities
37 construction and implementation of other conservation components, on western yellow-billed
38 cuckoo. The habitat model for western yellow-billed cuckoo includes potential breeding habitat,
39 which includes plant alliances from the valley/foothill riparian modeled habitat that contain a dense
40 forest canopy for foraging with understory willow for nesting, and a minimum patch size of 50 acres.
41 Modeled habitat also includes migratory habitat, which contains the same plant alliances as
42 breeding habitat but without the minimum 50-acre patch size requirement.

1 The western yellow-billed cuckoo is uncommon in the Plan Area at present, and the likelihood that it
2 will be found using the modeled habitat is low relative to more abundant riparian species. Nesting of
3 the species in the plan area has not been confirmed for approximately 100 years. Western yellow-
4 billed cuckoo was detected in the study area during 2009 DHCCP surveys, but nesting was not
5 confirmed and the bird is suspected to have been a migrant (Appendix 12C, *2009 to 2011 Bay Delta*
6 *Conservation Plan EIR/EIS Environmental Data Report*). Construction and restoration associated
7 with Alternative 1B conservation measures would result in both temporary and permanent losses of
8 Western yellow-billed cuckoo modeled habitat as indicated in Table 12-1B-40. Full implementation
9 of Alternative 1B would also include the following conservation actions over the term of the BDCP to
10 benefit the western yellow-billed cuckoo (BDCP Chapter 3, Section 3.3, *Biological Goals and*
11 *Objectives*).

- 12 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
13 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
14 associated with CM7).
- 15 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
16 10 (Objective VFRNC1.2, associated with CM3).
- 17 ● Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,
18 associated with CM3 and CM7).
- 19 ● Maintain the at least 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion
20 of the early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a
21 minimum patch size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4,
22 associated with CM3 and CM7).

23 As explained below, with the restoration or protection of these amounts of habitat, in addition to
24 management activities that would enhance these natural communities for the species and
25 implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least*
26 *Bell's Vireo, Western Yellow-Billed Cuckoo*, impacts on Western yellow-billed cuckoo would not be
27 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-40. Changes in Western Yellow-Billed Cuckoo Modeled Habitat Associated with**
2 **Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Breeding	3	3	0	0	NA	NA
	Migratory	15	15	26	26	NA	NA
Total Impacts CM1		18	18	26	26	NA	NA
CM2-CM18	Breeding	29	142	5	10	11-20	17
	Migratory	278	383	83	94	37-64	125
Total Impacts CM2-CM18		307	525	88	104	48-84	142
Total Breeding		32	145	5	10	11-20	17
Total Migratory		293	398	109	120	37-64	125
TOTAL IMPACTS		325	543	114	130	48-84	142

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3 **Impact BIO-95: Loss or Conversion of Habitat for and Direct Mortality of Western Yellow-**
4 **Billed Cuckoo**

5 Alternative 1B conservation measures would result in the combined permanent and temporary loss
6 of up to 673 acres of modeled habitat for western yellow-billed cuckoo (155 acres of breeding
7 habitat, 518 acres of migratory habitat; Table 12-1B-40). Conservation measures that would result
8 in these losses are conveyance facilities and transmission line construction, and establishment and
9 use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat
10 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management
11 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,
12 could result in local adverse habitat effects. In addition, maintenance activities associated with the
13 long-term operation of the water conveyance facilities and other BDCP physical facilities could
14 degrade or eliminate western yellow-billed cuckoo modeled habitat. Each of these individual
15 activities is described below. A summary statement of the combined impacts and NEPA effects and a
16 CEQA conclusion follow the individual conservation measure discussions

- 17 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B water conveyance facilities
18 would result in the permanent loss of up to 3 acres of modeled western yellow-billed cuckoo
19 breeding habitat and the combined permanent and temporary loss of 41 acres of modeled
20 migratory habitat (15 acres of permanent loss, 41 acres of temporary loss; Table 12-1B-40). The
21 habitat would be removed at multiple locations from the north Delta to the east Delta and in the

1 vicinity of Clifton Court Forebay. Habitat loss would primarily occur as a result of the
 2 construction of Intakes 1-5, the construction of the canal, and temporary work areas. There are
 3 no stand occurrences of yellow-billed cuckoo nests in the study area. However, this loss would
 4 have the potential to displace individuals, if present, and remove the functions and value of
 5 modeled habitat for nesting, protection, or foraging. Refer to the Terrestrial Biology Map Book
 6 for a detailed view of Alternative 1B construction locations.

- 7 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 8 would result in the loss of approximately 31 acres of breeding habitat (26 acres of permanent
 9 loss and 5 acres of temporary loss) and 140 acres of migratory habitat (57 acres of permanent
 10 loss and 83 acres of temporary loss) for yellow-billed cuckoo in the Yolo Bypass in CZ 2. The loss
 11 is expected to occur during the first 10 years of Alternative 1B implementation. There are no
 12 extant occurrences of yellow-billed cuckoo nesting in the study area.
- 13 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 14 inundation would permanently remove an estimated 110 acres of modeled yellow-billed cuckoo
 15 breeding habitat and 310 acres of modeled migratory habitat in CZ 1, 2, 6, and 11. There are no
 16 extant nesting records of yellow-billed cuckoo in the study area. However, a yellow-billed
 17 cuckoo detection was recorded during DHCCP surveys in 2009 (Appendix 12C, *2009 to 2011 Bay*
 18 *Delta Conservation Plan EIR/EIS Environmental Data Report*) in CZ 5 between Twin Cities Road
 19 and Walnut Grove. These detections do not overlap with the hypothetical restoration areas for
 20 CM4.
- 21 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 22 seasonally inundated floodplain would permanently and temporarily remove approximately 11
 23 acres of modeled yellow-billed cuckoo breeding habitat (6 acres of permanent loss and 5 acres
 24 of temporary loss) and 27 acres of migratory habitat (16 acres of permanent loss and 11 acres of
 25 temporary loss) in CZ 7. Based on the riparian habitat restoration assumptions, approximately
 26 3,000 acres of valley/foothill riparian habitat would be restored as a component of seasonally
 27 inundated floodplain restoration actions. The actual number of acres that would be restored
 28 may differ from these estimates, depending on how closely the outcome of seasonally inundated
 29 floodplain restoration approximates the assumed outcome. Once this restored riparian
 30 vegetation has developed habitat functions, a portion of it would be suitable to support western
 31 yellow-billed cuckoo habitat once the riparian vegetation has developed habitat functions for
 32 the cuckoo.
- 33 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
 34 activities that could be implemented in protected western yellow-billed cuckoo habitats would
 35 maintain and improve the functions of the habitat over the term of the BDCP. With conditions
 36 favorable for its future establishment in the Plan Area, western yellow-billed cuckoo would be
 37 expected to benefit from the increase in protected habitat. However, habitat management- and
 38 enhancement-related activities could disturb western yellow-billed cuckoo nests if they were
 39 present near work sites. *CM11 Natural Communities Enhancement and Management* actions
 40 designed to enhance wildlife values in restored riparian habitats may result in localized ground
 41 disturbances that could temporarily remove small amounts of western yellow-billed cuckoo
 42 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and
 43 other infrastructure maintenance activities, would be expected to have minor adverse effects on
 44 available western yellow-billed cuckoo habitat and would be expected to result in overall
 45 improvements and maintenance of western yellow-billed cuckoo habitat values over the term of
 46 the BDCP.

- 1 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,
2 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.
3 Temporarily affected areas would be restored as riparian habitat within 1 year following
4 completion of construction activities. Although the effects are considered temporary, the
5 restored riparian habitat would require 5 years to several decades, for ecological succession to
6 occur and for restored riparian habitat to functionally replace habitat that has been affected. The
7 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;
8 therefore, the replaced riparian vegetation would be expected to have structural components
9 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial
10 restoration activities are complete.
- 11 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
12 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
13 disturbances that could affect western yellow-billed cuckoo use of the surrounding habitat.
14 Maintenance activities would include vegetation management, levee and structure repair, and
15 re-grading of roads and permanent work areas. These effects, however, would be reduced by
16 AMMs and conservation actions as described below.
- 17 ● Injury and Direct Mortality: Western yellow-billed cuckoo nesting has not been confirmed in the
18 Delta for approximately 100 years. However, an unconfirmed breeding detection in 2009 in
19 DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*
20 *Data Report*) and the present of suitable habitat indicates that the species is potentially breeding
21 in the study area, or may nest there in the future. Construction-related activities would not be
22 expected to result in direct mortality of adult or fledged western yellow-billed cuckoo if they
23 were present in the Plan Area, because they would be expected to avoid contact with
24 construction and other equipment. If western yellow-billed cuckoo were to nest in the
25 construction area, construction-related activities, including equipment operation, noise and
26 visual disturbances could destroy nests or lead to their abandonment, resulting in mortality of
27 eggs and nestlings. These effects would be avoided and minimized with the incorporation of
28 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
29 *Cuckoo* into the BDCP.

30 The following paragraphs summarize the combined effects discussed above and describe other
31 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
32 included.

33 ***Near-Term Timeframe***

34 Because the water conveyance facilities construction is being evaluated at the project level, the near-
35 term BDCP conservation strategy has been evaluated to determine whether it would provide
36 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
37 effects of construction would not be adverse under NEPA. The Plan would remove 439 acres of
38 modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects would
39 result from the construction of the water conveyance facilities (CM1, 44 acres [3 acres of breeding
40 habitat; 41 acres of migratory habitat]), and implementing other conservation measures (CM2 *Yolo*
41 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*
42 *Inundated Floodplain Restoration*—395 acres of modeled nesting and migratory habitat). These
43 habitat losses would primarily consist of small, fragmented riparian stands in CZ 2–CZ 8 that do not
44 provide high-value habitat for the species.

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
2 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter
3 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
4 habitat. Using these ratios would indicate that 44 acres of valley/foothill riparian habitat should be
5 restored/created and 44 acres should be protected to compensate for the CM1 losses of yellow-
6 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres
7 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of
8 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
9 protection).

10 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
11 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These
12 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as
13 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
14 yellow-billed cuckoo. The majority of the riparian restoration acres would occur in CZ 7 as part of a
15 reserve system with extensive wide bands or large patches of valley/foothill riparian natural
16 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Goals
17 and objectives in the Plan for riparian restoration also include the restoration, maintenance and
18 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among
19 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and
20 grasslands (Objective VFRNC2.1). These natural community biological goals and objectives would
21 inform the near-term protection and restoration efforts and represent performance standards for
22 considering the effectiveness of conservation actions for the species.

23 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
24 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the
25 restored riparian habitat would require several years (early-mid successional) and several decades
26 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to
27 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not
28 known to be an established breeder in the Plan Area, the time lag in riparian restoration from BDCP
29 actions would not be expected to have an adverse population-level effect on the species. Overall,
30 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed
31 cuckoo by increasing opportunities for a breeding population to become reestablished in the study
32 area.

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
34 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
35 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
36 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
37 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
38 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
39 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
40 which have since been updated and which are provided in Appendix 3B, *Environmental*
41 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

42 **Late Long-Term Timeframe**

43 The habitat model indicates that the study area supports approximately 12,395 acres of modeled
44 breeding and migratory habitat for yellow-billed cuckoo. Alternative 1B as a whole would result in

1 the permanent loss of and temporary effects on 673 acres of modeled habitat (5% of the modeled
2 habitat in the Plan Area). These losses would occur from the construction of the water conveyance
3 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
4 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
5 would be in fragmented riparian habitat throughout the study area.

6 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
7 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
8 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
9 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
10 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
11 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least
12 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This
13 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian
14 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet
15 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.
16 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its
17 entirety the vegetative structure needed to support these species, because patch sizes may not be
18 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected
19 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11
20 would expand the patches of existing riparian forest in order to support the species should they
21 become established breeders in the study area.

22 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
23 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
24 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
26 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
27 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
28 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
29 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
30 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
31 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
32 which have since been updated and which are provided in Appendix 3B, *Environmental*
33 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

34 **NEPA Effects:** The loss of western yellow-billed cuckoo habitat associated with Alternative 1B would
35 represent an adverse effect in the absence of other conservation actions. However, the species is not
36 an established breeder in the plan area and current presence is limited to migrants. In addition, the
37 habitat that would be lost consists of small, fragmented riparian stands that do not provide high-
38 value habitat for the species. With habitat protection and restoration associated with CM3, CM7, and
39 CM11, guided by biological goals and objectives and by AMM1-AMM7 and *AMM22 Suisun Song*
40 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be in
41 place throughout the construction period, the effects of habitat loss and potential mortality on
42 western yellow-billed cuckoo would not be adverse under Alternative 1B.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction is being evaluated at the project level, the near-
4 term BDCP conservation strategy has been evaluated to determine whether it would provide
5 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
6 effects of construction would be less than significant under CEQA. The Plan would remove 439 acres
7 of modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects would
8 result from the construction of the water conveyance facilities (CM1, 44 acres [3 acres of breeding
9 habitat; 41 acres of migratory habitat]), and implementing other conservation measures (CM2 *Yolo*
10 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*
11 *Inundated Floodplain Restoration*—395 acres of modeled nesting and migratory habitat). These
12 habitat losses would primarily consist of small, fragmented riparian stands in CZ 2–CZ 8 that do not
13 provide high-value habitat for the species.

14 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
15 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter
16 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
17 habitat. Using these ratios would indicate that 44 acres of valley/foothill riparian habitat should be
18 restored/created and 44 acres should be protected to compensate for the CM1 losses of yellow-
19 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres
20 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of
21 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
22 protection).

23 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
24 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These
25 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as
26 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
27 yellow-billed cuckoo. The majority of the riparian restoration acres would occur in CZ 7 as part of a
28 reserve system with extensive wide bands or large patches of valley/foothill riparian natural
29 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Goals
30 and objectives in the Plan for riparian restoration also include the restoration, maintenance and
31 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among
32 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and
33 grasslands (Objective VFRNC2.1). These natural community biological goals and objectives would
34 inform the near-term protection and restoration efforts and represent performance standards for
35 considering the effectiveness of conservation actions for the species.

36 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
37 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the
38 restored riparian habitat would require several years (early-mid successional) and several decades
39 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to
40 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not
41 known to be an established breeder in the Plan Area, the time lag in riparian restoration from BDCP
42 actions would not be expected to have an adverse population-level effect on the species. Overall,
43 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed

1 cuckoo by increasing opportunities for a breeding population to become reestablished in the study
2 area.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
7 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
8 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
9 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
10 which have since been updated and which are provided in Appendix 3B, *Environmental*
11 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

12 **Late Long-Term Timeframe**

13 The habitat model indicates that the study area supports approximately 12,395 acres of modeled
14 breeding and migratory habitat for yellow-billed cuckoo. Alternative 1B as a whole would result in
15 the permanent loss of and temporary effects on 673 acres of modeled habitat (5% of the modeled
16 habitat in the Plan Area). These losses would occur from the construction of the water conveyance
17 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
18 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
19 would be in fragmented riparian habitat throughout the study area.

20 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
21 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
22 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
23 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
24 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
25 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least
26 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This
27 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian
28 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet
29 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.
30 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its
31 entirety the vegetative structure needed to support these species, because patch sizes may not be
32 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected
33 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11
34 would expand the patches of existing riparian forest in order to support the species should they
35 become established breeders in the study area.

36 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
37 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
38 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
43 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
44 these AMMs include elements that would avoid or minimize the risk of affecting individuals and

1 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
2 which have since been updated and which are provided in Appendix 3B, *Environmental*
3 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

4 In the absence of other conservation actions, effects on Western yellow-billed cuckoo from
5 Alternative 1B would represent an adverse effect as a result of habitat modification and potential for
6 direct mortality of a special-status species; however, considering Alternative 1B's protection and
7 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
8 greater than necessary to compensate for the time lag of restoring habitats lost to construction and
9 restoration activities, and with implementation of AMM1-AMM7, AMM10, and AMM22 *Suisun Song*
10 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, the loss of habitat or
11 direct mortality through implementation of Alternative 1B would not result in a substantial adverse
12 effect through habitat modifications and would not substantially reduce the number or restrict the
13 range of the species. Therefore, the loss of habitat or potential mortality under this alternative
14 would have a less-than-significant impact on western yellow-billed cuckoo.

15 **Impact BIO-96: Fragmentation of Western Yellow-Billed Cuckoo Habitat as a Result of** 16 **Constructing the Water Conveyance Facilities**

17 Grading, filling, contouring, and other initial ground-disturbing operations for water conveyance
18 facilities construction may temporarily fragment modeled western yellow-billed cuckoo habitat.
19 This could temporarily reduce the extent and functions supported by the affected habitat. Because
20 western yellow-billed cuckoo is not currently known to breed in the study area, and the protection
21 and restoration of riparian habitat will expand contiguous habitat block requirements, habitat
22 fragmentation would have a minimal effect on the species.

23 **NEPA Effects:** Fragmentation of habitat would not have an adverse effect on western yellow-billed
24 cuckoo. The habitat functions in the study area for the species would be greatly improved through
25 the implementation of CM5, which would restore and protect large contiguous patches of riparian
26 habitat.

27 **CEQA Conclusion:** Fragmentation of habitat would have a less-than-significant impact on western
28 yellow-billed cuckoo. The habitat functions in the study area for the species would be greatly
29 improved through the implementation of CM5, which would restore and protect large contiguous
30 patches of riparian habitat.

31 **Impact BIO-97: Effects on Western Yellow-Billed Cuckoo Associated with Electrical** 32 **Transmission Facilities**

33 New transmission lines would increase the risk for bird-power line strikes, which could result in
34 injury or mortality of western yellow-billed cuckoo. Because the western yellow-billed cuckoo uses
35 riparian forests to meet all of its breeding and wintering life requisites, the species remains
36 primarily within the canopy of riparian forests and rarely ventures into open spaces except during
37 migration, limiting its opportunity to encounter the proposed transmission lines. As a summer
38 resident, if the species were to occur in the study area, it would be during periods of relatively high
39 visibility and clear weather conditions, thus further reducing collision risk from daily use patterns
40 or seasonal migration flights. Finally, western yellow-billed cuckoo wing shape is characterized by
41 low wing loading and a moderate aspect ratio, making the species moderately maneuverable and
42 presumably able to avoid collisions, especially during high-visibility conditions (BDCP Appendix 5.J,
43 Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).

1 Transmission line poles and towers also provide perching substrate for raptors, which are predators
 2 on western yellow-billed cuckoo. Although there is potential for transmission lines to result in
 3 increased perching opportunities for raptors, the existing network of transmission lines in the study
 4 area currently poses these risks and any incremental risk associated with the new power line
 5 corridors would not be expected to affect the population. Because there is low probability for the
 6 species to occur in the study area, any increase in predation risk on western yellow-billed cuckoo
 7 from an increase in raptor perching opportunities would be minimal.

8 **NEPA Effects:** The risk of bird strike is considered to be minimal based on the species' rarity in the
 9 study area, its proclivity to remain in the riparian canopy, its presence in the study area during
 10 periods of relative high visibility, and its overall ability to successfully negotiate around overhead
 11 wires that it may encounter. Transmission line poles and towers also provide perching substrate for
 12 raptors, which could result in increased predation pressure on western yellow-billed cuckoo.
 13 However, because there is a low probability for the species to occur in the study area, any increase
 14 in predation risk on western yellow-billed cuckoo from an increase in raptor perching opportunities
 15 would be minimal. Therefore the construction and operation of new transmission lines under
 16 Alternative 1B would not result in an adverse effect on western yellow-billed cuckoo.

17 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
 18 significant impact on western yellow-billed cuckoo because the risk of bird strike is considered to be
 19 minimal based on the species' rarity in the study area, its proclivity to remain in the riparian canopy,
 20 its presence during periods of relative high visibility, and its overall ability to successfully negotiate
 21 around overhead wires that it may encounter. Transmission line poles and towers also provide
 22 perching substrate for raptors, which could result in increased predation pressure on western
 23 yellow-billed cuckoo. However, because there is a low probability for the species to occur in the
 24 study area, any increase in predation risk on western yellow-billed cuckoo from an increase in
 25 raptor perching opportunities would be minimal. Therefore the construction and operation of new
 26 transmission lines under Alternative 1B would result in a less-than-significant impact on western
 27 yellow-billed cuckoo.

28 **Impact BIO-98: Indirect Effects of Plan Implementation on Western Yellow-Billed Cuckoo**

29 Noise and visual disturbances associated with construction-related activities could result in
 30 temporary disturbances that affect western yellow-billed cuckoo use of modeled habitat adjacent to
 31 proposed construction areas. Construction noise above background noise levels (greater than 50
 32 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,
 33 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
 34 *Crane*, Table 4), although there are no available data to determine the extent to which these noise
 35 levels could affect western yellow-billed cuckoo. Indirect effects associated with construction
 36 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
 37 disturbing operations outside the project footprint but within 1,300 feet from the construction edge.
 38 If western yellow-billed cuckoo were to nest in or adjacent to work areas, construction and
 39 subsequent maintenance-related noise and visual disturbances could mask calls, disrupt foraging
 40 and nesting behaviors, and reduce the functions of suitable nesting habitat for these species. These
 41 potential effects would be minimized with incorporation of *AMM22 Suisun Song Sparrow*, *Yellow-*
 42 *Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* into the BDCP. The use of mechanical
 43 equipment during water conveyance facilities construction could cause the accidental release of
 44 petroleum or other contaminants that could affect western yellow-billed cuckoo in the surrounding
 45 habitat. The inadvertent discharge of sediment or excessive dust adjacent to western yellow-billed

1 cuckoo habitat could also affect the species. AMM1–AMM7, including *AMM2 Construction BMPs and*
2 *Monitoring*, in addition to *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*
3 *Western Yellow-Billed Cuckoo*, would minimize the likelihood of such spills and ensure that measures
4 were in place to prevent runoff from the construction area and any adverse effects of dust on active
5 nests.

6 **Methylmercury Exposure:** Western yellow-billed cuckoo modeled habitat includes primarily
7 middle marsh habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is
8 also used if it is of high value, and low marsh provides foraging habitat for the species. Cuckoos are a
9 top predator in the benthic food chain; they forage by probing their beaks into the mud (Zembal and
10 Fancher 1988) and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects
11 (Eddleman and Conway 1998).

12 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
13 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
14 species would overestimate the effects on western yellow-billed cuckoo. Organisms feeding within
15 pelagic-based (algal) foodwebs have been found to have higher concentrations of methylmercury
16 than those in benthic or epibenthic foodwebs; this has been attributed to food chain length and
17 dietary segregation (Grimaldo et al. 2009).

18 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
19 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
20 Thus, Alternative 1B restoration activities that create newly inundated areas could increase
21 bioavailability of mercury. Concentrations of methylmercury known to be toxic to bird embryos
22 have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003);
23 however, currently, it is unknown how much of the sediment-derived methylmercury enters the
24 food chain in Suisun Marsh or what tissue concentrations are actually harmful to the western
25 yellow-billed cuckoo. In general, the highest methylation rates are associated with high tidal
26 marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers
27 et al. 2008). In Suisun Marsh, the conversion of managed wetlands to tidal wetlands is expected to
28 result in an overall reduction in mercury methylation. Because of the complex and very site-specific
29 factors that determine if mercury becomes mobilized into the foodweb, *CM12 Methylmercury*
30 *Management* is included to provide for site-specific evaluation for each restoration project. If a
31 project is identified where there is a high potential for methylmercury production that could not be
32 fully addressed through restoration design and adaptive management, alternate restoration areas
33 would be considered. CM12 would be implemented in coordination with other similar efforts to
34 address mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis
35 Section. This conservation measure would include the following actions.

- 36 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
37 mercury methylation and bioavailability
- 38 ● Define design elements that minimize conditions conducive to generation of methylmercury in
39 restored areas.
- 40 ● Define adaptive management strategies that can be implemented to monitor and minimize
41 actual postrestoration creation and mobilization of methylmercury.

1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 5 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 6 classes within a species. In addition, the effect of selenium on a species can be confounded by
 7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 8 2009).

9 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
 10 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
 11 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
 12 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
 13 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
 14 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
 15 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
 16 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
 17 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
 18 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
 19 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
 20 have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 22 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 23 exacerbate bioaccumulation of selenium in avian species, including western yellow-billed cuckoo.
 24 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
 25 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
 26 Alternative 1B restoration activities that create newly inundated areas could increase bioavailability
 27 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
 28 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
 29 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
 30 increases in selenium concentrations in water in the Delta under any alternative. However, it is
 31 difficult to determine whether the effects of potential increases in selenium bioavailability
 32 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
 33 effects on western yellow-billed cuckoo.

34 Because of the uncertainty that exists at this programmatic level of review, there could be a
 35 substantial effect on western yellow-billed cuckoo from increases in selenium associated with
 36 restoration activities. This effect would be addressed through the implementation of *AMM27*
 37 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 38 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
 39 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
 40 selenium management to reduce selenium concentrations and/or bioaccumulation would be
 41 evaluated separately for each restoration effort as part of design and implementation. This
 42 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
 43 design schedule.

1 **NEPA Effects:** Indirect effects on western yellow-billed cuckoo as a result of Plan implementation
2 could have adverse effects on the species through the modification of habitat and potential for direct
3 mortality.

4 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
5 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
6 the western yellow-billed cuckoo foodweb to methylmercury in these areas, with the level of
7 exposure dependent on the amounts of mercury available in the soils and the biogeochemical
8 conditions. However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would
9 be expected to reduce the overall production of methylmercury, resulting in a net benefit to the
10 species. Implementation of CM12, which contains measures to assess the amount of mercury before
11 project development, followed by appropriate design and adaptation management, would minimize
12 the potential for increased methylmercury exposure, and would result in no adverse effect on the
13 species.

14 Tidal habitat restoration could result in increased exposure of western yellow-billed cuckoo to
15 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
16 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
17 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

18 Because of the species' minimal presence in the study area, and with the incorporation of AMM1–
19 AMM7, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed*
20 *Cuckoo*, and *AMM27 Selenium Management* into the BDCP, indirect effects would not have an adverse
21 effect on western yellow-billed cuckoo.

22 **CEQA Conclusion:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 1B
23 implementation could have a significant impact on the species from modification of habitat.

24 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
25 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
26 the western yellow-billed cuckoo foodweb to methylmercury in these areas, with the level of
27 exposure dependent on the amounts of mercury available in the soils and the biogeochemical
28 conditions. However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would
29 be expected to reduce the overall production of methylmercury, resulting in a net benefit to the
30 species. Implementation of CM12, which contains measures to assess the amount of mercury before
31 project development, followed by appropriate design and adaptation management, would minimize
32 the potential for increased methylmercury exposure, and would result in no adverse effect on the
33 species.

34 Tidal habitat restoration could result in increased exposure of yellow-headed blackbird to selenium.
35 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
36 would provide specific tidal habitat restoration design elements to reduce the potential for
37 bioaccumulation of selenium and its bioavailability in tidal habitats.

38 With the incorporation of AMM1–AMM7, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least*
39 *Bell's Vireo*, *Western Yellow-Billed Cuckoo*, and *AMM27 Selenium Management* into the BDCP, indirect
40 effects as a result of Alternative 1B implementation would have a less-than-significant impact on
41 western yellow-billed cuckoo.

1 **Impact BIO-99: Periodic Effects of Inundation of Western Yellow-Billed Cuckoo Habitat as a**
2 **Result of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
4 duration of inundation of approximately 11-20 acres of modeled western yellow-billed cuckoo
5 breeding habitat and 37–64 acres of modeled migratory habitat. No adverse effects of increased
6 inundation frequency on western yellow-billed cuckoo or its habitat are expected because the
7 cuckoo breeding period is outside the period the weir would be operated. In addition, riparian
8 vegetation supporting habitat has persisted under the existing Yolo Bypass flooding regime, and
9 changes to frequency and inundation would be within the tolerance of these vegetation types.

10 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
11 inundation of up to 142 acres of modeled western yellow-billed cuckoo habitat (17 acres of breeding
12 habitat, 125 acres of migratory habitat). Inundation of restored floodplains is not expected to affect
13 western yellow-billed cuckoo or its habitat adversely because the cuckoo breeding period is outside
14 the period the floodplains would likely be inundated, and periodic inundation of floodplains is
15 expected to restore a more natural flood regime in support of riparian vegetation types that provide
16 nesting and migratory habitat for western yellow-billed cuckoo. The overall effect of seasonal
17 inundation in existing riparian natural communities is likely to be beneficial for western yellow-
18 billed cuckoo, because, historically, flooding was the main natural disturbance regulating ecological
19 processes in riparian areas, and flooding promotes the germination and establishment of many
20 native riparian plants.

21 **NEPA Effects:** Periodic effects of inundation would not have an adverse on yellow-billed cuckoo if
22 they were to establish as breeders in the study area, because flooding is expected to occur outside of
23 the breeding season.

24 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on
25 yellow-billed cuckoos if they were to establish as breeders in the study area, because flooding is
26 expected to occur outside of the breeding season.

27 **White-Tailed Kite**

28 This section describes the effects of Alternative 1B, including water conveyance facilities
29 construction and implementation of other conservation components, on white-tailed kite. The
30 habitat model used to assess impacts on white-tailed kite includes nesting habitat and foraging
31 habitat. Most white-tailed kites in the Sacramento Valley are found in oak and cottonwood riparian
32 forests, valley oak woodlands, or other groups of trees and are usually associated with compatible
33 foraging habitat for the species in patches greater than 1,500 square meters (Erichsen et al. 1996).
34 Modeled foraging habitat for white-tailed kite consists of pasture and hay crops, compatible row and
35 grain crops and natural vegetation such as seasonal wetlands and annual grasslands (Erichsen
36 1995).

37 Construction and restoration associated with Alternative 1B conservation measures would result in
38 both temporary and permanent losses of white-tailed kite modeled habitat as indicated in Table 12-
39 1B-41. The majority of the losses would take place over an extended period of time as tidal marsh is
40 restored in the study area. Although restoration for the loss of nesting and foraging habitat would be
41 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)
42 for restored habitats to replace the functions of habitat lost. This time lag between impacts and
43 restoration of habitat function would be minimized by specific requirements of *AMM39 White-Tailed*

1 *Kite*, including the planting of mature trees in the near-term time period. Full implementation of
2 Alternative 1B would also include the following biological objectives over the term of the BDCP to
3 benefit the white-tailed kite (BDCP Chapter 3, *Conservation Strategy*).

- 4 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
5 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
6 associated with CM7).
- 7 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
8 10 (Objective VFRNC1.2, associated with CM3).
- 9 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
10 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
11 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 12 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 13 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
14 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 15 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
16 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 17 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
18 VPNC2.5, and GNC2.4, associated with CM11).
- 19 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
20 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 21 ● Plant and maintain native trees along roadsides and field borders within protected cultivated
22 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 23 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
24 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
25 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
26 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 27 ● Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey
28 populations throughout protected cultivated lands (Objective SH2.2, associated with CM11)

29 As explained below, with the restoration or protection of these amounts of habitat, in addition to
30 management activities that would enhance these natural communities for the species and
31 implementation of AMM1–AMM7 and AMM39 *White-tailed Kite*, impacts on white-tailed kite would
32 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-41. Changes in White-Tailed Kite Modeled Habitat Associated with Alternative 1B**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	40	40	39	39	NA	NA
	Foraging	5,475	5,475	9,594	9,594	NA	NA
Total Impacts CM1		5,515	5,515	9,633	9,633		
CM2-CM18	Nesting	312	507	88	121	48-82	230
	Foraging	8,723	52,675	516	1,484	3,030-6,651	7,402
Total Impacts CM2-CM18		9,035	53,182	604	1,605	3,078-6,733	7,632
Total Nesting		352	547	127	160	48-82	230
Total Foraging		14,198	58,150	10,110	11,078	3,030-6,651	7,402
TOTAL IMPACTS		14,550	58,697	10,237	11,238	3,078-6,733	7,632

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-100: Loss or Conversion of Habitat for and Direct Mortality of White-Tailed Kite**

5 Alternative 1B conservation measures would result in the combined permanent and temporary loss
6 of up to 69,935 acres of modeled habitat (707 acres of nesting habitat and 69,388 acres of foraging
7 habitat) for white-tailed kite (Table 12-1B-41). Conservation measures that would result in these
8 losses are conveyance facilities and transmission line construction, and establishment and use of
9 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration
10 (CM4), floodplain restoration (CM5), riparian restoration, (CM7), grassland restoration (CM8),
11 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of
12 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which
13 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.
14 In addition, maintenance activities associated with the long-term operation of the water conveyance
15 facilities and other BDCP physical facilities could affect white-tailed kite modeled habitat. Each of
16 these individual activities is described below. A summary statement of the combined impacts and
17 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B water conveyance facilities
19 would result in the combined permanent and temporary loss of up to 79 acres of white-tailed
20 kite nesting habitat (40 acres of permanent loss and 39 acres of temporary loss). The habitat
21 would be removed at multiple locations from the north Delta to the east Delta and in the vicinity

1 of Clifton Court Forebay. Almost all of the losses would occur on the borders of waterways. In
 2 the north Delta, most of the permanent loss would occur where Intakes 1–5 encroach on the
 3 Sacramento River’s east bank between Freeport and Courtland. The riparian areas here are very
 4 small patches, some dominated by valley oak and others by nonnative trees and scrub
 5 vegetation. Other small patches or narrow bands of riparian vegetation dominated by valley oak,
 6 willow, cottonwood or mixed brambles would be permanently removed by canal construction
 7 adjacent to Intake 1, between Intakes 2 and 4, and just south of Lambert Road. In the east Delta,
 8 small permanent losses would occur from canal construction just south of Twin Cities Road and
 9 just north of Walnut Grove Road. The temporary riparian losses would occur at the intake sites
 10 along the Sacramento River and at temporary siphon work areas where the canal would cross
 11 Beaver Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment Slough, Railroad
 12 Canal, and Middle River just south of Victoria Canal.

13 In addition, 15,069 acres of foraging habitat would be removed (5,475 acres of permanent loss,
 14 9,594 acres of temporary loss; Table 12-1B-41). The foraging habitat losses would occur at
 15 various locations along the new canal route from the construction of the canal and the
 16 associated borrow and spoil sites and at the intake sites along the Sacramento River. Permanent
 17 and temporary losses of foraging habitat would also occur at the new forebay site just south of
 18 Clifton Court Forebay and associated borrow and spoil sites. There are no occurrences of white-
 19 tailed kite that overlap with the CM1 construction footprint. However, the implementation of
 20 *AMM39 White-Tailed Kite* would minimize effects on white-tailed kites if they were to nest
 21 within or adjacent to the construction footprint. Refer to the Terrestrial Biology Map Book for a
 22 detailed view of Alternative 1B construction locations.

- 23 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 24 would result in the combined permanent and temporary loss of up to 170 acres of nesting
 25 habitat (82 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2. In
 26 addition, 1,525 acres of foraging habitat would be removed (1,008 acres of permanent loss, 516
 27 acres of temporary loss). Activities through CM2 could involve excavation and grading in
 28 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
 29 riparian losses would occur at the north end of Yolo Bypass where major fish passage
 30 improvements are planned. Excavation to improve water movement in the Toe Drain and in the
 31 Sacramento Weir would also remove white-tailed kite habitat. The loss is expected to occur
 32 during the first 10 years of Alternative 1B implementation.
- 33 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 34 inundation would permanently remove an estimated 383 acres of white-tailed kite nesting
 35 habitat and 41,625 acres of foraging habitat. The majority of the acres lost would consist of
 36 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity
 37 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,
 38 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
 39 directly impact and fragment grassland just north of Rio Vista in and around French and
 40 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
 41 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
 42 the northern fringes of Suisun Marsh. The conversion of cultivated lands to tidal wetlands over
 43 fairly broad areas within the tidal restoration footprints could result in the removal or
 44 abandonment of nesting territories that occur within or adjacent to the restoration areas. Trees
 45 would not be actively removed but tree mortality would be expected over time as areas became

1 tidally inundated. Depending on the extent and value of remaining habitat, this could reduce the
2 local nesting population.

- 3 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
4 seasonally inundated floodplain and riparian restoration actions would remove approximately
5 75 acres of white-tailed kite nesting habitat (42 acres of permanent loss, 33 acres of temporary
6 loss) and 2,675 acres of foraging habitat (1,706 acres of permanent loss, 968 acres of temporary
7 loss). These losses would be expected after the first 10 years of Alternative 1B implementation
8 along the San Joaquin River and other major waterways in CZ 7.
- 9 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
10 approximately 971 acres of white-tailed kite foraging habitat as part of tidal restoration and
11 3,991 acres as part of seasonal floodplain restoration through CM7.
- 12 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
13 implemented on agricultural lands and would result in the conversion of 1,849 acres of white-
14 tailed kite agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8, and 11.
15 If agricultural lands supporting higher value foraging habitat than the restored grassland were
16 removed, there would be a loss of white-tailed kite foraging habitat value.
- 17 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh
18 (CM10) would result in the permanent conversion of 1,440 acres of cultivated lands to nontidal
19 marsh in CZ 2 and CZ 4. This would not result in a loss of foraging habitat as both natural
20 communities are foraging habitat for white-tailed kite. Small patches of riparian vegetation that
21 support White-tailed kite nesting habitat may develop along the margins of restored nontidal
22 marsh restoration would also provide foraging habitat for the species.
- 23 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
24 enhancement-related activities could disturb white-tailed kite nests if they were present near
25 work sites. A variety of habitat management actions that are designed to enhance wildlife values
26 in BDCP-protected habitats may result in localized ground disturbances that could temporarily
27 remove small amounts of white-tailed kite habitat and reduce the functions of habitat until
28 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
29 and road and other infrastructure maintenance, are expected to have minor effects on available
30 white-tailed kite habitat and are expected to result in overall improvements to and maintenance
31 of habitat values over the term of the BDCP. These effects cannot be quantified, but are expected
32 to be minimal and would be avoided and minimized by the AMMs listed below. CM11 would also
33 include the construction of recreational-related facilities including trails, interpretive signs, and
34 picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The
35 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be
36 placed on existing, disturbed areas when and where possible. However, approximately 50 acres
37 of white-tailed kite grassland foraging habitat would be lost from the construction of trails and
38 facilities.
- 39 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
40 white-tailed kite foraging habitat for the development of a delta and longfin smelt conservation
41 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Alternative 1B
42 implementation.

43 Permanent and temporary white-tailed kite nesting habitat losses from the above conservation
44 measures, would primarily consist of small, fragmented riparian stands. Temporarily affected

1 nesting habitat would be restored as riparian habitat within 1 year following completion of
 2 construction activities. The restored riparian habitat would require 1 to several decades to
 3 functionally replace habitat that has been affected and for trees to attain sufficient size and
 4 structure suitable for nesting by white-tailed kite. *AMM39 White-Tailed Kite* contains actions
 5 described below to reduce the effect of temporal loss of nesting habitat, including the
 6 transplanting of mature trees and planting of trees near high-value foraging habitat. The
 7 functions of agricultural and grassland communities that provide foraging habitat for white-
 8 tailed kite are expected to be restored relatively quickly.

- 9 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
 10 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
 11 disturbances that could affect white-tailed kite use of the surrounding habitat. Maintenance
 12 activities would include vegetation management, levee and structure repair, and re-grading of
 13 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7
 14 and *AMM39 White-Tailed Kite* in addition to conservation actions as described below.
- 15 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in
 16 direct mortality of adult or fledged white-tailed kite if they were present in the Plan Area,
 17 because they would be expected to avoid contact with construction and other equipment.
 18 However, if white-tailed kite were to nest in the construction area, construction-related
 19 activities, including equipment operation, noise and visual disturbances could affect nests or
 20 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects
 21 would be avoided and minimized with the incorporation of *AMM39 White-Tailed Kite* into the
 22 BDCP.

23 The following paragraphs summarize the combined effects discussed above and describe other
 24 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
 25 included.

26 ***Near-Term Timeframe***

27 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 28 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 29 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
 30 the effect of construction would not be adverse under NEPA. The Plan would remove 479 acres (352
 31 acres of permanent loss, 127 acres of temporary loss) of white-tailed kite nesting habitat in the
 32 study area in the near-term. These effects would result from the construction of the water
 33 conveyance facilities (CM1, 79 acres), and implementing other conservation measures (*CM2 Yolo*
 34 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
 35 *Inundated Floodplain Restoration*—400 acres). In addition, 24,308 acres of white-tailed kite foraging
 36 habitat would be removed or converted in the near-term (CM1, 15,069 acres; *CM2 Yolo Bypass*
 37 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*
 38 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*
 39 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*
 40 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—9,239
 41 acres).

42 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
 43 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of
 44 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat

1 for nesting habitat, 1:1 protection for foraging habitat. Using these ratios would indicate that 79
2 acres of nesting habitat should be restored/created and 79 acres should be protected to mitigate the
3 CM1 losses of white-tailed kite nesting habitat. In addition, 15,069 acres of foraging habitat should
4 be protected to compensate for the CM1 losses of white-tailed kite foraging habitat. The near-term
5 effects of other conservation actions would remove 400 acres of modeled nesting habitat, and
6 therefore require 400 acres of protection of nesting habitat. Similarly, the near-term effects of other
7 conservation actions would result in the loss or conversion of 9,239 acres of modeled foraging
8 habitat, and therefore require 9,239 acres of protection of foraging habitat using the same typical
9 NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection of nesting habitat; 1:1 for
10 protection of foraging habitat).

11 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
12 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
13 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
14 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
15 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
16 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation
17 actions are associated with CM3, CM4, CM7, and CM8 and would occur in the same timeframe as the
18 construction and early restoration losses.

19 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
20 system with extensive wide bands or large patches of valley/foothill riparian natural community
21 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
22 restoration would expand the patches of existing riparian forest in order to support nesting habitat
23 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
24 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
25 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
26 would be increased by planting and maintaining native trees along roadsides and field borders
27 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
28 small but essential nesting habitat associated with cultivated lands would also be maintained and
29 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
30 farmyards or at rural residences (Objective CLNC1.3).

31 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
32 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
33 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
34 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
35 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
36 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
37 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
38 Foraging opportunities would also be improved by enhancing prey populations through the
39 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
40 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
41 would also be protected and maintained as part of the cultivated lands reserve system which would
42 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
43 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
44 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
45 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres
46 of tidal natural communities, including transitional uplands would provide high-value foraging

1 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for
 2 covered and other native wildlife species would be protected in the near-term time period
 3 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection
 4 and restoration efforts and represent performance standards for considering the effectiveness of
 5 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
 6 and the additional detail in the biological objectives satisfy the typical mitigation that would be
 7 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate
 8 the near-term effects of the other conservation measures.

9 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
 10 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
 11 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian
 12 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
 13 require one to several decades to functionally replace habitat that has been affected and for trees to
 14 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between
 15 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite
 16 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting
 17 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
 18 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat
 19 would further reduce this limited resource and could reduce or restrict the number of active white-
 20 tailed kite nests within the Plan Area until restored riparian habitat is sufficiently developed.

21 *AMM39 White-Tailed Kite* would implement a program to plant large mature trees, including
 22 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
 23 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
 24 within the 125-acre block are removed. These mature trees would be supplemented with additional
 25 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
 26 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
 27 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
 28 system for every tree 20 feet or taller removed by construction during the near-term period. A
 29 variety of native tree species would be planted to provide trees with differing growth rates,
 30 maturation, and life span. Trees would be planted within the BDCP reserve system in areas that
 31 support high value foraging habitat to increase nest sites, or within riparian plantings as a
 32 component of the riparian restoration (CM5, CM7) where they are in close proximity to suitable
 33 foraging habitat. Replacement trees that were incorporated into the riparian restoration would not
 34 be clustered in a single region of the Plan Area, but would be distributed throughout the lands
 35 protected as foraging habitat for white-tailed kite. With this program in place, Alternative 1B would
 36 not have a substantial adverse effect on white-tailed kite in the near-term timeframe, either through
 37 direct mortality or through habitat modifications. Further details of AMM39 are provided in
 38 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 43 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 44 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 45 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 46 of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres
3 of modeled foraging habitat for white-tailed kite. Alternative 1B as a whole would result in the
4 permanent loss of and temporary effects on 707 acres of potential nesting habitat (5% of the
5 potential nesting habitat in the study area) and the loss or conversion of 69,388 acres of foraging
6 habitat (14% of the foraging habitat in the study area). The locations of these losses are described
7 above in the analyses of individual conservation measures.

8 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
9 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
10 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*
11 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
12 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
13 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
14 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that
15 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal
16 wetlands (Table 3-4 in Chapter 3).

17 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
18 system with extensive wide bands or large patches of valley/foothill riparian natural community
19 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
20 restoration would expand the patches of existing riparian forest in order to support nesting habitat
21 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
22 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
23 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
24 would be increased by planting and maintaining native trees along roadsides and field borders
25 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
26 small but essential nesting habitat associated with cultivated lands would also be maintained and
27 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
28 farmyards or at rural residences (Objective CLNC1.3).

29 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
30 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
31 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
32 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
33 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
34 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
35 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
36 Foraging opportunities would also be improved by enhancing prey populations through the
37 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
38 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
39 would also be protected and maintained as part of the cultivated lands reserve system which would
40 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
41 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
42 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
43 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least
44 65,000 acres of tidal natural communities, including transitional uplands would provide high-value
45 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide

1 foraging habitat for white-tailed kite would be protected by the late long-term time period
2 (Objective CLNC1.1).

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
4 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
5 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration
6 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
11 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
12 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
13 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
14 of the Final EIR/EIS.

15 **NEPA Effects:** The loss of white-tailed kite habitat and potential for direct mortality of this special-
16 status species under Alternative 1B would represent an adverse effect in the absence of other
17 conservation actions. However, with habitat protection and restoration associated with CM3, CM5,
18 CM7, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and
19 *AMM39 White-Tailed Kite*, which would be in place throughout the construction period, the effects of
20 habitat loss and potential mortality on white-tailed kite under Alternative 1B would not be adverse.

21 **CEQA Conclusion:**

22 **Near-Term Timeframe**

23 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
24 the near-term BDCP conservation strategy has been evaluated to determine whether it would
25 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
26 the effect of construction would be less than significant under CEQA. The Plan would remove 479
27 acres (352 acres of permanent loss, 127 acres of temporary loss) of white-tailed kite nesting habitat
28 in the study area in the near-term. These effects would result from the construction of the water
29 conveyance facilities (CM1, 79 acres), and implementing other conservation measures (*CM2 Yolo*
30 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
31 *Inundated Floodplain Restoration*—400 acres). In addition, 24,308 acres of white-tailed kite foraging
32 habitat would be removed or converted in the near-term (CM1, 15,069 acres; *CM2 Yolo Bypass*
33 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*
34 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*
35 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*
36 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—9,239
37 acres).

38 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
39 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of
40 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
41 for nesting habitat, 1:1 protection for foraging habitat. Using these ratios would indicate that 79
42 acres of nesting habitat should be restored/created and 79 acres should be protected to mitigate the
43 CM1 losses of white-tailed kite nesting habitat. In addition, 15,069 acres of foraging habitat should

1 be protected to compensate for the CM1 losses of white-tailed kite foraging habitat. The near-term
2 effects of other conservation actions would remove 400 acres of modeled nesting habitat, and
3 therefore require 400 acres of protection of nesting habitat. Similarly, the near-term effects of other
4 conservation actions would result in the loss or conversion of 9,239 acres of modeled foraging
5 habitat, and therefore require 9,239 acres of protection of foraging habitat using the same typical
6 NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection of nesting habitat; 1:1 for
7 protection of foraging habitat).

8 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
9 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
10 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
11 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
12 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
13 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation
14 actions are associated with CM3, CM4, CM7, and CM8 and would occur in the same timeframe as the
15 construction and early restoration losses.

16 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
17 system with extensive wide bands or large patches of valley/foothill riparian natural community
18 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
19 restoration would expand the patches of existing riparian forest in order to support nesting habitat
20 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
21 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
22 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
23 would be increased by planting and maintaining native trees along roadsides and field borders
24 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
25 small but essential nesting habitat associated with cultivated lands would also be maintained and
26 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
27 farmyards or at rural residences (Objective CLNC1.3).

28 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
29 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
30 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
31 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
32 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
33 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
34 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
35 Foraging opportunities would also be improved by enhancing prey populations through the
36 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
37 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
38 would also be protected and maintained as part of the cultivated lands reserve system which would
39 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
40 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
41 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
42 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres
43 of tidal natural communities, including transitional uplands would provide high-value foraging
44 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for
45 covered and other native wildlife species would be protected in the near-term time period
46 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection

1 and restoration efforts and represent performance standards for considering the effectiveness of
2 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
3 and the additional detail in the biological objectives satisfy the typical mitigation that would be
4 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate
5 the near-term effects of the other conservation measures.

6 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
7 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
8 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian
9 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
10 require one to several decades to functionally replace habitat that has been affected and for trees to
11 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between
12 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite
13 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting
14 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
15 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat
16 would further reduce this limited resource and could reduce or restrict the number of active white-
17 tailed kite nests within the Plan Area until restored riparian habitat is sufficiently developed.

18 *AMM39 White-Tailed Kite* would implement a program to plant large mature trees, including
19 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
20 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
21 within the 125-acre block are removed. These mature trees would be supplemented with additional
22 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
23 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
24 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
25 system for every tree 20 feet or taller removed by construction during the near-term period. Of the
26 replacement trees planted, a variety of native tree species would be planted to provide trees with
27 differing growth rates, maturation, and life span. Trees would be planted within the BDCP reserve
28 system in areas that support high value foraging habitat to increase nest sites, or within riparian
29 plantings as a component of the riparian restoration (CM5, CM7) where they are in close proximity
30 to suitable foraging habitat. Replacement trees that were incorporated into the riparian restoration
31 would not be clustered in a single region of the Plan Area, but would be distributed throughout the
32 lands protected as foraging habitat for white-tailed kite. Further details of AMM39 are provided in
33 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. With this program
34 in place, Alternative 1B would not have a substantial adverse effect on white-tailed kite in the near-
35 term timeframe, either through direct mortality or through habitat modifications.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
37 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
38 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
39 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
40 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
41 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
42 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
43 of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres
3 of modeled foraging habitat for white-tailed kite. Alternative 1B as a whole would result in the
4 permanent loss of and temporary effects on 707 acres of potential nesting habitat (5% of the
5 potential nesting habitat in the study area) and the loss or conversion of 69,388 acres of foraging
6 habitat (14% of the foraging habitat in the study area). The locations of these losses are described
7 above in the analyses of individual conservation measures.

8 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
9 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
10 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*
11 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
12 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
13 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
14 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that
15 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal
16 wetlands (Table 3-4 in Chapter 3).

17 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
18 system with extensive wide bands or large patches of valley/foothill riparian natural community
19 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
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22 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
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25 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
26 small but essential nesting habitat associated with cultivated lands would also be maintained and
27 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
28 farmyards or at rural residences (Objective CLNC1.3).

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30 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
31 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
32 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
33 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
34 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
35 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
36 Foraging opportunities would also be improved by enhancing prey populations through the
37 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
38 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
39 would also be protected and maintained as part of the cultivated lands reserve system which would
40 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
41 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
42 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
43 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least
44 65,000 acres of tidal natural communities, including transitional uplands would provide high-value
45 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide

1 foraging habitat for white-tailed kite would be protected by the late long-term time period
2 (Objective CLNC1.1).

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
4 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
5 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration
6 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

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9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
11 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
12 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
13 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
14 of the Final EIR/EIS.

15 In the absence of other conservation actions, the effects on white-tailed kite habitat from Alternative
16 1B would represent an adverse effect as a result of habitat modification and potential for direct
17 mortality of a special status species; however, considering Alternative 1B's protection
18 and restoration provisions, which would provide acreages of new or enhanced habitat in amounts
19 greater than necessary to compensate for the time lag of restoring riparian and foraging habitats
20 lost to construction and restoration activities, and with implementation of AMM1-AMM7 and
21 *AMM39 White-Tailed Kite*, the loss of habitat or direct mortality through implementation of
22 Alternative 1B would not result in a substantial adverse effect through habitat modifications and
23 would not substantially reduce the number or restrict the range of the species. In particular, 95% of
24 the loss of foraging habitat effects involve the conversion of one habitat type to another form of
25 suitable foraging habitat. Therefore, the loss of habitat or potential mortality under this alternative
26 would have a less-than-significant impact on white-tailed kite.

27 **Impact BIO-101: Effects on White-Tailed Kite Associated with Electrical Transmission** 28 **Facilities**

29 There are several known occurrences of nesting white-tailed kite within 5 miles of the proposed
30 transmission line alignment. While white-tailed kite flight behavior puts them regularly within the
31 range of heights proposed for the new transmission lines (50 to 110 feet), their keen vision and high
32 maneuverability substantially reduce powerline collision risk for the species. Like other diurnal
33 raptors, white-tailed kites have highly developed eyesight (Jones et al. 2007), allowing them to
34 detect small prey while hunting from relatively high altitudes. Keen eyesight also allows for
35 detection and avoidance of other aerial objects, including above-ground utility lines. Like many
36 other falcons, the white-tailed kite has long, narrow, tapered wings and body size that allow for
37 efficient soaring flight and highly developed aerial maneuverability. White-tailed kite are at low risk
38 of bird strike mortality from the construction of new transmission lines based on its general
39 maneuverability, its keen eyesight, and lack of flocking behavior (BDCP Appendix 5.J, Attachment
40 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).
41 Marking transmission lines with flight diverters that make the lines more visible to birds has been
42 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated
43 that marking devices in the Central Valley could reduce avian mortality by 60%. With the
44 implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines would be fitted with

1 flight diverters, which would substantially reduce any risk of collision with lines. **NEPA Effects:** The
 2 construction and presence of new transmission lines would not represent an adverse effect because
 3 the risk of bird strike is considered to be minimal based on the species' general maneuverability,
 4 keen eyesight, and lack of flocking behavior. In addition, *AMM20 Greater Sandhill Crane* contains the
 5 commitment to place bird strike diverters on all new powerlines, which would eliminate or nearly
 6 eliminate the risk of mortality from bird strike for white-tailed kite as a result of the project.
 7 Therefore, the construction and operation of new transmission lines under Alternative 1B would not
 8 result in an adverse effect on white-tailed kite.

9 **CEQA Conclusion:** The construction and presence of new transmission lines would not represent a
 10 significant impact because the risk of bird strike is considered to be minimal based on the species'
 11 general maneuverability, keen eyesight, and lack of flocking behavior. In addition, *AMM20 Greater*
 12 *Sandhill Crane* contains the commitment to place bird strike diverters on all new powerlines, which
 13 would eliminate or nearly eliminate the risk of mortality from bird strike for white-tailed kite as a
 14 result of the project. Therefore, the construction and operation of new transmission lines under
 15 Alternative 1B would result in a less-than-significant impact on white-tailed kite.

16 **Impact BIO-102: Indirect Effects of Plan Implementation on White-Tailed Kite**

17 White-tailed kite nesting habitat within the vicinity of proposed construction areas could be
 18 indirectly affected by construction activities. Construction noise above background noise levels
 19 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
 20 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
 21 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
 22 which these noise levels could affect white-tailed kite. Indirect effects associated with construction
 23 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
 24 disturbing operations outside the project footprint but within 1,300 feet from the construction edge.
 25 If white-tailed kite were to nest in or adjacent to work areas, construction and subsequent
 26 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting
 27 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM39 White-*
 28 *Tailed Kite* would require preconstruction surveys, and if detected, 200-yard no-disturbance buffers
 29 would be established around active nests. The use of mechanical equipment during water
 30 conveyance facilities construction could cause the accidental release of petroleum or other
 31 contaminants that could affect white-tailed kite in the surrounding habitat. The inadvertent
 32 discharge of sediment or excessive dust adjacent to white-tailed kite habitat could also affect the
 33 species. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
 34 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff
 35 from the construction area and negative effects of dust on active nests.

36 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
 37 mercury in avian species, including white-tailed kite. Marsh (tidal and nontidal) and floodplain
 38 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed
 39 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to
 40 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP
 41 restoration activities that create newly inundated areas could increase bioavailability of mercury
 42 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Increased methylmercury
 43 associated with natural community and floodplain restoration may indirectly affect white-tailed kite
 44 (see BDCP Appendix 5.D, *Contaminants*). However, the potential mobilization or creation of
 45 methylmercury within the study area varies with site-specific conditions and would need to be

1 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-
2 specific Mercury Management Plans. Site-specific restoration plans that address the creation and
3 mobilization of mercury, as well as monitoring and adaptive management as described in CM12
4 would be available to address the uncertainty of methylmercury levels in restored tidal marsh and
5 potential impacts on white-tailed kite.

6 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
7 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
8 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
9 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
10 2009). The effect of selenium toxicity differs widely between species and also between age and sex
11 classes within a species. In addition, the effect of selenium on a species can be confounded by
12 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
13 2009).

14 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
15 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
16 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
17 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
18 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
19 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
20 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
21 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
22 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
23 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
24 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
25 levels of selenium have a higher risk of selenium toxicity.

26 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
27 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
28 exacerbate bioaccumulation of selenium in avian species, including white-tailed kite. Marsh (tidal
29 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
30 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP
31 restoration activities that create newly inundated areas could increase bioavailability of selenium
32 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
33 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
34 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
35 increases in selenium concentrations in water in the Delta under any alternative. However, it is
36 difficult to determine whether the effects of potential increases in selenium bioavailability
37 associated with restoration-related conservation measures (CM4–CM5) would lead to adverse
38 effects on white-tailed kite.

39 Because of the uncertainty that exists at this programmatic level of review, there could be a
40 substantial effect on white-tailed kite from increases in selenium associated with restoration
41 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
42 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
43 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
44 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
45 management to reduce selenium concentrations and/or bioaccumulation would be evaluated

1 separately for each restoration effort as part of design and implementation. This avoidance and
2 minimization measure would be implemented as part of the tidal habitat restoration design
3 schedule.

4 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
5 could reduce white-tailed kite use of modeled habitat adjacent to work areas. Moreover, operation
6 and maintenance of the water conveyance facilities, including the transmission facilities, could result
7 in ongoing but periodic postconstruction disturbances that could affect white-tailed kite use of the
8 surrounding habitat. Noise, potential spills of hazardous materials, increased dust and
9 sedimentation, and operations and maintenance of the water conveyance facilities under Alternative
10 1B would not have an adverse effect on white-tailed kite with the implementation of AMM1–AMM7,
11 and *AMM39 White-Tailed Kite*. Tidal habitat restoration could result in increased exposure of white-
12 tailed kite to selenium. This effect would be addressed through the implementation of *AMM27*
13 *Selenium Management* which would provide specific tidal habitat restoration design elements to
14 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
15 indirect effects associated with noise and visual disturbances, potential spills of hazardous material,
16 and increased exposure to selenium from Alternative 1B implementation would not have an adverse
17 effect on white-tailed kite. Tidal habitat restoration is unlikely to have an adverse effect on white-
18 tailed kite through increased exposure to methylmercury, as kites currently forage in tidal marshes
19 where elevated methylmercury levels exist. However, it is unknown what concentrations of
20 methylmercury are harmful to the species and the potential for increased exposure varies
21 substantially within the study area. Site-specific restoration plans in addition to monitoring and
22 adaptive management, described in *CM12 Methylmercury Management*, would address the
23 uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning phase of
24 marsh restoration would be the appropriate place to assess the potential for risk of methylmercury
25 exposure for white-tailed kite, once site specific sampling and other information could be developed.

26 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
27 operations and maintenance of the water conveyance facilities under Alternative 1B would have a
28 less-than-significant impact on white-tailed kite with the implementation of *AMM39 White-Tailed*
29 *Kite*, and AMM1–AMM7. Tidal habitat restoration could result in increased exposure of white-tailed
30 kite to selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
31 *Management* which would provide specific tidal habitat restoration design elements to reduce the
32 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
33 implementation of tidal natural communities restoration or floodplain restoration could result in
34 increased exposure of white-tailed kite to methylmercury. However, it is unknown what
35 concentrations of methylmercury are harmful to this species. *CM12 Methylmercury Management*
36 includes provisions for project-specific Mercury Management Plans. Site-specific restoration plans
37 that address the creation and mobilization of mercury, as well as monitoring and adaptive
38 management as described in *CM12*, would better inform potential impacts and address the
39 uncertainty of methylmercury levels in restored tidal marsh in the study area on white-tailed kite.
40 With these measures in place, the indirect effects associated with noise and visual disturbances,
41 potential spills of hazardous material, and increased exposure to selenium from Alternative 1B
42 implementation would have a less-than-significant impact on white-tailed kite.

1 **Impact BIO-103: Periodic Effects of Inundation of White-Tailed Kite Habitat as a Result of**
2 **Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations related to *CM2 Yolo Bypass Fisheries*
4 *Enhancement* would increase the frequency and duration of inundation on approximately 48–82
5 acres of modeled white-tailed kite nesting habitat and 3,030–6,651 acres of modeled white-tailed
6 kite foraging habitat (Table 12-1B-41). During inundation years, affected cultivated lands and
7 grassland would not be available as foraging habitat until prey populations have re-inhabited
8 inundated areas. This would result in temporary periodic reduction in availability of foraging
9 habitat. If late-season Fremont Weir operations were to preclude the planting of some crop types,
10 there could be a further loss of foraging habitat value if the crop type that would have been planted
11 would provide greater foraging habitat value than the fallowed fields. No known white-tailed kite
12 nest sites would be affected, and increased periodic flooding is not expected to cause any adverse
13 effect on nest sites that may be within the inundation area because existing trees already withstand
14 floods in the area, the increase in inundation frequency and duration is expected to remain within
15 the range of tolerance of riparian trees, and any nest sites would be located above floodwaters.

16 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
17 inundation of up to approximately 230 acres of modeled white-tailed kite nesting habitat and 7,402
18 acres of modeled white-tailed kite foraging habitat (Table 12-1B-41). Inundation of foraging habitat
19 could result in a periodic reduction of available foraging habitat due to the reduction in available
20 prey. Following draw-down, inundated habitats are expected to recover and provide suitable
21 foraging conditions until the following inundation period. Thus, this is considered a periodic impact
22 that is unlikely to affect white-tailed kite distribution and abundance, or foraging use of the Plan
23 Area.

24 Periodic inundation of floodplains (through CM2 and CM5) would be expected to restore a more
25 natural flood regime in support of riparian vegetation types that support white-tailed kite nesting
26 habitat. No adverse effects of inundation on white-tailed kite riparian habitat are expected because
27 valley/foothill riparian vegetation is expected to benefit from seasonal inundation.

28 **NEPA Effects:** Although foraging habitat would be periodically unavailable to white-tailed kite
29 because of CM2 and CM5 implementation, inundated habitats are expected to recover following
30 draw-down. Any effects are considered short-term and would not result in an adverse effect.

31 **CEQA Conclusion:** Although foraging habitat would be periodically unavailable to white-tailed kite
32 because of CM2 and CM5 implementation, inundated habitats are expected to recover following
33 draw-down. Any effects are considered short-term and would be expected to have a less-than-
34 significant impact on white-tailed kite.

35 **Yellow-Breasted Chat**

36 This section describes the effects of Alternative 1B, including water conveyance facilities
37 construction and implementation of other conservation components, on yellow-breasted chat.
38 Yellow-breasted chat modeled habitat includes suitable nesting and migratory habitat as those plant
39 alliances from the valley/foothill riparian modeled habitat that contain a shrub component and an
40 overstory component. Primary nesting and migratory habitat is qualitatively distinguished from
41 secondary habitat in Delta areas as those plant associations that support a greater percentage of a
42 suitable shrub cover, particularly blackberry, and California wild rose, and have an open to
43 moderately dense overstory canopy, using data from Hickson and Keeler-Wolf (2007). No

1 distinction is made between primary and secondary habitat for Suisun Marsh/Yolo Basin habitats
2 because supporting information is lacking. For this reason, the effects analysis only provides the
3 breakdown between primary and secondary habitat in the habitat loss totals and associated tables,
4 and does not provide this breakdown in the text by activity or effect type.

5 Construction and restoration associated with Alternative 1B conservation measures would result in
6 both temporary and permanent losses of yellow-breasted chat modeled habitat as indicated in Table
7 12-1B-42. Full implementation of Alternative 1B would also include the following conservation
8 actions over the term of the BDCP to benefit the yellow-breasted chat (BDCP Chapter 3, Section 3.3,
9 *Biological Goals and Objectives*).

- 10 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
11 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
12 associated with CM7).
- 13 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
14 10 (Objective VFRNC1.2, associated with CM3).
- 15 ● Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal
16 overlap among vegetation components and over adjacent riverine channels, freshwater
17 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM7).
- 18 ● Maintain at least 1,000 acres of early- to mid-successional vegetation with a well-developed
19 understory of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2,
20 associated with CM7).

21 As explained below, with the restoration or protection of these amounts of habitat, in addition to
22 management activities that would enhance these natural communities for the species and
23 implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least*
24 *Bell's Vireo, Western Yellow-Billed Cuckoo*, impacts on yellow-breasted chat would not be adverse for
25 NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-1B-42. Changes in Yellow-Breasted Chat Modeled Habitat Associated with Alternative 1B (acres)^a

Conservation Measure ^b	Nesting and Migratory Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	9	9	21	21	NA	NA
	Secondary	15	15	8	8	NA	NA
	Suisun Marsh/ Upper Yolo Bypass	0	0	0	0	NA	NA
Total Impacts CM1		24	24	29	29		
CM2–CM18	Primary	96	214	58	73	19–38	92
	Secondary	209	357	0	6	6–18	56
	Suisun Marsh/ Upper Yolo Bypass	76	85	29	29	23–32	0
Total Impacts CM2–CM18		381	656	87	108	48–88	148
Total Primary		105	223	79	94		
Total Secondary		224	372	8	14		
Total Suisun Marsh/Upper Yolo Bypass		76	85	29	29		
TOTAL IMPACTS		405	680	116	137	48–88	148

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-104: Loss or Conversion of Habitat for and Direct Mortality of Yellow-Breasted**
5 **Chat**

6 Alternative 1B conservation measures would result in the combined permanent and temporary loss
7 of up to 817 acres of modeled nesting and migratory habitat for yellow-breasted chat (680 acres of
8 permanent loss, 137 acres of temporary loss) (Table 12-1B-42). Conservation measures that would
9 result in these losses are conveyance facilities and transmission line construction, and establishment
10 and use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal
11 habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management
12 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,
13 could result in local adverse habitat effects. In addition, maintenance activities associated with the
14 long-term operation of the water conveyance facilities and other BDCP physical facilities could
15 degrade or eliminate yellow-breasted chat habitat. Each of these individual activities is described
16 below. A summary statement of the combined impacts and NEPA effects, and a CEQA conclusion
17 follow the individual conservation measure discussions.

- 1 ● *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would
2 result in the combined permanent and temporary loss of up 30 acres of primary habitat (9 acres
3 of permanent loss, 21 acres of temporary loss). In addition, 22 acres of secondary habitat would
4 be removed (10 acres of permanent loss, 12 acres of temporary loss) (Table 12-1B-42). The
5 habitat would be removed at multiple locations from the north Delta to the east Delta and in the
6 vicinity of Clifton Court Forebay. Almost all of the losses would occur on the borders of
7 waterways. In the north Delta, most of the permanent loss would occur where Intakes 1–5
8 encroach on the Sacramento River’s east bank between Freeport and Courtland. The riparian
9 areas here are very small patches, some dominated by valley oak and others by nonnative trees
10 and scrub vegetation. In the east Delta, small permanent losses would occur from canal
11 construction just south of Twin Cities Road and just north of Walnut Grove Road. A small area of
12 riparian habitat (mostly blackberries) would be permanently removed in the south Delta at the
13 new forebay construction site. The temporary riparian losses would occur at the intake sites
14 along the Sacramento River and at temporary siphon work areas where the canal would cross
15 Beaver Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment Slough, Railroad
16 Canal, and Middle River just south of Victoria Canal. Tunnel construction at Old River just south
17 of Victoria Canal would also temporarily remove mixed willows and brambles. There are no
18 occurrences of yellow-breasted chat that overlap with the CM1 construction footprint. The
19 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell’s Vireo, Western*
20 *Yellow-Billed Cuckoo* would minimize effects on yellow-breasted chat if they were to nest within
21 or adjacent to the construction footprint. Refer to the Terrestrial Biology Map Book for a
22 detailed view of Alternative 1B construction locations.
- 23 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction would permanently remove
24 approximately 83 acres and temporarily remove 88 acres of yellow-breasted chat habitat in the
25 Yolo Bypass in CZ 2. The loss is expected to occur during the first 10 years of Alternative 1B
26 implementation.
- 27 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
28 inundation would permanently remove an estimated 545 acres of modeled yellow-breasted chat
29 habitat in CZ 1, 2, 6, and 11. This total is composed of an estimated 182 acres of primary nesting
30 and migratory habitat, 349 acres of secondary nesting and migratory habitat, and 14 acres of
31 nesting and migratory habitat in the Suisun Marsh and upper Yolo Bypass areas.
- 32 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
33 seasonally inundated floodplain would permanently and temporarily remove approximately 49
34 acres of modeled yellow-breasted chat habitat in CZ 7. This total is comprised of 28 acres of
35 primary nesting and migratory habitat and 21 acres of secondary nesting and migratory habitat.
36 Based on the riparian habitat restoration assumptions, approximately 3,000 acres of
37 valley/foothill riparian habitat would be restored as a component of seasonally inundated
38 floodplain restoration actions. The actual number of acres that would be restored may differ
39 from these estimates, depending on how closely the outcome of seasonally inundated floodplain
40 restoration approximates the assumed outcome. Once this restored riparian vegetation has
41 developed habitat functions, a portion of it would be suitable to support yellow-breasted chat
42 habitat.
- 43 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
44 activities that could be implemented in protected yellow-breasted chat habitats would be
45 expected to maintain and improve the functions of the habitat over the term of the BDCP.

1 Yellow-breasted chat would be expected to benefit from the increase in protected habitat, which
2 would maintain conditions favorable for the chat's use of the Plan Area.

3 Habitat management- and enhancement-related activities could disturb yellow-breasted chat
4 nests if they are present near work sites. Equipment operation could destroy nests, and noise
5 and visual disturbances could lead to their abandonment, resulting in mortality of eggs and
6 nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*
7 *Billed Cuckoo* would ensure that these activities do not result in direct mortality of yellow-
8 breasted chat or other adverse effects.

9 Occupied habitat would be monitored to determine if there is a need to implement controls on
10 brood parasites (brown-headed cowbird) or nest predators. If implemented, these actions
11 would be expected to benefit the yellow-breasted chat by removing a potential stressor that
12 could, if not addressed, adversely affect the stability of newly established populations.

13 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*
14 *and Management* that are designed to enhance wildlife values in restored riparian habitats may
15 result in localized ground disturbances that could temporarily remove small amounts of yellow-
16 breasted chat habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
17 road and other infrastructure maintenance activities, are expected to have minor adverse effects
18 on available yellow-breasted chat habitat and are expected to result in overall improvements to
19 and maintenance of yellow-breasted chat habitat values over the term of the BDCP.

- 20 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
21 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
22 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding
23 habitat. Maintenance activities would include vegetation management, levee and structure
24 repair, and re-grading of roads and permanent work areas. These effects, however, would be
25 reduced by AMMs and conservation actions as described below.
- 26 ● Injury and Direct Mortality: Construction is not expected to result in direct mortality of yellow-
27 breasted chat because adults and fledged young are expected to occur only in very small
28 numbers and, if present, would avoid contact with construction and other equipment. If yellow-
29 breasted chat were to nest in the vicinity of construction activities, equipment operation could
30 destroy nests and noise and visual disturbances could lead to nest abandonment. *AMM22 Suisun*
31 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would avoid
32 and minimize this effect.
- 33 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,
34 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.
35 Temporarily affected areas would be restored as riparian habitat within 1 year following
36 completion of construction activities. Although the effects are considered temporary, the
37 restored riparian habitat would require 5 years to several decades, for ecological succession to
38 occur and for restored riparian habitat to functionally replace habitat that has been affected. The
39 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;
40 therefore, the replaced riparian vegetation would be expected to have structural components
41 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial
42 restoration activities are complete.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
3 included.

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction is being evaluated at the project level, the near-
6 term BDCP conservation strategy has been evaluated to determine whether it would provide
7 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
8 effects of construction would not be adverse under NEPA. The Plan would remove 521 acres of
9 modeled habitat for yellow-breasted chat in the study area in the near-term. These effects would
10 result from the construction of the water conveyance facilities (CM1, 53 acres of modeled nesting
11 and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
12 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
13 *Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses would
14 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value
15 habitat for the species.

16 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
17 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter
18 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
19 habitat. Using these ratios would indicate that 53 acres of valley/foothill riparian habitat should be
20 restored/created and 53 acres should be protected to compensate for the CM1 losses of yellow-
21 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres
22 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of
23 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
24 protection).

25 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
26 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These
27 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as
28 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
29 yellow-breasted chat. The majority of the riparian restoration acres would occur in CZ 7 as part of a
30 reserve system with extensive wide bands or large patches of valley/foothill riparian natural
31 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Goals
32 and objectives in the Plan for riparian restoration also include the restoration, maintenance and
33 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among
34 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and
35 grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural habitat
36 requirements, so only the early- to mid-successional portions of the restored and protected riparian
37 natural would be expected to provide suitable habitat characteristics for the species. These natural
38 community biological goals and objectives would inform the near-term protection and restoration
39 efforts and represent performance standards for considering the effectiveness of conservation
40 actions for the species.

41 The acres of protection contained in the near-term Plan goals and the additional detail in the
42 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be
43 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other
44 conservation measures. The restored riparian habitat could require 5 years to several decades, for

1 ecological succession to occur and for restored riparian habitat to functionally replace habitat that
2 has been affected. However, because the modeled habitat impacted largely consists of small patches
3 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have an adverse
4 population-level effect on the species in the near-term time period.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
6 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
7 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
8 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
9 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo*. All of
10 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
11 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
12 which have since been updated and which are provided in Appendix 3B, *Environmental*
13 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

14 **Late Long-Term Timeframe**

15 The habitat model indicates that the study area supports approximately 14,547 acres of modeled
16 nesting and migratory habitat for yellow-breasted chat. Alternative 1B as a whole would result in
17 the permanent loss of and temporary effects on 817 acres of modeled habitat (6% of the modeled
18 habitat in the Plan Area). These losses would occur from the construction of the water conveyance
19 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
20 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
21 would be in fragmented riparian habitat throughout the study area.

22 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
23 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
24 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
25 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
26 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
27 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted
28 chat has specific structural habitat requirements, so only the early- to mid-successional portions of
29 the restored and protected riparian natural would be expected to provide suitable habitat
30 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to
31 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to
32 natural erosion and deposition, which would provide conditions conducive to the establishment of
33 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if
34 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted
35 population in the Plan Area, a cowbird control program would be implemented through *CM11*
36 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian
37 restoration also include the maintenance and enhancement of structural heterogeneity (Objective
38 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

39 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
40 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
41 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted
42 chat.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
44 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
 3 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of
 4 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 5 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
 6 which have since been updated and which are provided in Appendix 3B, *Environmental*
 7 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

8 **NEPA Effects:** The loss of western yellow-breasted chat habitat and potential direct mortality of this
 9 special-status species would represent an adverse effect in the absence of other conservation
 10 actions. The restored riparian habitat would require 5 years to several decades for ecological
 11 succession to occur and a similar period of time for restored riparian habitat to functionally replace
 12 habitat that has been affected. However, the habitat that would be lost consists of small, fragmented
 13 riparian stands that would not provide high-value habitat for the species. And because the nesting
 14 and migratory habitat that would be lost is small relative to the species range throughout California
 15 and North America, BDCP actions would not be expected to have an adverse population-level effect
 16 on the species. With habitat protection and restoration associated with CM3, CM7, and CM11, guided
 17 by biological goals and objectives and by *AMM1 Worker Awareness Training, AMM2 Construction Best*
 18 *Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion*
 19 *and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6*
 20 *Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-*
 21 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be in place throughout
 22 the construction period, the effects of habitat loss and potential mortality on yellow-breasted chat
 23 under Alternative 1B would not be adverse.

24 **CEQA Conclusion:**

25 **Near-Term Timeframe**

26 Because the water conveyance facilities construction is being evaluated at the project level, the near-
 27 term BDCP conservation strategy has been evaluated to determine whether it would provide
 28 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
 29 impact of construction would be less than significant under CEQA. The Plan would remove 521 acres
 30 of modeled habitat for yellow-breasted chat in the study area in the near-term. These effects would
 31 result from the construction of the water conveyance facilities (CM1, 53 acres of modeled nesting
 32 and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
 33 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*
 34 *Restoration—468 acres of modeled nesting and migratory habitat*). These habitat losses would
 35 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value
 36 habitat for the species.

37 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
 38 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter
 39 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
 40 habitat. Using these ratios would indicate that 53 acres of valley/foothill riparian habitat should be
 41 restored/created and 53 acres should be protected to compensate for the CM1 losses of yellow-
 42 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres
 43 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of

1 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
2 protection).

3 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
4 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3). These
5 conservation actions are associated with CM3 and CM7 and would occur in the same timeframe as
6 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
7 yellow-breasted chat. The majority of the riparian restoration acres would occur in CZ 7 as part of a
8 reserve system with extensive wide bands or large patches of valley/foothill riparian natural
9 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Goals
10 and objectives in the Plan for riparian restoration also include the restoration, maintenance and
11 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among
12 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and
13 grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural habitat
14 requirements, so only the early- to mid-successional portions of the restored and protected riparian
15 natural would be expected to provide suitable habitat characteristics for the species. These natural
16 community biological goals and objectives would inform the near-term protection and restoration
17 efforts and represent performance standards for considering the effectiveness of conservation
18 actions for the species.

19 The acres of protection contained in the near-term Plan goals and the additional detail in the
20 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be
21 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other
22 conservation measures. The restored riparian habitat could require 5 years to several decades, for
23 ecological succession to occur and for restored riparian habitat to functionally replace habitat that
24 has been affected. However, because the modeled habitat impacted largely consists of small patches
25 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have a significant
26 population-level impact on the species in the near-term time period.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
31 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo*. All of
32 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
33 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
34 which have since been updated and which are provided in Appendix 3B, *Environmental*
35 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

36 ***Late Long-Term Timeframe***

37 The habitat model indicates that the study area supports approximately 14,547 acres of modeled
38 nesting and migratory habitat for yellow-breasted chat. Alternative 1B as a whole would result in
39 the permanent loss of and temporary effects on 817 acres of modeled habitat (6% of the modeled
40 habitat in the Plan Area). These losses would occur from the construction of the water conveyance
41 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
42 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
43 would be in fragmented riparian habitat throughout the study area.

1 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
2 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
3 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
4 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
5 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
6 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted
7 chat has specific structural habitat requirements, so only the early- to mid-successional portions of
8 the restored and protected riparian natural would be expected to provide suitable habitat
9 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to
10 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to
11 natural erosion and deposition, which would provide conditions conducive to the establishment of
12 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if
13 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted
14 population in the Plan Area, a cowbird control program would be implemented through *CM11*
15 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian
16 restoration also include the maintenance and enhancement of structural heterogeneity (Objective
17 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

18 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
19 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
20 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted
21 chat.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
26 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
27 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
28 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
29 which have since been updated and which are provided in Appendix 3B, *Environmental*
30 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

31 In the absence of other conservation actions, the effects on least Bell's vireo and yellow warbler
32 habitat from Alternative 1B would represent an adverse effect as a result of habitat modification and
33 potential for direct mortality of special-status species. Considering Alternative 1B's protection and
34 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
35 suitable to compensate for habitats lost to construction and restoration activities, and with
36 implementation of AMM1-AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least*
37 *Bell's Vireo, Western Yellow-Billed Cuckoo*, the loss of habitat or direct mortality through
38 implementation of Alternative 1B would not result in a substantial adverse effect through habitat
39 modifications and would not substantially reduce the number or restrict the range of the species.
40 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-
41 significant impact on western yellow-breasted chat.

1 **Impact BIO-105: Fragmentation of Yellow-Breasted Chat Habitat as a Result of Constructing**
2 **the Water Conveyance Facilities**

3 Grading, filling, contouring, and other initial ground-disturbing activities for water conveyance
4 facilities construction may temporarily fragment modeled yellow-breasted chat habitat. This could
5 temporarily reduce the extent of and functions supported by the affected habitat. Because of the
6 current infrequent occurrence and small numbers of yellow-breasted chat in the Plan Area, and
7 because *CM5 Seasonally Inundated Floodplain Restoration* would restore and protect contiguous
8 high-value riparian habitat in CZ 7, any such habitat fragmentation is expected to have no or
9 minimal effect on the species.

10 **NEPA Effects:** Temporary fragmentation of habitat would not result in an adverse effect on yellow-
11 breasted chat. The habitat functions for the species would be significantly improved through the
12 implementation of CM5, which would restore and protect large contiguous patches of riparian
13 habitat.

14 **CEQA Conclusion:** Temporary fragmentation of habitat would have a less-than-significant impact on
15 yellow-breasted chat. The habitat functions for the species would be significantly improved through
16 the implementation of CM5, which would restore and protect large contiguous patches of riparian
17 habitat.

18 **Impact BIO-106: Effects on Yellow-Breasted Chat Associated with Electrical Transmission**
19 **Facilities**

20 Yellow-breasted chats are migratory and usually arrive at California breeding grounds in April from
21 their wintering grounds in Mexico and Guatemala. Departure for wintering grounds occurs from
22 August to September. These are periods of relative high visibility when the risk of powerline
23 collisions will be low. The species' small, relatively maneuverable body; its foraging behavior; and its
24 presence in the Plan Area during the summer contribute to a low risk of collision with the proposed
25 transmission lines (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at*
26 *Proposed BDCP Transmission Lines*). Marking transmission lines with flight diverters that make the
27 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
28 Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian
29 mortality by 60%. All new project transmission lines would be fitted with flight diverters. Bird flight
30 diverters would further reduce any potential for powerline collisions.

31 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
32 adverse effect on yellow-breasted chat because the risk of bird strike is considered to be minimal
33 based on the species' small, relatively maneuverable body; its foraging behavior; and its presence in
34 the study area during the summer when visibility is high. Under *AMM20 Greater Sandhill Crane*, all
35 new project transmission lines would be fitted with bird diverters, which would further reduce any
36 potential for powerline collisions.

37 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
38 significant impact on yellow-breasted chat because the risk of bird strike is considered to be
39 minimal based on the species' small, relatively maneuverable body; its foraging behavior; and its
40 presence in the study area during the summer when visibility is high. Under *AMM20 Greater Sandhill*
41 *Crane*, all new project transmission lines would be fitted with bird diverters, which would further
42 reduce any potential for powerline collisions.

1 **Impact BIO-107: Indirect Effects of Plan Implementation on Yellow-Breasted Chat**

2 Noise and visual disturbances associated with construction-related activities could result in
 3 temporary disturbances that affect yellow-breasted chat use of modeled habitat adjacent to
 4 proposed construction areas. Construction noise above background noise levels (greater than 50
 5 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,
 6 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
 7 *Crane*, Table 4), although there are no available data to determine the extent to which these noise
 8 levels could affect yellow-breasted chat. Indirect effects associated with construction include noise,
 9 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
 10 operations outside the project footprint but within 1,300 feet of the construction edge. If yellow-
 11 breasted chat were to nest in or adjacent to work areas, construction and subsequent maintenance-
 12 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and
 13 reduce the functions of suitable nesting habitat for these species. These potential effects would be
 14 minimized with incorporation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
 15 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP, which would ensure 250-foot no-disturbance
 16 buffers were established around active nests. The use of mechanical equipment during water
 17 conveyance facilities construction could cause the accidental release of petroleum or other
 18 contaminants that could affect yellow-breasted chat in the surrounding habitat. The inadvertent
 19 discharge of sediment or excessive dust adjacent to yellow-breasted chat habitat could also affect
 20 the species. *AMM1-AMM7*, including *AMM2 Construction BMPs and Monitoring*, in addition to
 21 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*,
 22 would minimize the likelihood of such spills from occurring and ensure that measures were in place
 23 to prevent runoff from the construction area and any adverse effects of dust on active nests. If
 24 present, yellow-breasted chat individuals could be temporarily affected by noise and visual
 25 disturbances adjacent to water conveyance construction sites, *AMM22* would minimize this effect on
 26 the species.

27 **Methylmercury Exposure:** Yellow-breasted chat modeled habitat includes primarily middle marsh
 28 habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is also used if it is
 29 of high value, and low marsh provides foraging habitat for the species. Chats are a top predator in
 30 the benthic food chain; they forage by probing their beaks into the mud (Zembal and Fancher 1988)
 31 and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects (Eddleman and
 32 Conway 1998).

33 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
 34 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
 35 species would overestimate the effects on yellow-breasted chat. Organisms feeding within pelagic-
 36 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
 37 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
 38 segregation (Grimaldo et al. 2009).

39 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
 40 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
 41 Thus, Alternative 1B restoration activities that create newly inundated areas could increase
 42 bioavailability of mercury. Concentrations of methylmercury known to be toxic to bird embryos
 43 have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003);
 44 however, currently, it is unknown how much of the sediment-derived methylmercury enters the
 45 food chain in Suisun Marsh or what tissue concentrations are actually harmful to the yellow-

1 breasted chat. In general, the highest methylation rates are associated with high tidal marshes that
 2 experience intermittent wetting and drying and associated anoxic conditions (Alpers et al. 2008). In
 3 Suisun Marsh, the conversion of managed wetlands to tidal wetlands is expected to result in an
 4 overall reduction in mercury methylation. Because of the complex and very site-specific factors that
 5 determine if mercury becomes mobilized into the foodweb, *CM12 Methylmercury Management* is
 6 included to provide for site-specific evaluation for each restoration project. If a project is identified
 7 where there is a high potential for methylmercury production that could not be fully addressed
 8 through restoration design and adaptive management, alternate restoration areas would be
 9 considered. CM12 would be implemented in coordination with other similar efforts to address
 10 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
 11 conservation measure would include the following actions.

- 12 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
 13 mercury methylation and bioavailability
- 14 ● Define design elements that minimize conditions conducive to generation of methylmercury in
 15 restored areas.
- 16 ● Define adaptive management strategies that can be implemented to monitor and minimize
 17 actual postrestoration creation and mobilization of methylmercury.

18 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 19 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 20 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 21 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 22 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 23 classes within a species. In addition, the effect of selenium on a species can be confounded by
 24 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 25 2009).

26 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
 27 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
 28 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
 29 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
 30 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
 31 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
 32 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
 33 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
 34 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
 35 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
 36 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
 37 have a higher risk of selenium toxicity.

38 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 39 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 40 exacerbate bioaccumulation of selenium in avian species, including yellow-breasted chat. Marsh
 41 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
 42 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
 43 Alternative 1B restoration activities that create newly inundated areas could increase bioavailability
 44 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in

1 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
2 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
3 increases in selenium concentrations in water in the Delta under any alternative. However, it is
4 difficult to determine whether the effects of potential increases in selenium bioavailability
5 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
6 effects on yellow-breasted chat.

7 Because of the uncertainty that exists at this programmatic level of review, there could be a
8 substantial effect on yellow-breasted chat from increases in selenium associated with restoration
9 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
10 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
11 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
12 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
13 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
14 separately for each restoration effort as part of design and implementation. This avoidance and
15 minimization measure would be implemented as part of the tidal habitat restoration design
16 schedule.

17 **NEPA Effects:** The potential for noise and visual disturbance, hazardous spills, increased dust and
18 sedimentation, and the potential impacts of operations and maintenance of the water conveyance
19 facilities would not result in an adverse effect on yellow-breasted chat with the incorporation of
20 *AMM1–AMM7* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
21 *Yellow-Billed Cuckoo* into the BDCP.

22 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
23 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
24 the yellow-breasted chat foodweb to methylmercury in these areas, with the level of exposure
25 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
26 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
27 to reduce the overall production of methylmercury, resulting in a net benefit to the species.
28 Implementation of CM12, which contains measures to assess the amount of mercury before project
29 development, followed by appropriate design and adaptation management, would minimize the
30 potential for increased methylmercury exposure, and would result in no adverse effect on the
31 species.

32 Tidal habitat restoration could result in increased exposure of yellow-breasted chat to selenium.
33 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
34 would provide specific tidal habitat restoration design elements to reduce the potential for
35 bioaccumulation of selenium and its bioavailability in tidal habitats.

36 **CEQA Conclusion:** The potential for noise and visual disturbance, hazardous spills, increased dust
37 and sedimentation, and the potential impacts of operations and maintenance of the water
38 conveyance facilities would have a less-than-significant impact on yellow-breasted chat with the
39 incorporation of *AMM1–AMM7* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
40 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP.

41 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
42 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
43 the yellow-breasted chat foodweb to methylmercury in these areas, with the level of exposure
44 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.

1 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
2 to reduce the overall production of methylmercury, resulting in a net benefit to the species.
3 Implementation of CM12, which contains measures to assess the amount of mercury before project
4 development, followed by appropriate design and adaptation management, would minimize the
5 potential for increased methylmercury exposure, and would result in no adverse effect on the
6 species.

7 Tidal habitat restoration could result in increased exposure of yellow-breasted chat to selenium.
8 With implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
9 restoration design elements to reduce the potential for bioaccumulation of selenium and its
10 bioavailability in tidal habitats, the impact of increased exposure to selenium would be less than
11 significant.

12 **Impact BIO-108: Periodic Effects of Inundation of Yellow-Breasted Chat Habitat as a Result of** 13 **Implementation of Conservation Components**

14 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
15 duration of inundation of approximately 48–88 acres of modeled yellow-breasted chat nesting and
16 migratory habitat. No adverse effects of increased inundation frequency on yellow-breasted chat or
17 its habitat are expected because the chat breeding period is outside the period the weir would be
18 operated. Moreover, riparian vegetation supporting habitat has persisted under the existing Yolo
19 Bypass flooding regime, and changes to frequency and inundation would be within the tolerance of
20 these vegetation types.

21 Based on hypothetical floodplain restoration, CM5 could result in periodic inundation of up to 148
22 acres of modeled yellow-breasted chat habitat. Inundation of restored floodplains is not expected to
23 affect yellow-breasted chat or its habitat because the chat breeding period is outside the period the
24 floodplains would likely be inundated. In addition, providing for periodic inundation of floodplains
25 is expected to restore a more natural flood regime in support of riparian vegetation types that
26 provide nesting and migratory habitat for yellow-breasted chat. The overall effect of seasonal
27 inundation in existing riparian natural communities is likely to be beneficial because, historically,
28 flooding was the main natural disturbance regulating ecological processes in riparian areas, and
29 flooding promotes the germination and establishment of many native riparian plants.

30 **NEPA Effects:** Increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain
31 restoration would be expected to create more natural flood regimes that would support riparian
32 habitat, which would not result in an adverse effect on yellow breasted chat.

33 **CEQA Conclusion:** Periodic inundation would have a less-than-significant impact on yellow-breasted
34 chat because inundation would occur outside of the breeding season and would not be expected to
35 adversely modify habitat or result in direct mortality of the species. Flooding promotes the
36 germination and establishment of many native riparian plants. Therefore, the overall impact of
37 seasonal inundation would be beneficial for yellow-breasted chat.

38 **Cooper's Hawk and Osprey**

39 This section describes the effects of Alternative 1B, including water conveyance facilities
40 construction and implementation of other conservation components, on Cooper's hawk and osprey.
41 Although osprey often nest on manmade structures such as telephone poles, and Cooper's hawk will

1 nest in more developed landscapes, modeled nesting habitat for these species is restricted to
2 valley/foothill riparian forest.

3 Construction and restoration associated with Alternative 1B conservation measures would result in
4 both temporary and permanent losses of Cooper's hawk and osprey modeled habitat as indicated in
5 Table 12-1B-43. The majority of the losses would take place over an extended period of time as tidal
6 marsh is restored in the study area. Although restoration for the loss of nesting habitat would be
7 initiated in the same timeframe as the losses, it could take one or more decades for restored habitats
8 to replace the functions of habitat lost. This time lag between impacts and restoration of habitat
9 function would be minimized by specific requirements of *AMM18 Swainson's Hawk*, including the
10 planting of mature trees in the near-term time period. Full implementation of Alternative 1B would
11 include the following conservation actions over the term of the BDCP which would also benefit
12 Cooper's hawk and osprey (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 13 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
14 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
15 associated with CM7)
- 16 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
17 10 (Objective VFRNC1.2, associated with CM3).
- 18 ● Plant and maintain native trees along roadsides and field borders within protected cultivated
19 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 20 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
21 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
22 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
23 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

24 As explained below, with the acres of restoration or protection included in the Plan, in addition to
25 management activities to enhance natural communities for species and implementation of AMM1–
26 AMM7, *AMM18 Swainson's Hawk*, and Mitigation Measure BIO-75, impacts on Cooper's hawk and
27 osprey would not be adverse for NEPA purposes and would be less than significant for CEQA
28 purposes.

1 **Table 12-1B-43. Changes in Cooper’s Hawk and Osprey Modeled Habitat Associated with**
2 **Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	40	40	39	39	NA	NA
Total Impacts CM1		40	40	39	39	NA	NA
CM2–CM18	Nesting	312	507	88	121	48–82	230
Total Impacts CM2–CM18		312	507	88	121	48–82	230
TOTAL IMPACTS		352	547	127	160	48–82	230

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-109: Loss or Conversion of Habitat for and Direct Mortality of Cooper’s Hawk and**
5 **Osprey**

6 Alternative 1B conservation measures would result in the combined permanent and temporary loss
7 of up to 707 acres of modeled nesting habitat (547 acres of permanent loss, 160 acres of temporary
8 loss) habitat for Cooper’s hawk and osprey (Table 12-1B-43). Conservation measures that would
9 result in these losses are *CM1 Water Facilities and Operation* (which would involve construction of
10 conveyance facilities and transmission lines and establishment and use of borrow and spoil areas),
11 *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5*
12 *Seasonally Inundated Floodplain Restoration*. Habitat enhancement and management activities
13 (CM11), which would include ground disturbance or removal of nonnative vegetation, could result
14 in local adverse habitat effects. In addition, maintenance activities associated with the long-term
15 operation of the water conveyance facilities and other BDCP physical facilities could affect Cooper’s
16 hawk and osprey modeled habitat. Each of these individual activities is described below. A summary
17 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
18 conservation measure discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B water conveyance facilities
20 would result in the combined permanent and temporary loss of up to 79 acres of modeled
21 Cooper’s hawk and osprey habitat (Table 12-1B-43). Of the 79 acres of modeled habitat that
22 would be removed for the construction of the conveyance facilities, 40 acres would be a
23 permanent loss and 39 acres would be a temporary loss of habitat. The habitat would be
24 removed at multiple locations from the north Delta to the east Delta and in the vicinity of Clifton
25 Court Forebay. Almost all of the losses would occur on the borders of waterways. In the north
26 Delta, most of the permanent loss would occur where Intakes 1–5 encroach on the Sacramento

1 River's east bank between Freeport and Courtland. The riparian areas here are very small
 2 patches, some dominated by valley oak and others by nonnative trees and scrub vegetation.
 3 Other small patches or narrow bands of riparian vegetation dominated by valley oak, willow,
 4 cottonwood or mixed brambles would be permanently removed by canal construction adjacent
 5 to Intake 1, between Intakes 2 and 4, and just south of Lambert Road. In the east Delta, small
 6 permanent losses would occur from canal construction just south of Twin Cities Road and just
 7 north of Walnut Grove Road. The temporary riparian losses would occur at the intake sites along
 8 the Sacramento River and at temporary siphon work areas where the canal would cross Beaver
 9 Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment Slough, Railroad Canal, and
 10 Middle River just south of Victoria Canal. There are no occurrences of Cooper's hawk or osprey
 11 that overlap with the construction footprint for CM1. Mitigation Measure BIO-75, *Conduct*
 12 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds* would be available
 13 to address potential effects on Cooper's hawk and osprey if either species were to nest in or
 14 adjacent to the construction footprint. Refer to the Terrestrial Biology Map Book for a detailed
 15 view of Alternative 1B construction locations.

- 16 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 17 would result in the combined permanent and temporary loss of up to 170 acres of Cooper's
 18 hawk and osprey nesting habitat (82 acres of permanent loss, 88 acres of temporary loss) in the
 19 Yolo Bypass in CZ 2. Activities through CM2 could involve excavation and grading in
 20 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
 21 riparian losses would occur at the north end of Yolo Bypass where major fish passage
 22 improvements are planned. Excavation to improve water movement in the Toe Drain and in the
 23 Sacramento Weir would also remove potential Cooper's hawk and osprey habitat. The loss is
 24 expected to occur during the first 10 years of Alternative 1B implementation.
- 25 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration could permanently
 26 remove up to 383 acres of potential Cooper's hawk and osprey nesting habitat. Trees would not
 27 be actively removed but tree mortality would be expected over time as areas became tidally
 28 inundated.
- 29 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 30 seasonally inundated floodplain and riparian restoration actions would remove approximately
 31 75 acres of Cooper's hawk and osprey nesting habitat (42 acres of permanent loss, 33 acres of
 32 temporary loss). These losses would be expected after the first 10 years of Alternative 1B
 33 implementation along the San Joaquin River and other major waterways in CZ 7.
- 34 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
 35 enhancement-related activities could disturb Cooper's hawk and osprey nests if they were
 36 present near work sites. A variety of habitat management actions included in CM11 that are
 37 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground
 38 disturbances that could temporarily remove small amounts of Cooper's hawk and osprey habitat
 39 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,
 40 such as removal of nonnative vegetation and road and other infrastructure maintenance, are
 41 expected to have minor effects on available Cooper's hawk and osprey habitat and are expected
 42 to result in overall improvements to and maintenance of habitat values over the term of the
 43 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
 44 and minimized by the AMMs listed below.

1 Permanent and temporary habitat losses from the above conservation measures would
2 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored
3 as riparian habitat within 1 year following completion of construction activities. Although the
4 effects are considered temporary, the restored riparian habitat would require 1 to several
5 decades to functionally replace habitat that has been affected and for trees to attain sufficient
6 size and structure suitable for nesting by Cooper's hawk or osprey. *AMM18 Swainson's Hawk*
7 contains actions described below to reduce the effect of temporal loss of nesting habitat,
8 including the transplanting of mature trees.

- 9 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
10 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
11 disturbances that could affect Cooper's hawk or osprey use of the surrounding habitat.
12 Maintenance activities would include vegetation management, levee and structure repair, and
13 re-grading of roads and permanent work areas. These effects, however, would be reduced by
14 AMM1–AMM7 and conservation actions as described below.
- 15 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in
16 direct mortality of adult or fledged Cooper's hawk or osprey if they were present in the Plan
17 Area, because they would be expected to avoid contact with construction and other equipment.
18 If Cooper's hawk or osprey were to nest in the construction area, construction-related activities,
19 including equipment operation, noise and visual disturbances could affect nests or lead to their
20 abandonment, potentially resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
21 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
22 be available to address these adverse effects on Cooper's hawk and osprey.

23 The following paragraphs summarize the combined effects discussed above and describe other
24 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
25 included.

26 ***Near-Term Timeframe***

27 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
28 the near-term BDCP conservation strategy has been evaluated to determine whether it would
29 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
30 effect of construction would not be adverse under NEPA. The Plan would remove 449 acres (338
31 acres of permanent loss, 111 acres of temporary loss) of Cooper's hawk and osprey nesting habitat
32 in the study area in the near-term. These effects would result from the construction of the water
33 conveyance facilities (CM1, 49 acres), and implementing other conservation measures (*CM2 Yolo*
34 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
35 *Inundated Floodplain Restoration*—400 acres of habitat).

36 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
37 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.
38 Using these ratios would indicate that 49 acres of nesting habitat should be restored/created and 49
39 acres should be protected to compensate for the CM1 losses of modeled Cooper's hawk and osprey
40 habitat. In addition, the near-term effects of other conservation actions would remove 400 acres of
41 modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of
42 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios.

43 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
44 valley/foothill riparian natural community (Table 3-4 in Chapter 3). These conservation actions are

1 associated with CM3, and CM7 and would occur in the same timeframe as the construction and early
 2 restoration losses. The majority of riparian protection and restoration acres would occur in CZ 7 as
 3 part of a reserve system with extensive wide bands or large patches of valley/foothill riparian
 4 natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*).
 5 Riparian restoration would expand the patches of existing riparian forest in order to support nesting
 6 habitat for riparian species. The Plan's objectives would also benefit Cooper's hawk and osprey by
 7 protecting small but essential habitats that occur within cultivated lands, such as tree rows along
 8 field borders or roads, and small clusters of trees in farmyards or rural residences (Objective
 9 CLNC1.3). In addition, the distribution and abundance of potential nest trees would be increased by
 10 planting and maintaining native trees along roadsides and field borders within protected cultivated
 11 lands at a rate of one tree per 10 acres (Objective SWHA2.1).

12 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
 13 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
 14 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored
 15 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but
 16 would require one to several decades to functionally replace habitat that has been affected and for
 17 trees to attain sufficient size and structure suitable for nesting by these species. This time lag
 18 between the removal and restoration of nesting habitat could have a substantial impact on nesting
 19 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,
 20 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
 21 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
 22 habitat could further reduce this limited resource and reduce or restrict the number of active nests
 23 within the study area until restored riparian habitat is sufficiently developed.

24 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
 25 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson's hawk
 26 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
 27 within the 125-acre block are removed. These mature trees would be supplemented with additional
 28 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
 29 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
 30 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
 31 system for every tree 20 feet or taller removed by construction during the near-term period. A
 32 variety of native tree species would be planted to provide trees with differing growth rates,
 33 maturation, and life span. Trees would be planted within the BDCP reserve system in areas that
 34 support high-value Swainson's hawk foraging habitat to increase nest sites, or within riparian
 35 plantings as a component of the riparian restoration (CM5, CM7). Replacement trees that were
 36 incorporated into the riparian restoration would not be clustered in a single region of the study
 37 area, but would be distributed throughout the conserved lands. Further details of AMM18 are
 38 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. The
 39 Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 43 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 44 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 45 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 46 of the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. For

1 the BDCP to avoid having an adverse effect on individuals, preconstruction surveys for noncovered
2 avian species would be required to ensure that active nests are detected and avoided. Mitigation
3 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
4 *Birds*, would be available to address this adverse effect.

5 **Late Long-Term Timeframe**

6 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk
7 and osprey. Alternative 1B as a whole would result in the permanent loss of and temporary effects
8 on 677 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

9 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
10 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*
11 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
12 riparian natural community (Table 3-4 in Chapter 3). The majority of riparian protection and
13 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
14 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP
15 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing
16 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would
17 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within
18 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in
19 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of
20 potential nest trees would be increased by planting and maintaining native trees along roadsides
21 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective
22 SWHA2.1).

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
26 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
27 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
28 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
29 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
30 of the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. For
31 the BDCP to avoid having an adverse effect on individuals, preconstruction surveys for noncovered
32 avian species would be required to ensure that active nests are detected and avoided. Mitigation
33 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
34 *Birds*, would be available to address this adverse effect.

35 **NEPA Effects:** The loss of Cooper's hawk and osprey habitat and potential for direct mortality of
36 these special-status species under Alternative 1B would represent an adverse effect in the absence
37 of other conservation actions. However, with habitat protection and restoration associated with
38 CM3, CM5, CM7, guided by biological goals and objectives and by AMM1-AMM7 and *AMM18*
39 *Swainson's Hawk*, which would be in place throughout the construction period, the effects of habitat
40 loss on Cooper's hawk and osprey under Alternative 1B would not be adverse. Cooper's hawk and
41 osprey are not covered species under the BDCP. For the BDCP to avoid an adverse effect on
42 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
43 nests are detected and avoided. Mitigation Measure BIO-75 would be available to address this
44 adverse effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
6 effect of construction would not be adverse under NEPA. The Plan would remove 449 acres (338
7 acres of permanent loss, 111 acres of temporary loss) of Cooper's hawk and osprey nesting habitat
8 in the study area in the near-term. These effects would result from the construction of the water
9 conveyance facilities (CM1, 49 acres), and implementing other conservation measures (CM2 *Yolo*
10 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*
11 *Inundated Floodplain Restoration*—400 acres of habitat).

12 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
13 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.
14 Using these ratios would indicate that 49 acres of nesting habitat should be restored/created and 49
15 acres should be protected to mitigate the CM1 losses of modeled Cooper's hawk and osprey habitat.
16 In addition, the near-term effects of other conservation actions would remove 400 acres of modeled
17 breeding habitat, and therefore require 400 acres of restoration and 400 acres of protection of
18 modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios. The BDCP has
19 committed to near-term goals of protecting 750 acres and restoring 800 acres of valley/foothill
20 riparian natural community (Table 3-4 in Chapter 3). These conservation actions are associated
21 with CM3, and CM7 and would occur in the same timeframe as the construction and early
22 restoration losses. The majority of riparian protection and restoration acres would occur in CZ 7 as
23 part of a reserve system with extensive wide bands or large patches of valley/foothill riparian
24 natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*).
25 Riparian restoration would expand the patches of existing riparian forest in order to support nesting
26 habitat for riparian species. The Plan's objectives would also benefit Cooper's hawk and osprey by
27 protecting small but essential habitats that occur within cultivated lands, such as tree rows along
28 field borders or roads, and small clusters of trees in farmyards or rural residences (Objective
29 CLNC1.3). In addition, the distribution and abundance of potential nest trees would be increased by
30 planting and maintaining native trees along roadsides and field borders within protected cultivated
31 lands at a rate of one tree per 10 acres (Objective SWHA2.1).

32 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
33 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
34 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored
35 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but
36 would require one to several decades to functionally replace habitat that has been affected and for
37 trees to attain sufficient size and structure suitable for nesting by these species. This time lag
38 between the removal and restoration of nesting habitat could have a substantial impact on nesting
39 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,
40 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
41 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
42 habitat would further reduce this limited resource and could reduce or restrict the number of active
43 nests within the study area until restored riparian habitat is sufficiently developed.

1 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
 2 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson's hawk
 3 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
 4 within the 125-acre block are removed. These mature trees would be supplemented with additional
 5 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
 6 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
 7 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
 8 system for every tree 20 feet or taller removed by construction during the near-term period. A
 9 variety of native tree species would be planted to provide trees with differing growth rates,
 10 maturation, and life span. Trees would be planted within the BDCP reserve system in areas that
 11 support high-value Swainson's hawk foraging habitat to increase nest sites, or within riparian
 12 plantings as a component of the riparian restoration (CM5, CM7). Replacement trees that were
 13 incorporated into the riparian restoration would not be clustered in a single region of the study
 14 area, but would be distributed throughout the conserved lands. Further details of AMM18 are
 15 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
 17 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
 18 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 19 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
 20 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 21 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 22 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 23 of the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. For
 24 the BDCP to avoid having a significant impact on individuals, preconstruction surveys for
 25 noncovered avian species would be required to ensure that active nests are detected and avoided.
 26 Implementation of Mitigation Measure BIO-75 would reduce the potential impact on nesting
 27 Cooper's hawk and osprey to a less-than-significant level.

28 ***Late Long-Term Timeframe***

29 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk
 30 and osprey. Alternative 1B as a whole would result in the permanent loss of and temporary effects
 31 on 677 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

32 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 33 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*
 34 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
 35 riparian natural community (Table 3-4 in Chapter 3). The majority of riparian protection and
 36 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
 37 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP
 38 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing
 39 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would
 40 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within
 41 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in
 42 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of
 43 potential nest trees would be increased by planting and maintaining native trees along roadsides
 44 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective
 45 SWHA2.1).

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
8 of the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. For
9 the BDCP to have a less-than-significant impact on individuals, preconstruction surveys for
10 noncovered avian species would be required to ensure that active nests are detected and avoided.
11 Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
12 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

13 Considering these protection and restoration provisions, which would provide acreages of new or
14 enhanced habitat in amounts greater than necessary to compensate for the time lag of restoring
15 riparian habitats lost to construction and restoration activities, and with implementation of *AMM1–*
16 *AMM7*, *AMM18 Swainson's Hawk*, and Mitigation Measure BIO-75, the loss of habitat or direct
17 mortality through implementation of Alternative 1B would not result in a substantial adverse effect
18 through habitat modifications and would not substantially reduce the number or restrict the range
19 of either species. Therefore, the loss of habitat or potential mortality under this alternative would
20 have a less-than-significant impact on Cooper's hawk and osprey.

21 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
22 **Disturbance of Nesting Birds**

23 See Mitigation Measure BIO-75 under Impact BIO-75.

24 **Impact BIO-110: Effects on Cooper's Hawk and Osprey Associated with Electrical**
25 **Transmission Facilities**

26 New transmission lines would increase the risk for bird-power line strikes, which could result in
27 injury or mortality of Cooper's hawk and osprey. However, the flight behavior of these species, their
28 keen vision, and high maneuverability substantially reduce the risk of powerline collisions. The
29 existing network of transmission lines in the project area currently poses the same small risk for
30 Cooper's hawk and osprey, and any incremental risk associated with the new power line corridors
31 would also be expected to be low. Marking transmission lines with flight diverters that make the
32 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
33 Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian
34 mortality by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission
35 lines would be fitted with flight diverters, which would further reduce any risk of collision with
36 lines.

37 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
38 adverse effect because the risk of bird strike is considered to be minimal based on the flight
39 behavior, the general maneuverability, and keen eyesight of Cooper's hawk and osprey. In addition,
40 *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters on all new
41 powerlines, which would further reduce any risk of mortality from bird strike for Cooper's hawk
42 and osprey as a result of the project. Therefore, the construction and operation of new transmission
43 lines under Alternative 1B would not result in an adverse effect on Cooper's hawk and osprey.

1 **CEQA Conclusion:** The construction and presence of new transmission lines would not represent an
2 adverse effect because the risk of bird strike is considered to be minimal based on the flight
3 behavior, the general maneuverability, and keen eyesight of Cooper's hawk and osprey. In addition,
4 *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters on all new
5 powerlines, which would further reduce any risk of mortality from bird strike for Cooper's hawk
6 and osprey as a result of the project. Therefore, the construction and operation of new transmission
7 lines under Alternative 1B would result in a less-than-significant impact on Cooper's hawk and
8 osprey.

9 **Impact BIO-111: Indirect Effects of Plan Implementation on Cooper's Hawk and Osprey**

10 **Indirect Construction- and Operation-Related Effects:** Construction noise above background
11 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
12 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
13 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
14 the extent to which these noise levels could affect Cooper's hawk or osprey. If Cooper's hawk or
15 osprey were to nest in or adjacent to work areas, construction and subsequent maintenance-related
16 noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce
17 the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct*
18 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid the
19 potential for adverse effects of construction-related activities on survival and productivity of nesting
20 Cooper's hawk and osprey. The use of mechanical equipment during water conveyance facilities
21 construction could cause the accidental release of petroleum or other contaminants that could affect
22 Cooper's hawk and osprey in the surrounding habitat. The inadvertent discharge of sediment or
23 excessive dust adjacent to suitable habitat could also have an adverse effect on these species.
24 *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*, would
25 minimize the likelihood of such spills and ensure that measures are in place to prevent runoff from
26 the construction area and negative effects of dust on active nests.

27 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
28 mercury in avian species, including Cooper's hawk and osprey. Future operational impacts under
29 CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury concentration
30 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to
31 estimate fish-tissue concentrations under these future operational conditions (evaluated starting
32 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues
33 due to ESO were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

34 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to
35 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
36 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
37 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas
38 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of
39 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of
40 uncertainty with respect to species-specific effects. Increased methylmercury associated with
41 natural community and floodplain restoration could indirectly affect cooper's hawk and osprey, via
42 uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

43 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
44 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*

1 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
2 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
3 adaptive management as described in CM12 would be available to address the uncertainty of
4 methylmercury levels in restored tidal marsh and potential impacts on cooper's hawk and osprey.

5 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
6 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
7 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
8 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
9 2009). The effect of selenium toxicity differs widely between species and also between age and sex
10 classes within a species. In addition, the effect of selenium on a species can be confounded by
11 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
12 2009).

13 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
14 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
15 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
16 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
17 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
18 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
19 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
20 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
21 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
22 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
23 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
24 have a higher risk of selenium toxicity.

25 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
26 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
27 exacerbate bioaccumulation of selenium in avian species, including Cooper's hawk and osprey.
28 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
29 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
30 Alternative 1B restoration activities that create newly inundated areas could increase bioavailability
31 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
32 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
33 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
34 increases in selenium concentrations in water in the Delta under any alternative. However, it is
35 difficult to determine whether the effects of potential increases in selenium bioavailability
36 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
37 effects on Cooper's hawk and osprey.

38 Because of the uncertainty that exists at this programmatic level of review, there could be a
39 substantial effect on Cooper's hawk and osprey from increases in selenium associated with
40 restoration activities. This effect would be addressed through the implementation of *AMM27*
41 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
42 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
43 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
44 selenium management to reduce selenium concentrations and/or bioaccumulation would be
45 evaluated separately for each restoration effort as part of design and implementation. This

1 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
2 design schedule.

3 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
4 could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas. Moreover,
5 operation and maintenance of the water conveyance facilities, including the transmission facilities,
6 could result in ongoing but periodic postconstruction disturbances that could affect Cooper's hawk
7 and osprey use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
8 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse
9 effects on nesting individuals in addition to AMM1–AMM7.

10 The implementation of tidal natural communities restoration or floodplain restoration could result
11 in increased exposure of Cooper's hawk or osprey to methylmercury, through the ingestion of fish or
12 small mammals in tidally restored areas. However, it is currently unknown what concentrations of
13 methylmercury are harmful to these species and the potential for increased exposure varies
14 substantially within the study area. Site-specific restoration plans that address the creation and
15 mobilization of mercury, as well as monitoring and adaptive management as described in CM12
16 would better inform potential impacts and address the uncertainty of methylmercury levels in
17 restored tidal marsh in the study area on cooper's hawk and osprey. The site-specific planning phase
18 of marsh restoration would be the appropriate place to assess the potential for risk of
19 methylmercury exposure for Cooper's hawk and osprey, once site specific sampling and other
20 information could be developed.

21 Tidal habitat restoration could result in increased exposure of Cooper's hawk and osprey to
22 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
23 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
24 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

25 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
26 facilities could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas.
27 Moreover, operation and maintenance of the water conveyance facilities, including the transmission
28 facilities, could result in ongoing but periodic postconstruction disturbances that could affect
29 Cooper's hawk and osprey use of the surrounding habitat. Noise, the potential for hazardous spills,
30 increased dust and sedimentation, and operations and maintenance of the water conveyance
31 facilities under Alternative 1B would have a less-than-significant impact on Cooper's hawk and
32 osprey with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
33 *Surveys and Avoid Disturbance of Nesting Birds*, and AMM1–AMM7.

34 The implementation of tidal natural communities restoration or floodplain restoration could result
35 in increased exposure of Cooper's hawk or osprey to methylmercury through the ingestion of fish or
36 small mammals in restored tidal areas. However, it is currently unknown what concentrations of
37 methylmercury are harmful to these species. Site-specific restoration plans that address the creation
38 and mobilization of mercury, as well as monitoring and adaptive management as described in CM12,
39 would address the uncertainty of methylmercury levels in restored tidal marsh in the study area and
40 better inform potential impacts on Cooper's hawk and osprey.

41 Tidal habitat restoration could result in increased exposure of Cooper's hawk and osprey to
42 selenium. With implementation of *AMM27 Selenium Management*, which would provide specific tidal
43 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its

1 bioavailability in tidal habitats, the impact of increased exposure to selenium would be less than
2 significant.

3 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
4 **Disturbance of Nesting Birds**

5 See Mitigation Measure BIO-75 under Impact BIO-75.

6 **Impact BIO-112: Periodic Effects of Inundation of Cooper's Hawk and Osprey Nesting Habitat**
7 **as a Result of Implementation of Conservation Components**

8 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
9 duration of inundation of approximately 48-82 acres of modeled Cooper's hawk and osprey
10 breeding habitat. However, increased periodic flooding is not expected to cause any adverse effect on
11 breeding habitat because trees in which nest sites are situated already withstand floods, the
12 increase in inundation frequency and duration is expected to remain within the range of tolerance of
13 riparian trees, and nest sites are located above floodwaters.

14 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
15 inundation of up to 230 acres of breeding habitat for Cooper's hawk and osprey. The overall effect of
16 seasonal inundation in existing riparian natural communities is likely to be beneficial for these
17 species, because, historically, flooding was the main natural disturbance regulating ecological
18 processes in riparian areas, and flooding promotes the germination and establishment of many
19 native riparian plants.

20 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
21 sites because trees in which nest sites are situated already withstand floods, the increase in
22 inundation frequency and duration is expected to remain within the range of tolerance of riparian
23 trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic
24 inundation resulting from CM2 and CM5 would not have an adverse effect on Cooper's hawk and
25 osprey.

26 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
27 nest sites because trees in which nest sites are situated already withstand floods, the increase in
28 inundation frequency and duration is expected to remain within the range of tolerance of riparian
29 trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic
30 inundation resulting from CM2 and CM5 would have a less-than-significant impact on Cooper's
31 hawk and osprey.

32 **Golden Eagle and Ferruginous Hawk**

33 This section describes the effects of Alternative 1B, including water conveyance facilities
34 construction and implementation of other conservation components, on golden eagle and
35 ferruginous hawk. Modeled foraging habitat for these species consists of grassland, alkali seasonal
36 wetland, vernal pool complex, alfalfa, grain and hay, pasture, and idle cropland throughout the study
37 area.

38 Construction and restoration associated with Alternative 1B conservation measures would result in
39 both temporary and permanent losses of golden eagle and ferruginous hawk modeled foraging
40 habitat as indicated in Table 12-1B-44. Full implementation of Alternative 1B would include the

1 following conservation actions over the term of the BDCP that would also benefit golden eagles or
2 ferruginous hawk (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 3 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
4 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
5 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 6 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 7 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
8 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 9 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
10 VPNC2.5, and GNC2.4, associated with CM11).
- 11 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
12 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 13 • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
14 cultivated lands as Swainson’s hawk foraging habitat with at least 50% in very high-value
15 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

16 As explained below, with the restoration or protection of these amounts of habitat, in addition to
17 management activities to enhance natural communities for species and implementation of AMM1–
18 AMM7, impacts on golden eagle and ferruginous hawk would not be adverse for NEPA purposes and
19 would be less than significant for CEQA purposes.

20 **Table 12-1B-44. Changes in Golden Eagle and Ferruginous Hawk Habitat Associated with**
21 **Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Foraging	2,962	2,962	4,528	4,528	NA	NA
Total Impacts CM1		2,962	2,962	4,528	4,528	NA	NA
CM2–CM18	Foraging	5,450	26,198	376	893	1,158–3,650	3,823
Total Impacts CM2–CM18		5,450	26,198	376	893	1,158–3,650	3,823
TOTAL IMPACTS		8,412	29,160	4,904	5,421	1,158–3,650	3,823

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-113: Loss or Conversion of Habitat for and Direct Mortality of Golden Eagle and**
2 **Ferruginous Hawk**

3 Alternative 1B conservation measures would result in the combined permanent and temporary loss
4 of up to 34,581 acres of modeled foraging habitat for golden eagle and ferruginous hawk (29,160
5 acres of permanent loss and 5,421 acres of temporary loss; Table 12-1B-44). Conservation measures
6 that would result in these losses are conveyance facilities and transmission line construction, and
7 establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2),
8 tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland
9 restoration (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10),
10 and construction of conservation hatcheries (CM18). The majority of habitat loss (20,880 acres)
11 would result from CM4. Habitat enhancement and management activities (CM11), which include
12 ground disturbance or removal of nonnative vegetation, and the construction of recreational trails,
13 signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities
14 associated with the long-term operation of the water conveyance facilities and other BDCP physical
15 facilities could degrade or eliminate foraging habitat for both species. Each of these individual
16 activities is described below. A summary statement of the combined impacts and NEPA effects, and a
17 CEQA conclusion follows the individual conservation measure discussions.

- 18 ● *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would
19 result in the combined permanent and temporary loss of up to 7,490 acres of modeled golden
20 eagle and ferruginous hawk foraging habitat (2,962 acres of permanent loss, 4,528 acres of
21 temporary loss) from CZ 4, CZ 5, CZ 6, CZ 7, and CZ 8. The permanent and temporary losses
22 would occur at various locations along the new canal route from the transmission line footprint,
23 the construction of the canal and the associated borrow and spoil sites and at the intake sites
24 along the Sacramento River. Permanent and temporary losses of foraging habitat would also
25 occur at the new forebay site just south of Clifton Court Forebay and associated borrow and
26 spoil sites. The CM1 construction footprint does not overlap with any occurrences of golden
27 eagle or ferruginous hawk. However, some of the grassland habitat lost in CZ 8 is composed of
28 larger stands of ruderal and herbaceous vegetation and California annual grassland, which
29 provides high-value foraging habitat for these species. There are no Refer to the Terrestrial
30 Biology Map Book for a detailed view of Alternative 1B construction locations.
- 31 ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
32 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
33 golden eagle and ferruginous hawk foraging habitat (898 acres of permanent loss, 376 acres of
34 temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of
35 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass
36 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.
37 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland
38 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10
39 years of Alternative 1B implementation.
- 40 ● *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration (CM4) site preparation
41 and inundation would permanently remove an estimated 20,880 acres of modeled golden eagle
42 and ferruginous hawk habitat. The majority of the acres lost would consist of cultivated lands in
43 CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache Slough, on
44 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
45 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact
46 and fragment grassland just north of Rio Vista in and around French and Prospect Islands, and in

1 an area south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex
2 habitat would likely occur in the south end of the Yolo Bypass and on the northern fringes of
3 Suisun Marsh.

- 4 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
5 seasonally inundated floodplain would permanently and temporarily remove approximately
6 1,450 acres of modeled golden eagle and ferruginous hawk foraging habitat (933 permanent,
7 517 temporary). These losses would be expected after the first 10 years of Alternative 1B
8 implementation along the San Joaquin River and other major waterways in CZ 7.
- 9 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
10 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
11 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
12 would be restored after the construction periods. Grassland restoration would be implemented
13 on agricultural lands that also provide foraging habitat for golden eagle and ferruginous hawk
14 and would result in the conversion of 837 acres of cultivated lands to grassland.
- 15 ● *CM10 Nontidal Marsh Restoration*: Implementation of *CM10 Nontidal Marsh Restoration* would
16 result in the permanent removal of 705 acres of golden eagle and ferruginous hawk foraging
17 habitat.
- 18 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
19 actions included in CM11 that are designed to enhance wildlife values in restored or protected
20 habitats could result in localized ground disturbances that could temporarily remove small
21 amounts of golden eagle and ferruginous hawk foraging habitat. Ground-disturbing activities,
22 such as removal of nonnative vegetation and road and other infrastructure maintenance
23 activities, would be expected to have minor adverse effects on available habitat for these
24 species. CM11 would also include the construction of recreational-related facilities including
25 trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated*
26 *Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas,
27 bathrooms, etc. would be placed on existing, disturbed areas when and where possible.
28 However, approximately 50 acres of grassland habitat would be lost from the construction of
29 trails and facilities.
- 30 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
31 modeled golden eagle and ferruginous hawk foraging habitat for the development of a delta and
32 longfin smelt conservation hatchery in CZ 1.
- 33 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
34 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
35 disturbances that could affect golden eagle and ferruginous hawk use of the surrounding habitat.
36 Maintenance activities would include vegetation management, levee and structure repair, and
37 re-grading of roads and permanent work areas. These effects, however, would be reduced by
38 AMM1–AMM7 and conservation actions as described below.
- 39 ● *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
40 golden eagle and ferruginous hawk because foraging individuals would be expected to
41 temporarily avoid the increased noise and activity associated with construction areas.

42 The following paragraphs summarize the combined effects discussed above and describe other
43 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
44 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facility construction is being evaluated at the project level, the near-
3 term BDCP conservation strategy has been evaluated to determine whether it would provide
4 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
5 such conveyance facility construction would not be adverse under NEPA. The Plan would remove
6 13,316 acres (8,412 permanent, 4,904 temporary) of modeled golden eagle and ferruginous hawk
7 foraging habitat in the study area in the near-term. These effects would result from the construction
8 of the water conveyance facilities (CM1, 7,490 acres), and implementing other conservation
9 measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7*
10 *Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal*
11 *Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and*
12 *Management and CM18 Conservation Hatcheries—5,826 acres).*

13 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
14 would be 2:1 for protection of habitat. Using this ratio would indicate that 14,980 acres should be
15 protected to compensate for the CM1 losses of 7,490 acres of golden eagle and ferruginous hawk
16 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of
17 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous
18 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

19 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
20 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
21 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
22 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
23 in the same timeframe as the construction and early restoration losses thereby avoiding adverse
24 effects of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland
25 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2)
26 Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal
27 wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
28 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand golden
29 eagle and ferruginous hawk foraging habitat and reduce the effects of current levels of habitat
30 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect and
31 mammal prey populations would be increased on protected lands, enhancing the foraging value of
32 these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would
33 be increased on protected natural communities by encouraging ground squirrel occupancy and
34 expansion through the creation of berms, mounds, edges, and through the prohibition of ground
35 squirrel control programs (i.e., poisoning).

36 Cultivated lands that provide habitat for covered and other native wildlife species would provide
37 approximately 15,400 acres of potential foraging habitat for golden eagle and ferruginous hawk
38 (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time
39 period would be in alfalfa and pasture crop types (very high- and high-value crop types) for
40 Swainson’s hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.
41 This biological objective provides an estimate for the high proportion of cultivated lands protected
42 in the near-term time period which would be suitable for golden eagle and ferruginous hawk.

43 The acres of restoration and protection contained in the near-term Plan goals and the additional
44 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
45 level effects of CM1 on golden eagle and ferruginous hawk. However, the conservation commitment

1 is 7,572 acres short of meeting the compensation for other near-term effects on golden eagle and
2 ferruginous hawk habitat. Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden*
3 *Eagle and Ferruginous Hawk Foraging Habitat* would be available to address the adverse effect of
4 near-term habitat loss.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
6 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
7 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
8 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
9 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
10 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
11 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
12 of the Final EIR/EIS.

13 **Late Long-Term Timeframe**

14 Based on modeled habitat, the study area supports approximately 269,411 acres of modeled
15 foraging habitat for golden eagle and ferruginous hawk. Alternative 1B as a whole would result in
16 the permanent loss of and temporary effects on 34,631 acres of modeled foraging habitat during the
17 term of the Plan (13% of the modeled habitat in the study area). The locations of these losses are
18 described above in the analyses of individual conservation measures.

19 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
20 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
21 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural
22 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
23 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
24 species (Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland restoration and protection
25 would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in
26 CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes
27 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali
28 seasonal wetland, and vernal pool natural communities which would expand foraging habitat for
29 golden eagle and ferruginous hawk and reduce the effects of current levels of habitat fragmentation.
30 Under *CM11 Natural Communities Enhancement and Management*, insect and small mammal prey
31 populations would be increased on protected lands, enhancing the foraging value of these natural
32 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would be increased
33 on protected natural communities by encouraging ground squirrel occupancy and expansion
34 through the creation of berms, mounds, edges, and through the prohibition of ground squirrel
35 control programs (i.e., poisoning). Cultivated lands that provide habitat for covered and other native
36 wildlife species would provide approximately 15,400 acres of potential habitat for golden eagle and
37 ferruginous hawk (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected
38 would be in alfalfa and pasture crop types (very high- and high-value crop types) for Swainson's
39 hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
41 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
42 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
43 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
44 these AMMs include elements that would avoid or minimize the risk of affecting individuals and

1 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
2 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
3 of the Final EIR/EIS.

4 **NEPA Effects:** The loss of golden eagle and ferruginous hawk habitat and potential for mortality of
5 this special-status species under Alternative 1B would represent an adverse effect in the absence of
6 other conservation actions. However, with habitat protection and restoration associated with CM3,
7 CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would
8 be in place throughout the construction period, and Mitigation Measure BIO-113, *Compensate for the*
9 *Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the effects of habitat loss
10 and potential direct mortality on golden eagle and ferruginous hawk under Alternative 1B would not
11 be adverse.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
15 the near-term BDCP conservation strategy has been evaluated to determine whether it would
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
17 effects of construction would be less than significant under CEQA. The Plan would remove 13,316
18 acres (8,412 permanent, 4,904 temporary) of modeled golden eagle and ferruginous hawk foraging
19 habitat in the study area in the near-term. These effects would result from the construction of the
20 water conveyance facilities (CM1, 7,490 acres), and implementing other conservation measures
21 (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian*
22 *Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and*
23 *Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and*
24 *Management and CM18 Conservation Hatcheries—5,826 acres).*

25 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
26 would be 2:1 for protection of habitat. Using this ratio would indicate that 14,980 acres should be
27 protected to compensate for the CM1 losses of 7,490 acres of golden eagle and ferruginous hawk
28 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of
29 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous
30 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

31 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
32 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
33 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
34 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
35 in the same timeframe as the construction and early restoration losses thereby avoiding significant
36 impacts of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland
37 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and
38 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali
39 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
40 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
41 expand golden eagle and ferruginous hawk foraging habitat and reduce the effects of current levels
42 of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect
43 and mammal prey populations would be increased on protected lands, enhancing the foraging value
44 of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability

1 would be increased on protected natural communities by encouraging ground squirrel occupancy
2 and expansion through the creation of berms, mounds, edges, and through the prohibition of ground
3 squirrel control programs (i.e., poisoning). Cultivated lands that provide habitat for covered and
4 other native wildlife species would provide approximately 15,400 acres of potential foraging habitat
5 for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 87% of cultivated lands
6 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-
7 and high-value crop types) for Swainson's hawk (Objective SH1.2) which are also suitable for golden
8 eagle and ferruginous hawk. This biological objective provides an estimate for the high proportion of
9 cultivated lands protected in the near-term time period which would be suitable for golden eagle
10 and ferruginous hawk.

11 The acres of restoration and protection contained in the near-term Plan goals and the additional
12 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
13 level effects of CM1 on golden eagle and ferruginous hawk. However, the conservation commitment
14 is 7,572 acres short of meeting the compensation for other near-term effects on golden eagle and
15 ferruginous hawk habitat. The implementation of Mitigation Measure BIO-113, *Compensate for the*
16 *Near-Term Loss of Golden Eagle and Ferruginous Habitat*, would reduce the near-term impact of
17 habitat loss to a less-than-significant level.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
22 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
23 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
24 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
25 of the Final EIR/EIS.

26 **Late Long-Term Timeframe**

27 Based on modeled habitat, the study area supports approximately 269,411 acres of modeled
28 foraging habitat for golden eagle and ferruginous hawk. Alternative 1B as a whole would result in
29 the permanent loss of and temporary effects on 34,631 acres of modeled foraging habitat during the
30 term of the Plan (13% of the modeled habitat in the study area). The locations of these losses are
31 described above in the analyses of individual conservation measures.

32 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
33 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
34 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural
35 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
36 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
37 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
38 7, 8, and 11 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be
39 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
40 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
41 pool natural communities which would expand foraging habitat for golden eagle and ferruginous
42 hawk and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*
43 *Communities Enhancement and Management*, insect and small mammal prey populations would be
44 increased on protected lands, enhancing the foraging value of these natural communities (Objectives

1 ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would be increased on protected natural
2 communities by encouraging ground squirrel occupancy and expansion through the creation of
3 berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
4 poisoning). Cultivated lands that provide habitat for covered and other native wildlife species would
5 provide approximately 15,400 acres of potential habitat for golden eagle and ferruginous hawk
6 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa
7 and pasture crop types. These are very high- and high-value crop types for Swainson's hawk
8 (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
13 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
14 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
15 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
16 of the Final EIR/EIS.

17 In the absence of other conservation actions, the effects on golden eagle and ferruginous hawk
18 foraging habitat would represent an adverse effect as a result of habitat modification and potential
19 for direct mortality of special-status species; however, considering Alternative 1B's protection and
20 restoration provisions, which would provide acreages of new high-value or enhanced habitat in
21 amounts suitable to compensate for habitats lost to construction and restoration activities, and with
22 the implementation of AMM1-AMM7 and Mitigation Measure BIO-113, *Compensate for the Near-*
23 *Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the loss of habitat or direct
24 mortality through implementation of Alternative 1B would not result in a substantial adverse effect
25 through habitat modifications and would not substantially reduce the number or restrict the range
26 of either species. Therefore, the loss of habitat or potential mortality under this alternative would
27 have a less-than-significant impact on golden eagle and ferruginous hawk.

28 **Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and** 29 **Ferruginous Hawk Foraging Habitat**

30 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
31 crops, or alfalfa to provide golden eagle and ferruginous hawk foraging habitat such that the
32 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of
33 2:1. Additional grassland protection, enhancement, and management may be substituted for the
34 protection of high-value cultivated lands.

35 **Impact BIO-114: Effects on Golden Eagle and Ferruginous Hawk Associated with Electrical** 36 **Transmission Facilities**

37 Golden eagle and ferruginous hawk would be at low risk of bird strike mortality from the
38 construction of new transmission lines based on their maneuverability, their keen eyesight, their
39 lack of flocking behavior, and other factors assessed in the bird strike vulnerability analysis (BDCP
40 Appendix 5.J, Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP*
41 *Transmission Lines*). Marking transmission lines with flight diverters that make the lines more
42 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
43 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality

1 by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines
2 would be fitted with flight diverters which would substantially reduce any potential for powerline
3 collisions.

4 **NEPA Effects:** Golden eagle and ferruginous hawk are already at a low risk of bird strike mortality
5 based on their general maneuverability, keen eyesight and lack of flocking behavior. All new
6 transmission lines constructed as a result of the project would be fitted with bird diverters, which
7 have been shown to reduce avian mortality by 60%. By implementing *AMM20 Greater Sandhill*
8 *Crane*, the construction and operation of transmission lines would not result in an adverse effect on
9 golden eagle or ferruginous hawk.

10 **CEQA Conclusion:** Golden eagle and ferruginous hawk are already at a low risk of bird strike
11 mortality based on their general maneuverability, keen eyesight and lack of flocking behavior. All
12 new transmission lines constructed as a result of the project would be fitted with bird diverters,
13 which have been shown to reduce avian mortality by 60%. With implementation of *AMM20 Greater*
14 *Sandhill Crane*, the construction and operation of transmission lines would result in a less-than-
15 significant impact on golden eagle or ferruginous hawk.

16 **Impact BIO-115: Indirect Effects of Plan Implementation on Golden Eagle and Ferruginous** 17 **Hawk**

18 **Indirect Construction- and Operation-Related Effects:** Construction- and subsequent
19 maintenance-related noise and visual disturbances could disrupt foraging, and reduce the functions
20 of suitable foraging habitat for golden eagle and ferruginous hawk. Construction noise above
21 background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of
22 construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*
23 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to
24 determine the extent to which these noise levels could affect golden eagle or ferruginous hawk.
25 Indirect effects associated with construction include noise, dust, and visual disturbance caused by
26 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical
27 equipment during water conveyance facilities construction could cause the accidental release of
28 petroleum or other contaminants that could affect these species or their prey in the surrounding
29 habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
30 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment
31 or excessive dust adjacent to golden eagle and ferruginous hawk grassland habitat could also have a
32 negative effect on the species. However, AMM1–AMM7 would also ensure that measures would be in
33 place to prevent runoff from the construction area and the negative effects of dust on wildlife
34 adjacent to work areas.

35 **NEPA Effects:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative 1B
36 implementation could have adverse effects on these species through the modification of habitat.
37 With the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 1B
38 implementation would not have an adverse effect on golden eagle and ferruginous hawk.

39 **CEQA Conclusion:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative
40 1B implementation could have a significant impact on the species from modification of habitat. With
41 the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 1B
42 implementation would have a less-than-significant impact on golden eagle and ferruginous hawk.

1 **Impact BIO-116: Periodic Effects of Inundation on Golden Eagle and Ferruginous Hawk**
2 **Habitat as a Result of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
4 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–
5 3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat (Table 12-1B-44).

6 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
7 *Restoration* could result in the periodic inundation of up to approximately 3,823 acres of modeled
8 habitat (Table 12-1B-44).

9 Golden eagles and ferruginous hawks would not likely use inundated areas for foraging, and
10 increased frequency and duration of inundation of grassland habitats may affect prey populations
11 that have insufficient time to recover following inundation events. However, periodically inundated
12 habitat would not be expected to have an adverse effect on local or migratory golden eagles or the
13 wintering ferruginous hawk populations in the study area.

14 **NEPA Effects:** Implementation of CM2 would increase the frequency and duration of inundation on
15 approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat. In
16 addition, implementation of CM5 could result in the periodic inundation of up to 3,823 acres of
17 modeled habitat. However, periodic inundation would not be expected to have an adverse effect on
18 the wintering golden eagle or ferruginous hawk populations in the study area.

19 **CEQA Conclusion:** Implementation of CM2 would increase the frequency and duration of inundation
20 on approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging
21 habitat. In addition, implementation of CM5 could result in the periodic inundation of up to 3,823
22 acres of modeled habitat. However, periodic inundation would be expected to have a less-than-
23 significant impact on the golden eagle and ferruginous hawk populations in the study area.

24 **Cormorants, Herons and Egrets**

25 This section describes the effects of Alternative 1B, including water conveyance facilities
26 construction and implementation of other conservation components, on double-crested cormorant,
27 great blue heron, great egret, snowy egret, and black-crowned night heron. Modeled breeding
28 habitat for these species consists of valley/foothill riparian forest.

29 Construction and restoration associated with Alternative 1B conservation measures would result in
30 both temporary and permanent losses of cormorant, heron, and egret modeled habitat as indicated
31 in Table 12-1B-45. The majority of the losses would take place over an extended period of time as
32 tidal marsh is restored in the study area. Although restoration for the loss of nesting habitat would
33 be initiated in the same timeframe as the losses, it could take one or more decades for restored
34 habitats to replace the functions of habitat lost. This time lag between impacts and restoration of
35 habitat function would be minimized by specific requirements of *AMM18 Swainson's Hawk*, including
36 the planting of mature trees in the near-term time period. Full implementation of Alternative 1B
37 would include the following conservation actions over the term of the BDCP which would also
38 benefit cormorants, herons, and egrets (BDCP Chapter 3, Section 3.3, *Biological Goals and*
39 *Objectives*).

- 40 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
41 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
42 associated with CM7).

- Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10 (Objective VFRNC1.2, associated with CM3).
- Maintain and protect the small patches of important wildlife habitats associated with cultivated lands within the reserve system including isolated valley oak trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities to enhance natural communities for species and implementation of AMM1–AMM7, AMM18 *Swainson's Hawk*, and Mitigation Measures BIO-75 and BIO-117, impacts on cormorants, herons, and egrets would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1B-45. Changes in Cormorant, Heron and Egret Modeled Habitat Associated with Alternative 1B (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting (Rookeries)	51	51	39	39	NA	NA
Total Impacts CM1		51	51	39	39	NA	NA
CM2–CM18	Nesting (Rookeries)	387	684	88	123	51–92	266
Total Impacts CM2–CM18		387	684	88	123	51–92	266
TOTAL IMPACTS		438	735	127	162	51–92	266

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-117: Loss or Conversion of Nesting Habitat for and Direct Mortality of Cormorants, Herons and Egrets

Alternative 1B conservation measures would result in the combined permanent and temporary loss of up to 897 acres of modeled nesting habitat (735 acres of permanent loss and 162 acres of temporary loss) for double-crested cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron (Table 12-1B-45). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2), tidal natural communities restoration (CM4), and seasonally inundated floodplain restoration (CM5). Habitat

1 enhancement and management activities (CM11), which include ground disturbance or removal of
 2 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities
 3 associated with the long-term operation of the water conveyance facilities and other BDCP physical
 4 facilities could degrade or eliminate cormorant, heron, and egret modeled habitat. Each of these
 5 individual activities is described below. A summary statement of the combined impacts, NEPA
 6 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 7 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B water conveyance facilities
 8 would result in the combined permanent and temporary loss of up to 90 acres of modeled
 9 nesting habitat for cormorants, herons, and egrets (Table 12-1B-45). Of the 90 acres of modeled
 10 habitat that would be removed for the construction of the conveyance facilities, 51 acres would
 11 be a permanent loss and 39 acres would be a temporary loss of habitat. This loss would have the
 12 potential to displace individuals, if present, and remove the functions and value of potentially
 13 suitable habitat. The habitat would be removed at multiple locations from the north Delta to the
 14 east Delta and in the vicinity of Clifton Court Forebay. Almost all of the losses would occur on the
 15 borders of waterways. In the north Delta, most of the permanent loss would occur where
 16 Intakes 1–5 encroach on the Sacramento River’s east bank between Freeport and Courtland. The
 17 riparian areas here are very small patches, some dominated by valley oak and others by
 18 nonnative trees and scrub vegetation. In the east Delta, small permanent losses would occur
 19 from canal construction just south of Twin Cities Road and just north of Walnut Grove Road. A
 20 small area of riparian habitat (mostly blackberries) would be permanently removed in the south
 21 Delta at the new forebay construction site. The temporary riparian losses would occur at the
 22 intake sites along the Sacramento River and at temporary siphon work areas where the canal
 23 would cross Beaver Slough, Hog Slough, Sycamore Slough, White Slough, Disappointment
 24 Slough, Railroad Canal, and Middle River just south of Victoria Canal. Tunnel construction at Old
 25 River just south of Victoria Canal would also temporarily remove mixed willows and brambles.
 26 There are no occurrences of least Bell’s vireo or yellow warbler that intersect with the CM1
 27 footprint. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1B
 28 construction locations.

29 The primary impact of concern regarding double-crested cormorant, great blue heron, great
 30 egret, snowy egret, and black-crowned night heron is the loss of existing known nest trees, and
 31 other large trees associated with known nest sites. There is one great egret rookery that is
 32 currently intersected by a temporary siphon work area associated with CM1. The location of the
 33 rookery is on an inchannel island, north of Union Island and south of the town of Holt. Because
 34 the species is highly traditional in their use of rookeries, the establishment of new nest sites is
 35 unpredictable. Therefore, to avoid adverse effects on great blue herons (and cormorants,
 36 herons, and egrets, should future surveys detect additional rookeries), existing rookeries must
 37 be avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
 38 *Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*,
 39 would be available to address this adverse effect on cormorants, herons, and egrets. Refer to the
 40 Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations.

- 41 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
 42 would result in the combined permanent and temporary loss of up to 177 acres of nesting
 43 habitat (89 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2.
 44 Activities through CM2 could involve excavation and grading in valley/foothill riparian areas to
 45 improve passage of fish through the bypasses. Most of the riparian losses would occur at the
 46 north end of Yolo Bypass where major fish passage improvements are planned. Excavation to

1 improve water movement in the Toe Drain and in the Sacramento Weir would also remove
2 potential nesting habitat. The loss is expected to occur during the first 10 years of Alternative 1B
3 implementation.

- 4 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration (CM4) site preparation
5 and inundation would permanently remove an estimated 552 acres of nesting habitat for
6 cormorants, herons and egrets. Trees would not be actively removed but tree mortality would
7 be expected over time as areas became tidally inundated. Depending on the extent and value of
8 remaining habitat, this could reduce use of these habitats by these species. There is one CNDDDB
9 occurrence of a great blue heron rookery that overlaps with the hypothetical restoration
10 footprint for tidal restoration. The occurrence is on Decker Island and tidal restoration could
11 potentially impact the nest trees from inundation. This potential effect would need to be
12 addressed within the project-specific analysis for tidal restoration projects.
- 13 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
14 seasonally inundated floodplain would permanently remove approximately 43 acres and
15 temporarily remove approximately 35 acres of potential cormorants, heron, and egret nesting
16 habitat. These losses would be expected after the first 10 years of Alternative 1B
17 implementation along the San Joaquin River and other major waterways in CZ 7.
- 18 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
19 enhancement-related activities could disturb cormorant, heron, and egret nests if they were
20 present near work sites. A variety of habitat management actions included in CM11 that are
21 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground
22 disturbances that could temporarily remove small amounts of cormorant, heron, and egret
23 habitat and reduce the functions of habitat until restoration is complete. Ground-disturbing
24 activities, such as removal of nonnative vegetation and road and other infrastructure
25 maintenance, are expected to have minor effects on available habitat for these species and are
26 expected to result in overall improvements to and maintenance of habitat values over the term
27 of the BDCP. These effects cannot be quantified, but are expected to be minimal and would be
28 avoided and minimized by the AMMs listed below.
- 29 ● Permanent and temporary habitat losses from the above conservation measures would
30 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored
31 as riparian habitat within 1 year following completion of construction activities. Although the
32 effects are considered temporary, the restored riparian habitat would require years to several
33 decades to functionally replace habitat that has been affected and for trees to attain sufficient
34 size and structure for established rookeries. *AMM18 Swainson's Hawk* contains actions described
35 below to reduce the effect of temporal loss of mature riparian habitat, including the
36 transplanting of mature trees.
- 37 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
38 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
39 disturbances that could affect use of the surrounding habitat by cormorants, herons or egrets.
40 Maintenance activities would include vegetation management, levee and structure repair, and
41 re-grading of roads and permanent work areas. These effects, however, would be reduced by
42 AMMs and conservation actions as described below.
- 43 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
44 direct mortality of adult or fledged double-crested cormorant, great blue heron, great egret,
45 snowy egret, and black-crowned night heron if they were present in the Plan Area, because they

1 would be expected to avoid contact with construction and other equipment. If birds were to nest
2 in the construction area, construction-related activities, including equipment operation, noise
3 and visual disturbances could affect nests including any nests that are built on the ground (e.g.
4 Cormorant nests that have been built on the ground after nest trees fall over or die from stress
5 and guano produced by a rookery) or lead to their abandonment, potentially resulting in
6 mortality of eggs and nestlings. Because cormorants, herons and egrets are highly traditional in
7 their use of nest sites, all disturbance to nesting birds must be avoided or minimized. Mitigation
8 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
9 *Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to
10 address these adverse effects on cormorants, herons, and egrets.

11 The following paragraphs summarize the combined effects discussed above and describe other
12 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
13 included.

14 ***Near-Term Timeframe***

15 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
16 the near-term BDCP conservation strategy has been evaluated to determine whether it would
17 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
18 effects of construction would not be adverse under NEPA. The Plan would remove 565 acres of
19 nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These effects
20 would result from the construction of the water conveyance facilities (CM1, 90 acres of nesting
21 habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries Enhancement*,
22 CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain Restoration*—
23 475 acres of nesting habitat).

24 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
25 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for
26 breeding habitat. Using these ratios would indicate that 90 acres of breeding habitat should be
27 restored/created and 90 acres should be protected to compensate for the CM1 losses of modeled
28 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions
29 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of
30 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the
31 same typical NEPA and CEQA ratios.

32 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
33 system with extensive wide bands or large patches of valley/foothill riparian natural community
34 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
35 restoration would expand the patches of existing riparian forest in order to support nesting habitat
36 for these species. In addition, small but essential nesting habitat associated with cultivated lands
37 would also be maintained and protected such as isolated trees, tree rows along field borders or
38 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

39 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
40 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
41 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored
42 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but
43 would require years to several decades to functionally replace habitat that has been affected and for
44 trees to attain sufficient size and structure suitable for established rookeries. This time lag between

1 the removal and restoration of nesting habitat could have a substantial impact on cormorants,
2 herons and egrets in the near-term time period.

3 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
4 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson's hawk
5 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
6 within the 125-acre block are removed. These would be supplemented with additional saplings and
7 would be expected to reduce the temporal effects of loss of nesting habitat. The plantings would
8 occur prior to or concurrent with (in the case of transplanting) the loss of trees. In addition, at least
9 five trees (5-gallon container size) would be planted within the BDCP reserve system for every tree
10 20 feet or taller removed by construction during the near-term period. A variety of native tree
11 species would be planted to provide trees with differing growth rates, maturation, and life span.
12 Replacement trees that were incorporated into the riparian restoration would not be clustered in a
13 single region of the study area, but would be distributed throughout protected lands. Further details
14 of AMM18 are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
15 EIR/EIS.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
17 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
18 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
19 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
20 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
21 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
22 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
23 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
24 black-crowned night heron are not species that are covered under the BDCP. For the BDCP avoid
25 having an adverse effect on individuals, existing nests and rookeries would have to be avoided.
26 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
27 *Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to
28 address adverse effects on nesting cormorants, herons, and egrets.

29 ***Late Long-Term Timeframe***

30 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting
31 habitat for cormorants, herons, and egrets. Alternative 1B as a whole would result in the permanent
32 loss of and temporary effects on 897 acres of potential breeding habitat (5% of the potential
33 breeding habitat in the Plan Area).

34 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
35 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*
36 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
37 riparian natural community (Table 3-4 in Chapter 3). The majority of riparian protection and
38 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
39 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP
40 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing
41 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would
42 also benefit cormorants, herons, and egrets by protecting small but essential habitats that occur
43 within cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in
44 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of

1 potential nest trees would be increased by planting and maintaining native trees along roadsides
2 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective
3 SWHA2.1).

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
8 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
9 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
10 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
11 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
12 black-crowned night heron are not species that are covered under the BDCP. These species are
13 highly traditional in their use of nest sites, and for the BDCP to avoid having an adverse effect on
14 individuals, preconstruction surveys would be required to ensure that nests are detected and any
15 direct and indirect impacts on rookeries are avoided. Mitigation Measure BIO-75, *Conduct*
16 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure
17 BIO-117, *Avoid Impacts on Rookeries*, would be available to address adverse effects on nesting
18 cormorants, herons, and egrets.

19 **NEPA Effects:** The loss of cormorant, heron, and egret habitat and potential for direct mortality of
20 these special-status species under Alternative 1B would represent an adverse effect in the absence
21 of other conservation actions. However, with habitat protection and restoration associated with
22 CM3, CM5, CM7, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–
23 AMM7 and *AMM18 Swainson’s Hawk*, which would be in place throughout the construction period,
24 the effects of habitat loss on cormorants, herons, and egrets under Alternative 1B would not be
25 adverse. Double-crested cormorant, great blue heron, great egret, snowy egret, and black-crowned
26 night heron are not species that are covered under the BDCP. For the BDCP to avoid effects on these
27 species, preconstruction surveys for noncovered species would be necessary to ensure that nests
28 are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*
29 *and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*,
30 would be available to address adverse effects on nesting cormorants, herons, and egrets.

31 **CEQA Conclusion:**

32 **Near-Term Timeframe**

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
36 effects of construction would be less than significant under NEPA. The Plan would remove 565 acres
37 of nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These
38 effects would result from the construction of the water conveyance facilities (CM1, 90 acres of
39 nesting habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
40 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
41 *Restoration—475 acres of nesting habitat*).

42 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
43 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for
44 breeding habitat. Using these ratios would indicate that 90 acres of breeding habitat should be

1 restored/created and 90 acres should be protected to compensate for the CM1 losses of modeled
2 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions
3 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of
4 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the
5 same typical NEPA and CEQA ratios.

6 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
7 system with extensive wide bands or large patches of valley/foothill riparian natural community
8 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
9 restoration would expand the patches of existing riparian forest in order to support nesting habitat
10 for these species. In addition, small but essential nesting habitat associated with cultivated lands
11 would also be maintained and protected such as isolated trees, tree rows along field borders or
12 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

13 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
14 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
15 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored
16 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but
17 would require years to several decades to functionally replace habitat that has been affected and for
18 trees to attain sufficient size and structure suitable for established rookeries. This time lag between
19 the removal and restoration of nesting habitat could have a substantial impact on cormorants,
20 herons and egrets in the near-term time period.

21 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
22 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson's hawk
23 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
24 within the 125-acre block are removed. These would be supplemented with additional saplings and
25 would be expected to reduce the temporal effects of loss of nesting habitat. The plantings would
26 occur prior to or concurrent with (in the case of transplanting) the loss of trees. In addition, at least
27 five trees (5-gallon container size) would be planted within the BDCP reserve system for every tree
28 20 feet or taller removed by construction during the near-term period. A variety of native tree
29 species would be planted to provide trees with differing growth rates, maturation, and life span.
30 Replacement trees that were incorporated into the riparian restoration would not be clustered in a
31 single region of the study area, but would be distributed throughout protected lands. Further details
32 of AMM18 are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
33 EIR/EIS.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
38 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
39 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
40 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
41 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
42 black-crowned night heron are not species that are covered under the BDCP. For the BDCP to avoid
43 an adverse effect on individuals, preconstruction surveys for noncovered avian species would be
44 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
45 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure

1 BIO-117, *Avoid Impacts on Rookeries*, would reduce this potential impact to a less-than-significant
2 level.

3 **Late Long-Term Timeframe**

4 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting
5 habitat for cormorants, herons, and egrets. Alternative 1B as a whole would result in the permanent
6 loss of and temporary effects on 897 acres of potential breeding habitat (5% of the potential
7 breeding habitat in the Plan Area).

8 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
9 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*
10 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
11 riparian natural community (Table 3-4 in Chapter 3). The majority of riparian protection and
12 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
13 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP
14 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing
15 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would
16 also benefit cormorants, herons, and egrets by protecting small but essential habitats that occur
17 within cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in
18 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of
19 potential nest trees would be increased by planting and maintaining native trees along roadsides
20 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective
21 SWHA2.1).

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
26 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
27 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
28 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
29 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
30 black-crowned night heron are not species that are covered under the BDCP. These species are
31 highly traditional in their use of nest sites, and for the BDCP to avoid a significant impact on
32 individuals, preconstruction surveys would be required to ensure that nests are detected and any
33 direct and indirect impacts on rookeries are avoided. Mitigation Measure BIO-75, *Conduct*
34 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure
35 BIO-117, *Avoid Impacts on Rookeries*, would reduce this potential impact to a less-than-significant
36 level.

37 In the absence of other conservation actions, effects on nesting cormorants, herons, and egrets
38 would represent an adverse effect as a result of habitat modification and potential for direct
39 mortality of special-status species. This impact would be considered significant. Considering these
40 protection and restoration provisions, which would provide acreages of new or enhanced habitat in
41 amounts sufficient to compensate for the loss of riparian habitats lost to construction and
42 restoration activities, and with implementation of AMM1–AMM7, *AMM18 Swainson's Hawk*, and
43 Mitigation Measures BIO-75 and BIO-117, the loss of habitat or direct mortality through
44 implementation of Alternative 1B would not result in a substantial adverse effect through habitat

1 modifications and would not substantially reduce the number or restrict the range of these species.
2 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-
3 significant impact on cormorants, herons, and egrets.

4 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
5 **Disturbance of Nesting Birds**

6 See Mitigation Measure BIO-75 under Impact BIO-75.

7 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

8 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);
9 therefore, DWR will avoid all direct and indirect impacts on rookeries.

10 **Impact BIO-118: Effects Associated with Electrical Transmission Facilities on Cormorants,**
11 **Herons and Egrets**

12 New transmission lines would increase the risk for bird-power line strikes, which could result in
13 injury or mortality of cormorants, herons and egrets. New transmission lines would increase the
14 risk for bird-power line strikes. Waterbirds have a higher susceptibility to collisions than passerines,
15 raptors, and other birds. Marking transmission lines with flight diverters that make the lines more
16 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
17 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
18 by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines
19 constructed as a result of the project would be fitted with flight diverters, which would reduce bird
20 strike risk of cormorants, herons, and egrets.

21 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
22 could result in injury or mortality of cormorants, herons, and egrets. The implementation of *AMM20*
23 *Greater Sandhill Crane* would require the installation of bird flight diverters on all new transmission
24 lines, which could reduce bird strike risk of cormorants, herons, and egrets by 60%. With the
25 installation of bird flight diverters, the construction and operation of new transmission lines under
26 Alternative 1B would not result in an adverse effect on cormorants, herons, and egrets.

27 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
28 could result in injury or mortality of cormorants, herons, and egrets. The implementation of *AMM20*
29 *Greater Sandhill Crane* would require the installation of bird flight diverters on all new transmission
30 lines, which could reduce bird strike risk of cormorants, herons, and egrets by 60%. With the
31 installation of bird flight diverters, the construction and operation of new transmission lines under
32 Alternative 1B would result in a less-than-significant impact on cormorants, herons, and egrets.

33 **Impact BIO-119: Indirect Effects of Plan Implementation on Cormorants, Herons and Egrets**

34 **Indirect Construction- and Operation-Related Effects:** Construction noise above background
35 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
36 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
37 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
38 the extent to which these noise levels could affect cormorants, herons, or egrets. If cormorants,
39 herons or egrets were to nest in or adjacent to work areas, construction and subsequent
40 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting

1 behaviors, and reduce the functions of suitable nesting habitat for these species. Mitigation Measure
 2 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
 3 avoid the potential for adverse effects of construction-related activities on survival and productivity
 4 of nesting cormorants, herons or egrets. The use of mechanical equipment during water conveyance
 5 facilities construction could cause the accidental release of petroleum or other contaminants that
 6 could affect cormorants, herons or egrets in the surrounding habitat. The inadvertent discharge of
 7 sediment or excessive dust adjacent to suitable habitat could also have an adverse effect on these
 8 species. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
 9 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff
 10 from the construction area and negative effects of dust on active nests.

11 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
 12 mercury in avian species, including cormorants, herons or egrets.

13 A detailed review of the methylmercury issues associated with implementation of the BDCP is
 14 contained in Appendix 11F, *Substantive BDCP Revisions*. This review includes an overview of the
 15 BDCP-related mechanisms that could result in increased mercury in the foodweb, and how exposure
 16 of individual species to mercury may occur based on feeding habits and where species habitat
 17 overlaps with the areas where mercury bioavailability could increase. Mercury is transformed into
 18 the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to
 19 regular wetting and drying such as tidal marshes and flood plains (Alpers et al.
 20 2008). Bioaccumulation of methylmercury varies by species as there are taxonomic differences in
 21 rates of detoxification within the liver (Eagles-Smith et al. 2009). Organisms feeding within pelagic-
 22 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
 23 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
 24 segregation (Grimaldo et al. 2009). That is, the pelagic food chain tends to be longer than the benthic
 25 food chain, which allows for greater biomagnification of methylmercury in top predators. Also, there
 26 is less prey diversity at the top of the pelagic food chain than in the benthic food chain; pelagic top
 27 predators eat smaller fish and little else, while benthic top predators consume a variety of
 28 organisms, many of which are lower in the food chain than fishes and thus have less potential for
 29 methylmercury biomagnification.

30 Largemouth bass was used as a surrogate species for analysis (Appendix 11F, *Substantive BDCP*
 31 *Revisions*) and the modeled effects of mercury concentrations from changes in water operations
 32 under CM1 on largemouth bass did not differ substantially from existing conditions; therefore,
 33 results also indicate that cormorant, heron, and egret tissue concentrations would not measurably
 34 increase as a result of CM1 implementation.

35 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to
 36 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
 37 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
 38 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas
 39 could increase bioavailability of mercury. Species sensitivity to methylmercury differs widely and
 40 there is a large amount of uncertainty with respect to species-specific effects. Increased
 41 methylmercury associated with natural community and floodplain restoration could indirectly effect
 42 on cormorants, herons or egrets, via uptake in lower trophic levels (as described in BDCP Appendix
 43 5.D, *Contaminants*). Mercury is generally elevated throughout the Delta, and restoration of the lower
 44 potential areas in total may result in generalized, very low level increases of mercury. Given that
 45 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in

1 some level of effects. Restoration in Suisun Marsh would convert managed wetlands to tidal
2 wetlands, which would be expected to result in an overall reduction in mercury methylation.

3 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
4 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
5 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
6 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
7 adaptive management as described in CM12 would be available to address the uncertainty of
8 methylmercury levels in restored tidal marsh and potential impacts on cormorants, herons or
9 egrets.

10 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
11 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
12 each restoration project. On a project-specific basis, where high potential for methylmercury
13 production is identified that restoration design and adaptive management cannot fully address
14 while also meeting restoration objectives, alternate restoration areas would be considered. CM12
15 would be implemented in coordination with other similar efforts to address mercury in the Delta,
16 and specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
17 would include the following actions.

- 18 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
19 mercury methylation and bioavailability
- 20 ● Define design elements that minimize conditions conducive to generation of methylmercury in
21 restored areas.
- 22 ● Define adaptive management strategies that can be implemented to monitor and minimize
23 actual postrestoration creation and mobilization of methylmercury.

24 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
25 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
26 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
27 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
28 2009). The effect of selenium toxicity differs widely between species and also between age and sex
29 classes within a species. In addition, the effect of selenium on a species can be confounded by
30 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
31 2009).

32 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
33 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
34 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
35 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
36 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
37 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
38 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
39 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
40 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
41 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
42 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
43 levels of selenium have a higher risk of selenium toxicity.

1 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 2 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 3 exacerbate bioaccumulation of selenium in avian species, including cormorants, herons, and egrets.
 4 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
 5 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
 6 BDCP restoration activities that create newly inundated areas could increase bioavailability of
 7 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
 8 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
 9 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
 10 long-term increases in selenium concentrations in water in the Delta under any alternative.
 11 However, it is difficult to determine whether the effects of potential increases in selenium
 12 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
 13 lead to adverse effects on cormorants, herons, and egrets.

14 Because of the uncertainty that exists at this programmatic level of review, there could be a
 15 substantial effect on cormorants, herons, and egrets from increases in selenium associated with
 16 restoration activities. This effect would be addressed through the implementation of *AMM27*
 17 *Selenium Management* which would provide specific tidal habitat restoration design elements to
 18 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats, (see
 19 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
 20 selenium management to reduce selenium concentrations and/or bioaccumulation would be
 21 evaluated separately for each restoration effort as part of design and implementation. This
 22 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
 23 design schedule.

24 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
 25 could reduce cormorant, heron, and egret use of modeled habitat adjacent to work areas. Moreover,
 26 operation and maintenance of the water conveyance facilities, including the transmission facilities,
 27 could result in ongoing but periodic postconstruction disturbances that could affect cormorant,
 28 heron, and egret use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
 29 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*
 30 *Impacts on Rookeries*, would be available to address adverse effects on nesting individuals in
 31 addition to AMM1–AMM7. Tidal habitat restoration could result in increased exposure of
 32 cormorants, herons, and egrets to selenium. This effect would be addressed through the
 33 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
 34 restoration design elements to reduce the potential for bioaccumulation of selenium and its
 35 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or
 36 floodplain restoration could result in increased exposure of cormorants, herons or egrets to
 37 methylmercury through the ingestion of fish in restored tidal areas. However, it is unknown what
 38 concentrations of methylmercury are harmful to these species and the potential for increased
 39 exposure varies substantially within the study area. Implementation of CM12 which contains
 40 measures to assess the amount of mercury before project development, followed by appropriate
 41 design and adaptation management, would minimize the potential for increased methylmercury
 42 exposure, and would result in no adverse effect on cormorants, herons, and egrets.

43 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
 44 sedimentation, and operations and maintenance of the water conveyance facilities would represent
 45 an adverse effect in the absence of other conservation actions. This impact would be significant.
 46 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*

1 *Nesting Birds*, Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, and AMM1–AMM7 would
2 reduce this impact to a less-than-significant level.

3 Tidal habitat restoration could result in increased exposure of cormorants, herons, and egrets to
4 selenium which could result in mortality of special-status species. This effect would be addressed
5 through the implementation of *AMM27 Selenium Management*, which would provide specific tidal
6 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its
7 bioavailability in tidal habitats. With implementation of AMM27, potential for increased selenium
8 exposure would result in no adverse effect on the species.

9 The implementation of tidal natural communities restoration or floodplain restoration could result
10 in increased exposure of cormorants, herons or egrets to methylmercury, through the ingestion of
11 fish in tidally restored areas. However, it is unknown what concentrations of methylmercury are
12 harmful to these species. Implementation of CM12 which contains measures to assess the amount of
13 mercury before project development, followed by appropriate design and adaptation management,
14 would minimize the potential for increased methylmercury exposure, and would result in no
15 adverse effect on the species.

16 With AMM1–AMM7, AMM27, and CM12 in place, in addition to the implementation of Mitigation
17 Measures BIO-75 and BIO-117, indirect effects of plan implementation would not result in a
18 substantial adverse effect on cormorants, herons, and egrets through habitat modification or
19 potential mortality. Therefore, the indirect effects of Alternative 1B implementation would have a
20 less-than-significant impact on cormorants, herons, and egrets.

21 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
22 **Disturbance of Nesting Birds**

23 See Mitigation Measure BIO-75 under Impact BIO-75.

24 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

25 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);
26 therefore, DWR will avoid all direct and indirect impacts on rookeries.

27 **Impact BIO-120: Periodic Effects of Inundation on Cormorants, Herons and Egrets as a Result**
28 **of Implementation of Conservation Components**

29 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
30 duration of inundation of approximately 51–92 acres of modeled breeding habitat for cormorants,
31 herons and egrets. However, increased periodic flooding is not expected to cause any adverse effect
32 on breeding habitat because trees in which nest sites are situated already withstand floods, the
33 increase in inundation frequency and duration is expected to remain within the range of tolerance of
34 riparian trees, and nest sites are located above floodwaters.

35 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
36 inundation of up to 266 acres of breeding habitat for cormorants, herons and egrets. The overall
37 effect of seasonal inundation in existing riparian natural communities is likely to be beneficial for
38 these species, because, historically, flooding was the main natural disturbance regulating ecological
39 processes in riparian areas, and flooding promotes the germination and establishment of many
40 native riparian plants.

1 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
2 sites because trees in which nest sites are situated already withstand floods, the increase in
3 inundation frequency and duration is expected to remain within the range of tolerance of riparian
4 trees, and nest sites are located above floodwaters. Therefore, increased duration of inundation
5 from CM2 and CM5 would not result in an adverse effect on cormorants, herons and egrets.

6 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
7 nest sites because trees in which nest sites are situated already withstand floods, the increase in
8 inundation frequency and duration is expected to remain within the range of tolerance of riparian
9 trees, and nest sites are located above floodwaters. Therefore, increased duration of inundation
10 from CM2 and CM5 would have a less-than-significant impact on cormorants, herons and egrets.

11 **Short-Eared Owl and Northern Harrier**

12 This section describes the effects of Alternative 1B, including water conveyance facilities
13 construction and implementation of other conservation components, on short-eared owl and
14 northern harrier. Modeled habitat for short-eared owl and northern harrier include tidal brackish
15 and freshwater emergent wetland, nontidal freshwater perennial emergent wetland, managed
16 wetland, other natural seasonal wetland, grassland, alkali seasonal wetland, vernal pool complex,
17 and selected cultivated lands (grain and hay crops, pasture [including alfalfa], rice, truck, nursery,
18 and berry crops [including tomatoes and melons], beets, and idle lands).

19 Construction and restoration associated with Alternative 1B conservation measures would result in
20 both temporary and permanent losses of modeled habitat for short-eared owl and northern harrier
21 as indicated in Table 12-1B-46. Full implementation of Alternative 1B would include the following
22 conservation actions over the term of the BDCP which would also benefit short-eared owl and
23 northern harrier (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 24 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at
25 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
26 with CM4).
- 27 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,
28 and/or 7 (Objective TFEWNC1.2, associated with CM4).
- 29 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
30 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
31 associated with CM10).
- 32 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
33 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
34 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 35 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 36 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
37 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with Cm3).
- 38 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
39 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 40 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
41 VPNC2.5, and GNC2.4, associated with CM11).

1 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 2 management activities that would enhance habitat for these species and implementation of AMM1–
 3 AMM7, *AMM27 Selenium Management* and Mitigation Measures BIO-75 and BIO-121, impacts on
 4 short-eared owl and northern harrier would not be adverse for NEPA purposes and would be less
 5 than significant for CEQA purposes.

6 **Table 12-1B-46. Changes in Short-Eared Owl and Northern Harrier Modeled Habitat Associated**
 7 **with Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting and foraging	3,569	3,569	5,630	5,630	NA	NA
Total Impacts CM1		3,569	3,569	5,630	5,630	NA	NA
CM2–CM18	Nesting and foraging	12,281	46,700	471	1,224	2,926–8,060	5,978
Total Impacts CM2–CM18		12,281	46,700	471	1,224	2,926–8,060	5,978
TOTAL IMPACTS		15,850	50,269	6,101	6,854	2,926–8,060	5,978

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

8

9 **Impact BIO-121: Loss or Conversion of Habitat for and Direct Mortality of Short-Eared Owl**
 10 **and Northern Harrier**

11 Alternative 1B conservation measures would result in the combined permanent and temporary loss
 12 of up to 57,123 acres of modeled habitat for short-eared owl and northern harrier (50,269 acres of
 13 permanent loss and 6,854 acres of temporary loss, Table 12-1B-46). Conservation measures that
 14 would result in these losses are conveyance facilities and transmission line construction, and
 15 establishment and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal
 16 habitat restoration (CM4), floodplain restoration (CM5), grassland restoration (CM8), vernal pool
 17 and wetland restoration (CM9), marsh restoration (CM10), and construction of conservation
 18 hatcheries (CM18). The majority of habitat loss would result from CM4. Habitat enhancement and
 19 management activities (CM11), which include ground disturbance or removal of nonnative
 20 vegetation, could result in local adverse habitat effects. In addition, maintenance activities
 21 associated with the long-term operation of the water conveyance facilities and other BDCP physical
 22 facilities could degrade or eliminate short-eared owl and northern harrier modeled habitat. Each of
 23 these individual activities is described below. A summary statement of the combined impacts and
 24 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 1 ● *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would
2 result in the combined permanent and temporary loss of up to 2,785 acres of modeled short-
3 eared owl and northern harrier habitat (2,012 acres of permanent loss, 773 acres of temporary
4 loss). The majority of habitat removed would consist of grassland and alfalfa fields. Habitat
5 losses would occur at various locations along the new canal route from the construction of the
6 canal and the associated borrow and spoil sites and at the intake sites along the Sacramento
7 River. Permanent and temporary losses of foraging habitat would also occur at the new forebay
8 site just south of Clifton Court Forebay and associated borrow and spoil sites. There are no
9 occurrences of nesting short-eared owl and northern harrier that overlap with the construction
10 footprint of CM1. However, northern harrier nests were detected throughout the central Delta
11 during DHCCP surveys and there is suitable habitat throughout the study area for both species.
12 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
13 *of Nesting Birds* would require preconstruction surveys and the establishment of no-disturbance
14 buffers and would be available to address potential effects on short-eared owls and northern
15 harriers if they were to nest in or adjacent to construction activities. The majority of habitat
16 removed would be grassland and cultivated lands from proposed borrow and spoil sites
17 adjacent to the canal alignment in CZs 4–8. Refer to the Terrestrial Biology Map Book for a
18 detailed view of Alternative 1B construction locations.
- 19 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
20 would permanently remove 1,021 acres of modeled short-eared owl and northern harrier
21 habitat in the Yolo Bypass in CZ 2. In addition, 471 acres of habitat would be temporarily
22 removed. The impact would primarily consist of loss of acreages of pastures. The conversion is
23 expected to occur during the first 10 years of Alternative 1B implementation.
- 24 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
25 inundation would permanently remove an estimated 39,017 acres of modeled short-eared owl
26 and northern harrier habitat. The majority of the losses would be managed wetlands and
27 cultivated lands in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. Tidal restoration actions through CM4 would
28 restore an estimated 55,000 acres of tidal natural communities. These restored wetland areas
29 could provide suitable nesting habitat for short-eared owl and northern harrier. Consequently,
30 although existing nesting habitat for short-eared owl and northern harrier would be removed,
31 restoration of wetland habitats is expected to benefit marsh associated ground nesting birds by
32 increasing the extent and value of their nesting habitat. Grizzley Island supports the only known
33 resident population of short-eared owls in the Suisun Marsh and Sacramento-San Joaquin River
34 Delta (Roberson 2008). Grizzley Island does not overlap with the hypothetical footprint for CM4.
35 However, this is an important breeding area for short-eared owl and if restoration footprints
36 were changed during the implementation process of BDCP to overlap with this area, the effects
37 on breeding short-eared owls could likely be adverse. Future NEPA and CEQA analysis would be
38 conducted for restoration projects under BDCP and if restoration was proposed to occur outside
39 of the hypothetical footprints used for this programmatic analysis, potential impacts on these
40 species would be captured in the project-level analysis (Appendix 3B, *Environmental*
41 *Commitments, AMMs, and CMs*).
- 42 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
43 seasonally inundated floodplain would permanently and temporarily remove approximately
44 2,086 acres of modeled short-eared owl and northern harrier habitat (1,332 permanent, 754
45 temporary). These losses would be expected to occur along the San Joaquin River and other
46 major waterways in CZ 7.

- 1 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
2 approximately 623 acres of short-eared owl and northern harrier habitat as part of tidal
3 restoration and 2,479 acres of habitat as part of seasonal floodplain restoration.
- 4 ● *CM8 Grassland Natural Community Restoration* Restoration of grassland is expected to be
5 implemented on agricultural lands and would result in the conversion of 1,066 acres of
6 cultivated lands to grassland in CZs 1, 2, 4, 5, 7, 8, and 11. The resulting 2,000 acres of grassland
7 would provide habitat for short-eared owl and northern harrier.
- 8 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
9 actions included in *CM11 Natural Communities Enhancement and Management* that are designed
10 to enhance wildlife values in restored or protected habitats could result in localized ground
11 disturbances that could temporarily remove small amounts of modeled habitat. Ground-
12 disturbing activities, such as removal of nonnative vegetation and road and other infrastructure
13 maintenance activities, would be expected to have minor adverse effects on available habitat
14 and would be expected to result in overall improvements to and maintenance of habitat values
15 over the term of the BDCP. Habitat management- and enhancement-related activities could
16 short-eared owl and northern harrier nests. If either species were to nest in the vicinity of a
17 worksite, equipment operation could destroy nests, and noise and visual disturbances could
18 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
19 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
20 be available to minimize these adverse effects.
- 21 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of short-
22 eared owl and northern harrier habitat for the development of a delta and longfin smelt
23 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan
24 implementation.
- 25 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
26 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
27 disturbances that could affect short-eared owl and northern harrier use of the surrounding
28 habitat. Maintenance activities would include vegetation management, levee and structure
29 repair, and re-grading of roads and permanent work areas. These effects, however, would be
30 reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as described
31 below.
- 32 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
33 direct mortality of adult or fledged short-eared owl and northern harrier if they were present in
34 the Plan Area, because they would be expected to avoid contact with construction and other
35 equipment. If either species were to nest in the construction area, construction-related
36 activities, including equipment operation, noise and visual disturbances could destroy nests or
37 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
38 75 would be available to minimize these adverse effects.

39 The following paragraphs summarize the combined effects discussed above and describe other
40 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
41 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-
3 term BDCP conservation strategy has been evaluated to determine whether it would provide
4 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
5 construction would not be adverse under NEPA. The Plan would remove 21,951 acres of modeled
6 habitat (15,850 permanent, 6,101 temporary) for short-eared owl and northern harrier in the study
7 area in the near-term. These effects would result from the construction of the water conveyance
8 facilities (CM1, 9,199 acres), and implementing other conservation measures (CM2 *Yolo Bypass*
9 *Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5 *Seasonally Inundated*
10 *Floodplain Restoration*, CM7, *Riparian Natural Community Restoration*, CM8 *Grassland Natural*
11 *Community Restoration*, CM10 *Nontidal Marsh Restoration*, and CM18 *Conservation Hatcheries*—
12 12,752 acres).

13 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
14 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios
15 would indicate that 9,199 acres of habitat should be restored and 9,199 acres should be protected to
16 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term
17 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore
18 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern
19 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
20 protection).

21 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
22 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
23 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
24 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
25 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation
26 actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the
27 construction and early restoration losses.

28 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
29 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
30 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
31 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
32 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
33 of current levels of habitat fragmentation. Small mammal populations would also be increased on
34 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
35 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
36 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
37 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
38 other uncultivated areas would also be protected and maintained as part of the cultivated lands
39 reserve system which would provide additional foraging habitat and a source of rodent prey that
40 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
41 (including upland grassland components) would preserve habitat for short-eared owl and northern
42 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
43 objective would focus on highly degraded areas in order to provide the greatest possible level of
44 enhancement benefit to the managed wetland natural community and associated species. Managed

1 wetland protection and enhancement would be concentrated in Suisun Marsh, which currently
2 supports a high concentration of nesting short-eared owls on Grizzley Island.

3 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would
4 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and
5 northern harrier nest in tidal brackish and freshwater emergent wetland, nontidal freshwater
6 perennial emergent wetland, managed wetland, other natural seasonal wetland, grassland, alkali
7 seasonal wetland, vernal pool complex, and selected cultivated lands, which includes alfalfa,
8 irrigated pasture, and other grain fields. At least 15,400 acres of cultivated lands that provide
9 habitat for covered and other native wildlife species would be protected in the near-term time
10 period (Objective CLNC1.1). A minimum of 87% of cultivated lands protected by the late long-term
11 time period would be in alfalfa, irrigated pasture, and other hay crops (Objective SH1.2). This
12 biological objective provides an estimate for the proportion of cultivated lands protected in the
13 near-term time period which would provide suitable nesting and foraging habitat for short-eared
14 owl and northern harrier.

15 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
16 that would be applied to the project-level effects of CM1 and the effects from other near-term
17 restoration actions. The acres of restoration in the near-term satisfy the project-level effects of CM1,
18 but are 1,661 acres short of satisfying the compensation required for other near-term impacts.
19 Mitigation Measure BIO-121, *Compensate for Loss of Short-Eared Owl and Northern Harrier Nesting*
20 *Habitat*, would be available to address the adverse effect of near-term habitat loss.

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
22 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
23 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
24 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
25 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
26 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
27 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
28 of the Final EIR/EIS.

29 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP
30 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would
31 be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
32 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
33 address this adverse effect.

34 **Late Long-Term Timeframe**

35 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting
36 and foraging habitat for short-eared owl and northern harrier. Alternative 1B as a whole would
37 result in the permanent loss of and temporary effects on 57,123 acres of modeled short-eared owl
38 and northern harrier habitat during the term of the Plan (14% of the modeled habitat in the study
39 area). The locations of these losses are described above in the analyses of individual conservation
40 measures.

41 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
42 *Restoration*, *CM4 Tidal Natural Communities Restoration*, and *CM8 Grassland Natural Community*
43 *Restoration*, to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect

1 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect
 2 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable
 3 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in
 4 Chapter 3).

5 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 6 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
 7 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
 8 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
 9 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
 10 of current levels of habitat fragmentation. Small mammal populations would also be increased on
 11 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
 12 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
 13 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
 14 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
 15 other uncultivated areas would also be protected and maintained as part of the cultivated lands
 16 reserve system which would provide additional foraging habitat and a source of rodent prey that
 17 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
 18 (including upland grassland components) would preserve habitat for short-eared owl and northern
 19 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
 20 objective would focus on highly degraded areas in order to provide the greatest possible level of
 21 enhancement benefit to the managed wetland natural community and associated species. Managed
 22 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
 23 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the
 24 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time
 25 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands
 26 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared
 27 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated
 28 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected
 29 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated
 30 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 35 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 36 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 37 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 38 of the Final EIR/EIS. Short-eared owl and northern harrier are not species that are covered under
 39 the BDCP. For the BDCP to avoid having an adverse effect on individuals, preconstruction surveys
 40 for noncovered avian species would be required to ensure that active nests are detected and
 41 avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
 42 *Disturbance of Nesting Birds*, would be available to address this adverse effect.

43 **NEPA Effects:** The loss of short-eared owl and northern harrier habitat and potential for direct
 44 mortality of these special-status species under Alternative 1B would represent an adverse effect in
 45 the absence of other conservation actions. However, with habitat protection and restoration
 46 associated with CM3, CM8, and CM11, guided by biological goals and objectives and by AMM1–

1 AMM7, which would be in place throughout the construction period, the effects of habitat loss from
2 Alternative 1B would not be adverse under NEPA. Short-eared owl and northern harrier are not
3 covered species under the BDCP, and preconstruction surveys for noncovered avian species would
4 be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75 would be
5 available to address the adverse effect of direct mortality on short-eared owl and northern harrier.

6 ***CEQA Conclusion:***

7 ***Near-Term Timeframe***

8 Because the water conveyance facilities construction is being evaluated at the project level, the near-
9 term BDCP conservation strategy has been evaluated to determine whether it would provide
10 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
11 construction would be less than significant under CEQA. The Plan would remove 21,951 acres of
12 modeled habitat (15,850 permanent, 6,101 temporary) for short-eared owl and northern harrier in
13 the study area in the near-term. These effects would result from the construction of the water
14 conveyance facilities (CM1, 9,199 acres), and implementing other conservation measures (*CM2 Yolo*
15 *Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally*
16 *Inundated Floodplain Restoration, CM7, Riparian Natural Community Restoration, CM8 Grassland*
17 *Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation*
18 *Hatcheries—12,752 acres).*

19 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
20 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios
21 would indicate that 9,199 acres of habitat should be restored and 9,199 acres should be protected to
22 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term
23 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore
24 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern
25 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
26 protection).

27 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
28 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
29 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
30 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
31 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation
32 actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the
33 construction and early restoration losses.

34 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
35 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
36 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
37 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
38 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
39 of current levels of habitat fragmentation. Small mammal populations would also be increased on
40 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
41 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
42 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
43 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
44 other uncultivated areas would also be protected and maintained as part of the cultivated lands

1 reserve system which would provide additional foraging habitat and a source of rodent prey that
2 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
3 (including upland grassland components) would preserve habitat for short-eared owl and northern
4 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
5 objective would focus on highly degraded areas in order to provide the greatest possible level of
6 enhancement benefit to the managed wetland natural community and associated species. Managed
7 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
8 high concentration of nesting short-eared owls on Grizzley Island.

9 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would
10 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and
11 northern harrier nest in tidal brackish and freshwater emergent wetland, nontidal freshwater
12 perennial emergent wetland, managed wetland, other natural seasonal wetland, grassland, alkali
13 seasonal wetland, vernal pool complex, and selected cultivated lands, which includes alfalfa,
14 irrigated pasture, and other grain fields. At least 15,400 acres of cultivated lands that provide
15 habitat for covered and other native wildlife species would be protected in the near-term time
16 period (Objective CLNC1.1). A minimum of 87% of cultivated lands protected by the late long-term
17 time period would be in alfalfa, irrigated pasture, and other hay crops (Objective SH1.2). This
18 biological objective provides an estimate for the proportion of cultivated lands protected in the
19 near-term time period which would provide suitable nesting and foraging habitat for short-eared
20 owl and northern harrier. These biological goals and objectives would inform the near-term
21 protection and restoration efforts and represent performance standards for considering the
22 effectiveness of restoration actions.

23 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
24 that would be applied to the project-level effects of CM1 and the effects from other near-term
25 restoration actions. The acres of restoration in the near-term satisfy the project-level effects of CM1,
26 but are 1,661 acres short of satisfying the compensation required for other near-term impacts. The
27 implementation of Mitigation Measure BIO-121, *Compensate for Loss of Short-Eared Owl and*
28 *Northern Harrier Nesting Habitat*, would reduce the impact of near-term habitat loss to a less-than-
29 significant level.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
34 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
35 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
36 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
37 of the Final EIR/EIS.

38 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP
39 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would
40 be required to ensure that nests are detected and avoided. The implementation of Mitigation
41 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
42 *Birds*, would reduce this potential impact to a less-than-significant level.

1 **Late Long-Term Timeframe**

2 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting
3 and foraging habitat for short-eared owl and northern harrier. Alternative 1B as a whole would
4 result in the permanent loss of and temporary effects on 57,123 acres of modeled short-eared owl
5 and northern harrier habitat during the term of the Plan (14% of the modeled habitat in the study
6 area). The locations of these losses are described above in the analyses of individual conservation
7 measures.

8 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
9 *Restoration, CM4 Tidal Natural Communities Restoration, and CM8 Grassland Natural Community*
10 *Restoration*, to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
11 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect
12 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable
13 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in
14 Chapter 3).

15 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
16 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
17 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
18 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
19 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
20 of current levels of habitat fragmentation. Small mammal populations would also be increased on
21 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
22 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
23 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
24 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
25 other uncultivated areas would also be protected and maintained as part of the cultivated lands
26 reserve system which would provide additional foraging habitat and a source of rodent prey that
27 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
28 (including upland grassland components) would preserve habitat for short-eared owl and northern
29 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
30 objective would focus on highly degraded areas in order to provide the greatest possible level of
31 enhancement benefit to the managed wetland natural community and associated species. Managed
32 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
33 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the
34 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time
35 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands
36 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared
37 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated
38 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected
39 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated
40 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

41 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
42 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
43 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
44 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
45 *these AMMs include elements that would avoid or minimize the risk of affecting individuals and*

1 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
2 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
3 of the Final EIR/EIS. Short-eared owl and northern harrier are not species that are covered under
4 the BDCP. For the BDCP to have a less-than-significant impact on individuals, preconstruction
5 surveys for noncovered avian species would be required to ensure that active nests are detected and
6 avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
7 *Disturbance of Nesting Birds*, would be reduce the impact to a less-than-significant level.

8 Considering Alternative 1B's protection and restoration provisions, which would provide acreages
9 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
10 construction and restoration activities, and with the implementation of AMM1-AMM7 and
11 Mitigation Measures BIO-75 and BIO-121, the loss of habitat or direct mortality through
12 implementation of Alternative 1B would not result in a substantial adverse effect through habitat
13 modifications and would not substantially reduce the number or restrict the range of either species.
14 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-
15 significant impact on short-eared owl and northern harrier.

16 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
17 **Disturbance of Nesting Birds**

18 See Mitigation Measure BIO-75 under Impact BIO-75.

19 **Mitigation Measure BIO-121: Compensate for Loss of Short-Eared Owl and Northern**
20 **Harrier Nesting Habitat**

21 DWR will restore and protect sufficient acres of suitable nesting habitat for short-eared owl and
22 northern harrier such that the total acres of habitat impacted in the near-term timeframe are
23 mitigated at a ratio of 1:1. Restored habitat could consist of grassland or managed wetlands.

24 **Impact BIO-122: Effects on Short-Eared Owl and Northern Harrier Associated with Electrical**
25 **Transmission Facilities**

26 New transmission lines would increase the risk that short-eared owl and northern harrier could be
27 subject to power line strikes, which could result in injury or mortality of these species. Short-eared
28 owl and northern harrier would be at low risk of bird strike mortality based on their keen eyesight
29 and largely ground-based foraging behavior (BDCP Appendix 5.J, Attachment 5.J-2, *Memorandum:*
30 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). The existing network of
31 transmission lines in the project area currently poses the same small risk for these species, and any
32 incremental risk associated with the new power line corridors would also be expected to be low.
33 Marking transmission lines with flight diverters that make the lines more visible to birds has been
34 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated
35 that marking devices in the Central Valley could reduce avian mortality by 60%. With the
36 implementation of *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted
37 with flight diverters, which would further reduce any bird strike risk of short-eared owl and
38 northern harrier.

39 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
40 adverse effect on short-eared owl or northern harrier because the risk of bird strike is considered to
41 be low for both species based on their keen eyesight and behavioral characteristics. New
42 transmission lines would minimally increase the risk for short-eared owl and northern harrier

1 power line strikes. All new transmission lines constructed as a result of the project would be fitted
2 with bird diverters (*AMM20 Greater Sandhill Crane*), which have been shown to reduce avian
3 mortality by 60% and which would further reduce any potential for powerline collisions. Therefore,
4 the construction and operation of transmission lines under Alternative 1B would not result in an
5 adverse effect on short-eared owl or northern harrier.

6 **CEQA Conclusion:** The construction and presence of new transmission lines would not result in a
7 significant impact on short-eared owl or northern harrier because the risk of bird strike is
8 considered to be low for both species based on their keen eyesight and behavioral characteristics.
9 New transmission lines would minimally increase the risk for short-eared owl and northern harrier
10 power line strikes. All new transmission lines constructed as a result of the project would be fitted
11 with bird diverters (*AMM20 Greater Sandhill Crane*), which have been shown to reduce avian
12 mortality by 60% and which would further reduce any potential for powerline collisions. Therefore,
13 the construction and operation of transmission lines under Alternative 1B would result in a less-
14 than-significant impact on short-eared owl or northern harrier.

15 **Impact BIO-123: Indirect Effects of Plan Implementation on Short-Eared Owl and Northern**
16 **Harrier**

17 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
18 with construction-related activities could result in temporary disturbances that affect short-eared
19 owl and northern harrier use of modeled habitat. Construction noise above background noise levels
20 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
21 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
22 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
23 which these noise levels could affect short-eared owl or northern harrier. Indirect effects associated
24 with construction include noise, dust, and visual disturbance caused by grading, filling, contouring,
25 and other ground-disturbing operations. Construction-related noise and visual disturbances could
26 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could
27 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*
28 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse
29 effects on active nests. The use of mechanical equipment during water conveyance construction
30 could cause the accidental release of petroleum or other contaminants that could affect these
31 species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best*
32 *Management Practices and Monitoring*, would minimize the likelihood of such spills from occurring.
33 The inadvertent discharge of sediment or excessive dust adjacent to short-eared owl and northern
34 harrier could also have a negative effect on these species. AMM1–AMM7 would ensure that
35 measures are in place to prevent runoff from the construction area and the negative effects of dust
36 on wildlife adjacent to work areas.

37 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
38 mercury in avian species, including short-eared owl and northern harrier. Marsh (tidal and nontidal)
39 and floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
40 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
41 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
42 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
43 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity
44 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-
45 specific effects. Increased methylmercury associated with natural community and floodplain

1 restoration could indirectly affect short-eared owl and northern harrier, via uptake in lower trophic
2 levels (as described in BDCP Appendix 5.D, *Contaminants*).

3 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
4 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
5 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
6 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
7 adaptive management as described in CM12 would be available to address the uncertainty of
8 methylmercury levels in restored tidal marsh and potential impacts on short-eared owl and
9 northern harrier.

10 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
11 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
12 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
13 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
14 2009). The effect of selenium toxicity differs widely between species and also between age and sex
15 classes within a species. In addition, the effect of selenium on a species can be confounded by
16 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
17 2009).

18 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
19 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
20 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
21 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
22 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
23 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
24 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
25 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
26 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
27 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
28 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
29 levels of selenium have a higher risk of selenium toxicity.

30 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
31 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
32 exacerbate bioaccumulation of selenium in avian species, including short-eared owl and northern
33 harrier. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
34 selenium, and therefore increase avian exposure from ingestion of prey items with elevated
35 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase
36 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).
37 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was
38 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
39 in substantial, long-term increases in selenium concentrations in water in the Delta under any
40 alternative. However, it is difficult to determine whether the effects of potential increases in
41 selenium bioavailability associated with restoration-related conservation measures (CM4–CM5)
42 would lead to adverse effects on short-eared owl and northern harrier.

43 Because of the uncertainty that exists at this programmatic level of review, there could be a
44 substantial effect on short-eared owl and northern harrier from increases in selenium associated

1 with restoration activities. This effect would be addressed through the implementation of *AMM27*
2 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
3 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
4 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
5 selenium management to reduce selenium concentrations and/or bioaccumulation would be
6 evaluated separately for each restoration effort as part of design and implementation. This
7 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
8 design schedule.

9 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
10 could reduce short-eared owl and northern harrier use of modeled habitat adjacent to work areas.
11 Moreover, operation and maintenance of the water conveyance facilities, including the transmission
12 facilities, could result in ongoing but periodic postconstruction disturbances that could affect short-
13 eared owl and northern harrier use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*
14 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
15 address adverse effects on nesting individuals in addition to AMM1–AMM7. Tidal habitat restoration
16 could result in increased exposure of short-eared owl and northern harrier to selenium. This effect
17 would be addressed through the implementation of *AMM27 Selenium Management*, which would
18 provide specific tidal habitat restoration design elements to reduce the potential for
19 bioaccumulation of selenium and its bioavailability in tidal habitats.

20 Tidal habitat restoration is unlikely to have an adverse effect on short-eared owl and northern
21 harrier through increased exposure to methylmercury, as these species currently nest and forage in
22 tidal marshes where elevated methylmercury levels exist. However, it is unknown what
23 concentrations of methylmercury are harmful to the species and the potential for increased
24 exposure varies substantially within the study area. Site-specific restoration plans in addition to
25 monitoring and adaptive management, described in *CM12 Methylmercury Management*, would
26 address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning
27 phase of marsh restoration would be the appropriate place to assess the potential for risk of
28 methylmercury exposure for California least tern, once site specific sampling and other information
29 could be developed.

30 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
31 operations and maintenance of the water conveyance facilities would have a less-than-significant
32 impact on short-eared owl and northern harrier with the implementation of Mitigation Measure
33 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds* and
34 AMM1–AMM7. Tidal habitat restoration is unlikely to have a significant impact on short-eared owl
35 and northern harrier through increased exposure to methylmercury, as these species currently nest
36 and forage in tidal marshes where elevated methylmercury levels exist. However, it is unknown
37 what concentrations of methylmercury are harmful to these species. Site-specific restoration plans
38 that address the creation and mobilization of mercury, as well as monitoring and adaptive
39 management as described in CM12 would better inform potential impacts and address the
40 uncertainty of methylmercury levels in restored tidal marsh in the study area. Tidal habitat
41 restoration could result in increased exposure of short-eared owl and northern harrier to selenium.
42 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
43 would provide specific tidal habitat restoration design elements to reduce the potential for
44 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of
45 Alternative 1B implementation would result in a less-than-significant impact on short-eared owl and
46 northern harrier.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 See Mitigation Measure BIO-75 under Impact BIO-75.

4 **Impact BIO-124: Periodic Effects of Inundation on Short-Eared Owl and Northern Harrier as a**
5 **Result of Implementation of Conservation Components**

6 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
7 *Enhancement*) would increase the frequency and duration of inundation on approximately 2,926–
8 8,060 acres of modeled short-eared owl and northern harrier habitat (Table 12-1B-46).

9 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
10 *Restoration* could result in the periodic inundation of up to approximately 5,978 acres of modeled
11 habitat (Table 12-1B-46), the majority of which would be pasture and other cultivated lands.

12 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
13 season due to periodic inundation. However, inundation would occur during the nonbreeding
14 season and would not be expected to have an adverse effect on either species.

15 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on short-
16 eared owl and northern harrier because inundation is expected to occur prior to the breeding
17 season.

18 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on short-
19 eared owl and northern harrier because inundation is expected to occur prior to the breeding
20 season.

21 **Redhead and Tule Greater White-Fronted Goose**

22 Impacts, relevant protection and restoration actions, and mitigation requirements under CEQA are
23 discussed for these species in the *General Terrestrial Biology Effects* section under Impacts BIO-178
24 through BIO-183. Further details of the methods of analysis for waterfowl and shorebirds can be
25 found in the *BDCP Waterfowl and Shorebird Effects Analysis* (Ducks Unlimited 2013).

26 **Mountain Plover**

27 This section describes the effects of Alternative 1B, including water conveyance facilities
28 construction and implementation of other conservation components, on mountain plover. Modeled
29 habitat for mountain plover include grassland, alkali seasonal wetland, vernal pool complex, alfalfa,
30 grain and hay, pasture, and idle cropland throughout the study area.

31 Construction and restoration associated with Alternative 1B conservation measures would result in
32 both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table
33 12-1B-47. Full implementation of Alternative 1B would include the following biological objectives
34 over the term of the BDCP which would also benefit the mountain plover (BDCP Chapter 3,
35 *Conservation Strategy*).

- 36 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
37 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
38 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 39 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).

- 1 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
2 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 3 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
4 VPNC2.5, GNC2.4, associated with CM11).
- 5 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
6 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 7 • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
8 cultivated lands as Swainson’s hawk foraging habitat with at least 50% in very high-value
9 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

10 As explained below, with the restoration or protection of these amounts of habitat, in addition to
11 management activities that would enhance these natural communities for the species, impacts on
12 mountain plover would not be adverse for NEPA purposes and would be less than significant for
13 CEQA purposes.

14 **Table 12-1B-47. Changes in Mountain Plover Modeled Habitat Associated with Alternative 1B**
15 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Wintering	2,962	2,962	4,528	4,528	NA	NA
Total Impacts CM1		2,962	2,962	4,528	4,528	NA	NA
CM2–CM18	Wintering	5,450	26,198	376	893	1,158–3,650	3,823
Total Impacts CM2–CM18		5,450	26,198	376	893	1,158–3,650	3,823
TOTAL IMPACTS		8,412	29,160	4,904	5,421	1,158–3,650	3,823

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

16

17 **Impact BIO-125: Loss or Conversion of Habitat for and Direct Mortality of Mountain Plover**

18 Alternative 1B conservation measures would result in the combined permanent and temporary loss
19 of up to 34,581 acres of modeled habitat for mountain plover (29,160 acres of permanent loss and
20 5,421 of temporary loss, Table 12-1B-47). Conservation measures that would result in these losses
21 are conveyance facilities and transmission line construction, and establishment and use of borrow
22 and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4),
23 floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), vernal pool
24 and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of

1 conservation hatcheries (CM18). The majority of habitat loss (20,880 acres) would result from CM4.
2 Habitat enhancement and management activities (CM11), which include ground disturbance or
3 removal of nonnative vegetation, and the construction of recreational trails, signs, and facilities,
4 could result in local adverse habitat effects. In addition, maintenance activities associated with the
5 long-term operation of the water conveyance facilities and other BDCP physical facilities could
6 degrade or eliminate mountain plover modeled wintering habitat. Each of these individual activities
7 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA
8 conclusion follows the individual conservation measure discussions.

- 9 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would
10 result in the combined permanent and temporary loss of up to loss of up to 7,490 acres of
11 modeled mountain plover wintering habitat (2,962 acres of permanent loss, 4,528 acres of
12 temporary loss) from CZ 4, CZ 5, CZ 6, CZ 7 and CZ 8. The primary impact is from the
13 construction of the canal and from the potential borrow and spoil areas on either side of the
14 canal throughout the central Delta. The CM1 construction footprint does not overlap with any
15 occurrences of mountain plover. However, the study area does overlap with the wintering range
16 for the species and suitable habitat exists throughout the study area. Refer to the Terrestrial
17 Biology Map Book for a detailed view of Alternative 1B construction locations.
- 18 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
19 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
20 mountain plover wintering habitat (898 acres of permanent loss, 376 acres of temporary loss) in
21 the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of grassland and pasture.
22 Most of the grassland losses would occur at the north end of the bypass below Fremont Weir,
23 along the Toe Drain/Tule Canal, and along the west side channels. Realignment of Putah Creek
24 could also involve excavation and grading in alkali seasonal wetland complex habitat as a new
25 channel is constructed. The loss is expected to occur during the first 10 years of Alternative 1B
26 implementation.
- 27 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
28 inundation would permanently remove an estimated 20,880 acres of modeled mountain plover
29 habitat. The majority of the acres lost would consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or
30 7. Grassland losses would likely occur in the vicinity of Cache Slough, on Decker Island in the
31 West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow bands adjacent to
32 waterways in the South Delta ROA. Tidal restoration would directly impact and fragment
33 grassland just north of Rio Vista in and around French and Prospect Islands, and in an area
34 south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex habitat
35 would likely occur in the south end of the Yolo Bypass and on the northern fringes of Suisun
36 Marsh.
- 37 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
38 seasonally inundated floodplain would permanently and temporarily remove approximately
39 1,450 acres of modeled mountain plover habitat (933 permanent, 517 temporary). These losses
40 would be expected after the first 10 years of Alternative 1B implementation along the San
41 Joaquin River and other major waterways in CZ 7.
- 42 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
43 approximately 370 acres of mountain plover wintering habitat as part of tidal restoration and
44 1,489 acres of habitat as part of seasonal floodplain restoration.

- 1 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
2 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
3 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
4 would be restored after the construction periods. Grassland restoration would be implemented
5 on agricultural lands that also provide wintering habitat for mountain plover and would result
6 in the conversion of 837 acres of cultivated lands to grassland.
- 7 ● *CM10 Nontidal Marsh Restoration*: Implementation of *CM10 Nontidal Marsh Restoration* would
8 result in the permanent removal of 705 acres of mountain plover habitat.
- 9 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
10 actions included in CM11 that are designed to enhance wildlife values in restored or protected
11 habitats could result in localized ground disturbances that could temporarily remove small
12 amounts of mountain plover habitat. Ground-disturbing activities, such as removal of nonnative
13 vegetation and road and other infrastructure maintenance activities, would be expected to have
14 minor adverse effects on available mountain plover habitat. CM11 would also include the
15 construction of recreational-related facilities including trails, interpretive signs, and picnic
16 tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of
17 trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
18 disturbed areas when and where possible. However, approximately 50 acres of grassland
19 habitat would be lost from the construction of trails and facilities.
- 20 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
21 modeled mountain plover habitat for the development of a delta and longfin smelt conservation
22 hatchery in CZ 1.
- 23 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
24 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
25 disturbances that could affect mountain plover use of the surrounding habitat. Maintenance
26 activities would include vegetation management, levee and structure repair, and re-grading of
27 roads and permanent work areas. These effects, however, would be reduced by AMM1–
28 AMM7 and conservation actions as described below.
- 29 ● *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
30 mountain plover because foraging individuals would be expected to temporarily avoid the
31 increased noise and activity associated with construction areas.

32 The following paragraphs summarize the combined effects discussed above and describe other
33 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
34 included.

35 ***Near-Term Timeframe***

36 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
37 the near-term BDCP conservation strategy has been evaluated to determine whether it would
38 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
39 effects of construction would not be adverse under NEPA. The Plan would remove 13,316 acres
40 (8,412 permanent, 4,904 temporary) of modeled mountain plover wintering habitat in the study
41 area in the near-term. These effects would result from the construction of the water conveyance
42 facilities (CM1, 7,490 acres), and implementing other conservation measures (*CM2 Yolo Bypass*
43 *Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian Natural*

1 *Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali*
2 *Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management*
3 *and CM18 Conservation Hatcheries—5,826 acres).*

4 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
5 would be 2:1 for protection of habitat. Using this ratio would indicate that 14,980 acres should be
6 protected to compensate for the CM1 losses of 7,490 acres of mountain plover wintering habitat.
7 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,
8 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical
9 NEPA and CEQA ratio (2:1 for protection).

10 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
11 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
12 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
13 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
14 in the same timeframe as the construction and early restoration losses thereby avoiding adverse
15 effects of habitat loss on mountain plover wintering in the study area. Grassland restoration and
16 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland
17 protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland
18 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
19 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand
20 mountain plover wintering habitat and reduce the effects of current levels of habitat fragmentation.
21 Under *CM11 Natural Communities Enhancement and Management*, insect prey populations would be
22 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
23 ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other
24 native wildlife species would provide approximately 15,400 acres of potential wintering habitat for
25 mountain plover (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late
26 long-term time period would be in alfalfa and pasture crop types (very high- and high-value crop
27 types) for Swainson's hawk (Objective SH1.2) which are also modeled habitat for wintering
28 mountain plover. This biological objective provides an estimate for the high proportion of cultivated
29 lands protected in the near-term time period which would be suitable for mountain plover.

30 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
31 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
32 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
33 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term
34 timeframe would need to include suitable crop types for these species in order to avoid an adverse
35 effect of habitat loss from CM1. The conservation commitment is 7,572 acres short of meeting the
36 compensation for other near-term effects on mountain plover habitat. Mitigation Measure BIO-125,
37 *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, would be available to
38 address the adverse effect of near-term high-value habitat loss by providing crop management
39 requirements for CM1 compensation and requiring acreage compensation for the other near-term
40 effects.

41 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
42 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
43 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
44 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
45 these AMMs include elements that would avoid or minimize the risk of affecting individuals and

1 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
2 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
3 of the Final EIR/EIS.

4 **Late Long-Term Timeframe**

5 Based on the habitat model, the study area supports approximately 269,411 acres of potential
6 habitat for mountain plover. Alternative 1B as a whole would result in the permanent loss of and
7 temporary effects on 34,631 acres of modeled mountain plover wintering habitat during the term of
8 the Plan (13% of the total habitat in the study area). The locations of these losses are described
9 above in the analyses of individual conservation measures. The Plan includes conservation
10 commitments through *CM3 Natural Communities Protection and Restoration*, *CM8 Grassland Natural*
11 *Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to
12 protect 8,000 acres and restore 2,000 acres of grassland natural community, protect 600 acres of
13 vernal pool complex, protect 150 acres of alkali seasonal wetland complex and protect 48,625 acres
14 of cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3).
15 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
16 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
17 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
18 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
19 would expand habitat for mountain plover and reduce the effects of current levels of habitat
20 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
21 populations would be increased on protected lands, enhancing the foraging value of these natural
22 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat
23 for covered and other native wildlife species would provide approximately 15,400 acres of potential
24 wintering habitat for mountain plover (Objective CLNC1.1). Approximately 42,275 acres of
25 cultivated lands protected would be in alfalfa and pasture crop types (very high- and high-value crop
26 types) for Swainson's hawk (Objective SH1.2) which would also provide potential wintering habitat
27 for mountain plover.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
32 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
33 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
34 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
35 of the Final EIR/EIS.

36 **NEPA Effects:** The loss of mountain plover habitat and potential for mortality of this special-status
37 species under Alternative 1B would represent an adverse effect in the absence of other conservation
38 actions. However, with habitat protection and restoration associated with CM3, CM8, CM9, and
39 CM11, guided by biological goals and objectives and by AMM1-AMM7, which would be in place
40 throughout the construction period, and with implementation of Mitigation Measure BIO-125,
41 *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, the effects of habitat loss
42 and potential for direct mortality on mountain plover under Alternative 1B would not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
6 effects of construction would be less than significant under CEQA. The Plan would remove 13,316
7 acres (8,412 permanent, 4,904 temporary) of modeled mountain plover wintering habitat in the
8 study area in the near-term. These effects would result from the construction of the water
9 conveyance facilities (CM1, 7,490 acres), and implementing other conservation measures (CM2 *Yolo*
10 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian Natural*
11 *Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and Alkali*
12 *Seasonal Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and Management*
13 and CM18 *Conservation Hatcheries*—5,826 acres).

14 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
15 would be 2:1 for protection of habitat. Using this ratio would indicate that 14,980 acres should be
16 protected to compensate for the CM1 losses of 7,490 acres of mountain plover wintering habitat.
17 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,
18 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical
19 NEPA and CEQA ratio (2:1 for protection).

20 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
21 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
22 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
23 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
24 in the same timeframe as the construction and early restoration losses thereby avoiding significant
25 impacts of habitat loss on mountain plover. Grassland restoration and protection would occur in CZs
26 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11
27 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1
28 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and
29 vernal pool natural communities which would expand wintering habitat for mountain plover and
30 reduce the effects of current levels of habitat fragmentation. Under CM11 *Natural Communities*
31 *Enhancement and Management*, insect prey populations would be increased on protected lands,
32 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
33 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would
34 provide approximately 15,400 acres of potential wintering habitat for mountain plover (Objective
35 CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time period would
36 be in alfalfa and pasture crop types (very high- and high-value crop types) for Swainson's hawk
37 (Objective SH1.2) which would also provide potential habitat for mountain plover wintering in the
38 study area. This biological objective provides an estimate for the high proportion of cultivated lands
39 protected in the near-term time period which would provide habitat for mountain plover.

40 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
41 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
42 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
43 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term
44 timeframe would need to include suitable crop types for these species in order to avoid the

1 significant impact of habitat loss resulting from CM1. The conservation commitment is 7,572 acres
2 short of meeting the compensation for other near-term effects on mountain plover habitat.
3 Implementation of Mitigation Measure BIO-125, *Compensate for the Near-Term Loss of Mountain*
4 *Plover Wintering Habitat*, would reduce the impact of near-term habitat loss to a less-than-
5 significant level.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
10 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
11 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
12 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
13 of the Final EIR/EIS.

14 **Late Long-Term Timeframe**

15 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 34,631
16 acres of mountain plover habitat during the term of the Plan (13% of the total habitat in the study
17 area). The locations of these losses are described above in the analyses of individual conservation
18 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
19 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
20 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
21 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
22 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
23 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would
24 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,
25 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives
26 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal
27 wetland, and vernal pool natural communities which would expand wintering habitat for mountain
28 plover and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*
29 *Communities Enhancement and Management*, insect prey populations would be increased on
30 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
31 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife
32 species would provide approximately 15,400 acres of potential habitat for mountain plover
33 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa
34 and pasture crop types (very high- and high-value crop types) for Swainson's hawk (Objective
35 SH1.2) which would also provide habitat for mountain plover.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
40 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
41 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
42 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
43 of the Final EIR/EIS.

1 In the absence of other conservation actions, effects on mountain plover would represent an adverse
2 effect as a result of habitat modification and potential for direct mortality of special-status species.
3 This impact would be considered significant. Considering Alternative 1B's protection and
4 restoration provisions, which would provide acreages of new high-value or enhanced habitat in
5 amounts suitable to compensate for habitats lost to construction and restoration activities, and with
6 the implementation of AMM1-AMM7 and Mitigation Measure BIO-125, *Compensate for the Near-
7 Term Loss of Mountain Plover Wintering Habitat*, the loss of habitat or direct mortality through
8 implementation of Alternative 1B would not result in a substantial adverse effect through habitat
9 modifications and would not substantially reduce the number or restrict the range of mountain
10 plover. Therefore, the loss of habitat or potential mortality under this alternative would have a less-
11 than-significant impact on mountain plover.

12 **Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover** 13 **Wintering Habitat**

14 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
15 crops, or alfalfa to provide habitat for mountain plover such that the total acres of high-value
16 habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1. Additional grassland
17 protection, enhancement, and management may be substituted for the protection of high-value
18 cultivated lands.

19 **Impact BIO-126: Effects on Mountain Plover Associated with Electrical Transmission** 20 **Facilities**

21 Mountain plovers congregate in flocks during the winter and travel between grasslands and
22 cultivated lands that provide foraging habitat for the species. This flocking behavior puts them at
23 risk of collisions with powerlines. However, plovers exhibit low wing loading and high aspect-ratio
24 wings and as a result can maneuver relatively quickly around an obstacle such as a transmission
25 line. Their wing structure and design allows for rapid flight and quick, evasive actions. Marking
26 transmission lines with flight diverters that make the lines more visible to birds has been shown to
27 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
28 marking devices in the Central Valley could reduce avian mortality by 60%. Plovers are primarily
29 visual foragers and therefore, the risk for collision would be further reduced by *AMM20 Greater
30 Sandhill Crane*, which would require the installation of bird flight diverters on all new transmission
31 lines in the study area.

32 **NEPA Effects:** New transmission lines are not expected to have an adverse effect on mountain plover
33 because the probability of bird-powerline strikes is highly unlikely due to their flight behaviors. The
34 implementation of *AMM20 Greater Sandhill Crane*, which would require the installation of bird flight
35 diverters on all new transmission lines, would further reduce any potential for mortality. Therefore,
36 the construction and operation of new transmission lines under Alternative 1B would not result in
37 an adverse effect on mountain plover.

38 **CEQA Conclusion:** New transmission lines would have a less-than-significant impact on mountain
39 plover because the probability of bird-powerline strikes is highly unlikely due to their flight
40 behaviors. The implementation of *AMM20 Greater Sandhill Crane*, which would require the
41 installation of bird flight diverters on all new transmission lines, would further reduce any potential
42 for mortality. Therefore, the construction and operation of new transmission lines under Alternative
43 1B would result in a less-than-significant impact on mountain plover.

1 **Impact BIO-127: Indirect Effects of Plan Implementation on Mountain Plover**

2 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt
3 foraging, and reduce the functions of suitable foraging habitat for mountain plover. Construction
4 noise above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from
5 the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*
6 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no
7 available data to determine the extent to which these noise levels could affect mountain plover.
8 Indirect effects associated with construction include noise, dust, and visual disturbance caused by
9 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical
10 equipment during water conveyance facilities construction could cause the accidental release of
11 petroleum or other contaminants that could affect these species or their prey in the surrounding
12 habitat. AMM1–AMM7 would minimize the likelihood of such spills from occurring. The inadvertent
13 discharge of sediment or excessive dust adjacent to mountain plover grassland habitat could also
14 have a negative effect on the species. However, AMM1–AMM7 would also ensure that measures
15 would be in place to prevent runoff from the construction area and the negative effects of dust on
16 wildlife adjacent to work areas.

17 **NEPA Effects:** Indirect effects on mountain plover as a result of Alternative 1B implementation could
18 have adverse effects on the species through the modification of habitat. With the With the
19 implementation of AMM1–AMM7, indirect effects as a result of Alternative 1B implementation
20 would not have an adverse effect mountain plover.

21 **CEQA Conclusion:** Indirect effects on mountain plover as a result of Alternative 1B implementation
22 could have a significant impact on the species from modification of habitat. With the implementation
23 of AMM1–AMM7, indirect effects as a result of Alternative 1B implementation would have a less-
24 than-significant impact on mountain plover.

25 **Impact BIO-128: Periodic Effects of Inundation on Mountain Plover as a Result of** 26 **Implementation of Conservation Components**

27 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
28 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–
29 3,650 acres of modeled mountain plover wintering habitat (Table 12-1B-47). Based on hypothetical
30 footprints, implementation of *CM5 Seasonally Inundated Floodplain Restoration*, could result in the
31 periodic inundation of up to approximately 3,823 acres of modeled mountain plover habitat (Table
32 12-1B-47).

33 **NEPA Effects:** Implementation of CM2 and CM5 would periodically inundate suitable mountain
34 plover foraging habitat. However, effects of periodic inundation would not have an adverse effect on
35 mountain plover because birds would be expected to move to adjacent foraging habitat.

36 **CEQA Conclusion:** Implementation of CM2 and CM5 would periodically inundate suitable mountain
37 plover foraging habitat. However, effects of periodic inundation would have a less-than-significant
38 impact on mountain plover because birds would be expected to move to adjacent foraging habitat.

39 **Black Tern**

40 This section describes the effects of Alternative 1B, including water conveyance facilities
41 construction and implementation of other conservation components, on black tern. Modeled nesting
42 habitat for black tern in the study area is currently limited to rice in CZ 2.

1 Construction and restoration associated with Alternative 1B conservation measures would result in
2 both temporary and permanent losses of modeled habitat for black tern as indicated in Table 12-1B-
3 48. Full implementation of Alternative 1B would include the following biological objectives over the
4 term of the BDCP which would also benefit the black tern (BDCP Chapter 3, *Conservation Strategy*).

- 5 • Protect 700 acres of cultivated lands, with at least 500 acres consisting of rice land, to expand
6 upon and buffer newly restored/created nontidal perennial habitat in CZ 2, (Objective GGS2.3,
7 associated with CM3).
- 8 • Protect up to 1,700 acres of rice land or equivalent habitat (e.g. perennial wetland) in the Yolo
9 Bypass if this portion meets the criteria specified in CM3, *Reserve Design Requirements by Species*
10 for giant garter snake. Any remaining acreage (from a total 2,740 acre commitment) will consist
11 of rice land or equivalent-value habitat outside the Yolo Bypass in CZs 1, 2, 4, or 5 (Objective
12 GGS3.1, associated with CM3).
- 13 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
14 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 15 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
16 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
17 associated with CM10).

18 As explained below, with the restoration and protection of these amounts of habitat, in addition to
19 management activities that would enhance this habitat for the species and implementation of
20 AMM1–AMM7 and Mitigation Measure BIO-75, impacts on black tern would not be adverse for NEPA
21 purposes and would be less than significant for CEQA purposes.

22 **Table 12-1B-48. Changes in Black Tern Modeled Habitat Associated with Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2–CM18	Nesting	306	490	1	1	791–1,582	0
Total Impacts CM2–CM18		306	490	1	1	791–1,582	0
TOTAL IMPACTS		306	490	1	1	791–1,582	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-129a: Loss or Conversion of Habitat for and Direct Mortality of Black Tern**

2 Alternative 1B conservation measures would result in the permanent loss of up to 491 acres of
3 modeled nesting habitat for black tern, consisting of freshwater wetlands and rice in CZ 2 (Table 12-
4 1B-48). Conservation measures that would result in these losses are Yolo Bypass fisheries
5 improvements (CM2), tidal habitat restoration (CM4), grassland restoration (CM8) and nontidal
6 marsh restoration (CM10). Each of these individual activities is described below. A summary
7 statement of the combined impacts and NEPA effects, and a CEQA conclusion follows the individual
8 conservation measure discussions.

- 9 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
10 would permanently remove 31 acres of modeled black tern habitat in the Yolo Bypass in CZ 2. In
11 addition, 1 acre of habitat would be temporarily removed. The loss is expected to occur during
12 the first 10 years of Alternative 1B implementation.
- 13 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
14 inundation would permanently remove an estimated 199 acres of modeled black tern habitat in
15 CZ 2.
- 16 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
17 implemented on agricultural lands and would result in the conversion of 52 acres of rice lands
18 to grassland in CZ 2 by the late-long time period. An estimated 30 acres of impact would occur in
19 the first 10 years.
- 20 ● *CM10 Nontidal Marsh Restoration*: Implementation of *CM10* would result in the permanent
21 removal of 208 acres of black tern nesting habitat in in CZ 2. An estimated 46 acres would be
22 removed in the first 10 years.

23 *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
24 actions that are designed to enhance wildlife values in restored or protected habitats could
25 result in localized ground disturbances that could temporarily remove small amounts of
26 modeled habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road
27 and other infrastructure maintenance activities, would be expected to have minor adverse
28 effects on available habitat and would be expected to result in overall improvements to and
29 maintenance of habitat values over the term of the BDCP. Habitat management- and
30 enhancement-related activities could disturb nesting black terns if they were to nest in the
31 vicinity of a worksite. Equipment operation could destroy nests, and noise and visual
32 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings. The
33 potential for these activities to result in direct mortality of black tern would be minimized with
34 the implementation of and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
35 *Surveys and Avoid Disturbance of Nesting Birds*.

- 36 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration
37 infrastructure could result in ongoing but periodic disturbances that could affect black tern
38 nesting adjacent to maintenance areas. Maintenance activities would include vegetation
39 management, levee and structure repair, and re-grading of roads and permanent work areas.
40 These effects, however, would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and
41 conservation actions as described below.
- 42 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
43 direct mortality of adult or fledged black tern individuals if they were present in the study area,
44 because they would be expected to avoid contact with construction and other equipment. If

1 black tern were to nest in the construction area, construction-related activities, including
2 equipment operation, noise and visual disturbances could destroy nests or lead to their
3 abandonment, resulting in mortality of eggs and nestlings. These effects would be avoided and
4 minimized with the implementation of Mitigation Measure BIO-75.

- 5 ● Late season flooding in the Yolo Bypass could result in the loss of rice (nesting habitat for black
6 tern) by precluding the preparation and planting of rice fields. The methods for estimating loss
7 of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation*
8 *of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo Bypass*. This analysis
9 concludes that the estimated loss of rice could be up to 1,662 acres by the late long-term
10 timeframe. This potential impact is further described under Impact BIO-129c below.

11 The following paragraphs summarize the combined effects discussed above and describe other
12 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
13 included.

14 ***Near-Term Timeframe***

15 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
16 the near-term BDCP conservation strategy has been evaluated to determine whether it would
17 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
18 effects of construction would not be adverse under NEPA. There would be no impacts on black tern
19 nesting habitat resulting from the construction of the water conveyance facilities (CM1). However,
20 there would be a loss of 307 acres of modeled nesting habitat for black tern in the study area in the
21 near-term. These effects would result from implementing *CM2 Yolo Bypass Fisheries Enhancements*,
22 *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration* and
23 *CM10 Nontidal Marsh Restoration*.

24 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection and 1:1
25 restoration for the loss of black tern nesting habitat. Using this ratio would indicate that 307 acres of
26 rice lands and/or freshwater wetlands should be protected and 307 acres should be restored in CZ 2
27 to compensate for the losses of black tern nesting habitat.

28 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or
29 equivalent habitat and restoring 8,850 acres of tidal freshwater emergent wetland (see Table 3-4 in
30 Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3 and CM4
31 and would occur in the same timeframe as the early restoration losses. The BDCP also contains
32 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to
33 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria
34 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3
35 and GGS 3.1) by the late long-term time period. The tidal freshwater emergent wetland would be
36 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*
37 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that
38 increase connectivity among protected lands (Objective TFEWNC2.2).

39 These objectives would inform the nearterm protection actions, and therefore some portion of the
40 200 acres of rice and 700 acres of rice or equivalent habitat and the 8,850 acres of tidal freshwater
41 emergent wetland would be expected to be restored or protected in CZ 2. However, there is no near-
42 term acreage commitment in the plan that is specific to CZ 2. In order to avoid an adverse effect on
43 black tern from habitat loss, protection and restoration of 307 acres of rice and/or freshwater

1 wetlands would need to occur in CZ 2 in the nearterm timeframe. Mitigation Measure BIO-129a,
2 *Compensate for Loss of Black Tern Nesting Habitat*, would be available to address this adverse effect.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
7 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
8 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
9 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
10 of the Final EIR/EIS. Black tern is not a covered species under the BDCP and in order to avoid an
11 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
12 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
13 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
14 address this adverse effect.

15 **Late Long-Term Timeframe**

16 Alternative 1B as a whole would result in the permanent loss of 491 acres of modeled black tern
17 nesting habitat during the term of the Plan. This impact would result from the removal or
18 conversion of rice and freshwater wetlands in CZ 2. The Plan includes conservation commitments
19 through *CM3 Natural Communities Protection and Restoration* to protect 500 acres of rice lands (see
20 Table 3-4 in Chapter 3, *Description of Alternatives*) and up to 1,700 acres of rice lands or equivalent
21 habitat for the giant garter snake (Objective GGS3.1) in CZ 2. The nesting habitat for black tern in the
22 northern part of the study area has largely been reduced to rice lands, and these acres would
23 provide protected nesting habitat for the species. The Plan also includes conservation commitments
24 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
25 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1).

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
30 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
31 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
32 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
33 of the Final EIR/EIS. Black tern is not a covered species under the BDCP and in order to avoid an
34 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
35 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
36 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
37 address this adverse effect.

38 **NEPA Effects:** The loss of black tern nesting habitat and potential for mortality of this special-status
39 species under Alternative 1B would represent an adverse effect in the absence of other conservation
40 actions. With habitat protection associated with CM3, guided by biological goals and objectives and
41 by AMM1–AMM7, which would be in place throughout the construction period, the effects of habitat
42 loss under Alternative 1B would not be adverse under NEPA. Black tern is not a covered species
43 under the BDCP and the potential for mortality would be adverse without preconstruction surveys
44 to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*

1 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this
2 adverse effect.

3 **CEQA Conclusion:**

4 **Near-Term Timeframe**

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
8 effects of construction would be less than significant under CEQA. There would be no impacts on
9 black tern nesting habitat resulting from the construction of the water conveyance facilities (CM1).
10 However, there would be a loss of 307 acres of modeled nesting habitat for black tern in the study
11 area in the near-term. These effects would result from implementing *CM2 Yolo Bypass Fisheries*
12 *Enhancements*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*
13 *Restoration* and *CM10 Nontidal Marsh Restoration*.

14 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection for the loss of
15 black tern nesting habitat. Using this ratio would indicate that 307 acres of rice lands and/or
16 freshwater wetlands should be protected and 307 acres should be restored in CZ 2 to mitigate the
17 losses of black tern nesting habitat.

18 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or
19 equivalent habitat and restoring 8,850 acres of tidal freshwater emergent wetland (see Table 3-4 in
20 Chapter 3 *Description of Alternatives*). These conservation actions are associated with CM3 and
21 would occur in the same timeframe as the early restoration losses. The BDCP also contains
22 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to
23 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria
24 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3
25 and GGS 3.1) by the late long-term time period. The tidal freshwater emergent wetland would be
26 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*
27 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that
28 increase connectivity among protected lands (Objective TFEWNC2.2).

29 These objectives would inform the nearterm protection actions, and therefore some portion of the
30 200 acres of rice and 700 acres of rice or equivalent habitat and the 8,850 acres of tidal freshwater
31 emergent wetland would be expected to be restored and protected in CZ 2. However, there is no
32 near-term acreage commitment in the plan that is specific to CZ 2.

33 In order to compensate for black tern habitat loss, the protection and restoration of 307 acres of rice
34 or freshwater wetlands would need to occur in CZ 2 in the near-term timeframe. Mitigation Measure
35 BIO-129a, *Compensate for Loss of Black Tern Nesting Habitat*, would reduce this potential impact to a
36 less-than-significant level.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
38 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
39 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
40 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
41 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
42 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since

1 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
2 of the Final EIR/EIS.

3 Black tern is not a covered species under the BDCP and in order to have a less-than-significant
4 impact on individuals, preconstruction would be required to ensure that nests are detected and
5 avoided.

6 In the absence of other conservation actions, effects on black tern would represent an adverse effect
7 as a result of habitat modification and potential for direct mortality of a special-status species. This
8 impact would be significant. However, the BDCP has committed to habitat protection, restoration,
9 management and enhancement activities described above. As outlined in BDCP Chapter 3, Section
10 3.4, *Conservation Measures*, natural community restoration and protection are planned so that they
11 keep pace with project impacts. Thus, there would be minimal lag time between impacts and those
12 measures designed to offset those impacts on natural communities and the species that use them. In
13 addition, implementation of AMM1-AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction*
14 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-129a,
15 *Compensate for Loss of Black Tern Nesting Habitat*, which would require 1:1 protection of habitat in
16 CZ 2 in the near-term time frame, would reduce this potential impact to a less-than-significant level.

17 **Late Long-Term Timeframe**

18 Alternative 1B as a whole would result in the permanent loss of 491 acres of modeled black tern
19 nesting habitat during the term of the Plan. This impact would result from the removal or
20 conversion of rice and freshwater wetlands in CZ 2. The Plan includes conservation commitments
21 through *CM3 Natural Communities Protection and Restoration* to protect 500 acres of rice lands (see
22 Table 3-4 in Chapter 3, *Description of Alternatives*) and up to 1,700 acres of rice lands or equivalent
23 habitat for the giant garter snake (Objective GGS3.1) in CZ 2. The nesting habitat for black tern in the
24 northern part of the study area has largely been reduced to rice lands, and these acres would
25 provide protected nesting habitat for the species. The Plan also includes conservation commitments
26 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
27 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1).

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils*. All of these AMMs include elements
32 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
33 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
34 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. Black
35 tern is not a covered species under the BDCP and in order to avoid an adverse effect on individuals,
36 preconstruction surveys for noncovered avian species would be required to ensure that nests are
37 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
38 *Avoid Disturbance of Nesting Birds*, would identify any nesting terns during preconstruction surveys
39 and ensure that active nests are avoided which would reduce the potential impact on nesting black
40 tern to a less-than-significant level.

41 In the absence of other conservation actions, effects on black tern would represent an adverse effect
42 as a result of habitat modification and potential for direct mortality of special-status species. This
43 impact would be considered significant. Considering these protection provisions, which would
44 provide acreages of new or enhanced habitat in amounts greater than necessary to compensate for

1 habitats lost to construction and restoration activities, loss of habitat or direct mortality through
2 implementation of Alternative 1B would not result in a substantial adverse effect through habitat
3 modifications and would not substantially reduce the number or restrict the range of the species.
4 Therefore, the alternative would have a less-than-significant impact on black tern.

5 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
6 **Disturbance of Nesting Birds**

7 See Mitigation Measure BIO-75 under Impact BIO-75.

8 **Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat**

9 Because there is no near-term acreage commitment associated with the protection of rice and
10 the restoration of freshwater wetlands in CZ 2, BDCP proponents must protect and restore rice
11 and/or freshwater wetlands at a 1:1 ratio for each acre of habitat impacted in CZ 2.

12 **Impact BIO-129b: Indirect Effects of Plan Implementation on Black Tern**

13 If black terns were to nest in or adjacent to work areas, construction and subsequent maintenance-
14 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and
15 reduce the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75,
16 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid
17 the potential for adverse effects of construction-related activities on survival and productivity of
18 nesting black terns. The use of mechanical equipment during restoration activities could cause the
19 accidental release of petroleum or other contaminants that could affect black terns in the
20 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable
21 habitat could also have an adverse effect on these species. AMM1–AMM7, including *AMM2*
22 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such
23 spills and ensure that measures are in place to prevent runoff from the construction area and
24 negative effects of dust on active nests.

25 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
26 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
27 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
28 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
29 2009). The effect of selenium toxicity differs widely between species and also between age and sex
30 classes within a species. In addition, the effect of selenium on a species can be confounded by
31 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
32 2009).

33 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
34 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
35 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
36 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
37 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
38 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
39 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
40 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
41 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
42 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic

1 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
2 levels of selenium have a higher risk of selenium toxicity.

3 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
4 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
5 exacerbate bioaccumulation of selenium in avian species, including black tern. Marsh (tidal and
6 nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore increase
7 avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP restoration
8 activities that create newly inundated areas could increase bioavailability of selenium (see BDCP
9 Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium concentrations
10 were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to Existing
11 Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases
12 in selenium concentrations in water in the Delta under any alternative. However, it is difficult to
13 determine whether the effects of potential increases in selenium bioavailability associated with
14 restoration-related conservation measures (CM4–CM5) would lead to adverse effects on black tern.

15 Because of the uncertainty that exists at this programmatic level of review, there could be an effect
16 on black tern from increases in selenium associated with restoration activities. This effect would be
17 addressed through the implementation of *AMM27 Selenium Management*, which would provide
18 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
19 selenium and its bioavailability in tidal habitats (see Appendix 3B, *Environmental Commitments*,
20 *AMMs, and CMs*). Furthermore, the effectiveness of selenium management to reduce selenium
21 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as
22 part of design and implementation. This avoidance and minimization measure would be
23 implemented as part of the tidal habitat restoration design schedule.

24 **NEPA Effects:** Noise and visual disturbances from the construction of conservation components
25 could affect black tern use of modeled habitat adjacent to work areas. Moreover, the use of
26 mechanical equipment for the construction of conservation components could cause the accidental
27 release of petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust
28 adjacent to suitable habitat which could result in potential mortality of a special-status species.
29 These impacts would be significant. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct*
30 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
31 address adverse effects on nesting individuals. Tidal habitat restoration could result in increased
32 exposure of black tern to selenium. This effect would be addressed through the implementation of
33 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
34 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
35 habitats.

36 **CEQA Conclusion:** Noise and visual disturbances from the construction of conservation components
37 could affect black tern use of modeled habitat adjacent to work areas. Moreover, the use of
38 mechanical equipment for the construction of conservation components could cause the accidental
39 release of petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust
40 adjacent to suitable habitat which could result in potential mortality of a special-status species.
41 These impacts would be significant. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct*
42 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce these
43 impacts on a less-than-significant level.

1 Tidal habitat restoration could result in increased exposure of black tern to selenium which could
2 result in potential mortality of a special-status species. These impacts would be significant. This
3 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
4 would provide specific tidal habitat restoration design elements to reduce the potential for
5 bioaccumulation of selenium and its bioavailability in tidal habitats. With AMM27 in place, potential
6 effects of increased exposure of black tern to selenium would be reduced to a less-than-significant
7 impact.

8 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
9 **Disturbance of Nesting Birds**

10 See Mitigation Measure BIO-75 under Impact BIO-75

11 **Impact BIO-129c: Periodic Effects of Inundation on Black Tern Nesting Habitat as a Result of**
12 **Implementation of Conservation Components**

13 Flooding of the Yolo Bypass would inundate 791–1,582 acres of suitable black tern nesting habitat
14 (land currently managed as rice in CZ 2). Inundation would occur during the nonbreeding season
15 but could reduce the availability of nesting habitat during years that flooding extends into the
16 nesting season (past March). Extended inundation of the Yolo Bypass would not be expected to
17 affect black tern nesting habitat. However, if periodic inundation took land out of rice production,
18 this could have an adverse effect on black tern nesting habitat. Late season flooding in the Yolo
19 Bypass could result in the loss of rice (nesting habitat for black tern) by precluding the preparation
20 and planting of rice fields. The methods for estimating loss of rice in the bypass and results are
21 provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter Snake*
22 *Summer Foraging Habitat in the Yolo Bypass*. This analysis concludes that the estimated loss of rice
23 could be up to 1,662 acres by the late long-term timeframe. The BDCP has committed to protect,
24 restore and/or create up to 1,700 acres of rice in the Yolo Bypass (Objective GGS3.1). These acres of
25 rice would be protected in areas that are less susceptible to inundation, which would benefit the
26 black tern during years in which the magnitude and duration of inundation were increased.

27 **NEPA Effects:** Flooding of the Yolo Bypass is not expected to adversely affect nesting habitat for
28 black tern. However, if flooding were to extend into the nesting season or were to significantly
29 reduce rice production, it could also reduce suitable black tern nesting habitat. This potential effect
30 would not be adverse with the creation and/or protection of 1,700 acres of rice in CZ 2 under BDCP
31 Objective GGS3.1.

32 **CEQA Conclusion:** Flooding of the Yolo Bypass is not expected to have a significant impact on
33 nesting habitat for black tern. However, if flooding were to significantly reduce rice production and
34 reduce suitable black tern nesting habitat, this impact would be reduced to a less-than-significant
35 level by the creation and/or protection of 1,700 acres of rice in CZ 2 under BDCP Objective GGS3.1.

36 **California Horned Lark and Grasshopper Sparrow**

37 This section describes the effects of Alternative 1B, including water conveyance facilities
38 construction and implementation of other conservation components, on California horned lark and
39 grasshopper sparrow. The primary impact of concern for grasshopper sparrow and California
40 horned lark would be the loss of nest habitat in the Plan Area, which includes grassland, vernal pool
41 complex, and alkali seasonal wetland natural communities and selected cultivated lands including
42 grain and hay crops and pasture.

1 Construction and restoration associated with Alternative 1B conservation measures would result in
2 both temporary and permanent losses of modeled breeding habitat for California horned lark and
3 grasshopper sparrow as indicated in Table 12-1B-49. Full implementation of Alternative 1B would
4 include the following biological objectives over the term of the BDCP which would also benefit the
5 California horned lark and the grasshopper sparrow (BDCP Chapter 3, *Conservation Strategy*).

- 6 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
7 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
8 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 9 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 10 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
11 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 12 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
13 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 14 • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
15 cultivated lands as Swainson’s hawk foraging habitat with at least 50% in very high-value
16 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 17 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
18 VPNC2.5, and GNC2.4, associated with CM11).

19 As explained below, with the restoration or protection of these amounts of habitat, in addition to
20 management activities that would enhance habitat for these species and implementation of AMM1–
21 AMM7 and Mitigation Measure BIO-75, impacts on California horned lark and grasshopper sparrow
22 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

23 **Table 12-1B-49. Changes in California Horned Lark and Grasshopper Sparrow Modeled Habitat**
24 **Associated with Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Breeding	2,962	2,962	4,528	4,528	NA	NA
Total Impacts CM1		2,962	2,962	4,528	4,528	NA	NA
CM2–CM18	Breeding	5,450	26,198	376	893	777–2,423	3,823
Total Impacts CM2–CM18		5,450	26,198	376	893	777–2,423	3,823
TOTAL IMPACTS		8,412	29,160	4,904	5,421	777–2,423	3,823

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-130: Loss or Conversion of Habitat for and Direct Mortality of California Horned**
2 **Lark and Grasshopper Sparrow**

3 Alternative 1B conservation measures would result in the combined permanent and temporary loss
4 of up to 34,581 acres of modeled breeding habitat for California horned lark and grasshopper
5 sparrow (29,160 acres of permanent loss and 5,421 acres of temporary loss; Table 12-1B-49).
6 Conservation measures that would result in these losses are conveyance facilities and transmission
7 line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries
8 improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian
9 restoration (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9),
10 nontidal marsh restoration (CM10), and construction of conservation hatcheries (CM18). The
11 majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement and
12 management activities (CM11), which include ground disturbance or removal of nonnative
13 vegetation, and the construction of recreational trails, signs, and facilities, could result in local
14 adverse habitat effects. In addition, maintenance activities associated with the long-term operation
15 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate
16 California horned lark and grasshopper sparrow modeled habitat. Each of these individual activities
17 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA
18 conclusion follow the individual conservation measure discussions.

- 19 ● *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would
20 result in the combined permanent and temporary loss of up to 7,490 acres of modeled California
21 horned lark and grasshopper sparrow habitat (2,962 acres of permanent loss, 4,528 acres of
22 temporary loss) in CZ 4, CZ 5, CZ 6, CZ 7, and CZ 8. Habitat losses would occur at various
23 locations along the new canal route from the construction of the canal and the associated
24 borrow and spoil sites and at the intake sites along the Sacramento River. Permanent and
25 temporary losses of foraging habitat would also occur at the new forebay site just south of
26 Clifton Court Forebay and associated borrow and spoil sites. Approximately 685 acres of impact
27 would be from the new forebay constructed south of the Clifton Court Forebay in CZ 8.
28 Grasshopper sparrows were detected in DHCCP surveys south of Byron Highway in CZ 8 (1
29 occurrence) and east of Intakes 2 and 3 (6 occurrences), in the Stone Lakes NWR. However, the
30 CM1 footprint does not overlap with any grasshopper sparrow or California horned lark
31 occurrences. However, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*
32 *and Avoid Disturbance of Nesting Birds*, would require preconstruction surveys and the
33 establishment of no-disturbance buffers and would be available to address potential effects on
34 California horned larks and grasshopper sparrows if they were to nest in or adjacent to
35 construction areas. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative
36 1B construction locations.
- 37 ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
38 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
39 California horned lark and grasshopper sparrow habitat (898 acres of permanent loss, 376 acres
40 of temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of
41 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass
42 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.
43 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland
44 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10
45 years of Alternative 1B implementation.

- 1 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
2 inundation would permanently remove an estimated 20,880 acres of modeled California horned
3 lark and grasshopper sparrow habitat. The majority of the acres lost would consist of cultivated
4 lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache
5 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and
6 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
7 directly impact and fragment grassland just north of Rio Vista in and around French and
8 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
9 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
10 the northern fringes of Suisun Marsh.
- 11 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
12 seasonally inundated floodplain would permanently and temporarily remove approximately
13 1,450 acres of modeled California horned lark and grasshopper sparrow nesting habitat (933
14 permanent, 517 temporary). These losses would be expected after the first 10 years of
15 Alternative 1B implementation along the San Joaquin River and other major waterways in CZ 7.
- 16 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
17 approximately 370 acres of California horned lark and grasshopper sparrow nesting habitat as
18 part of tidal restoration and 1,489 acres as part of seasonal floodplain restoration.
- 19 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
20 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
21 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
22 would be restored after the construction periods. Grassland restoration would be implemented
23 on agricultural lands that also provide nesting habitat for California horned lark and
24 grasshopper sparrow and would result in the conversion of 837 acres of cultivated lands to
25 grassland.
- 26 ● *CM10 Nontidal Marsh Restoration*: Implementation of *CM10 Nontidal Marsh Restoration* would
27 result in the permanent removal of 705 acres of California horned lark and grasshopper
28 sparrow nesting habitat.
- 29 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
30 actions included in CM11 that are designed to enhance wildlife values in restored or protected
31 habitats could result in localized ground disturbances that could temporarily remove small
32 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
33 vegetation and road and other infrastructure maintenance activities, would be expected to have
34 minor adverse effects on available habitat and would be expected to result in overall
35 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would
36 also include the construction of recreational-related facilities including trails, interpretive signs,
37 and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The
38 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be
39 placed on existing, disturbed areas when and where possible. However, approximately 50 acres
40 of grassland habitat would be lost from the construction of trails and facilities.
- 41 Habitat management- and enhancement-related activities could disturb California horned lark
42 and grasshopper sparrow nests. If either species were to nest in the vicinity of a worksite,
43 equipment operation could destroy nests, and noise and visual disturbances could lead to their
44 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct*

1 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available
2 to address these adverse effects.

- 3 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
4 modeled California horned lark and grasshopper sparrow habitat for the development of a delta
5 and longfin smelt conservation hatchery in CZ 1.
- 6 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
7 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
8 disturbances that could affect California horned lark and grasshopper sparrow use of the
9 surrounding habitat. Maintenance activities would include vegetation management, levee and
10 structure repair, and re-grading of roads and permanent work areas. These effects, however,
11 would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as
12 described below.
- 13 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
14 direct mortality of adult or fledged California horned lark and grasshopper sparrow if they were
15 present in the Plan Area, because they would be expected to avoid contact with construction and
16 other equipment. If either species were to nest in the construction area, construction-related
17 activities, including equipment operation, noise and visual disturbances could destroy nests or
18 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
19 75 would be available to address these adverse effects.

20 The following paragraphs summarize the combined effects discussed above and describe other
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
22 included.

23 ***Near-Term Timeframe***

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
27 effects of construction would not be adverse under NEPA. The Plan would remove 13,316 acres
28 (8,412 permanent, 4,904 temporary) of modeled breeding habitat for California horned lark and
29 grasshopper sparrow in the study area in the near-term. These effects would result from the
30 construction of the water conveyance facilities (CM1, 7,490 acres), and implementing other
31 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
32 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*
33 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*
34 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

35 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
36 would be 2:1 for protection of habitat. Using this ratio would indicate that 14,980 acres should be
37 protected to compensate for the CM1 losses of 7,490 acres of California horned lark and
38 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove
39 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California
40 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio
41 (2:1 for protection).

42 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
43 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of

1 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
 2 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
 3 in the same timeframe as the construction and early restoration losses thereby avoiding adverse
 4 effects of habitat loss on California horned lark and grasshopper sparrow. Grassland restoration and
 5 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland
 6 protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland
 7 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
 8 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand
 9 breeding habitat for California horned lark and grasshopper sparrow and reduce the effects of
 10 current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and*
 11 *Management*, insect prey populations would be increased on protected lands, enhancing the
 12 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
 13 Cultivated lands that provide habitat for covered and other native wildlife species would provide
 14 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper
 15 sparrow (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-
 16 term time period would be in alfalfa and pasture crop types (very high- and high-value crop types)
 17 for Swainson's hawk (Objective SH1.2) which would also provide potential nesting habitat for
 18 California horned lark and grasshopper sparrow. This biological objective provides an estimate for
 19 the high proportion of cultivated lands protected in the near-term time period which would provide
 20 nesting habitat for California horned lark and grasshopper sparrow.

21 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
 22 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
 23 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
 24 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term
 25 timeframe would need to include suitable crop types for these species in order to avoid an adverse
 26 effect of habitat loss from CM1. The conservation commitment is 7,572 acres short of meeting the
 27 compensation for other near-term effects on California horned lark and grasshopper sparrow
 28 habitat. Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark*
 29 *and Grasshopper Sparrow Habitat*, would be available to address the adverse effect of near-term
 30 high-value habitat loss by providing crop management requirements for CM1 compensation and
 31 requiring additional acreage compensation for the other near-term effects.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 36 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 37 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 38 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 39 of the Final EIR/EIS.

40 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the
 41 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
 42 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-
 43 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
 44 available to address this adverse effect.

1 **Late Long-Term Timeframe**

2 Based on the habitat model, the study area supports approximately 269,411 acres of potential
 3 habitat for California horned lark and grasshopper sparrow. Alternative 1B as a whole would result
 4 in the permanent loss of and temporary effects on 34,631 acres of modeled California horned lark
 5 and grasshopper sparrow habitat during the term of the Plan (13% of the total habitat in the study
 6 area). The locations of these losses are described above in the analyses of individual conservation
 7 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
 8 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
 9 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
 10 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
 11 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
 12 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would
 13 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,
 14 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives
 15 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal
 16 wetland, and vernal pool natural communities which would expand breeding habitat for California
 17 horned lark and grasshopper sparrow and reduce the effects of current levels of habitat
 18 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
 19 populations would be increased on protected lands, enhancing the foraging value of these natural
 20 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat
 21 for covered and other native wildlife species would provide approximately 15,400 acres of potential
 22 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).
 23 Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture crop types.
 24 These are very high- and high-value crop types for Swainson's hawk (Objective SH1.2) and would
 25 provide potential nesting habitat for California horned lark and grasshopper sparrow.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 30 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 31 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 32 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 33 of the Final EIR/EIS. California horned lark and grasshopper sparrow are not covered species under
 34 the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
 35 noncovered avian species would be required to ensure that nests are detected and avoided.
 36 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
 37 *Nesting Birds*, would be available to address this adverse effect.

38 **NEPA Effects:** The loss of California horned lark and grasshopper sparrow habitat and potential for
 39 mortality of these special-status species under Alternative 1B would represent an adverse effect in
 40 the absence of other conservation actions. However, with habitat protection and restoration
 41 associated with CM3, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1-
 42 AMM7, which would be in place throughout the construction period, and with implementation of
 43 Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and*
 44 *Grasshopper Sparrow Habitat*, the effects of habitat loss under Alternative 1B4 on California horned
 45 lark and grasshopper sparrow would not be adverse. California horned lark and grasshopper
 46 sparrow are not covered species under the BDCP and the potential for mortality would be an

1 adverse effect without preconstruction surveys to ensure that nests are detected and avoided.
2 Mitigation Measure BIO-75 would be available to address this effect.

3 **CEQA Conclusion:**

4 **Near-Term Timeframe**

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
8 effects of construction would be less than significant under CEQA. The Plan would remove 13,316
9 acres (8,412 permanent, 4,904 temporary) of modeled breeding habitat for California horned lark
10 and grasshopper sparrow in the study area in the near-term. These effects would result from the
11 construction of the water conveyance facilities (CM1, 7,490 acres), and implementing other
12 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
13 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*
14 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*
15 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

16 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
17 would be 2:1 for protection of habitat. Using this ratio would indicate that 14,980 acres should be
18 protected to compensate for the CM1 losses of 7,490 acres of California horned lark and
19 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove
20 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California
21 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio
22 (2:1 for protection).

23 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
24 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
25 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
26 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
27 in the same timeframe as the construction and early restoration losses thereby avoiding significant
28 impacts on California horned lark and grasshopper sparrow. Grassland restoration and protection
29 would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in
30 CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes
31 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali
32 seasonal wetland, and vernal pool natural communities which would expand breeding habitat for
33 California horned lark and grasshopper sparrow and reduce the effects of current levels of habitat
34 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
35 populations would be increased on protected lands, enhancing the foraging value of these natural
36 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat
37 for covered and other native wildlife species would provide approximately 15,400 acres of potential
38 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).
39 Approximately 87% of cultivated lands protected by the late long-term time period would be in
40 alfalfa and pasture crop types (very high- and high-value crop types) for Swainson's hawk (Objective
41 SH1.2) which would also provide potential nesting habitat for California horned lark and
42 grasshopper sparrow. This biological objective provides an estimate for the high proportion of
43 cultivated lands protected in the near-term time period which would provide nesting habitat for
44 California horned lark and grasshopper sparrow.

1 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
2 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
3 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
4 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term
5 timeframe would need to include suitable crop types for these species in order to avoid the
6 significant impact of habitat loss resulting from CM1. The conservation commitment is 7,572 acres
7 short of meeting the compensation for other near-term effects on California horned lark and
8 grasshopper sparrow habitat. Implementation of Mitigation Measure BIO-130, *Compensate for the*
9 *Near-Term Loss of California Horned Lark and Grasshopper Sparrow Habitat*, would reduce the
10 impact of near-term high-value habitat loss by providing crop management requirements for CM1
11 compensation and requiring additional acreage compensation for the other near-term effects.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
16 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
17 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
18 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
19 of the Final EIR/EIS.

20 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the
21 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
22 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-
23 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
24 reduce this potential impact to a less-than-significant level.

25 ***Late Long-Term Timeframe***

26 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 34,631
27 acres of California horned lark and grasshopper sparrow habitat during the term of the Plan (13% of
28 the total habitat in the study area). The locations of these losses are described above in the analyses
29 of individual conservation measures. The locations of these losses are described above in the
30 analyses of individual conservation measures. The Plan includes conservation commitments
31 through *CM3 Natural Communities Protection and Restoration*, *CM8 Grassland Natural Community*
32 *Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000
33 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool
34 complex, protect 150 acres of alkali seasonal wetland complex and protect 48,625 acres of
35 cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3).
36 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
37 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
38 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
39 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
40 would expand breeding habitat for California horned lark and grasshopper sparrow and reduce the
41 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*
42 *and Management*, insect prey populations would be increased on protected lands, enhancing the
43 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
44 Cultivated lands that provide habitat for covered and other native wildlife species would provide
45 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper

1 sparrow (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in
2 alfalfa and pasture crop types (very high- and high-value crop types) for Swainson's hawk (Objective
3 SH1.2) which would also provide potential nesting habitat for California horned lark and
4 grasshopper sparrow.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
6 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
7 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
8 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
9 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
10 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
11 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
12 of the Final EIR/EIS. California horned lark and grasshopper sparrow are not covered species under
13 the BDCP. For the BDCP to avoid significant impacts on individuals, preconstruction surveys for
14 noncovered avian species would be required to ensure that nests are detected and avoided.
15 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
16 *Nesting Birds*, would reduce this potential impact to a less-than-significant level.

17 Considering Alternative 1B's protection and restoration provisions, which would provide acreages
18 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
19 construction and restoration activities, and with the implementation of AMM1-AMM7, Mitigation
20 Measure BIO-75, and Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California*
21 *Horned Lark and Grasshopper Sparrow Habitat*, the loss of habitat or direct mortality through
22 implementation of Alternative 1B would not result in a substantial adverse effect through habitat
23 modifications and would not substantially reduce the number or restrict the range of either species.
24 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-
25 significant impact on California horned lark and grasshopper sparrow.

26 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 27 **Disturbance of Nesting Birds**

28 See Mitigation Measure BIO-75 under Impact BIO-75.

29 **Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and** 30 **Grasshopper Sparrow Habitat**

31 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
32 crops, or alfalfa to provide California horned lark and grasshopper sparrow habitat such that the
33 total acres of habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1
34 protection. Additional grassland protection, enhancement, and management may be substituted
35 for the protection of cultivated lands.

36 **Impact BIO-131: Effects on California Horned Lark and Grasshopper Sparrow and Associated** 37 **with Electrical Transmission Facilities**

38 New transmission lines would increase the risk for bird-power line strikes, which could result in
39 injury or mortality of grasshopper sparrow and California horned lark. *AMM20 Greater Sandhill*
40 *Crane* would minimize the risk of bird strikes by requiring the installation of flight diverters on
41 new and selected existing powerlines.

1 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
2 could result in injury or mortality of grasshopper sparrow and California horned lark. With the
3 implementation of *AMM20 Greater Sandhill Crane* the effect of new transmission lines on California
4 horned lark and grasshopper sparrow would not be adverse.

5 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
6 could result in injury or mortality of grasshopper sparrow and California horned lark. With the
7 incorporation of *AMM20 Greater Sandhill Crane*, new transmission lines would have a less-than-
8 significant impact on grasshopper sparrow and California horned lark.

9 **Impact BIO-132: Indirect Effects of Plan Implementation on California Horned Lark and**
10 **Grasshopper Sparrow**

11 Noise and visual disturbances associated with construction-related activities could result in
12 temporary disturbances that affect California horned lark and grasshopper sparrow use of modeled
13 habitat. Construction noise above background noise levels (greater than 50 dBA) could extend 1,900
14 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*
15 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there
16 are no available data to determine the extent to which these noise levels could affect California
17 horned lark or grasshopper sparrow. Indirect effects associated with construction include noise,
18 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
19 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
20 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
21 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
22 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use
23 of mechanical equipment during water conveyance construction could cause the accidental release
24 of petroleum or other contaminants that could affect these species or their prey in the surrounding
25 habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
26 would minimize the likelihood of such spills. The inadvertent discharge of sediment or excessive
27 dust adjacent to California horned lark and grasshopper sparrow nesting habitat could also have a
28 negative effect on these species. AMM1–AMM7 would ensure that measures are in place to prevent
29 runoff from the construction area and the negative effects of dust on wildlife adjacent to work areas.

30 **NEPA Effects:** Indirect effects on California horned lark and grasshopper sparrow as a result of
31 Alternative 1B implementation could have adverse effects on these species through the modification
32 of habitat and potential for direct mortality. California horned lark and grasshopper sparrow are not
33 covered species under the BDCP, and the potential for mortality would be adverse without
34 preconstruction surveys to ensure that nests are detected and avoided. In conjunction with AMM1–
35 AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
36 *Disturbance of Nesting Birds*, would be available to address this adverse effect.

37 **CEQA Conclusion:** Indirect effects on California horned lark and grasshopper sparrow as a result of
38 Alternative 1B implementation could have a significant impact on these species. The incorporation
39 of AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*
40 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this
41 impact to a less-than-significant level.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 See Mitigation Measure BIO-75 under Impact BIO-75.

4 **Impact BIO-133: Periodic Effects of Inundation on California Horned Lark and Grasshopper**
5 **Sparrow as a Result of Implementation of Conservation Components**

6 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
7 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158-
8 3,650 acres of modeled California horned lark and grasshopper sparrow habitat (Table 12-1B-49).

9 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
10 *Restoration* could result in the periodic inundation of up to approximately 3,823 acres of modeled
11 habitat (Table 12-1B-49).

12 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
13 season due to periodic inundation. However, inundation would occur during the nonbreeding
14 season and would not be expected to have an adverse effect on either species.

15 **NEPA Effects:** Periodic inundation of floodplains would not have adverse effects on grasshopper
16 sparrow or California horned lark because inundation is expected to occur prior to the breeding
17 season.

18 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on
19 grasshopper sparrow or California horned lark because inundation is expected to occur prior to the
20 breeding season.

21 **Least Bittern and White-Faced Ibis**

22 This section describes the effects of Alternative 1B, including water conveyance facilities
23 construction and implementation of other conservation components, on least bittern and white-
24 faced ibis. Modeled breeding habitat for least bittern and white-faced ibis includes tidal freshwater
25 emergent wetlands, nontidal freshwater emergent wetlands, managed wetlands, and other natural
26 seasonal wetlands in CZs 2, 4, and 11.

27 Construction and restoration associated with Alternative 1B conservation measures would result in
28 both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table
29 12-1B-50. Full implementation of Alternative 1B would include the following biological objectives
30 over the term of the BDCP which would also benefit least bittern and white-faced ibis (BDCP Chapter
31 3, *Conservation Strategy*).

- 32 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
33 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 34 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
35 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
36 associated with CM10).
- 37 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
38 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).

1 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 2 management activities that would enhance habitat for these species and implementation of AMM1-
 3 AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on least bittern and
 4 white-faced ibis would not be adverse for NEPA purposes and would be less than significant for
 5 CEQA purposes.

6 **Table 12-1B-50. Changes in Least Bittern and White-Faced Ibis Modeled Habitat Associated with**
 7 **Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	6	6	5	5	NA	NA
Total Impacts CM1		6	6	5	5	NA	NA
CM2–CM18	Nesting	5,134	13,063	45	45	961–2,672	NA
Total Impacts CM2–CM18		5,134	13,063	45	45	961–2,672	NA
TOTAL IMPACTS		5,140	13,069	50	50	961–2,672	NA

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

8

9 **Impact BIO-134: Loss or Conversion of Habitat for and Direct Mortality of Least Bittern and**
 10 **White-Faced Ibis**

11 Alternative 1B conservation measures would result in the combined permanent and temporary loss
 12 and conversion of up to 13,119 acres of modeled habitat for least bittern and white-faced ibis
 13 (13,069 acres of permanent loss and conversion and 50 of temporary loss, Table 12-1B-50).
 14 Conservation measures that would result in these losses are conveyance facilities and transmission
 15 line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass
 16 enhancements (CM2), and tidal habitat restoration (CM4). Habitat enhancement and management
 17 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,
 18 could result in local adverse habitat effects. In addition, maintenance activities associated with the
 19 long-term operation of the water conveyance facilities and other BDCP physical facilities could
 20 degrade or eliminate least bittern and white-faced ibis habitat. Each of these individual activities is
 21 described below. A summary statement of the combined impacts, NEPA effects, and a CEQA
 22 conclusion follow the individual conservation measure discussions.

- 23 • *CM1 Water Facilities and Operation*: Construction of Alternative 1B conveyance facilities would
 24 result in the combined permanent and temporary loss of up to 11 acres of modeled least bittern
 25 and white-faced ibis habitat (6 acre of permanent loss, 5 acres of temporary loss) from CZ 4.

1 Permanent losses would occur as a result of constructing the east canal. Small areas of emergent
2 wetland and managed wetland would be removed where the canal would cross manmade
3 channels. The temporary losses would also occur where small patches or stringers of wetlands
4 would be removed for siphon construction. The construction footprint for CM1 does not overlap
5 with any occurrences of least bittern or white-faced ibis. Mitigation Measure BIO-75, *Conduct*
6 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available
7 to address potential effects on least bittern or white-faced ibis if they were to nest in or adjacent
8 to construction areas. Refer to the Terrestrial Biology Map Book for a detailed view of
9 Alternative 1B construction locations.

- 10 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
11 would permanently remove 55 acres of modeled least bittern and white-faced ibis habitat in the
12 Yolo Bypass in CZ 2. In addition, 45 acres of habitat would be temporarily removed. The loss is
13 expected to occur during the first 10 years of Alternative 1B implementation.
- 14 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
15 inundation would permanently remove an estimated 13,008 acres of modeled least bittern and
16 white-faced ibis habitat in CZ 2, 4, and 11 by the late long-term time period.
- 17 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
18 actions included in *CM11 Natural Communities Enhancement and Management* that are designed
19 to enhance wildlife values in restored or protected habitats could result in localized ground
20 disturbances that could temporarily remove small amounts of least bittern and white-faced ibis
21 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and
22 other infrastructure maintenance activities, would be expected to have minor adverse effects on
23 available least bittern and white-faced ibis habitat.
- 24 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
25 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
26 disturbances that could affect least bittern and white-faced ibis use of the surrounding habitat.
27 Maintenance activities would include vegetation management, levee and structure repair, and
28 re-grading of roads and permanent work areas. These effects, however, would be reduced by
29 AMM1–AMM7 described below and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
30 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to further reduce
31 potential effects.
- 32 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
33 direct mortality of least bittern and white-faced ibis because adults and fledged young would be
34 expected to avoid contact with construction and other equipment. However, if either species
35 were to nest in the construction area, equipment operation, noise and visual disturbances could
36 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings.
37 Mitigation Measure BIO-75 would be available to address these adverse effects.

38 The following paragraphs summarize the combined effects discussed above and describe other
39 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
40 included.

41 ***Near-Term Timeframe***

42 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
43 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
2 effects of construction would not be adverse under NEPA. The Plan would remove 5,190 acres of
3 modeled habitat for least bittern and white-faced ibis in the study area in the near-term (5,140 acres
4 of permanent loss, and 50 acres of temporary loss). These effects would result from the construction
5 of the water conveyance facilities (CM1, 11 acres), and the implementation of other conservation
6 measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration [CM4] 5,179 acres).

7 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
8 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using
9 these ratios would indicate that 11 acres of habitat should be restored and 11 acres of habitat
10 should be protected to compensate for the CM1 losses of 11 acres of least bittern and white-faced
11 ibis habitat. The near-term effects of other conservation actions would remove 5,179 acres of
12 modeled habitat, and therefore require 5,179 acres of restoration and 5,179 acres of protection of
13 least bittern and white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for
14 restoration and 1:1 for protection).

15 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
16 wetland and protecting and enhancing 4,800 acres of managed wetland in the Plan Area (Table 3-4
17 in Chapter 3). These conservation actions are associated with CM4 and CM3 and would occur in the
18 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
19 habitat loss on least bittern and white-faced ibis. The tidal freshwater emergent wetland would be
20 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*
21 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that
22 increase connectivity among protected lands (Objective TFEWNC2.2). The 4,800 acres of managed
23 wetland would be protected and enhanced in CZ 11 and would benefit these species through the
24 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
25 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
26 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). In addition, at
27 least 400 acres of nontidal marsh would be created, some of which would provide nesting habitat
28 for least bittern and white-faced ibis. These Plan objectives represent performance standards for
29 considering the effectiveness of restoration and protection actions. The acres of restoration and
30 protection contained in the near-term Plan goals satisfy the typical mitigation that would be applied
31 to the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation
32 measures.

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
37 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
38 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
39 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
40 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
41 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
42 noncovered avian species would be required to ensure that nests are detected and avoided.

1 **Late Long-Term Timeframe**

2 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 13,119
3 acres (13,069 acres of permanent loss, 50 acres of temporary loss) of least bittern and white-faced
4 ibis habitat during the term of the Plan. The locations of these losses are described above in the
5 analyses of individual conservation measures. The Plan includes conservation commitments
6 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
7 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200
8 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres
9 of managed wetland would be protected and enhanced in CZ 11.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
14 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
15 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
16 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
17 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
18 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
19 noncovered avian species would be required to ensure that nests are detected and avoided.
20 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
21 *Nesting Birds*, would be available to address this potential effect.

22 **NEPA Effects:** The loss of least bittern and white-faced ibis habitat and potential mortality of these
23 special status species under Alternative 1B would represent an adverse effect in the absence of
24 other conservation actions. However, with the habitat protection and restoration associated with
25 CM3, CM4, CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7,
26 which would be in place throughout the construction period, the effects of habitat loss under on
27 least bittern and white-faced ibis would not be adverse under Alternative 1B. Least bittern and
28 white-faced ibis are not covered species under the BDCP, and the potential for mortality would be
29 adverse without preconstruction surveys to ensure that nests are detected and avoided. Mitigation
30 Measure BIO-75 would be available to address this adverse effect.

31 **CEQA Conclusion:**

32 **Near-Term Timeframe**

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
36 impacts of construction would be less than significant under CEQA. The Plan would remove 5,190
37 acres of modeled habitat for least bittern and white-faced ibis in the study area in the near-term
38 (5,140 acres of permanent loss, and 50 acres of temporary loss). These effects would result from the
39 construction of the water conveyance facilities (CM1, 11 acres), and the implementation of other
40 conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration [CM4]
41 5,179 acres).

42 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
43 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using

1 these ratios would indicate that 11 acres of habitat should be restored and 11 acres of habitat
2 should be protected to compensate for the CM1 losses of 11 acres of least bittern and white-faced
3 ibis habitat. The near-term effects of other conservation actions would remove 5,179 acres of
4 modeled habitat, and therefore require 5,179 acres of restoration and 5,179 acres of protection of
5 least bittern and white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for
6 restoration and 1:1 for protection).

7 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal freshwater emergent
8 wetland and 4,800 acres of managed wetland in the Plan Area (Table 3-4 in Chapter 3). These
9 conservation actions are associated with CM4 and CM3 and would occur in the same timeframe as
10 the construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
11 least bittern and white-faced ibis. The tidal freshwater emergent wetland would be restored in CZs
12 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be
13 restored in a way that creates topographic heterogeneity and in areas that increase connectivity
14 among protected lands (Objective TFEWNC2.2). The 4,800 acres of managed wetland would be
15 protected and enhanced in CZ 11 and would benefit these species through the enhancement of
16 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists
17 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-
18 American bulrush plant associations (Objective MWNC1.1). In addition, at least 400 acres of nontidal
19 marsh would be created, some of which would provide nesting habitat for least bittern and white-
20 faced ibis. These Plan objectives represent performance standards for considering the effectiveness
21 of restoration and protection actions. The acres of restoration and protection contained in the near-
22 term Plan goals satisfy the typical mitigation that would be applied to the project-level effects of
23 CM1, as well as mitigate the near-term effects of the other conservation measures.

24 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
25 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
26 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
27 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
28 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
29 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
30 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
31 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
32 under the BDCP. For the BDCP to have a less-than-significant impact on individuals, preconstruction
33 surveys would be required to ensure that nests were detected and avoided. Mitigation Measure BIO-
34 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
35 reduce the potential impact on nesting least bittern and white-faced ibis to a less-than-significant
36 impact.

37 **Late Long-Term Timeframe**

38 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 13,119
39 acres (13,069 acres of permanent loss, 50 acres of temporary loss) of least bittern and white-faced
40 ibis habitat during the term of the Plan. The locations of these losses are described above in the
41 analyses of individual conservation measures. The Plan includes conservation commitments
42 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
43 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200
44 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres
45 of managed wetland would be protected and enhanced in CZ 11.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
6 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
7 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
8 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
9 under the BDCP. For the BDCP to avoid having a significant impact on individuals, preconstruction
10 surveys for noncovered avian species would be required to ensure that nests were detected and
11 avoided. Mitigation Measure BIO-75 would reduce the potential impact on nesting least bittern and
12 white-faced ibis and to a less-than-significant level.

13 Considering these protection and restoration provisions, which would provide acreages of new
14 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction
15 and restoration activities, and with the implementation of AMM1–AMM7 and Mitigation Measure
16 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, the loss
17 of habitat or direct mortality through implementation of Alternative 1B would not result in a
18 substantial adverse effect through habitat modifications and would not substantially reduce the
19 number or restrict the range of the species. Therefore, the loss of habitat or potential mortality
20 under this alternative would have a less-than-significant impact on least bittern and white-faced
21 ibis.

22 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 23 **Disturbance of Nesting Birds**

24 See Mitigation Measure BIO-75 under Impact BIO-75.

25 **Impact BIO-135: Effects on Least Bittern and White-Faced Ibis Associated with Electrical** 26 **Transmission Facilities**

27 New transmission lines would increase the risk for bird-power line strikes, which could result in
28 injury or mortality of least bittern and white-faced ibis. Waterbirds have a higher susceptibility to
29 collisions than passerines, raptors, and other birds. Bitterns and ibises have a high wing loading/low
30 aspect ratio which limits their maneuverability and make them more vulnerable to collisions rather
31 than more agile species (see BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions*
32 *at Proposed BDCP Powerlines*). Marking transmission lines with flight diverters that make the lines
33 more visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
34 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
35 by 60%. All new project transmission lines would be fitted with flight diverters which would reduce
36 bird strike risk of least bittern and white-faced ibis. **NEPA Effects:** New transmission lines would
37 increase the risk for bird-power line strikes, which could result in injury or mortality of least bittern
38 and white-faced ibis. Bitterns and ibises have a high wing loading/low aspect ratio which limits their
39 maneuverability and make them more vulnerable to collisions rather than more agile species. The
40 implementation of *AMM20 Greater Sandhill Crane* would require the installation of bird flight
41 diverters on all new transmission lines, which could reduce bird strike risk of least bittern and
42 white-faced ibis by 60%. With the installation of bird flight diverters, the construction and operation
43 of new transmission lines under Alternative 1B would not result in an adverse effect on least bittern
44 and white-faced ibis.

1 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
2 could result in injury or mortality of least bittern and white-faced ibis. Bitterns and ibises have a
3 high wing loading/low aspect ratio which limits their maneuverability and make them more
4 vulnerable to collisions rather than more agile species. The implementation of *AMM20 Greater*
5 *Sandhill Crane* would require the installation of bird flight diverters on all new transmission lines,
6 which could reduce bird strike risk of least bittern and white-faced ibis by 60%. With the installation
7 of bird flight diverters, the construction and operation of new transmission lines under Alternative
8 1B would result in a less-than-significant impact on least bittern and white-faced ibis.

9 **Impact BIO-136: Indirect Effects of Plan Implementation on Least Bittern and White-Faced**
10 **Ibis**

11 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
12 with construction-related activities could result in temporary disturbances that affect least bittern
13 and white-faced ibis use of modeled habitat. Construction noise above background noise levels
14 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
15 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
16 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
17 which these noise levels could affect least bittern or white-faced ibis. Indirect effects associated with
18 construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and
19 other ground-disturbing operations. Construction-related noise and visual disturbances could
20 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could
21 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*
22 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse
23 effects on active nests. The use of mechanical equipment during water conveyance facilities
24 construction could cause the accidental release of petroleum or other contaminants that could affect
25 these species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction*
26 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills from
27 occurring. The inadvertent discharge of sediment or excessive dust adjacent to least bittern and
28 white-faced ibis could also have a negative effect on these species. AMM1–AMM7 would ensure that
29 measures are in place to prevent runoff from the construction area and the negative effects of dust
30 on wildlife adjacent to work areas.

31 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
32 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
33 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
34 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
35 newly inundated areas could increase bioavailability of mercury (see Chapter 3, *Conservation*
36 *Strategy*, of the BDCP for details of restoration). Species sensitivity to methylmercury differs widely
37 and there is a large amount of uncertainty with respect to species-specific effects. A detailed review
38 of the methylmercury issues associated with implementation of the BDCP is contained in Appendix
39 11F, *Substantive BDCP Revisions*. The review includes an overview of the BDCP-related mechanisms
40 that could result in increased mercury in the foodweb, and how exposure of individual species to
41 mercury may occur based on feeding habits and where species habitat overlaps with the areas
42 where mercury bioavailability could increase. Increased methylmercury associated with natural
43 community and floodplain restoration could indirectly affect least bittern and white-faced ibis, via
44 uptake in lower trophic levels (as described in Appendix 11F, *Substantive BDCP Revisions*).

1 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
2 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
3 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
4 project-specific basis, where high potential for methylmercury production is identified that
5 restoration design and adaptive management cannot fully address while also meeting restoration
6 objectives, alternate restoration areas would be considered. CM12 would be implemented in
7 coordination with other similar efforts to address mercury in the Delta, and specifically with the
8 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
9 following actions.

- 10 • Assess pre-restoration conditions to determine the risk that the project could result in increased
11 mercury methylation and bioavailability
- 12 • Define design elements that minimize conditions conducive to generation of methylmercury in
13 restored areas.
- 14 • Define adaptive management strategies that can be implemented to monitor and minimize
15 actual postrestoration creation and mobilization of methylmercury.

16 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
17 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
18 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
19 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
20 2009). The effect of selenium toxicity differs widely between species and also between age and sex
21 classes within a species. In addition, the effect of selenium on a species can be confounded by
22 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
23 2009).

24 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
25 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
26 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
27 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
28 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
29 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
30 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
31 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
32 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
33 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
34 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
35 levels of selenium have a higher risk of selenium toxicity.

36 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
37 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
38 exacerbate bioaccumulation of selenium in avian species, including least bittern and white-faced
39 ibis. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium,
40 and therefore increase avian exposure from ingestion of prey items with elevated selenium levels.
41 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
42 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
43 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
44 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,

1 long-term increases in selenium concentrations in water in the Delta under any alternative.
2 However, it is difficult to determine whether the effects of potential increases in selenium
3 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
4 lead to adverse effects on least bittern and white-faced ibis.

5 Because of the uncertainty that exists at this programmatic level of review, there could be a
6 substantial effect on least bittern and white-faced ibis from increases in selenium associated with
7 restoration activities. This effect would be addressed through the implementation of *AMM27*
8 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
9 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
10 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
11 selenium management to reduce selenium concentrations and/or bioaccumulation would be
12 evaluated separately for each restoration effort as part of design and implementation. This
13 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
14 design schedule.

15 **NEPA Effects:** Indirect effects on least bittern and white-faced ibis as a result of constructing the
16 water conveyance facilities could have adverse effects on these species in the absence of other
17 conservation actions. However, the implementation of AMM1–AMM7 would help to reduce this
18 effect. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
19 *Disturbance of Nesting Birds*, would also be available to address the adverse indirect effects of
20 construction on active nests. Tidal habitat restoration could result in increased exposure of least
21 bittern and white-faced ibis to selenium. This effect would be addressed through the
22 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
23 restoration design elements to reduce the potential for bioaccumulation of selenium and its
24 bioavailability in tidal habitats.

25 Increased methylmercury associated with natural community and floodplain restoration could
26 indirectly affect least bittern and white-faced ibis, via uptake in lower trophic levels (as described in
27 Appendix 5.D, *Contaminants*, of the BDCP). However, it is unknown what concentrations of
28 methylmercury are harmful to the species, and the potential for increased exposure varies
29 substantially within the study area. Implementation of CM12 which contains measures to assess the
30 amount of mercury before project development, followed by appropriate design and adaptation
31 management, would minimize the potential for increased methylmercury exposure, and would
32 result in no adverse effect on least bittern and white-faced ibis.

33 **CEQA Conclusion:** Indirect effects of noise and visual disturbance, in addition to the potential for
34 hazardous spills or increased dust on least bittern and white-faced ibis and their habitat as a result
35 of plan implementation would represent a substantial adverse effect in the absence of other
36 conservation actions. This impact would be significant. The incorporation of AMM1–AMM7 into the
37 BDCP and the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
38 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant
39 level.

40 Tidal habitat restoration could result in increased exposure of least bittern and white-faced ibis to
41 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
42 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
43 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
44 implementation of tidal natural communities restoration or floodplain restoration could result in

1 increased exposure of least bittern and white-faced ibis to methylmercury in restored tidal areas.
2 However, it is unknown what concentrations of methylmercury are harmful to these species and the
3 potential for increased exposure varies substantially within the study area. Implementation of CM12
4 which contains measures to assess the amount of mercury before project development, followed by
5 appropriate design and adaptation management, would minimize the potential for increased
6 methylmercury exposure, and would result in no adverse effect on least bittern and white-faced ibis.

7 Indirect effects of plan implementation would represent an adverse effect on least bittern and
8 white-faced ibis in the absence of other conservation measures. This would be a significant impact.
9 With AMM1–AMM7, *AMM27 Selenium Management*, and CM12 in place, and with the
10 implementation of Mitigation Measure BIO-75, indirect effects of plan implementation would not
11 result in a substantial adverse effect through habitat modifications and would not substantially
12 reduce the number or restrict the range of either species. Therefore, the indirect effects of
13 Alternative 1B implementation would have a less-than-significant impact on least bittern and white-
14 faced ibis.

15 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 16 **Disturbance of Nesting Birds**

17 See Mitigation Measure BIO-75 under Impact BIO-75.

18 **Impact BIO-137: Periodic Effects of Inundation on Least Bittern and White-Faced Ibis as a** 19 **Result of Implementation of Conservation Components**

20 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
21 *Enhancement*) would increase the frequency and duration of inundation on approximately 961-
22 2,672 acres of modeled least bittern and white-faced ibis habitat (Table 12-1B-50). However, no
23 adverse effects of increased inundation frequency on nesting habitat are expected because wetland
24 vegetation has persisted under the existing Yolo Bypass flooding regime, and changes to frequency
25 and inundation are within the tolerance of these vegetation types. Inundation would occur in the
26 nonbreeding season and wetlands supporting habitat would not be expected to be affected by flood
27 flows.

28 **NEPA Effects:** Periodic inundation of Yolo Bypass would not be expected to have adverse effects on
29 least bittern or white-faced ibis because wetland vegetation has persisted under the existing Yolo
30 Bypass flooding regime, and changes to frequency and inundation are within the tolerance of these
31 vegetation types.

32 **CEQA Conclusion:** Periodic inundation of Yolo Bypass would not be expected to have a significant
33 impact on least bittern or white-faced ibis because wetland vegetation has persisted under the
34 existing Yolo Bypass flooding regime, and changes to frequency and inundation are within the
35 tolerance of these vegetation types.

36 **Loggerhead Shrike**

37 This section describes the effects of Alternative 1B, including water conveyance facilities
38 construction and implementation of other conservation components, on loggerhead shrike. Modeled
39 habitat for loggerhead shrike includes both high-value and low-value modeled habitat. High-value
40 habitat includes grassland, vernal pool complex and alkali seasonal wetland natural communities in
41 addition to cultivated lands, including pasture and grain and hay crops. Breeding shrikes require

1 shrubs and tall trees for perching and nest placement, and are generally associated with riparian
2 edge grasslands (Humble 2008) or cultivated lands with associated trees and shrubs. Loggerhead
3 shrike modeled habitat is overestimated as it does not differentiate between lands with or without
4 associated nesting vegetation. Low-value habitat includes row crops such as truck and berry crops
5 and field crops which are not considered to be valuable habitat for the species but were included in
6 the model as they may provide foraging opportunities.

7 Construction and restoration associated with Alternative 1B would result in both temporary and
8 permanent losses of modeled habitat for loggerhead shrike as indicated in Table 12-1B-51.

9 Construction and restoration associated with Alternative 1B conservation measures would include
10 the following biological objectives over the term of the BDCP which would also benefit loggerhead
11 shrike (see Chapter 3, Section 3.3, *Biological Goals and Objectives*, of the BDCP).

- 12 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
13 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
14 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 15 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 16 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
17 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 18 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
19 VPNC2.5, and GNC2.4, associated with CM11).
- 20 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
21 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 22 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
23 lands that occur in cultivated lands within the reserve system, including isolated valley oak
24 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
25 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
26 with CM3).
- 27 ● Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
28 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated
29 with CM11).

30 As explained below, with the restoration or protection of these amounts of habitat, in addition to
31 management activities that would enhance habitat for the species and implementation of AMM1-
32 AMM7 and Mitigation Measure BIO-75, impacts on loggerhead shrike would not be adverse for
33 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-51. Changes in Loggerhead Shrike Modeled Habitat Associated with Alternative 1B**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	2,962	2,962	4,528	4,528	NA	NA
	Low-value	2,626	2,626	5,236	5,236	NA	NA
Total Impacts CM1		5,588	5,588	9,764	9,764	NA	NA
CM2-CM18	High-value	5,151	25,252	165	633	894-2,460	3,470
	Low-value	1,874	17,353	0	526	1,227-1,858	4,375
Total Impacts CM2-CM18		7,025	42,605	165	1,159	2,121-4,318	7,845
Total High-value		8,113	28,214	4,693	5,161	894-2,460	3,470
Total Low-value		4,500	19,979	5,236	5,762	1,227-1,858	4,375
TOTAL IMPACTS		12,613	48,193	9,929	10,923	2,121-4,318	7,845

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-138: Loss or Conversion of Modeled Habitat for and Direct Mortality of**
5 **Loggerhead Shrike**

6 Alternative 1B conservation measures would result in the combined permanent loss or conversion
7 and temporary loss of up to 59,116 acres of modeled habitat for loggerhead shrike (33,375 acres of
8 which would be high-value habitat and 25,741 acres of which would be low-value habitat, Table 12-
9 1B-51). Conservation measures that would result in these losses are conveyance facilities and
10 transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo
11 Bypass fisheries improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5),
12 channel margin enhancement (CM6), riparian restoration, (CM7), grassland restoration (CM8),
13 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), natural
14 communities enhancement and management (CM11) and construction of conservation hatcheries
15 (CM18). The majority of habitat loss (33,244 acres) would result from CM4. Habitat enhancement
16 and management activities (CM11), which include ground disturbance or removal of nonnative
17 vegetation, and the construction of recreational trails, signs, and facilities, could result in local
18 adverse habitat effects. In addition, maintenance activities associated with the long-term operation
19 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate
20 loggerhead shrike modeled habitat. Each of these individual activities is described below. A
21 summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the
22 individual conservation measure discussions.

1 *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would
 2 result in the combined permanent and temporary loss of up to 15,172 acres of modeled
 3 loggerhead shrike habitat. This would be comprised of 7,490 acres of high-value habitat (2,962
 4 permanent loss or conversion, 4,528 temporary loss or conversion) and 7,862 acres of low-
 5 value cultivated lands (2,626 permanent loss, 5,236 temporary loss) from CZ 4, CZ 5, CZ 6, CZ 7,
 6 and CZ 8. Impacts would primarily occur from the construction of the new forebay and
 7 associated borrow and spoil area in CZ 8. Other habitat losses would occur as a result of
 8 construction of the canal and associated borrow and spoil areas, and from the construction of
 9 the intakes in the north Delta. The largest impact from CM1 on loggerhead shrike would occur in
 10 CZ 8, where there are larger stands of ruderal and herbaceous vegetation and California annual
 11 grassland, which provides high-value habitat for the species. Approximately 685 acres of impact
 12 would be from the new forebay constructed south of the Clifton Court Forebay in CZ 8.
 13 Temporarily affected areas (grassland, cultivated lands, and associated shrubs or trees) would
 14 be restored within 1 year following completion of construction activities as described in *AMM10*
 15 *Restoration of Temporarily Affected Natural Communities*. Loggerhead shrikes nest in high
 16 abundance in shrubs associated with the grasslands to the south and to the west of Clifton
 17 Court Forebay. Shrikes were detected using this area at a much higher rate than other
 18 grasslands and areas in the Delta during DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta*
 19 *Conservation Plan EIR/EIS Environmental Data Report*). The CM1 footprint overlaps with six
 20 loggerhead shrike occurrences, all in CZ 8. The construction of the new forebay overlaps with
 21 five occurrences and there is one occurrence that overlaps with the footprint of a temporary
 22 transmission line. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
 23 *Avoid Disturbance of Nesting Birds*, would require preconstruction surveys and the
 24 establishment of no-disturbance buffers and would be available to address potential effects on
 25 loggerhead shrikes if they were to nest in or adjacent to construction areas. Refer to the
 26 Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations.
 27 Construction of the water conveyance facilities would occur in the near-term timeframe.

- 28 ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
 29 would result in the combined permanent and temporary loss of up to 1,274 acres of high-value
 30 loggerhead shrike habitat (898 acres of permanent loss, 376 acres of temporary loss) in the Yolo
 31 Bypass in CZ 2. In addition, 182 acres of low-value habitat would be removed (85 acres of
 32 permanent loss, 97 acres of temporary loss). The loss is expected to occur during the first 10
 33 years of Alternative 1B implementation.
- 34 ● *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration (CM4) site preparation
 35 and inundation would permanently remove an estimated 20,880 acres of high-value loggerhead
 36 shrike habitat and 12,364 acres of low-value habitat. The majority of the acres lost would
 37 consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the
 38 vicinity of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of
 39 Suisun Marsh, and along narrow bands adjacent to waterways in the South Delta ROA. Tidal
 40 restoration would directly impact and fragment grassland just north of Rio Vista in and around
 41 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses
 42 of alkali seasonal wetland complex habitat would likely occur in the south end of the Yolo
 43 Bypass and on the northern fringes of Suisun Marsh.
- 44 ● *CM5 Seasonally Inundated Floodplain Restoration:* Construction of setback levees to restore
 45 seasonally inundated floodplain would permanently and temporarily remove approximately
 46 1,450 acres of high-value loggerhead shrike habitat (933 permanent, 517 temporary). These

1 losses would be expected after the first 10 years of Alternative 1B implementation along the San
2 Joaquin River and other major waterways in CZ 7.

- 3 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
4 approximately 370 acres of high-value loggerhead shrike habitat as part of tidal restoration and
5 1,489 acres as part of seasonal floodplain restoration. In addition, 503 acres of low-value habitat
6 would be removed as a part of tidal restoration and 1,971 acres would be removed as part of
7 seasonal floodplain restoration through CM7.
- 8 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
9 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
10 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
11 would be restored after the construction periods. Grassland restoration would be implemented
12 on agricultural lands that also provide habitat for loggerhead shrike and would result in the
13 conversion of 1,849 acres of cultivated lands to high-value grassland.
- 14 ● *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
15 removal of 705 acres of high-value loggerhead shrike habitat and 735 acres of low-value
16 loggerhead shrike habitat.
- 17 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
18 actions included in CM11 that are designed to enhance wildlife values in restored or protected
19 habitats could result in localized ground disturbances that could temporarily remove small
20 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
21 vegetation and road and other infrastructure maintenance activities, would be expected to have
22 minor adverse effects on available habitat and would be expected to result in overall
23 improvements to and maintenance of habitat values over the term of the BDCP. Fences (e.g.
24 barbed wire) installed as part of CM11 in or adjacent to protected grasslands and cultivated
25 lands could benefit loggerhead shrike by providing hunting perches and impalement
26 opportunities. CM11 would also include the construction of recreational-related facilities
27 including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and*
28 *Associated Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic
29 areas, bathrooms, etc. would be placed on existing, disturbed areas when and where possible.
30 However, approximately 50 acres of grassland habitat would be lost from the construction of
31 trails and facilities.

32 Habitat management- and enhancement-related activities could disturb loggerhead shrike nests.
33 If the species were to nest in the vicinity of a worksite, equipment operation could destroy nests
34 if shrubs and trees in grasslands or cultivated lands were removed, and noise and visual
35 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings.
36 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
37 *of Nesting Birds*, would be available to address these adverse effects.

- 38 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
39 value loggerhead shrike habitat for the development of a delta and longfin smelt conservation
40 hatchery in CZ 1. Hatchery construction is expected to occur within the first 10 years of Plan
41 implementation.
- 42 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
43 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
44 disturbances that could affect loggerhead shrike use of the surrounding habitat. Maintenance

1 activities would include vegetation management, levee and structure repair, and re-grading of
2 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7,
3 Mitigation Measure BIO-75, and conservation actions as described below.

- 4 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
5 direct mortality of adult or fledged loggerhead shrike if they were present in the Plan Area,
6 because they would be expected to avoid contact with construction and other equipment. If
7 either species were to nest in the construction area, construction-related activities, including
8 equipment operation, noise and visual disturbances could destroy nests or lead to their
9 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be
10 available to address these adverse effects.

11 The following paragraphs summarize the combined effects discussed above and describe other
12 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
13 included.

14 ***Near-Term Timeframe***

15 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
16 the near-term BDCP conservation strategy has been evaluated to determine whether it would
17 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
18 effects of construction would not be adverse under NEPA. The Plan would remove 13,316 acres
19 (8,412 permanent, 4,904 temporary) of high-value habitat for loggerhead shrike in the study area in
20 the near-term. These effects would result from the construction of the water conveyance facilities
21 (CM1, 7,490 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries
22 Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain
23 Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community
24 Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural
25 Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres*). In
26 addition, 9,761 acres (4,427 permanent, 5,333 temporary) of low-value habitat would be removed
27 or converted in the near-term (CM1, 5,045 acres; *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal
28 Natural Communities Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland
29 Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration,
30 CM11 Natural Communities Enhancement and Management and CM18 Conservation Hatcheries—
31 1,898 acres*).

32 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
33 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 14,980 acres
34 should be protected to compensate for the loss of high-value habitat from CM1. The near-term
35 effects of other conservation actions would require 11,652 acres of protection to compensate for the
36 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the
37 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a
38 large proportion of the low-value habitat would result from the conversion and enhancement to
39 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively
40 quickly after completion of construction.

41 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
42 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
43 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4

1 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
2 in the same timeframe as the construction and early restoration losses.

3 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
4 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
5 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
6 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
7 create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce the
8 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement
9 and Management*, insect prey populations would be increased on protected lands, enhancing the
10 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
11 Cultivated lands that provide habitat for covered and other native wildlife species would provide
12 approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective
13 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and
14 protect small patches of trees and shrubs within cultivated lands that would maintain foraging
15 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows
16 along field borders and roadsides within protected cultivated lands would also provide high-value
17 nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to near-term goals
18 of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural community.
19 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
20 late-successional habitat types with a well-developed understory of dense shrubs. *AMM18
21 Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
22 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
23 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
24 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
25 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
26 nesting habitat for loggerhead shrike. These Plan objectives represent performance standards for
27 considering the effectiveness of conservation actions.

28 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
29 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
30 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
31 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term
32 timeframe would need to include suitable high-value crop types for loggerhead shrike to avoid an
33 adverse effect of habitat loss from CM1. The conservation commitment is 7,572 acres short of
34 meeting the compensation for other near-term effects on loggerhead shrike high-value habitat.
35 Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike
36 Habitat*, would be available to address the adverse effect of near-term high-value habitat loss by
37 providing crop management requirements for CM1 compensation and requiring additional acreage
38 compensation for the other near-term effects. The management and enhancement of cultivated
39 lands including insect prey enhancement through CM3 and CM11, the protection of shrubs and
40 establishment of hedgerows within protected cultivated lands would compensate for any potential
41 effect from the loss of low-value loggerhead shrike foraging habitat.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2
43 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention
44 Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and
45 Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
46 these AMMs include elements that would avoid or minimize the risk of affecting individuals and

1 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
2 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
3 of the Final EIR/EIS.

4 The loggerhead shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse
5 effect on individuals, preconstruction surveys for noncovered avian species would be required to
6 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*
7 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this
8 adverse effect.

9 **Late Long-Term Timeframe**

10 Alternative 1B as a whole would result in the combined permanent of and temporary effects on
11 34,631 acres of high-value habitat and 25,741 acres of low-value loggerhead shrike habitat over the
12 term of the Plan. The locations of these losses are described above in the analyses of individual
13 conservation measures. The Plan includes conservation commitments through *CM3 Natural*
14 *Communities Protection and Restoration*, *CM7, Riparian Natural Community Restoration*, *CM8*
15 *Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*
16 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
17 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex and protect
18 48,625 acres of cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in
19 Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11
20 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, 8, and 11 would be associated with
21 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would
22 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural
23 communities which would create larger, more expansive patches of high-value habitat for
24 loggerhead shrike and reduce the effects of current levels of habitat fragmentation. Under *CM11*
25 *Natural Communities Enhancement and Management*, insect prey populations would be increased on
26 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
27 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife
28 species would provide approximately 48,625 acres of potential high-value habitat for loggerhead
29 shrike (Objective CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to
30 maintain and protect small patches of trees and shrubs within cultivated lands that would maintain
31 foraging perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide
32 hedgerows along field borders and roadsides within protected cultivated lands would also provide
33 high-value nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to
34 near-term goals of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural
35 community. Riparian areas would be restored, maintained, and enhanced to provide a mix of early-,
36 mid- and late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
37 *Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
38 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
39 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
40 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
41 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
42 nesting habitat for loggerhead shrike.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
44 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
45 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*
 2 *Material, and AMM10 Restoration of Temporarily Affected Natural Communities.* All of these AMMs
 3 include elements that would avoid or minimize the risk of affecting individuals and species habitats
 4 adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and
 5 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
 6 EIR/EIS. The loggerhead shrike is not a covered species under the BDCP. For the BDCP to avoid an
 7 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
 8 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
 9 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
 10 address this adverse effect.

11 **NEPA Effects:** The loss of loggerhead shrike habitat and potential for mortality of this special-status
 12 species under Alternative 1B would represent an adverse effect in the absence of other conservation
 13 actions. However, with habitat protection and restoration associated with CM3, CM8, CM9, and
 14 CM11, guided by biological goals and objectives and AMM1– AMM6, *AMM10 Restoration of*
 15 *Temporarily Affected Natural Communities*, and *AMM18 Swainson’s Hawk*, and with implementation
 16 of Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike*
 17 *Habitat*, which would be available to guide the near-term protection and management of cultivated
 18 lands, the effects of habitat loss on loggerhead shrike under Alternative 1B would not be adverse.
 19 Loggerhead shrike is not a covered species under the BDCP, and the potential for mortality would be
 20 an adverse effect without preconstruction surveys to ensure that nests are detected and avoided.
 21 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
 22 *Nesting Birds*, would be available to address this adverse effect.

23 **CEQA Conclusion:**

24 **Near-Term Timeframe**

25 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 26 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 27 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 28 effects of construction would be less than significant under CEQA. The Plan would remove 13,316
 29 acres (8,412 permanent, 4,904 temporary) of high-value habitat for loggerhead shrike in the study
 30 area in the near-term. These effects would result from the construction of the water conveyance
 31 facilities (CM1, 7,490 acres), and implementing other conservation measures (*CM2 Yolo Bypass*
 32 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*
 33 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*
 34 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*
 35 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries—5,826*
 36 acres). In addition, 9,761 acres (4,427 permanent, 5,333 temporary) of low-value habitat would be
 37 removed or converted in the near-term (CM1, 5,045 acres; *CM2 Yolo Bypass Fisheries Enhancement*,
 38 *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8*
 39 *Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*
 40 *Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation*
 41 *Hatcheries—1,898 acres*).

42 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
 43 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 14,980 acres
 44 should be protected to compensate for the loss of high-value habitat from CM1. The near-term

1 effects of other conservation actions would require 11,652 acres of protection to compensate for the
2 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the
3 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a
4 large proportion of the low-value habitat would result from the conversion and enhancement to
5 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively
6 quickly after completion of construction.

7 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
8 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
9 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
10 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
11 in the same timeframe as the construction and early restoration losses.

12 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
13 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
14 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
15 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
16 would create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce
17 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
18 *Enhancement and Management*, insect prey populations would be increased on protected lands,
19 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
20 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would
21 provide approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective
22 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and
23 protect small patches of trees and shrubs within cultivated lands that would maintain foraging
24 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows
25 along field borders and roadsides within protected cultivated lands would also provide high-value
26 nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to near-term goals
27 of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural community.
28 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
29 late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
30 *Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
31 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
32 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
33 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
34 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
35 nesting habitat for loggerhead shrike. These Plan objectives represent performance standards for
36 considering the effectiveness of conservation actions.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
38 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
39 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
40 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
41 *Affected Natural Communities*. All of these AMMs include elements that would avoid or minimize the
42 risk of affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C
43 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
44 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 In the absence of other conservation actions, the effects on loggerhead shrike habitat would
 2 represent an adverse effect as a result of habitat modification and potential direct mortality of a
 3 special-status species. This impact would be significant. Loggerhead shrike is not a covered species
 4 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
 5 noncovered avian species would be required to ensure that nests are detected and avoided. The
 6 combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex, and
 7 alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
 8 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
 9 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term
 10 timeframe would need to include suitable high-value crop types for loggerhead shrike to avoid the
 11 significant impact of habitat loss from CM1. The conservation commitment is 7,572 acres short of
 12 meeting the mitigation needed to compensate for other near-term effects on loggerhead shrike high-
 13 value habitat. Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value*
 14 *Loggerhead Shrike Habitat*, would address the significant impact of near-term high-value habitat loss
 15 by providing crop management requirements for CM1 compensation and requiring additional
 16 acreage compensation for the other near-term effects.

17 With the acres of habitat protection and restoration described above, in addition to Mitigation
 18 Measure BIO-138, *Compensate for the Near-term Loss of High-Value Loggerhead Shrike Habitat*,
 19 Alternative 1B would not result in a substantial adverse effect through loss of high-value habitat.
 20 The management and enhancement of cultivated lands including insect prey enhancement through
 21 CM3 and CM11, the protection of shrubs and establishment of hedgerows within protected
 22 cultivated lands would compensate for any potential substantial impact from the loss of low-value
 23 loggerhead shrike foraging habitat. In addition, AMM1-AMM7, and implementation of Mitigation
 24 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
 25 *Birds*, would avoid potentially significant impacts on nesting individuals. With these measures in
 26 place, Alternative 1B would not result in a substantial adverse effect through habitat modification
 27 and would not substantially reduce the number or restrict the range of the species. Therefore,
 28 Alternative 1B would have a less-than-significant impact on loggerhead shrike.

29 ***Late Long-Term Timeframe***

30 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 34,631
 31 acres of high-value loggerhead shrike habitat during the term of the Plan. In addition, 21,047 acres
 32 of low-value loggerhead shrike habitat would be impacted. The locations of these losses are
 33 described above in the analyses of individual conservation measures. The Plan includes
 34 conservation commitments through *CM3 Natural Communities Protection and Restoration*, *CM7,*
 35 *Riparian Natural Community Restoration*, *CM8 Grassland Natural Communities Restoration*, and *CM9*
 36 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore
 37 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex, protect 150
 38 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands that provide
 39 suitable habitat for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and
 40 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland
 41 protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland
 42 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
 43 grassland, alkali seasonal wetland, and vernal pool natural communities which would create larger,
 44 more expansive patches of high-value habitat for loggerhead shrike and reduce the effects of current
 45 levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*,
 46 insect prey populations would be increased on protected lands, enhancing the foraging value of

1 these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that
2 provide habitat for covered and other native wildlife species would provide approximately 48,625
3 acres of potential high-value habitat for loggerhead shrike (Objective CLNC1.1). In addition, there is
4 a commitment in the plan (Objective CLNC1.3) to maintain and protect small patches of trees and
5 shrubs within cultivated lands that would maintain foraging perches and nesting habitat for the
6 species. The establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides
7 within protected cultivated lands would also provide high-value nesting habitat for loggerhead
8 shrike (Objective SH2.2). The BDCP has committed to near-term goals of protecting 750 acres and
9 restoring 800 acres of valley/foothill riparian natural community. Riparian areas would be restored,
10 maintained, and enhanced to provide a mix of early-, mid- and late-successional habitat types with a
11 well-developed understory of dense shrubs. *AMM18 Swainson's Hawk* includes a measure to plant
12 large mature trees, including transplanting trees scheduled for removal. Trees would be planted in
13 areas that support high-value Swainson's hawk foraging habitat within or adjacent to conserved
14 cultivated lands, or as a component of the riparian restoration where they are in close proximity to
15 suitable foraging habitat. Locating tree plantings and riparian restoration adjacent to Swainson's
16 hawk foraging habitat would also provide suitable nesting habitat for loggerhead shrike.

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
18 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
20 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
21 *Affected Natural Communities*. All of these AMMs include elements that would avoid or minimize the
22 risk of affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C
23 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
24 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. The loggerhead shrike is not a
25 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
26 preconstruction surveys for noncovered avian species would be required to ensure that nests are
27 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
28 *Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a less-than-significant
29 level.

30 In the absence of other conservation actions, the effects on loggerhead shrike habitat would
31 represent an adverse effect as a result of habitat modification and potential direct mortality of a
32 special-status species. This impact would be significant. Considering Alternative 1B's protection and
33 restoration provisions, which would provide acreages of new high-value or enhanced habitat in
34 amounts suitable to compensate for habitats lost to construction and restoration activities, and with
35 the implementation of AMM1-AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
36 *Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-138, *Compensate*
37 *for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*, the loss of habitat or direct
38 mortality through implementation of Alternative 1B would not result in a substantial adverse effect
39 through habitat modifications and would not substantially reduce the number or restrict the range
40 of the species. Therefore, the loss of habitat or potential mortality under this alternative would have
41 a less-than-significant impact on loggerhead shrike.

42 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
43 **Disturbance of Nesting Birds**

44 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Mitigation Measure BIO-138: Compensate for the Near-term Loss of High-Value**
2 **Loggerhead Shrike Habitat**

3 Because the BDCP does not include acreage commitments for the protection of crop types in the
4 near-term time period, DWR will manage and protect sufficient acres of cultivated lands such as
5 pasture, grain and hay crops, or alfalfa as high-value loggerhead shrike habitat such that the
6 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of
7 2:1. Additional grassland protection, enhancement, and management may be substituted for the
8 protection of high-value cultivated lands.

9 **Impact BIO-139: Effects on Loggerhead Shrike Associated with Electrical Transmission**
10 **Facilities**

11 Loggerhead shrike's small, relatively maneuverable body, its lack of flocking behavior, and its
12 diurnal foraging behavior contribute to a low risk of collision with the proposed transmission lines.
13 Marking transmission lines with flight diverters that make the lines more visible to birds has been
14 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). For example, Yee
15 (2008) estimated that marking devices in the Central Valley could reduce avian mortality by 60%.
16 As described in *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted
17 with flight diverters, which would substantially reduce any potential for mortality of loggerhead
18 shrike individuals from powerline collisions.

19 **NEPA Effects:** Loggerhead shrike's small, relatively maneuverable body, its lack of flocking behavior,
20 and its diurnal foraging behavior contribute to a low risk of collision with the proposed
21 transmission lines In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird
22 strike diverters on all new transmission lines, which would substantially reduce the risk of bird
23 strike for loggerhead shrike as a result of the project. Therefore, the construction and operation of
24 new transmission lines under Alternative 1B would not result in an adverse effect on loggerhead
25 shrike.

26 **CEQA Conclusion:** Loggerhead shrike's small, relatively maneuverable body, its lack of flocking
27 behavior, and its diurnal foraging behavior contribute to a low risk of collision with the proposed
28 transmission lines In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird
29 strike diverters on all new transmission lines, which would substantially reduce the risk of bird
30 strike for loggerhead shrike as a result of the project. Therefore, the construction and operation of
31 new transmission lines under Alternative 1B would result in a less-than-significant impact on
32 loggerhead shrike.

33 **Impact BIO-140: Indirect Effects of Plan Implementation on Loggerhead Shrike**

34 Noise and visual disturbances associated with construction-related activities could result in
35 temporary disturbances that affect loggerhead shrike use of modeled habitat. Construction noise
36 above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge
37 of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*
38 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to
39 determine the extent to which these noise levels could affect loggerhead shrike. Indirect effects
40 associated with construction include noise, dust, and visual disturbance caused by grading, filling,
41 contouring, and other ground-disturbing operations. Construction-related noise and visual
42 disturbances could disrupt nesting and foraging behaviors, and reduce the functions of suitable
43 habitat which could result in an adverse effect on these species. Indirect effects from construction of

1 the new forebay in CZ 8 could result in substantial effects on active loggerhead shrike nests. DHCCP
2 surveys in 2009 detected 10 nest sites south-west of the Clifton Court Forebay (Appendix 12C, 2009
3 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report) and the large expanses of
4 grassland in CZ 8 provide high-value nesting habitat for the species. Mitigation Measure BIO-75,
5 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
6 available to minimize adverse effects on active nests. The use of mechanical equipment during water
7 conveyance facilities construction could cause the accidental release of petroleum or other
8 contaminants that could affect these species or their prey in the surrounding habitat. AMM1–AMM7,
9 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the
10 likelihood of such spills. The inadvertent discharge of sediment or excessive dust adjacent to
11 loggerhead shrike nesting habitat could also have a negative effect on these species. AMM1–AMM7
12 would ensure that measures are in place to prevent runoff from the construction area and the
13 negative effects of dust on wildlife adjacent to work areas.

14 **NEPA Effects:** Indirect effects on loggerhead shrike as a result of Plan implementation could have
15 adverse effects on these species through the modification of habitat and potential for direct
16 mortality. The loggerhead shrike is not a covered species under the BDCP and the potential for
17 mortality would be adverse without preconstruction surveys to ensure that nests are detected and
18 avoided. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting
19 loggerhead shrikes in the highly suitable habitat surrounding Clifton Court Forebay and adjacent to
20 work areas. In conjunction with AMM1–AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction*
21 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this
22 adverse effect.

23 **CEQA Conclusion:** Indirect effects on loggerhead shrike as a result of Alternative 1B implementation
24 could have a significant impact on these species. Construction of the new forebay in CZ 8 would have
25 the potential to disrupt nesting loggerhead shrikes in the highly suitable habitat surrounding Clifton
26 Court Forebay and adjacent to work areas. The incorporation of AMM1–AMM7 into the BDCP and
27 the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
28 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

29 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
30 **Disturbance of Nesting Birds**

31 See Mitigation Measure BIO-75 under Impact BIO-75.

32 **Impact BIO-141: Periodic Effects of Inundation on Loggerhead Shrike as a Result of**
33 **Implementation of Conservation Components**

34 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
35 *Enhancement*) would increase the frequency and duration of inundation on 1,830–5,646 acres of
36 modeled loggerhead shrike habitat (consisting of approximately 777–2,423 acres of high-value
37 habitat; Table 12-1B-51).

38 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
39 *Restoration*, could result in the periodic inundation of up to approximately 8,138 acres of modeled
40 habitat (Table 12-1B-51), consisting of 3,823 acres of high-value and 4,315 acres of low-value
41 habitat.

1 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
2 season due to periodic inundation. However, increased frequency and duration of inundation would
3 occur during the nonbreeding season.

4 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on loggerhead
5 shrike from the modification of habitat. Reduced foraging habitat availability may be expected
6 during the fledgling period of the nesting season due to periodic inundation. However, increased
7 frequency and duration of inundation would occur during the nonbreeding season.

8 **CEQA Conclusion:** Periodic inundation of floodplains would result in a less-than-significant impact
9 on loggerhead shrike from the modification of habitat. Reduced foraging habitat availability may be
10 expected during the fledgling period of the nesting season due to periodic inundation. However,
11 increased frequency and duration of inundation would occur during the nonbreeding season.

12 **Song Sparrow “Modesto” Population**

13 This section describes the effects of Alternative 1B, including water conveyance facilities
14 construction and implementation of other conservation components, on Modesto song sparrow. The
15 Modesto song sparrow is common and ubiquitous throughout the study area, excluding CZ 11, and
16 modeled habitat for the species includes managed wetlands, tidal freshwater emergent, nontidal
17 freshwater emergent, and valley/foothill riparian vegetation communities.

18 Construction and restoration associated with Alternative 1B conservation measures would result in
19 both temporary and permanent removal of Modesto song sparrow habitat in the quantities
20 indicated in Table 12-1B-52. Full implementation of Alternative 1B would include the following
21 biological objectives over the term of the BDCP which would benefit Modesto song sparrow (BDCP
22 Chapter 3, *Conservation Strategy*).

- 23 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
24 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
25 associated with CM7).
- 26 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
27 10 (Objective VFRNC1.2, associated with CM3).
- 28 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,
29 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 30 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
31 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
32 associated with CM10)
- 33 ● Create 500 acres of managed wetlands in CZ 3, 4, 5, or 6 (Objectives GSHC1.3 and GSHC1.4,
34 associated with CM10).
- 35 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
36 VPNC2.5, and GNC2.4, associated with CM11).
- 37 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
38 lands that occur in cultivated lands within the reserve system, including isolated valley oak
39 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
40 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
41 with CM3).

- Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated with CM3).

As explained below, with the restoration or protection of these amounts of habitat, in addition to implementation of AMM1–AMM7 and Mitigation Measure BIO-75, impacts on Modesto song sparrow would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1B-52. Changes in Modesto Song Sparrow Modeled Habitat Associated with Alternative 1B (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	74	74	72	72	NA	NA
Total Impacts CM1		74	74	72	72	NA	NA
CM2–CM18	Nesting	2,444	3,253	133	169	81–158	284
Total Impacts CM2–CM18		2,444	3,253	133	169	81–158	284
TOTAL IMPACTS		2,518	3,327	205	241	81–158	284

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-142: Loss or Conversion of Habitat for and Direct Mortality of Modesto Song Sparrow

Alternative 1B conservation measures would result in the combined permanent and temporary loss of up to 3,568 acres of modeled habitat for Modesto song sparrow (of which 3,327 acres would be a permanent loss and 241 acres would be a temporary loss of habitat, Table 12-1B-52). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management activities (CM11), which would include ground disturbance and removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate Modesto song sparrow modeled habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follows the individual conservation measure discussions.

- 1 ● *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would
2 result in the combined permanent and temporary loss of up to 146 acres of modeled Modesto
3 song sparrow habitat (74 acres of permanent loss, 72 acres of temporary loss) from CZ 4, CZ 5,
4 CZ 6, CZ 7, and CZ 8. The permanent footprint for CM1 overlaps with 19 occurrences of Modesto
5 song sparrow. Fourteen occurrences would be impacted by the construction of the canal, and
6 the other impacts would occur from the forebay, potential borrow or spoil sites, siphon work
7 areas, the permanent transmission line footprint, and a reusable tunnel material storage area. In
8 addition, the temporary footprint overlaps with 42 occurrences of song sparrow. Thirty-six of
9 these occurrences would be impacted by siphon work areas, two would be impacted by intake
10 work areas, and the other 4 occurrences would be impacted by a tunnel work area. Mitigation
11 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
12 *Birds*, would require preconstruction surveys and the establishment of no-disturbance buffers
13 and would be available to address adverse effects on nesting Modesto song sparrows. Refer to
14 the Terrestrial Biology Map Book for a detailed view of Alternative 1B construction locations.
15 Construction of the water conveyance facilities would occur within the first 10 years of
16 Alternative 1B implementation.
- 17 ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
18 would permanently remove 143 acres of modeled Modesto song sparrow habitat in the Yolo
19 Bypass in CZ 2. In addition, 133 acres of habitat would be temporarily removed. These losses
20 would occur in the near-term timeframe and primarily consist of valley/foothill riparian natural
21 community and managed wetland. The loss is expected to occur during the first 10 years of
22 Alternative 1B implementation.
- 23 ● *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and
24 inundation would result in the conversion of an estimated loss of 3,066 acres of modeled
25 Modesto song sparrow habitat by the late long-term timeframe.
- 26 ● *CM5 Seasonally Inundated Floodplain Restoration:* Construction of setback levees to restore
27 seasonally inundated floodplain would permanently and temporarily remove approximately 80
28 acres of modeled Modesto song sparrow habitat (44 permanent, 36 temporary). These losses
29 would be expected to occur along the San Joaquin River and other major waterways in CZ 7. The
30 BDCP is expected to restore approximately 5,000 acres of valley/foothill riparian natural
31 community. These lands would be managed as a mosaic of seral stages, age classes, and plant
32 heights, some of which would provide suitable nesting habitat for Modesto song sparrow.
- 33 ● *CM6 Channel Margin Enhancement:* Channel margin habitat enhancement could result in
34 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
35 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
36 activity would occur along waterway margins where riparian habitat stringers exist, including
37 levees and channel banks. The improvements would occur within the study area on sections of
38 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
39 Some of the restored riparian habitat in the channel margin would be expected to support
40 nesting habitat for Modesto song sparrow.
- 41 ● *CM11 Natural Communities Enhancement and Management:* A variety of habitat management
42 actions included in CM11 that are designed to enhance wildlife values in restored or protected
43 habitats could result in localized ground disturbances that could temporarily remove small
44 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
45 vegetation and road and other infrastructure maintenance activities, would be expected to have

1 minor adverse effects on available habitat and would be expected to result in overall
2 improvements to and maintenance of habitat values over the term of the BDCP.

3 Habitat management- and enhancement-related activities could affect Modesto song sparrow
4 nests. If the individuals were to nest in the vicinity of a worksite, equipment operation could
5 destroy nests, and noise and visual disturbances could lead to their abandonment, resulting in
6 mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
7 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address these adverse
8 effects.

- 9 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
10 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
11 disturbances that could affect Modesto song sparrow use of the surrounding habitat.
12 Maintenance activities would include vegetation management, levee and structure repair, and
13 re-grading of roads and permanent work areas. These effects, however, would be reduced by
14 AMM1–AMM7 and conservation actions as described below.
- 15 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in
16 direct mortality of adult or fledged Modesto song sparrow if they were present in the Plan Area,
17 because they would be expected to avoid contact with construction and other equipment. If
18 either species were to nest in the construction area, construction-related activities, including
19 equipment operation, noise and visual disturbances could destroy nests or lead to their
20 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be
21 available to address these adverse effects.

22 The following paragraphs summarize the combined effects discussed above and describe other
23 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
24 also included.

25 ***Near-Term Timeframe***

26 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
27 the near-term BDCP conservation strategy has been evaluated to determine whether it would
28 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
29 effects of construction would not be adverse under NEPA. The Plan would remove 2,723 acres of
30 modeled habitat (2,518 permanent, 205 temporary) for Modesto song sparrow in the study area in
31 the near-term. These effects would result from the construction of the water conveyance facilities
32 (CM1, 146 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
33 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
34 *Restoration—2,577 acres*).

35 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
36 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios
37 would indicate that 146 acres of suitable habitat should be restored/created and 146 acres should
38 be protected to compensate for the CM1 losses of Modesto song sparrow habitat. The near-term
39 effects of other conservation actions would remove 2,577 acres of modeled habitat, and therefore
40 require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song sparrow
41 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1 for
42 protection).

1 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
2 valley/foothill riparian natural community, restoring 8,850 acres of tidal freshwater emergent
3 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the
4 Plan Area (Table 3-4 in Chapter 3). These conservation actions are associated with CM3, CM4, CM7,
5 and CM10 and would occur in the same timeframe as the construction and early restoration losses,
6 thereby avoiding adverse effects of habitat loss on Modesto song sparrow.

7 The majority of the riparian restoration acres would occur in CZ 7 as part of a reserve system with
8 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives
9 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and would provide suitable
10 Modesto song sparrow nesting habitat. The tidal freshwater emergent wetland would be restored in
11 CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be restored in a way that creates
12 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
13 TFEWNC2.2). The nontidal marsh restoration would occur in CZs 2, 4, and/or 5, and the managed
14 wetland restoration would occur in CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland
15 restoration are associated with CM10 and would provide nesting habitat for Modesto song sparrow.

16 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated
17 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands
18 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field
19 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).
20 The management of protected grasslands to increase insect prey through techniques such as the
21 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
22 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
23 standards for considering the effectiveness of conservation actions. The acres of restoration and
24 protection contained in the near-term Plan goals and the additional detail in the biological objectives
25 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
26 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
31 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
32 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
33 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
34 of the Final EIR/EIS.

35 Modesto song sparrow is not a covered species under the BDCP. For the BDCP avoid an adverse
36 effect on individuals, preconstruction surveys for noncovered avian species would be required to
37 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*
38 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this
39 adverse effect.

40 **Late Long-Term Timeframe**

41 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 3,568
42 acres (3,327 acres of permanent loss, 241 acres of temporary loss) of modeled Modesto song
43 sparrow habitat during the term of the Plan. The locations of these losses are described above in the
44 analyses of individual conservation measures. The Plan includes conservation commitments

1 through *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities*
 2 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of
 3 the valley/foothill riparian natural community, restore 24,000 acres of tidal freshwater emergent
 4 wetland, restore 500 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the
 5 Plan Area (Table 3-4 in Chapter 3). Additional acres of valley/foothill riparian habitat would be
 6 restored as a component of channel margin enhancement actions (CM6) along 20 miles of river and
 7 slough channels in the Delta, some of which would be expected to support nesting habitat for
 8 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of
 9 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,
 10 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives
 11 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the
 12 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would
 13 provide suitable nesting habitat for Modesto song sparrow.

14 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
 15 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas
 16 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh
 17 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in
 18 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with
 19 CM10 and would provide nesting habitat for Modesto song sparrow.

20 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands
 21 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective
 22 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and
 23 roadsides, which would provide additional habitat for the species (Objective SH2.2). The
 24 management of protected grasslands to increase insect prey through techniques such as the
 25 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
 26 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
 27 standards for considering the effectiveness of conservation actions. The acres of restoration and
 28 protection contained in the near-term Plan goals and the additional detail in the biological objectives
 29 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
 30 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 35 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 36 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 37 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 38 of the Final EIR/EIS. Modesto song sparrow is not a covered species under the BDCP. For the BDCP
 39 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species
 40 would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75,
 41 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
 42 available to address this adverse effect.

43 **NEPA Effects:** The loss of Modesto song sparrow habitat and potential for mortality of this special-
 44 status species under Alternative 1B would represent an adverse effect in the absence of other
 45 conservation actions. However, with habitat protection and restoration associated with CM3, CM4,

1 CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would
 2 be in place throughout the construction period, the effects of habitat loss on Modesto song sparrow
 3 under Alternative 1B would not be adverse. The Modesto song sparrow is not a covered species
 4 under the BDCP, and the potential for mortality would be an adverse effect without preconstruction
 5 surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75 would be
 6 available to address this adverse effect.

7 **CEQA Conclusion:**

8 **Near-Term Timeframe**

9 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 10 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 11 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 12 effects of construction would be less than significant under CEQA. The Plan would remove 2,723
 13 acres of modeled habitat (2,518 permanent, 205 temporary) for Modesto song sparrow in the study
 14 area in the near-term. These effects would result from the construction of the water conveyance
 15 facilities (CM1, 146 acres), and implementing other conservation measures (CM2 *Yolo Bypass*
 16 *Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated*
 17 *Floodplain Restoration*—2,577 acres).

18 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
 19 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios
 20 would indicate that 146 acres of suitable habitat should be restored/created and 146 acres should
 21 be protected to compensate for the CM1 losses of Modesto song sparrow habitat. The near-term
 22 effects of other conservation actions would remove 2,577 acres of modeled habitat, and therefore
 23 require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song sparrow
 24 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1 for
 25 protection).

26 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
 27 valley/foothill riparian natural community, restoring 8,850 acres of tidal freshwater emergent
 28 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the
 29 Plan Area (Table 3-4 in Chapter 3). These conservation actions are associated with CM3, CM4, CM7,
 30 and CM10 and would occur in the same timeframe as the construction and early restoration losses,
 31 thereby avoiding a significant impact of habitat loss on Modesto song sparrow.

32 The majority of the riparian restoration acres would occur in CZ 7 as part of a reserve system with
 33 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives
 34 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and would provide suitable
 35 Modesto song sparrow nesting habitat. The tidal freshwater emergent wetland would be restored in
 36 CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be restored in a way that creates
 37 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
 38 TFEWNC2.2). The nontidal marsh restoration would occur in CZs 2, 4, and/or 5, and the managed
 39 wetland restoration would occur in CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland
 40 restoration are associated with CM10 and would provide nesting habitat for Modesto song sparrow.

41 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated
 42 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands
 43 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field

1 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).
2 The management of protected grasslands to increase insect prey through techniques such as the
3 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
4 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
5 standards for considering the effectiveness of conservation actions. The acres of restoration and
6 protection contained in the near-term Plan goals and the additional detail in the biological objectives
7 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
8 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
13 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
14 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
15 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
16 of the Final EIR/EIS. Modesto song sparrow is not a covered species under the BDCP. For the BDCP
17 to have a less-than-significant impact on individuals, preconstruction surveys for noncovered avian
18 species would be required to ensure that nests were detected and avoided. Mitigation Measure BIO-
19 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
20 reduce this impact to a less-than-significant level.

21 **Late Long-Term Timeframe**

22 Alternative 1B as a whole would result in the permanent loss of and temporary effects on 3,658
23 acres (3,327 acres of permanent loss, 241 acres of temporary loss) of modeled Modesto song
24 sparrow habitat during the term of the Plan. The locations of these losses are described above in the
25 analyses of individual conservation measures. The Plan includes conservation commitments
26 through *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities*
27 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of
28 the valley/foothill riparian natural community, restore 24,000 acres of tidal freshwater emergent
29 wetland, restore 500 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the
30 Plan Area (Table 3-4 in Chapter 3). Additional acres of valley/foothill riparian habitat would be
31 restored as a component of channel margin enhancement actions (CM6) along 20 miles of river and
32 slough channels in the Delta, some of which would be expected to support nesting habitat for
33 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of
34 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,
35 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives
36 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the
37 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would
38 provide suitable nesting habitat for Modesto song sparrow.

39 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
40 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas
41 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh
42 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in
43 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with
44 CM10 and would provide nesting habitat for Modesto song sparrow.

1 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands
2 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective
3 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and
4 roadsides, which would provide additional habitat for the species (Objective SH2.2). The
5 management of protected grasslands to increase insect prey through techniques such as the
6 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
7 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
8 standards for considering the effectiveness of conservation actions. The acres of restoration and
9 protection contained in the near-term Plan goals and the additional detail in the biological objectives
10 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
11 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
16 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
17 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
18 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
19 of the Final EIR/EIS. Modesto song sparrow is not a covered species under the BDCP. For the BDCP
20 to minimize direct mortality of individuals, preconstruction surveys for noncovered avian species
21 would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75,
22 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce
23 this impact to a less-than-significant level.

24 Considering Alternative 1B's protection and restoration provisions, which would provide acreages
25 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
26 construction and restoration activities, and with the implementation of AMM1-AMM7 and
27 Mitigation Measure BIO-75, the loss of habitat or direct mortality through implementation of
28 Alternative 1B would not result in a substantial adverse effect through habitat modifications and
29 would not substantially reduce the number or restrict the range of Modesto song sparrow.
30 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-
31 significant impact on Modesto song sparrow.

32 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
33 **Disturbance of Nesting Birds**

34 See Mitigation Measure BIO-75 under Impact BIO-75.

35 **Impact BIO-143: Effects on Modesto Song Sparrow Associated with Electrical Transmission**
36 **Facilities**

37 New transmission lines would increase the risk for bird-power line strikes, which could result in
38 injury or mortality of Modesto song sparrow. Existing lines currently pose this risk for Modesto song
39 sparrow and the incremental increased risk from the construction of new transmission lines is not
40 expected to adversely affect the population.

41 **NEPA Effects:** The incremental increased risk of bird-powerline strikes from the construction of new
42 transmission lines would not adversely affect the Modesto song sparrow population.

1 **CEQA Conclusion:** The incremental increased risk of bird-powerline strikes from the construction of
2 new transmission lines would have a less-than-significant impact on the Modesto song sparrow

3 **Impact BIO-144: Indirect Effects of Plan Implementation on Modesto Song Sparrow**

4 **Indirect Construction-Related Effects:** Noise and visual disturbances associated with
5 construction-related activities could result in temporary disturbances that affect Modesto song
6 sparrow use of modeled habitat. Construction noise above background noise levels (greater than 50
7 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,
8 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
9 *Crane*, Table 4), although there are no available data to determine the extent to which these noise
10 levels could affect Modesto song sparrow. Indirect effects associated with construction include
11 noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
12 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and
13 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse
14 effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
15 *Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests.
16 The use of mechanical equipment during water conveyance construction could cause the accidental
17 release of petroleum or other contaminants that could affect these species or their prey in the
18 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
19 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge
20 of sediment or excessive dust adjacent to Modesto song sparrow could also have a negative effect on
21 these species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the
22 construction area and the negative effects of dust on wildlife adjacent to work areas.

23 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
24 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
25 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
26 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
27 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*
28 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is
29 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury
30 associated with natural community and floodplain restoration could indirectly affect Modesto song
31 sparrow, via uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

32 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
33 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
34 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
35 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
36 adaptive management as described in CM12 would be available to address the uncertainty of
37 methylmercury levels in restored tidal marsh and potential impacts on Modesto song sparrow.

38 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
39 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
40 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
41 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
42 2009). The effect of selenium toxicity differs widely between species and also between age and sex
43 classes within a species. In addition, the effect of selenium on a species can be confounded by

1 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
2 2009).

3 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
4 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
5 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
6 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
7 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
8 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
9 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
10 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
11 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
12 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
13 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
14 have a higher risk of selenium toxicity.

15 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
16 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
17 exacerbate bioaccumulation of selenium in avian species, including Modesto song sparrow. Marsh
18 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
19 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
20 Alternative 1B restoration activities that create newly inundated areas could increase bioavailability
21 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
22 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
23 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
24 increases in selenium concentrations in water in the Delta under any alternative. However, it is
25 difficult to determine whether the effects of potential increases in selenium bioavailability
26 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
27 effects on Modesto song sparrow.

28 Because of the uncertainty that exists at this programmatic level of review, there could be a
29 substantial effect on Modesto song sparrow from increases in selenium associated with restoration
30 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
31 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
32 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
33 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
34 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
35 separately for each restoration effort as part of design and implementation. This avoidance and
36 minimization measure would be implemented as part of the tidal habitat restoration design
37 schedule.

38 **NEPA Effects:** Indirect effects on Modesto song sparrow as a result of constructing the Alternative
39 1B water conveyance facilities could adversely affect individuals in the absence of other
40 conservation actions. The incorporation of AMM1–AMM7 into the BDCP and the implementation of
41 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
42 *Nesting Birds*, would minimize this adverse effect.

43 The implementation of tidal natural communities restoration or floodplain restoration could result
44 in increased exposure of Modesto song sparrow to methylmercury. However, it is unknown what

1 concentrations of methylmercury are harmful to the species and the potential for increased
2 exposure varies substantially within the study area. Site-specific restoration plans that address the
3 creation and mobilization of mercury, as well as monitoring and adaptive management as described
4 in *CM12 Methylmercury Management* would address the potential impacts of methylmercury levels
5 in restored tidal marsh in the study area. The site-specific planning phase of marsh restoration
6 would be the appropriate place to assess the potential for risk of methylmercury exposure for
7 Modesto song sparrow, once site specific sampling and other information could be developed.

8 Tidal habitat restoration could result in increased exposure of Modesto song sparrow to selenium.
9 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
10 would provide specific tidal habitat restoration design elements to reduce the potential for
11 bioaccumulation of selenium and its bioavailability in tidal habitats.

12 **CEQA Conclusion:** Indirect effects on Modesto song sparrow as a result of constructing the water
13 conveyance facilities could have a significant impact on these species. The incorporation of AMM1-
14 AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*
15 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this
16 impact to a less-than-significant level. The implementation of tidal natural communities restoration
17 or floodplain restoration could result in increased exposure of Modesto song sparrow to
18 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the
19 species. Site-specific restoration plans that address the creation and mobilization of mercury, as well
20 as monitoring and adaptive management as described in *CM12 Methylmercury Management* would
21 address the potential impacts of methylmercury levels in restored tidal marsh in the study area.

22 Tidal habitat restoration could result in increased exposure of Modesto song sparrow to selenium.
23 With the implementation of *AMM27 Selenium Management*, which would provide specific tidal
24 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its
25 bioavailability in tidal habitats, the impact of increased exposure to selenium would be less than
26 significant.

27 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
28 **Disturbance of Nesting Birds**

29 See Mitigation Measure BIO-75 under Impact BIO-75.

30 **Impact BIO-145: Periodic Effects of Inundation on Modesto Song Sparrow as a Result of**
31 **Implementation of Conservation Components**

32 Flooding of the Yolo Bypass (CM2) would inundate 81-158 acres of modeled Modesto song sparrow
33 habitat. However, inundation would occur during the nonbreeding season. Reduced foraging habitat
34 availability would be expected during the fledgling period of the nesting season due to periodic
35 inundation.

36 Based on hypothetical floodplain restoration, construction of setback levees from seasonally
37 inundated floodplain restoration (CM5) could result in periodic inundation of up to approximately
38 284 acres of Modesto song sparrow modeled habitat (Table 12-1B-52).

39 The periodic inundation of the Yolo Bypass (CM2) and of seasonal floodplains (CM5) is expected to
40 restore a more natural flood regime in support of wetland and riparian vegetation types that
41 support Modesto song sparrow habitat, but may reduce the availability of nesting habitat during
42 years when flooding extends into the nesting season (after March).

1 **NEPA Effects:** Periodic inundation would not result in an adverse effect on Modesto song sparrow
2 because increased frequency and duration of inundation would be expected to restore a more
3 natural flood regime in support of wetland and riparian vegetation types that provide Modesto song
4 sparrow habitat.

5 **CEQA Conclusion:** Periodic inundation would have a less-than-significant impact on Modesto song
6 sparrow because increased frequency and duration of inundation would be expected to restore a
7 more natural flood regime in support of wetland and riparian vegetation types that provide Modesto
8 song sparrow habitat.

9 **Bank Swallow**

10 This section describes the effects of Alternative 1B, including construction and implementation of
11 other conservation components, on bank swallow. Bank swallows nest in colonies along rivers,
12 streams, or other water and require fine textured sandy soils in vertical banks to create their
13 burrows. There is little suitable habitat for bank swallow in the study area because most of the
14 erodible banks have been stabilized with of levee revetment. The placement of rock revetment
15 prevents the lateral migration of rivers, removing the natural river process that creates vertical
16 banks through erosion (Bank Swallow Technical Advisory Committee 2013, Stillwater Sciences
17 2007). An estimated 70-90% of the bank swallow population in California nests along the
18 Sacramento and Feather Rivers (Bank Swallow Technical Advisory Committee 2013) upstream of
19 the study area. However, there are three CNDDDB records of bank swallow colonies in the study area:
20 two in CZ 2 north of Fremont Weir, and one in CZ 5 on Brannan Island, just west of Twitchell Island.

21 The closest natural community to represent modeled habitat for bank swallow is valley foothill
22 riparian. Although there are impacts to the valley foothill riparian natural community along the
23 northeast corner of Clifton Court Forebay, at the intermediate forebay, and on Bouldin Island, it is
24 highly unlikely that the habitat in these locations is suitable for bank swallow (alluvial soils that
25 form steep, eroded banks that have not been stabilized with levee revetment). Reusable tunnel
26 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that the
27 substrate would provide suitable nesting habitat for the species. However, if reusable tunnel
28 material areas were to become suitable for swallows over time, Mitigation Measure BIO-146 *Active*
29 *Bank Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*,
30 would avoid impacts on nesting bank swallows by requiring surveys to be conducted prior to the
31 removal of reusable tunnel material. Construction and restoration associated with Alternative 1B
32 conservation measures would not result in the direct loss of modeled habitat for bank swallow
33 (Table 12-1B-53). However, indirect effects of noise and visual disturbance resulting from *CM2 Yolo*
34 *Bypass Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration* could impact bank
35 swallow colonies if they were present near work areas. In addition, there is uncertainty with respect
36 to how water flows upstream of the study area would affect bank swallow habitat.

37 As explained below, impacts on bank swallow would not be adverse for NEPA purposes and would
38 be less than significant for CEQA purposes with the implementation of mitigation measures to
39 monitor colonies and address the uncertainty of upstream operations on the species.

1 **Table 12-1B-53. Changes in Bank Swallow Modeled Habitat Associated with Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Breeding	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2–CM18	Breeding	0	0	0	0	0	0
Total Impacts CM2–CM18		0	0	0	0	0	0
TOTAL IMPACTS		0	0	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-146: Indirect Effects of Implementation of Conservation Components on Bank**
4 **Swallow**

5 Noise and visual disturbances during restoration activities from *CM2 Yolo Bypass Fisheries*
6 *Enhancement*, and *CM4 Tidal Natural Communities Restoration*, including operation of earthmoving
7 equipment and human activities at work sites, could result in temporary disturbances that cause
8 bank swallow to abandon active nest burrows adjacent to construction areas. Bank swallow colonies
9 with occupied burrows have been recorded in CZ 2 and CZ 5, and construction-related disturbances
10 could result in an adverse effect on individuals. Various activities related to *CM11 Natural*
11 *Communities Enhancement and Management* could also have indirect impacts on bank swallow.

12 **NEPA Effects:** Construction activities associated with habitat restoration could adversely affect bank
13 swallow colonies in the absence of other measures. Noise and visual disturbances could result in
14 adverse effects on bank swallows if active colonies were present within 500 feet of work areas.
15 Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and Indirect Effects on*
16 *Bank Swallow Will Be Minimized*, would be available to address this adverse effect.

17 **CEQA Conclusion:** Construction activities associated with habitat restoration could result in a
18 significant impact on bank swallow colonies in the absence of other measures. Noise and visual
19 disturbances could result in significant impacts on bank swallows if active colonies were present
20 within 500 feet of work areas. Implementation of Mitigation Measure BIO-146, *Active Bank Swallow*
21 *Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would reduce this
22 impact to a less-than-significant level.

1 **Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect**
2 **Effects on Bank Swallow Will Be Minimized**

3 To the extent practicable, BDCP proponents will not construct conservation components during
4 the bank swallow nesting season (April 1 through August 31). If restoration activities cannot be
5 avoided during nesting season, a qualified biologist will conduct preconstruction surveys to
6 determine if active bank swallow nesting colonies are present within 500 feet of work areas. If
7 no active nesting colonies are present, no further mitigation is required. Reusable tunnel
8 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that
9 the substrate would provide suitable nesting habitat for the species. However, reusable tunnel
10 material sites could become suitable for swallows over time. Surveys of reusable tunnel material
11 areas that have been present for at least 1 year, allowing the substrate to stabilize, will be
12 conducted prior to the removal of reusable tunnel material.

13 If active colonies are detected, DWR will establish a nondisturbance buffer (determined by DWR
14 in consultation with CDFW and the Bank Swallow Technical Advisory Committee) around the
15 colony during the breeding season. In addition, a qualified biologist will monitor any active
16 colony within 500 feet of construction to ensure that construction activities do not affect nest
17 success.

18 **Impact BIO-147: Effects of Upstream Reservoir and Water Conveyance Facilities Operations**
19 **on Bank Swallow**

20 Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes
21 with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the
22 species is loss of nesting habitat from the placement of rock revetment for levee stabilization.

23 Because of this limited available habitat, and the reduction of natural river process, the species is
24 highly sensitive to 1) reductions in winter flows which are necessary to erode banks for habitat
25 creation, and 2) high flows during the breeding season. The potential impacts of changes in
26 upstream flows during the breeding season on bank swallows are the flooding of active burrows and
27 destruction of burrows from increased bank sloughing. Bank swallows arrive in California and begin
28 to excavate their burrows in March, and the peak egg-laying occurs during April and May (Bank
29 Swallow Technical Advisory Committee 2013). Therefore, increases in flows after the March when
30 the swallows have nested and layed eggs in the burrows could result in the loss of nests. On the
31 Sacramento River, breeding season flows between 14,000 and 30,000 cfs have been associated with
32 localized bank collapses that resulted in partial or complete colony failure (Stillwater Sciences
33 2007).

34 The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations
35 on the Sacramento (Sacramento River at Keswick, Sacramento River upstream of Red Bluff,
36 Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-
37 flow channel at Thermalito Dam, and Feather River at the confluence with the Sacramento River).
38 Flows were estimated for wet years, above normal years, below normal years, dry years, and critical
39 years. An average also was estimated (see Chapter 5, Section 5.3.1, *Methods for Analysis*, for a
40 description of the model). Alternative 1B would implement Operational Scenario A, which is the
41 same Operational Scenario as Alternative 1A described below.

42 On the Sacramento River, at the Keswick and Red Bluff gauges, mean monthly flows under
43 Alternative 1A could increase between April and August in all but wet years at the Keswick flow

1 gauge based on modeling assumptions (Table 1 in Section 11C.1.1 of Appendix 11C, *CALSIM II Model*
 2 *Results Utilized in the Fish Analysis*) and in dry and critical years at the gauge upstream of Red Bluff
 3 (Table 3 in Section 11C.1.1 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*)
 4 which could lead to inundation of active colonies. However, model outputs indicate that the flows
 5 under Existing Conditions and the predicted flows in the late long-term without the project (No
 6 Action Alternative) also show increases in flows during the breeding season (April through August)
 7 in these water year types. Similar trends are shown for the Feather River (Table 15 in Section
 8 11C.1.1 and Table 17 in Section 11C.1.1 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish*
 9 *Analysis*). In addition, at the Verona gauge on the Sacramento River in average, above normal, and
 10 wet water years, flows are predicted to be greater than 14,000 cfs during some months of the
 11 breeding season, which could lead to bank collapse events (Tables 1, 3, and 7 in Section 11C.1.1 of
 12 Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*). However, flows of this height
 13 are recorded under Existing Conditions at this flow gauge and are also predicted for the late long-
 14 term time without the project (No Action Alternative).

15 **NEPA Effects:** High spring flows on the Sacramento and Feather Rivers may already be impacting
 16 bank swallow colonies during the breeding season, and predicted flows under Alternative 1B would
 17 not differ substantially from those under the No Action Alternative. However, because of the
 18 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding
 19 the potential for and magnitude of upstream impacts on bank swallow from changes in water
 20 facilities operations. Soil type, high winter flows, and low spring flows all contribute to successful
 21 nesting of bank swallow, and even moderate changes in seasonal flows could have an adverse effect
 22 on breeding success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and*
 23 *Evaluate Winter and Spring Flows Upstream of the Study Area*, would be available to address the
 24 uncertainty of potential adverse effects of upstream operations on bank swallow.

25 **CEQA Conclusion:** High spring flows on the Sacramento and Feather Rivers may already be
 26 impacting bank swallow colonies during the breeding season, and predicted flows under Alternative
 27 1B would not differ substantially from than those under the Existing Conditions. However, because
 28 of the complexity of variables that dictate suitable habitat for the species, there is uncertainty
 29 regarding the potential for and magnitude of impacts on bank swallow from changes in upstream
 30 operations. There are many variables that dictate suitable habitat for the species that cannot be
 31 clearly quantified, and seasonal changes in flow could increase or decrease suitable habitat for bank
 32 swallow depending on soil type and location of current colonies. Implementation of Mitigation
 33 Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of*
 34 *the Study Area*, would address this potential significant impact and further determine if additional
 35 mitigation is required for bank swallow.

36 **Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and**
 37 **Spring Flows Upstream of the Study Area**

38 To address the uncertainty of the impact of upstream spring flows on existing bank swallow
 39 habitat, DWR will continue to support annual monitor ing¹ of existing colonies upstream of the
 40 study area. DWR will collect data to be used for quantifying the magnitude of flows that would

¹ Bank swallow colonies have historically been and are currently monitored by DWR, USFWS, and CDFW in association with the Bank Swallow Technical Advisory Committee, which is a diverse coalition of state and federal agency and nongovernmental organization personnel, created in response to the continued decline of bank swallow populations on the Sacramento River.

1 result in loss of active nest sites or degradation of available nesting habitat, and the extent to
2 which changes in SWP operations attributable solely to the California WaterFix are the cause of
3 such impacts. If DWR determines that changes in SWP operations attributable solely to the
4 California WaterFix have caused loss of active nest sites or degradation of available nesting
5 habitat, replacement habitat will be established at a minimum of 2:1 for the length of bank
6 habitat affected. Replacement habitat will consist of removing bank revetment to create habitat
7 for bank swallow at a location subject to CDFW approval (Bank Swallow Technical Advisory
8 Committee 2013).

9 **Yellow-Headed Blackbird**

10 This section describes the effects of Alternative 1B, including water conveyance facilities
11 construction and implementation of other conservation components, on yellow-headed blackbird.
12 The habitat model used to assess impacts on yellow-headed blackbird includes nesting habitat and
13 foraging habitat. Modeled nesting habitat includes tidal freshwater emergent wetland, other natural
14 seasonal wetland, nontidal freshwater perennial emergent wetland, and managed wetland. These
15 natural communities support aquatic insects which are important prey items for yellow-headed
16 blackbird young (Beedy 2008). Modeled foraging habitat for yellow-headed blackbird consists of
17 cultivated lands and noncultivated land cover types known to support abundant insect populations,
18 including corn, pasture, and feedlots.

19 Construction and restoration associated with Alternative 1B conservation measures would result in
20 both temporary and permanent losses of yellow-headed blackbird modeled habitat as indicated in
21 Table 12-1B-54. Full implementation of Alternative 1B would include the following biological
22 objectives over the term of the BDCP which would also benefit yellow-headed blackbird (BDCP
23 Chapter 3, *Conservation Strategy*).

- 24 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
25 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 26 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
27 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
28 associated with CM10).
- 29 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
30 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 31 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
32 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
33 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 34 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 35 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
36 complex in CZs 1, 8, and/or 11 (Objective ASWNC1.1, Objective VPNC1.1, associated with CM3).
- 37 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
38 lands that occur in cultivated lands within the reserve system, including isolated valley oak
39 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
40 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
41 with CM3).

- 1 • Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat (Table 12-1B-
2 38) in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.3, associated with CM3).
- 3 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
4 lands that occur in cultivated lands within the reserve system, including isolated valley oak
5 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
6 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
7 with CM3).
- 8 • Increase prey abundance and accessibility for grassland-foraging species (Objective GNC2.4,
9 associated with CM11).

10 As explained below, with the restoration or protection of these amounts of habitat, in addition to
11 management activities to enhance habitats for the species and implementation of AMM1–AMM7,
12 *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on yellow-headed blackbird
13 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

14 **Table 12-1B-54. Changes in Yellow-Headed Blackbird Modeled Habitat Associated with Alternative**
15 **1B**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	19	19	35	35	NA	NA
	Foraging	2,964	2,964	4,582	4,582	NA	NA
Total Impacts CM1		2,983	2,983	4,617	4,617	NA	NA
CM2–CM18	Nesting	5,814	13,902	45	46	961–2,678	18
	Foraging	5,612	26,673	376	905	368–1,476	2,701
Total Impacts CM2–CM18		11,426	40,575	421	951	1,495–4,394	2,719
Total Nesting		5,833	13,921	80	81	961–2,678	18
Total Foraging		8,576	29,637	4,958	5,487	368–1,476	2,701
TOTAL IMPACTS		14,409	43,558	5,038	5,568	1,495–4,394	2,719

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

16

17 **Impact BIO-148: Loss of Habitat for and Direct Mortality of Yellow-Headed Blackbird**

18 Alternative 1B conservation measures would result in the combined permanent and temporary loss
19 of up to 49,126 acres of modeled habitat (14,002 acres of nesting habitat and 35,124 acres of

1 foraging habitat) for yellow-headed blackbird (Table 12-1B-54). Conservation measures that would
 2 result in these losses are conveyance facilities and transmission line construction, and establishment
 3 and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat
 4 restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration
 5 (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat
 6 enhancement and management activities (CM11) which include ground disturbance or removal of
 7 nonnative vegetation could result in local adverse habitat effects. In addition, maintenance activities
 8 associated with the long-term operation of the water conveyance facilities and other BDCP physical
 9 facilities could degrade or eliminate yellow-headed blackbird suitable habitat. Each of these
 10 individual activities is described below. A summary statement of the combined impacts and NEPA
 11 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 12 ● *CM1 Water Facilities and Operation*: Construction of Alternative 1B water conveyance facilities
 13 would result in the combined permanent and temporary loss of up to 54 acres of yellow-headed
 14 blackbird nesting habitat (19 acres of permanent loss and 35 acres of temporary loss). In
 15 addition, 7,546 acres of foraging habitat would be removed (2,964 acres of permanent loss,
 16 4,582 acres of temporary loss) (Table 12-1B-54). Impacts from CM1 would occur in the central
 17 delta in CZ 4, CZ 5, CZ 6, CZ 7, and CZ 8. There are no occurrences of yellow-headed blackbird
 18 that overlap with the construction footprint for CM1. However, Mitigation Measure BIO-75,
 19 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
 20 require preconstruction surveys and the establishment of no-disturbance buffers and would be
 21 available to address potential effects on yellow-headed blackbirds if they were to nest in or
 22 adjacent to construction activities. Refer to the Terrestrial Biology Map Book for a detailed view
 23 of Alternative 1B construction locations.
- 24 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 25 would result in the combined permanent and temporary loss of up to 100 acres of nesting
 26 habitat (55 acres of permanent loss, 45 acres of temporary loss) in the Yolo Bypass in CZ 2. In
 27 addition, 1,144 acres of foraging habitat would be removed (879 acres of permanent loss, 265
 28 acres of temporary loss). The loss is expected to occur during the first 10 years of Alternative 1B
 29 implementation.
- 30 ● *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation from CM4 would
 31 permanently remove or convert an estimated 13,847 acres of nesting habitat, which would
 32 consist primarily of managed wetland. In addition, 20,029 acres of foraging habitat would be
 33 lost or converted as a result of tidal restoration, over half of which would be from the loss or
 34 conversion of alfalfa. However, the resulting 65,000 acres of tidal natural communities would
 35 also provide habitat for the species, 24,000 acres of which would be tidal freshwater natural
 36 communities providing breeding habitat for yellow-headed blackbird.
- 37 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 38 seasonally inundated floodplain and riparian restoration actions would remove approximately 2
 39 acres of yellow-headed blackbird nesting habitat (1 acres of permanent loss, 1 acres of
 40 temporary loss) and 1,641 acres of foraging habitat (1,051 acres of permanent loss, 590 acres of
 41 temporary loss). These losses would be expected after the first 10 years of Alternative 1B
 42 implementation along the San Joaquin River and other major waterways in CZ 7.
- 43 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
 44 approximately 509 acres of yellow-headed blackbird foraging habitat as part of tidal restoration
 45 and 2,033 acres as part of seasonal floodplain restoration through CM7.

- 1 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
2 implemented on agricultural lands and would result in the conversion of 926 acres of yellow-
3 headed blackbird agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,
4 and 11. If agricultural lands supporting higher value foraging habitat than the restored
5 grassland were removed, there would be a loss of foraging habitat value. CM8 would result in the
6 restoration of 2,000 acres of grassland foraging habitat in the study area.
- 7 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh
8 (CM10) would result in the permanent conversion of 988 acres of cultivated lands foraging
9 habitat to nontidal marsh in CZ 2 and CZ 4. Yellow-headed blackbird nesting habitat may
10 develop along the margins of restored nontidal marsh and restoration would also provide
11 foraging habitat for the species.
- 12 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
13 enhancement-related activities could disturb yellow-headed blackbird nests if they were
14 present near work sites. A variety of habitat management actions included in CM11 that are
15 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground
16 disturbances that could temporarily remove small amounts of yellow-headed blackbird habitat
17 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,
18 such as removal of nonnative vegetation and road and other infrastructure maintenance, would
19 be expected to have minor effects on available yellow-headed blackbird habitat. These effects
20 cannot be quantified, but are expected to be minimal and would be avoided and minimized by
21 AMM1–AMM7. CM11 would also include the construction of recreational-related facilities
22 including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and*
23 *Associated Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic
24 areas, bathrooms, etc. would be placed on existing, disturbed areas when and where possible.
25 However, approximately 50 acres of grassland foraging habitat would be lost from the
26 construction of trails and facilities.
- 27 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
28 yellow-headed blackbird foraging habitat for the development of a delta and longfin smelt
29 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan
30 implementation.
- 31 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
32 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
33 disturbances that could affect yellow-headed blackbird use of the surrounding habitat.
34 Maintenance activities would include vegetation management, levee and structure repair, and
35 re-grading of roads and permanent work areas. These effects, however, would be reduced by
36 AMMs and conservation actions as described below.
- 37 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
38 direct mortality of adult or fledged yellow-headed blackbird if they were present in the Plan
39 Area, because they would be expected to avoid contact with construction and other equipment.
40 If yellow-headed blackbird were to nest in the construction area, construction-related activities,
41 including equipment operation, noise and visual disturbances could destroy nests or lead to
42 their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75,
43 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
44 available to address these adverse effects on yellow-headed blackbird.

1 The following paragraphs summarize the combined effects discussed above and describe other
 2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
 3 included.

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 8 effects of construction would not be adverse under NEPA. The Plan would remove 5,913 acres
 9 (5,833 acres of permanent loss, 80 acres of temporary loss) of yellow-headed blackbird nesting
 10 habitat in the study area in the near-term. These effects would result from the construction of the
 11 water conveyance facilities (CM1, 54 acres), and implementing other conservation measures (CM2
 12 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*
 13 *Inundated Floodplain Restoration*—5,859 acres). In addition, 13,534 acres of yellow-headed
 14 blackbird foraging habitat would be removed or converted in the near-term (CM1, 7,546 acres; CM2
 15 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5 *Seasonally*
 16 *Inundated Floodplain Restoration*, CM7 *Riparian Natural Community Restoration*, CM8 *Grassland*
 17 *Natural Community Restoration*, CM10 *Nontidal Marsh Restoration*, and CM18 *Conservation*
 18 *Hatcheries*—5,988 acres).

19 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
 20 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection
 21 of foraging habitat. Using these ratios would indicate that 54 acres of nesting habitat should be
 22 restored/created and 54 acres should be protected to compensate for the CM1 losses of yellow-
 23 headed blackbird nesting habitat. In addition, 7,546 acres of foraging habitat should be protected to
 24 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of
 25 other conservation actions would require 5,859 acres each of restoration and protection of breeding
 26 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA
 27 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

28 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
 29 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of
 30 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,
 31 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland
 32 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3).
 33 These conservation actions are associated with CM3, CM4, CM8, and CM10 and would occur in the
 34 same timeframe as the construction and early restoration losses.

35 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
 36 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
 37 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
 38 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and
 39 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas
 40 of bare ground or marsh where the predominant vegetation consists of invasive species such as
 41 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant
 42 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be
 43 created, some of which would provide nesting habitat for the species.

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
2 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
3 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
4 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
5 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
6 abundance would also be increased on protected lands, enhancing the foraging value of these
7 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
8 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
9 hedgerows along field borders and roadsides within protected cultivated lands (Objective
10 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
11 wetlands would also be protected and maintained as part of the cultivated lands reserve system
12 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

13 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife
14 species would be protected in the near-term time period (Objective CLNC1.1), much of which would
15 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection
16 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the
17 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed
18 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
23 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
24 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
25 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
26 of the Final EIR/EIS. The yellow-headed blackbird is not a covered species under the BDCP. For the
27 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
28 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-
29 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
30 available to address this adverse effect.

31 ***Late Long-Term Timeframe***

32 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres
33 of modeled foraging habitat for yellow-headed blackbird. Alternative 1B as a whole would result in
34 the permanent loss of and temporary effects on 13,948 acres of potential nesting habitat (17% of the
35 potential nesting habitat in the study area) and the loss or conversion of 35,124 acres of foraging
36 habitat (11% of the foraging habitat in the study area). The locations of these losses are described
37 above in the analyses of individual conservation measures.

38 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
39 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*
40 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of
41 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,
42 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres
43 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of

1 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable
2 habitat for native wildlife species (Table 3-4 in Chapter 3).

3 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
4 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
5 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
6 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit
7 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground
8 or marsh where the predominant vegetation consists of invasive species such as perennial
9 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
10 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of
11 which would provide nesting habitat for the species.

12 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
13 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
14 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
15 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
16 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
17 abundance would also be increased on protected lands, enhancing the foraging value of these
18 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
19 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
20 hedgerows along field borders and roadsides within protected cultivated lands (Objective
21 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
22 wetlands would also be protected and maintained as part of the cultivated lands reserve system
23 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the
24 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time
25 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types
26 for tricolored blackbird (Table 3.3-6 in BDCP Chapter 3). These crop types include pasture,
27 sunflower, alfalfa, and other crop types that would provide high-value foraging habitat for yellow-
28 headed blackbird.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
33 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
34 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
35 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
36 of the Final EIR/EIS.

37 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
38 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
39 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
40 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
41 address this adverse effect.

42 **NEPA Effects:** The loss of yellow-headed blackbird habitat and potential for direct mortality of this
43 special-status species associated with Alternative 1B would represent an adverse effect in the
44 absence of other conservation actions. However, with habitat protection and restoration associated

1 with CM3, CM4, CM8, CM10, and CM11, guided by biological goals and objectives and by AMM1–
2 AMM7, which would be in place throughout the construction phase, the effects of habitat loss would
3 not be adverse under Alternative 1B. The yellow-headed blackbird is not a covered species under
4 the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
5 noncovered avian species would be required to ensure that nests are detected and avoided.
6 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
7 *Nesting Birds*, would be available to address this adverse effect.

8 **CEQA Conclusion:**

9 **Near-Term Timeframe**

10 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
11 the near-term BDCP conservation strategy has been evaluated to determine whether it would
12 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
13 effects of construction would be less than significant under CEQA. The Plan would remove 5,913
14 acres (5,833 acres of permanent loss, 80 acres of temporary loss) of yellow-headed blackbird
15 nesting habitat in the study area in the near-term. These effects would result from the construction
16 of the water conveyance facilities (CM1, 54 acres), and implementing other conservation measures
17 (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5
18 Seasonally Inundated Floodplain Restoration—5,859 acres). In addition, 13,534 acres of yellow-
19 headed blackbird foraging habitat would be removed or converted in the near-term (CM1, 7,546
20 acres; CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5
21 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8
22 Grassland Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation
23 Hatcheries—5,988 acres).

24 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
25 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection
26 of foraging habitat. Using these ratios would indicate that 54 acres of nesting habitat should be
27 restored/created and 54 acres should be protected to compensate for the CM1 losses of yellow-
28 headed blackbird nesting habitat. In addition, 7,546 acres of foraging habitat should be protected to
29 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of
30 other conservation actions would require 5,859 acres each of restoration and protection of breeding
31 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA
32 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

33 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
34 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of
35 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,
36 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland
37 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3).
38 These conservation actions are associated with CM3, CM4, CM8, and CM10 and would occur in the
39 same timeframe as the construction and early restoration losses.

40 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
41 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
42 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
43 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and
44 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas

1 of bare ground or marsh where the predominant vegetation consists of invasive species such as
2 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant
3 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be
4 created, some of which would provide nesting habitat for the species.

5 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
6 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
7 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
8 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
9 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
10 abundance would also be increased on protected lands, enhancing the foraging value of these
11 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
12 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
13 hedgerows along field borders and roadsides within protected cultivated lands (Objective
14 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
15 wetlands would also be protected and maintained as part of the cultivated lands reserve system
16 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

17 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife
18 species would be protected in the near-term time period (Objective CLNC1.1), much of which would
19 provide foraging habitat for yellow-headed blackbird.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
24 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
25 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
26 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
27 of the Final EIR/EIS.

28 In the absence of other conservation actions, the effects on yellow-headed blackbird habitat would
29 represent an adverse effect as a result of habitat modification and potential direct mortality of a
30 special-status species. This impact would be significant. Yellow-headed blackbird is not a covered
31 species under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction
32 surveys for noncovered avian species would be required to ensure that nests are detected and
33 avoided. The acres of restoration and protection contained in the near-term Plan goals and the
34 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
35 the project-level effects of CM1 on yellow-headed blackbird habitat, as well as mitigate the near-
36 term effects of the other conservation measures. With the acres of habitat protection and restoration
37 described above, in addition to AMM1–AMM7, and implementation of Mitigation Measure BIO-75,
38 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, Alternative 1B
39 would not result in a substantial adverse effect through habitat modification and would not
40 substantially reduce the number or restrict the range of the species. Therefore, Alternative 1B would
41 have a less-than-significant impact on yellow-headed blackbird.

42 **Late Long-Term Timeframe**

43 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres
44 of modeled foraging habitat for yellow-headed blackbird. Alternative 1B as a whole would result in

1 the permanent loss of and temporary effects on 13,948 acres of potential nesting habitat (17% of the
2 potential nesting habitat in the study area) and the loss or conversion of 35,124 acres of foraging
3 habitat (11% of the foraging habitat in the study area). The locations of these losses are described
4 above in the analyses of individual conservation measures.

5 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
6 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*
7 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of
8 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,
9 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres
10 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of
11 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable
12 habitat for native wildlife species (Table 3-4 in Chapter 3).

13 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
14 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
15 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
16 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit
17 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground
18 or marsh where the predominant vegetation consists of invasive species such as perennial
19 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
20 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of
21 which would provide nesting habitat for the species.

22 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
23 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
24 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
25 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
26 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
27 abundance would also be increased on protected lands, enhancing the foraging value of these
28 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
29 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
30 hedgerows along field borders and roadsides within protected cultivated lands (Objective
31 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
32 wetlands would also be protected and maintained as part of the cultivated lands reserve system
33 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the
34 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time
35 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types
36 for tricolored blackbird (Table 3.3-6 in BDCP Chapter 3). These crop types include pasture,
37 sunflower, alfalfa, and other crop types that would provide high-value foraging habitat for yellow-
38 headed blackbird.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
43 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
44 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since

1 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
2 of the Final EIR/EIS.

3 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
4 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
5 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
6 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this
7 impact to a less-than-significant level.

8 In the absence of other conservation actions, the effects on yellow-headed blackbird habitat would
9 represent an adverse effect as a result of habitat modification and potential direct mortality of a
10 special-status species. This impact would be significant. Considering Alternative 1B's protection and
11 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
12 necessary to compensate for habitat lost to construction and restoration activities, and with the
13 implementation of AMM1-AMM7 and Mitigation Measure BIO-75, the loss of habitat or direct
14 mortality through implementation of Alternative 1B would not result in a substantial adverse effect
15 through habitat modifications and would not substantially reduce the number or restrict the range
16 of either species. Therefore, the loss of habitat or potential mortality under this alternative would
17 have a less-than-significant impact on yellow-headed blackbird.

18 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
19 **Disturbance of Nesting Birds**

20 See Mitigation Measure BIO-75 under Impact BIO-75.

21 **Impact BIO-149: Effects on Yellow-Headed Blackbird Associated with Electrical Transmission**
22 **Facilities**

23 Yellow-headed blackbirds are colonial and have the potential to collide with the proposed
24 transmission lines when migrating in large flocks. However, similar to tricolored blackbird behavior,
25 daily flights associated with foraging likely occur in smaller flocks at heights that are lower than the
26 transmission lines (BDCP Appendix 5.J, Attachment 5.J-2, *Memorandum: Analysis of Potential Bird*
27 *Collisions at Proposed BDCP Transmission Lines*). Marking transmission lines with flight diverters
28 that make the lines more visible to birds has been shown to reduce the incidence of bird mortality
29 (Brown and Drewien 1995). For example, Yee (2008) estimated that marking devices in the Central
30 Valley could reduce avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new
31 project transmission lines would be fitted with flight diverters, which would reduce the potential for
32 yellow-headed blackbird collision with transmission lines. Transmission line poles and towers also
33 provide perching substrate for raptors, which are predators on yellow-headed blackbird. Although
34 there is potential for transmission lines to result in increased perching opportunities for raptors and
35 result in increased predation pressure on yellow-headed blackbirds, the existing network of
36 transmission lines in the study area currently poses this risk for yellow-headed blackbirds, and any
37 incremental risk associated with the new transmission line corridors would not be expected to
38 affect the study area population. Therefore, it is assumed that the increase in predation risk on
39 yellow-headed blackbird from an increase in raptor perching opportunities would be minimal.

40 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
41 could result in injury or mortality of yellow-headed blackbird. *AMM20 Greater Sandhill Crane*
42 contains the commitment to place bird strike diverters on all new powerlines, which would reduce
43 the potential impact of the construction of new transmission lines on yellow-headed blackbird. The

1 increase in predation risk on yellow-headed blackbird from an increase in raptor perching
2 opportunities would be minimal. Therefore, the construction and operation of new transmission
3 lines under Alternative 1B would not result in an adverse effect on yellow-headed blackbird.

4 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
5 could result in injury or mortality of yellow-headed blackbird. *AMM20 Greater Sandhill Crane*
6 contains the commitment to place bird strike diverters on all new powerlines, which would reduce
7 the potential impact of the construction of new transmission lines on yellow-headed blackbird. The
8 increase in predation risk on yellow-headed blackbird from an increase in raptor perching
9 opportunities would be minimal. The construction and operation of new transmission lines under
10 Alternative 1B would not substantially reduce the number or restrict the range of the species and
11 would therefore result in a less-than-significant impact on yellow-headed blackbird.

12 **Impact BIO-150: Indirect Effects of Plan Implementation on Yellow-Headed Blackbird**

13 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
14 with construction-related activities could result in temporary disturbances that affect yellow-
15 headed blackbird use of suitable habitat. Construction noise above background noise levels (greater
16 than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP
17 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*
18 *Sandhill Crane*, Table 4), although there are no available data to determine the extent to which these
19 noise levels could affect yellow-headed blackbird. Indirect effects associated with construction
20 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
21 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and
22 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse
23 effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
24 *Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests.
25 The use of mechanical equipment during water conveyance construction could cause the accidental
26 release of petroleum or other contaminants that could affect the species in the surrounding habitat.
27 The inadvertent discharge of sediment or excessive dust adjacent to yellow-headed blackbird
28 habitat could also have a negative effect on the species. Where nests are located above open water,
29 impacts of contamination, dust, and sediment in water could impact fledglings directly, or affect
30 aquatic insect prey, which is important for feeding young. AMM1–AMM7 would minimize the
31 likelihood of spills from occurring and ensure that measures are in place to prevent runoff from the
32 construction area and the negative effects of dust on wildlife adjacent to work areas.

33 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
34 mercury in avian species, including yellow-headed blackbird. Marsh (tidal and nontidal) and
35 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
36 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
37 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
38 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
39 mercury (see Chapter 3, *Conservation Strategy*, of the BDCP for details of restoration). Species
40 sensitivity to methylmercury differs widely and there is a large amount of uncertainty with respect
41 to species-specific effects. A detailed review of the methylmercury issues associated with
42 implementation of the BDCP is contained in Appendix 11F, *Substantive BDCP Revisions*. The review
43 includes an overview of the BDCP-related mechanisms that could result in increased mercury in the
44 foodweb, and how exposure of individual species to mercury may occur based on feeding habits and
45 where species habitat overlaps with the areas where mercury bioavailability could increase.

1 Increased methylmercury associated with natural community and floodplain restoration could
2 indirectly affect yellow-headed blackbird, via uptake in lower trophic levels (as described in
3 Appendix 5.D, *Contaminants*, of the BDCP).

4 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
5 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
6 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
7 project-specific basis, where high potential for methylmercury production is identified that
8 restoration design and adaptive management cannot fully address while also meeting restoration
9 objectives, alternate restoration areas would be considered. CM12 would be implemented in
10 coordination with other similar efforts to address mercury in the Delta, and specifically with the
11 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
12 following actions.

- 13 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
14 mercury methylation and bioavailability
- 15 ● Define design elements that minimize conditions conducive to generation of methylmercury in
16 restored areas.
- 17 ● Define adaptive management strategies that can be implemented to monitor and minimize
18 actual postrestoration creation and mobilization of methylmercury.

19 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
20 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
21 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
22 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
23 2009). The effect of selenium toxicity differs widely between species and also between age and sex
24 classes within a species. In addition, the effect of selenium on a species can be confounded by
25 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
26 2009).

27 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
28 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
29 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
30 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
31 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
32 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
33 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
34 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
35 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
36 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
37 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
38 have a higher risk of selenium toxicity.

39 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
40 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
41 exacerbate bioaccumulation of selenium in avian species, including yellow-headed blackbird. Marsh
42 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
43 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
44 Alternative 1B restoration activities that create newly inundated areas could increase bioavailability

1 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
2 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
3 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
4 increases in selenium concentrations in water in the Delta under any alternative. However, it is
5 difficult to determine whether the effects of potential increases in selenium bioavailability
6 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
7 effects on yellow-headed blackbird.

8 Because of the uncertainty that exists at this programmatic level of review, there could be a
9 substantial effect on yellow-headed blackbird from increases in selenium associated with
10 restoration activities. This effect would be addressed through the implementation of *AMM27*
11 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
12 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
13 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
14 selenium management to reduce selenium concentrations and/or bioaccumulation would be
15 evaluated separately for each restoration effort as part of design and implementation. This
16 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
17 design schedule.

18 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
19 could reduce yellow-headed blackbird use of modeled habitat adjacent to work areas. Moreover,
20 operation and maintenance of the water conveyance facilities, including the transmission facilities,
21 could result in ongoing but periodic postconstruction disturbances that could affect yellow-headed
22 blackbird use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
23 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse
24 effects on nesting individuals in addition to AMM1–AMM7.

25 The implementation of tidal natural communities restoration or floodplain restoration could result
26 in increased exposure of yellow-headed blackbird to methylmercury, in restored tidal areas.
27 However, it is unknown what concentrations of methylmercury are harmful to these species and the
28 potential for increased exposure varies substantially within the study area. Implementation of CM12
29 which contains measures to assess the amount of mercury before project development, followed by
30 appropriate design and adaptation management, would minimize the potential for increased
31 methylmercury exposure, and would result in no adverse effect on yellow-headed blackbird.

32 Tidal habitat restoration could result in increased exposure of yellow-headed blackbird to selenium.
33 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
34 would provide specific tidal habitat restoration design elements to reduce the potential for
35 bioaccumulation of selenium and its bioavailability in tidal habitats.

36 **CEQA Conclusion:** In the absence of other conservation actions, noise and visual disturbance, the
37 potential for hazardous spills, increased dust and sedimentation, and operations and maintenance of
38 the water conveyance facilities under Alternative 1B would represent an adverse effect. This impact
39 would be significant. The implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*
40 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and AMM1–AMM7, would reduce this
41 impact to a less-than-significant level.

42 The implementation of tidal natural communities restoration or floodplain restoration could result
43 in increased exposure of yellow-headed blackbird to methylmercury in restored tidal areas.
44 However, it is unknown what concentrations of methylmercury are harmful to these species and the

1 potential for increased exposure varies substantially within the study area. Implementation of CM12
2 which contains measures to assess the amount of mercury before project development, followed by
3 appropriate design and adaptation management, would minimize the potential for increased
4 methylmercury exposure, and would result in no adverse effect on yellow-headed blackbird.

5 Tidal habitat restoration could result in increased exposure of yellow-headed blackbird to selenium.
6 With implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
7 restoration design elements to reduce the potential for bioaccumulation of selenium and its
8 bioavailability in tidal habitats, the impact of increased exposure to selenium would be less than
9 significant.

10 Indirect effects of plan implementation would represent an adverse effect on yellow-headed
11 blackbird in the absence of other conservation measures. This would be a significant impact. With
12 AMM1–AMM7, AMM27, and CM12 in place, and with the implementation of Mitigation Measure BIO-
13 75, indirect effects of plan implementation would not result in a substantial adverse effect through
14 habitat modifications and would not substantially reduce the number or restrict the range of the
15 species. Therefore, indirect effects of plan implementation would have a less-than-significant impact
16 on yellow-headed blackbird.

17 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
18 **Disturbance of Nesting Birds**

19 See Mitigation Measure BIO-75 under Impact BIO-75.

20 **Impact BIO-151: Periodic Effects of Inundation of Yellow-Headed Blackbird Nesting Habitat**
21 **as a Result of Implementation of Conservation Components**

22 Flooding of the Yolo Bypass (CM2) would inundate 961–2,678 acres of nesting habitat and 368–
23 2,678 acres of foraging habitat (Table 12-1B-54). Based on hypothetical floodplain restoration,
24 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in
25 periodic inundation of approximately 18 acres of nesting habitat and 2,701 acres of nonbreeding
26 habitat (Table 12-1B-54) resulting in the temporary loss of these habitats. Foraging yellow-headed
27 blackbirds would be expected to move to adjacent suitable foraging habitat when the bypass is
28 inundated, as they do under the current flooding regime. However, this inundation could reduce the
29 availability of nesting habitat during years when flooding extends into the nesting season (past
30 March). The periodic inundation of the Yolo Bypass (CM2) and of other floodplains (CM5) is
31 expected to restore a more natural flood regime in support of wetland and riparian vegetation types
32 that support nesting habitat.

33 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and
34 foraging habitat for yellow-headed blackbird. Periodic inundation would not have an adverse effect
35 on yellow-headed blackbird because inundation is expected to take place outside of the breeding
36 season, and, although foraging habitat may be temporarily unavailable, birds would be expected to
37 move to adjacent foraging habitat.

38 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting
39 and foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-
40 significant impact on yellow-headed blackbird because inundation is expected to take place outside
41 of the breeding season, and, although foraging habitat would be temporarily unavailable, birds
42 would be expected to move to adjacent foraging habitat.

1 **Riparian Brush Rabbit**

2 The habitat model used to assess effects on the riparian brush rabbit consists of 38 vegetation
3 associations within the valley/foothill riparian natural community and adjacent grasslands. The
4 vegetation associations were selected based on a review of understory and overstory composition
5 from Hickson and Keeler-Wolf (2007) and species habitat requirements.

6 Just until recently, the only known naturally occurring populations of riparian brush rabbits were
7 confined to Caswell Memorial State Park (MSP), a 258-acre park supporting riparian oak woodland
8 on the Stanislaus River immediately southeast of the study area, and in the south Delta southwest of
9 Lathrop, which is within the study area (Williams and Basey 1986; Williams et al. 2002) (Figure 12-
10 46). On October 11, 2012 a single female riparian brush rabbit was captured near Durham Ferry
11 Road in riparian habitat along the San Joaquin River between Caswell MSP and Lathrop (Bradbury
12 pers. comm.). This is only the 2nd naturally occurring population documented outside of Caswell
13 MSP. Factors considered in assessing the value of adversely affected habitat for riparian brush
14 rabbit, to the extent information was available, included size and degree of isolation of habitat
15 patches, proximity to recorded species occurrences, and adjacency to conserved lands.

16 Construction and restoration associated with Alternative 1B conservation measures would result in
17 both temporary and permanent losses of riparian brush rabbit modeled habitat as indicated in Table
18 12-1B-55. Full implementation of Alternative 1B would also include biological objectives over the
19 term of the BDCP to benefit the riparian brush rabbit (BDCP Chapter 3, *Conservation Strategy*). The
20 conservation strategy for the riparian brush rabbit, with conservation principles involves
21 protecting, restoring or creating, and maintaining habitat and corridors near the largest remaining
22 fragments of habitat and extant populations; providing high-water refugia from flooding; and
23 managing feral predators (dogs and cats) in areas occupied by the species. The conservation
24 measures that would be implemented to achieve the biological goals and objectives are summarized
25 below.

- 26 ● Provide a range of elevations in restored floodplains that transition from frequently flooded
27 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a
28 range of habitat conditions, upland habitat values, and refugia from flooding during most flood
29 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 30 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
31 between existing conservation lands (Objective L1.6, associated with CM3).
- 32 ● Allow floods to promote fluvial processes, such that bare mineral soils are available for natural
33 recolonization of vegetation, desirable natural community vegetation is regenerated, and
34 structural diversity is promoted, or implement management actions that mimic those natural
35 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 36 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to
37 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
38 associated with CM3–CM8, and CM11).
- 39 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000
40 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated
41 with CM3 and CM7).
- 42 ● Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
43 (Objective VFRNC1.2, associated with CM3).

- 1 ● Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory
2 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated
3 with CM5, CM7, and CM11).
- 4 ● Of the 750 acres of protected valley/foothill riparian natural community protected under
5 Objective VFRNC1.2, protect at least 200 acres of suitable riparian brush rabbit habitat (defined
6 in CM7 Riparian Natural Community Restoration) that is occupied by the species or contiguous
7 with occupied habitat (Objective RBR1.1, associated with 3).
- 8 ● Of the 1,000 acres of early- to midsuccessional riparian habitat maintained under VFRNC2.2,
9 maintain at least 800 acres within the range of the riparian brush rabbit (CZ 7), in areas that are
10 adjacent to or that facilitate connectivity with occupied or potentially occupied habitat
11 (Objective RBR1.2, associated with CM3, CM7, and CM11).
- 12 ● Of the 5,000 acres of valley/foothill riparian natural community restored under Objective
13 VFRNC1.1, restore/create and maintain at least 300 acres of early- to mid-successional riparian
14 habitat that meets the ecological requirements of the riparian brush rabbit and that is within or
15 adjacent to or that facilitates connectivity with existing occupied or potentially occupied habitat
16 (Objective 1.3, associated with CM3, CM7, and CM11).
- 17 ● Create and maintain high-water refugia in the 300 acres of restored riparian brush rabbit
18 habitat and the 200 acres of protected riparian brush rabbit habitat, through the retention,
19 construction and/or restoration of high-ground habitat on mounds, berms, or levees, so that
20 refugia are no further apart than 66 feet (Objective RBR1.4, associated with CM7 and CM11).
- 21 ● In protected riparian areas that are occupied by riparian brush rabbit, monitor for and control
22 nonnative predators that are known to prey on riparian brush rabbit (Objective RBR1.5,
23 associated with CM11).
- 24 ● Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres of
25 grasslands restored under Objective GNC1.2, protect or restore grasslands on the landward side
26 of levees adjacent to restored floodplain to provide flood refugia and foraging habitat for
27 riparian brush rabbit (Objective RBR1.6, associated with CM3 and CM8).

28 As explained below, with the restoration and protection of these amounts of habitat, in addition to
29 implementation of the AMMs to reduce potential effects, impacts on riparian brush rabbit would not
30 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-55. Changes in Riparian Brush Rabbit Modeled Habitat Associated with Alternative 1B**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	5	5	5	5	NA	NA
	Grassland	137	137	30	30	NA	NA
Total Impacts CM1		142	142	35	35	NA	NA
CM2–CM18	Riparian	0	62	0	35	0	264
	Grassland	0	44	0	20	0	423
Total Impacts CM2–CM18		0	106	0	55	0	687
TOTAL IMPACTS		142	248	35	90	0	687

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-152: Loss or Conversion of Habitat for and Direct Mortality of Riparian Brush**
5 **Rabbit**

6 Alternative 1B conservation measures would result in the permanent loss of up to 107 acres of
7 riparian habitat and 231 acres of associated grassland habitat for the riparian brush rabbit in the
8 study area (Table 12-1B-55). The hypothetical footprint for levee construction under CM5, overlaps
9 with one occurrence record for riparian brush rabbit, south of the Interstate 5/Interstate 205
10 interchange. Conservation measures resulting in permanent habitat loss include conveyance
11 facilities construction (CM1), tidal natural communities restoration (CM4), and floodplain
12 restoration (CM5). Each of these individual activities is described below. A summary statement of
13 the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation
14 measure discussions.

- 15 • *CM1 Water Facilities and Operation*: Development of Alternative 1B water conveyance facilities
16 would result in the permanent removal of approximately 5 acres of riparian habitat and
17 137 acres of associated grassland habitat and in the temporary removal of 5 acres of riparian
18 habitat and 30 acres of grassland habitat for riparian brush rabbit in CZ 8 (Table 12-1B-55). The
19 riparian habitat that would be removed is of low value for the riparian brush rabbit as it
20 consists of several small, isolated patches surrounded by agricultural lands northeast of Clifton
21 Court Forebay. The associated grasslands are also of low value for the species: They consist of
22 long, linear strips that abut riparian habitat, but extend several miles from the riparian habitat
23 and, therefore, provide few if any opportunities for adjacent cover. Trapping efforts conducted
24 for the riparian brush rabbit in this area were negative (BDCP Appendix 3.E, *Conservation*

1 *Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Refer to the Terrestrial Biology
2 Map Book for a detailed view of Alternative 1B construction locations.

- 3 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
4 inundation would permanently remove approximately 19 acres of riparian habitat and 18 acres
5 of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late long-term. The
6 riparian habitat that would be removed consists of relatively small and isolated patches along
7 canals and irrigation ditches surrounded by agricultural lands in the Union Island and Roberts
8 Island areas, and several small patches along the San Joaquin River. The habitat that would be
9 removed is not adjacent to any existing conserved lands, and is several miles north and northeast
10 of the northernmost riparian brush rabbit record located northeast of Paradise Cut (Williams et
11 al. 2002). Although the final footprint for tidal natural communities restoration would differ
12 from the hypothetical footprint, *AMM25 Riparian Woodrat and Riparian Brush Rabbit* requires
13 that tidal natural communities restoration avoid removal of any habitat occupied by the riparian
14 brush rabbit.
- 15 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
16 restoration would result in the permanent removal of approximately 43 acres of riparian habitat
17 and 26 acres of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late
18 longterm. Levee construction would also result in the temporary removal of 35 acre riparian
19 habitat and 20 acres of grassland habitat for the riparian brush rabbit. Although the effects are
20 considered temporary, five years to several decades may be required for ecological succession
21 to occur and for restored riparian habitat to replace the function of habitat that has been
22 affected. The value of this habitat for riparian brush rabbit is high: although it consists of small
23 patches and narrow bands of riparian vegetation, these areas are in proximity to, or contiguous
24 with, habitat with recorded occurrences of riparian brush rabbit. The hypothetical footprint for
25 levee construction overlaps with one occurrence record for riparian brush rabbit, south of the
26 Interstate 5/Interstate 205 interchange.

27 Although the final floodplain restoration design would differ from the hypothetical footprint
28 used for this effects analysis, restoration of the river floodplain in CZ 7 would be targeted in the
29 general area of the riparian brush rabbit population. Implementation of adaptive management
30 described in *AMM25* would ensure that riparian brush rabbit habitat permanently removed
31 does not exceed maximum allowable habitat loss for this species.

- 32 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
33 actions included in *CM11* that are designed to enhance wildlife values in BDCP protected
34 habitats may result in localized ground disturbances that could temporarily remove small
35 amounts of riparian brush rabbit habitat. Enhancement and management actions in riparian
36 brush rabbit habitat within the reserve system may include invasive plant removal, planting and
37 maintaining vegetation to improve and sustain habitat characteristics for the species, and
38 creating and maintaining flood refugia. These activities are expected to have minor adverse
39 effects on available riparian brush rabbit habitat and are expected to result in overall
40 improvements to and maintenance of riparian brush rabbit habitat values over the term of the
41 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
42 and minimized through the AMMs listed below.

43 Passive recreation in the reserve system could result in disturbance of individual riparian brush
44 rabbits foraging in the ecotone between riparian and adjacent open habitats. However, *AMM37*,
45 *Recreation* limits trail development adjacent to riparian corridors within the range of the

1 riparian brush rabbit. With this minimization measure in place, recreation related effects on the
2 riparian brush rabbit are expected to be minimal.

- 3 ● Operations and maintenance: Ongoing maintenance of BDCP facilities are not expected to
4 adversely affect the riparian brush rabbit because the species is not expected to occur in the
5 vicinity of proposed facilities.
- 6 ● Injury and direct mortality: Water conveyance facility construction is not likely to result in
7 injury or mortality of individual riparian brush rabbits because the species is not likely to be
8 present in the areas that would be affected by this activity, based on live trapping results (BDCP
9 Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal
10 natural communities restoration would not result in injury or mortality of the riparian brush
11 rabbit because tidal natural communities restoration projects would be designed to avoid
12 occupied riparian brush rabbit habitat and, if that is not possible, rabbits would be trapped and
13 relocated as described in AMM25 (see Appendix 3B, *Environmental Commitments, AMMs, and*
14 *CMs*). Activities associated with construction of setback levees for floodplain restoration could
15 result in injury or mortality of riparian brush rabbits: however, preconstruction surveys,
16 construction monitoring, and other measures would be implemented to avoid and minimize
17 injury or mortality of this species during construction (AMM25).

18 The following paragraphs summarize the combined effects discussed above and describe other
19 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
20 also included.

21 ***Near-Term Timeframe***

22 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
23 the near-term BDCP conservation strategy has been evaluated to determine whether it would
24 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
25 effects of construction would not be adverse under NEPA.

26 Alternative 1B would result in permanent and temporary effects combined on 10 acres of riparian
27 habitat and 167 acres of grassland habitat for riparian brush rabbit in the near-term as a result of
28 construction of the water conveyance facilities (CM1). The habitat would be lost in the
29 valley/foothill riparian and grassland natural communities. All the near-term loss of riparian brush
30 rabbit habitat would occur be an area unlikely to be occupied by the species. Habitat loss in CZ 7, in
31 areas known or likely to be occupied, would occur during the early long-term and late long-term
32 timeframes. Riparian restoration would be phased to minimize temporal habitat loss. There would
33 be no near-term losses from CM2–CM18.

34 Typical NEPA project-level mitigation ratios for these natural communities that would be affected
35 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of
36 the BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural
37 community, and 2:1 for protection of grassland. Using these ratios would indicate that 10 acres of
38 riparian habitat should be restored, 10 acres of riparian habitat should be protected, and 334 acres
39 of grassland should be protected for riparian brush rabbit for near-term losses.

40 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
41 and an unknown number of associated acres of grassland and protection of 750 acres of riparian
42 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in
43 Chapter 3). In addition, the species-specific biological goals and objectives (RBR1.1–RBR1.6) would

1 inform the near-term protection and restoration efforts. The natural community restoration and
2 protection activities are expected to be concluded during the first 10 years of plan implementation,
3 which is close enough in time to the occurrence of impacts to constitute adequate mitigation for
4 NEPA purposes. These commitments are more than sufficient to support the conclusion that the
5 near-term effects of Alternative 1B would be not be adverse under NEPA, because the number of
6 acres required to meet the typical ratios described above would be only 10 acres of riparian habitat
7 restored, 10 acres of riparian habitat protected, and 334 acres of grassland protected.

8 The plan also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*
9 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
10 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
11 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, AMM10*
12 *Restoration of Temporarily Affected Natural Communities, AMM25 Riparian Woodrat and Riparian*
13 *Brush Rabbit, and AMM37 Recreation. These AMMs contain elements that avoid or minimize the risk*
14 *of BDCP activities affecting habitats and species adjacent to work areas and storage sites. BDCP*
15 *Appendix 3.C describes the AMMs, which have since been updated and which are provided in*
16 *Appendix 3B, Environmental Commitments, AMMs, and CMs, of the Final EIR/EIS.*

17 **Late Long-Term Timeframe**

18 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of
19 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 1B a
20 whole would result in permanent and temporary effects combined on 107 acres of modeled riparian
21 habitat and 231 acres of modeled grassland habitat for riparian brush rabbit, representing 4% and
22 8% of the riparian and grassland modeled habitat in CZ 6, CZ 7, and CZ 8. Habitat lost in CZ 6 and CZ
23 8 is fragmented, isolated, and unlikely to support the species. Habitat would also be lost in areas in
24 CZ 7 that provide high-value habitat for the species.

25 The BDCP would restore at least 5,000 acres and protect at least 750 acres of valley/foothill riparian
26 natural community, a portion of which is expected to consist of suitable riparian brush rabbit
27 habitat (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of
28 early- to midsuccessional riparian natural community be conserved in CZ 7, in areas that are
29 adjacent to or that facilitate connectivity with existing occupied or potentially occupied habitat. This
30 would consist of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored
31 habitat. The 800 acres to be conserved would consist of early successional riparian vegetation
32 suitable for riparian brush rabbit. The conserved habitat would also be part of a larger, more
33 contiguous, and less patchy area of protected and restored riparian natural community than what
34 currently exists in CZ 7 and would be contiguous with existing modeled riparian brush rabbit
35 habitat. The species-specific objectives further require that the 200 acres of protected riparian
36 habitat (Objective RBR1.4) and at least 300 acres of the restored riparian habitat (Objective RBR1.3)
37 meet more specific ecological requirements of riparian brush rabbit, including large patches of
38 dense riparian brush; ecotonal edges that transition from brush species to grasses and forbs,
39 scaffolding plants to support vines that grow above flood levels; a tree canopy that is open, if
40 present; and high-ground refugia from flooding. In protected riparian areas that are occupied by
41 riparian brush rabbit, nonnative predators that are known to prey on riparian brush rabbit would
42 be monitored and controlled (Objective RBR1.5).

43 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the Plan
44 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation

1 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide
2 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood
3 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would
4 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands
5 on the landward side of levees adjacent to restored floodplain would be restored or protected as
6 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

7 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as
8 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to
9 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently
10 flooded areas would provide refuge for the riparian brush rabbit during most years. The BDCP
11 would also create and maintain mounds, levee sections, or other high areas in restored and
12 protected riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia
13 for the riparian brush rabbit (BDCP Appendix 3.F, *Conservation Principles for the Riparian Brush*
14 *Rabbit and Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian
15 brush rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas
16 that are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

17 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
18 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
19 restoration of valley/foothill riparian and grassland that could overlap with the species model,
20 would result in the restoration of 800 acres of riparian and 79 acres of grassland modeled habitat
21 for riparian brush rabbit. In addition, protection of valley/foothill riparian and grassland could
22 overlap with the species model and would result in the protection of 200 acres of riparian and 317
23 acres of grassland riparian brush rabbit modeled habitat.

24 **NEPA Effects:** In the near-term, the loss of riparian brush rabbit habitat under Alternative 1B would
25 not be adverse because there is little likelihood of riparian brush rabbits being present and the
26 BDCP has committed to protecting and restoring the acreage required to meet the typical mitigation
27 ratios described above. In the late long-term, the losses of riparian brush rabbit riparian and
28 grassland habitat associated with Alternative 1B, in the absence of other conservation actions,
29 would represent an adverse effect as a result of habitat modification and potential direct mortality
30 of a special-status species. However, with habitat protection and restoration associated with the
31 conservation components, guided by landscape-scale goals and objectives and by AMM1-AMM6,
32 AMM10, AMM25, and AMM37, the effects of Alternative 1B as a whole on riparian brush rabbit
33 would not be adverse.

34 **CEQA Conclusion:**

35 **Near-Term Timeframe**

36 Because the water conveyance facilities construction is being evaluated at the project level, the near-
37 term BDCP conservation strategy has been evaluated to determine whether it would provide
38 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
39 construction would be less than significant under CEQA.

40 Alternative 1B would result in permanent and temporary effects combined on 10 acres of riparian
41 habitat and 167 acres of grassland habitat for riparian brush rabbit in the near-term as a result of
42 construction of the water conveyance facilities (CM1). The habitat would be lost in the
43 valley/foothill riparian and grassland natural communities. All the near-term loss of riparian brush

1 rabbit habitat would occur be an area unlikely to be occupied by the species. Habitat loss in CZ 7, in
2 areas known or likely to be occupied, would occur during the early long-term and late long-term
3 timeframes. Riparian restoration would be phased to minimize temporal habitat loss. There would
4 be no near-term losses from CM2–CM18.

5 Typical NEPA project-level mitigation ratios for these natural communities that would be affected
6 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of
7 the BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural
8 community, and 2:1 for protection of grassland. Using these ratios would indicate that 10 acres of
9 riparian habitat should be restored, 10 acres of riparian habitat should be protected, and 334 acres
10 of grassland should be protected for riparian brush rabbit for near-term losses.

11 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1) and
12 an unknown number of associated acres of grassland and protection of 750 acres of riparian
13 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in
14 Chapter 3). In addition, the species-specific biological goals and objectives (RBR1.1–RBR1.6) would
15 inform the near-term protection and restoration efforts. The natural community restoration and
16 protection activities are expected to be concluded during the first 10 years of plan implementation,
17 which is close enough in time to the occurrence of impacts to constitute adequate mitigation for
18 CEQA purposes. These commitments are more than sufficient to support the conclusion that the
19 near-term effects of Alternative 1B would be less than significant under CEQA, because the number
20 of acres required to meet the typical ratios described above would be only 10 acres of riparian
21 habitat protected, 10 acres of riparian habitat restored, and 334 acres of grassland habitat

22 The plan also contains commitments to implement AMM1–AMM7, AMM10, AMM25, and AMM37.
23 These AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats
24 and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
25 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
26 *AMMs, and CMs*, of the Final EIR/EIS.

27 **Late Long-Term Timeframe**

28 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of
29 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 1B would
30 result in permanent and temporary effects combined on 105 acres of modeled riparian habitat and
31 244 acres of modeled grassland habitat for riparian brush rabbit in CZ 6, CZ 7, and CZ 8. Habitat lost
32 in CZ 6 and CZ 8 is fragmented, isolated, and unlikely to support the species. Habitat would also be
33 lost in areas in CZ 7 that provide high-value habitat for the species.

34 The BDCP would restore at least 5,000 acres and protect at least 750 acres of valley/foothill riparian
35 natural community, a portion of which is expected to consist of suitable riparian brush rabbit
36 habitat (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of
37 early- to midsuccessional riparian natural community be conserved in CZ 7, in areas that are
38 adjacent to or that facilitate connectivity with existing occupied or potentially occupied habitat. This
39 would consist of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored
40 habitat. The 800 acres to be conserved would consist of early successional riparian vegetation
41 suitable for riparian brush rabbit. The conserved habitat would also be part of a larger, more
42 contiguous, and less patchy area of protected and restored riparian natural community than what
43 currently exists in CZ 7 and would be contiguous with existing modeled riparian brush rabbit
44 habitat. The species-specific objectives further require that the 200 acres of protected riparian

1 habitat (Objective RBR1.4) and at least 300 acres of the restored riparian habitat (Objective RBR1.3)
2 meet more specific ecological requirements of riparian brush rabbit, including large patches of
3 dense riparian brush; ecotonal edges that transition from brush species to grasses and forbs,
4 scaffolding plants to support vines that grow above flood levels; a tree canopy that is open, if
5 present; and high-ground refugia from flooding. In protected riparian areas that are occupied by
6 riparian brush rabbit, nonnative predators that are known to prey on riparian brush rabbit would
7 be monitored and controlled (RBR1.5).

8 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the BDCP
9 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation
10 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide
11 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood
12 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would
13 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands
14 on the landward side of levees adjacent to restored floodplain would be restored or protected as
15 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

16 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as
17 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to
18 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently
19 flooded areas would provide refuge for the riparian brush rabbit during most years. The BDCP
20 would also create and maintain mounds, levee sections, or other high areas in restored and
21 protected riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia
22 for the riparian brush rabbit (BDCP Appendix 3.F, *Conservation Principles for the Riparian Brush
23 Rabbit and Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian
24 brush rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas
25 that are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

26 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and
27 Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
28 restoration of valley/foothill riparian and grassland that could overlap with the species model,
29 would result in the restoration of 800 acres of riparian and 79 acres of grassland modeled habitat
30 for riparian brush rabbit. In addition, protection of valley/foothill riparian and grassland could
31 overlap with the species model and would result in the protection of 200 acres of riparian and 317
32 acres of grassland riparian brush rabbit modeled habitat.

33 Only a small proportion of the habitat losses would be considered occupied and of high value. The
34 Alternative 1B conservation measures provide for large acreages of riparian brush rabbit riparian
35 and grassland habitats to be protected and restored, and the BDCP includes AMM1–AMM7, AMM10,
36 AMM25, and AMM37, which are directed at minimizing or avoiding potential effects during
37 construction and operation of the conservation measures. Overall, the BDCP would provide a
38 substantial net benefit to the riparian brush rabbit through the increase in available habitat and
39 habitat in protected status. These protected areas would be managed and monitored to support the
40 species.

41 Considering the habitat restoration and protection associated with CM3, CM7, CM8 and CM11,
42 guided by species-specific goals and objectives and by AMM1–AMM7, AMM10, AMM25, and AMM37,
43 the temporary and permanent losses of riparian and grassland habitat and potential for direct
44 mortality of riparian brush rabbit as a result of implementing Alternative 1B would not represent a

1 substantial adverse effect through habitat modifications and would not substantially reduce the
2 number or restrict the range of the species. The loss of habitat and potential mortality of riparian
3 brush rabbits would not be a significant impact under CEQA.

4 **Impact BIO-153: Indirect Effects of Plan Implementation on Riparian Brush Rabbit**

5 Noise, lighting, and visual disturbances adjacent to construction activities could indirectly affect the
6 use of modeled riparian brush rabbit riparian habitat and associated grassland habitat in the study
7 area. These construction activities would include water conveyance construction, tidal natural
8 communities restoration construction, construction and subsequent maintenance of transmission
9 lines, and construction of setback levees. Construction would occur in CZ 8 where there is suitable
10 habitat for the species but surveys by ESRP did not indicate the species is present in this area;
11 therefore, the potential for adverse noise and visual effects from conveyance facility construction
12 would be minimal. Tidal natural communities restoration construction would potentially affect
13 adjacent riparian habitat and associated grassland habitat for this species: however, adverse effects
14 on the species are unlikely because tidal natural communities restoration projects would be sited to
15 avoid areas occupied by riparian brush rabbit. The activity most likely to result in noise, lighting,
16 and visual disturbances to riparian brush rabbit is the construction of setback levees for floodplain
17 restoration, which would take place in CZ 7, where the species is known to occur. The use of
18 mechanical equipment during construction might cause the accidental release of petroleum or other
19 contaminants that would affect the riparian brush rabbit in adjacent habitat, if the species is present.

20 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1B
21 would avoid the potential for substantial adverse effects on riparian brush rabbits, either indirectly
22 or through habitat modifications or result in a substantial reduction in numbers or a restriction in
23 the range of riparian brush rabbits. Therefore, indirect effects of Alternative 1B would not have an
24 adverse effect on riparian brush rabbit.

25 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
26 as construction-related noise, lighting, and visual disturbances could affect riparian brush rabbit in
27 riparian and grassland habitats. The use of mechanical equipment during construction could cause
28 the accidental release of petroleum or other contaminants that could affect riparian brush rabbit.
29 The inadvertent discharge of sediment or excessive dust adjacent to riparian brush rabbit habitat
30 could also have a negative effect on the species. With implementation of AMM1-AMM7, AMM10,
31 AMM25, and AMM37 as part of Alternative 1B, the BDCP would avoid the potential for substantial
32 adverse effects on riparian brush rabbits, either indirectly or through habitat modifications and
33 would not result in a substantial reduction in numbers or a restriction in the range of riparian brush
34 rabbits. Indirect effects of Alternative 1B would have a less-than-significant impact on riparian
35 brush rabbit.

36 **Impact BIO-154: Periodic Effects of Inundation of Riparian Brush Rabbit Habitat as a Result of** 37 **Implementation of Conservation Components**

38 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in
39 periodic inundation of riparian brush rabbit habitat. This activity would periodically inundate
40 approximately 264 acres of riparian habitat (9% of riparian habitat in the Plan Area) and 423 acres
41 of associated grassland habitat (14% of associated grassland habitat in the Plan Area) for the
42 riparian brush rabbit. The area between existing levees that would be breached and the newly
43 constructed setback levees would be inundated through seasonal flooding. The potentially

1 inundated areas consist of high-value habitat for the species: although they consist of small patches
2 and narrow bands of riparian vegetation, many of these areas are in proximity to, or contiguous
3 with, habitat with recorded occurrences of riparian brush rabbit. The restored floodplain would
4 include a range of elevations from lower lying areas that flood frequently (e.g., every 1 to 2 years) to
5 higher elevation areas that flood infrequently (e.g., every 10 years or more).

6 Seasonal flooding in restored floodplains can result in injury or mortality of individuals if riparian
7 brush rabbits occupy these areas and cannot escape flood waters. One recorded occurrence of
8 riparian brush rabbit (Williams et al. 2002), just west of Stewart Road in Mossdale, is in the area that
9 would be seasonally flooded based on the hypothetical restoration footprint.

10 **NEPA Effects:** Floodplain restoration under CM5 would periodically affect only a small proportion of
11 the modeled riparian brush rabbit habitat in the study area. The adverse effects of periodic
12 inundation on the riparian brush rabbit would be minimized through construction and maintenance
13 of flood refugia to allow riparian brush rabbits to escape inundation. Therefore, implementing
14 Alternative 1B, including AMM1–AMM7, AMM10, AMM25, and AMM37, would not be expected to
15 result in substantial adverse effects on riparian brush rabbit, either directly or through habitat
16 modifications and would not result in a substantial reduction in numbers or a restriction in the
17 range of riparian brush rabbits. Therefore, Alternative 1B would not adversely affect the species.

18 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect only a small
19 proportion of the modeled riparian brush rabbit habitat in the study area. The overall effect of
20 seasonal inundation on existing riparian natural communities may instead be beneficial. Historically,
21 flooding was the main natural disturbance regulating ecological processes in riparian areas, and
22 flooding promotes the germination and establishment of many native riparian plants. In the late
23 long-term, seasonal inundation in areas currently occupied by riparian vegetation may contribute to
24 the establishment of high-value habitat for covered riparian species, such as the riparian brush
25 rabbit. Long-term management of riparian areas would ensure that refugia also exist along the
26 edges of seasonally inundated habitat.

27 The adverse effects of periodic inundation on the riparian brush rabbit would be minimized through
28 construction and maintenance of flood refugia to allow riparian brush rabbits to escape inundation.
29 Therefore, implementing Alternative 1B, including AMM1–AMM7, AMM10, AMM25, and AMM37,
30 would not be expected to result in substantial adverse effects on riparian brush rabbit, either
31 directly or through habitat modifications and would not result in a substantial reduction in numbers
32 or a restriction in the range of riparian brush rabbits. Periodic inundation of riparian and grassland
33 habitat for riparian brush rabbit under Alternative 1B would have a less-than-significant impact on
34 the species.

35 **Riparian Woodrat**

36 The habitat model used to assess effects for the riparian woodrat consists of selected plant alliances
37 from the valley/foothill riparian natural community, geographically constrained to the south Delta
38 portion of the BDCP area in CZ 7, south of SR 4 and Old River Pipeline along the Stanislaus, San
39 Joaquin, Old, and Middle Rivers. Valley/foothill riparian areas along smaller drainages (Paradise Cut,
40 Tom Paine Slough), and some larger streams in the northern portion of CZ 7 were excluded from the
41 riparian woodrat habitat model due to a lack of trees or riparian corridors that were too narrow.
42 Factors considered in assessing the value of affected habitat for the riparian woodrat, to the extent
43 that information is available, include habitat patch size and connectivity.

1 The riparian woodrat is not known to occur in the study area. The only verified extant population of
 2 riparian woodrats rangewide is 2 miles east of the southern end of the study area in Caswell
 3 Memorial State Park along the Stanislaus River (Williams and Basey 1986:1–112; 1993). Riparian
 4 woodrat may occur in small patches of valley oak riparian forest along the San Joaquin River from
 5 the southern tip of the study area north to approximately the Interstate 5 overcrossing near
 6 Lathrop. Construction and restoration associated with Alternative 1B conservation measures would
 7 result in both temporary and permanent losses of riparian woodrat modeled habitat as indicated in
 8 Table 12-1B-56. Tidal habitat restoration, floodplain restoration, and protection and management of
 9 natural communities could affect modeled riparian woodrat habitat. However, because the species is
 10 not known to occur in the study area it is not expected to be affected by BDCP actions unless the
 11 species were to establish in the study area over the term of the BDCP. Full implementation of
 12 Alternative 1B would also include biological objectives over the term of the BDCP to benefit the
 13 riparian woodrat (BDCP Chapter 3, *Conservation Strategy*). The conservation strategy for the
 14 riparian woodrat involves providing opportunities for population expansion into the Plan Area from
 15 adjacent lands to the south and southeast. The strategy focuses on restoring and maintaining
 16 suitable habitat at the southernmost end of CZ 7, providing connectivity with existing populations to
 17 the south and southeast, and creating and maintaining flood refugia. This conservation approach is
 18 consistent with the recovery plan (U.S. Fish and Wildlife Service 1998) and conservation principles
 19 (BDCP Appendix 3.E). The conservation measures that would be implemented to achieve the
 20 biological goals and objectives are summarized below.

- 21 ● Provide a range of elevations in restored floodplains that transition from frequently flooded
 22 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a
 23 range of habitat conditions, upland habitat values, and refugia from flooding during most flood
 24 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 25 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
 26 between existing conservation lands (Objective L1.6, associated with CM3).
- 27 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to
 28 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
 29 associated with CM3-CM8, and CM11).
- 30 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with 3,000 acres
 31 occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated with
 32 CM3 and CM7).
- 33 ● Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
 34 (Objective VFRNC1.2, associated with CM3).
- 35 ● Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal
 36 overlap among vegetation components and over adjacent riverine channels, freshwater
 37 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM5, CM7, and CM11).
- 38 ● Of the 5,000 acres of valley/foothill riparian natural community restored under Objective
 39 VFRNC1.1, restore/create and maintain 300 acres riparian habitat in CZ 7 that meets the
 40 ecological requirements of the riparian woodrat (i.e., dense willow understory and oak
 41 overstory) and that is adjacent to or facilitates connectivity with existing occupied or potentially
 42 occupied habitat (Objective RW1.1, associated with CM3, CM7, CM11).
- 43 ● Provide and maintain high-water refugia in the 300 acres of riparian woodrat habitat restored
 44 under Objective RW1.1 through the retention, construction, and/or restoration of high-ground

1 habitat on mounds, berms, or levees, so that refugia are no further apart than 67 feet (Objective
2 RW1.2, associated with CM7 and CM11).

3 As explained below, with the restoration and protection of these amounts of habitat, in addition to
4 implementation of the AMMs to reduce potential effects, impacts on riparian woodrat would not be
5 adverse for NEPA purposes and would be less than significant for CEQA purposes.

6 **Table 12-1B-56. Changes in Riparian Woodrat Modeled Habitat Associated with Alternative 1B**
7 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	0	0	1	1	NA	NA
Total Impacts CM1		0	0	1	1	NA	NA
CM2–CM18	Riparian	0	51	0	33	0	203
Total Impacts CM2–CM18		0	51	0	33	0	203
TOTAL IMPACTS		0	51	1	34	0	203

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

8

9 **Impact BIO-155: Loss or Conversion of Habitat for and Direct Mortality of Riparian Woodrat**

- 10 • Alternative 1B conservation measures would result in the permanent loss of up to 51 acres of
11 habitat (2% of the habitat in the study area) and temporary loss of up to 34 acres of habitat for
12 riparian woodrat (Table 12-1B-56). Construction of Alternative 1B water conveyance facilities
13 (CM1), tidal natural communities restoration (CM4) and seasonally inundated floodplain
14 restoration (CM5) would remove habitat. Each of these individual activities is described below.
15 A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow
16 the individual conservation measure discussions *CM1 Water Facilities and Operation*:
17 Development of Alternative 1B water conveyance facilities would result in the temporary
18 removal of approximately 1 acre of modeled habitat for riparian woodrat in CZ 8 (Table 12-1B-
19 56). The modeled habitat that would be removed is of low value for the riparian woodrat as it
20 consists of several small, isolated patches surrounded by agricultural lands northeast of Clifton
21 Court Forebay. Trapping efforts conducted for the riparian woodrat in this area were negative
22 (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian*
23 *Woodrat*). Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1B
24 construction locations.

1 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
2 inundation would permanently remove approximately 10 acres of modeled habitat for the
3 riparian woodrat in CZ 7. This habitat is of low value, consisting of a small, isolated patch
4 surrounded by agricultural lands, and the species has a relatively low likelihood of being present
5 in these areas. The measures described in *AMM25 Riparian Woodrat and Riparian Brush Rabbit*
6 require that tidal natural communities restoration avoid removal of any habitat occupied by the
7 riparian woodrat as determined by presence/absence surveys. Because the estimates of habitat
8 loss due to tidal inundation are based on projections of where restoration may occur, actual
9 habitat loss is expected to be lower because sites would be selected to minimize effects on
10 riparian woodrat.

11 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
12 restoration would result in the permanent removal of approximately 41 acres of modeled
13 habitat for the riparian woodrat in CZ 7. The value of this habitat for riparian woodrat is
14 moderate. Although the habitat consists of small patches and narrow bands of riparian
15 vegetation and no riparian woodrats have been detected in CZ 7, the riparian patches are in proximity
16 to each other along the San Joaquin River. There are two species occurrences immediately south
17 of CZ 7, one of which is less than 1.5 mile from the southernmost patch of riparian habitat
18 potentially affected by levee construction.

19 The final floodplain restoration design would differ from the hypothetical footprint used for this
20 effects analysis. However, monitoring and adaptive management described in CM11 and AMM25
21 would ensure that modeled habitat permanently removed does not exceed the amount
22 estimated based on the hypothetical footprint. Habitat loss is expected to be lower than 41 acres
23 because sites would be selected and restoration designed to minimize effects on the riparian
24 woodrat. If natural flooding is insufficient to maintain appropriate riparian woodrat vegetation
25 structure, the vegetation would be actively managed to provide suitable habitat structure as
26 described in CM11 Natural Communities Enhancement and Management.

27 Levee construction would also result in the temporary removal of 33 acres of modeled habitat
28 for the riparian woodrat. Although the effects are considered temporary, 5 years to several
29 decades may be required for ecological succession to occur and for restored riparian habitat to
30 replace the function of habitat that has been affected.

31 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
32 actions included in CM11 that are designed to enhance wildlife values in BDCP protected
33 habitats may result in localized ground disturbances that could temporarily remove small
34 amounts of riparian woodrat habitat. Enhancement and management actions in riparian
35 woodrat habitat within the reserve system may include invasive plant removal, planting and
36 maintaining vegetation to improve and sustain habitat characteristics for the species, and
37 creating and maintaining flood refugia. These activities are expected to have minor adverse
38 effects on available riparian woodrat habitat and are expected to result in overall improvements
39 to and maintenance of riparian woodrat habitat values over the term of the BDCP. These effects
40 cannot be quantified, but are expected to be minimal and would be avoided and minimized
41 through the AMMs listed below.

42 ● *Operations and maintenance*: The only ongoing effects on the riparian woodrat are those
43 potentially resulting from habitat enhancement and management activities. Enhancement and
44 management actions in riparian woodrat habitat within the reserve system may include invasive
45 plant removal, planting and maintaining vegetation to improve and sustain habitat

1 characteristics for the species, and creating and maintaining flood refugia. These activities may
2 result in harassment of riparian woodrats through noise and visual disturbance which would be
3 minimized with implementation of AMM1–AMM7, AMM10, and AMM25.

- 4 • Injury and direct mortality: Water conveyance facility construction is not likely to result in
5 injury or mortality of individual riparian woodrats because the species is not likely to be present
6 in the areas that would be affected by this activity, based on live trapping results (BDCP
7 Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal
8 natural communities restoration would not result in injury or mortality of the riparian woodrats
9 because tidal natural communities restoration projects would be designed to avoid occupied
10 riparian woodrat habitat and if that is not possible to trap and relocate the species (AMM25).
11 Activities associated with construction of setback levees for floodplain restoration could result
12 in injury or mortality of riparian woodrats: however, preconstruction surveys, construction
13 monitoring, and other measures would be implemented under AMM25 to avoid and minimize
14 injury or mortality of this species during construction, as described in Appendix 3B,
15 *Environmental Commitments, AMMs, and CMs*. If occupied riparian woodrat habitat cannot be
16 avoided, mortality would be avoided through implementation of a trapping and relocation
17 program. The program would be developed in coordination with USFWS, and relocation would
18 be to a site approved by USFWS prior to construction activities.

19 The following paragraphs summarize the combined effects discussed above and describe other
20 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
21 also included.

22 ***Near-Term Timeframe***

23 Because water conveyance facilities construction is being evaluated at the project level, the near-
24 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
25 protection or restoration in an appropriate timeframe to ensure that the construction effects would
26 not be adverse under NEPA. Alternative 1B would result in temporary effects on 1 acre of modeled
27 habitat for riparian woodrat in the near-term as a result of construction of the water conveyance
28 facilities (CM1). The habitat would be lost in the valley/foothill riparian. All the near-term loss of
29 riparian woodrat habitat would result from CM1 conveyance facility construction in CZ 8, and would
30 occur in an area not likely to be occupied by the species. Habitat loss in CZ 7, in areas known or
31 likely to be occupied, would occur during the early long-term and late long-term implementation
32 periods. Riparian restoration would be phased to minimize temporal habitat loss. There would be no
33 near-term losses from CM2–CM18.

34 Typical NEPA project-level mitigation ratios for these natural communities that would be affected
35 and that are identified in the biological goals and objectives for riparian woodrat in Chapter 3 of the
36 BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural
37 community. Using these ratios would indicate that 1 acre of riparian habitat should be restored and
38 1 acre of riparian habitat should be protected for riparian woodrat for near-term losses.

39 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
40 and protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3). In addition,
41 the species-specific biological goals and objectives (RW1.1 and RW1.2) would inform the near-term
42 protection and restoration efforts. The natural community restoration and protection activities are
43 expected to be concluded during the first 10 years of plan implementation, which is close enough in
44 time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes. These

1 commitments are more than sufficient to support the conclusion that the near-term effects of
2 Alternative 1B would not be adverse under NEPA, because only 1 acre of modeled habitat would be
3 temporarily affected and there is only limited potential for minor adverse effects on woodrats or its
4 habitat from implementation of CM11.

5 These effects cannot be quantified, but are expected to be minimal and would be avoided and
6 minimized through the BDCP's commitment to *AMM1 Worker Awareness Training, AMM2*
7 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
8 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
9 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, AMM10*
10 *Restoration of Temporarily Affected Natural Communities, and AMM25 Riparian Woodrat and*
11 *Riparian Brush Rabbit. BDCP Appendix 3.C describes the AMMs, which have since been updated and*
12 *which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs, of the Final*
13 *EIR/EIS.*

14 **Late Long-Term Timeframe**

15 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.
16 Alternative 1B as a whole would result in the permanent loss of and temporary removal of 85 acres
17 of modeled habitat for riparian woodrat habitat during the late long-term. None of this habitat is
18 considered occupied.

19 The BDCP would restore at least 5,000 acres and protect at least 750 acres of valley/foothill riparian
20 natural community, a portion of which is expected to consist of suitable riparian brush rabbit
21 habitat (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of
22 riparian habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow
23 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing
24 occupied or potentially occupied habitat to be restored in CZ 7. The conserved habitat would also be
25 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural
26 community than what currently exists in CZ 7 and would be contiguous with existing modeled
27 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of
28 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,
29 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural
30 community would provide riparian woodrat habitat proportional to the amount of modeled habitat
31 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area
32 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community
33 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is
34 comparable to or of higher value than existing modeled grassland habitat. All riparian protection
35 would occur during the near-term period, to offset early riparian losses.

36 The BDCP would also create and maintain mounds, levee sections, or other high areas in restored
37 and protected riparian areas (Objective RW1.2) that are designed specifically to provide flood
38 refugia for the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush*
39 *Rabbit and Riparian Woodrat*). In addition, the restored floodplains would transition from areas that
40 flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or
41 more) (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian
42 woodrat during most years.

43 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
44 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the

1 restoration of valley/foothill riparian that could overlap with the species model, would result in the
2 restoration of 300 acres of modeled habitat for riparian woodrat. In addition, protection of
3 valley/foothill riparian could overlap with the species model and would result in the protection of
4 90 acres riparian woodrat modeled habitat.

5 Although there are no records of occurrences of the riparian woodrat in the study area, habitat
6 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase
7 opportunities for northward expansion of the species into the study area. Implementation of
8 Alternative 1B conservation measures is not expected to adversely affect the riparian woodrat for
9 the following reasons.

- 10 ● There are no riparian woodrat occurrences in the Plan Area.
- 11 ● The habitat that would be removed consists of small patches that are of moderate value for the
12 species.
- 13 ● The habitat that would be removed permanently is a small proportion of the total habitat in the
14 Plan Area (2%).
- 15 ● Avoidance and minimization measures would be implemented to avoid injury or mortality of
16 riparian woodrats, and to minimize loss of occupied habitat.
- 17 ● Floodplain restoration would be designed to provide flood refugia so that flooding would not
18 adversely affect any riparian woodrats that occupy restored floodplains.

19 **NEPA Effects:** Alternative 1B would provide a substantial benefit to the riparian woodrat through
20 the net increase of available habitat and a net increase of habitat in protected status. These
21 protected areas would be managed and monitored to support the species. The habitat that would be
22 affected by Alternative 1B is currently unoccupied, and habitat removal is not expected to result in a
23 discernible change in the abundance or distribution of riparian woodrats if they occupy study area
24 habitats. Should the species be detected in the study area, implementation of AMM1–AMM7,
25 AMM10, and AMM25 would avoid and minimize the effects of conservation component construction
26 and implementation. Therefore, the loss of habitat and potential mortality of individuals under
27 Alternative 1B would not have an adverse effect on riparian woodrat.

28 **CEQA Conclusion:**

29 **Near-Term Timeframe**

30 Because water conveyance facilities construction is being evaluated at the project level, the near-
31 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
32 protection or restoration in an appropriate timeframe to ensure that the construction effects would
33 be less than significant for CEQA purposes.

34 Alternative 1B would result in temporary effects on 1 acre s of modeled habitat for riparian woodrat
35 in the near-term as a result of construction of the water conveyance facilities (CM1). The habitat
36 would be lost in the valley/foothill riparian. All the near-term loss of riparian woodrat habitat would
37 result from CM1 conveyance facility construction, and would occur in CZ 8 in an area not likely to be
38 occupied by the species. Habitat loss in CZ 7, in areas known or likely to be occupied, would occur
39 during the early long-term and late long-term implementation periods. Riparian restoration would
40 be phased to minimize temporal habitat loss. There would be no near-term losses from CM2–CM18.

1 Typical CEQA project-level mitigation ratios for these natural communities that would be affected
2 and that are identified in the biological goals and objectives for riparian woodrat in Chapter 3 of the
3 BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural
4 community. Using these ratios would indicate that 1 acre of riparian habitat should be restored and
5 1 acre of riparian habitat should be protected for riparian woodrat for near-term losses.

6 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
7 and protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3). In addition,
8 the species-specific biological goals and objectives (RW1.1 and RW1.2) would inform the near-term
9 protection and restoration efforts. The natural community restoration and protection activities are
10 expected to be concluded during the first 10 years of plan implementation, which is close enough in
11 time to the occurrence of impacts to constitute adequate mitigation for CEQA purposes.

12 These commitments are more than sufficient to support the conclusion that the near-term effects of
13 Alternative 1B would not be significant under CEQA, because only 1 acre of modeled habitat would
14 be temporarily affected and there is only limited potential for minor adverse effects on woodrats or
15 its habitat from implementation of CM11.

16 These effects cannot be quantified, but are expected to be minimal and would be avoided and
17 minimized through the BDCP's commitment to AMM1-AMM7, AMM10, and AMM25. BDCP Appendix
18 3.C describes the AMMs, which have since been updated and which are provided in Appendix 3B,
19 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

20 **Late Long-Term Timeframe**

21 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.
22 Alternative 1B as a whole would result in the permanent loss of and temporary removal of 85 acres
23 of modeled habitat for riparian woodrat habitat during the late long-term. None of this habitat is
24 considered occupied.

25 The BDCP would restore at least 5,000 acres and protect at least 750 acres of valley/foothill riparian
26 natural community, a portion of which is expected to consist of suitable riparian brush rabbit
27 habitat (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of
28 riparian habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow
29 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing
30 occupied or potentially occupied habitat to be restored in CZ 7. The conserved habitat would also be
31 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural
32 community than what currently exists in CZ 7 and would be contiguous with existing modeled
33 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of
34 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,
35 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural
36 community would provide riparian woodrat habitat proportional to the amount of modeled habitat
37 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area
38 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community
39 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is
40 comparable to or of higher value than existing modeled grassland habitat. All riparian protection
41 would occur during the near-term period, to offset early riparian losses.

42 The Plan would also create and maintain mounds, levee sections, or other high areas in restored and
43 protected riparian areas (Objective RW1.2) that are designed specifically to provide flood refugia for

1 the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and*
2 *Riparian Woodrat*). In addition, the restored floodplains would transition from areas that flood
3 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more)
4 (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian woodrat
5 during most years.

6 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
7 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
8 restoration of valley/foothill riparian that could overlap with the species model, would result in the
9 restoration of 300 acres of modeled habitat for riparian woodrat. In addition, protection of
10 valley/foothill riparian could overlap with the species model and would result in the protection of
11 90 acres riparian woodrat modeled habitat.

12 Although there are no records of occurrences of the riparian woodrat in the study area, habitat
13 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase
14 opportunities for northward expansion of the species into the study area. Implementation of
15 Alternative 1B conservation measures is not expected to adversely affect the riparian woodrat for
16 the following reasons.

- 17 ● There are no riparian woodrat occurrences in the Plan Area.
- 18 ● The habitat that would be removed consists of small patches that are of moderate value for the
19 species.
- 20 ● The habitat that would be removed permanently is a small proportion of the total habitat in the
21 Plan Area (2%).
- 22 ● Avoidance and minimization measures would be implemented to avoid injury or mortality of
23 riparian woodrats, and to minimize loss of occupied habitat.
- 24 ● Floodplain restoration would be designed to provide flood refugia so that flooding would not
25 adversely affect any riparian woodrats that occupy restored floodplains.

26 Alternative 1B would provide a substantial benefit to the riparian woodrat through the net increase
27 of available habitat and a net increase of habitat in protected status. These protected areas would be
28 managed and monitored to support the species. The habitat that would be affected by Alternative 1B
29 is currently unoccupied, and habitat removal is not expected to result in a discernible change in the
30 abundance or distribution of riparian woodrats if they occupy study area habitats. Should the
31 species be detected in the study area, AMM1–AMM7, AMM10, and AMM25 would avoid and
32 minimize the effects of conservation component construction and implementation. Therefore, the
33 loss of habitat and potential mortality of individuals under Alternative 1B would not have a
34 significant impact on riparian woodrat.

35 **Impact BIO-156: Indirect Effects of Plan Implementation on Riparian Woodrat**

36 Noise, lighting, and visual disturbances adjacent to construction activities could indirectly affect the
37 use of modeled habitat for riparian woodrat. These effects are related construction activities
38 associated with water conveyance construction, tidal natural community restoration construction,
39 and construction of setback levees. Indirect effects on the species from construction associated with
40 tidal natural community restoration are unlikely because tidal natural community restoration
41 projects would be sited to avoid areas occupied by riparian woodrat. The activity most likely to

1 result in noise, lighting, and visual disturbances to riparian woodrat is the construction of setback
2 levees.

3 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1B
4 would avoid the potential for substantial adverse effects on riparian woodrats, either indirectly or
5 through habitat modifications or result in a substantial reduction in numbers or a restriction in the
6 range of riparian woodrats. Therefore, indirect effects of Alternative 1B would not have an adverse
7 effect on riparian woodrat.

8 **CEQA Conclusion:** Should the species be detected in the study area, indirect effects of conservation
9 measure construction and implementation could impact riparian woodrat and its habitat. AMM1-
10 AMM7, AMM10, and AMM25 would avoid and minimize the impact.

11 **Impact BIO-157: Periodic Effects of Inundation of Riparian Woodrat Habitat as a Result of** 12 **Implementation of Conservation Components**

13 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in
14 periodic inundation of riparian woodrat habitat. Floodplain restoration would result in periodic
15 inundation of up to 203 acres of riparian woodrat habitat (9% of the riparian woodrat habitat in the
16 Plan Area). The area between existing levees that would be breached and the newly constructed
17 setback levees would be inundated through seasonal flooding. The potentially inundated areas
18 consist of moderate-value habitat for the species. Although the habitat consists of small patches and
19 narrow bands of riparian vegetation and no riparian woodrats have detected in CZ 7, the riparian
20 patches are in proximity to each other along the San Joaquin River and there are two species
21 occurrences immediately south of CZ 7, one of which is less than 1 mile from the southernmost
22 patch of riparian habitat potentially affected by levee construction. The restored floodplains would
23 transition from areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently
24 (e.g., every 10 years or more).

25 **NEPA Effects:** Alternative 1B's period inundation of 203 acres of riparian habitat for riparian
26 woodrat is not expected to result in substantial adverse effects on riparian woodrat, either directly
27 or through habitat modifications and would not result in a substantial reduction in numbers or a
28 restriction in the range of riparian woodrat. The effects of periodic inundation on the riparian
29 woodrat would be minimized through construction and maintenance of flood refugia to allow
30 riparian woodrats to escape inundation. Therefore, the periodic inundation of riparian woodrat
31 habitat would not adversely affect the species Alternative 1B.

32 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect a total of 203 acres of
33 riparian habitat for riparian woodrat, representing 9% of the 2,166 acres of modeled riparian
34 woodrat habitat in the study area. The impact of periodic inundation on the riparian woodrat would
35 be minimized through construction and maintenance of flood refugia to allow riparian woodrats to
36 escape inundation, as described in AMM25. Implementation of CM5 would not be expected to result
37 in significant impacts on riparian woodrat, either directly or through habitat modifications, and
38 would not result in a substantial reduction in numbers or a restriction in the range of riparian
39 woodrats. Periodic inundation of riparian woodrat habitat under Alternative 1B would have a less-
40 than-significant impact.

1 Salt Marsh Harvest Mouse

2 This section describes the effects of Alternative 1B, including water conveyance facilities
3 construction and implementation of other conservation components, on the salt marsh harvest
4 mouse. The habitat model used to assess effects for the salt marsh harvest mouse includes six
5 habitat types: primary tidal marsh habitat, secondary tidal marsh habitat (low marsh), secondary
6 upland habitat adjacent to tidal marsh habitat, primary habitat within managed wetlands, secondary
7 habitat within managed wetlands (dominated by plants characteristic of low marsh), and upland
8 habitats within managed wetland boundaries. The tidal and managed wetland habitats were
9 discriminated recognizing that regardless of habitat value, managed wetlands are at high risk of
10 catastrophic flooding and have lower long-term conservation value than tidal wetlands.

11 Construction and restoration associated with Alternative 1B conservation measures would result in
12 effects on modeled salt marsh harvest mouse habitat, which would include permanent losses and
13 habitat conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species
14 post-restoration) as indicated in Table 12-1B-57. All of the effects on the species would take place
15 over an extended period of time as tidal marsh is restored in the Plan Area. Full implementation of
16 Alternative 1B would also include the following conservation actions over the term of the BDCP to
17 benefit salt marsh harvest mouse (BDCP Chapter 3, *Conservation Strategy*).

- 18 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with
19 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California
20 (Objective TBEWNC1.1, associated with CM4)
- 21 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500
22 acres of middle and high marsh (primary salt marsh harvest mouse habitat) to contribute to
23 total (existing and restored) acreage targets for each complex as specified in the final Recovery
24 Plan for Tidal Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2,
25 associated with CM4).
- 26 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
27 natural community within the reserve system (Objective TBEWNC2.1).
- 28 ● Protect and enhance at least at least 1,500 acres of managed wetland in Grizzly Island Marsh
29 Complex for the benefit of salt marsh harvest mouse (Objective MWNC1.1, associated with
30 CM3).
- 31 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide
32 at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective
33 GNC1.4, associated with CM3 and CM8).
- 34 ● Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of restored or
35 created middle and high marsh as defined in the final Recovery Plan for Tidal Marsh Ecosystems
36 of Northern and Central California (Objective SMHM1.1).
- 37 ● Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of managed
38 wetland protected and enhanced in the Grizzly Island Marsh Complex as defined in the final
39 Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California, and increase
40 population levels above the current baseline (Objective SMHM1.2).

41 As explained below, with the restoration or protection of these amounts of habitat, in addition to
42 implementation of AMMs to minimize potential effects, impacts on the salt marsh harvest mouse
43 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1B-57. Changes in Salt Marsh Harvest Mouse Modeled Habitat Associated with**
2 **Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
CM2-CM18	TBEW Primary	64	67	0	0	0	0
	TBEW Secondary	0	0	0	0	0	0
	Upland Secondary	8	9	0	0	0	0
	MW Wetland Primary	1,913	5,323	0	0	0	0
	MW Wetland Secondary	315	807	0	0	0	0
	MW Upland	165	762	0	0	0	0
Total Impacts CM2-CM18		2,465	6,968	0	0	0	0
TOTAL IMPACTS		2,645	6,968	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

TBEW = tidal brackish emergent wetland

MW = managed wetland

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-158: Loss or Conversion of Habitat for and Direct Mortality of Salt Marsh Harvest**
5 **Mouse**

6 Alternative 1B tidal restoration (CM4) would be the only conservation measure resulting in effects
7 on salt marsh harvest mouse habitat. Habitat enhancement and management activities (CM11),
8 which include ground disturbance or removal of nonnative vegetation, could result in local adverse
9 habitat effects. Each of these activities is described in detail below. A summary statement of the
10 combined impacts and NEPA and CEQA conclusions follows the individual conservation measure
11 discussions.

- 12 • *CM4 Tidal Natural Communities Restoration* would result in effects on 6,968 acres of salt marsh
13 harvest mouse modeled habitat, which would include 5,376 acres of permanent losses and 1,592
14 acres of habitat conversions. Salt marsh harvest mouse may be displaced temporarily from areas
15 of converted habitat but these areas would ultimately provide suitable habitat for the species.
16 However, 1,058 of these acres would be downgraded from primary habitat (67 acres of primary
17 tidal brackish emergent wetland and 991 acres of primary managed wetland) to secondary tidal
18 brackish emergent wetland. The hypothetical restoration footprints in Suisun Marsh overlap

1 with 13 CNDDDB records for salt marsh harvest mouse (California Department of Fish and
2 Wildlife 2013); however, the BDCP's conservation actions assume that all suitable habitat in
3 Suisun Marsh is occupied by the species.

- 4 ● *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the
5 restoration of at least 1,500 acres of tidal brackish emergent wetland would be managed to
6 provide viable habitat for salt marsh harvest mouse and the protection of 1,500 acres of
7 managed wetland specifically to be managed for salt marsh harvest mouse. A variety of habitat
8 management actions included in *CM11 Natural Communities Enhancement and Management* that
9 are designed to enhance and manage these areas for salt marsh harvest mouse and may result in
10 localized ground disturbances that could temporarily remove small amounts of salt marsh
11 harvest mouse habitat. The restoration of tidal brackish emergent wetlands, the protection
12 managed wetlands, and the protection and/or restoration of grasslands within 200 feet of
13 restored salt marsh harvest mouse habitat would also have enhancement and management
14 actions that would include invasive species control, nonnative wildlife control, and vegetation
15 management. Ground-disturbing activities, such as removal of nonnative vegetation are
16 expected to have minor effects on habitat and are expected to result in overall improvements to
17 and maintenance of salt marsh harvest mouse habitat values over the term of the BDCP. These
18 effects cannot be quantified, but are expected to be minimal and would be avoided and
19 minimized by the AMMs listed below.
- 20 ● *Injury and Direct Mortality*: The use of heavy equipment and handtools may result in injury or
21 mortality to salt marsh harvest mouse during restoration, enhancement, and management
22 activities. However, preconstruction surveys, construction monitoring, and other measures
23 would be implemented to avoid and minimize injury or mortality of this species during these
24 activities, as required by the AMMs listed below.

25 The following paragraphs summarize the combined effects discussed above and describe other
26 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
27 also included.

28 ***Near-Term Timeframe***

29 The near-term BDCP conservation strategy has been evaluated to determine whether it would
30 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
31 the effects of near-term covered activities would not be adverse under NEPA and would be less than
32 significant under CEQA. Alternative 1B would affect 2,465 acres of salt marsh harvest mouse
33 modeled habitat in the study area in the near-term. These effects include 1,517 acres of permanent
34 loss and 948 acres of converted habitat. Most of the habitat converted would be from primary
35 habitats (599 acres consisting of 64 acres of tidal brackish emergent wetland and 534 acres of
36 managed wetland) to secondary tidal brackish emergent wetland.

37 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
38 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,
39 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest
40 mouse. Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to
41 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of
42 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation
43 value than tidal wetlands. The species-specific biological goals and objectives would inform the
44 near-term protection and restoration efforts. These Plan goals represent performance standards for

1 considering the effectiveness of restoration actions. The acres of protection and restoration
2 contained in the near-term Plan goals would keep pace with the loss of habitat and effects on salt
3 marsh harvest mouse.

4 Other factors relevant to effects on salt marsh harvest mouse are listed below.

- 5 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
6 wetlands as noted in the specie's draft recovery plan, because the conversion of managed
7 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by
8 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest
9 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided
10 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a
11 prolonged period (sometimes a decade or more) in which resident mice populations are
12 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these
13 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for
14 restoration of tidal wetlands through the conversion of managed wetlands. These plans are
15 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse
16 habitat from a variety of factors, including flooding from levee failure and cessation of active
17 management (which is often necessary to maintain habitat values in managed wetlands).
18 Therefore, the temporary effects under Alternative 1B would be consistent with those deemed
19 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 20 • Restoration in Suisun Marsh would be carefully phased over time to offset adverse effects of
21 restoration as it occurs. This phasing would ensure that temporal loss as a result of tidal natural
22 communities restoration does not adversely affect the salt marsh harvest mouse population,
23 restoration in Suisun Marsh would be carefully phased over time to offset adverse effects of
24 restoration as it occurs, ensure that short-term population loss is relatively small and
25 incremental, and maintain local source populations to recolonize newly restored areas. The tidal
26 restoration projects in Suisun Marsh would be implemented in 150-acre or greater patches that
27 provide viable habitat areas for the salt marsh harvest mouse habitat consistent with the draft
28 tidal marsh recovery plan (U.S. Fish and Wildlife Service 2010).
- 29 • The salt marsh harvest mouse population would be monitored during the phasing process (see
30 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure
31 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
32 Section 3.6).
- 33 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
34 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
35 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
36 forage and cover.

37 Because there would be no project-level impacts on salt marsh harvest mouse from CM1, the
38 analysis of the effects of conservation actions does not include a comparison with standard ratios
39 used for project-level NEPA analyses.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
41 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
42 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
43 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
44 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work

1 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
2 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

3 **Late Long-Term Timeframe**

4 Based on modeled habitat, the study area supports approximately 35,588 acres of salt marsh
5 harvest mouse modeled habitat. Alternative 1B as a whole would result in effects on 6,968 acres of
6 saltmarsh harvest mouse modeled habitat over the term of the Plan, which would include 5,376
7 acres of permanent losses and 1,592 acres of habitat conversions. These effects (loss and
8 conversion) would be to 20% of the modeled habitat in the study area. Most of these effects (99%)
9 would be to managed wetlands, which though are known to be occupied by salt marsh harvest
10 mouse are at high risk of catastrophic flooding and have a lower long-term conservation value than
11 tidal wetlands (U.S. Fish and Wildlife Service 2010). Effects on up to 20% of the species' habitat in
12 the Plan Area may diminish the salt marsh harvest mouse population in the Plan Area and result in
13 reduced genetic diversity, thereby putting the local population at risk of local extirpation due to
14 random environmental fluctuations or catastrophic events. This effect is expected to be greatest if
15 large amounts of habitat are removed at one time in Suisun Marsh and are not effectively restored
16 for many years, and if there are no adjacent lands with salt marsh harvest mouse populations to
17 recolonize restored areas.

18 The Plan includes a commitment to restore or create 6,000 acres of tidal brackish emergent wetland,
19 1,500 acres of which would target middle and high marsh habitat (primary habitat for salt marsh
20 harvest mouse) (Objectives TBEWNC1.1, TBEWNC1.2, and SMHM1.1, associated with CM4); the
21 protection of 6,500 acres of managed wetlands, 1,500 acres of which would be specifically managed
22 for salt marsh harvest mouse (Objectives SMHM1.2 and MWNC1.1, associated with CM3), and the
23 protection and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of
24 tidal restoration) to provide upland refugia for salt marsh harvest mouse (Objective GNC1.4,
25 associated with). Other factors relevant to effects on salt marsh harvest mouse are listed here.

- 26 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
27 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the
28 conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is
29 often accomplished by breaching levees and converting diked nontidal marsh currently
30 occupied by salt marsh harvest mouse populations to tidal wetlands, their historic condition.
31 Conversion of these subsided areas requires sedimentation and accretion over time to restore
32 marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident
33 mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service
34 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan
35 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.
36 These plans are based on the premise that managed wetlands are at high risk of loss of salt
37 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and
38 cessation of active management (which is often necessary to maintain habitat values in managed
39 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed
40 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
41 Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan
42 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.
43 These plans are based on the premise that managed wetlands are at high risk of loss of salt
44 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and
45 cessation of active management (which is often necessary to maintain habitat values in managed

1 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed
2 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.

- 3 ● In order to ensure that temporal loss as a result of tidal natural communities restoration does
4 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh
5 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure
6 that short-term population loss is relatively small and incremental, and maintain local source
7 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh
8 would be implemented in 150-acre or greater patches that provide viable habitat areas for the
9 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish
10 and Wildlife Service 2010).
- 11 ● The salt marsh harvest mouse population would be monitored during the phasing process (see
12 BDCP Chapter 3, Section 3.4.4.3.4,) and adaptive management would be applied to ensure
13 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
14 Section 3.6).
- 15 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
16 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
17 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
18 forage and cover.
- 19 ● The habitat that would be restored and protected would consist of large blocks of contiguous
20 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
21 vegetation suitable for the species. This would provide greater habitat connectivity and greater
22 habitat value, which is expected to accommodate larger populations and to therefore increase
23 population resilience to random environmental events and climate change.

24 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
25 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
26 the restoration of 6,046 acres and the protection of 1,550 acres of modeled habitat for salt marsh
27 harvest mouse.

28 **NEPA Effects:** In the absence of other conservation actions, the effects on salt marsh harvest mouse
29 habitat from Alternative 1B in the near-term would represent an adverse effect as a result of habitat
30 modification and potential direct mortality of a special-status species. However, the BDCP has
31 committed to habitat protection, restoration, management, and enhancement associated with CM3,
32 CM4, CM8, and CM11. This habitat protection, restoration, management, and enhancement would be
33 guided by species-specific goals and objectives and by AMM1–AMM5 and AMM26, which would be
34 in place throughout the construction period. Considering these commitments, losses and
35 conversions of salt marsh harvest mouse habitat and potential mortality of individuals under
36 Alternative 1B would not be an adverse effect.

37 **CEQA Conclusion:**

38 **Near-Term Timeframe**

39 The near-term BDCP conservation strategy has been evaluated to determine whether it would
40 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
41 impacts of near-term covered activities would be less than significant under CEQA. Alternative 1B
42 would affect 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the near-
43 term. These effects include 1,517 acres of permanent loss and 948 acres of converted habitat. Most

1 of the habitat converted would be to primary habitats (599 acres consisting of 64 acres of tidal
2 brackish emergent wetland and 534 acres of managed wetland) to secondary tidal brackish
3 emergent wetland.

4 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
5 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,
6 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest
7 mouse. Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to
8 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of
9 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation
10 value than tidal wetlands. The species-specific biological goals and objectives would inform the
11 near-term protection and restoration efforts. These Plan goals represent performance standards for
12 considering the effectiveness of restoration actions. The acres of protection and restoration
13 contained in the near-term Plan goals would keep pace with the loss of habitat and effects on salt
14 marsh harvest mouse habitat.

15 Other factors relevant to effects on salt marsh harvest mouse are listed below.

- 16 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
17 wetlands as noted in the specie's draft recovery plan because the conversion of managed
18 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by
19 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest
20 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided
21 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a
22 prolonged period (sometimes a decade or more) in which resident mice populations are
23 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these
24 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for
25 restoration of tidal wetlands through the conversion of managed wetlands. These plans are
26 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse
27 habitat from a variety of factors, including flooding from levee failure and cessation of active
28 management (which is often necessary to maintain habitat values in managed wetlands).
29 Therefore, the temporary effects under Alternative 1B would be consistent with those deemed
30 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 31 ● To ensure that temporal loss as a result of tidal natural communities restoration does not
32 adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh would be
33 carefully phased over time to offset adverse effects of restoration as it occurs, ensure that short-
34 term population loss is relatively small and incremental, and maintain local source populations
35 to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh would be
36 implemented in 150-acre or greater patches that provide viable habitat areas for the salt marsh
37 harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish and Wildlife
38 Service 2010).
- 39 ● The salt marsh harvest mouse population would be monitored during the phasing process (see
40 BDCP Chapter 3, Section 3.4.4.3.4,) and adaptive management would be applied to ensure
41 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
42 Section 3.6).
- 43 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
44 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit

1 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
2 forage and cover.

3 Because there would be no project-level impacts on salt marsh harvest mouse from CM1, the
4 analysis of the effects of conservation actions does not include a comparison with standard ratios
5 used for project-level CEQA analyses.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
9 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
10 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
11 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
12 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

13 These commitments are more than sufficient to support the conclusion that the near-term impacts
14 of Alternative 1B would be less than significant.

15 **Late Long-Term Timeframe**

16 The study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat.
17 Alternative 1B as a whole would result in effects on 6,968 acres of saltmarsh harvest mouse
18 modeled habitat over the term of the Plan, which would include 5,376 acres of permanent losses and
19 1,592 acres of habitat conversions. The Plan includes a commitment to restore or create 6,000 acres
20 of tidal brackish emergent wetland, 1,500 acres of which would target middle and high marsh
21 habitat (primary habitat for salt marsh harvest mouse) (Objectives TBEWNC1.1, TBEWNC1.2, and
22 SMHM1.1, associated with CM4); the protection of 6,500 acres of managed wetlands, 1,500 acres of
23 which would be specifically managed for salt marsh harvest mouse (Objectives SMHM1.2 and
24 MWNC1.1, associated with CM3), and the protection and/or restoration of grassland adjacent to
25 tidal restoration (areas within 200 feet of tidal restoration) to provide upland refugia for salt marsh
26 harvest mouse (Objective GNC1.4, associated with CM3 and CM8). Other factors relevant to effects
27 on salt marsh harvest mouse include:

- 28 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
29 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the
30 conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is
31 often accomplished by breaching levees and converting diked nontidal marsh currently
32 occupied by salt marsh harvest mouse populations to tidal wetlands, their historic condition.
33 Conversion of these subsided areas requires sedimentation and accretion over time to restore
34 marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident
35 mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service
36 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan
37 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.
38 These plans are based on the premise that managed wetlands are at high risk of loss of salt
39 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and
40 cessation of active management (which is often necessary to maintain habitat values in managed
41 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed
42 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.

- 1 • In order to ensure that temporal loss as a result of tidal natural communities restoration does
2 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh
3 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure
4 that short-term population loss is relatively small and incremental, and maintain local source
5 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh
6 would be implemented in 150-acre or greater patches that provide viable habitat areas for the
7 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish
8 and Wildlife Service 2010).
- 9 • The salt marsh harvest mouse population would be monitored during the phasing process (see
10 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure
11 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
12 Section 3.6).
- 13 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
14 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
15 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
16 forage and cover.
- 17 • The habitat that would be restored and protected would consist of large blocks of contiguous
18 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
19 vegetation suitable for the species. This would provide greater habitat connectivity and greater
20 habitat value, which is expected to accommodate larger populations and to therefore increase
21 population resilience to random environmental events and climate change.

22 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
23 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
24 the restoration of 6,046 acres and the protection of 1,550 acres of modeled habitat for salt marsh
25 harvest mouse.

26 Alternative 1B would result in substantial modifications to salt marsh harvest mouse habitat in the
27 absence of other conservation actions. However, with habitat protection, restoration, management,
28 and enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and
29 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the time period of
30 construction, Alternative 1B over the term of the BDCP would not result in a substantial adverse
31 effect through habitat modifications and would not substantially reduce the number or restrict the
32 range of the species. Therefore, the alternative would have a less-than-significant impact on salt
33 marsh harvest mouse.

34 **Impact BIO-159: Indirect Effects of Plan Implementation on Salt Marsh Harvest Mouse**

35 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),
36 and management and enhancement activities (CM11) could result in temporary noise and visual
37 disturbances to salt marsh harvest mouse occurring within 100 feet of these areas over the term of
38 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM5, and
39 AMM26, which would be in effect throughout the term of the Plan.

40 The use of mechanical equipment during the implementation of the conservation measures could
41 cause the accidental release of petroleum or other contaminants that could affect salt marsh harvest
42 mouse and its habitat. The inadvertent discharge of sediment could also have a negative effect on
43 the species and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would

1 ensure measures are in place to prevent runoff from the construction area and potential effects of
 2 sediment on salt marsh harvest mouse.

3 Tidal marsh restoration has the potential to increase salt marsh harvest mouse's exposure to
 4 mercury. Mercury is transformed into the more bioavailable form of methylmercury under
 5 anaerobic conditions, which in the environment typically occurs in sediments subjected to regular
 6 wetting and drying such as tidal marshes and flood plains. Thus, BDCP restoration activities that
 7 create newly inundated areas could increase bioavailability of mercury. In general, the highest
 8 methylation rates are associated with high tidal marshes that experience intermittent wetting and
 9 drying and associated anoxic conditions (Alpers et al. 2008). High tidal marsh is considered to be
 10 primary habitat for salt marsh harvest mouse and thus the species could be exposed to methyl
 11 mercury in tidal restoration areas. Salt marsh harvest mouse may be exposed to elemental mercury
 12 by feeding on pickleweed, which is found concentrated in the distal tips of pickleweed leaves (Yee et
 13 al., 2008). Though elemental mercury is less bioavailable than methylmercury, studies have shown
 14 that mercury can become methylated in the anaerobic portions of the intestinal tract (Rudd et al.
 15 1980, Rieder et al. 2013) and could thus become a pathway for salt marsh harvest exposure to
 16 methylmercury. A study of small mammals residing in pickleweed around the San Francisco Bay
 17 showed an absence of salt marsh harvest mouse where mercury concentrations measured in house
 18 mice (*Mus musculus*) livers were $\geq 0.19 \mu\text{g/g}$ (dry weight) (Clark et al. 1992). Clark et al (1992) also
 19 report that the lack of salt marsh harvest mouse at these locations are not the result of undetected
 20 habitat differences or are by chance. Clarke et al (1992) suggest that the absence of salt marsh
 21 harvest mouse at certain locations may be associated with higher amounts of mercury and
 22 polychlorinated biphenyls (PCBs); however, because their study didn't analyze contaminants in salt
 23 marsh harvest mouse and because (at that time) there was no data in the literature on contaminants
 24 in harvest mice, they could not make conclusions on these associations. Currently, it is unknown
 25 what the exact exposure pathways are or what tissue concentrations are harmful to the salt marsh
 26 harvest mouse.

27 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
 28 under the plan would generate less methylmercury than the existing managed wetlands. The
 29 potential for salt marsh harvest mouse exposure to methyl mercury in Suisun Marsh may decrease
 30 in the long term because the creation of tidal brackish emergent wetland would predominantly
 31 result from the conversion of managed wetlands. *CM12 Methylmercury Management* includes
 32 provisions for project-specific Mercury Management Plans. Along with avoidance and minimization
 33 measures and adaptive management and monitoring, CM12 could reduce the effects of
 34 methylmercury on salt marsh harvest mouse resulting from BDCP tidal restoration.

35 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1B
 36 would avoid and minimize indirect effects on salt marsh harvest mouse. These AMMs would also
 37 avoid and minimize effects that could substantially reduce the number of salt marsh harvest mouse,
 38 or restrict the species' range. Therefore, the indirect effects of Alternative 1B would not have an
 39 adverse effect on salt marsh harvest mouse.

40 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could
 41 impact salt marsh harvest mouse within 100 feet of these disturbances. The use of mechanical
 42 equipment during construction could cause the accidental release of petroleum or other
 43 contaminants that could impact salt marsh harvest mouse and its habitat. The inadvertent discharge
 44 of sediment adjacent to salt marsh harvest mouse habitat could also impact the species. With
 45 implementation of AMM1-AMM5 and AMM26 as part of Alternative 1B construction, operation and

1 maintenance, the BDCP would avoid the potential for substantial adverse effects on salt marsh
2 harvest mouse, either indirectly or through habitat modifications, in that the BDCP would not result
3 in a substantial reduction in numbers or a restriction in the range of salt marsh harvest mouse. The
4 indirect effects of Alternative 1B would have a less-than-significant impact on salt marsh harvest
5 mouse.

6 Salt marsh harvest mouse could experience indirect effects from increased exposure to
7 methylmercury as a result of tidal habitat restoration (CM4). With implementation of CM12, the
8 potential indirect effects of methylmercury would not result in a substantial reduction in numbers
9 or a restriction in the range of salt marsh harvest mouse, and, therefore, would have a less-than-
10 significant impact on the species.

11 **Suisun Shrew**

12 Primary Suisun shrew habitat consists of all *Salicornia*-dominated natural seasonal wetlands and
13 certain *Scirpus* and *Typha* communities found within Suisun Marsh only. Low marsh dominated by
14 *Schoenoplectus acutus* and *S. californicus* and upland transitional zones within 150 feet of the tidal
15 wetland edge were classified separately as secondary habitat because they are used seasonally
16 (Hays and Lidicker 2000). All managed wetlands were excluded from the habitat model.
17 Construction and restoration associated with Alternative 1B would also include the following
18 conservation actions over the term of the BDCP to benefit Suisun shrew (BDCP Chapter 3,
19 *Conservation Strategy*).

- 20 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with
21 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California
22 (Objective TBEWNC1.1, associated with CM4)
- 23 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500
24 acres of middle and high marsh (primary Suisun shrew habitat) to contribute to total (existing
25 and restored) acreage targets for each complex as specified in the final Recovery Plan for Tidal
26 Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2, associated with
27 CM4).
- 28 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
29 natural community within the reserve system (Objective TBEWNC2.1).
- 30 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide at
31 least 200 feet of adjacent grasslands beyond the sea level rise accommodation area, which
32 provides refugia during high tides (Objective GNC1.4, associated with CM3 and CM8).

33 As explained below, with the restoration or protection of these amounts of habitat, impacts on the
34 Suisun shrew would not be adverse for NEPA purposes and would be less than significant for CEQA
35 purposes.

1 **Table 12-1B-58. Changes in Suisun Shrew Modeled Habitat Associated with Alternative 1B (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2-CM18	Primary	58	60	0	0	0	0
	Secondary	47	342	0	0	0	0
Total Impacts CM2-CM18		105	401	0	0	0	0
TOTAL IMPACTS		105	401	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-160: Loss or Conversion of Habitat for and Direct Mortality of Suisun shrew**

4 BDCP tidal restoration (CM4) would be the only conservation measure resulting in loss of habitat to
5 Suisun shrew. Habitat enhancement and management activities (CM11), which include ground
6 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. Each of
7 these activities is described in detail below. A summary statement of the combined impacts and
8 NEPA and CEQA conclusions follows the individual conservation measure discussions.

9 • *CM4 Tidal Natural Communities Restoration* would result in effects on 401 acres of Suisun shrew
10 modeled habitat, which would include 377 acres of permanent losses and 24 acres of habitat
11 conversions. Suisun shrew may be displaced temporarily from areas of converted habitat but
12 would ultimately provide suitable habitat for the species. However, all 9 acres would be
13 converted from secondary to primary habitat and therefore over would be net benefit to the
14 species. The hypothetical restoration footprints overlap with two CNDDDB records for Suisun
15 shrew (California Department of Fish and Wildlife 2013).

16 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the
17 restoration of at least 6,000 acres of tidal brackish emergent wetland would be managed to
18 provide habitat for covered species, including Suisun shrew. A variety of habitat management
19 actions included in *CM11 Natural Communities Enhancement and Management* that are designed
20 to enhance and manage these areas may result in localized ground disturbances that could
21 temporarily remove small amounts of Suisun shrew habitat. The areas of grasslands that would
22 be protected and/or restored within 200 feet of restored tidal marsh would also have
23 enhancement and management actions that would include invasive species control, nonnative
24 wildlife control, and vegetation management. Ground-disturbing activities, such as removal of

1 nonnative vegetation are expected to have minor effects on habitat and are expected to result in
2 overall improvements to and maintenance of Suisun shrew habitat values over the term of the
3 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
4 and minimized by the AMMs listed below.

- 5 • Injury and Direct Mortality: The use of heavy equipment and handtools may result in injury or
6 mortality to Suisun shrew during restoration, enhancement, and management activities.
7 However, preconstruction surveys, construction monitoring, and other measures would be
8 implemented to avoid and minimize injury or mortality of this species during these activities, as
9 required by the AMM described below.

10 The following paragraphs summarize the combined effects discussed above and describe other
11 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
12 also included.

13 ***Near-Term Timeframe***

14 The near-term BDCP conservation strategy has been evaluated to determine whether it would
15 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
16 the effects of near-term covered activities would not be adverse under NEPA. Alternative 1B would
17 affect 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These effects
18 include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary habitat
19 being converted to primary habitat.

20 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
21 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal
22 wetlands, of which approximately 150 feet of this area would benefit the species. These Plan goals
23 represent performance standards for considering the effectiveness of restoration actions. The acres
24 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-
25 term Plan goals would keep pace with the loss of habitat and effects on Suisun shrew.

26 Other factors relevant to effects on Suisun shrew.

- 27 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
28 loss of habitat and habitat fragmentation
- 29 • The habitat that would be restored and protected would consist of large blocks of contiguous
30 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
31 vegetation suitable for the species. This would provide greater habitat connectivity and greater
32 habitat value and quantity, with is expected to accommodate larger populations and to therefore
33 increase population resilience to random environmental events and climate change.
- 34 • The amount of tidal habitat restored in the near-term (2,000 acres) would greatly exceed the
35 amount permanently lost (105 acres).

36 Because there would be no project-level impacts on Suisun shrew resulting from CM1, the analysis
37 of the effects of conservation actions does not include a comparison with standard ratios used for
38 project-level NEPA analyses.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
40 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
41 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
2 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
3 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
4 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

5 **Late Long-Term Timeframe**

6 Based on modeled habitat, the study area supports approximately 7,515 acres of Suisun shrew
7 modeled habitat. Alternative 1B as a whole would result in effects on 401 acres of Suisun shrew
8 modeled habitat over the term of the Plan, which would include 377 acres of permanent losses and
9 24 acres of habitat conversions (roughly 5% of the habitat in the study area). The Plan includes a
10 commitment to restore or create 6,000 acres of tidal brackish emergent wetland, 1,500 acres of
11 which would target middle and high marsh habitat (primary habitat for Suisun shrew) (Objectives
12 TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4) and the protection and/or restoration of
13 grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration, of which
14 approximately 150 feet of this area would benefit the species) to provide upland refugia for Suisun
15 shrew (Objective GNC1.4, associated with CM3 and CM8). Other factors relevant to effects on Suisun
16 shrew are listed here.

- 17 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
18 loss of habitat and habitat fragmentation
- 19 ● The habitat that would be restored and protected would consist of large blocks of contiguous
20 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
21 vegetation suitable for the species. This would provide greater habitat connectivity and greater
22 habitat value and quantity, with is expected to accommodate larger populations and to therefore
23 increase population resilience to random environmental events and climate change.
- 24 ● The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost
25 and converted (401 acres).

26 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
27 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
28 the restoration of 6,006 acres and the protection of 232 acres of modeled habitat for Suisun shrew.

29 **NEPA Effects:** In the absence of other conservation actions, the effects on Suisun shrew habitat from
30 Alternative 1B would represent an adverse effect as a result of habitat modification and potential
31 direct mortality of a special-status species. However, the BDCP has committed to habitat protection,
32 restoration, management, and enhancement associated with CM3, CM4, CM8, and CM11. This habitat
33 protection, restoration, management, and enhancement would be guided by biological goals and
34 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the construction
35 period. Considering these commitments, losses and conversions of Suisun shrew habitat and
36 potential mortality of individuals in both the near-term and the late long-term under Alternative 1B
37 would not be an adverse effect.

38 **CEQA Conclusion:**

39 **Near-Term Timeframe**

40 The near-term BDCP conservation strategy has been evaluated to determine whether it would
41 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
42 the impacts of near-term covered activities would be less than significant under CEQA. Alternative

1 1B would impact 105 acres of Suisun shrew modeled habitat in the study area in the near-term.
2 These effects include 90 acres of permanent loss and 15 acres of converted habitat, which is all
3 secondary habitat being converted to primary habitat.

4 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
5 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal
6 wetlands, of which approximately 150 feet of this area would benefit the species. These Plan goals
7 represent performance standards for considering the effectiveness of restoration actions. The acres
8 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-
9 term Plan goals would keep pace with the loss of habitat and effects on Suisun shrew.

10 Other factors relevant to effects on Suisun shrew.

- 11 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
12 loss of habitat and habitat fragmentation
- 13 ● The habitat that would be restored and protected would consist of large blocks of contiguous
14 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
15 vegetation suitable for the species. This would provide greater habitat connectivity and greater
16 habitat value and quantity, with is expected to accommodate larger populations and to therefore
17 increase population resilience to random environmental events and climate change.
- 18 ● The amount of tidal habitat restored in the near term (2,000 acres) greatly exceeds the amount
19 permanently lost (105 acres).

20 Because there would be no project-level impacts on Suisun shrew resulting from CM1, the analysis
21 of the effects of conservation actions does not include a comparison with standard ratios used for
22 project-level CEQA analyses.

23 The Plan also includes commitments to *AMM1 Worker Awareness Training, AMM2 Construction Best*
24 *Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion*
25 *and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, and*
26 *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs include elements that avoid
27 or minimize the risk of affecting habitats and species adjacent to work areas. BDCP Appendix 3.C
28 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
29 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

30 These commitments are more than sufficient to support the conclusion that the near-term effects of
31 Alternative 1B would be less than significant under CEQA.

32 **Late Long-Term Timeframe**

33 The study area supports approximately 7,515 acres of Suisun shrew modeled habitat. Alternative 1B
34 as a whole would result in effects on 401 acres of Suisun shrew modeled habitat over the term of the
35 Plan, which would include 377 acres of permanent losses and 24 acres of habitat conversions
36 (roughly 5% of the habitat in the study area). The Plan includes a commitment to restore or create
37 6,000 acres of tidal brackish emergent wetland, 1,500 acres of which would target middle and high
38 marsh habitat (primary habitat for Suisun shrew) (Objectives TBEWNC1.1, TBEWNC1.2, and
39 SMHM1.1, associated with CM4) and the protection and/or restoration of grassland adjacent to tidal
40 restoration (areas within 200 feet of tidal restoration, of which approximately 150 feet of this area
41 would benefit the species) to provide upland refugia for Suisun shrew (Objective GNC1.4, associated
42 with CM3 and CM8). Other factors relevant to effects on Suisun shrew are listed here.

- 1 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
2 loss of habitat and habitat fragmentation
- 3 • The habitat that would be restored and protected would consist of large blocks of contiguous
4 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
5 vegetation suitable for the species. This would provide greater habitat connectivity and greater
6 habitat value and quantity, with is expected to accommodate larger populations and to therefore
7 increase population resilience to random environmental events and climate change.
- 8 • The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost
9 (401 acres).

10 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
11 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
12 the restoration of 6,006 acres and the protection of 232 acres of modeled habitat for Suisun shrew.

13 Alternative 1B would result in substantial modifications to Suisun shrew habitat in the absence of
14 other conservation actions. However, with habitat protection, restoration, management, and
15 enhancement associated with CM3, CM4, CM8 and CM11, guided by species-specific goals and
16 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the construction
17 phase, Alternative 1B over the term of the BDCP would not result in a substantial adverse effect
18 through habitat modifications and would not substantially reduce the number or restrict the range
19 of the species. Therefore, the alternative would have a less-than-significant impact on Suisun shrew.

20 **Impact BIO-161: Indirect Effects of Plan Implementation on Suisun Shrew**

21 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),
22 and management and enhancement activities (CM11) could result in temporary noise and visual
23 disturbances to Suisun shrew occurring within 100 feet of these areas over the term of the BDCP.
24 These potential effects would be minimized or avoided through AMM1–AMM5, and AMM26, which
25 would be in effect throughout the term of the Plan.

26 The use of mechanical equipment during the implementation of the conservation measures could
27 cause the accidental release of petroleum or other contaminants that could affect Suisun shrew and
28 its habitat. The inadvertent discharge of sediment could also have a negative effect on the species
29 and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would ensure
30 measures are in place to prevent runoff from the construction area and potential effects of sediment
31 on Suisun shrew.

32 Tidal marsh restoration has the potential to increase Suisun shrew's exposure to mercury. Mercury
33 is transformed into the more bioavailable form of methylmercury under anaerobic conditions,
34 which in the environment typically occurs in sediments subjected to regular wetting and drying
35 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly
36 inundated areas could increase bioavailability of mercury. In general, the highest methylation rates
37 are associated with high tidal marshes that experience intermittent wetting and drying and
38 associated anoxic conditions (Alpers et al. 2008). High and mid tidal marsh is considered to be
39 primary habitat for Suisun shrew and thus the species could be exposed to methylmercury in tidal
40 restoration areas. Suisun shrew could be exposed to methylmercury by feeding on marsh
41 invertebrates that may bioaccumulate methylmercury from marsh sediments. Toxic concentrations
42 of methylmercury have been found in the kidneys of shrews that inhabit contaminated sites and

1 forage on earthworms and other prey that live within contaminated sediments (Talmage and
2 Walton 1993; Hinton and Veiga 2002).

3 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
4 under the plan would generate less methylmercury than the existing managed wetlands. The
5 potential for Suisun shrew exposure to methyl mercury in Suisun Marsh may decrease in the long
6 term because the creation of tidal brackish emergent wetland would predominantly result from the
7 conversion of managed wetlands. *CM12 Methylmercury Management* includes provisions for project-
8 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive
9 management and monitoring, CM12 could reduce the effects of methylmercury on Suisun shrew
10 resulting from BDCP tidal restoration.

11 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1B
12 would avoid and minimize the potential for substantial adverse effects on Suisun shrew, either
13 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that
14 could substantially reduce the number of Suisun shrew, or restrict the species' range. Therefore, the
15 indirect effects of Alternative 1B would not have an adverse effect on Suisun shrew.

16 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could
17 impact Suisun shrew within 100 feet of these disturbances. The use of mechanical equipment during
18 construction could cause the accidental release of petroleum or other contaminants that could
19 impact Suisun shrew and its habitat. The inadvertent discharge of sediment adjacent to Suisun
20 shrew habitat could also impact the species. With implementation of AMM1–AMM5 and AMM26 as
21 part of Alternative 1B construction, operation and maintenance, the BDCP would avoid the potential
22 for substantial adverse effects on Suisun shrew, either indirectly or through habitat modifications, in
23 that the BDCP would not result in a substantial reduction in numbers or a restriction in the range of
24 Suisun shrew. The indirect effects of Alternative 1B would have a less-than-significant impact on
25 Suisun shrew.

26 Suisun shrew could experience indirect effects from increased exposure to methylmercury as a
27 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects
28 of methylmercury would not result in a substantial reduction in numbers or a restriction in the
29 range of Suisun shrew, and, therefore, would have a less-than-significant impact on the species.

30 **San Joaquin Kit Fox and American Badger**

31 Within the study area, the modeled habitat for the San Joaquin kit fox and potential habitat for the
32 American badger is restricted to 5,327 acres of grassland habitat west of Clifton Court Forebay along
33 the study area's southwestern edge, in CZ 7–CZ 10. The study area represents the extreme
34 northeastern corner of the San Joaquin kit fox's range in California, which extends westward and
35 southward from the study area border. The northern range of the San Joaquin kit fox (including the
36 study area) was most likely marginal habitat historically and has been further degraded due to
37 development pressures, habitat loss, and fragmentation (Clark et al. 2007). CNDDB (California
38 Department of Fish and Wildlife 2013) reports twelve occurrences of San Joaquin kit foxes along the
39 extreme western edge of the Plan Area within CZ 8, south of Brentwood (Figure 12-49). However,
40 Clark et al. (2007) provide evidence that a number of CNDDB occurrences in the northern portion of
41 the species' range may be coyote pups misidentified as San Joaquin kit foxes. Smith et al. (2006)
42 suggest that the northern range may possibly be a population sink for the San Joaquin kit fox. There
43 are five American badger records in the study area (California Department of Fish and Wildlife

2013). Two are from 1938 and no longer extant. The remaining three are all located in CZ 8, west of Clifton Court Forebay.

Construction and restoration associated with Alternative 1B conservation measures would result in both temporary and permanent losses of San Joaquin kit and American badger habitat (Table 12-1B-59). Grassland restoration, and protection and management of natural communities could affect modeled San Joaquin kit fox habitat and potential American badger habitat. Full implementation of Alternative 1B would also include biological objectives over the term of the BDCP to benefit the San Joaquin kit fox which would also benefit American badger which uses similar habitat (BDCP Chapter 3, *Conservation Strategy*). The conservation strategy for the San Joaquin kit fox involves protecting and enhancing habitat in the northern extent of the species' range to increase the likelihood that kit fox may reside and breed in the Plan Area; and providing connectivity to habitat outside the Plan Area. The conservation measures that would be implemented to achieve the biological goals and objectives are summarized below.

- Protect and improve habitat linkages that allow terrestrial covered and other native species to move between protected habitats within and adjacent to the Plan Area (Objective L3.1, associated with CM3-CM8, and CM11).
- Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- Restore or create alkali seasonal wetlands in CZ 1, CZ 8, and/or CZ 11 (up to 72 acres of alkali seasonal wetland complex restoration) (Objective ASWNC1.2, associated with CM3 and CM9).
- Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and/or CZ 11, primarily in core vernal pool recovery areas identified in the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1, associated with CM3).
- Restore vernal pool complex in CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool acreage (up to 67 acres of vernal pool complex restoration) (Objective VPNC1.2, associated with CM3 and CM9).
- Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland (Objective GNC1.2, associated with CM3 and CM8).
- Increase burrow availability for burrow-dependent species in grasslands surrounding alkali seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective ASWNC2.3, associated with CM11).
- Increase prey, especially small mammals and insects, for grassland-foraging species in grasslands surrounding alkali seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective ASWNC2.4, associated with CM11).
- Increase burrow availability for burrow-dependent species in grasslands surrounding vernal pools within restored and protected vernal pool complex (Objective VPNC2.4, associated with CM11).
- Increase prey, especially small mammals and insects, for grassland-foraging species in grasslands surrounding vernal pools within restored and protected vernal pool complex (Objective VPNC2.5, associated with CM11).

- 1 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
- 2 CM11).
- 3 • Increase prey abundance and accessibility, especially small mammals and insects, for grassland-
- 4 foraging species (Objective GNC2.4, associated with CM11).

5 As explained below, with the restoration and protection of these amounts of habitat, in addition to
 6 the AMMs to reduce potential effects, impacts on San Joaquin kit fox and American badger would not
 7 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

8 **Table 12-1B-59. Changes in San Joaquin Kit Fox Modeled Habitat Associated with Alternative 1B**
 9 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Grassland	172	172	165	165	NA	NA
Total Impacts CM1		172	172	165	165		
CM2-CM18	Grassland	3	8	0	0	0	0
Total Impacts CM2-CM18		3	8	0	0	0	0
TOTAL IMPACTS		175	180	165	165	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

10

11 **Impact BIO-162: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Kit Fox**
 12 **and American Badger**

13 Alternative 1B conservation measures would result in the permanent and temporary loss combined
 14 of 345 acres of modeled habitat for the San Joaquin kit fox (Table 12-1B-59). Because American
 15 badger uses grasslands for denning and foraging and may occupy the same range as the San Joaquin
 16 kit fox in the project area, effects on are anticipated to be the same as those described for San
 17 Joaquin kit fox. Construction of Alternative 1B water conveyance facilities (CM1) and recreation
 18 facilities (CM11) would remove habitat. Habitat enhancement and management activities (CM11)
 19 could result in local adverse effects on species. In addition, construction vehicle activity could cause
 20 injury or mortality of San Joaquin kit foxes and badgers. Each of these individual activities is
 21 described below. A summary statement of the combined impacts and NEPA effects and a CEQA
 22 conclusion follow the individual conservation measure discussions.

- 23 • *CM1 Water Facilities and Operation*: Construction of the conveyance facilities would result in the
- 24 permanent loss of approximately 172 acres and the temporary loss of 165 acres of modeled San
- 25 Joaquin kit fox habitat and American badger habitat. This habitat is located in areas of

1 naturalized grassland in a highly disturbed or modified setting on lands immediately adjacent to
2 Clifton Court Forebay, in CZ 8.

- 3 ● *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails
4 and recreational staging areas would result in the permanent removal of 8 acres of San Joaquin
5 kit fox modeled habitat and American badger potential habitat. AMM24 would be implemented
6 to ensure that San Joaquin kit fox dens are avoided, as described in Appendix 3B, *Environmental*
7 *Commitments, AMMs, and CMs*. Mitigation Measure BIO-162: *Conduct Preconstruction Survey for*
8 *American Badger* would be implemented to ensure that American badger dens are avoided.

9 Passive recreation in the reserve system could result in disturbance of San Joaquin kit foxes and
10 American badgers at their den site. Natal and pupping dens would be particularly vulnerable to
11 human disturbance. Additionally, disease could be transmitted from domestic dogs that enter
12 the reserve system with recreational users. However, *AMM37 Recreation* and Mitigation
13 Measure BIO-162 would prohibit construction of new trails within 250 feet of active San Joaquin
14 kit fox and American badger dens. Existing trails would be closed within 250 feet of active
15 natal/pupping dens until young have vacated, and within 50 feet of other active dens. No dogs
16 would be allowed on reserve units with active San Joaquin kit fox and American badger
17 populations. Rodent control would be prohibited even on grazed or equestrian access areas with
18 San Joaquin kit fox populations. AMM37 measures to protect San Joaquin kit fox would also
19 benefit American badger if present. With these restrictions, recreation-related effects on San
20 Joaquin kit fox and American badger are expected to be minimal.

21 The BDCP would require the protection of grasslands in large patch sizes connected to existing
22 large areas of grassland, habitat corridors and transition habitat areas to improve the ecological
23 functions of the grasslands necessary to support the San Joaquin kit fox. American badger is
24 expected to benefit in a similar fashion.

25 The BDCP would require the enhancement and management of these protected existing
26 grasslands and restored grasslands to improve their function as a natural community of plants
27 and wildlife and for associated covered species, including San Joaquin kit fox and American
28 badger. The BDCP also includes actions to improve rodent prey availability.

29 However, management activities could result in injury or mortality of San Joaquin kit fox or
30 American badger if individuals were present in work sites or if dens were located in the vicinity
31 of habitat management work sites. A variety of habitat management actions included in *CM11*
32 that are designed to enhance wildlife values on protected lands may result in localized ground
33 disturbances that could temporarily remove small amounts of San Joaquin kit fox and American
34 badger habitat near Clifton Court Forebay, in CZ 8. Ground-disturbing activities, such as removal
35 of nonnative vegetation and road and other infrastructure maintenance activities, are expected
36 to have minor effects on available habitat and are expected to result in overall improvements to
37 and maintenance of San Joaquin kit fox and badger habitat values over the term of the BDCP.
38 These effects cannot be quantified, but are expected to be minimal and would be avoided and
39 minimized through the AMMs and mitigation measures listed below. These AMMs and
40 mitigation measures would remain in effect throughout the BDCP's construction phase.

- 41 ● *Operations and maintenance*: Ongoing maintenance of BDCP facilities would be expected to have
42 little if any adverse effect on San Joaquin kit fox or American badger. Postconstruction
43 operations and maintenance of the above-ground water conveyance facilities and restoration
44 infrastructure could result in ongoing but periodic disturbances that could affect either species'
45 use of the surrounding habitat near Clifton Court Forebay, in CZ 8. Maintenance activities would

1 include vegetation management, levee and structure repair, and regrading of roads and
2 permanent work areas. These effects, however, would be minimized with implementation of
3 AMM1–AMM6, AMM10, and AMM24 and with preconstruction surveys for the American badger,
4 as required by Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American*
5 *Badger*.

- 6 • Injury and direct mortality: Water conveyance facility construction may cause injury to or
7 mortality of either species. If San Joaquin kit fox or American badger reside where activities take
8 place (most likely in the vicinity of Clifton Court Forebay, in CZ 8), the operation of equipment
9 for land clearing, construction, operations and maintenance, and restoration, enhancement, and
10 management activities could result in injury to or mortality of either species. Measures would be
11 implemented to avoid and minimize injury to or mortality of these species as described in
12 AMM1–AMM6, AMM10, AMM24, and AMM37 (see Appendix 3B, *Environmental Commitments,*
13 *AMMs, and CMs*) and Mitigation Measure BIO-162.

14 The following paragraphs summarize the combined effects discussed above and describe other
15 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
16 also included.

17 ***Near-Term Timeframe***

18 Because water conveyance facilities construction is being evaluated at the project level, the near-
19 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
20 protection or restoration in an appropriate timeframe to ensure that the construction effects would
21 not be adverse under NEPA.

22 Under Alternative 1B there would be a loss of 340 acres of San Joaquin kit fox modeled habitat and
23 American badger habitat from CM1 (337 acres) and CM11 (3 acres). Typical NEPA project-level
24 mitigation ratio for the natural community that would be affected and that is identified in the
25 biological goals and objectives for San Joaquin kit fox in Chapter 3 of the BDCP would be 2:1 for
26 protection of grassland. Using this ratio would indicate that 680 acres of grassland should be
27 protected for San Joaquin kit fox to mitigate near-term losses.

28 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective
29 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland
30 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal
31 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000
32 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities
33 are expected to be concluded during the first 10 years of plan implementation, which is close enough
34 in time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes. These
35 commitments are more than sufficient to support the conclusion that the near-term effects of
36 Alternative 1B would be not be adverse under NEPA, because the number of acres required to meet
37 the typical ratios described above would be only 680 acres of grassland protected.

38 The effects on San Joaquin kit fox and American badger habitat from Alternative 1B as a whole
39 would represent an adverse effect as a result of habitat modification of a special-status species and
40 potential for direct mortality in the absence of other conservation actions. However, with habitat
41 protection, restoration associated, and management and enhancement with CM3, CM8, and CM11 in
42 addition to *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and*
43 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan,*

1 *AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils,*
2 *AMM10 Restoration of Temporarily Affected Natural Communities, AMM24 San Joaquin Kit Fox, and*
3 *AMM37 Recreation, the effects of Alternative 1B on San Joaquin kit fox and American badger would*
4 *not be adverse under NEPA. The AMMs include elements that avoid or minimize the risk of*
5 *construction activity affecting habitat and species adjacent to work areas and storage sites.*
6 *Remaining effects would be addressed by implementation of Mitigation Measure BIO-162. BDCP*
7 *Appendix 3.C describes the AMMs, which have since been updated and which are provided in*
8 *Appendix 3B, Environmental Commitments, AMMs, and CMs, of the Final EIR/EIS.*

9 **Late Long-Term Timeframe**

10 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 1B as a
11 whole would result in the permanent loss of and temporary effects on 345 acres of modeled habitat
12 for San Joaquin kit fox and potential habitat for American badger representing 6% of the modeled
13 habitat.

14 With full implementation of the BDCP, at least 1,000 acres of grassland would be protected in CZ 8,
15 where the San Joaquin kit fox and American badger is most likely to occur if present in the Plan Area.
16 Additionally, a portion of the 2,000 acres of grassland restoration would likely occur in CZ 8.
17 Assuming the restored grasslands would provide suitable San Joaquin kit fox habitat proportional to
18 the amount of modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in
19 the Plan Area consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored
20 grasslands would be suitable for both species.

21 Because San Joaquin kit fox home ranges are large (varying from approximately 1 to 12 square
22 miles; see BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the
23 conservation of the species. Grasslands would be acquired for protection in locations that provide
24 connectivity to existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining
25 San Joaquin kit fox habitat within and adjacent to the Plan Area. Connectivity to occupied habitat
26 adjacent to the Plan Area would help ensure the movement of San Joaquin kit foxes and American
27 badger, if present, to larger habitat patches outside of the Plan Area in Contra Costa County.
28 Grassland protection would focus in particular on acquiring the largest remaining contiguous
29 patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (BDCP
30 Appendix 2.A, *Covered Species Accounts*). This area connects to over 620 acres of existing habitat
31 that was protected under the East Contra Costa County HCP/NCCP. Grasslands in CZ 8 would also be
32 managed and enhanced to increase prey availability and to increase mammal burrows, which could
33 benefit the San Joaquin kit fox and American badger by increasing potential den sites, which are a
34 limiting factor for the San Joaquin kit fox in the northern portion of its range (Objectives ASWNC2.3,
35 ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective GNC2.3, and Objective GNC2.4). These
36 management and enhancement actions are expected to benefit the San Joaquin kit fox as well as the
37 American badger by increasing the habitat value of the protected and restoration grasslands.

38 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the
39 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this
40 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches
41 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool
42 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in
43 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities
44 construction.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
2 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
3 restoration of grassland and vernal pool that could overlap with the species model, would result in
4 the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In addition, protection of
5 grassland and vernal pool complex could overlap with the species model and would result in the
6 protection of 1,011 acres of modeled habitat for San Joaquin kit fox. These restoration and
7 protection actions would also benefit the American badger.

8 **NEPA Effects:** In the absence of other conservation actions, the effects on San Joaquin kit fox and
9 American badger habitat from Alternative 1B would represent an adverse effect as a result of
10 habitat modification and potential direct mortality of special-status species. However, with habitat
11 protection, restoration, management, and enhancement associated with CM3, CM8, and CM11, and
12 guided by AMM1–AMM6, AMM10, AMM24, AMM37, which would be in place throughout the time
13 period of construction, and with implementation of Mitigation Measure BIO-162, *Conduct*
14 *Preconstruction Survey for American Badger*, the effects of Alternative 1B as a whole on San Joaquin
15 kit fox and American badger would not be adverse under NEPA.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Because water conveyance facilities construction (CM1) is being evaluated at the project level, the
19 near-term BDCP strategy has been analyzed to determine whether it would provide sufficient
20 habitat protection or restoration in an appropriate timeframe to ensure that the construction effects
21 would be less than significant for CEQA purposes.

22 Under Alternative 1B there would be a loss of 340 acres of San Joaquin kit fox modeled habitat and
23 American badger habitat from CM1 (337 acres) and CM11 (3 acres). Typical CEQA project-level
24 mitigation ratio for the natural community that would be affected and that is identified in the
25 biological goals and objectives for San Joaquin kit fox in Chapter 3 of the BDCP would be 2:1 for
26 protection of grassland. Using this ratio would indicate that 680 acres of grassland should be
27 protected for San Joaquin kit fox and American badger to mitigate near-term losses.

28 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective
29 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland
30 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal
31 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000
32 acres of grassland (Objective GNC1.1).

33 These conservation actions would occur in the same timeframe as the construction losses, thereby
34 avoiding adverse effects of habitat loss on San Joaquin kit fox and American badger. These Plan
35 objectives represent performance standards for considering the effectiveness of CM3 protection and
36 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
37 and the additional detail in the biological objectives for San Joaquin kit fox and the mitigation
38 measure for American badger satisfy the typical mitigation that would be applied to the project-level
39 effects of CM1, as well as mitigate the near-term effects of the other conservation measures.

40 The BDCP also contains commitments to implement AMM1–AMM6, AMM10, AMM24, and AMM37
41 which include elements that avoid or minimize the risk of construction activity impacting habitat
42 and species adjacent to work areas. Remaining effects would be addressed by implementation of
43 Mitigation Measure BIO-162. BDCP Appendix 3.C describes the AMMs, which have since been

1 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
2 the Final EIR/EIS.

3 These commitments are more than sufficient to support the conclusion that the near-term effects of
4 Alternative 1B on San Joaquin kit fox and American badger would be less than significant under
5 CEQA, because the number of acres required to meet the typical ratios described above would be
6 only 680 acres of grassland protected.

7 ***Late Long-Term Timeframe***

8 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 1B as a
9 whole would result in the permanent loss of and temporary effects on 345 acres of modeled habitat
10 for San Joaquin kit fox and potential habitat for American badger representing 6% of the modeled
11 habitat.

12 With full implementation of Alternative 1B, at least 1,000 acres of grassland would be protected in
13 CZ 8, where the San Joaquin kit fox and American badger is most likely to occur if present in the Plan
14 Area. Additionally, a portion of the 2,000 acres of grassland restoration would likely occur in CZ 8.
15 Assuming the restored grasslands would provide suitable San Joaquin kit fox habitat proportional to
16 the amount of modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in
17 the Plan Area consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored
18 grasslands would be suitable for the species (6.6% of 2,000 acres). Because San Joaquin kit fox home
19 ranges are large (ranging from around 1 to 12 square miles; see BDCP Appendix 2.A, *Covered Species*
20 *Accounts*), habitat connectivity is key to the conservation of the species. Grasslands would be
21 acquired for protection in locations that provide connectivity to existing protected breeding habitats
22 in CZ 8 (Objective L3.1) and to other adjoining San Joaquin kit fox and American badger habitat
23 within and adjacent to the Plan Area. Connectivity to occupied habitat adjacent to the Plan Area
24 would help ensure the movement of San Joaquin kit foxes, if present, to larger habitat patches
25 outside of the Plan Area in Contra Costa County. Grassland protection would focus in particular on
26 acquiring the largest remaining contiguous patches of unprotected grassland habitat, which are
27 located south of SR 4 in CZ 8 (BDCP Appendix 2.A). This area connects to over 620 acres of existing
28 habitat that was protected under the East Contra Costa County HCP/NCCP. Grasslands in CZ 8 would
29 also be managed and enhanced to increase prey availability and to increase mammal burrows,
30 which could benefit the San Joaquin kit fox and American badger by increasing potential den sites,
31 which are a limiting factor for the San Joaquin kit fox in the northern portion of its range (Objectives
32 ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective GNC2.3, and Objective GNC2.4).
33 These management and enhancement actions are expected to benefit the San Joaquin kit fox as well
34 as the American badger by increasing the habitat value of the protected and restoration grasslands.

35 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the
36 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this
37 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches
38 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool
39 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in
40 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities
41 construction.

42 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
43 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
44 restoration of grassland and vernal pool that could overlap with the species model, would result in

1 the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In addition, protection of
2 grassland and vernal pool complex could overlap with the species model and would result in the
3 protection of 1,011 acres of modeled habitat for San Joaquin kit fox. These restoration and
4 protection actions would also benefit the American badger.

5 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger
6 habitat from Alternative 1B would represent an adverse effect as a result of habitat modification and
7 potential direct mortality of special-status species. However, with habitat protection, restoration,
8 management, and enhancement associated with CM3, CM8, and CM11, and guided by AMM1-AMM6,
9 AMM10, AMM24, and AMM37, which would be in place throughout the time period of construction,
10 and with implementation of Mitigation Measure BIO-162, the impact of Alternative 1B as a whole on
11 San Joaquin kit fox and American badger would not be significant under CEQA.

12 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

13 A qualified biologist provided by DWR will survey for American badger concurrent with the
14 preconstruction survey for San Joaquin kit fox and burrowing owl. If badgers are detected, the
15 biologist will passively relocate badgers out of the work area prior to construction if feasible. If
16 an active den is detected within the work area, DWR will establish a suitable buffer distance and
17 avoid the den until the qualified biologist determines the den is no longer active. Dens that are
18 determined to be inactive by the qualified biologist will be collapsed by hand to prevent
19 occupation of the den between the time of the survey and construction activities. In addition,
20 ground disturbance within project related conservation areas within 50 feet of active American
21 badger dens would be prohibited. Existing trails would be closed within 250 feet of active
22 natal/pupping dens until young have vacated, and within 50 feet of other active dens. No dogs
23 would be allowed on conservation areas with active American badger populations. Rodent
24 control would be prohibited on areas with American badger populations to ensure rodent prey
25 availability. Mitigation Measure BIO-162 is applicable to all ground-disturbing activities related
26 to construction, restoration, and operations and maintenance.

27 **Impact BIO-163: Indirect Effects of Plan Implementation on San Joaquin Kit Fox and** 28 **American Badger**

29 Noise and visual disturbances outside the project footprint but within 250 feet of construction
30 activities could temporarily affect modeled San Joaquin kit fox habitat and potential American
31 badger habitat. Water conveyance facilities operations and maintenance activities would include
32 vegetation and weed control, rodent control, canal maintenance, infrastructure and road
33 maintenance, levee maintenance, and maintenance and upgrade of electrical systems. Because
34 operations and maintenance are covered activities rodent control would be prohibited in areas with
35 San Joaquin kit fox or American badger populations to ensure rodent prey availability. While
36 maintenance activities are not expected to remove San Joaquin kit fox and badger habitat, operation
37 of equipment could disturb small areas of vegetation around maintained structures and could result
38 in injury or mortality of individual foxes and badgers, if present. Given the remote likelihood of
39 active San Joaquin kit fox or badger dens in the vicinity of the conveyance facilities, the potential for
40 this effect is small and would further be minimized with the implementation of seasonal no-
41 disturbance buffers around occupied dens, and implementation of other measures as described in
42 AMM1-AMM6, AMM10, AMM24, and AMM37 and Mitigation Measure BIO-162.

1 **NEPA Effects:** Implementation of the AMMs listed above and Mitigation Measure BIO-162, *Conduct*
2 *Preconstruction Survey for American Badger*, would avoid the potential for substantial adverse
3 effects on San Joaquin kit fox or American badger, either indirectly or through habitat modifications.
4 These measures would also avoid and minimize effects that could substantially reduce the number
5 of San Joaquin kit fox or American badger, or restrict either species' range. Therefore, the indirect
6 effects of Alternative 1B would not have an adverse effect on San Joaquin kit fox or American badger.

7 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
8 as construction-related noise and visual disturbances could impact San Joaquin kit fox and American
9 badger. With implementation of AMM1–AMM6, AMM10, AMM24, and AMM37 as part of Alternative
10 1B construction, operation, and maintenance, the BDCP would avoid the potential for significant
11 adverse effects on either species, either indirectly or through habitat modifications, and would not
12 result in a substantial reduction in numbers or a restriction in the range of either species. In
13 addition, Mitigation Measure BIO-162 would reduce the impact of indirect effects of Alternative 1B
14 on American badger to a less-than-significant level.

15 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

16 Please see Mitigation Measure BIO-162 under Impact BIO-162.

17 **San Joaquin Pocket Mouse**

18 This section describes the effects of Alternative 1B, including water conveyance facilities
19 construction and implementation of other conservation components, on San Joaquin pocket mouse.
20 Habitat for this species consists of the grassland natural community throughout the Plan Area. The
21 species requires friable soils for burrowing.

22 Construction and restoration associated with Alternative 1B conservation measures would result in
23 both temporary and permanent losses of San Joaquin pocket mouse habitat as indicated in Table 12-
24 1B-60. Full implementation of Alternative 1B would also include the following conservation actions
25 over the term of the BDCP that would likely benefit San Joaquin pocket mouse.

- 26 ● Protect at least 8,000 acres of grasslands (Objective GNC1.1, associated with CM3).
- 27 ● Restore at least 2,000 acres of grasslands to connect fragmented patches of protected grasslands
28 (Objective GNC1.2, associated with CM8).
- 29 ● Restore and sustain a mosaic of grassland vegetation alliances, reflecting localized water
30 availability, soil chemistry, soil texture, topography, and disturbance regimes, with
31 consideration of historical states (Objective GNC2.1).

32 As explained below, with the restoration or protection of these amounts of habitat, impacts on San
33 Joaquin pocket mouse would not be adverse for NEPA purposes and would be less than significant
34 for CEQA purposes.

1 **Table 12-1B-60. Changes in San Joaquin Pocket Mouse Habitat Associated with Alternative 1B**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Grassland	400	400	358	358	NA	NA
Total Impacts CM1		400	400	358	358		
CM2-CM18	Grassland	888	2,055	239	274	385-1,277	514
Total Impacts CM2-CM18		888	2,055	239	274	385-1,277	514
TOTAL IMPACTS		1,288	2,455	597	632	385-1,277	514

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-164: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Pocket**
5 **Mouse**

6 Alternative 1B conservation measures would result in the combined permanent and temporary loss
7 of up to 3,209 acres of habitat for San Joaquin pocket mouse (of which 2,654 acres would be a
8 permanent loss and 555 acres would be a temporary loss of habitat, Table 12-1B-60). Conservation
9 measures that would result in these losses are conveyance facilities and transmission line
10 construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass Fisheries
11 Enhancement (CM2), Tidal Natural Communities Restoration (CM4), Seasonally Inundated
12 Floodplain Restoration (CM5), Grassland Natural Community Restoration (CM8), Vernal Pool
13 Natural Community and Alkali Seasonal Wetland Complex Restoration (CM9), Nontidal Marsh
14 Restoration (CM10), and Conservation Hatcheries (CM18). The majority of habitat loss would result
15 from CM4. Habitat enhancement and management activities (CM11), which include ground
16 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In
17 addition, maintenance activities associated with the long-term operation of the water conveyance
18 facilities and other BDCP physical facilities could degrade or eliminate San Joaquin pocket mouse
19 habitat. Each of these individual activities is described below. A summary statement of the combined
20 impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would
22 result in the combined permanent and temporary loss of up to 761 acres of potential San
23 Joaquin pocket mouse habitat (403 acres of permanent loss, 358 acres of temporary loss) in CZ
24 3-CZ 6, CZ 8, and CZ 9. The majority of grassland that would be removed would be in CZ 8 and
25 CZ 9, from the construction of the new canals. Refer to the Terrestrial Biology Map Book for a
26 detailed view of Alternative 1B construction locations. Construction of the forebay would affect

1 the area where there is a record of San Joaquin pocket mouse (California Department of Fish and
2 Wildlife 2013).

- 3 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
4 (CM2) would permanently remove 261 acres of potential San Joaquin pocket mouse habitat in
5 the Yolo Bypass in CZ 2. In addition, 165 acres would be temporarily removed. Most of the
6 grassland losses would occur at the north end of the bypass below Fremont Weir, along the Toe
7 Drain/Tule Canal, and along the west side channels.
- 8 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration (CM4) site preparation
9 and inundation would permanently remove an estimated 1,506 acres of potential San Joaquin
10 pocket mouse habitat. The majority of the losses would likely occur in the vicinity of Cache
11 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and
12 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
13 directly impact and fragment remaining grassland just north of Rio Vista in and around French
14 and Prospect Islands, and in an area south of Rio Vista around Threemile Slough.
- 15 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
16 seasonally inundated floodplain (CM5) would permanently and temporarily remove
17 approximately 481 acres of San Joaquin pocket mouse habitat (449 permanent, 32 temporary).
18 These losses would be expected to occur along the San Joaquin River and other major
19 waterways in CZ 7.
- 20 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
21 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
22 result from implementation of *CM8* and *CM9* in CZ 1, CZ 8, and CZ 11. However, all areas would
23 be restored to their original or higher value habitat after the construction periods. The resulting
24 restoration of 2,000 acres of grassland would benefit San Joaquin pocket mouse.
- 25 • *CM11 Natural Communities Enhancement and Management*: The protection of 8,000 acres of
26 grassland for covered species is also expected to benefit San Joaquin pocket mouse by protecting
27 existing habitats from potential loss or degradation that otherwise could occur with future
28 changes in existing land use. Habitat management and enhancement-related activities could
29 cause disturbance or direct mortality to San Joaquin pocket mouse if they are present near work
30 areas.

31 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*
32 *and Management* that are designed to enhance wildlife values in restored or protected habitats
33 could result in localized ground disturbances that could temporarily remove small amounts of
34 San Joaquin pocket mouse habitat. Ground-disturbing activities, such as removal of nonnative
35 vegetation and road and other infrastructure maintenance activities, would be expected to have
36 minor adverse effects on habitat and would be expected to result in overall improvements to
37 and maintenance of habitat values over the term of the BDCP. Noise and visual disturbance from
38 management-related equipment operation could temporarily displace individuals or alter the
39 behavior of the species if adjacent to work areas. With full implementation of the BDCP,
40 enhancement and management actions designed for western burrowing owl would also be
41 expected to benefit these species. San Joaquin pocket mouse would benefit particularly from
42 protection of grassland habitat against potential loss or degradation that otherwise could occur
43 with future changes in existing land use.

- 1 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of San
2 Joaquin pocket mouse habitat.
- 3 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
4 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
5 disturbances that could affect San Joaquin pocket mouse use of the surrounding habitat.
6 Maintenance activities would include vegetation management, levee and structure repair, and
7 re-grading of roads and permanent work areas. These effects, however, would be reduced by
8 AMMs and conservation actions as described below.
- 9 ● *Injury and Direct Mortality*: Construction could result in direct mortality of San Joaquin pocket
10 mouse if present in construction areas.

11 The following paragraphs summarize the combined effects discussed above and describe other
12 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
13 also included.

14 ***Near-Term Timeframe***

15 Because the water conveyance facility construction is being evaluated at the project level, the near-
16 term BDCP conservation strategy has been evaluated to determine whether it would provide
17 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
18 effects of such conveyance facility construction would not be adverse under NEPA. Alternative 1B
19 would remove 1,877 acres of San Joaquin pocket mouse habitat (1,354 permanent, 523 temporary)
20 in the study area in the near-term. One record of San Joaquin pocket mouse near Clifton Court
21 forebay could be affected by the construction of the new forebay. These effects would result from
22 the construction of the water conveyance facilities (CM1, 761 acres), and implementing other
23 conservation measures (Yolo Bypass Fisheries Enhancement [CM2] Tidal Natural Communities
24 Restoration [CM4], Seasonally Inundated Floodplain Restoration [CM5], Grassland Natural
25 Community Restoration [CM8], Vernal Pool and Alkali Seasonal Wetland Complex Restoration
26 [CM9], and Conservation Hatcheries [CM18] 1,116 acres).

27 Typical NEPA project-level mitigation ratios for those natural communities affected by CM1 would
28 be 2:1 protection of grassland habitat. Using these typical ratios would indicate that 1,522 acres of
29 grassland natural communities should be protected to mitigate the CM1 permanent and temporary
30 effects on 751 acres of San Joaquin pocket mouse habitat. The BDCP has committed to near-term
31 goals of protecting 2,000 acres and restoring 1,140 acres of grassland natural community in CZ 1, CZ
32 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and restoration of grasslands, would result in a
33 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
34 would expand habitat for San Joaquin pocket mouse and reduce the effects of current levels of
35 habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, San
36 Joaquin pocket mouse would likely benefit from the management of the grasslands for general
37 wildlife benefit.

38 These natural community biological goals and objectives would inform the near-term protection and
39 restoration efforts and represent performance standards for considering the effectiveness of
40 restoration actions for the species. The acres of protection and restoration contained in the near-
41 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level
42 effects of CM1, especially considering that a large portion of the affected grasslands consists of thin

1 strips of grassland along levees and that areas of grassland protection and restoration would be in
2 large contiguous blocks.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
7 *Affected Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of
8 affecting habitats and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes
9 the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
10 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

11 **Late Long-Term Timeframe**

12 Based on the habitat model, the study area supports approximately 78,624 acres of potential habitat
13 for San Joaquin pocket mouse. Alternative 1B as a whole would result in the permanent loss of and
14 temporary effects on 3,209 acres of grasslands that could be suitable for San Joaquin pocket mouse
15 (4% of the habitat in the study area). The locations of these losses are described above in the
16 analyses of individual conservation measures. The Plan includes a commitment to restore or create
17 at least 2,000 acres of grassland in CZ 1, CZ 8 and CZ 11 and to protect 8,000 acres of grassland (with
18 at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000 acres protected in CZ
19 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11 in the
20 study area). All protected habitat would be managed under *CM11 Natural Communities Enhancement*
21 *and Management*.

22 **NEPA Effects:** In the absence of other conservation actions, the loss of San Joaquin pocket mouse
23 habitat associated with Alternative 1B would represent an adverse effect as a result of habitat
24 modification and potential mortality of a special-status species. However, with habitat protection
25 and restoration associated with CM3, CM8, and CM11, guided by biological goals and objectives and
26 by AMM1–AMM6, and AMM10 which would be in place throughout the construction period, the
27 effects of habitat loss and potential mortality under Alternative 1B on San Joaquin pocket mouse
28 would not be adverse.

29 **CEQA Conclusion:** Alternative 1B (CM1–CM5, and CM11) would have both temporary and
30 permanent impacts on San Joaquin pocket mouse and its habitat and operation of construction
31 equipment could disturb individuals, if present in the study area.

32 **Near-Term Timeframe**

33 Because the water conveyance facility construction is being evaluated at the project level, the near-
34 term BDCP conservation strategy has been evaluated to determine whether it would provide
35 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
36 effects of such conveyance facility construction would be less than significant under CEQA.
37 Alternative 1B would remove 1,877 acres of modeled (1,354 permanent, 523 temporary) habitat for
38 San Joaquin pocket mouse in the study area in the near-term. One record of San Joaquin pocket
39 mouse near Clifton Court forebay could be affected by the construction of the new forebay. These
40 effects would result from the construction of the water conveyance facilities (CM1, 761 acres), and
41 implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal*
42 *Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM8 Grassland*

1 *Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration,*
2 *and CM18 Conservation Hatcheries—1,116 acres).*

3 Typical CEQA project-level mitigation ratios for those natural communities affected by CM1 would
4 be 2:1 protection of grassland habitat. Using these typical ratios would indicate that 1,522 acres of
5 grassland natural communities should be protected to mitigate the CM1 losses of 645 acres of San
6 Joaquin pocket mouse habitat.

7 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
8 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and
9 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,
10 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and
11 reduce the effects of current levels of habitat fragmentation. Under CM11 Natural Communities
12 Enhancement and Management, San Joaquin pocket mouse would likely benefit from the
13 management of the grasslands for general wildlife benefit.

14 These natural community biological goals and objectives would inform the near-term protection and
15 restoration efforts and represent performance standards for considering the effectiveness of
16 restoration actions for the species. The acres of protection and restoration contained in the near-
17 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level
18 effects of CM1, especially considering that a large portion of the affected grasslands consists of thin
19 strips of grassland along levees and that areas of grassland protection and restoration would be in
20 large contiguous blocks.

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
22 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
23 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
24 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM10 Restoration of Temporarily*
25 *Affected Natural Communities.* All of these AMMs include elements that avoid or minimize the risk of
26 affecting habitats and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes
27 the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
28 *Commitments, AMMs, and CMs,* of the Final EIR/EIS.

29 These commitments are more than sufficient to support the conclusion that the near-term effects of
30 Alternative 1B would be less than significant under CEQA.

31 ***Late Long-Term Timeframe***

32 Based on the habitat model, the study area supports approximately 78,624 acres of potential habitat
33 for San Joaquin pocket mouse. Alternative 1B as a whole would result in the permanent loss of and
34 temporary effects on 3,209 acres of grasslands that could be suitable for San Joaquin pocket mouse
35 (4% of the habitat in the study area). The locations of these losses are described above in the
36 analyses of individual conservation measures. The Plan includes a commitment to restore or create
37 at least 2,000 acres of grassland in CZ 1, CZ 8 and CZ 11 and to protect 8,000 acres of grassland (with
38 at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000 acres protected in CZ
39 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11 in the
40 study area). All protected habitat would be managed under *CM11 Natural Communities Enhancement*
41 *and Management.*

42 Considering these protection and restoration provisions, which would provide acreages of new
43 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction

1 and restoration activities, and with implementation of AMM1–AMM6, and AMM10, the loss of
2 habitat or direct mortality through implementation of Alternative 1B would not result in a
3 substantial adverse effect through habitat modifications and would not substantially reduce the
4 number or restrict the range of San Joaquin pocket mouse. Therefore, the loss of habitat or potential
5 mortality under this alternative would have a less-than-significant impact on San Joaquin pocket
6 mouse.

7 **Impact BIO-165: Indirect Effects of Plan Implementation on San Joaquin Pocket Mouse**

8 Construction activities associated with water conveyance facilities, conservation components and
9 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
10 conveyance facilities, including the transmission facilities, could result in ongoing periodic
11 postconstruction disturbances and noise with localized effects on San Joaquin kit pocket mouse and
12 its habitat over the term of the BDCP. These potential effects would be minimized and avoided
13 through AMM1–AMM6 and AMM10, which would be in effect throughout the plan’s construction
14 phase.

15 Water conveyance facilities operations and maintenance activities would include vegetation and
16 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
17 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance
18 activities are not expected to remove pocket mouse habitat, operation of equipment could disturb
19 small areas of vegetation around maintained structures and could result in injury or mortality of
20 individual pocket mice, if present.

21 **NEPA Effects:** Implementation of the AMMs listed above would avoid the potential for substantial
22 adverse effects on San Joaquin pocket mouse, either indirectly or through habitat modifications.
23 These measures would also avoid and minimize effects that could substantially reduce the number
24 of San Joaquin pocket mouse, or restrict the species’ range. Therefore, the indirect effects of
25 Alternative 1B would not have an adverse effect on San Joaquin pocket mouse.

26 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
27 as construction-related noise and visual disturbances could impact San Joaquin pocket mouse. With
28 implementation of AMM1–AMM6 and AMM10, as part of Alternative 1B construction, operation, and
29 maintenance, the BDCP would avoid the potential for significant adverse effects on either species,
30 either indirectly or through habitat modifications, and would not result in a substantial reduction in
31 numbers or a restriction in the range of the species. Therefore, the indirect effects under this
32 alternative would have a less-than-significant impact on San Joaquin pocket mouse.

33 **Special-Status Bat Species**

34 Special-status bat species with potential to occur in the study area employ varied roost strategies,
35 from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as
36 tunnels, buildings, and bridges. Various roost strategies could include night roosts, maternity roosts,
37 migration stopover, or hibernation. The habitat types used to assess effects for special-status bats
38 roosting habitat includes valley/foothill riparian natural community, developed lands and
39 landscaped trees, including eucalyptus, palms and orchards. Potential foraging habitat includes all
40 riparian habitat types, cultivated lands, developed lands, grasslands, and wetlands.

41 There is potential for at least thirteen different bat species to be present in the study area (Figure
42 12-51), including four California species of special concern and nine species ranked from low to

1 moderate priority by the Western Bat Working Group (Table 12A-2 in Appendix 12A, *Special-Status*
2 *Species with Potential to Occur in the Study Area*). In 2009, DHCCP conducted a large-scale effort that
3 involved habitat assessments, bridge surveys, and passive acoustic monitoring surveys for bats (see
4 Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report* for
5 details on methods and results, and Table 12A-2 in Appendix 12A).

6 The majority of the parcels assessed during field surveys contained bat foraging and roosting
7 features and were considered highly suitable habitat, at the time of the 2009 field surveys, DWR
8 biologists initially identified 145 bridges in their survey area. Eleven of the 145 bridges were not
9 accessible and thirteen were determined to not be suitable for bats. Evidence of bat presence was
10 observed at six of the bridges and bat sign (guano, urine staining, odor, or vocalizations) was
11 observed at 26 of the bridges. biologists observed Mexican free-tailed bats at four of the bridges and
12 unidentified species at the remaining two bridges. One of these bridges, over the Yolo Causeway,
13 was used by approximately 10,000 Mexican free-tailed bats, indicating a maternity roost. A second
14 roost site of about 50 individuals was observed under a bridge in eastern Solano County.

15 The remaining 89 bridges contained structural features that were considered conducive to
16 maternity, solitary, day and/or night roosting. Night roosts may have crevices and cracks but more
17 often have box beams or other less protected roosting spots where bats rest temporarily while
18 feeding. Day roosts are commonly found in bridges with expansion joints, crevices, or cracks where
19 bats are protected from predators and weather. Seventeen bridges in the survey area had no
20 potential for roosting because they lacked surface features from which bats could hang and offered
21 no protection from weather or predators.

22 Construction and restoration associated with Alternative 1B conservation measures would result in
23 both temporary and permanent losses of foraging and roosting habitat for special-status bats as
24 indicated in Table 12-1B-61. Protection and restoration for special-status bat species focuses on
25 habitats and does not include manmade structures such as bridges. The conservation measures that
26 would be implemented to achieve the biological goals and objectives that would also benefit special-
27 status bats are summarized below.

- 28 ● Protect or restore 142,200 acres of high-value natural communities (Objective L1.1, associated
29 with CM3). This objective includes protecting and restoring a variety of habitat types described
30 below (BDCP Chapter 3, Table 3.3-2).
 - 31 ○ Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
32 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
 - 33 ○ Protect 600 acres of existing vernal pool complex (Objective VPNC1.1, associated with CM3).
 - 34 ○ Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
 - 35 ○ Protect 8,100 acres of managed wetland (Objective MWNC1.1, associated with CM3 and
36 CM11).
 - 37 ○ Protect 48,625 acres of cultivated lands (Objective CLNC1.1, associated with CM3 and
38 CM11).
 - 39 ○ Protect, restore, or create 2,740 acres of rice land or equivalent habitat type for the giant
40 garter snake (Objective GGS3.1, associated with CM3, CM4, and CM10).
 - 41 ○ Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective
42 GNC1.2, associated with CM3 and 8).

- 1 ○ Restore 67 acres of vernal pool complex (Objective VPNC1.2, associated with CM3 and 9).
- 2 ○ Restore and protect 65,000 acres of tidal natural communities (Objective L1.2, associated
- 3 with CM2, 3, and 4).
- 4 ○ Restore or create 5,000 acres of valley/foothill riparian natural community (Objective
- 5 VFRNC1.1, associated with CM3 and CM7).
- 6 ○ Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
- 7 (Objective VFRNC1.2, associated with CM3).

8 As explained below, with the restoration and protection of these amounts of habitat, in addition to
 9 mitigation measures to reduce potential effects, impacts on special-status bats would not be adverse
 10 for NEPA purposes and would be less than significant for CEQA purposes.

11 **Table 12-1B-61. Changes in Special-Status Bat Roosting and Foraging Habitat Associated with**
 12 **Alternative 1B (acres) ^a**

Conservation Measure ^b	Habitat Type ^c	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT ^d	CM2	CM5
CM1	Roosting	474	474	322	322	NA	NA
	Foraging	8,572	8,572	13,255	13,255	NA	NA
Total Impacts CM1		9,046	9,046	13,577	13,577	NA	NA
CM2-CM18	Roosting	524	1,570	167	212	324	411
	Foraging	14,497	60,399	773	2,126	21,265	10,137
Total Impacts CM2-CM18		15,021	61,969	940	2,338	21,589	10,548
TOTAL IMPACTS		24,067	71,015	14,517	15,915	21,589	10,548

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c Affected roosting habitat acreages include valley/foothill riparian habitat, developed lands, and orchards. An unknown number of buildings, bridges, tunnels, and individual trees could also be affected but were not included in this analysis. Foraging habitat includes all natural communities, cultivated lands, and developed lands in the study area. Foraging habitat effects for CM2-CM18 were not considered adverse as they reflect a conversion from one foraging habitat type (mostly cultivated lands) to another foraging habitat (wetlands).

^d LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^e Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as the maximum possible based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

13

Impact BIO-166: Loss or Conversion of Habitat for and Direct Mortality of Special-Status Bats

Alternative 1B conservation measure CM1 would result in the permanent and temporary loss combined of up to 796 acres of roosting habitat and 21,827 acres of foraging habitat for special-status bats in the study area. DWR identified three bridges as potential night roosting that could be affected by construction in CM1. Conservation measures Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5) would result in the permanent and temporary loss of 1,782 acres of roosting habitat and the conversion of approximately 65,525 acres of foraging habitat from mostly cultivated lands and managed wetlands to tidal and nontidal wetlands. Habitat enhancement and management activities (CM11) could result in local adverse effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could affect special-status bat habitat. A summary of combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure discussions.

- *CM1 Water Facilities and Operation:* Construction of Alternative 1B conveyance facilities would result in the permanent loss of approximately 474 acres of roosting habitat and 8,572 acres of foraging habitat in the study area. Development of the water conveyance facilities would also result in the temporary removal of up to 322 acres of roosting habitat and up to 13,255 acres of foraging habitat for special-status bats in the study area (Table 12-1B-61). DWR identified three bridges with potential night roosting habitat for bats; one is in a new bridge construction area, the other two are within the railroad work area that could be affected by construction for CM1.
- *CM2 Yolo Bypass Fisheries Enhancement:* Improvements in the Yolo Bypass would result in the conversion of approximately 2,025 acres of foraging habitat into wetlands that could still be used by bats for foraging. CM2 would also result in the permanent removal of 89 acres and temporary removal of 167 acres of roosting habitat for special-status bats. The maternity colony of Mexican free-tailed bats located at both ends of the Yolo Causeway bridge could also be affected during construction for CM2. Implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, would ensure that improvements in the Yolo Bypass avoid effects on roosting special-status bats.
- *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and inundation would result in the conversion of approximately 56,810 acres of foraging habitat into wetlands that could still be used by bats for foraging. Approximately 1,425 acres of roosting habitat for special-status bats would permanently affected. This habitat is of low value, consisting of a small, isolated patch surrounded by cultivated lands, and the species has a relatively low likelihood of being present in these areas. The roosting habitat that would be removed consists of relatively small and isolated patches along canals and irrigation ditches surrounded by cultivated lands in the Union Island and Roberts Island areas, and several small patches along the San Joaquin River. Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, described below, requires that tidal natural communities restoration avoid effects on roosting special-status bats.
- *CM5 Seasonally Inundated Floodplain Restoration:* Levee construction associated with floodplain restoration would result in the conversion of an estimated 3,690 acres of foraging habitat into wetlands that could still be used by bats for foraging. CM5 would also result in the permanent removal of 57 acres and temporary removal of 45 acres of roosting habitat for special-status bats in the study area.

- 1 ● *CM11 Natural Communities Enhancement and Management*: Implementation of Alternative 1B
2 would result in an overall benefit to special-status bats within the study area through protection
3 and restoration of their foraging and roosting habitats. The majority of affected acres would
4 convert agricultural land to natural communities with higher potential foraging and roosting
5 value, such as riparian, tidal and nontidal wetlands, and periodically inundated lands.
6 Implementation of Restored foraging habitats primarily would replace agricultural lands.
7 Restored habitats are expected to be of higher function because the production of flying insect
8 prey species is expected to be greater in restored wetlands and uplands on which application of
9 pesticides would be reduced relative to affected agricultural habitats. Noise and visual
10 disturbances during implementation of riparian habitat management actions could result in
11 temporary disturbances that, if bat roost sites are present, could cause temporary abandonment
12 of roosts. This effect would be minimized with implementation of Mitigation Measure BIO-166,
13 *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*.
- 14 ● *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have
15 little if any adverse effect on special-status bats. Postconstruction operation and maintenance of
16 the above-ground water conveyance facilities and restoration infrastructure could result in
17 ongoing but periodic disturbances that could affect special-status bat use of the surrounding
18 habitat in the Yolo Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ
19 4, CZ 5, CZ 6, CZ 7 and CZ 8). Maintenance activities would include vegetation management,
20 levee and structure repair, and regrading of roads and permanent work areas. These effects,
21 however, would be minimized with implementation of the mitigation measure described below.
- 22 ● *Injury and direct mortality*: In addition, to habitat loss and conversion, construction activities,
23 such as grading, the movement of construction vehicles or heavy equipment, and the installation
24 of water conveyance facilities components and new transmission lines, may result in the direct
25 mortality, injury, or harassment of roosting special-status bats. Construction activities related to
26 conservation components could have similar affects. Preconstruction surveys would be
27 conducted and if roosting or maternity sites are detected, seasonal restrictions would be placed
28 while bats are present, as described below in the mitigation measure.

29 The following paragraphs summarize the combined effects discussed above and describe other
30 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are
31 also included.

32 ***Near-Term Timeframe***

33 Because water conveyance facilities construction is being evaluated at the project level, the near-
34 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
35 protection or restoration in an appropriate timeframe to ensure that the construction effects would
36 not be adverse under NEPA. Because the majority of affected acres would convert agricultural land
37 to natural communities with higher potential foraging and roosting value, such as riparian, tidal and
38 nontidal wetlands, and periodically inundated lands this analysis focuses only on losses of roosting
39 habitat under CM1, CM2, and CM4.

40 Alternative 1B would permanently or temporarily affect 1,487 acres of roosting habitat for special-
41 status bats in the near-term as a result of implementing CM1 (796 acres roosting habitat), CM2 (256
42 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in
43 the late long-term. Only 565 acres of the 1,487 acres of roosting habitat losses would be in
44 valley/foothill riparian habitat.

1 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
2 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian
3 natural community. Using these ratios would indicate that 565 acres of riparian habitat should be
4 restored and 565 acres of riparian habitat should be protected.

5 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status
6 bats within the study area through protection and restoration of their foraging and roosting habitats
7 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and
8 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities
9 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and
10 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging
11 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective
12 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and
13 Objective GNC1.1.). Restored foraging habitats would replace primarily cultivated lands. Restored
14 habitats are expected to be of higher function because the production of flying insect prey species is
15 expected to be greater in restored wetlands and uplands on which application of pesticides would
16 be reduced relative to affected agricultural habitats. Conservation components in the near-term
17 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 1B.

18 In addition, activities associated with natural communities enhancement and protection and with
19 ongoing facilities operations and maintenance could affect special-status bat use of surrounding
20 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,
21 described below, requires preconstruction surveys to reduce these effects.

22 The BDCP also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
26 *Affected Natural Communities*. These AMMs include elements that avoid or minimize the risk of
27 construction activity affecting habitat and species adjacent to work areas and storage sites. BDCP
28 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
29 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

30 **Late Long-Term Timeframe**

31 Alternative 1B as a whole would affect 2,578 acres of roosting habitat (Table 12-1B-61). Because the
32 majority of affected acres would convert agricultural land to natural communities with higher
33 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically
34 inundated lands this analysis focuses only on losses of roosting habitat under CM1, CM2, CM4, and
35 CM5.

36 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-
37 status bats within the study area through protection and restoration of approximately 142,200 acres
38 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to
39 protect the highest quality natural communities and covered species habitat in the Plan Area to
40 optimize the ecological value of the reserve system for conserving covered species and native
41 biodiversity. The target for total protected and restored acreage is based on the sum of all natural
42 community acreage targets. Achieving this objective is intended to protect and restore natural
43 communities, species-specific habitat elements, and species diversity on a landscape-scale.,
44 Achieving this objective is also intended to conserve representative natural and seminatural

1 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired
2 ecosystem function, and biological diversity.

3 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and
4 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging
5 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,
6 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,
7 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored
8 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of
9 higher function because the production of flying insect prey species is expected to be greater in
10 restored wetlands and uplands on which application of pesticides would be reduced relative to
11 affected agricultural habitats.

12 Should any of the special-status bat species be detected roosting in the study area, construction of
13 water conveyance facilities and restoration activities would have an adverse effect on roosting
14 special-status bats. Noise and visual disturbances and the potential for injury or mortality of
15 individuals associated within implementation of the restoration activities on active roosts would be
16 minimized with implementation of Mitigation Measure BIO-166. Conservation components would
17 sufficiently offset the adverse effects resulting from late long-term effects from CM1, CM2, CM4, and
18 CM5.

19 **NEPA Effects:** In the near-term the losses of roosting and foraging habitat for special-status bats
20 associated with implementing Alternative 1B are not expected to result in substantial adverse
21 effects on special-status bats, either directly or through habitat modifications, and would not result
22 in a substantial reduction in numbers or a restriction in the range of special-status bats because the
23 BDCP has committed to protecting the acreage required to meet the typical mitigation ratios
24 described above. In the late long-term, the losses of roosting and foraging habitat for special-status
25 bats associated with Alternative 1B, in the absence of other conservation actions, would represent
26 an adverse effect as a result of habitat modification and potential direct mortality of special-status
27 species. However, with habitat protection and restoration associated with the conservation
28 components, guided by landscape-scale goals and objectives and by AMM1–AMM6 and AMM10, and
29 with implementation of Mitigation Measure BIO-166, the effects of Alternative 1B as a whole on
30 special-status bats would not be adverse.

31 **CEQA Conclusion:**

32 **Near-Term Timeframe**

33 Because water conveyance facilities construction is being evaluated at the project level, the near-
34 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
35 protection or restoration in an appropriate timeframe to ensure that the construction effects would
36 be less than significant under CEQA. Because the majority of affected acres would convert
37 agricultural land to natural communities with higher potential foraging and roosting value, such as
38 riparian, tidal and nontidal wetlands, and periodically inundated lands this analysis focuses only on
39 losses to roosting habitat for CM1, CM2, and CM4 in the near-term.

40 Alternative 1B would permanently or temporarily affect 1,487 acres of roosting habitat for special-
41 status bats in the near-term as a result of implementing CM1 (796 acres roosting habitat), CM2 (256
42 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in

1 the late long-term. Only 565 acres of the 1,487 acres of roosting habitat losses would be in
2 valley/foothill riparian habitat.

3 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
4 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian
5 natural community. Using these ratios would indicate that 565 acres of riparian habitat should be
6 restored and 565 acres of riparian habitat should be protected.

7 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status
8 bats within the study area through protection and restoration of their foraging and roosting habitats
9 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and
10 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities
11 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and
12 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging
13 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective
14 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and
15 Objective GNC1.1.). Restored foraging habitats would replace primarily cultivated lands. Restored
16 habitats are expected to be of higher function because the production of flying insect prey species is
17 expected to be greater in restored wetlands and uplands on which application of pesticides would
18 be reduced relative to affected agricultural habitats. Conservation components in the near-term
19 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 1B.

20 In addition, activities associated with natural communities enhancement and protection and with
21 ongoing facilities operations and maintenance could affect special-status bat use of surrounding
22 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,
23 described below, requires preconstruction surveys to reduce these impacts to a less-than-significant
24 level.

25 The permanent loss of roosting habitat from Alternative 1B would be mitigated through
26 implementation of Mitigation Measure BIO-166, which would ensure there is no significant impact
27 under CEQA on roosting special-status bats, either directly or through habitat modifications and no
28 substantial reduction in numbers or a restriction in the range of special-status bats. The BDCP also
29 contains commitments to implement AMM1–AMM6 and AMM10. These AMMs include elements that
30 avoid or minimize the risk of construction activity affecting habitat and species adjacent to work
31 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
32 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
33 EIR/EIS.

34 **Late Long-Term Timeframe**

35 Alternative 1B as a whole would affect 2,578 acres of roosting habitat (Table 12-1B-61). Because the
36 majority of affected acres would convert agricultural land to natural communities with higher
37 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically
38 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5
39 in the late long-term.

40 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-
41 status bats within the study area through protection and restoration of approximately 142,200 acres
42 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to
43 protect the highest quality natural communities and covered species habitat in the Plan Area to

1 optimize the ecological value of the reserve system for conserving covered species and native
2 biodiversity. The target for total protected and restored acreage is based on the sum of all natural
3 community acreage targets. Achieving this objective is intended to protect and restore natural
4 communities, species-specific habitat elements, and species diversity on a landscape-scale.,
5 Achieving this objective is also intended to conserve representative natural and seminatural
6 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired
7 ecosystem function, and biological diversity.

8 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and
9 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging
10 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,
11 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,
12 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored
13 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of
14 higher function because the production of flying insect prey species is expected to be greater in
15 restored wetlands and uplands on which application of pesticides would be reduced relative to
16 affected agricultural habitats.

17 Should any of the special-status bat species roost in the study area, construction of water
18 conveyance facilities and restoration activities would have an adverse effect on roosting special-
19 status bats. Noise and visual disturbances and the potential injury or mortality of individuals as a
20 result of implementation of the Alternative 1B activities would be minimized with implementation
21 of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement*
22 *Protective Measures*. Conservation components would sufficiently offset the adverse effects resulting
23 from late long-term effects from CM1, CM2, CM4, and CM5.

24 The permanent loss of roosting habitat resulting from Alternative 1B would be mitigated through
25 implementation of Mitigation Measure BIO-166, which would ensure there is no significant impact
26 under CEQA on roosting special-status bats, either directly or through habitat modifications, and no
27 substantial reduction in numbers or a restriction in the range of special-status bats. Therefore,
28 Alternative 1B would not result in a significant impact on special-status bats under CEQA.

29 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
30 **Implement Protective Measures**

31 The following measure was designed to avoid and minimize adverse direct and indirect effects
32 on special-status bats. However, baseline data are not available or are limited on how bats use
33 the study area, and on individual numbers of bats and how they vary seasonally. Therefore, it is
34 difficult to determine if there would be a substantial reduction in species numbers. Bat species
35 with potential to occur in the study area employ varied roost strategies, from solitary roosting in
36 foliage of trees to colonial roosting in trees and artificial structures, such as buildings and
37 bridges. Daily and seasonal variations in habitat use are common. To obtain the highest
38 likelihood of detection, preconstruction bat surveys will be conducted by DWR and will include
39 these components.

- 40 ● Identification of potential roosting habitat within project footprint.
- 41 ● Daytime search for bats and bat sign in and around identified habitat.
- 42 ● Evening emergence surveys at potential day-roost sites, using night-vision goggles and/or
- 43 active full-spectrum acoustic monitoring where species identification is sought.

- 1 • Passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from
2 dusk to dawn over multiple nights.
- 3 • Additional on-site night surveys as needed following passive acoustic detection of special
4 status bats to determine nature of bat use of the structure in question (e.g., use of structure
5 as night roost between foraging bouts).
- 6 • Qualified biologists will have knowledge of the natural history of the species that could
7 occur in the study area and experience using full-spectrum acoustic equipment. During
8 surveys, biologists will avoid unnecessary disturbance of occupied roosts.

9 ***Preconstruction Bridges and Other Structure Surveys***

10 Before work begins on the bridge/structure, qualified biologists will conduct a daytime search
11 for bat sign and evening emergence surveys to determine if the bridge/structure is being used
12 as a roost. Biologists conducting daytime surveys would listen for audible bat calls and would
13 use naked eye, binoculars, and a high-powered spotlight to inspect expansion joints, weep holes,
14 and other bridge features that could house bats. Bridge surfaces and the ground around the
15 bridge/structure would be surveyed for bat sign, such as guano, staining, and prey remains.

16 Evening emergence surveys will consist of at least one biologist stationed on each side of the
17 bridge/structure watching for emerging bats from a half hour before sunset to 1–2 hours after
18 sunset for a minimum of two nights within the season that construction would be taking place.
19 Night-vision goggles and/or full-spectrum acoustic detectors shall be used during emergence
20 surveys to assist in species identification. All emergence surveys would be conducted during
21 favorable weather conditions (calm nights with temperatures conducive to bat activity and no
22 precipitation predicted).

23 Additionally, passive monitoring with full-spectrum bat detectors will be used to assist in
24 determining species present. A minimum of four nights of acoustic monitoring surveys will be
25 conducted within the season that the construction would be taking place. If site security allows,
26 detectors should be set to record bat calls for the duration of each night. To the extent possible,
27 all monitoring will be conducted during favorable weather conditions (calm nights with
28 temperatures conducive to bat activity and no precipitation predicted). The biologists will
29 analyze the bat call data using appropriate software and prepare a report with the results of the
30 surveys. If acoustic data suggest that bats may be using the bridge/structure as a night roost,
31 biologists will conduct a night survey from 1–2 hours past sunset up to 6 hours past sunset to
32 determine if the bridge is serving as a colonial night roost.

33 If suitable roost structures would be removed, additional surveys may be required to determine
34 how the structure is used by bats, whether it is as a night roost, maternity roosts, migration
35 stopover, or for hibernation.

36 ***Preconstruction Tree Surveys***

37 If tree removal or trimming is necessary, qualified biologists will examine trees to be removed
38 or trimmed for suitable bat roosting habitat. High-value habitat features (large tree cavities,
39 basal hollows, loose or peeling bark, larger snags, palm trees with intact thatch, etc.) will be
40 identified and the area around these features searched for bats and bat sign (guano, culled insect
41 parts, staining, etc.). Riparian woodland, orchards, and stands of mature broadleaf trees should
42 be considered potential habitat for solitary foliage roosting bat species.

1 If bat sign is detected, biologists will conduct evening visual emergence survey of the source
2 habitat feature, from a half hour before sunset to 1–2 hours after sunset for a minimum of two
3 nights within the season that construction would be taking place. Methodology should follow
4 that described above for the bridge emergence survey.

5 Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector
6 will be used to assist in determining species present. These surveys would be conducted in
7 coordination with the acoustic monitoring conducted for the bridge/structure.

8 ***Protective Measures for Bats using Bridges/Structures and Trees***

9 Avoidance and minimization measures shall be necessary if it is determined that bats are using
10 the bridge/structure or trees as roost sites and/or sensitive bats species are detected during
11 acoustic monitoring. Appropriate measures will be determined by DWR in consultation with
12 CDFW and shall include, as applicable, measures listed below.

- 13 ● Ensure that bats are protected from noise, vibrations, and light that result from construction
14 activities associated with water conveyance facilities, conservation components, and
15 ongoing habitat enhancement, as well as operations and maintenance of above-ground
16 water conveyance facilities, including the transmission facilities. This would be
17 accomplished by either directing noise barriers and lights inward from the disturbance or
18 ensuring that the disturbances do not extend more than 300 feet from the point source.
- 19 ● Disturbance of the bridge will be avoided between March 1 and October 31 (the maternity
20 period) to avoid impacts on reproductively active females and dependent young.
- 21 ● Installation of exclusion devices from March 1 through October 31 to preclude bats from
22 occupying the bridge during construction. Exclusionary devices will only be installed by or
23 under the supervision of an experienced bat biologist.
- 24 ● Tree removal will be avoided between April 15 and September 15 (the maternity period for
25 bat species that use trees) to avoid impacts on pregnant females and active maternity roosts
26 (whether colonial or solitary).
- 27 ● Tree removal would be conducted between September 15 and October 31 to the maximum
28 extent feasible, which corresponds to a time period when bats would not likely have entered
29 winter hibernation and would not be caring for flightless young. If weather conditions
30 remain conducive to regular bat activity beyond October 31, later tree removal may be
31 considered in consultation with CDFW.
- 32 ● Trees would be removed in pieces, rather than felling the entire tree.
- 33 ● If a maternity roost is located, whether solitary or colonial, that roost will remain
34 undisturbed with a buffer as determined in consultation with CDFW until September 15 or
35 until a qualified biologist has determined the roost is no longer active.
- 36 ● If a non-maternity roost is found, that roost will be avoided to the maximum extent feasible
37 and an appropriate buffer established in consultation with CDFW. Every effort would be
38 made to avoid the roost to the maximum extent feasible, as methods to evict bats from trees
39 are largely untested. However, if the roost cannot be avoided, eviction would be attempted
40 and procedures designed in consultation with CDFW to reduce the likelihood of mortality of
41 evicted bats. In all cases:

- 1 ○ Eviction will not occur before September 15th and will match the timeframe for tree
2 removal approved by CDFW.
- 3 ○ Qualified biologists will carry out or oversee the eviction tasks monitor the tree
4 trimming/removal.
- 5 ○ Eviction will take place late in the day or in the evening to reduce the likelihood of
6 evicted bats falling prey to diurnal predators.
- 7 ○ Eviction will take place during weather and temperature conditions conducive to bat
8 activity.
- 9 ○ Special-status bat roosts will not be disturbed.

10 Eviction procedures shall include but are not limited to:

- 11 ○ Pre-eviction surveys to obtain data to inform the eviction approach and subsequent
12 mitigation requirements. Relevant data may include the species, sex, reproductive status
13 and/or number of bats using the roost, and roost conditions themselves such as
14 temperature and dimensions. Surveys may include visual emergence, night vision,
15 acoustic, and/or capture.
- 16 ○ Structural changes may be made to the roost, performed without harming bats, such
17 that the conditions in the roost are undesirable to roosting bats and the bats leave on
18 their own (e.g., open additional portals so that temperature, wind, light and
19 precipitation regime in the roost change).
- 20 ○ Noninjurious harassment at the roost site to encourage bats to leave on their own, such
21 as ultrasound deterrents or other sensory irritants.
- 22 ● Prior to removal/trimming, after other eviction efforts have been attempted, any confirmed
23 roost tree would be shaken, repeatedly struck with a heavy implement such as an axe and
24 several minutes should pass before felling trees or trimming limbs to allow bats time to
25 arouse and leave the tree. The biologists should search downed vegetation for dead and
26 injured bats. The presence of dead or injured bats would be reported to CDFW.

27 Compensatory mitigation for the loss of roosting habitat will also be determined through
28 consultation with CDFW and may include the construction and installation of suitable
29 replacement habitat onsite. Depending on the species and type of roost lost, various roost
30 replacement habitats have met with some success (e.g., bat houses, “bat bark,” planting
31 cottonwood trees, leaving palm thatch in place rather than trimming). The creation of natural
32 habitat onsite is generally preferable to artificial.

33 Artificial roosts are often unsuccessful, and care must be taken to determine as closely as
34 possible the conditions in the natural roost to be replaced. Even with such care, artificial habitat
35 may fail. Several artificial roosts have been highly successful in replacing bridge roost habitat
36 when incorporated into new bridge designs. “Bat bark” has been successfully used by Arizona
37 Department of Game and Fish to create artificial crevice-roosting bat habitat mounted on pine
38 trees (Mering and Chambers 2012: 765). Bat houses have at best an inconsistent track record
39 but information is mounting on how to create successful houses. There is no single protocol or
40 recipe for bat-house success. Careful study of the roost requirements of the species in question;
41 the particular conditions at the lost roost site including temperature, orientation of the

1 openings, airflow, internal dimensions and structures (cavity vs. crevice, etc.) should increase
2 the chances of designing a successful replacement.

3 Restoring riparian woodland with plantings shows signs of success in Colorado. Western red bat
4 activity has been positively correlated with increased vegetation and tree growth, canopy
5 complexity and restoration acreage at cottonwood-willow restoration sites along the Lower
6 Colorado River (Broderick 2012: 39). These complex woodland areas would ultimately provide
7 a wider range of bat species with preferred roost types, including both foliage-roosting and
8 crevice-/cavity-roosting bats.

9 **Impact BIO-167: Indirect Effects of Plan Implementation on Special-Status Bats**

10 Construction activities associated with water conveyance facilities, conservation components and
11 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
12 conveyance facilities, including the transmission facilities, could result in ongoing periodic
13 disturbances from light, vibrations, and noise with localized effects on special-status bats and their
14 roosting habitat over the term of the BDCP.

15 Water conveyance facilities operations and maintenance activities would include vegetation and
16 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
17 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance
18 activities are not expected to remove special-status bat habitat, operation of equipment could
19 disturb small areas of vegetation around maintained structures and could result in disturbances to
20 roosting bats, if present. Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting
21 Bats and Implement Protective Measures*, is available to address these adverse effects.

22 Increased exposure to methylmercury associated with tidal natural communities restoration would
23 potentially indirectly affect special-status bat species. *CM12 Methylmercury Management* describes
24 the process by which tidal natural communities restoration may increase methyl mercury levels in
25 wetlands in the study area. Mercury has been found in high concentrations in some bat species, such
26 as the Indiana bat. Many bat species forage heavily on aquatic insects, which might result in rapid
27 bioaccumulation (Evers et al. 2012). Measures described in *CM12 Methylmercury Management* are
28 expected to reduce the effects of methylmercury on special-status bat species resulting from BDCP
29 tidal natural communities restoration.

30 **NEPA Effects:** Implementation of the Mitigation Measure BIO-166 for special-status bats would
31 avoid the potential for substantial adverse effects on roosting special-status bats, either indirectly or
32 through habitat modifications. This mitigation measure would also avoid and minimize effects that
33 could substantially reduce the number of special-status bats, or restrict species' range. Therefore,
34 the indirect effects of Alternative 1B would not have an adverse effect on special-status bats.

35 **CEQA Conclusion:** Indirect effects from conservation components operations and maintenance as
36 well as construction-related noise and visual disturbances could have a significant impact on
37 special-status bat species, either indirectly or through habitat modifications. Mitigation Measure
38 BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*,
39 would reduce this impact to a less-than-significant level and ensure Alternative 1B would not result
40 in a substantial reduction in numbers or a restriction in the range of species.

1 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
2 **Implement Protective Measures**

3 See Mitigation Measure BIO-166 under Impact BIO-166.

4 **Impact BIO-168: Periodic Effects of Inundation of Special-Status Bat Habitat as a Result of**
5 **Implementation of Conservation Components**

6 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
7 324 acres of roosting habitat and 21,265 acres of foraging habitat for special-status bats in the study
8 area (Table 12-1B-61).

9 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate up to 411 acres of
10 roosting habitat and 10,137 acres of foraging habitat for special-status bats (Table 12-1B-61).
11 Potential roosting trees are likely to be retained within seasonally flooded areas, although high
12 velocity flooding could uproot some trees. Seasonal flooding would not adversely affect foraging
13 habitat for the species. The overall effect of seasonal inundation in existing riparian natural
14 communities may instead be beneficial. Historically, flooding was the main natural disturbance
15 regulating ecological processes in riparian areas, and flooding promotes the germination and
16 establishment of many native riparian plants. In the late long-term, seasonal inundation in areas
17 currently occupied by riparian vegetation may contribute to the establishment of high-value habitat
18 for special-status bats that use riparian habitats.

19 **NEPA Effects:** Periodic effects on roosting and foraging habitat for special-status bats associated
20 with implementing Alternative 1B are not expected to result in substantial adverse effects on
21 special-status bats, either directly or through habitat modifications and would not result in a
22 substantial reduction in numbers or a restriction in the range of special-status bats. Mitigation
23 Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective*
24 *Measures*, is available to address any effects of periodic inundation on special-status bats and
25 roosting habitat. Therefore, Alternative 1B would not adversely affect the species.

26 **CEQA Conclusion:** Periodic inundation under CM2 and floodplain restoration under CM5 would
27 periodically affect foraging and roosting habitat for special-status bats in the study area. Any impact
28 of periodic inundation on special-status bats would be mitigated through implementation of
29 Mitigation Measure BIO-166, which would ensure there is no significant impact on roosting special-
30 status bats, either directly or through habitat modifications and no substantial reduction in numbers
31 or a restriction in the range of special-status bats.

32 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
33 **Implement Protective Measures**

34 See Mitigation Measure BIO-166 under Impact BIO-166.

35 **Plant Species**

36 **Vernal Pool Plants**

37 Five covered plant species and 12 noncovered special-status plant species occur in vernal pools in
38 the study area (Tables 12-2, 12-3, summarized in Table 12-1B-62). The vernal pool habitat model
39 used for the impact analysis was based on vegetation types and associations from various data sets
40 which were used to create maps showing the distribution of vernal pool habitat in the study area

1 according to three habitat types in which the species are known to occur, including vernal pool
2 complex and degraded vernal pool complex, and alkali seasonal wetland habitat. Vernal pool
3 complex habitat consists of vernal pools and uplands that display characteristic vernal pool and
4 swale visual signatures that have not been significantly impacted by agricultural or development
5 practices. Degraded vernal pool complex habitat consists of habitat that ranges from areas with
6 vernal pool and swale visual signatures that display clear evidence of significant disturbance due to
7 plowing, discing, or leveling to areas with clearly artificial basins such as shallow agricultural
8 ditches, depressions in fallow fields, and areas of compacted soils in pastures. Because wetlands in
9 the degraded vernal pool complex are inundated during the wet season and may have historically
10 been located in or near areas with natural vernal pool complex, they may support individuals or
11 small populations of species that are found in vernal pools and swales. However, they do not possess
12 the full complement of ecosystem and community characteristics of natural vernal pools, swales and
13 their associated uplands and they are generally ephemeral features that are eliminated during the
14 course of normal agricultural practices. A small amount of alkali seasonal wetland habitat was
15 included in the model because alkaline vernal pools are also present in some areas mapped as alkali
16 seasonal wetland.

17 Because each of the vernal pool species addressed in this EIR/EIS have specific microhabitat
18 affinities, and because vernal pool habitat within the study area is highly heterogeneous with
19 respect to habitat parameters such as soil type and pool depth, the vernal pool habitat model greatly
20 overestimates the extent of habitat in the study area occupied by each species. However, the vernal
21 pool habitat model is likely to encompass all or most of the potential area within which special-
22 status vernal pool plant species would occur. Therefore, it is not likely to underestimate the extent
23 of occupied habitat or to underestimate the effects of Alternative 1B.

24 Full implementation of Alternative 1B would include the following conservation actions over the
25 term of the BDCP to benefit covered vernal pool plants (BDCP Chapter 3, Section 3.3, *Effects on*
26 *Covered Wildlife and Plant Species*).

- 27 ● Protect two currently unprotected occurrences of alkali milk-vetch in the Altamont Hills or
28 Jepson Prairie core recovery areas (Objective VPP1.1, associated with CM3).
- 29 ● Maintain no net loss of Heckard's peppergrass in Conservation Zones 1, 8, or 11 within
30 restoration sites or within the area of affected tidal range of restoration projects (Objective
31 VPP1.2, associated with CM3 and CM9).

32 The construction and restoration activities covered under Alternative 1B could have impacts on
33 special-status vernal pool plants. Modeled vernal pool habitat is within the proposed footprint for
34 the Alternative 1B water conveyance facilities and within the hypothetical footprints for restoration
35 activities, although no known occurrences of the 17 covered and noncovered vernal pool plant
36 species is within the proposed footprint for the Alternative 1B water conveyance facilities or the
37 footprint for restoration activities. Table 12-1B-62 summarizes the acreage of modeled vernal pool
38 habitat in the study area, the number of occurrences of each special-status vernal pool plant in the
39 study area, and potential effects.

1

Table 12-1B-62. Summary of Impacts on Vernal Pool Plants under Alternative 1B

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Modeled Habitat					
Vernal pool complex	9,557	2	0	0	Habitat loss from tidal restoration
Degraded vernal pool complex	2,567	373	0	0	Habitat loss from construction of water conveyance facilities and tidal restoration
Alkali seasonal wetland	188	0	0	0	None
Total	12,312	375	0	0	
Covered Species					
Alkali milk-vetch	0	0	16	0	None
Dwarf downingia	0	0	12	0	None
Boggs Lake hedge-hyssop	0	0	1	0	None
Legenere	0	0	8	0	None
Heckard's peppergrass	0	0	4 ^a	0	None
Noncovered Species					
Ferris' milk-vetch	0	0	6	0	None
Vernal pool smallscale	0	0	2	0	None
Hogwallow starfish	0	0	0	0	None
Ferris' goldfields	0	0	4	0	None
Contra Costa goldfields	0	0	7	0	None
Cotula-leaf navarretia	0	0	5	0	None
Baker's navarretia	0	0	3	0	None
Colusa grass	0	0	1	0	None
Bearded popcorn-flower	0	0	5	0	None
Delta woolly marbles	0	0	3	0	None
Saline clover	0	0	9	0	None
Solano grass	0	0	1	0	None

^a One additional occurrence is in alkali seasonal wetlands.

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Impact BIO-169: Effects on Habitat and Populations of Vernal Pool Plants

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Alternative 1B could affect habitat for special-status vernal pool plants. The individual effects of each relevant conservation measure are addressed below. A summary statement of the combined impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

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- *CM1 Water Facilities and Operation*: Four acres of modeled habitat would be removed by construction of the water conveyance facilities. However, no known occurrences of the 17 special-status vernal pool plants are within the proposed footprint for the Alternative 1B water conveyance facilities. Because the proposed footprint for the Alternative 1B water conveyance

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1 facilities affects very little modeled habitat, effects on undiscovered occurrences of special-
2 status vernal pool plant species are highly unlikely.

- 3 ● *CM2 Yolo Bypass Fisheries Enhancement*: No modeled vernal pool habitat and no known
4 occurrences of special-status vernal pool plants are within the hypothetical footprint for
5 construction or operation of the Yolo Bypass fisheries enhancements.
- 6 ● *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit covered
7 vernal pool plants by protecting 600 acres of vernal pool complex in CZ 1, CZ 8, and CZ 11
8 (Objective VPNC1.1). The protected vernal pool habitat would be managed and enhanced to
9 sustain populations of native vernal pool species. These benefits also would accrue to any
10 noncovered vernal pool plants occurring in the protected vernal pool complex.
- 11 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would result in the
12 inundation of 373 acres of vernal pool complex and would, therefore, potentially affect special-
13 status vernal pool plants. However, most of this habitat (373 acres) consists of degraded vernal
14 pool habitat that is unlikely to contain special-status plants. In addition, 257.8 acres of critical
15 habitat for Contra Costa goldfields could be affected. No known occurrences of covered and
16 noncovered vernal pool plants would be affected by tidal restoration.
- 17 ● *CM5 Seasonally Inundated Floodplain Restoration*: No vernal pool habitat or occurrences of
18 special-status vernal pool plants are present within areas proposed for floodplain restoration.
19 Therefore, floodplain restoration and construction of new floodplain levees would have no
20 impacts on covered and noncovered vernal pool plants.
- 21 ● *CM6 Channel Margin Enhancement*: No vernal pool habitat or occurrences of special-status
22 vernal pool plants are present within areas proposed for channel margin habitat enhancement.
23 Therefore, channel margin habitat enhancement would have no impacts on covered and
24 noncovered vernal pool plants.
- 25 ● *CM7 Riparian Natural Community Restoration*: No vernal pool habitat or occurrences of special-
26 status vernal pool plants are present within areas proposed for riparian habitat enhancement.
27 Therefore, riparian habitat enhancement would have no impacts on covered and noncovered
28 vernal pool plants.
- 29 ● *CM8 Grassland Natural Community Restoration*: Although the vernal pool complex habitat
30 includes grassland matrix within which the vernal pools occur, grassland restoration activities
31 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands
32 that are not included within vernal pool complex habitat. Therefore, grassland communities
33 restoration would have no impacts on covered and noncovered vernal pool plants.
- 34 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: If, through unforeseen
35 circumstances, BDCP activities result in the net loss of vernal pool habitat, CM9 would be
36 implemented to compensate for that loss. Because vernal pool complex restoration would focus
37 on habitat that had been cleared and leveled but maintained an intact duripan or claypan, the
38 likelihood of affecting any special-status vernal pool plants would be low. However, vernal pool
39 restoration potentially could adversely affect remnant populations of special-status vernal pool
40 plants or potentially affect vernal pool habitat adjacent to the restoration areas.
- 41 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
42 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid vernal pool
43 habitat and would have no impacts on covered and noncovered vernal pool plants.

- *Avoidance and Minimization Measures:* Effects on covered vernal pool plants potentially resulting from implementation of CM4 would be avoided or minimized through *AMM11 Covered Plant Species, AMM2 Construction Best Management Practices and Monitoring, AMM12 Vernal pool Crustaceans, and AMM12 Vernal Pool Crustaceans*. AMM11 prohibits ground disturbance or hydrologic disturbance within 250 feet of existing vernal pools. In addition, AMM11 specifies that individual projects be designed to avoid critical habitat for listed plant and wildlife vernal pool species. AMM12 limits the direct removal of vernal pool crustacean habitat to no more than 10 wetted acres and the indirect effect to no more than 20 wetted acres through the life of the Plan. AMM12 also requires that that tidal natural communities restoration or other ground-disturbing covered activities in Conservation Zones 1 and 11 would not result in the adverse modification of primary constituent elements of critical habitat for vernal pool fairy shrimp, conservancy fairy shrimp, and vernal pool tadpole shrimp. These protections would also apply to critical habitat for Contra Costa goldfields, where it overlaps with critical habitat for these vernal pool crustaceans. AMM37 requires that new recreation trails avoid populations of covered vernal pool plants. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

In addition, the BDCP includes species-specific goals to benefit covered vernal pool plants. This includes protecting two occurrences of alkali milkvetch (Objective VPP1.1) and requiring no net loss of Heckard's peppergrass (Objective VPP1.2).

In summary, no adverse effects on covered special-status vernal pool plants would be expected from implementing Alternative 1B. No known occurrences of special-status vernal pool plants would be affected. Beneficial effects on special-status vernal pool plants could occur by protecting 600 acres of vernal pool complex in CZ 1, CZ 8, and CZ 11 and by protecting occurrences of alkali milk-vetch.

The GIS analysis estimated that up to 375 acres of vernal pool complex could be adversely affected by covered activities under Alternative 1B. However, the actual effect on habitat for special-status vernal pool plants is expected to be much less than the estimated impact because the BDCP limits the total loss of wetted vernal pool habitat resulting from specific projects to 10 acres (approximately 67 acres of vernal pool complex) over the permit term (AMM12). At the proposed restoration ratios of 1:1 (prior to impact) and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal pool complex restoration would be required to compensate for the loss of modeled habitat for special-status vernal pool plants (Objective VPNC1.2, associated with CM9). This would be consistent with typical NEPA and CEQA project-level mitigation ratios for vernal pool impacts. The limitation on the loss of wetted vernal pool habitat would constrain the implementation of tidal restoration projects that are adjacent to vernal pool complex, which could affect the feasibility of restoring 65,000 acres of tidal habitat (Objective TPANC1.1, associated with CM4).

NEPA Effects: The loss of modeled habitat for vernal pool plant species would be minimized by AMM12 and offset through CM9. Therefore, Alternative 1B would not result in adverse effects on covered and noncovered vernal pool plant species.

CEQA Conclusion: Because loss of modeled habitat for covered vernal pool plants would be offset through restoration, and because impacts on occurrences of covered vernal pool plants would be avoided, the impacts of implementing Alternative 1B on covered and noncovered special-status vernal pool plants in the study area would be less than significant. No mitigation is required.

1 **Alkali Seasonal Wetland Plants**

2 Five covered species and three noncovered plants occur in alkali seasonal wetlands in the study area
3 (Tables 12-2, 12-3, summarized in Table 12-1B-63). Alkali seasonal wetland habitat was modeled
4 separately for four covered plant species occurring in seasonal alkali wetlands.

5 The San Joaquin spearscale habitat model approximated the distribution of suitable San Joaquin
6 spearscale habitat in the study area according to the species' preferred habitat types, intersected
7 with soil series and slope position. Historical and current records of San Joaquin spearscale in the
8 study area indicate that its current distribution is limited to alkaline soil areas with shallow basin or
9 swale microtopography along the western border. The vegetation cover of the alkaline soils is
10 typically a combination of alkaline soil-adapted species and annual grasses, including annual
11 ryegrass and Mediterranean barley. Habitat types used for the model included alkali seasonal
12 wetlands, vernal pool complex, and grasslands. Soil series used in the model consisted of either clays
13 or clay loams with alkaline horizons. San Joaquin spearscale typically occurs in swales or in level
14 terrain but occasionally occurs on the lower slopes adjacent to streams or swales or where seeps are
15 present. Because some of the soil series with which San Joaquin spearscale is associated can occur
16 on hillsides, slope was used to limit the extent of the model to the toe of the slope where these soils
17 occur by excluding areas with slope greater than 1%. Land uses that are incompatible with the
18 species' habitat requirements, such as modeled habitat polygons falling on leveled or developed
19 lands, were removed from the model.

20 Modeled habitat for brittlescale was mapped as hydrologic features such as stream corridors and
21 playa pools located on alluvium associated with the Montezuma Block along the western boundary
22 of the study area or on alluvium associated with tertiary formations located along the southwest
23 boundary of the study area. Stream corridors (intermittent and perennial) that intersected these
24 geologic units were selected and truncated at the point at which they encountered the upper
25 elevation of intertidal marsh. The corridors were buffered 50 feet (15.2 meters) on either side of
26 their centerlines to capture the estimated maximum extent of alluvium deposits in proximity to the
27 streams. Mapped habitat that was occupied by urban or intensive agricultural uses was removed
28 from the model.

29 The habitat model for heartscale was based on the species distribution in the study area (Solano and
30 Yolo Counties) and on the soil types and plant communities within which it occurs. Potential habitat
31 was determined by intersecting the GIS coverage for three parameters: 1) Yolo and Solano County
32 boundaries; 2) Solano, Pescadero, and Willows soils; and 3) grassland, alkali seasonal wetland, and
33 vernal pool complex natural communities. The model excluded areas that have been developed or
34 cultivated, i.e., where the topography, soils, and hydrology have been substantially altered.

35 Delta button-celery habitat was modeled as alkali seasonal wetland complex, vernal pool complex,
36 other natural seasonal wetland, and grassland occurring on Brentwood, Grangerville, Marcuse,
37 Solano, and Vernalis soil map units within the San Joaquin Basin (i.e., south of the mainstem San
38 Joaquin River). For this species, land cover north of the Discovery Bay area where intensive
39 agriculture was classified as annual grassland were manually deleted from the area of predicted
40 habitat. Additionally, other areas of potential habitat that have been developed were also manually
41 deleted.

42 Full implementation of Alternative 1B would include the following conservation actions over the
43 term of the BDCP to benefit covered alkali seasonal wetland plants (BDCP Chapter 3, Section 3.3,
44 *Effects on Covered Wildlife and Plant Species*).

- 1 ● Of the 150 acres of alkali seasonal wetland complex protected under Objective ASWNC1.1, 600
2 acres of vernal pool complex protected under Objective VPNC1.1, and 8,000 acres of grassland
3 natural community protected under Objective GNC1.1, protect 75 acres of suitable brittlescale
4 habitat and 75 acres of suitable heartscale habitat in Conservation Zones 1, 8, or 11 (Objective
5 BRIT/HART/SJSC1.1, associated with CM3).
- 6 ● Protect two currently unprotected occurrences of San Joaquin spearscale in Conservation Zones
7 1, 8, or 11 (Objective BRIT/HART/SJSC1.2, associated with CM3).

8 Alternative 1B would have adverse effects on modeled habitat for San Joaquin spearscale,
9 brittlescale, heartscale, and Delta button-celery. It would also have adverse effects on occurrences of
10 heartscale, Heckard's peppergrass, and crownscale. Table 12-1B-63 summarizes the acreage of
11 modeled alkali seasonal wetland habitat in the study area and the number of occurrences of each
12 special-status alkali seasonal wetland plant in the study area.

1

Table 12-1B-63. Summary of Impacts on Alkali Seasonal Wetland Plants under Alternative 1B

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
San Joaquin spearscale modeled habitat	14,933	748	0	0	Habitat loss from construction of water conveyance facilities, construction of Yolo Bypass fisheries enhancements, tidal habitat restoration, and floodplain restoration levee construction
Brittlescale modeled habitat	451	4	0	0	Habitat loss from tidal habitat restoration
Heartscale modeled habitat	6,528	306	0	0	Habitat loss from tidal habitat restoration
Delta button celery modeled habitat	3,361 ^a	21	0	0	Habitat loss from construction of water conveyance facilities
Alkali seasonal wetlands	3,723	72	0	0	Habitat loss from tidal restoration and Yolo Bypass fisheries enhancements
Covered Species					
San Joaquin spearscale	0	0	19	1	Population loss from tidal habitat restoration
Brittlescale	0	0	6	0	None
Heartscale	0	0	3	0	None
Delta button celery	0	0	1 ^b	0	None
Heckard's peppergrass	0	0	1 ^c	1	Population loss from tidal habitat restoration
Noncovered Species					
Crownscale	0	0	17	1	Population loss from construction of water conveyance facilities
Palmate-bracted bird's-beak	0	0	1	0	None
Recurved larkspur	0	0	4	0	None
^a A portion of this acreage consists of riparian habitat.					
^b A second occurrence in study area is in riparian habitat.					
^c Four additional occurrences of Heckard's peppergrass are associated with vernal pools.					

2

1 **Impact BIO-170: Effects on Habitat and Populations of Alkali Seasonal Wetland Plants**

2 Modeled habitat for Delta button-celery would be adversely affected by construction of the
3 Alternative 1B water conveyance facilities. One population of crownscale also would be adversely
4 affected by construction of the water conveyance facilities. Modeled habitat for brittlescale and
5 heartscale could be adversely affected by tidal habitat restoration. One occurrence each of
6 heartscale and Heckard's peppergrass could be affected by tidal habitat restoration. No adverse
7 effects on palmate-bracted bird's-beak or recurved larkspur would be expected.

8 The individual effects of each relevant conservation measure are addressed below. A summary
9 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
10 conservation measure discussions.

- 11 • *CM1 Water Facilities and Operation:* Under Alternative 1B, construction of the Byron Tract
12 Forebay would permanently remove 69 acres of modeled habitat for San Joaquin spearscale and
13 21 acres of modeled habitat for Delta button-celery. This could be an adverse effect, depending
14 on whether the affected modeled habitat is actually occupied by the species. Modeled habitat is
15 assumed to encompass all potential habitat for a species and may therefore overestimate the
16 area actually occupied. Known occurrences of San Joaquin spearscale near the forebay do not
17 appear to be affected by facilities construction. Delta button-celery is not known to occur in CZ
18 8; the nearest known occurrence, in CZ 9, would not be affected.

19 Construction of the water conveyance facilities would permanently remove 0.2 acre of habitat
20 occupied by crownscale at the Byron Tract Forebay. Part of the occurrence would be removed,
21 but most of the occurrence would not be directly affected. However, a reduction of the
22 population size, both in area and number of individuals present, would be an adverse impact.

23 Construction of the water conveyance facilities would not affect brittlescale, heartscale,
24 Heckard's peppergrass, palmate-bracted bird's-beak, or recurved larkspur.

- 25 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo Bypass fisheries
26 enhancements would permanently remove 56 acres of modeled habitat for San Joaquin
27 spearscale. No known occurrences of San Joaquin spearscale would be affected. No modeled
28 habitat and no known occurrences of the seven other alkali seasonal wetland plants are within
29 the hypothetical footprint for construction or operation of the Yolo Bypass fisheries
30 enhancements.

- 31 • *CM3 Natural Communities Protection and Restoration:* The BDCP proposes to benefit alkali
32 seasonal wetland plants by protecting 150 acres of alkali seasonal wetland in Conservation
33 Zones 1, 8, and/or 11. The protected alkali seasonal wetland habitat would be managed and
34 enhanced to sustain populations of native plant species.

- 35 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration is expected to convert
36 alkali seasonal wetlands on the margins of tidal wetlands to freshwater or brackish tidal marsh.
37 Tidal habitat restoration would convert 622 acres of modeled habitat for San Joaquin spearscale
38 to tidal marsh. Tidal habitat restoration would permanently remove 4 acres of modeled habitat
39 for brittlescale in CZ 1 near Lindsey Slough and in CZ 11 near Nurse Slough; however, the BDCP
40 would allow up to 50 acres of modeled habitat to be converted to tidal wetlands. Tidal habitat
41 restoration would remove 306 acres of modeled habitat for heartscale in CZ 1 in the vicinity of
42 Jepson Prairie and in CZ 11 adjacent to Suisun Marsh. The extent to which the modeled habitat is
43 actually occupied by these species is not known; modeled habitat is assumed to encompass all
44 potential habitat for a species and may therefore overestimate the area actually occupied. Tidal

1 habitat restoration could adversely affect one occurrence of Heckard’s peppergrass at Hass
2 Slough and one occurrence of San Joaquin spearscale at Main Prairie, both in CZ 1. These
3 occurrences are based on historic records, and whether the populations still exist is not known.
4 In each case, the loss of modeled habitat and occurrences for covered species would be adverse
5 effects. Delta button celery, crownscale, palmate-bracted bird’s-beak, and recurved larkspur
6 would not be affected by tidal habitat restoration.

- 7 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
8 would result in the removal of 2 acres of modeled habitat for San Joaquin spearscale. No known
9 occurrences of San Joaquin spearscale would be affected. No other alkali seasonal wetland
10 habitat or occurrences of special-status alkali seasonal wetland plants are present within areas
11 proposed for floodplain restoration. Therefore, floodplain restoration and construction of new
12 floodplain levees would have no impacts on covered and noncovered alkali seasonal wetland
13 plants.
- 14 ● *CM6 Channel Margin Enhancement*: No alkali seasonal wetland habitat or occurrences of special-
15 status alkali seasonal wetland plants are present within areas proposed for channel margin
16 habitat enhancement. Therefore, channel margin habitat enhancement would have no impacts
17 on covered and noncovered alkali seasonal wetland plants.
- 18 ● *CM7 Riparian Natural Community Restoration*: No alkali seasonal wetland habitat or occurrences
19 of special-status alkali seasonal wetland plants are present within areas proposed for riparian
20 habitat enhancement. Therefore, riparian habitat enhancement would have no impacts on
21 covered and noncovered alkali seasonal wetland plants.
- 22 ● *CM8 Grassland Natural Community Restoration*: Although the alkali seasonal wetland habitat
23 includes the grassland matrix within which the wetlands occur, grassland restoration activities
24 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands
25 that are not included within alkali seasonal wetland habitat. Therefore, grassland communities
26 restoration would have no impacts on covered and noncovered alkali seasonal wetland plants.
- 27 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Although some vernal pools
28 are alkaline, alkali seasonal wetlands in the study area consist of alkali grassland, alkali meadow,
29 or iodine bush scrub. Therefore, vernal pool restoration would avoid alkali seasonal wetland
30 habitat and would have no impacts on covered and noncovered alkali seasonal wetland plants.
31 In addition, the BDCP would compensate for the loss of alkali seasonal wetlands from other CMs
32 by restoring or creating 72 acres of alkali seasonal wetlands in Conservation Zones 1, 8, or 11 to
33 achieve no net loss of this habitat.
- 34 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
35 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid alkali
36 seasonal wetland habitat and would have no impacts on covered and noncovered alkali seasonal
37 wetland plants.
- 38 ● *Avoidance and Minimization Measures*: Effects on special-status alkali seasonal wetland plants
39 potentially resulting from implementation of CM1 and CM4 would be avoided or minimized
40 though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*
41 *Monitoring*, and *AMM37 Recreation*. Under AMM11, surveys for covered plant species would be
42 performed during the planning phase of projects, and any impacts on populations of covered
43 species would be avoided through project design or subsequently minimized through AMM2. In
44 addition, AMM11 prohibits ground disturbance or hydrologic disturbance within 250 feet of

1 existing vernal pools, which would protect those species with modeled habitat that includes
2 vernal pool complex. Occurrences of covered species in vernal pools near tidal wetlands would
3 not be affected by tidal habitat restoration where critical habitat for vernal pool species is
4 present and would be avoided under AMM11. AMM37 requires that new recreation trails avoid
5 populations of covered alkali seasonal wetland plants. BDCP Appendix 3.C describes the AMMs,
6 which have since been updated and which are provided in Appendix 3B, *Environmental*
7 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

8 In summary, only one known occurrence of a special-status alkali seasonal wetland species
9 (crownscale) would be affected under Alternative 1B, although one historic occurrence of Heckard's
10 peppergrass and one historic occurrence of San Joaquin spearscale could also be affected by tidal
11 restoration activities, if those occurrences still exist. AMM11 would be implemented to avoid an
12 adverse effect on Heckard's peppergrass and San Joaquin spearscale occurrences.

13 The primary effect of the Alternative 1B on special-status alkali seasonal wetland plants would be
14 the loss of potential (i.e., modeled) habitat for San Joaquin spearscale, brittlescale, heartscale, and
15 Delta button-celery. Approximately 72 acres of this habitat loss would be alkali seasonal wetlands.
16 The actual effect on modeled habitat for alkali seasonal wetland plants is expected to be somewhat
17 less than the estimated impact because some of this habitat is composed of vernal pool complex, and
18 the BDCP limits the total loss of wetted vernal pool habitat to 10 acres (approximately 67 acres of
19 vernal pool complex) over the permit term (AMM12). Loss of modeled habitat would be
20 compensated for by restoring or creating vernal pool complex, alkali seasonal wetlands, and
21 grasslands, in proportion to the amount of each habitat removed. At the proposed restoration ratios
22 of 1:1 (prior to impact) and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal
23 pool complex restoration would be required to compensate for the loss of modeled habitat
24 composed of vernal pool complex (Objective VPNC1.2, associated with CM9). Approximately 72
25 acres of alkali seasonal wetlands would be restored (Objective ASWC1.2, associated with CM9). Loss
26 of modeled habitat composed of grasslands would be compensated for by restoring grassland
27 habitat on a 1:1 basis (Objective GNC1.1, associated with CM8). These compensation levels would be
28 consistent with typical NEPA and CEQA project-level mitigation ratios for impacts on vernal pools,
29 alkali seasonal wetlands, and grasslands.

30 The BDCP would have a small beneficial effect on special-status alkali seasonal wetland plants by
31 protecting 150 acres of alkali seasonal wetland habitat. The BDCP also includes the species-specific
32 goal that 75 acres would be modeled habitat for brittlescale and heartscale (Objective
33 BRIT/HART/SJSC1.1) and another goal that would protect 2 occurrences of San Joaquin spearscale
34 (Objective BRIT/HART/SJSC1.1). The benefits of habitat protection and management also would
35 accrue to any noncovered alkali seasonal wetland plants occurring in the protected habitat.

36 **NEPA Effects:** Under Alternative 1B, loss of modeled habitat for alkali seasonal wetland plant
37 species would be offset through restoration of grassland, vernal pool, and alkali seasonal wetland
38 habitat (CM8, CM9), and impacts on one occurrence of San Joaquin spearscale and one occurrence of
39 Heckard's peppergrass would be avoided through AMM11. With avoidance and habitat restoration,
40 these effects would not be adverse. The loss of one occurrence of crownscale, a noncovered species,
41 would result in a reduction in the range and numbers of this species and would be an adverse effect.
42 Adverse effects on crownscale could be avoided or offset through implementation of Mitigation
43 Measure BIO-170, *Avoid, Minimize, or Compensate for Impacts on Noncovered Special-Status Plant*
44 *Species*.

1 **CEQA Conclusion:** Because loss of modeled habitat for alkali seasonal wetland plant species would
2 be offset through restoration, and because impacts on occurrences of covered alkali seasonal
3 wetland plants would be avoided, impacts on alkali seasonal wetlands as a result of implementing
4 Alternative 1B would not result in substantially reducing the number or restricting the range of five
5 covered and two noncovered plant species. However, conservation measures that benefit or protect
6 covered species do not apply to noncovered species, and portions of the crownscale population at
7 Byron Tract Forebay would be lost, which would be a significant impact. Mitigation Measure BIO-
8 170 would reduce this impact to a less-than-significant level.

9 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**
10 **Special-Status Plant Species**

11 DWR will evaluate all projects for their impacts on special-status plants, avoid or minimize
12 impacts on species that occur on project sites, and compensate for impacts on species. All
13 impacts on diamond-petaled California poppy and caper-fruited tropidocarpum shall be
14 avoided. Impacts on other special-status plant species shall be avoided to the extent feasible,
15 and any unavoidable impacts shall be compensated for.

- 16 ● DWR shall conduct surveys for the special-status plant species within and adjacent to all
17 project sites. Special-status plant surveys required for project-specific permit compliance
18 will be conducted during the planning phase to allow design of the individual restoration
19 projects to avoid adverse modification of habitat for specified covered plants if practicable.
20 The purpose of these surveys will be to verify that the locations of special-status plants
21 identified in previous record searches or surveys are extant, identify any new special-status
22 plant occurrences, and cover any portions of the project area not previously surveyed. The
23 extent of mitigation of direct loss of or indirect effects on special-status plants will be based
24 on these survey results.
- 25 ● All surveys shall be conducted by qualified biologists using the using *Guidelines for*
26 *Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate*
27 *Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating*
28 *Impacts to Special Status Native Plant Populations and Natural Communities* (California
29 Department of Fish and Game 2009) during the season that special-status plant species
30 would be evident and identifiable, i.e., during their blooming season. Locations of special-
31 status plants in proposed construction areas will be recorded using a GPS unit and flagged.
- 32 ● The construction monitoring plan for the protection of covered fish, wildlife, and plant
33 species, prepared by DWR before implementing an approved project, will provide for
34 construction activity monitoring in areas identified during the planning stages and
35 species/habitat surveys as having noncovered special-status plant species.
- 36 ● Where surveys determine that a special-status plant species is present in or adjacent to a
37 project site, direct and indirect impacts of the project on the species shall be avoided if
38 feasible through the establishment of 250-foot activity exclusion zones surrounding the
39 periphery of occurrences, within which no ground-disturbing activities shall take place,
40 including construction of new facilities, construction staging, or other temporary work
41 areas. Activity exclusion zones for special-status plant species shall be established according
42 to a 250-foot buffer surrounding the periphery of each special-status species occurrence, the
43 boundaries of which shall be clearly marked with standard orange plastic construction
44 exclusion fencing or its equivalent. The establishment of activity exclusion zones shall not be

1 required if no construction-related disturbances will occur within 250 feet of the occurrence
2 periphery. The size of activity exclusion zones may be reduced through consultation with a
3 qualified biologist and with concurrence from USFWS or CDFW based on project site-
4 specific conditions.

- 5 • Where avoidance of impacts on a special-status plant species is infeasible, DWR will
6 compensate for loss of individuals or occupied habitat of a special-status plant species
7 through the acquisition, protection, and subsequent management in perpetuity of other
8 existing occurrences at a 2:1 ratio (preservation: impact). DWR will provide detailed
9 information to USFWS and CDFW on the location of the preserved occurrences, quality of
10 the preserved habitat, feasibility of protecting and managing the areas in-perpetuity,
11 responsible parties, and other pertinent information. If suitable occurrences of a special-
12 status plant species are not available for preservation, then the project shall be redesigned
13 to remove features that would result in impacts on that species.

14 **Grassland Plants**

15 One covered plant and 11 noncovered special-status plants occur in grasslands in the study area
16 (Tables 12-2, 12-3, summarized in Table 12-1B-64). The only covered plant species occurring in
17 grassland is Carquinez goldenbush. Carquinez goldenbush modeled habitat included hydrological
18 features such as stream corridors on alluvium derived from the Montezuma Formation. Stream
19 corridors (intermittent and perennial) that intersected these geologic units were selected and
20 truncated at the point at which they encountered the upper elevation of intertidal marsh. The
21 corridors were buffered 50 feet (15 meters) on either side in an effort to capture the estimated
22 maximum extend of alluvium deposits in close proximity to the actual rivers/streams.

23 Full implementation of Alternative 1B would include the following conservation actions over the
24 term of the BDCP to benefit covered grassland plants (BDCP Chapter 3, Section 3.3, *Effects on*
25 *Covered Wildlife and Plant Species*).

- 26 • Protect three unprotected occurrences of the Carquinez goldenbush in Conservation Zones 1
27 and/or 11 (Objective CGB1.1, associated with CM3).
- 28 • Maintain and enhance occupied Carquinez goldenbush habitat to slow erosion and reverse
29 degradation from livestock grazing (Objective CGB1.2, associated with CM11).

30 Of 78,047 acres of grasslands in the study area, Alternative 1B would adversely affect 3,037 acres,
31 including 4 acres that are modeled habitat for Carquinez goldenbush. For 10 of the plants, no known
32 occurrences would be affected. One of five Parry's rough tarplant occurrences in the study area
33 could be adversely affected by Alternative 1B. Table 12-1B-64 summarizes the acreage of grassland
34 habitat in the study area and the number of occurrences of each special-status grassland plant in the
35 study area.

1

Table 12-1B-64. Summary of Impacts on Grassland Plants under Alternative 1B

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Carquinez goldenbush modeled habitat	1,019	4	0	0	Habitat loss from tidal habitat restoration
Grassland	78,047	3,037	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, floodplain restoration, and construction of conservation hatcheries
Covered Species					
Carquinez goldenbush	0	0	10	1	Habitat loss from tidal habitat restoration
Noncovered Species					
Big tarplant	0	0	5	0	None
Round-leaved filaree	0	0	2	0	None
Pappose tarplant	0	0	7	0	None
Parry's rough tarplant	0	0	5	1	Periodic inundation of one occurrence as a result of Yolo Bypass operations
Small-flowered morning-glory	0	0	0	0	None
Diamond-petaled poppy	0	0	1	0	None
Stinkbells	0	0	1	0	None
Fragrant fritillary	0	0	4	0	None
Gairdner's yampah	0	0	0	0	None
Streamside daisy ^a	0	0	1	0	None
Caper-fruited tropidocarpum	0	0	8	0	None
^a This species actually occurs in upland woodland, a habitat that has not been mapped or quantified in the BDCP.					

2

3

Impact BIO-171: Effects on Habitat and Populations of Grassland Plant Species

4

Alternative 1B, could have adverse effects on modeled habitat for Carquinez goldenbush. It could also have adverse effects on one occurrence of Carquinez goldenbush and one occurrence of Parry's rough tarplant. Although Alternative 1B would have no expected effects on known occurrences of the other special-status plant species that occur in grasslands, the loss of 3,037 acres of grassland would have the potential to adversely affected undocumented populations of special-status grassland species.

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1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 ● *CM1 Water Facilities and Operation*: No modeled habitat for Carquinez goldenbush and no
5 known occurrences of the 12 special-status grassland plants are within the proposed footprint
6 for the Alternative 1B water conveyance facilities. About 758 acres of grassland habitat would
7 be affected by construction of the water conveyance facilities. However, this grassland habitat
8 primarily consists of small patches of herbaceous ruderal vegetation along levees that do not
9 provide habitat for special-status grassland species. Therefore, under Alternative 1B,
10 construction and operation of the water conveyance facilities would not affect the 12 special-
11 status grassland plants.
- 12 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries
13 enhancements would remove 627 acres of grassland habitat. Yolo Bypass operations would
14 result in more frequent and longer inundation of 1,597 acres of grasslands in the Yolo Causeway
15 (CZ 2) that include habitat for one occurrence of Parry's rough tarplant. Parry's rough tarplant is
16 a summer-blooming plant that occurs in areas subject to occasional inundation during the wet
17 season, such as swales and seasonal wetlands. Increasing the frequency or duration of
18 inundation may decrease the distribution in some areas by making some conditions too wet but
19 would also expand the distribution into areas that may currently be too dry. Overall, changing
20 the frequency and duration of inundation in the area of this occurrence should not result in a
21 substantial change in the range of numbers of Parry's rough tarplant. Construction and
22 operation of the Yolo Bypass fisheries enhancements would not affect modeled habitat for
23 Carquinez goldenbush or known occurrences of other special-status grassland plants.
- 24 ● *CM3 Natural Communities Protection and Restoration*: Alternative 1B would preserve 8,000
25 acres of grassland habitat, some of which may contain modeled habitat for Carquinez
26 goldenbush. Protection of grassland habitat may also protect undiscovered occurrences of
27 special-status plant species.
- 28 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently
29 remove 1,122 acres of grassland habitat. Four acres of modeled habitat for Carquinez
30 goldenbush along the eastern side of Suisun Marsh could be adversely affected, including part of
31 one known occurrence. No other known occurrences of special-status grassland plants are
32 within the hypothetical footprint of tidal restoration.
- 33 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of new floodplain levees would
34 result in the loss of 85 acres of grassland habitat, periodic inundation of the floodplain would
35 affect 513 acres of grassland habitat, and another 399 acres of grassland habitat would be
36 converted to riparian habitat. However, no modeled habitat for Carquinez goldenbush or known
37 occurrences of special-status grassland plants are present within areas proposed for floodplain
38 restoration, and the affected grassland habitat consists of herbaceous ruderal vegetation that
39 does not support special-status grassland plants. Therefore, floodplain restoration and
40 construction of new floodplain levees would have no impacts on covered and noncovered
41 grassland plants.
- 42 ● *CM6 Channel Margin Enhancement*: No known occurrences of special-status grassland plants are
43 present within areas proposed for channel margin habitat enhancement. Areas mapped as
44 grassland along levees that would be affected by channel margin habitat enhancement are small
45 patches of ruderal vegetation along levees that do not provide habitat for special-status

1 grassland species and are not modeled habitat for Carquinez goldenbush. Therefore, channel
2 margin habitat enhancement would have no impacts on covered and noncovered grassland
3 plants.

- 4 ● *CM7 Riparian Natural Community Restoration*: No modeled habitat for Carquinez goldenbush or
5 known occurrences of special-status grassland plants are present within areas proposed for
6 riparian habitat enhancement. Therefore, riparian habitat enhancement would have no impacts
7 on covered and noncovered grassland plants.
- 8 ● *CM8 Grassland Natural Community Restoration*: Grassland restoration would restore 2,000 acres
9 of grassland habitat. Restoration activities would take place in non-grasslands (ruderal habitat,
10 cultivated land) or degraded grasslands. These areas do not currently provide habitat for
11 special-status grassland plants. Therefore, grassland communities restoration would have no
12 impacts on covered and noncovered grassland plants.
- 13 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Vernal pool complex includes
14 vernal pools as well as the surrounding grassland matrix. Because the habitat to be restored
15 would consist of areas of former vernal pool complex that have been leveled for cultivation,
16 special-status grassland plants would not be present. Therefore, vernal pool and Alkali Seasonal
17 Wetland complex restoration would not affect special-status grassland plants.
- 18 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
19 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid grassland
20 habitat and would have no impacts on covered and noncovered grassland plants.
- 21 ● *CM18 Conservation Hatcheries*: Construction of the conservation hatcheries would remove 35
22 acres of grassland habitat. The removed habitat would consist of ruderal herbaceous vegetation
23 that would not be likely to provide habitat for special-status grassland plants. Therefore,
24 construction of the conservation hatcheries would not be expected to affect special-status
25 grassland plants.
- 26 ● *Avoidance and Minimization Measures*: Effects on Carquinez goldenbush potentially resulting
27 from implementation of CM4 and potential effects on undiscovered populations of special-status
28 grassland plants would be avoided or minimized through *AMM11 Covered Plant Species*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, and *AMM37 Recreation*. Under AMM11,
30 surveys for covered plant species would be performed during the planning phase of projects,
31 and any impacts on populations of covered species would be avoided through project design or
32 subsequently minimized through AMM2. AMM37 requires that new recreation trails would avoid
33 populations of Carquinez goldenbush. BDCP Appendix 3.C describes the AMMs, which have since
34 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and*
35 *CMs*, of the Final EIR/EIS.

36 The primary effect of Alternative 1B on special-status grassland plants is the loss of potential (i.e.,
37 modeled) habitat for Carquinez goldenbush, including part of one known occurrence. Under
38 AMM11, the occurrence would be surveyed to establish the population limits and to redesign the
39 project to avoid affecting the populations, to the extent feasible. Protecting three unprotected
40 occurrences of Carquinez goldenbush (Objective CGB1.1, associated with CM3) and maintaining and
41 enhancing occupied Carquinez goldenbush (Objective CGB1.2, associated with CM11) would
42 compensate for any residual effects. One occurrence of Parry's rough tarplant would be affected by
43 CM2, but the effect is not expected to be adverse. No known occurrences of the other special-status
44 grassland plants would be affected.

1 The BDCP would have a potential beneficial effect on special-status grassland plants by protecting
2 8,000 acres of grassland habitat. To ensure that this habitat preservation would specifically benefit
3 Carquinez goldenbush, the plan proposes to protect at least three Carquinez goldenbush
4 occurrences in CZ 1 and CZ 11 that are currently not protected and to maintain and enhance
5 occupied Carquinez goldenbush habitat. The preservation of modeled or potential habitat, together
6 with avoidance and minimization of impacts on species occurrences, would reduce any effects of
7 BDCP implementation on covered grassland plants to a level that is no longer adverse.

8 **NEPA Effects:** The loss of modeled and occupied habitat for Carquinez goldenbush would be offset
9 through CM3, CM8, and CM11. Therefore, implementation of Alternative 1B would result in no
10 adverse effects on special-status grassland plants.

11 **CEQA Conclusion:** Because adverse effects on special-status grassland plant species would be
12 avoided or compensated for, Alternative 1B would not result in a reduction in the range and
13 numbers of covered and noncovered grassland plants, and this impact would be less than significant.
14 No mitigation is required.

15 **Valley/Foothill Riparian Plants**

16 Two covered plants and two noncovered special-status plants occur in valley/foothill riparian
17 habitat in the study area (Tables 12-2, 12-3, summarized in Table 12-1B-65). The valley/foothill
18 riparian habitat model for Delta button-celery and slough thistle was mapped as all of the study area
19 along the flood plain of the San Joaquin River between the levees from the Mossdale Bridge to
20 Vernalis. Whether or not this modeled habitat is actually occupied by Delta button-celery and slough
21 thistle is unknown; all known occurrences of these species within the area of modeled habitat are
22 believed to be extirpated.

23 Full implementation of Alternative 1B would include the following conservation actions over the
24 term of the BDCP to benefit covered valley/foothill riparian plants (BDCP Chapter 3, Section 3.3,
25 *Effects on Covered Wildlife and Plant Species*).

- 26 ● Protect and enhance two occurrences of delta button celery. If occurrences are not found in the
27 Plan Area, establish self-sustaining occurrences of delta button celery for a total of two
28 occurrences within the restored floodplain habitat on the mainstem of the San Joaquin River in
29 Conservation Zone 7 between Mossdale and Vernalis. (Objective DBC1.1, associated with CM3
30 and CM11).
- 31 ● Protect and enhance two occurrences of slough thistle. If occurrences are not found in the Plan
32 Area, establish self-sustaining occurrences of slough thistle for a total of two occurrences within
33 the 10,000 acres of restored floodplain on the mainstem of the San Joaquin River in
34 Conservation Zone 7 between Mossdale and Vernalis (Objective ST1.1: associated with CM3 and
35 CM11).

36 Of 17,966 acres of valley/foothill riparian habitat in the study area, Alternative 1B would adversely
37 affect 896 acres, including 15 acres that are modeled habitat for Delta button-celery and 11 acres
38 that are modeled habitat for slough thistle. Table 12-1B-65 summarizes the acreage of modeled
39 habitat for Delta button-celery and slough thistle and the number of occurrences of each special-
40 status grassland plant in the study area.

1 **Table 12-1B-65. Summary of Impacts on Valley/Foothill Riparian Plants under Alternative 1B**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Delta button celery modeled habitat	3,361 ^a	15	0	0	Habitat loss from floodplain restoration
Slough thistle modeled habitat	1,834	11	0	0	Habitat loss from floodplain restoration
Valley/foothill riparian habitat	17,966	896	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Covered Species					
Delta button celery	0	0	1 ^b	1	Occurrence potentially affected by floodplain restoration
Slough thistle	0	0	2	2	Occurrences potentially affected by floodplain restoration
Noncovered Species					
Northern California black walnut	0	0	1	0	None
Wright's trichocoronis	0	0	1	0	None

^a portion of this acreage consists of alkali seasonal wetland.
^b A second occurrence is in alkali seasonal wetland.

2

3 **Impact BIO-172: Effects on Habitat and Populations of Valley/Foothill Riparian Plants**

4 No extant occurrences of Delta button-celery, slough thistle, Northern California black walnut, or
5 Wright's trichocoronis are present in the study area. Therefore, no impacts on special-status
6 valley/foothill riparian plants are expected. Modeled habitat for Delta button-celery and slough
7 thistle, which may support undocumented occurrences of these species, would be affected by
8 restoration of seasonally inundated floodplain.

9 The individual effects of each relevant conservation measure are addressed below. A summary
10 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
11 conservation measure discussions.

- 12 • *CM1 Water Facilities and Operation*: Construction of the water conveyance facilities would
13 remove 91 acres of valley-foothill riparian habitat under Alternative 1B. However, no modeled
14 habitat and no known occurrences of the four special-status valley/foothill riparian plants are
15 within the proposed footprint for the Alternative 1B water conveyance facilities. Therefore,
16 under Alternative 1B, construction and operation of the water conveyance facilities would not
17 affect covered or noncovered special-status valley/foothill riparian plants.

- 1 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction and operation of the Yolo Bypass fisheries
2 enhancements would adversely affect 378 acres of valley/foothill riparian habitat. However, no
3 modeled habitat and no known occurrences of the four special-status valley/foothill riparian
4 plants are within the hypothetical footprint for construction or operation of the Yolo Bypass
5 fisheries enhancements. Therefore, construction and operation of the Yolo Bypass fisheries
6 enhancements would not affect the covered or noncovered valley/foothill riparian plants.
- 7 ● *CM3 Natural Communities Protection and Restoration*: Alternative 1B would protect 552 acres of
8 existing valley/foothill riparian forest in CZ 7. This action would have no substantial effects on
9 special-status valley/foothill plants because no extant occurrences of special-status
10 valley/foothill plants are present in the study area.
- 11 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would inundate 552 acres
12 of valley/foothill riparian habitat. However, no modeled habitat and no known occurrences of
13 the four special-status valley/foothill riparian plants are within the hypothetical footprint for
14 tidal restoration. Therefore, tidal restoration would not affect the covered or noncovered
15 valley/foothill riparian plants.
- 16 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
17 would remove 15 acres of modeled habitat for Delta button-celery along the San Joaquin River
18 in CZ 7. In addition, floodplain restoration would result in more frequent and longer inundation
19 of 18 acres of modeled habitat for Delta button-celery in this area. The area affected contains
20 one historic occurrence of Delta button celery. This occurrence is considered to be extirpated,
21 because all habitat for Delta button-celery at his location has been converted to agriculture
22 (California Department of Fish and Wildlife 2013). Therefore, Alternative 1B would not have an
23 adverse effect on Delta button celery in CZ 7.

24 The BDCP proposes to benefit Delta button-celery at this location by restoring 5,000 acres of
25 valley/foothill riparian habitat and re-introducing two occurrences of Delta button-celery.
26 Although Delta button celery occurs in riparian habitat, it is not associated with woodland or
27 scrub habitats; rather, it occurs in alkali seasonal wetlands in floodplains, which may or may not
28 also contain adjacent woody riparian habitat. Restoring habitat for Delta button-celery may not
29 be compatible with restoring woody riparian habitat. In addition, establishing new populations
30 of Delta button-celery is an untried, unproven procedure and may not be feasible. Therefore, any
31 beneficial effects on Delta button-celery would be speculative.

32 Floodplain restoration levee construction would remove 11 acres of modeled habitat for slough
33 thistle and would result in more frequent and longer inundation of 6 acres of modeled habitat
34 for slough thistle along the San Joaquin River in CZ 7. However, the BDCP would allow up to 50
35 acres of modeled habitat to be converted to riparian habitat. Whether the affected modeled
36 habitat is actually occupied by slough thistle is not known; however, of two historic occurrences
37 of slough thistle present in the study area, only one is considered to be extirpated (California
38 Department of Fish and Wildlife 2013). The BDCP would protect and enhance two occurrences
39 of slough thistle. If occurrences are not found in the study area, then two self-sustaining
40 occurrences of slough thistle would be established using locally-sourced genetic material for a
41 total of two occurrences within the restored floodplain habitat on the main stem of the San
42 Joaquin River in Conservation Zone 7 between Mossdale and Vernalis. Establishing new
43 populations of slough thistle is an untried, unproven procedure and may not be feasible.
44 Therefore, any beneficial effects on slough thistle would be speculative.

1 One historic occurrence of Wright's trichocoronis in the study area near Lathrop (CZ 7) could
2 also be affected by floodplain restoration. The occurrence is presumed to be extant because the
3 presence or absence of suitable habitat has not been verified by field surveys (California
4 Department of Fish and Wildlife 2013). However, the species has not been observed at this
5 location for nearly a century, and habitat for Wright's trichocoronis, which would have been
6 similar to that for Delta button celery and slough thistle, no longer appears to be present in
7 aerial photographs of the area. Therefore, Alternative 1B would not be expected to have an
8 adverse effect on Wright's trichocoronis.

- 9 ● *CM6 Channel Margin Enhancement*: No modeled habitat or occurrences of special-status
10 valley/foothill riparian plants are present within areas proposed for channel margin habitat
11 enhancement. Therefore, channel margin habitat enhancement would have no impacts on
12 covered and noncovered valley/foothill riparian plants.
- 13 ● *CM7 Riparian Natural Community Restoration*: No extant occurrences of special-status
14 valley/foothill riparian plants are present within areas proposed for riparian habitat
15 restoration. Therefore, riparian habitat restoration would have no impacts on covered and
16 noncovered valley/foothill riparian plants.
- 17 ● *CM8 Grassland Natural Community Restoration*: No occurrences of special-status valley/foothill
18 riparian plants are present within areas proposed for grassland communities restoration.
19 Therefore, grassland communities restoration would have no impacts on covered and
20 noncovered valley/foothill riparian plants.
- 21 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No occurrences of special-
22 status valley/foothill riparian plants are present within areas proposed for vernal pool and
23 alkali seasonal wetland complex restoration. Therefore, vernal pool and alkali seasonal wetland
24 complex restoration would have no impacts on covered and noncovered valley/foothill riparian
25 plants.
- 26 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
27 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid
28 valley/foothill riparian habitat and would have no impacts on covered and noncovered
29 valley/foothill riparian plants.
- 30 ● *CM22 Avoidance and Minimization Measures*: Effects on Delta button-celery and slough thistle
31 potentially resulting from implementation of CM5 would be avoided or minimized though
32 *AMM11 Covered Plant Species* and *AMM2 Construction Best Management Practices and*
33 *Monitoring*. Under AMM11, surveys for covered plant species would be performed during the
34 planning phase of projects, and any impacts on populations of covered species would be avoided
35 through project design or subsequently minimized though AMM2. BDCP Appendix 3.C describes
36 the AMMs, which have since been updated and which are provided in Appendix 3B,
37 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

38 Because no extant occurrences of special-status valley/foothill riparian plants are known to occur in
39 the study area, Alternative 1B is not expected to adversely affect any special-status valley/foothill
40 riparian plants. Modeled habitat for both Delta button-celery and slough thistle would be affected.
41 Under AMM11, surveys for covered plants would be performed during the planning phase for
42 floodplain restoration. If Delta button-celery or slough thistle were found to be present in the
43 floodplain restoration area, then the project would be designed to avoid impacts on the populations.
44 Therefore, Alternative 1B would not have an adverse effect on these species.

1 The BDCP proposes to benefit Delta button-celery and slough thistle by restoring 5,000 acres of
2 valley/foothill riparian habitat and re-introducing two occurrences of both species. Establishing
3 new populations of Delta-button-celery or slough thistle would be a beneficial effect. However,
4 establishing new populations is an untried, unproven procedure and may not be feasible.

5 **NEPA Effects:** Implementing the BDCP under Alternative 1B would not have an adverse effect on
6 special-status valley/foothill riparian plant species.

7 **CEQA Conclusion:** Alternative 1B would not result in a reduction in the range and numbers of
8 covered and noncovered valley/foothill riparian plants, and this impact would be less than
9 significant. No mitigation is required.

10 **Tidal Wetland Plants**

11 Seven covered plants and one noncovered special-status plant occur in tidal wetlands in the study
12 area (Tables 12-2, 12-3, summarized in Table 12-1B-66). Five tidal wetland habitat models were
13 developed for the seven covered plant species occurring in tidal wetland habitat.

14 Modeled habitat for Mason's lilaopsis and Delta mudwort was mapped as areas within 10 feet (3
15 meters) on either side of the landward boundary of tidal perennial aquatic land cover type, which
16 was obtained from the BDCP GIS vegetation data layer.

17 The side-flowering skullcap model mapped the distribution of suitable habitat in the study area
18 according to the species' habitat association with woody riparian habitat. The model selected Delta
19 riparian vegetation types providing the habitat characteristics that side-flowering skullcap seems to
20 require, namely, woody substrate in freshwater tidal areas. The model included vegetation subunits
21 of the BDCP Valley Riparian natural community characterized by California dogwood, white alder,
22 and arroyo willow.

23 The modeled habitat for soft bird's-beak consisted of pickleweed- and saltgrass-dominated
24 vegetation units located west of the Antioch Bridge. Modeled habitat for these two plant species was
25 mapped as areas within 10 feet (3 meters) on either side of the landward boundary of tidal
26 perennial aquatic land cover types. The model used all Tidal Brackish Emergent Wetland polygons
27 that were limited by specific vegetation units that are known to be closely associated with soft
28 bird's-beak habitat.

29 Habitat for Delta tule pea and Suisun Marsh aster was modeled separately based on the salinity of
30 the water. For the tidal freshwater emergent wetland BDCP land cover type, modeled habitat was
31 mapped as the area within 10 feet (3 meters) of the landward side of the landward boundary,
32 exclusively where this land cover type is adjacent to grassland, vernal pool complex, valley/foothill
33 riparian, or cultivated land habitats cover types. For brackish water areas in and near Suisun Marsh,
34 the model used all tidal brackish emergent wetland polygons within an elevation range of 7 to 10
35 feet (2 to 3 meters) to capture elevations 1 foot (30 centimeters) below intertidal to 2 feet (60
36 centimeters) above intertidal.

37 The modeled habitat for Suisun thistle in and near Suisun Marsh consists of all tidal brackish
38 emergent wetland polygons with the appropriate vegetation. This included vegetation units
39 dominated by saltscale, saltgrass, pickleweed, and broad-leaved peppergrass.

1 Full implementation of Alternative 1B would include the following conservation actions over the
2 term of the BDCP to benefit covered tidal wetland plants (BDCP Chapter 3, Section 3.3, *Effects on*
3 *Covered Wildlife and Plant Species*).

- 4 • No net loss of Mason’s lilaepsis and delta mudwort occurrences within restoration sites, or
5 within the area of affected tidal range of restoration projects (Objective DMW/ML1.1, associated
6 with CM4 and CM11).
- 7 • No net loss of Delta tule pea and Suisun Marsh aster occurrences within restoration sites
8 (Objective DTP/SMA1.1, associated with CM4 and CM11).
- 9 • Restore tidal inundation to wetlands in the Hill Slough Ecological Reserve and to the ponded
10 area at Rush Ranch (Objective SBB/SuT1.1, associated with CM4).
- 11 • Complete seed banking of all existing Suisun Marsh populations and the representative genetic
12 diversity using accepted seed banking protocols (Objective SBB/SuT1.2, associated with CM11).
- 13 • Establish a cultivated population of Suisun thistle from wild seed using accepted seed collection
14 protocols (Objective SBB/SuT1.3, associated with CM11).
- 15 • Establish two occurrences of Suisun thistle in Conservation Zone 11 (Objective SBB/SuT1.4,
16 associated with CM11).

17 Of 17,357 acres of tidal wetlands in the study area, Alternative 1B would affect 28 acres, including
18 areas that are modeled habitat for Mason’s lilaepsis, Delta mudwort, side-flowering skullcap, Delta
19 tule pea, Suisun Marsh aster, soft bird’s-beak, and Suisun thistle. Known occurrences of all of these
20 species would be affected. In addition, four occurrences of Bolander’s water-hemlock, a noncovered
21 special-status plant, could be affected by tidal habitat restoration. Table 12-1B-66 summarizes the
22 acreage of modeled habitat for covered tidal wetland species and the number of occurrences of each
23 special-status tidal wetland plants in the study area.

24 **Table 12-1B-66. Summary of Impacts on Tidal Wetland Plants under Alternative 1B**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Delta mudwort/Mason’s lilaepsis modeled habitat	6,081	53	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Side-flowering skullcap modeled habitat	2,447	13	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Soft bird’s-beak modeled habitat	1,228	73	0	0	Habitat loss from tidal habitat restoration

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Delta tule pea/Suisun Marsh aster modeled habitat	5,853	5	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Suisun thistle modeled habitat	1,281	73	0	0	Habitat loss from tidal habitat restoration
Tidal brackish emergent wetland	8,501	0	0	0	Habitat loss from tidal habitat restoration
Tidal freshwater emergent wetland	8,856	28	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Covered Species					
Delta mudwort	0	0	58	3	Occurrences affected by tidal habitat restoration
Delta tule pea	0	0	106	28	Occurrences affected by tidal habitat restoration
Mason's lilaeopsis	0	0	181	18	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Side-flowering skullcap	0	0	12	2	Occurrences affected by construction of water conveyance facilities
Soft bird's-beak	0	0	13	7	Occurrences affected by tidal habitat restoration
Suisun Marsh aster	0	0	164	27	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Suisun thistle	0	0	4	0	None
Noncovered Species					
Bolander's water hemlock	0	0	8	3	Occurrences affected by tidal habitat restoration

1

2

Impact BIO-173: Effects on Habitat and Populations of Tidal Wetland Plants

3

Alternative 1B would have adverse effects on tidal marsh special-status plants through

4

implementation of CM1, CM2, CM4, and CM5. No adverse effects are expected from implementation

5

of CM3, CM6, CM7, CM8, and CM9.

1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 ● *CM1 Water Facilities and Operation*: Construction of the Alternative 1B water conveyance
5 facilities would remove 39 acres of modeled habitat for delta mudwort and Mason's lilaepsis, 7
6 acres of modeled habitat for side-flowering skullcap, and 4 acres of modeled habitat for Delta
7 tule pea and Suisun Marsh aster. The extent to which modeled habitat is actually occupied by
8 these species is not known; however, three occurrences of Mason's lilaepsis, two occurrences
9 of Delta tule pea, and two occurrences of side-flowering skullcap in the study area could be
10 affected by construction impacts. No known occurrences of the other covered and noncovered
11 tidal wetland species would be affected by construction of the water conveyance facilities.
- 12 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries
13 enhancements would remove 5 acres of modeled habitat for Mason's lilaepsis and delta
14 mudwort. The extent to which modeled habitat is actually occupied by these species is not
15 known; however, no known occurrences in the study area would be affected. Yolo Bypass
16 operations would result in more frequent and longer inundation of 8 acres of modeled habitat
17 Delta tule peas and Suisun Marsh aster. Two occurrences of Suisun Marsh aster would be
18 affected by Yolo Bypass operations. Habitat for these species is normally periodically inundated
19 or saturated; therefore, a small increase in the frequency and duration of periodic inundation of
20 the habitat would not be expected to have a substantial effect.
- 21 ● *CM3 Natural Communities Protection and Restoration*: The BDCP proposes restoring or creating
22 20 linear miles of transitional tidal areas within other natural communities that would be
23 created or restored, including 6,000 acres of tidal brackish emergent wetland and 24,000 acres
24 of tidal freshwater emergent wetland. In addition, the habitat and ecosystem functions of these
25 areas would be maintained and enhanced. The BDCP does not specifically propose to protect
26 any occurrences of tidal wetland plants nor does it propose active restoration of affected habitat
27 or occurrences. Instead, the BDCP assumes that the 20 linear miles of restored transitional tidal
28 areas will be passively colonized by the covered tidal wetland plants.
- 29 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently
30 remove 6 acres of modeled habitat for Mason's lilaepsis and Delta mudwort. Habitat loss would
31 occur through conversion of the species habitat (at and immediately above the tidal zone in
32 marshes and along rivers and streams) to inundated tidal habitat. The extent to which modeled
33 habitat is actually occupied by the species is not known; however, 14 of 181 known occurrences
34 of Mason's lilaepsis and 3 of 58 known occurrences of delta mudwort in the study area could be
35 affected by tidal habitat restoration.

36 Tidal habitat restoration would remove 4 acres of modeled habitat for side-flowering skullcap.
37 Whether the affected modeled habitat is actually occupied by side-flowering skullcap is not
38 known; however, none of the 12 known occurrences in the study area would be affected.

39 Tidal habitat restoration would remove 2 acres of modeled habitat for Delta tule pea and Suisun
40 Marsh aster. However, the BDCP would allow up to 50 acres of modeled habitat to be removed.
41 Habitat loss would result from conversion of the species habitat (at and immediately above the
42 tidal zone in marshes and along rivers and streams) to inundated tidal habitat. The extent to
43 which modeled habitat is actually occupied by the species is not known; however, 26 of 106
44 known occurrences of Delta tule pea and 24 of 164 occurrences of Suisun Marsh aster in the
45 study area would be affected.

1 Tidal habitat restoration could affect 73 acres of modeled habitat for soft bird's-beak and Suisun
2 thistle, including 1.3 acres of critical habitat. The extent to which modeled habitat is actually
3 occupied by the species is not known; however, seven of 13 known occurrences of soft bird's-
4 beak in the study area could be affected. None of the four known occurrences of Suisun thistle in
5 the study area would be affected.

6 Tidal habitat restoration could affect three of eight known occurrences of Bolander's water-
7 hemlock, a noncovered special-status species in the study area. Because Bolander's water-
8 hemlock occurs in tidal marsh, it may benefit from tidal marsh restoration. However, site
9 preparation, earthwork, and other site activities could adversely affect Bolander's water-
10 hemlock through direct habitat removal.

- 11 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
12 would remove 3 acres of modeled habitat for Mason's lilaepsis and delta mudwort and 2 acres
13 of modeled habitat for side-flowering skullcap. No known occurrences of these species in the
14 study area would be affected by floodplain restoration.

15 Floodplain restoration would result in more frequent and longer inundation of 2 acres of
16 modeled habitat for Mason's lilaepsis and delta mudwort, 18 acres of modeled habitat for side-
17 flowering skullcap, and 1 acre of modeled habitat for Delta tule peas and Suisun Marsh aster. No
18 known occurrences of these species in the study area would be affected by periodic inundation
19 of restored floodplain habitat. Habitat for these species is normally periodically inundated or
20 saturated; therefore, a small increase in the frequency and duration of periodic inundation of the
21 habitat would not be expected to have a substantial effect.

- 22 ● *CM6 Channel Margin Enhancement*: Effects of channel margin enhancement were not analyzed
23 separately from the effects of tidal habitat restoration. Channel margin enhancement would
24 have adverse effects on tidal wetland plants through direct removal and habitat modification.
25 However, it would have beneficial effects on these species by improving the habitat functions for
26 these species as a result of riprap removal and creation of floodplain benches. Side-flowering
27 skullcap would benefit from installation of large woody material, which it appears to colonize.
- 28 ● *CM7 Riparian Natural Community Restoration*: Riparian habitat restoration is not expected to
29 adversely affect special-status tidal wetland plants. Preparatory work that involves habitat
30 disturbance would occur during implementation of CM4 and CM5. Riparian plantings carried out
31 for CM7 would be placed in floodplain areas, not in tidal wetlands.
- 32 ● *CM8 Grassland Natural Community Restoration*: No tidal wetlands or occurrences of special-
33 status tidal wetland plants are present within areas proposed for grassland communities
34 restoration. Therefore, grassland communities restoration would have no impacts on covered
35 and noncovered tidal wetland plants.
- 36 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No tidal wetlands or
37 occurrences of special-status tidal wetland plants are present within areas proposed for vernal
38 pool and alkali seasonal wetland complex restoration. Therefore, vernal pool and alkali seasonal
39 wetland complex restoration would have no impacts on covered and noncovered tidal wetland
40 plants.
- 41 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
42 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid tidal wetland
43 habitat and would have no impacts on covered and noncovered tidal wetland plants.

- 1 • *Avoidance and Minimization Measures*: Effects on covered tidal wetland plants potentially
2 resulting from implementation of CM1, CM2, CM4, and CM5 would be avoided or minimized
3 though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*
4 *Monitoring*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37 Recreation*.
5 Under AMM11, surveys for covered plant species would be performed during the planning
6 phase of projects, and any impacts on populations of covered species would be avoided through
7 project design or subsequently minimized through AMM2. In addition, AMM11 contains specific
8 guidance to avoid adverse modification of any of the primary constituent elements for Suisun
9 thistle or soft bird's-beak critical habitat. AMM30, which specifies that proposed transmission
10 line poles and towers would be sited to avoid sensitive terrestrial and aquatic habitats, to the
11 maximum extent feasible, would avoid some impacts on Mason's lilaepsis, Delta tule pea, and
12 side-flowering skullcap. AMM37 requires that new recreation trails avoid populations of
13 covered tidal wetland plants. BDCP Appendix 3.C describes the AMMs, which have since been
14 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
15 of the Final EIR/EIS.

16 In summary, the GIS analysis indicates that Alternative 1B would result in the loss of modeled
17 habitat for all of the covered species and result in adverse effects on known occurrences of most of
18 the special-status plants occurring in tidal wetlands. However, the BDCP predicts that habitat
19 restoration activities would greatly expand the amount of habitat available to each of these species,
20 offsetting any potential loss of habitat or occurrences resulting from covered activities.

21 Delta mudwort could lose 53 acres of modeled habitat (0.9%), including all or part of three
22 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
23 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
24 colonization by Delta mudwort, which could offset this habitat loss. Channel margin enhancement
25 (CM6) and riparian natural community restoration (CM7) will also consider the potential for
26 creating habitat for Delta mudwort; creation of suitable habitat under these measures could also
27 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP
28 predicts that natural expansion of populations into the restored habitat would take place and result
29 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation
30 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that
31 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

32 Mason's lilaepsis could lose 53 acres of modeled habitat (0.9%), including all or part of 18
33 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
34 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
35 colonization by Mason's lilaepsis, which could offset this habitat loss. Channel margin enhancement
36 (CM6) and riparian natural community restoration (CM7) will also consider the potential for
37 creating habitat for Mason's lilaepsis; creation of suitable habitat under these measures could also
38 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP
39 predicts that natural expansion of populations into the restored habitat would take place and result
40 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation
41 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that
42 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

43 Delta tule pea could lose 5 acres of modeled habitat (0.08%), including all or part of 28 occurrences.
44 The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives
45 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by

1 Delta tule pea, which could offset this habitat loss. Channel margin enhancement (CM6) and riparian
2 natural community restoration (CM7) would also consider the potential for creating habitat for
3 Delta tule pea; creation of suitable habitat under these measures could also help offset this habitat
4 loss. Although active restoration of this species is not proposed, the BDCP predicts that natural
5 expansion of populations into the restored habitat would take place and result in no net loss of
6 occurrences (Objective DTP/SMA1.1, associated with CM11). Post-implementation monitoring of
7 affected occurrences and occurrences in reserve lands would be done to confirm that no net loss of
8 occurrences has been achieved (Monitoring Action CM11-22, associated with CM11).

9 Suisun Marsh aster could lose 5 acres of modeled habitat (0.08%), including all or part of 27
10 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
11 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
12 colonization by Suisun Marsh aster, which could offset this habitat loss. Channel margin
13 enhancement (CM6) and riparian natural community restoration (CM7) will also consider the
14 potential for creating habitat for Suisun marsh aster; creation of suitable habitat under these
15 measures could also help offset this habitat loss. Although active restoration of this species is not
16 proposed, the BDCP predicts that natural expansion of populations into the restored habitat would
17 occur and result in no net loss of occurrences (Objective DTP/SMA1.1, associated with CM11). Post-
18 implementation monitoring of affected occurrences and occurrences in reserve lands would be done
19 to confirm that no net loss of occurrences has been achieved (Monitoring Action CM11-22,
20 associated with CM11).

21 All four of these species (Delta mudwort, Mason's lilaopsis, Delta tule pea, and Suisun Marsh aster)
22 are widespread in the study area with many occurrences. Habitat modification and loss are the
23 primary stressors that are responsible for their decline and that currently limit their distribution
24 and abundance. Therefore, restoring large areas of habitat and improving habitat functions for these
25 species would provide a reasonable expectation that the distribution and abundance of these
26 species would also improve. Because a relatively small amount of modeled habitat would be
27 adversely affected (less than 1% of the total), it is likely that the initial adverse effects of covered
28 activities on these species would be offset and that the overall effect of Alternative 1B on these
29 species would not be adverse.

30 Side-flowering skullcap could lose 13 acres of modeled habitat (0.5%), including all or part of two
31 occurrences. One occurrence would be avoided through implementation of AMM30. The location of
32 a second potentially affected occurrence, which was last observed in 1892, is not known precisely.
33 Under AMM11, this occurrence would be surveyed for, and because this is a tidal freshwater
34 wetland species, avoidance of the habitat during project construction would be highly likely. The
35 BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives TBEWNC1.1
36 and TFEWNC1.1) would increase the extent of habitat available for colonization by side-flowering
37 skullcap, which could offset this habitat loss. Channel margin enhancement (CM6) and riparian
38 natural community restoration (CM7) will also consider the potential for creating habitat for side-
39 flowering skullcap; creation of suitable habitat under these measures could also help offset this
40 habitat loss. No active restoration of this species is proposed, and no post-implementation
41 monitoring of affected occurrences and occurrences in reserve lands would be done. Because
42 impacts on occurrences of side-flowering skullcap would be avoided, and because loss of modeled
43 habitat for the species would be offset through restoration, the overall effect of Alternative 1B on
44 this species would not be adverse.

1 Soft bird's-beak could lose 73 acres of modeled habitat (6%), including all or part of seven
 2 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
 3 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
 4 colonization by soft bird's-beak, which could offset this habitat loss. Tidal restoration in the Hill
 5 Slough Ecological Reserve would be done to increase potential habitat there for soft bird's-beak
 6 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and
 7 manage livestock in tidal marsh habitat under CM11 could enhance habitat for soft bird's-beak.
 8 Although no active restoration of this species is proposed, post-implementation monitoring of soft
 9 bird's-beak occurrences in proximity to tidal restoration sites would be done to confirm that
 10 occurrences are stable or increasing (Monitoring Action CM11-22, associated with CM11). Soft
 11 bird's-beak has a restricted distribution in the study area with highly localized occurrences, and
 12 habitat modification is the primary factor responsible for the species' decline and limiting the
 13 species' distribution and abundance. Improving habitat functions for this species would provide a
 14 reasonable expectation that the distribution and abundance of soft bird's-beak would also improve.
 15 Although a substantial amount of modeled habitat could be affected, the primary habitat for soft
 16 bird's-beak is high tidal brackish marsh, and the affected habitat is low tidal brackish marsh.
 17 Therefore, it is likely that the overall effect of Alternative 1B on this species would not be adverse.

18 Suisun thistle could lose 73 acres of modeled habitat (6%), although no occurrences would be
 19 affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives
 20 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by
 21 Suisun thistle, which could offset this habitat loss. Tidal restoration in the Hill Slough Ecological
 22 Reserve and at Rush Ranch would be done to increase potential habitat there for Suisun thistle
 23 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and
 24 manage livestock in tidal marsh habitat under CM11 could enhance habitat for Suisun thistle. In
 25 addition, two new occurrences of Suisun thistle would be established in CZ 11 (Objective
 26 SBB/SuT1.4, associated with CM11). Post-implementation monitoring of Suisun thistle occurrences
 27 in proximity to tidal restoration sites would be done to confirm that occurrences are stable or
 28 increasing (Monitoring Action CM11-22, associated with CM11). Habitat restoration, enhancement
 29 of habitat functions, and establishment of new occurrences would offset any potential loss of
 30 modeled habitat for Suisun Marsh thistle.

31 Three occurrences of Bolander's water-hemlock could be affected. Although the extent of potential
 32 habitat affected was not determined, it would be comparable to that for Delta tule pea and Suisun
 33 Marsh aster (5 acres). Tidal habitat restoration activities proposed under CM4 (Objectives
 34 TBEWNC1.1 and TFEWNC1.1) could increase the extent of habitat available for colonization by
 35 Bolander's water-hemlock, which could offset this habitat loss. Because only a few scattered
 36 occurrences of Bolander's water-hemlock are present in the study area, there is no reasonable
 37 expectation that habitat restoration without active species-specific restoration activities would
 38 result in the establishment of new occurrences to offset the losses. Also, because Bolander's water-
 39 hemlock is a noncovered species, the species protections and occurrence monitoring afforded to
 40 covered species under the BDCP would not apply to this species. Therefore, the effects of Alternative
 41 1B on Bolander's water hemlock could be adverse.

42 **NEPA Effects:** The loss of modeled and occupied habitat for special-status tidal wetland plants
 43 would be offset through tidal habitat restoration (CM4). Therefore, implementation of Alternative
 44 1B would result in no adverse effects on seven of eight special-status grassland plants in the study
 45 area. Alternative 1B would result in a reduction in the range and numbers of Bolander's water-
 46 hemlock, which would be an adverse effect. Adverse effects on Bolander's water-hemlock could be

1 avoided or offset through implementation of Mitigation Measure BIO-170, *Avoid, Minimize, or*
2 *Compensate for Impacts on Noncovered Special-Status Plant Species.*

3 **CEQA Conclusion:** Because loss of occurrences and modeled habitat for covered tidal habitat plant
4 species would be offset through habitat restoration, impacts on covered tidal wetland plants as a
5 result of implementing Alternative 1B would not be significant. However, the loss of Bolander’s
6 water-hemlock populations in CZ 11 would result in a reduction in the range and numbers of this
7 species and would be a significant impact. Implementation of Mitigation Measure BIO-170 would
8 reduce this impact to a less-than-significant level.

9 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**
10 **Special-Status Plant Species**

11 Please see Mitigation Measure BIO-170 under Impact BIO-170.

12 **Inland Dune Plants**

13 **Impact BIO-174: Effects on Habitat and Populations of Inland Dune Plants**

14 Alternative 1B would have no adverse effects on inland dune plants (Table 12-1B-67). No
15 construction activities or habitat restoration would take place where the species occur. No specific
16 actions to benefit inland dune species are proposed.

17 **Table 12-1B-67. Summary of Impacts on Inland Dune Plants under Alternative 1B**

	Acres in Study Area	Acres affected	Occurrence in Study Area	Occurrences Affected	Impacts
Modeled Habitat					
Inland Dunes	19	0	0	0	None
Noncovered Species					
Hoover’s cryptantha	0	0	1	0	None
Antioch Dunes buckwheat	0	0	1	0	None
Mt. Diablo buckwheat	0	0	1	0	None
Contra Costa wallflower	0	0	3	0	None
Antioch Dunes evening- primrose	0	0	9	0	None

18
19 **NEPA Effects:** Implementing the BDCP under Alternative 1B would not affect special-status inland
20 dune plant species.

21 **CEQA Conclusion:** Implementation of Alternative 1B would have no impacts on inland dune species.
22 No mitigation is required.

23 **Nontidal Wetland Plants**

24 No covered plant species occur in nontidal wetlands in the study area; however, six noncovered
25 special-status plant species occur in nontidal wetlands in the study area. Table 12-1B-68

1 summarizes the acreage of nontidal wetland habitat in the study area and the number of
2 occurrences of each special-status nontidal wetland plant in the study area.

3 **Table 12-1B-68. Summary of Impacts on Nontidal Wetland Plants under Alternative 1B**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Nontidal freshwater aquatic	5,567	293	0	0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Nontidal freshwater perennial emergent wetland	1,509	137	0	0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Noncovered Species					
Watershield	0	0	3	0	None
Bristly sedge	0	0	18	4	Loss of habitat from construction of water conveyance facilities
Woolly rose-mallow ^a	0	0	121	15	Loss of habitat from construction of water conveyance facilities and from tidal habitat restoration
Eel grass pondweed	0	0	1	0	None
Sanford's arrowhead	0	0	23	3	Loss of habitat from construction of water conveyance facilities and tidal habitat restoration
Marsh skullcap ^a	0	0	3	0	None

^a Also occurs in valley/foothill riparian habitat.

4

5 **Impact BIO-175: Effects on Habitat and Populations of Nontidal Wetland Plants**

6 Under Alternative 1B, known occurrences of bristly sedge and woolly rose-mallow are within the
7 proposed footprint for the water conveyance facilities or within the hypothetical footprint for
8 restoration activities and would be adversely affected. Alternative 1B would have no adverse effects
9 on watershield, eel-grass pondweed or marsh skullcap.

1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 ● *CM1 Water Facilities and Operation*: Construction of the Alternative 1B water conveyance
5 facilities would adversely affect three noncovered special-status plants occurring in nontidal
6 wetlands. Two occurrences of bristly sedge in CZ 4 and CZ 5, including approximately 1.54 acres
7 of occupied habitat, would be affected by construction of the water conveyance facilities. Eleven
8 occurrences of woolly rose-mallow would be affected. Five occurrence would be affected by
9 construction of the intake structures, and six occurrences would be affected by siphon works
10 areas and borrow/spoils sites. Two occurrences of Sanford's arrowhead would be affected.
- 11 ● *CM2 Yolo Bypass Fisheries Enhancement*: No known occurrences of special-status nontidal
12 wetland plants are present in the hypothetical footprint for construction or operation of the
13 Yolo Bypass fisheries enhancements. Therefore, construction and operation of the Yolo Bypass
14 Fisheries enhancements would not affect special-status nontidal marsh plants.
- 15 ● *CM3 Natural Communities Protection and Restoration*: No specific natural communities
16 protection is proposed for nontidal wetlands under the BDCP. Therefore, no occurrences of
17 special-status nontidal plants are proposed for protection.
- 18 ● *CM4 Tidal Natural Communities Restoration*: One known occurrence of Sanford's arrowhead in
19 CZ 2 and one occurrence of woolly rose-mallow in CZ 7 are present within areas proposed for
20 tidal habitat restoration and could be lost as a result of habitat conversion. Therefore, tidal
21 habitat restoration would have an adverse effect on these species. No other special-status tidal
22 wetland plants would be affected.
- 23 ● *CM5 Seasonally Inundated Floodplain Restoration*: No known occurrences of special-status
24 nontidal wetland plants are present within areas proposed for floodplain restoration. Therefore,
25 floodplain restoration and construction of new floodplain levees would have no impacts on
26 special-status nontidal wetland plants.
- 27 ● *CM6 Channel Margin Enhancement*: No known occurrences of special-status nontidal wetland
28 plants are present within areas proposed for channel margin habitat enhancement. Therefore,
29 channel margin habitat enhancement would have no impacts on special-status nontidal wetland
30 plants.
- 31 ● *CM7 Riparian Natural Community Restoration*: No known occurrences of special-status nontidal
32 wetland plants are present within areas proposed for riparian habitat restoration. Therefore,
33 riparian habitat restoration would have no impacts on special-status nontidal wetland plants.
- 34 ● *CM8 Grassland Natural Community Restoration*: No known occurrences of special-status nontidal
35 wetland plants are present within areas proposed for grassland communities restoration.
36 Therefore, grassland communities restoration would have no impacts on special-status nontidal
37 wetland plants.
- 38 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No known occurrences of
39 special-status nontidal wetland plants are present within areas proposed for vernal pool and
40 alkali seasonal wetland complex restoration. Therefore, vernal pool and alkali seasonal wetland
41 complex restoration would have no impacts on special-status nontidal wetland plants.
- 42 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
43 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid existing

1 nontidal marsh and would have no adverse effects on special-status nontidal wetland plants.
2 The BDCP may benefit nontidal wetland species by creating 400 acres of nontidal freshwater
3 marsh, including components of nontidal perennial aquatic and nontidal freshwater perennial
4 emergent wetland communities, and by maintaining and enhancing the habitat functions of
5 protected and created nontidal wetland habitats for covered and other native species. However,
6 no specific actions to benefit noncovered species are proposed.

7 Under Alternative 1B, 1,500 acres of nontidal marsh would be restored (Objective
8 NFEW/NPANC1.1, addressed under CM10). However, these wetlands would be restored primarily
9 as habitat for giant garter snake. These habitat restoration activities would be unlikely to expand the
10 amount of habitat available to bristly sedge, woolly rose-mallow, and Sanford's arrowhead, potential
11 loss of habitat or occurrences resulting from covered activities would not be compensated for.
12 Moreover, because special-status nontidal wetland plant species are not covered under the BDCP,
13 the species protections afforded to covered species under the AMMs do not apply to these species,
14 and the effects of Alternative 1B on these species would be adverse.

15 **NEPA Effects:** Implementation of the BDCP under Alternative 1B could result in a reduction in the
16 range and numbers of bristly sedge, woolly rose-mallow, and Sanford's arrowhead, three
17 noncovered nontidal wetland species, which would be an adverse effect. Adverse effects on these
18 species could be avoided or offset through implementation of Mitigation Measure BIO-170.

19 **CEQA Conclusion:** Under Alternative 1B, construction of the water conveyance facilities and tidal
20 habitat restoration could result in a reduction in the range and numbers of bristly sedge, woolly
21 rose-mallow, and Sanford's arrowhead. Tidal habitat restoration could result in a reduction in the
22 range and numbers of Sanford's arrowhead and woolly rose-mallow. These impacts would be
23 significant. Implementation of Mitigation Measure BIO-170 would reduce these impacts to a less-
24 than-significant level.

25 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered** 26 **Special-Status Plant Species**

27 Please see Mitigation Measure BIO-170 under Impact BIO-170.

28 **General Terrestrial Biology Effects**

29 **Wetlands and Other Waters of the United States**

30 Alternative 1B actions would both permanently and temporarily remove or convert wetlands and
31 open water that are regulated by the USACE under Section 404 of the CWA. The Section 404
32 regulations and relevant information on mitigating impacts on wetlands and waters of the United
33 States are described in Section 12.2.1.1. The following two impacts address the project-level effects
34 of CM1 on these potential wetlands and waters, and the programmatic-level effects of other relevant
35 conservation actions (CM2–CM10). CM11–CM21 would not directly result in loss or conversion of
36 wetlands or other waters of the United States. The methods used to conduct these analyses are
37 described in Section 12.3.2.4, *Methods Used to Assess Wetlands and Other Waters of the United States*.
38 The waters of the United States data used for this analysis is based on a verified wetland delineation
39 from USACE that was completed in early 2015. These waters of the United States were mapped at
40 finer scale than that which was done for the natural community mapping for the BDCP and therefor
41 the acreages of these two datasets differ. The waters of the United States mapping identified

1 numerous agricultural ditches and seasonal wetlands occurring within and associated with
2 cultivated lands, which explains the majority of the difference.

3 **Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and**
4 **Other Waters of the United States**

5 Alternative 1B proposes the construction, maintenance, and operation of water conveyance facilities
6 within, or requiring the unavoidable fill of, waters of the United States. The estimated fill of
7 jurisdictional waters associated with this alternative is described in Table 12-1B-69. Based on the
8 methodology used to conduct this analysis, the losses would occur at pipeline, canal and intake
9 areas, borrow/spoil storage sites, transmission corridors, forebay site, and multiple temporary work
10 areas associated with the construction activity. The permanent open water and wetland losses
11 would occur at scattered locations along the water conveyance facility alignment, with the majority
12 caused by construction of Alternative 1B's five intake structures along the eastern bank of the
13 Sacramento River between Freeport and Courtland in the north Delta (including associated
14 spoil/borrow areas), along the entire canal route in the east Delta, and at the Byron forebay site in
15 the south Delta. The temporary open water and wetland effects would also occur mainly at the five
16 intake construction sites along the eastern bank of the Sacramento River, and at temporary siphon
17 work areas where the canal crosses under eastern Delta sloughs and waterways.

18 **Table 12-1B-69. Estimated Fill of Waters of the United States Associated with the Construction of**
19 **Water Conveyance Facilities under Alternative 1B (acres)**

Wetland/Water Type	Permanent Impact	Temporary Impacts Treated as Permanent ^a	Temporary Impact	Total Impact
Agricultural Ditch	228.0	31.1	0	259.1
Alkaline Wetland	0.1	0	0	0.1
Clifton Court Forebay	1.0	0	0	1.0
Conveyance Channel	12.7	1.1	0	13.8
Depression	35.1	1.9	0	37.0
Emergent Wetland	77.6	20.0	0	97.6
Forest	9.3	6.9	0	16.2
Lake	0.2	0.3	0	0.5
Scrub-Shrub	13.8	12.2	0	26.0
Seasonal Wetland	177.5	0	0	177.5
Tidal Channel	28.1	146.3	0	174.3
Vernal Pool	0	0	0	0
Total	583	220	0	803

^a Temporary impacts treated as permanent are temporary impacts expected to last over one year. These impact sites will eventually be restored to pre-project conditions; however, due to the duration of effect, compensatory mitigation will be included for these areas.

20
21 The majority of the impacts on wetlands and waters of U.S. are to wetlands found within cultivated
22 lands (mostly agricultural ditches and seasonal wetlands), tidal channel, and emergent wetlands.
23 These impacts mostly result from reuseable tunnel material areas, canal construction, and siphon
24 work areas. The impacted seasonal wetlands mapped within the Conveyance Planning Area, as

1 described in Section 12.3.2.4, *Methods Used to Assess Wetlands and Other Waters of the United States*,
 2 all occur in the central Delta within plowed agricultural fields.

3 Unavoidable impacts on waters of the United States would be offset such that the loss of acreage and
 4 functions due to construction activities are fully compensated. Wetland functions are defined as a
 5 process or series of processes that take place within a wetland. These include the storage of water,
 6 transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have
 7 value for the wetland itself, for surrounding ecosystems, and for people. Functions can be grouped
 8 broadly as habitat, hydrologic/hydraulic, or water quality. Not all wetlands perform all functions nor
 9 do they perform all functions equally well. The location and size of a wetland may determine what
 10 functions it will perform. For example, the geographic location may determine its habitat functions,
 11 and the location of a wetland within a watershed may determine its hydrologic/hydraulic or water-
 12 quality functions. Many factors determine how well a wetland will perform these functions: climatic
 13 conditions, quantity and quality of water entering the wetland, and disturbances or alteration within
 14 the wetland or the surrounding ecosystem. Wetland disturbances may be the result of natural
 15 conditions, such as an extended drought, or human activities, such as land clearing, dredging, or the
 16 introduction of nonnative species. Wetlands are among the most productive habitats in the world,
 17 providing food, water, and shelter for fish, shellfish, birds, and mammals, and serving as a breeding
 18 ground and nursery for numerous species. Many endangered plant and animal species are
 19 dependent on wetland habitats for their survival. Hydrologic and hydraulic functions are those
 20 related to the quantity of water that enters, is stored in, or leaves a wetland. These functions include
 21 such factors as the reduction of flow velocity, the role of wetlands as ground-water recharge or
 22 discharge areas, and the influence of wetlands on atmospheric processes. Water-quality functions
 23 include the trapping of sediment, pollution control, and the biochemical processes that take place as
 24 water enters, is stored in, or leaves a wetland.

25 The functions of the waters of the United States that would be temporarily or permanently impacted
 26 by this alternative vary greatly depending primarily on existing land uses and historical levels of
 27 disturbance. Generally, agricultural ditches and conveyance channels, which are regularly
 28 maintained and often devoid of vegetation, support only minimal hydraulic function (water
 29 conveyance), with virtually no water quality or habitat function. With respect to Clifton Court
 30 Forebay, the facility is regularly maintained, but supports some hydrologic, hydraulic, and water
 31 quality functions (e.g., reduction of velocity, groundwater recharge, and trapping of sediment). Tidal
 32 channels affected by this alternative support functions in all three categories, but the level at which
 33 these functions perform vary depending on setting, size, and level of disturbance. The alkaline
 34 wetlands and vernal pools exist in non-native grasslands and have been subjected to some
 35 disturbance due to past land uses. Although these features likely support habitat, water quality, and
 36 hydrologic/hydraulic functions, the capacity of these features to perform such functions vary
 37 depending on the overall ecological setting and level of disturbance. Functions associated with
 38 emergent wetland, forest, and scrub-shrub, depend primarily on the location of these habitat types.
 39 Where they exist as in-stream (in-channel islands) or as the thick band of habitat adjacent to a
 40 waterway, these features are expected to function at a high level. However, where these habitats
 41 exist as thin bands, or where they are situated in agricultural fields, their habitat functions will be
 42 considerably lower. All of the wetlands classified as seasonal wetlands occur in agricultural fields. As
 43 such, their habitat functions have been greatly compromised, but they retain some water quality and
 44 hydrologic/hydraulic function. Like seasonal wetlands, most depressions occur within agricultural
 45 areas; however the depressions may support wetland vegetation at their edges. The areas mapped

1 as lake are the dredged borrow ponds created during the construction of Interstate 5. Although
2 relatively small, each lake is likely performing functions from all three categories.

3 A functional assessment of wetlands proposed for fill will be conducted during the development of
4 the Conceptual Mitigation Plan as part of the Clean Water Act permitting process. The results of this
5 assessment will be compared to the expected functions at the proposed mitigation site(s) such that
6 it can be confirmed that the compensatory mitigation will in fact accomplish full functional
7 replacement of impacted wetlands. All impacted wetlands would be replaced with fully functional
8 compensatory wetland habitat demonstrating high levels of habitat, water quality, and
9 hydrologic/hydraulic function. Because many impacted wetlands are significantly less than high
10 function, the compensatory mitigation would result in a net increase in wetland function.

11 Alternative 1B was designed to avoid waters of the United States to the maximum extent practicable.
12 Each of the conveyance components has been located in upland areas where it was feasible to do so.
13 Once construction begins, specific measures would be implemented, as described in the AMMs set
14 out in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, and in Appendix 11F, *Substantive*
15 *BDCP Revisions*, to further avoid and minimize effects on waters of the United States as well as on
16 special-status species. The AMMs would be implemented at all phases of a project, from siting
17 through design, construction, and on to operations and maintenance. The AMMs that pertain
18 specifically to waters of the United States are *AMM1 Worker Awareness Training, AMM2 Construction*
19 *Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4*
20 *Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan,*
21 *AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily*
22 *Affected Natural Communities, AMM12 Vernal Pool Crustaceans, AMM30 Transmission Line Design and*
23 *Alignment Guidelines, AMM34 Construction Site Security, and AMM36 Notification of Activities in*
24 *Waterways*.

25 The implementation of measures to avoid and minimize impacts on habitat for aquatic species and
26 species which utilize aquatic habitats, such as California tiger salamander, giant garter snake,
27 California red legged frog, western pond turtle, riparian woodrat, and riparian brush rabbit, would
28 also result in further avoidance and minimization of effects on waters of the United States.

29 Aside from wetland habitats that would be created as a result of implementing CM4–CM10, some of
30 which could serve the dual purpose of offsetting effects on species and mitigating impacts on waters
31 of the United States, more specific mitigation is required to ensure that there is no net loss of
32 wetland functions and values as a result of implementing Alternative 1B pursuant to USACE's and
33 U.S. EPA's Mitigation Rule (see Section 12.2.1.1). Mitigation Measure BIO-176, *Compensatory*
34 *Mitigation for Fill of Waters of the United States*, would be available to address adverse impacts on
35 waters of the United States.

36 **NEPA Effects:** The permanent and temporary loss of these jurisdictional wetlands and waters as a
37 result of constructing Alternative 1B water conveyance facilities would be a substantial effect if not
38 compensated by wetland protection and/or restoration. This loss would represent a removal of
39 federally protected wetlands as defined by Section 404 of the CWA. Project proponents under
40 Alternative 1B would also implement AMM1–AMM7, AMM10, AMM12, AMM30, AMM34, and
41 AMM36, which would avoid and minimize fill of wetlands and waters and any indirect effects on
42 wetlands and waters. Specific mitigation would be required to ensure that Alternative 1B does not
43 result in a loss of functions and values of waters of the United States and thus that the affect is not

1 adverse. Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters of the United States*,
2 would be available to reduce these effects such that they are not adverse.

3 **CEQA Conclusion:** The permanent and temporary loss of these jurisdictional wetlands and waters of
4 the United States as a result of constructing Alternative 1B water conveyance facilities would be a
5 significant impact. Specific mitigation would be required to ensure that Alternative 1B does not
6 result in a loss of functions and values of waters of the U.S. Mitigation Measure BIO-176,
7 *Compensatory Mitigation for Fill of Waters of the U.S.*, would be available to reduce the impact to a
8 less-than-significant level. Alternative 1B does propose to restore up to 76,721 acres of wetland
9 natural communities under the Plan, which would include 65,000 acres of tidal marsh restoration
10 (CM4), 10,000 acres of seasonally inundated floodplain restoration (CM5), 21 acres of vernal
11 pool/alkali seasonal wetlands (CM9; 67 acres of vernal pool complex and 72 acres of alkali seasonal
12 wetland complex assuming a wetland density of 15%), and 1,700 acres of nontidal marsh
13 restoration (CM10). In addition, Alternative 1B would restore 5,000 acres of riparian habitat (CM7),
14 some portion of which may also qualify as forested or scrub-shrub wetland. In addition, 20 miles of
15 levees will have channel margin enhancement conducted on them (CM6), which would include
16 improving channel geometry and restoring riparian, marsh, and mudflat habitats on the water side
17 of levees. Impacts on wetlands from CM1 construction would occur in the first 10 years after BDCP
18 approval. Approximately 20,065 acres of this wetland restoration would occur during this time
19 period

20 The success in implementing these Conservation Measures would be assured through effectiveness
21 monitoring, which includes success criteria, and adaptive management as outlined in the *Adaptive*
22 *Management and Monitoring* sections of the BDCP Chapter 3, *Conservation Strategy*, for tidal marsh
23 restoration (BDCP Section 3.4.4), seasonal floodplain restoration (BDCP Section 3.4.5.4), channel
24 margin enhancement (BDCP Section 3.4.6.4), valley/foothill riparian restoration (BDCP Section
25 3.4.7.4), vernal pool and alkali seasonal wetland complex restoration (BDCP Section 3.4.9.4), and
26 nontidal marsh restoration (BDCP Section 3.4.10.3). All restored areas will be secured in fee-title or
27 through conservation easements.

28 Alternative 1B would also result in the protection and management of the following natural
29 communities that contain wetlands: 750 acres of valley/foothill riparian, 600 acres of vernal pool
30 complex, 150 acres of alkali seasonal wetland complex, 8,100 acres of managed wetlands, and 50
31 acres of nontidal marsh. In addition, 8,000 acres of grasslands and 51,625 acres of cultivated lands
32 will be protected and managed, which would likely include areas of seasonal wetlands, ponds, and
33 agricultural ditches.

34 The project proponents under Alternative 1B would also implement AMM1–AMM7, AMM10,
35 AMM12, AMM30, AMM34, and AMM36, which would avoid and minimize fill of waters of the United
36 States and any indirect effects on wetlands and waters. As stated above, specific mitigation would be
37 required to ensure that Alternative 1B does not result in a loss of functions and values of waters of
38 the United States. Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters of the*
39 *United States*, would be available to reduce the impact to a less-than-significant level.

40 **Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the U.S.**

41 All mitigation proposed as compensatory mitigation would be subject to specific success criteria,
42 success monitoring, long-term preservation, and long-term maintenance and monitoring
43 pursuant to the requirements of the Mitigation Rule. All compensatory mitigation shall fully
44 replace lost function through the mechanisms discussed below which will result in restoration

1 and/or creation of habitat with at least as much function and value as those of the impacted
2 habitat. In some cases, the mitigation habitat will afford significantly higher function and value
3 than that of impacted habitat.

4 Compensation ratios are driven by type, condition, and location of replacement habitat as
5 compared to type, condition and location of impacted habitat. Compensatory mitigation usually
6 includes restoration, creation, or rehabilitation of aquatic habitat. The USACE does not typically
7 accept preservation as the only form of mitigation; use of preservation as mitigation typically
8 requires a very high ratio of replacement to impact. It is anticipated that ratios will be a
9 minimum of 1:1, depending on the factors listed above.

10 Compensatory mitigation will consist of restoration, creation, and/or rehabilitation of aquatic
11 habitat. Typically, impacted habitat will be replaced in-kind, although impacts on some habitat
12 types such as agricultural ditches, conveyance channels, and Clifton Court Forebay, will be
13 mitigated out-of-kind with higher functioning habitat types such as riparian wetland, marsh,
14 and/or seasonal wetland. Compensatory mitigation shall be accomplished by one, or a
15 combination of the following methods:

- 16 • Purchase credits for restored/created/rehabilitated habitat at an approved wetland
17 mitigation bank;
- 18 • On-site (adjacent to the project footprint) restoration or rehabilitation of wetlands
19 converted to uplands due to past land use activities (such as agriculture) or functionally
20 degraded by such activities;
- 21 • On-site (adjacent to the project footprint) creation of aquatic habitat;
- 22 • Off-site (within the Delta) restoration or rehabilitation of wetlands converted to uplands
23 due to past land use activities (such as agriculture) or functionally degraded by such
24 activities;
- 25 • Off-site (within the Delta) creation of aquatic habitat; and/or
- 26 • Payment into the Corps' Fee-in-Lieu program.

27 *Purchase of Credits or Payment into Fee-in-Lieu Program*

28 It is envisioned that purchase of bank credits and/or payment into a fee-in-lieu program will be
29 utilized for habitat types that would be difficult to restore or create within the Delta. Examples
30 are vernal pool habitat, which requires an intact hardpan or other impervious layer and very
31 specific soil types, and alkali seasonal wetland, which requires a specific set of chemical soil
32 parameters. It is anticipated that only a small amount of compensatory mitigation will fall into
33 these categories.

34 *On-Site Restoration, Rehabilitation and/or Creation*

35 Much of the Delta consists of degraded or converted habitat that is more or less functioning as
36 upland. Opportunities will be sought where on-site restoration, rehabilitation, and/or creation
37 could occur immediately adjacent to the project footprint. It is anticipated that some of the
38 compensatory mitigation will fall into this category.

1 *Off-Site Restoration, Rehabilitation and/or Creation*

2 There exists, within the immediate vicinity of the project area, Delta land which has been subject
3 to agricultural practices or other land uses which have degraded or even converted wetlands
4 that existed historically. Sites within the Delta will be evaluated for their restoration,
5 rehabilitation, and/or creation potential. It is anticipated that most of the compensatory
6 mitigation will fall into this category.

7 Compensatory mitigation will result in no net loss of acreage of waters of the United States and
8 will accomplish full functional replacement of impacted wetlands. All impacted wetlands will be
9 replaced with fully functioning wetland habitat demonstrating high levels of habitat, water
10 quality, and hydrologic/hydraulic function. Since many impacted wetlands are likely to function
11 at significantly less than high levels, the compensatory mitigation will result in a significant net
12 increase in wetland function.

13 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on**
14 **Wetlands and Other Waters of the United States**

15 The habitat protection and restoration activities associated with Alternative 1B's other conservation
16 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and waters of
17 the United States in the study area over the course of BDCP conservation action implementation.
18 Because these conservation measures have not been defined to the level of site-specific footprints, it
19 is not possible to delineate and quantify these effects in detail. Several of the conservation measures
20 (CM2, CM4 and CM5) have been described with theoretical footprints for purposes of the effects
21 analysis contained in Chapter 5, *Effects Analysis*, of the BDCP.

22 Because the wetland delineation was only conducted within the Conveyance Planning Area and not
23 the remainder of the Plan Area, the effects on potential wetlands and waters of the United States
24 from CM2-CM10 were analyzed by looking at effects on wetland natural communities mapped
25 within the theoretical footprints for CM2, CM4, and CM5 by assuming that 100% of the
26 predominantly wetland natural communities listed in Appendix 12E, *Detailed Accounting of Direct*
27 *Effects of Alternatives on Natural Communities and Covered Species*, and that 10% of all of the non-
28 wetland natural communities listed in that table would qualify as wetlands or other waters of the
29 United States under the CWA. Based on this approach approximately 19,850 acres of potentially
30 jurisdictional wetlands and waters could be affected by CM2-CM10. The majority of these impacts
31 are attributable to the conversion of 13,746 acres of managed wetland to tidal marsh under CM4,
32 which would likely result in an improvement of wetland function in the Plan Area.

33 **NEPA Effects:** The conversion of existing wetland natural communities to other types of wetland
34 natural communities through implementation of CM2–CM10 for Alternative 1B would be
35 approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open
36 water through implementation of CM4. Although the increase in wetland acreage and wetland
37 functions from these restoration actions could in part offset the effects on waters of the United
38 States in these areas, implementation of Mitigation Measure BIO-176, *Compensatory Mitigation for*
39 *Fill of Waters of the United States*, would be required to ensure that these effects are not adverse.

40 **CEQA Conclusion:** The conversion of existing wetland natural communities to other types of
41 wetland natural communities through implementation of CM2–CM10 for Alternative 1B would be
42 approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open
43 water through implementation of CM4. In total, up to 76,721 acres of wetland natural communities

1 would be restored under Alternative 1B. Although the increase in wetland acreage and wetland
 2 functions from these restoration could in part offset the effects on waters of the United States in
 3 these areas, implementation of Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of*
 4 *Waters of the United States*, would be required to ensure that the impacts are reduced to a less-than-
 5 significant level.

6 **Shorebirds and Waterfowl**

7 Managed wetlands, tidal natural communities, and cultivated lands (including grain and hay crops,
 8 pasture, field crops, rice, and idle lands) provide freshwater nesting, feeding, and resting habitat for
 9 a large number of Pacific flyway waterfowl and shorebirds. The primary effects of concern for
 10 shorebirds and waterfowl are related to the conversion of managed wetland and cultivated lands to
 11 tidal marsh associated with habitat restoration. Ducks Unlimited (2013) conducted an analysis to
 12 determine the effects of BDCP conservation measures on waterfowl, as well as to determine whether
 13 BDCP actions would impede attainment of the goals established by the Central Valley Joint Venture
 14 (CVJV) Implementation Plan for the Delta, Yolo, and Suisun Marsh drainage basins. The CVJV efforts
 15 are guided by its 2006 Implementation Plan, which is founded on the principles of strategic habitat
 16 conservation (Central Valley Joint Venture 2006). Those principles emphasize the establishment of
 17 population abundance objectives and the use of species-habitat models to link population objectives
 18 to habitat needs. The CVJV has used species-habitat models to translate bird abundance objectives
 19 into habitat objectives, while explicitly identifying the biological assumptions that underpin these
 20 models and the data used to populate them. As a result, the CVJV's biological planning provides a
 21 framework for evaluating the effects of the BDCP on waterfowl.

22 The Ducks Unlimited waterfowl analysis focused primarily on dabbling ducks. Less than 5% of all
 23 geese in the Central Valley occur in the Yolo, Delta, and Suisun Marsh drainage basins. Moreover,
 24 geese in the Central Valley rely mostly on agricultural habitats to meet their food energy needs. The
 25 BDCP's effect on agricultural habitats is limited to the Delta Basin where about 2500 acres of corn
 26 now available to geese would be converted to other habitats (Ducks Unlimited 2013: Table 5). Food
 27 supplies for geese would still be well in excess of demand even with the loss of these agricultural
 28 habitats (Central Valley Joint Venture 2006, Ducks Unlimited 2013). The duck population objectives
 29 used in the analysis were taken directly from the CVJV Plan. Dabbling duck species make up 92% of
 30 this objective, while diving duck species make up the remaining 8%. Thus, the results were mostly
 31 driven by dabbling duck needs and largely interpreted in the context of dabbling duck foraging
 32 ecology. The 55,000 acres of Tidal Natural Communities Restoration (CM4) would be expected to
 33 benefit diving ducks by providing deep water foraging habitat. Refer to the Ducks Unlimited Report
 34 (Ducks Unlimited 2013) for details of the analysis and methods with respect to the TRUMET model
 35 used to quantify effects on food biomass and food quality.

36 An analysis was conducted to determine the effects of the BDCP covered activities on wintering and
 37 breeding shorebird habitat (ICF International 2013). This analysis evaluated the relative increase
 38 and decrease in natural communities known to provide important foraging, roosting, and breeding
 39 habitat. Similar to the waterfowl analysis, the results were broken up into the three Central Valley
 40 Joint Venture Basins that overlap with the BDCP study area: Yolo, Delta, and Suisun. Natural
 41 community losses and gains were then translated into species-specific outcomes, comparing the
 42 relative habitat value of each BDCP natural community for each Central Valley shorebird species
 43 (Table 1, ICF International 2013). The shorebird species ranking system displayed in Table 1 (ICF
 44 International 2013) was modified from a table in Stralberg et. al (2010). The table was created using

1 survey data and experts' species-specific habitat rankings. The survey data included fall, winter, and
2 spring density data. This resulted in an overall, cross-season representation of habitat requirements.

3 **Impact BIO-178: Loss or Conversion of Habitat for Waterfowl and Shorebirds as a Result of**
4 **Water Conveyance Facilities Construction**

5 Development of the water conveyance facilities (CM1) would result in the permanent removal of
6 approximately 6 acres of managed wetland, 8 acres of tidal wetlands, 24 acres of nontidal wetlands,
7 and 4,091 acres of suitable cultivated lands (including grain and hay crops, pasture, field crops, rice,
8 and idle lands). In addition, 18 acres of managed wetland, 11 acres of tidal wetlands, 11 acres of
9 nontidal wetlands and 7,470 acres of suitable cultivated lands would be temporarily impacted.
10 These losses of habitat would occur within the first 10 years of Alternative 1B implementation in the
11 Delta Basin. The BDCP has committed to the near-term protection of 15,400 acres of non-rice
12 cultivated lands, 200 acres of rice, and 700 acres of rice or "rice equivalent" natural communities
13 including nontidal wetlands in the near-term. In addition, 4,100 acres of managed wetlands would
14 be created, protected, and enhanced, 8,850 acres of freshwater tidal wetlands would be restored,
15 and 2,000 acres of tidal brackish emergent wetland would be restored (Table 3-4, Chapter 3).

16 Construction activities could have an adverse effect on nesting shorebirds or waterfowl if they were
17 present in or adjacent to work areas and could result in destruction of nests or disturbance of
18 nesting and foraging behaviors. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
19 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on
20 nesting birds.

21 **NEPA Effects:** Habitat loss from construction of the Alternative 1B water conveyance facilities would
22 not result in an adverse effect on shorebirds and waterfowl because of the acres of natural
23 communities and cultivated lands that would be restored and protected in the near-term timeframe.
24 If waterfowl were present in or adjacent to work areas, construction activities could result in
25 destruction or nests or disturbance of nesting and foraging behaviors, which would be an adverse
26 effect on nesting shorebirds and waterfowl. Mitigation Measure BIO-75, *Conduct Preconstruction*
27 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse
28 effects on nesting birds.

29 **CEQA Conclusion:** Habitat loss from construction of the Alternative 1B water conveyance facilities
30 would have a less-than-significant impact on shorebirds and waterfowl because of the acres of
31 natural communities and cultivated lands that would be restored and protected in the near-term
32 timeframe. If waterfowl were present in or adjacent to work areas, construction activities could
33 result in destruction of nests or disturbance of nesting and foraging behaviors, which would be a
34 significant impact. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
35 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact on nesting birds to a
36 less-than-significant level.

37 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
38 **Disturbance of Nesting Birds**

39 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-179: Loss or Conversion of Habitat for Wintering Waterfowl as a Result of**
2 **Implementation of Conservation Components**

3 **Suisun Marsh:** Managed seasonal wetlands in Suisun Marsh would be reduced by an estimated
4 8,818 acres as a result of Alternative 1B. This would represent a 25% decrease in managed seasonal
5 wetlands compared with long-term conditions without Alternative 1B (Ducks Unlimited 2013,
6 Table 5). There is considerable uncertainty about the biomass and nutritional quality of waterfowl
7 foods produced in the Suisun's managed wetlands, which makes it difficult to identify the amount of
8 mitigation needed. To address this uncertainty, three levels of food biomass and three levels of
9 nutritional quality were modeled for these existing habitats (Ducks Unlimited 2013, Table 7). Three
10 mitigation scenarios were based on these energetic assumptions of biomass and food quality were
11 then run to determine a minimum acreage of managed seasonal wetlands to be protected and
12 enhanced to compensate for the loss of productivity from habitat conversion to tidal wetlands.

- 13 • Scenario 1) Assume that existing managed seasonal wetlands provide low food biomass and low
14 food quality. Under this assumption, the managed seasonal wetlands in Suisun produce 50% of
15 the seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds have
16 60% of the metabolizable energy of seeds produced outside of Suisun. Given the assumption
17 that managed seasonal wetlands in Suisun could be enhanced to provide high food biomass and
18 high food quality (equal to wetlands in the Central Valley), 5,000 acres of managed wetlands
19 protected and managed for high biomass and high food quality would mitigate the conversion of
20 8,857 acres of managed seasonal wetland to tidal marsh.
- 21 • Scenario 2) Assume that the managed seasonal wetlands lost provide medium food biomass and
22 medium food quality. Under this assumption, the managed seasonal wetlands in Suisun produce
23 75% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds
24 have 80% of the metabolizable energy of seeds produced outside of Suisun. Given the
25 assumption that managed seasonal wetlands in Suisun could be enhanced to provide high food
26 biomass and high food quality (equal to wetlands in the Central Valley), 13,300 acres of
27 managed wetlands protected and managed for high biomass and high food quality would
28 mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal marsh.
- 29 • Scenario 3) Assume that existing managed seasonal wetlands provide low food biomass and low
30 food quality. Given the assumption that managed seasonal wetlands in Suisun could only be
31 enhanced to provide medium food biomass and medium food quality (produce 75% of the seed
32 biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds have 80% of the
33 metabolizable energy of seeds produced outside of Suisun), 8,800 acres of managed wetlands
34 protected and managed for medium biomass and medium food quality would mitigate the
35 conversion of 8,857 acres of managed seasonal wetland to tidal marsh.

36 The BDCP has committed to protecting and enhancing a minimum of 5,000 acres of managed
37 seasonal wetlands in Suisun to compensate for the loss of productivity from habitat conversion to
38 tidal marsh. This minimum commitment of 5000 acres would mitigate the reduced productivity
39 from conversion of managed seasonal wetlands under the assumptions that 1) existing managed
40 seasonal wetlands on average in Suisun provide low biomass and low-quality food to wintering
41 waterfowl and 2) protected seasonal wetlands can be managed to produce high biomass and high
42 food quality. However, the food biomass and productivity in Suisun Marsh would need to be
43 quantified in order to determine if the 5,000 acres was sufficient to avoid an adverse effect on
44 wintering waterfowl in the Suisun Marsh, or if additional mitigation would be needed. Mitigation

1 Measure BIO-179a, *Conduct Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*,
2 would be available to address this adverse effect.

3 **Yolo and Delta Basins:** The replacement of 1,400 acres of managed seasonal wetland with 19,000
4 acres of palustrine tidal wetlands in the Delta Watershed, and the replacement of 600 acres of
5 managed seasonal wetlands with 2,000 acres of palustrine tidal wetlands in the Yolo Watershed
6 would not be expected to have an adverse effect on food productivity, under the assumption that
7 these wetlands would provide adequate food sources. However, a monitoring component and a food
8 study in these tidal habitats would be necessary order to demonstrate that there is a less-than-
9 significant loss of food value in these habitats for wintering waterfowl. If it is determined from
10 monitoring, that there is in fact a significant loss in food productivity from habitat conversion to
11 tidal wetlands, the protection and enhancement of managed wetlands in these watersheds would be
12 required to mitigate the change in food biomass and quality. Mitigation Measure BIO-179b, *Conduct*
13 *Food Studies and Monitoring to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and*
14 *Delta Basins*, would be available to address this uncertainty.

15 **NEPA Effects:** There is considerable uncertainty about the biomass and nutritional quality of
16 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify
17 the level of effect that Alternative 1B habitat loss or conversion would have. The BDCP has
18 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in
19 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal
20 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.
21 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced
22 productivity from conversion of managed seasonal wetlands under the assumptions that 1) existing
23 managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food
24 to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high
25 biomass and high-quality food. However, the food biomass and productivity in Suisun Marsh would
26 need to be quantified to determine if the 5,000 acres would be sufficient for Alternative 1B to avoid
27 an adverse effect on wintering waterfowl in the Suisun Marsh. Mitigation Measure BIO-179a,
28 *Conduct Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would be available to
29 address this adverse effect.

30 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal
31 wetlands in the Delta Watershed, and the replacement of 600 acres of managed seasonal wetlands
32 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter
33 food productivity for wintering waterfowl. However, the conclusion that these wetlands would
34 provide adequate food sources is entirely dependent on assumptions about food production in
35 palustrine tidal habitats. Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring to*
36 *Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would be
37 available to address this uncertainty and avoid an adverse effect on wintering waterfowl.

38 **CEQA Conclusion:** There is considerable uncertainty about the biomass and nutritional quality of
39 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify
40 the level of impact that Alternative 1B habitat loss or conversion would have. The BDCP has
41 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in
42 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal
43 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.
44 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced
45 productivity resulting from conversion of managed seasonal wetlands under the assumptions that

1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food for wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high biomass and high-quality food. However, the food biomass and productivity in Suisun Marsh would need to be quantified to determine if the 5,000 acres would be sufficient for Alternative 1B to avoid having a significant impact on wintering waterfowl in the Suisun Marsh, or if additional mitigation would be needed. Implementation of Mitigation Measure BIO-179a, *Conduct Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would address this potential significant impact.

The replacement of 1,400 acres of managed seasonal wetland with 19,000 acres of palustrine tidal wetlands in the Delta Watershed, and the replacement of 600 acres of managed seasonal wetlands with 2,000 acres of palustrine tidal wetlands in the Yolo Watershed would not be expected to alter food productivity for wintering waterfowl. However, the conclusion that these tidal wetlands would provide adequate food sources is entirely dependent on assumptions about food production in palustrine tidal habitats. Studies of food biomass and food quality in palustrine tidal habitats are needed to confirm that no mitigation for wintering waterfowl is required in the Yolo and Delta Basins. Implementation of Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would address this uncertainty and would reduce this impact on wintering waterfowl to a less-than-significant level.

Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh

Poorly managed wetlands (considered low biomass and food quality) will be identified and managed by BDCP proponents to improve food quality and biomass. Studies will be required to quantify 1) food production of existing managed wetlands in Suisun Marsh and 2) energetic productivity of brackish and tidal marsh habitats. Protected wetlands will be monitored to measure changes in the energetic productivity of these sites. Based on the food studies and monitoring results, BDCP proponents will determine if the minimum commitment of 5,000 acres is sufficient to meet the goal of 1:1 compensation for loss of wintering waterfowl habitat with the protection and management of managed wetlands in perpetuity. If monitoring demonstrates that additional acreage is needed to meet this goal, additional acreage of protection or creation of managed wetlands and management will be required.

Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins

In order to address the uncertainty of the impact of loss of managed wetlands in the Yolo and Delta Basins on wintering waterfowl, BDCP proponents will conduct food studies and monitoring to demonstrate the food quality of palustrine tidal habitats in these basins. If studies show that the assumption of no effect was inaccurate, and the food quality goal of 1:1 compensation for wintering waterfowl food value is not met, additional acreage of protection or creation of managed wetland and management will be required.

1 **Impact BIO-180: Loss or Conversion of Habitat for Breeding Waterfowl from Implementation**
2 **of Conservation Components**

3 **Yolo and Delta Basins:** Alternative 1B would reduce managed wetlands in the Yolo and Delta
4 basins by 437 acres and 1,155 acres respectively. Under the assumption that 15% of these wetlands
5 are managed as semi-permanent wetlands, Alternative 1B would reduce semipermanent wetlands
6 in the Yolo and Delta drainage basins by 77 acres and 203 acres respectively. While a reduction in
7 these semipermanent habitats would represent a habitat loss for breeding waterfowl, with the
8 restoration of 24,000 acres of palustrine tidal wetlands (Table 3-4, Chapter 3) in the Yolo and Delta
9 basins there would be a less than adverse effect on breeding waterfowl. These palustrine habitats
10 would presumably contain water during the breeding period (i.e., March through July), and would
11 be expected to compensate for the loss of 280 acres of managed semi-permanent wetlands in the
12 Yolo and Delta watersheds attributed to Alternative 1B.

13 **Suisun Marsh:** Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640
14 acres from the conversion of managed seasonal and semi-permanent wetlands to tidal habitats.
15 Some of the remaining seasonal wetlands could be managed as semi-permanent wetlands to offset
16 the loss of breeding habitat, but this could further reduce food supplies available to wintering
17 waterfowl under the assumption that semi-permanent wetlands provide few food resources
18 compared to seasonally managed habitats (Central Valley Joint Venture 2006).

19 The BDCP includes a commitment to protect and enhance 1,600 acres of permanently flooded
20 managed wetlands in Suisun Marsh to provide habitat for breeding waterfowl. In addition, 5,000
21 acres of semipermanent wetlands that would be protected and enhanced for wintering and
22 migratory waterfowl (Table 3-4, Chapter 3; Objective MWNC1.1 in BDCP Chapter 3, *Conservation*
23 *Strategy*).

24 Food studies and monitoring would be necessary to determine how increases in tidal marsh and
25 salinity levels would affect the overall reproductive capacity of the marsh. These studies would be
26 needed in order to quantify impacts on breeding waterfowl in Suisun Marsh and to determine not
27 only the number of acres that would compensate for loss of breeding habitat at a ratio of 1:1 for
28 habitat value, but how those acres should be managed. Mitigation Measure BIO-180, *Conduct Food*
29 *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address the
30 uncertainty of this effect.

31 In addition to providing semipermanent wetlands to breeding waterfowl, the Suisun Marsh contains
32 several key upland areas that have significant nesting value. The largest block of upland habitat in
33 the region is the core area on the Grizzly Island Wildlife Area. This area does not overlap with the
34 hypothetical footprint for *CM4 Tidal Natural Communities Restoration*. However, this core area
35 includes over 2,000 acres of upland grasslands that have some of the highest duck nesting densities
36 in California (Central Valley Joint Venture 2006). A few small wetland areas are scattered within this
37 core grassland mosaic that provide necessary freshwater brooding habitat. If restoration footprints
38 were changed during the implementation process of BDCP to overlap with this area, the effects on
39 breeding waterfowl would likely be greatly increased.

40 **NEPA Effects:** Alternative 1B would reduce managed wetlands in the Yolo and Delta basins by 437
41 acres and 1,155 acres respectively. Under the assumption that 15% of these wetlands are managed
42 as semi-permanent wetlands, Alternative 1B would reduce semi-permanent wetlands in the Yolo
43 and Delta drainage basins by 77 acres and 203 acres, respectively. The reduction in these semi-
44 permanent habitats would represent a habitat loss for breeding waterfowl. However, with the

1 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 1B
 2 would not have an adverse effect on breeding waterfowl. These palustrine habitats would
 3 presumably contain water during the breeding period (March through July), and would be expected
 4 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta
 5 watersheds attributed to Alternative 1B. Total managed wetlands in Suisun Marsh would decline
 6 from 41,012 acres to 30,640 acres with the conversion of managed seasonal and semi-permanent
 7 wetlands to tidal habitats. Some of the remaining seasonal wetlands could be managed as semi-
 8 permanent wetlands to offset the loss of breeding habitat, but such management could further
 9 reduce food supplies available to wintering waterfowl under the assumption that semi-permanent
 10 wetlands provide few food resources compared with seasonally managed habitats. The protection
 11 and enhancement of 1,600 acres of permanently flooded managed wetlands would provide habitat
 12 for breeding waterfowl. However, food studies and monitoring would be necessary to determine
 13 how increases in tidal marsh and salinity levels would affect the overall reproductive capacity of the
 14 marsh. Therefore, the loss of breeding waterfowl habitat resulting from implementation of
 15 Alternative 1B could have an adverse effect. Mitigation Measure BIO-180, *Conduct Food and*
 16 *Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address the
 17 uncertainty of model assumptions and the potential adverse effect of habitat conversion on breeding
 18 waterfowl in Suisun Marsh.

19 **CEQA Conclusion:** Alternative 1B would reduce managed wetlands in the Yolo and Delta basins by
 20 437 acres and 1,155 acres respectively. Under the assumption that 15% of these wetlands are
 21 managed as semi-permanent wetlands, Alternative 1B would reduce semipermanent wetlands in
 22 the Yolo and Delta drainage basins by 77 acres and 203 acres respectively. The reduction in these
 23 semi-permanent habitats would represent a habitat loss for breeding waterfowl. However, with the
 24 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 1B
 25 would have a less-than-significant impact on breeding waterfowl. These palustrine habitats would
 26 presumably contain water during the breeding period (March through July), and would be expected
 27 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta
 28 watersheds attributed to Alternative 1B.

29 Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640 acres with the
 30 conversion of managed seasonal and semi-permanent wetlands to tidal habitats. Some of the
 31 remaining seasonal wetlands could be managed as semi-permanent wetlands to offset the loss of
 32 breeding habitat, but this management could further reduce food supplies available to wintering
 33 waterfowl under the assumption that semi-permanent wetlands provide few food resources
 34 compared with seasonally managed habitats. The protection and enhancement of 1,600 acres of
 35 permanently flooded managed wetlands would provide habitat for breeding waterfowl. However,
 36 food studies and monitoring would be necessary to determine how increases in tidal marsh and
 37 salinity levels would affect the overall reproductive capacity of the marsh. Therefore, the loss or
 38 conversion of habitat from implementation of Alternative 1B could have a significant impact on
 39 breeding waterfowl in Suisun Marsh. Implementation of Mitigation Measure BIO-180, *Conduct Food*
 40 *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would address the uncertainty of
 41 model assumptions and reduce the impact to a less-than-significant level.

42 **Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding**
 43 **Waterfowl in Suisun Marsh**

44 To address the uncertainty of the impact of loss of managed wetlands in Suisun Marsh on
 45 breeding waterfowl, BDCP proponents will conduct food studies and monitoring to determine

1 how increases in tidal marsh and salinity levels will affect the overall reproductive capacity of
2 the marsh.

3 The required studies will examine how increases in tidal marsh and salinity levels will affect the
4 overall reproductive capacity of the Marsh. Reproductive studies will address but will not be
5 limited to the following questions:

- 6 • How does the distribution of breeding waterfowl in Suisun Marsh differ in tidal versus
7 managed habitats and across salinity gradients?
- 8 • How does waterfowl nest success and nest density vary with respect to tidal versus
9 managed habitats and across salinity gradients?
- 10 • What are the patterns of habitat selection and movements by waterfowl broods in relation
11 to tidal vs. managed habitats, and are there impacts on duckling survival?
- 12 • What is the current relationship between waterfowl reproductive success and interactions
13 with alternate prey and predators, and how is tidal restoration likely to alter these
14 relationships?

15 **Impact BIO-181: Loss or Conversion of Habitat for Shorebirds from the Implementation of** 16 **Conservation Components**

17 Shorebird use of the study area varies by species and fluctuates both geographically and by habitat
18 type throughout the year. Shallow flooded agricultural fields and wetlands support large numbers of
19 wintering and migrating shorebirds (Shuford et al. 1998), particularly least and western sandpipers,
20 dunlin, greater yellowlegs and long-billed dowitcher. Rice lands of the Sacramento Valley provide
21 important breeding habitat for shorebirds such as American avocet and black-necked stilt (Shuford
22 et al. 2004) and have been designated as a Western Hemisphere Shorebird Reserve Network Site of
23 International Importance (Hickey et al. 2003). Managed wetlands provide suitable foraging and
24 roosting habitat for shorebirds; black-necked stilts, avocets, and yellowlegs use this habitat type
25 almost exclusively. Water depth in all of these habitat types is an important habitat variable as the
26 majority of shorebird species require water depths of approximately 10–20 cm for foraging (Isola et
27 al. 2000, Hickey et al. 2003).

28 ***Managed Wetlands***

29 **Yolo Basin:** Primarily as a result of *CM4 Tidal Natural Communities Restoration* within the Yolo
30 Basin, 1,185 acres of managed wetland habitat would be permanently converted; 1,066 acres of
31 which are protected. In addition, 42 acres of managed wetland habitat would be temporarily lost by
32 construction-related activities associated with tidal restoration (CM4) and fisheries enhancement
33 activities (CM2) (Table 2, ICF International 2013). Increased inundation frequency, depth and
34 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could
35 periodically affect managed wetlands ranging from an estimated 643 acres during a notch flow of
36 1,000 cfs to an estimated 2,055 acres during a notch flow of 4,000 cfs (Table 5.4-2, in BDCP Chapter
37 5, *Effects Analysis*) in the Yolo Basin.

38 **Delta Basin:** Within the Delta Basin, 90 acres of managed wetland habitat would be permanently
39 converted, as a result of tidal restoration (CM4). Thirteen of the 90 acres are protected (Table 3, ICF
40 International 2013). Periodic flooding would not affect this natural community type in Delta Basin.

1 **Suisun Basin:** Within the Suisun Basin, 11,532 acres of managed wetland habitat would be
2 permanently converted as a result of tidal restoration (CM4); 10,354 of which are protected. (Table
3 4, ICF International 2013). Periodic flooding would not affect this natural community type in Suisun
4 Basin.

5 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for
6 managed wetland habitat suitability (Table 1, ICF International 2013): black-necked stilt
7 (*Himantopus mexicanus*), greater yellowlegs (*Tringa melanoleuca*), and long-billed dowitcher
8 (*Limnodromus scolopaceus*). Dunlin (*Calidris alpina*), least sandpiper (*Calidris minutilla*),
9 semipalmated plover (*Charadrius semipalmatus*), and western sandpiper (*Calidris mauri*), had a
10 rank 2 for managed wetland habitat suitability. Black-bellied plover (*Pluvialis squatarola*) and
11 whimbrel (*Numenius phaeopus*) both had rank 3 for managed wetland habitat suitability.

12 Managed wetlands would decrease in overall extent by 20% (Table 5, ICF International
13 International 2013). Most of this loss would occur in Suisun with some additional acreage loss in the
14 Yolo Basin. The loss of managed wetland habitat for covered species and waterfowl would be
15 compensated for with 8,200 acres remaining managed wetland protection in Suisun Marsh. Of these
16 8,200 acres, the 5,000 acres of seasonal wetland protected, enhanced, and managed to provide
17 overwintering waterfowl foraging habitat would be the habitat type most likely to benefit
18 overwintering shorebirds. However, the 1,600 acres of semi-permanent and permanent managed
19 wetlands for breeding waterfowl and 1,500 acres of managed wetlands for salt marsh harvest
20 mouse would also be expected to have some benefit to wintering and breeding shorebirds.

21 **Cultivated Lands**

22 **Yolo Basin:** Primarily as a result of tidal restoration (CM4) and Fisheries Enhancement activities
23 (CM2) within the Yolo Basin, 8,309 acres of cultivated lands would be permanently converted; 1,272
24 acres of which are protected. Also within the Yolo Basin, increased inundation frequency, depth and
25 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could affect an
26 estimated 3,219 acres of cultivated lands during a notch flow of 1,000 cfs to an estimated 5,512
27 acres during a notch flow of 6,000 cfs (Table 5.4-2, in BDCP Chapter 5, *Effects Analysis*).

28 **Delta Basin:** Within the Delta Basin, as a result of tidal restoration (CM4) and floodplain restoration
29 (CM5), 25,633 acres of cultivated lands would be permanently converted. There would also be an
30 additional 112 acres lost temporarily due to CM5 activities. Of the total permanently converted
31 lands, 3,925 acres are protected (Table 3, ICF International 2013). Seasonal flooding (CM5) on the
32 restored floodplain would periodically affect 738 acres of cultivated lands in Delta.

33 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for
34 cultivated lands habitat suitability (Table 1, ICF International 2013): killdeer (*Charadrius*
35 *vociferous*), long-billed curlew, and whimbrel within pasture habitat. Long-billed dowitcher and
36 killdeer both had a rank 2 for idle crop habitat suitability and black-bellied plover was ranked 2 for
37 pasture habitat. Red-necked phalarope (*Phalaropus lobatus*) and Wilson's phalarope (*Phalaropus*
38 *tricolor*) were both ranked 2 for grain and hay crops. Long-billed dowitcher, dunlin, least sandpiper,
39 and long-billed curlew were all ranked 3 for rice habitat suitability and killdeer was ranked 3 for
40 field crop habitat suitability.

41 Cultivated land loss would occur in all three basins, but the majority of acreage loss would occur in
42 the Delta basin. Pasture crop types would decrease in overall extent by 15% over baseline (Table 5,
43 ICF International 2013), but would increase in protection by 135%. More than half of all cultivated

1 lands within the 48,000-acre BDCP cultivated lands reserve would be in pasture production
2 (primarily alfalfa) and enhanced and managed to benefit Swainson's hawk. Idle crop types are not
3 identified as a specific conservation target in the BDCP, are expected to occur within the reserve and
4 are recognized in the BDCP as having "moderate" foraging habitat value for Swainson's hawk, white-
5 tailed kite, and greater sandhill crane.

6 Grain and hay crop would be expected to decrease by 13% (Table 5, ICF International 2013) while
7 protection, enhancement and management would be expected to increase by 28% (Table 6, ICF
8 International 2013). These crop types would be managed for a tricolored blackbirds, Swainson's
9 hawk, white-tailed kite, greater sandhill crane, and burrowing owls.

10 Rice would decrease in overall extent by 2% (Table 5, ICF International 2013) but increase in total
11 protection by 57%. Rice lands would be protected, enhanced, and managed for the benefit for giant
12 garter snake.

13 **Tidal Wetlands**

14 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)
15 within the Yolo Basin, 194 acres of tidal wetland habitat would be permanently converted; 180 acres
16 of which are protected. In addition, 12 acres of tidal wetland habitat would be temporarily lost by
17 construction-related activities associated with fisheries enhancement activities (CM2) (Table 2, ICF
18 International 2013). Periodic flooding in Yolo Bypass would affect 3,957 acres of tidal wetlands in
19 Yolo Basin.

20 **Delta Basin:** Within the Delta Basin, 54 acres of tidal wetlands would be permanently converted as
21 a result of tidal restoration (CM4) (Table 3, ICF International 2013). Of the total permanently
22 converted lands, 26 acres are protected. Periodic flooding in Yolo Bypass would affect 26 acres of
23 tidal wetlands in Delta Basin.

24 **Suisun Basin:** Within the Suisun Basin, 219 acres of tidal wetland habitat would be permanently
25 converted as a result of tidal restoration (CM4); 215 of which are protected. (Table 4, ICF
26 International 2013). Periodic flooding would not affect this natural community type in Suisun Basin.

27 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for
28 tidal mudflat habitat suitability (Table 6, ICF International 2013): black-bellied plover, dunlin, least
29 sandpiper, marbled godwit (*Limosa fedoa*), semipalmated plover, short-billed dowitcher
30 (*Limnodromus griseus*), western sandpiper, and willet (*Tringa semipalmata*). Long-billed curlew
31 (*Numenius americanus*) and whimbrel both had a rank 2 for tidal mudflat habitat suitability.
32 American avocet (*Recurvirostra americana*) was ranked 3 for tidal mudflat habitat suitability. For
33 tidal brackish emergent wetland/tidal freshwater emergent wetland, willet was ranked 2 and long-
34 billed curlew and whimbrel were both ranked 3 for habitat suitability.

35 Tidal mudflat habitat would be estimated to increase in extent by 1,780 acres. This extremely large
36 increase in tidal mudflat habitat would occur almost exclusively in Suisun Marsh as the result of
37 tidal restoration and the conversion of existing mid- and high-marsh types to low marsh and tidal
38 mudflats in response to sea level rise. BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*,
39 details the methods and assumptions modeled to come about this result. Tidal mudflat habitats
40 would be expected to require management, however, sediment augmentation has been discussed as
41 an experimental method that could be employed in places like Suisun to combat the loss of intertidal
42 marshes in the face of sea level rise and reduced sediment supplies.

1 Tidal emergent wetland habitat would increase in extent by 152% (Table 5, ICF International 2013).
2 Of the 30,000 acres of emergent wetland restoration, 6,000 acres would be in the Suisun Basin and
3 the rest would be distributed between the Yolo and Delta Basins. Enhancement and management on
4 these lands would be likely to be focused on nonnative, invasive species management. Any
5 additional actions in Suisun would be focused on salt marsh harvest mouse, Suisun shrew, California
6 clapper rail, black rail, Suisun thistle, and soft bird's-beak. In freshwater marshes, enhancement and
7 management would be likely to focus on black rail, western pond turtle, and, in some cases, giant
8 garter snake.

9 ***Nontidal Wetlands***

10 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)
11 within the Yolo Basin, 313 acres of nontidal wetland habitat would be permanently converted; 119
12 acres of which are protected. In addition, 11 acres of nontidal wetland habitat would be temporarily
13 lost by construction-related activities associated with Fisheries Enhancement activities (CM2)
14 (Table 2, ICF International 2013). Periodic flooding in Yolo Bypass associated with ongoing Fremont
15 Weir operation (CM2) would affect 305 acres of nontidal wetlands in Yolo Basin, specifically
16 nontidal perennial aquatic habitat.

17 **Delta Basin:** Within the Delta Basin, 99 acres of nontidal wetlands would be permanently converted
18 as a result of tidal restoration (CM4) and floodplain restoration (CM5) (Table 3, ICF International
19 2013). There would also be 8 acres of nontidal perennial aquatic habitat temporarily lost from CM5
20 activities. Of the total permanently converted lands, 29 acres are protected. Periodic flooding from
21 CM5 would affect 4 acres of nontidal perennial aquatic habitat in Delta Basin.

22 **Suisun Basin:** Within the Suisun Basin, 1 acre of nontidal wetland habitat, specifically vernal pool
23 complex, would be permanently converted as a result of tidal restoration (CM4); and is not
24 protected. (Table 4, ICF International 2013). Periodic flooding would not affect this natural
25 community type in Suisun Basin.

26 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for
27 nontidal wetland habitat suitability (Table 6, ICF International 2013): red-necked phalarope and
28 Wilson's phalarope for nontidal freshwater perennial emergent wetland and American avocet for
29 alkali seasonal wetland complex. Greater yellowlegs had a rank 2 for vernal pool complex habitat
30 suitability. Red-necked phalarope and western sandpiper were both ranked 3 for alkali seasonal
31 wetland habitat suitability and greater yellowlegs was ranked 3 for nontidal freshwater perennial
32 emergent wetland habitat suitability.

33 Nontidal freshwater emergent wetland would increase in extent by 88% as a result of BDCP
34 implementation (Table 5, ICF International 2013). These lands would be managed to benefit giant
35 garter snake and located within the Delta Basin (likely in the vicinity of White Slough) and the Yolo
36 Basin (in the Cache Slough area).

37 Impacts on wetted acres of vernal pool complex and alkali seasonal wetland complex would be
38 avoided and thus loss of this community is not expected. However, up to 10 acres of wetted acre loss
39 could be permitted under the Plan. Protection of vernal pool complex natural community would
40 increase by 13% and by 6% for alkali seasonal wetlands (Table 6, ICF International 2013).
41 Protection of these two community types would enhance and manage habitat for vernal pool
42 crustaceans and alkali-related plant species.

1 The protection and restoration of natural communities would also include management and
2 enhancement actions under *CM11 Natural Communities Enhancement and Management*. The
3 following management activities to benefit shorebirds would be considered for implementation
4 under CM11, in areas where they would not conflict with covered species management.

5 ● Managed wetlands:

- 6 ○ Managed wetlands can be potentially manipulated to provide the optimum water depths for
7 foraging shorebirds and islands for nesting (Hickey et al. 2003).
- 8 ○ During fall and spring, stagger the timing and location of draining and flooding to optimize
9 the extent of shallow-water habitat; varying depths within the wetland unit helps to create
10 temporal variation in foraging opportunities. During warm, dry springs when wetland units
11 dry quickly, wetland units can be re-supplied with water to extend habitat availability for
12 shorebirds.
- 13 ○ Provide open, shallow water habitat adjacent to minimally vegetated, shallowly sloped
14 edges for nesting shorebirds between April and July.
- 15 ○ Provide islands with little to no vegetation to increase the likelihood of shorebird roosting
16 and nesting.
- 17 ○ Create low slopes on islands and levees; gradual angles (10-12:1) are better than steep
18 angles.
- 19 ○ Limit levee maintenance during the nesting season (April through July). However, mowing
20 the center of levees is fine.
- 21 ○ Potentially add material to levees or to islands to encourage nesting for some species.

22 ● Cultivated Lands:

- 23 ○ Maintaining a mosaic of dry and flooded crop types, and varying water depths will promote
24 a diverse community of waterbirds, including shorebirds, during fall migration and winter
25 (Shuford et al. 2013).
- 26 ○ To provide wintering habitat for multiple waterbird guilds, including shorebirds, use a
27 combination of flooding practices that include one-time water application and maintenance
28 flooding while also providing unflooded habitat (Strum et al. *in review*).
- 29 ○ The post-harvest flooding of winter wheat and potato fields in early fall (July- September)
30 can provide substantial benefits to shorebirds at a time of very limited shallow-water
31 habitat on the landscape (Shuford et al. 2013).
- 32 ○ Stagger the drawdown of flooded rice and other winter-flooded agricultural fields to
33 prolong the availability of flooded habitat (Iglecia et al. 2012). Be aware of soil type because
34 this practice may not be as effective on soils that drain quickly.
- 35 ○ Remove as much stubble as possible in rice and other agricultural fields after harvest to
36 increase the potential shorebird habitat on intentionally flooded or unflooded fields that
37 may passively gather rain water (Iglecia et al. 2012).
- 38 ○ Shallowly flood available agricultural fields during July, August, and September to provide
39 early fall migration habitat for shorebirds. Fields should be free of vegetation prior to
40 flooding, have minimal micro-topography (e.g., no large clods), and should remain flooded

- 1 for up to three week periods (after three weeks, vegetation encroachment reduces habitat
2 value for shorebirds; ICF International 2013).
- 3 ○ Manage levee habitats to have minimal vegetation but do not spray herbicide directly or
4 drive on levees during the nesting season (April–July, Iglecia et al. 2012).
 - 5 ○ Maintain a minimum top-width of 30 inches for levees, based on increased avocet use of
6 wider levees (Iglecia et al. 2012).
 - 7 ○ When possible, flood fields with nesting habitat (modified levees and islands) in late April to
8 provide nesting habitat for American avocets (Iglecia et al. 2012).
 - 9 ○ Finer grained substrate (clods smaller than a fist) in rice and other agricultural fields may be
10 more appealing for nesting shorebirds (Iglecia et al. 2012).
 - 11 ○ Maintain gently sloping levees and island sides (10-12:1; Iglecia et al. 2012).
 - 12 ○ Islands should be disked along with the rest of the field after harvest to help inhibit
13 vegetation growth (Iglecia et al. 2012).

14 **NEPA Effects:** Alternative 1B implementation would result in the conversion of managed wetland
15 and cultivated lands to tidal natural communities, including tidal mudflat. The result would be
16 substantial loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,
17 and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least
18 sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and
19 willet. While substantial losses of cultivated lands would be incurred, protection, enhancement, and
20 management of the remaining acres would likely have substantial benefits for select species of
21 wintering and breeding shorebirds. This is because impacts on crop types would be distributed
22 across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,
23 and rice types. While the protection, enhancement, and management of these crop types are being
24 driven by covered species, these management actions would also benefit shorebirds. The protection,
25 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation
26 for the loss of substantial acreage, would have some incremental benefits for shorebirds, but would
27 be unlikely to compensate for the overall loss. However, with the protection and restoration of acres
28 in the Delta and Yolo watersheds, in addition to the implementation of the management actions
29 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would not
30 be expected to result in an adverse effect on shorebird populations in the study area.

31 **CEQA Conclusion:** Alternative 1B implementation would result in the conversion of managed
32 wetland and cultivated lands to tidal natural communities, including tidal mudflat. The result would
33 be significant loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,
34 and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least
35 sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and
36 willet. While significant losses of cultivated lands would be incurred, protection, enhancement, and
37 management of the remaining acres would likely have substantial benefits for select species of
38 wintering and breeding shorebirds. This is because impacts on crop types would be distributed
39 across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,
40 and rice types. While the protection, enhancement, and management of these types are being driven
41 by covered species, these management actions would also benefit shorebirds. The protection,
42 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation
43 for substantial acreage loss, would have some incremental benefits for shorebirds, but would be
44 unlikely to compensate for the overall loss. However, with the protection and restoration of acres in

1 the Delta and Yolo watersheds, in addition to the implementation of the management actions
2 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would be
3 expected to have a less-than-significant impact on shorebird populations in the study area.

4 **Impact BIO-182: Effects on Shorebirds and Waterfowl Associated with Electrical** 5 **Transmission Facilities**

6 New transmission lines installed in the study area would increase the risk for bird-power line
7 strikes, which could result in injury or mortality of shorebirds and waterfowl. The existing network
8 of power lines in the study currently poses a risk for shorebirds and waterfowl in the Delta. New
9 transmission lines would increase this risk and have an adverse effect on shorebird and waterfowl
10 species in the absence of other conservation actions. The implementation of *AMM20 Greater Sandhill*
11 *Crane* would reduce potential effects through the installation of flight diverters on new transmission
12 lines, and selected existing transmission lines in the study area.

13 **NEPA Effects:** New transmission lines would increase the risk for shorebird and waterfowl power
14 line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the potential effect of the
15 construction of new transmission lines on shorebird and waterfowl would not be adverse.

16 **CEQA Conclusion:** New transmission lines would increase the risk for shorebird and waterfowl
17 power line strikes. The implementation of *AMM20 Greater Sandhill Crane* would reduce the potential
18 impact of the construction of new transmission lines on shorebirds and waterfowl to a less-than-
19 significant level.

20 **Impact BIO-183: Indirect Effects of Plan Implementation on Shorebirds and Waterfowl**

21 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
22 with construction-related activities could result in temporary disturbances that affect shorebird and
23 waterfowl use of modeled habitat. Indirect effects associated with construction include noise, dust,
24 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
25 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
26 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
27 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
28 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use
29 of mechanical equipment during water conveyance construction could cause the accidental release
30 of petroleum or other contaminants that could affect shorebirds and waterfowl or their prey in the
31 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
32 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge
33 of sediment or excessive dust adjacent to shorebirds and waterfowl in the study area could also have
34 a negative effect on these species. AMM1–AMM7 would ensure that measures were in place to
35 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to
36 work areas.

37 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
38 mercury in avian species, including shorebird and waterfowl species. Marsh (tidal and nontidal) and
39 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
40 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
41 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
42 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
43 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity

1 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-
2 specific effects. Increased methylmercury associated with natural community and floodplain
3 restoration could indirectly affect shorebirds and waterfowl, via uptake in lower trophic levels (as
4 described in BDCP Appendix 5.D, *Contaminants*).

5 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
6 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
7 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
8 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
9 adaptive management as described in CM12 would be available to address the uncertainty of
10 methylmercury levels in restored tidal marsh and potential impacts on shorebirds and waterfowl.

11 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
12 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
13 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
14 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
15 2009). The effect of selenium toxicity differs widely between species and also between age and sex
16 classes within a species. In addition, the effect of selenium on a species can be confounded by
17 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
18 2009).

19 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
20 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
21 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
22 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
23 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
24 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
25 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
26 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
27 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
28 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
29 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
30 levels of selenium have a higher risk of selenium toxicity.

31 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
32 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
33 exacerbate bioaccumulation of selenium in avian species, including shorebird and waterfowl
34 species. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
35 selenium, and therefore increase avian exposure from ingestion of prey items with elevated
36 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase
37 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).
38 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was
39 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
40 in substantial, long-term increases in selenium concentrations in water in the Delta under any
41 alternative. However, it is difficult to determine whether the effects of potential increases in
42 selenium bioavailability associated with restoration-related conservation measures (CM4–CM5)
43 would lead to adverse effects on shorebirds and waterfowl species.

1 Because of the uncertainty that exists at this programmatic level of review, there could be a
2 substantial effect on shorebirds and waterfowl from increases in selenium associated with
3 restoration activities. This effect would be addressed through the implementation of *AMM27*
4 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
5 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
6 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
7 selenium management to reduce selenium concentrations and/or bioaccumulation would be
8 evaluated separately for each restoration effort as part of design and implementation. This
9 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
10 design schedule.

11 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
12 could reduce shorebird and waterfowl use of modeled habitat adjacent to work areas. Moreover,
13 operation and maintenance of the water conveyance facilities, including the transmission facilities,
14 could result in ongoing but periodic postconstruction disturbances that could affect shorebird and
15 waterfowl use of the surrounding habitat. AMM1–AMM7 would minimize these effects, and
16 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
17 *Nesting Birds*, would be available to address adverse effects on nesting individuals. Tidal habitat
18 restoration could result in increased exposure of shorebirds and waterfowl to selenium. This effect
19 would be addressed through the implementation of *AMM27 Selenium Management*, which would
20 provide specific tidal habitat restoration design elements to reduce the potential for
21 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects
22 associated with noise and visual disturbances, and increased exposure to selenium from Alternative
23 1B implementation would not have an adverse effect on shorebirds and waterfowl. Tidal habitat
24 restoration is unlikely to have an adverse effect on shorebirds and waterfowl through increased
25 exposure to methylmercury, as these species currently nest and forage in tidal marshes with
26 elevated methylmercury levels. However, it is unknown what concentrations of methylmercury are
27 harmful to species of waterfowl and shorebirds, and the potential for increased exposure would
28 vary substantially within the study area. Site-specific restoration plans in addition to monitoring and
29 adaptive management, described in *CM12 Methylmercury Management*, would address the
30 uncertainty of methylmercury levels in restored tidal marsh. Once site-specific sampling and other
31 information is developed, the site-specific planning phase of marsh restoration would be the
32 appropriate place to assess the potential risk of shorebird and waterfowl exposure to
33 methylmercury.

34 **CEQA Conclusion:** Noise, potential hazardous spills, and increased dust and sedimentation as a
35 result of water conveyance facilities construction and operation and maintenance would have a
36 significant impact on shorebirds and waterfowl. AMM1–AMM7 would minimize these impacts, and
37 implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
38 *Avoid Disturbance of Nesting Birds*, would reduce the impacts to a less-than-significant level. Tidal
39 habitat restoration is unlikely to have a significant impact on shorebirds and waterfowl species
40 through increased exposure to methylmercury, as these species currently nest and forage in tidal
41 marshes with elevated methylmercury levels. However, it is unknown what concentrations of
42 methylmercury are harmful to species of waterfowl and shorebirds. Site-specific restoration plans
43 that address the creation and mobilization of mercury, as well as the monitoring and adaptive
44 management described in *CM12*, would be the appropriate place to assess the potential risk of
45 shorebird and waterfowl exposure to methylmercury in the study area. Tidal habitat restoration
46 could result in increased exposure of shorebirds and waterfowl to selenium. This effect would be

1 addressed through the implementation of *AMM27 Selenium Management*, which would provide
2 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
3 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 1B
4 implementation would have a less-than-significant impact on shorebirds and waterfowl.

5 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
6 **Disturbance of Nesting Birds**

7 See Mitigation Measure BIO-75 under Impact BIO-75.

8 ***Common Wildlife and Plants***

9 Common wildlife and plants are widespread, often abundant, species that are not covered under
10 laws or regulations that address conservation or protection of individual species. Examples of
11 common wildlife and plants occurring in the study area are provided within the discussion for each
12 natural community type in Section 12.1.2.2, *Special-Status and Other Natural Communities*. Impacts
13 on common wildlife and plants would occur through the same mechanisms discussed for natural
14 communities and special-status wildlife and plants for each alternative.

15 **Impact BIO-184: Effects on Habitat and Populations of Common Wildlife and Plants**

16 Effects on habitat of common wildlife and plants, including habitat removal and conversion, are
17 discussed in the analysis of Alternative 1B effects on natural communities (Impacts BIO-1 through
18 BIO-31). In general, effects on habitat of common wildlife and plants would not be adverse. Through
19 the course of implementing the Plan over a 50-year time period, several natural communities and
20 land cover types would be reduced in size, primarily from restoration of other natural communities.
21 Grassland, managed wetland and cultivated land would be reduced in acreage, so the common
22 species that occupy these habitats would be affected. However, the losses in acreage and value of
23 these habitats would be offset by protection, restoration, enhancement and management actions
24 contained in the BDCP, including *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal*
25 *Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM6 Channel*
26 *Margin Enhancement*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*
27 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM10*
28 *Nontidal Marsh Restoration*, and *CM11 Natural Communities Enhancement and Management*. In
29 addition, the AMMs contained in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, would
30 be in place to reduce or eliminate the potential to adversely affect both special-status and common
31 wildlife and plants.

32 Direct effects on common wildlife and plants from constructing water conveyance facilities and
33 implementing BDCP conservation measures would include construction or inundation-related
34 disturbances that result in injury or mortality of wildlife or plants and the immediate displacement
35 of wildlife, including increased traffic on local roads from construction vehicles that could increase
36 wildlife mortality and impede wildlife movement. Effects of construction traffic on wildlife moving
37 in the vicinity of Stone Lakes NWR would be minimized by *AMM20 Greater Sandhill Crane* (see
38 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). *AMM20* includes a measure for the
39 installation of a vegetation screen or other noise and visual barrier along Hood Franklin Road for the
40 benefit of cranes that would be a minimum of 5 feet high (above the adjacent elevated road, if
41 applicable) and would provide a continuous surface impenetrable by light. This measure would
42 potentially direct wildlife wishing to cross Hood Franklin Road toward the overcrossing of the canal

1 that links the Stone Lakes properties (just east of the Town of Hood). The overcrossing includes
2 strips of terrestrial habitat on either side of the canal.

3 Indirect effects include project-related disturbances to nearby wildlife and plants during
4 construction (e.g., disruption of breeding and foraging behaviors from noise and human activity,
5 habitat degradation from fugitive dust and runoff) and effects occurring later in time (e.g., collisions
6 of birds with transmission lines, habitat fragmentation, vegetation management). Indirect effects
7 could result both from construction and from operations and maintenance (e.g., ground
8 disturbances could result in the spread and establishment of invasive plants or noxious weeds).

9 **NEPA Effects:** The direct and indirect effects associated with constructing water conveyance
10 facilities and restoring tidal and other habitats as part of implementing Alternative 1B would not be
11 adverse because the conservation measures and AMMs also expand and protect natural
12 communities, avoid or minimize effects on special-status species, prevent the introduction and
13 spread of invasive species, and enhance natural communities. These actions would result in avoiding
14 and minimizing effects on common wildlife and plants as well.

15 **CEQA Conclusion:** Construction and operation of the water conveyance facilities and habitat
16 restoration activities would have impacts on common wildlife and plants in the study area through
17 habitat loss and through direct or indirect loss or injury of individuals. The loss of habitat would not
18 be substantial, because habitat restoration would increase the amount and extent of habitat
19 available for use by most common wildlife and plant species. Conservation measures to avoid or
20 minimize effects on special-status species, to prevent the introduction and spread of invasive
21 species, and to enhance natural communities also would result in avoiding and minimizing effects on
22 common wildlife and plants. Consequently, implementation of the BDCP is not expected to cause any
23 populations of common wildlife or plants to drop below self-sustaining levels, and this impact would
24 be less than significant. No mitigation would be required.

25 **Wildlife Corridors**

26 ECAs are lands likely to be important to wildlife movement between large, mostly natural areas at
27 the state wide level. The ECAs form a functional network of wildlands that are considered important
28 to the continued support of California's diverse natural communities. Four general areas were
29 identified within the study area that contain ECAs (Figure 12-2). The BDCP also identified important
30 landscape linkages in the Plan Area to guide reserve design, which can also be seen on Figure 12-2.

31 **Impact BIO-185: Effect of BDCP Conservation Measures on Wildlife Corridors**

32 Alternative 1B water conveyance facilities would cross one of the ECAs identified during the
33 analysis, the Stone Lake-Yolo Bypass ECA. The conveyance facilities would also cross four landscape
34 linkages identified in the BDCP, the *San Joaquin River* linkage (#5 in Figure 12-2), the *Middle River*
35 linkage (#6 in Figure 12-2), the *Cosumnes to Stone Lakes* linkage (#10 in Figure 12-2), and the *White*
36 *Slough to Stone Lakes* linkage (#11 in Figure 12-2). Though the conveyance facilities shown on
37 Figure 12-2 overlap with the line representing the *Sacramento River* linkage (#9 in Figure 12-2) this
38 line generally represents the course of the Sacramento River and is intended to address the needs of
39 aquatic species and will thus not be addressed in this chapter.

40 The construction of Intakes 1, 2, 3, and 4, associated borrow and spoil areas, and the canal from east
41 of Clarksburg to just north of Walnut Grove would occur within the Stone Lake-Yolo Bypass ECA.
42 These activities would result in the permanent loss of narrow strips of riparian vegetation along the

1 Sacramento River and the permanent and temporary loss of grasslands and agricultural lands. These
2 loses would not substantially increase impediments to movement of wildlife that could move from
3 Stone Lakes to Yolo Bypass because the Sacramento River and Sacramento Deep Water Shipping
4 Channel already create a barrier to dispersal for nonavian species and the loss of the narrow strips
5 of riparian vegetation and agricultural lands would generally not impede the movement of bird
6 species between these areas. However, the construction of the canal and the intakes would create a
7 substantial barrier to the north-south movement of nonavian terrestrial species in the area between
8 the Sacramento River and the Southern Pacific Dredger Cut west of Stone Lakes, as well as the east-
9 west movement between Stone Lakes and the east bank of the Sacramento River. There are records
10 of Swainson's hawk, western pond turtle, and American badger that would be affected by
11 construction of the canal (California Department of Fish and Wildlife 2013). Though there would be
12 losses in Swainson's hawk foraging habitat and potential nesting habitat in these areas, these losses
13 would not substantially impede the movements of Swainson's hawks in the area. The loss in habitat
14 is addressed in the Swainson's hawk effects analysis.

15 The addition of new permanent transmission lines within the Stone Lake-Yolo Bypass ECA could
16 adversely affect birds during periods of low visibility. Sandhill cranes that are known to roost at
17 Stone Lakes could particularly be adversely affected by the addition of the north-south running
18 transmission line to the west of Stone Lakes.

19 The canal and a borrow and spoils area that occur adjacent to the *Cosumnes to Stone Lakes* linkage,
20 which is identified in the BDCP for reserve planning to benefit greater sandhill crane movement
21 from north to south in the Plan Area, could be in conflict with future reserve planning in this area
22 (see impact discussions for greater and lesser sandhill cranes).

23 The portion of the canal and associated borrow and spoils area that cross the *White Slough to Stone*
24 *Lakes* linkage, which is identified in the BDCP for reserve planning to connect the White Slough
25 population of giant garter snake to habitat in the Stone Lakes area, would conflict with BDCP's
26 reserve design planning as well limiting connectivity under Existing Conditions by creating a
27 substantial barrier to movement across this landscape.

28 Alternative 1B would also cross the *Middle River* and *San Joaquin River* linkages. These linkages were
29 established to guide riparian restoration and protection along the Middle River and San Joaquin
30 River to improve riparian connectivity for the benefit of riparian brush rabbit, riparian woodrat,
31 least Bell's vireo, yellow-breasted chat, yellow-billed cuckoo, Swainson's hawk, and white-tailed kite.
32 Though the canal siphons below both of these river crossings, the adjacent canal, borrow and spoils
33 areas, RTM storage areas, and permanent transmission line would remove existing riparian
34 vegetation at these locations and conflict with the BDCP's plans for establishing habitat connectivity
35 along these river corridors through restoration and preservation.

36 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*
37 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*
38 *Restoration*). These activities would generally improve the movement of wildlife within and outside
39 of the study area. In addition, the preservation of restored lands (CM3) and the enhancement and
40 management of these areas (CM11) would improve and maintain wildlife corridors within the Plan
41 Area.

42 **NEPA Effects:** Despite the contributions from restoration and protection activities, Alternative 1B
43 would create substantial barriers to the movement of terrestrial wildlife from the eastern portion of
44 the study area into the central Delta, to the north-south movement of wildlife between the

1 Sacramento River and I-5, and create barriers to safe movement of avian species during periods of
2 low visibility. The Alternative 1B conveyance facilities would result in adverse effects on wildlife
3 corridors.

4 **CEQA Conclusion:** Alternative 1B water conveyance facilities would create a substantial barrier to
5 the north-south movement of terrestrial species in the area between the Sacramento River and the
6 Southern Pacific Dredger Cut west of Stone Lakes, as well as the east-west movement between Stone
7 Lakes and the east bank of the Sacramento River within the Stone Lakes-Yolo Bypass ECA.

8 The addition of new permanent transmission lines within the Stone Lake-Yolo Bypass ECA could
9 adversely affect birds during periods of low visibility. Sandhill cranes that are known to roost at
10 Stone Lakes could particularly be adversely affected by the addition of the north-south running
11 transmission line to the west of Stone Lakes.

12 The canal, associated borrow and spoils areas, RTM storage areas, and permanent transmission
13 lines would conflict with the BDCP's reserve design planning for greater sandhill crane, giant garter
14 snake, and covered riparian species.

15 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*
16 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*
17 *Restoration*). These activities would generally improve the movement of wildlife within and outside
18 of the study area. In addition, the preservation of restored lands (CM3) and the enhancement and
19 management of these areas (CM11) would improve and maintain wildlife corridors within the study
20 area.

21 Despite the contributions from restoration and protection activities, Alternative 1B would create a
22 substantial barrier to the movement of terrestrial wildlife from the eastern portion of the Plan Area
23 into the central Delta, to the north-south movement of wildlife between the Sacramento River and I-
24 5, and create barriers to safe movement of avian species during periods of low visibility. The
25 Alternative 1B conveyance facilities would result in significant unavoidable impacts on wildlife
26 corridors. There is no practicable mitigation measure to reduce this impact to a less-than-significant
27 level.

28 **Invasive Plant Species**

29 The invasive plant species that primarily affect each natural community in the study area, which
30 include water hyacinth, perennial pepperweed, giant reed, and Brazilian waterweed, are discussed
31 in Section 12.1.4, *Invasive and Noxious Plant Species*. Invasive species compete with native species
32 for resources and can alter natural communities by altering fire regimes, hydrology (e.g.,
33 sedimentation and erosion), light availability, nutrient cycling, and soil chemistry, but also have the
34 potential to harm human health and the economy by adversely affecting natural ecosystems, water
35 delivery, flood protection systems, recreation, agricultural lands, and developed areas (Randall and
36 Hoshovsky 2000). The construction and restoration activities covered under the BDCP could result
37 in the introduction or spread of invasive plant species by creating temporary ground disturbance
38 that provides opportunities for colonization by invasive plants in the study area.

39 The primary mechanisms for the introduction of invasive plants as the result of implementation of
40 Alternative 1B are:

- 41 ● Grading, excavation, grubbing, and placement of fill material.
- 42 ● Breaching, modification, or removal of existing levees and construction of new levees.

- 1 • Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,
- 2 electric transmission and gas lines, irrigation infrastructure).
- 3 • Maintenance of infrastructure.
- 4 • Removal of existing vegetation and planting/seeding of vegetation.
- 5 • Maintaining vegetation and vegetation structure (e.g., grazing, mowing, burning, trimming).
- 6 • Dredging waterways.

7 Clearing operations and the movement of vehicles, equipment, and construction materials in the
 8 study area would facilitate the introduction and spread of invasive plants by bringing in or moving
 9 seeds and other propagules. These effects would result from:

- 10 • Spreading chipped vegetative material from clearing operations over topsoil after earthwork
- 11 operations are complete.
- 12 • Importing, distributing, storing, or disposing of fill, borrow, spoil, or dredge material.
- 13 • Traffic from construction vehicles (e.g., water and cement trucks) and personal vehicles of
- 14 construction staff.
- 15 • Transport of construction materials and equipment within the study area and to/from the study
- 16 area.

17 Table 12-1B-70 lists the acreages of temporary disturbance in each natural community in the study
 18 area that would result from implementation of Alternative 1B of the BDCP.

19 **Table 12-1B-70. Summary of Temporary Disturbance in Natural Communities under Alternative 1B**

Natural Community	Temporary Impacts (acres)
Tidal perennial aquatic	160
Tidal brackish emergent wetland	1
Tidal freshwater emergent wetland	12
Valley foothill riparian	162
Grassland	632
Inland dune scrub	0
Alkali seasonal wetland complex	0
Vernal pool complex	0
Other natural seasonal wetland	0
Nontidal freshwater perennial emergent wetland	8
Nontidal perennial aquatic	32
Managed wetlands	62
Cultivated lands	14,109
Total	15,178

20

1 **Impact BIO-186: Adverse Effects on Natural Communities Resulting from the Introduction**
2 **and Spread of Invasive Plant Species**

3 Under Alternative 1B, the BDCP would have adverse effects on natural communities from the
4 introduction and spread of invasive plant species through implementation of CM1–CM10 and
5 AMM6. No adverse effects are expected from implementation of CM11–CM21.

- 6 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1B water conveyance
7 facilities would result in the temporary disturbance of 13,133 acres that would provide
8 opportunities for colonization by invasive plant species.
- 9 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries
10 enhancements would result in the temporary disturbance of 758 acres that would provide
11 opportunities for colonization by invasive plant species. Vegetation maintenance activities for
12 the Fremont Weir and Yolo Bypass improvements may include the removal of giant reed;
13 however, the clearing of linear areas to facilitate water flow may also result increased
14 opportunities for invasion. Sediment removal, transportation, and application as a source
15 material for restoration or levee projects as part of Fremont Weir and Yolo Bypass maintenance
16 activities could also result in the spread of invasives if the sediment contains viable invasive
17 plant propagules.
- 18 • *CM3 Natural Communities Protection and Restoration*: The restoration activities in the natural
19 communities located in the eleven CZs would result in the temporary disturbance of restoration
20 areas that would provide opportunities for colonization by invasive plant species.
- 21 • *CM4 Tidal Natural Communities Restoration*: The activities associated with the restoration of
22 tidal perennial aquatic, tidal mudflat, tidal freshwater emergent wetland, and tidal brackish
23 emergent wetland in ROAs would result in the temporary disturbance of tidal areas that would
24 provide opportunities for colonization by invasive plant species. These adverse effects would be
25 reduced by designing restoration projects to minimize the establishment of nonnative
26 submerged aquatic vegetation, and early restoration projects would be monitored to assess the
27 response of nonnative species to restoration designs and local environmental conditions. If
28 indicated by monitoring results, the BDCP Implementation Office would implement invasive
29 plant control measures in restored natural communities to help ensure the establishment of
30 native marsh plain plant species. Additionally, the BDCP Implementation Office would actively
31 remove submerged and floating aquatic vegetation in subtidal portions of tidal natural
32 community restoration sites.
- 33 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
34 would result in the temporary disturbance of 1,285 acres along channels in the north, east, and
35 south Delta (San Joaquin, Old, and Middle Rivers) that would provide opportunities for
36 colonization by invasive plant species.
- 37 • *CM6 Channel Margin Enhancement*: The temporary effects of channel margin enhancement were
38 not estimated because specific locations for this activity and their areal extent have not been
39 developed. Channel margin enhancement (Sacramento River between Freeport and Walnut
40 Grove, San Joaquin River between Vernalis and Mossdale, Steamboat and Sutter Sloughs, and
41 salmonid migration channels in the interior Delta) would result in the temporary disturbance of
42 channel areas that would provide opportunities for colonization by invasive plant species.

- 1 ● *CM7 Riparian Natural Community Restoration*: The restoration of valley/foothill riparian habitat
2 would result in the temporary disturbance of riparian areas that would provide opportunities
3 for colonization by invasive plant species.
- 4 ● *CM8 Grassland Natural Community Restoration*: The restoration of grassland habitat in CZ 1, CZ 8
5 and/or CZ 11 would result in the temporary disturbance of degraded grassland or cultivated
6 land that would provide opportunities for colonization by invasive plant species.
- 7 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: The restoration of vernal pool
8 and alkali seasonal wetland complexes in CZ 1, CZ 8, or CZ 11 would result in the temporary
9 disturbance of grassland areas that would provide opportunities for colonization by invasive
10 plant species.
- 11 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration, which would take place through
12 conversion of agricultural lands in CZ 2 and CZ 4, would result in the temporary disturbance of
13 fallow agricultural areas that would provide opportunities for colonization by invasive plant
14 species. These adverse effects would be reduced by monitoring the development of marsh
15 vegetation to determine if nonnative vegetation needs to be controlled to facilitate the
16 establishment of native marsh vegetation or if restoration success could be improved with
17 supplemental plantings of native species. If indicated by monitoring, nonnative vegetation
18 control measures and supplemental plantings would be implemented.
- 19 ● *Avoidance and Minimization Measures: AMM6 Disposal and Reuse of Spoils* would have adverse
20 effects if spoil, RTM, dredged material, or chipped vegetative materials containing viable
21 invasive plant propagules are used as topsoil in uninfested areas.

22 The adverse effects that would result from the introduction and spread of invasive plants through
23 colonization of temporarily disturbed areas would be minimized by implementation of CM11,
24 AMM4, AMM10, and AMM11.

25 *CM11 Natural Communities Enhancement and Management* would reduce these adverse effects by
26 implementing invasive plant control within the BDCP reserve system to reduce competition on
27 native species, thereby improving conditions for covered species, ecosystem function, and native
28 biodiversity. The invasive plant control efforts would target new infestations that are relatively easy
29 to control or the most ecologically damaging nonnative plants for which effective suppression
30 techniques are available. In aquatic and emergent wetland communities, Brazilian waterweed,
31 perennial pepperweed, barbgrass, and rabbits foot grass would be controlled (and tidal mudflats
32 would be maintained). In riparian areas, invasive plant control would focus on reducing or
33 eliminating species such as Himalayan blackberry, giant reed, and perennial pepperweed. In
34 grassland areas, techniques such as grazing and prescribed burning may be used to decrease the
35 cover of invasive plant species.

36 Implementation of AMM4, AMM10 and AMM11 would also reduce the adverse effects that could
37 result from construction activities. The AMMs provide methods to minimize ground disturbance,
38 guidance for developing restoration and monitoring plans for temporary construction effects, and
39 measures to minimize the introduction and spread of invasive plants. AMM4 would include the
40 preparation and implementation of an erosion and sediment control plan that would control erosion
41 and sedimentation and restore soils and vegetation in affected areas. The restoration and
42 monitoring plans for implementation of AMM10 would include methods for stockpiling, storing, and
43 restoring topsoil, revegetating disturbed areas, monitoring and maintenance schedules, adaptive
44 management strategies, reporting requirements, and success criteria. AMM10 would also include

1 planting native species appropriate for the natural community being restored, with the exception of
2 some borrow sites in cultivated lands that would be restored as grasslands.

3 AMM11 specifies that the BDCP Implementation Office would retain a qualified botanist or weed
4 scientist prior to clearing operations to determine if affected areas contain invasive plants. If areas
5 to be cleared do contain invasive plants, then chipped vegetation material from those areas would
6 not be used for erosion control but would be disposed to minimize the spread of invasive plant
7 propagules (e.g., burning, composting). During construction of the water conveyance facilities and
8 construction activities associated with the other CMs, construction vehicles and construction
9 machinery would be cleaned prior to entering construction sites that are in or adjacent natural
10 communities other than cultivated lands and prior to entering any BDCP restoration sites or
11 conservation lands other than cultivated lands. Vehicles working in or travelling off paved roads
12 through areas with infestations of invasive plant species would be cleaned before travelling to other
13 parts of the Plan Area. Cleaning stations would be established at the perimeter of BDCP covered
14 activities along construction routes as well as at the entrance to reserve system lands. Biological
15 monitoring would include locating and mapping locations of invasive plant species within the
16 construction areas during the construction phase and the restoration phase. Infestations of invasive
17 plant species would be targeted for control or eradication as part of the restoration and revegetation
18 of temporarily disturbed construction areas.

19 **NEPA Effects:** The implementation of AMM4, AMM10, AMM11, and CM11 would reduce the
20 potential for the introduction and spread of invasive plants and avoid or minimize the potential
21 effects on natural communities and special-status species; therefore, these effects would not be
22 adverse.

23 **CEQA Conclusion:** Under Alternative 1B, impacts on natural communities from the introduction or
24 spread of invasive plants as a result of implementing Alternative 1B would not result in the long-
25 term degradation of a sensitive natural community due to substantial alteration of site conditions
26 and would, therefore, be less than significant. No mitigation would be required.

27 **Compatibility with Plans and Policies**

28 **Impact BIO-187: Compatibility of the Proposed Water Conveyance Facilities and Other** 29 **Conservation Measures with Federal, State, or Local Laws, Plans, Policies, or Executive Orders** 30 **Addressing Terrestrial Biological Resources in the Study Area**

31 Constructing the water conveyance facilities (CM1) and implementing CM2–CM21 for Alternative 1B
32 have the potential for being incompatible with plans and policies related to managing and protecting
33 terrestrial biological resources of the study area. A number of laws, plans, policies, programs, and
34 executive orders that are relevant to actions in the study area provide guidance for terrestrial
35 biological resource issues as overviewed in Section 12.2, *Regulatory Setting*. This overview of plan
36 and policy compatibility evaluates whether Alternative 1B would be compatible or incompatible
37 with such enactments, rather than whether impacts would be adverse or not adverse, or significant
38 or less than significant. If the incompatibility relates to an applicable plan, policy, or executive order
39 adopted to avoid or mitigate terrestrial biological resource effects, then an incompatibility might be
40 indicative of a related significant or adverse effect under CEQA and NEPA, respectively. Such
41 physical effects of Alternative 1B on terrestrial biological resources are addressed in the discussions
42 of impacts on natural communities and species. The following is a summary of compatibility

1 evaluations related to terrestrial biological resources for laws, plans, policies, and executive orders
2 relevant to the BDCP.

3 **Federal and State Legislation**

- 4 ● The federal *Clean Water Act*, *Endangered Species Act*, *Fish and Wildlife Coordination Act*,
5 *Migratory Bird Treaty Act*, *Rivers and Harbors Act* and *Marine Mammal Protection Act* all contain
6 legal guidance that either directly or indirectly promotes or stipulates the protection and
7 conservation of terrestrial biological resources in the process of undertaking activities that
8 involve federal decision making. The biological goals and objectives contained in the BDCP that
9 provide the major guidance for implementing the various conservation elements of Alternative
10 1B are all designed to promote the long-term viability of the natural communities, special-status
11 species, and common species that inhabit the Plan Area. While some of the conservation
12 measures of the alternative involve permanent and temporary loss of natural communities and
13 associated habitats during facilities construction and expansion of certain natural communities,
14 the long-term guidance in the Plan would provide for the long-term viability and expansion of
15 the habitats and special-status species populations in the Plan Area. Alternative 1B conservation
16 actions would be compatible with the policies and directives for terrestrial biological resources
17 contained in these federal laws.
- 18 ● The *California Endangered Species Act*, *California Native Plant Protection Act*, *Porter-Cologne*
19 *Water Quality Control Act*, and *Natural Communities Conservation Planning Act* are state laws
20 that have relevance to the management and protection of terrestrial biological resources in the
21 study area. Each of these laws promotes consideration of wildlife and native vegetation either
22 through comprehensive planning or through regulation of activities that may have an adverse
23 effect on the terrestrial and aquatic natural resources of the state. The BDCP, which is the basis
24 for Alternative 1B, contains biological goals and objectives that have been developed to promote
25 the species protection and natural resource conservation that are directed by these state laws.
26 Alternative 1B conservation actions would be compatible with the policies and directives
27 contained in these laws.
- 28 ● The *Johnston-Baker-Andal-Boatwright Delta Protection Act of 1992 (Delta Protection Act)* and the
29 *Sacramento-San Joaquin Delta Reform Act*, which updated the Delta Protection Act, promote the
30 maintenance and protection of natural resources and the protection of agricultural land uses in
31 the Delta's primary zone through the goals and policies contained in the 2009 updated Land Use
32 and Resources Management Plan (LURMP). While nothing in the LURMP is binding on state
33 agencies that are BDCP proponents, the LURMP does promote restoration and enhancement of
34 habitats for the terrestrial and aquatic species of the Delta on public land. The BDCP biological
35 goals and objectives would be compatible with these LURMP goals (Delta Protection
36 Commission 2010).
- 37 ● The *Suisun Marsh Preservation Act* of 1974 was designed to protect the Suisun Marsh for long-
38 term use as wildlife habitat, with a goal of preserving and enhancing the value and diversity of
39 the Marsh's aquatic and wildlife habitats. The BDCP and its plans for protection and restoration
40 of tidal marsh habitats in Suisun Marsh would be compatible with the intent of the Suisun Marsh
41 Preservation Act.

1 **Plans, Programs, and Policies**

- 2 ● *The Delta Plan*, which was developed by the Delta Stewardship Council in compliance with the
3 2009 Sacramento-San Joaquin Delta Reform Act, is mandated to achieve two co-equal goals:
4 provide for a more reliable water supply for California and protect, restore, and enhance the
5 Delta ecosystem. The co-equal goals are to be achieved in a manner that protects and enhances
6 the unique cultural, recreational, natural resource, and agricultural values of the Delta as an
7 evolving place. The BDCP is intended to become a component of the Delta Plan. The Delta
8 Stewardship Council will determine whether the BDCP is compatible with the goals and
9 objectives of the Delta Plan prior to its incorporation into the Plan. The compatibility of the
10 BDCP with the Delta Plan is considered in detail in Section 13.2.2.2 of Chapter 13, *Land Use*.
- 11 ● *California Wetlands Conservation Policy*, which was adopted by Executive Order in 1993,
12 promotes a long-term gain in the quantity, value and permanence of wetlands acreages and
13 values in California. The BDCP conservation measures that provide for a significant expansion of
14 wetland acreage and value in the Delta and Suisun Marsh are compatible with the intent of the
15 California Wetlands Conservation Policy.
- 16 ● *The North American Waterfowl Management Plan (NAWMP)* and *Central Valley Joint Venture*
17 *(CVJV)* strive to maintain and expand wetlands and uplands for waterfowl and shorebirds in the
18 major basins of California's Central Valley. The NAWMP is a management plan jointly approved
19 by the United States and Canada in 1986. It contains general guidance from the principal wildlife
20 management agencies of the two countries for sustaining abundant waterfowl populations by
21 conserving landscapes through self-directed partnerships (joint ventures) that are guided by
22 sound science. The CVJV is the joint venture established for overseeing NAWMP implementation
23 in the Central Valley. The CVJV is made up of 21 conservation organizations, state and federal
24 government agencies, and one corporation that have formed a partnership to improve the
25 habitat conditions for breeding and nonbreeding waterfowl, breeding and nonbreeding
26 shorebirds, waterbirds, and riparian-dependent songbirds in the Central Valley. The CVJV's
27 2006 Implementation Plan (Central Valley Joint Venture 2006) establishes conservation
28 objectives and priorities for these bird groups within the basins of the Central Valley. The BDCP
29 Plan Area includes all or portions of three Implementation Plan basins— the Delta, Yolo and
30 Suisun basins. The 2006 Implementation Plan contains basin-specific objectives for wetland
31 restoration, protection of existing wetland habitats, wetland enhancement, adequate power and
32 water supplies for wetland management, agricultural land enhancement, farmland easements
33 that maintain waterfowl food resources on agricultural land, and farmland easements that
34 buffer existing wetlands from urban and residential growth.

35 Implementation of the Alternative 1B conservation measures would result in significant
36 reductions in cultivated land and managed wetland acreage in the Delta, Yolo and Suisun basins;
37 however, significant increases in tidal and nontidal wetlands in these basins would be another
38 result. Because of the large conversion of managed wetland in the Suisun basin, the BDCP has
39 included a large managed wetland conservation and enhancement goal for this area. For the
40 Suisun basin conversions to be compatible with the 2006 Implementation Plan goals, this
41 EIR/EIS has added mitigation that would require food production studies and adaptive
42 management to ensure that the Suisun basin would continue to provide the waterfowl and
43 shorebird habitat envisioned in the Implementation Plan.

- 1 ● *Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan, Cosumnes River Preserve*
2 *Management Plan, Brannan Island and Franks Tract State Recreation Areas General Plan, Yolo*
3 *Bypass Wildlife Area Land Management Plan, Grizzly Island Wildlife Area Management Plan, and*
4 *the Lower Sherman Island Wildlife Area Land Management Plan* are primarily designed to
5 preserve and enhance the natural resource and recreation qualities of these areas.
6 Implementing Alternative 1B, especially construction of CM1 and CM2 facilities, and land
7 modification associated with CM4 restoration activities, could create temporary disruptions to
8 the terrestrial biological resource management activities in these management areas. The
9 ultimate goals of aquatic and terrestrial habitat enhancement and restoration contained in the
10 BDCP would be compatible with the long-term management goals of these areas. Proposed
11 restoration areas in the Yolo Bypass, on Sherman Island, and in Suisun Marsh would be designed
12 to be compatible with and to complement the current management direction for these areas and
13 would be required to adapt restoration proposals to meet current policy established for
14 managing these areas.
- 15 ● *Suisun Marsh Preservation Agreement and Suisun Marsh Plan* are the most recent efforts by the
16 state and federal agencies responsible for Suisun Marsh (the Marsh) to maintain its long-term
17 viability as managed wetlands and wildlife habitat, consistent with the Suisun Marsh
18 Preservation Act. The SMPA was signed in 1987 and modified in 2005 by DWR, CDFW,
19 Reclamation and the Suisun Resource Conservation District to establish the mitigation approach
20 in the Marsh for effects of operating the SWP and CVP. The primary concerns were the effects of
21 CVP and SWP Delta diversions on salinity in the Marsh. The SMPA focused on ways to ensure
22 adequate water quality and quantity for the managed wetlands and wildlife habitats in the
23 Marsh to assure equal waterfowl values in the Marsh. The Suisun Marsh Plan, for which a Final
24 EIS/EIR was released in 2010 by these agencies, provides for restoration of tidal marsh habitat
25 and enhancement of managed wetland in the Marsh, maintenance of waterfowl hunting and
26 recreational opportunities in the Marsh, maintenance and improvement of the Marsh levee
27 system, and protection and enhancement of water quality for beneficial uses of the Marsh. An
28 integral component of the Suisun Marsh Plan is balancing continued managed wetland
29 operation with new tidal wetland restoration to provide improved and greater habitat for fish
30 and wildlife species. The Suisun Marsh Plan is a programmatic, long-term plan and does not
31 include specific projects, project proponents, or funding mechanisms. However, the Suisun
32 Marsh Plan relies on tidal restoration to allow for managed wetland operations to continue. The
33 BDCP would provide a funding mechanism and increased management potential relative to
34 existing and restored habitats, assisting the Suisun Marsh Plan in meeting its broader ecological
35 goals, consistent with long-term operation of the SWP and CVP water conveyance facilities. The
36 conservation actions contained in the BDCP, which are designed to ensure the long-term
37 protection and recovery of special-status fish and wildlife species dependent on the Marsh,
38 would be compatible with the water quality and habitat restoration goals of the SMPA and
39 Suisun Marsh Plan.
- 40 ● *California Aquatic Invasive Species Management Plan* does not address terrestrial invasive
41 species. Implementation of the Plan's long-term control and management objectives affect
42 terrestrial species that utilize study area aquatic habitats. These effects are positive in that Plan
43 objectives are to control and remove invasive aquatic species that are detrimental to native
44 aquatic and terrestrial species. Implementation of BDCP's conservation actions would be
45 undertaken with the goal of avoiding any further spread of aquatic invasive species. Alternative
46 1B would, therefore, be compatible with the objectives of the California Aquatic Invasive Species
47 Management Plan.

- 1 • *Habitat Conservation Plans and Natural Community Conservation Plans* are the subject of a
2 detailed analysis at the end of this chapter. The analysis considers the compatibility of the BDCP
3 with all HCPs and NCCPs that share planning area with the BDCP Plan Area.

4 ***Executive Orders***

- 5 • *Executive Order 11990: Protection of Wetlands* requires all federal agencies to consider wetland
6 protection in their policies and actions. The BDCP proposes to protect, enhance and expand the
7 wetlands of the Plan Area, and, therefore, would be compatible with Executive Order 11990.
- 8 • *Executive Order 13112: Invasive Species* directs federal agencies to prevent and control the
9 introduction and spread of invasive species in a cost-effective and environmentally sound
10 manner. Alternative 1B construction and restoration actions have the potential to both
11 introduce and spread invasive species in the study area. Implementation of mitigation measures
12 described in this chapter would be capable of making Alternative 1B implementation compatible
13 with Executive Order 13112.
- 14 • *Executive Order 113443: Facilitation of Hunting Heritage and Wildlife Conservation* directs
15 federal agencies whose activities affect public land management, outdoor recreation, and
16 wildlife management to facilitate the expansion and enhancement of hunting opportunities, and
17 the management of game species and their habitat. Alternative 1B conservation measures that
18 involve conversion of cultivated land and managed wetland to tidal and nontidal wetlands and
19 other natural communities would conflict with the hunting expansion and enhancement aspects
20 of this executive order. Refer to Chapter 15, *Recreation*, for a detailed analysis of the effects of
21 alternatives on hunting opportunities. The habitat protection and expansion conservation
22 measures of Alternative 1B would be compatible with the executive order's goal of facilitating
23 the management of habitats for some game species.

24 ***CEQA Conclusion:*** The potential plan and policy incompatibilities of implementing Alternative 1B
25 identified in the analysis above indicate the potential for a physical consequence to the environment.
26 The primary physical consequence of concern is the conversion of large acreages of cultivated land
27 and managed wetland to natural wetland and riparian habitat in the study area. The physical effects
28 are discussed in the Shorebirds and Waterfowl analysis above and no additional CEQA conclusion is
29 required related to the compatibility of the alternative with relevant plans and polices. The reader is
30 referred to Section 13.2.3 of Chapter 13, *Land Use*, for a further discussion of the responsibilities of
31 state and federal agencies to comply with local regulations and the relationship between plan and
32 policy consistency and physical consequences to the environment.

1 **12.3.3.4 Alternative 1C—Dual Conveyance with West Alignment and**
2 **Intakes W1–W5 (15,000 cfs; Operational Scenario A)**

3 Section 3.5.4 in Chapter 3, *Description of Alternatives*, provides details of Alternative 1C, and Figure
4 3-6 depicts the alternative.

5 **Natural Communities**

6 **Tidal Perennial Aquatic**

7 Construction, operation, maintenance and management associated with the conservation
8 components of Alternative 1C would have no long-term adverse effects on the habitats associated
9 with the tidal perennial aquatic natural community. Initial development and construction of CM1,
10 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal or modification of
11 this community (see Table 12-1C-1). Full implementation of Alternative 1C would also include the
12 following conservation actions over the term of the BDCP to benefit the tidal perennial aquatic
13 natural community (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 14 • Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
15 accommodate sea level rise (Objective L1.3, associated with CM4).
- 16 • Within the restored and protected tidal natural communities and transitional uplands, restore
17 or create tidal perennial aquatic natural community as necessary when creating tidal emergent
18 wetland (Objective TPANC1.1, associated with CM4).
- 19 • Control invasive aquatic vegetation that adversely affects native fish habitat (Objective
20 TPANC2.1, associated with CM13).

21 There is a variety of other, less specific conservation goals and objectives in the BDCP that would
22 improve the value of tidal perennial aquatic natural community for terrestrial species. As explained
23 below, with the restoration and enhancement of these amounts of habitat, in addition to AMMs,
24 impacts on tidal aquatic natural community would not be adverse for NEPA purposes and would be
25 less than significant for CEQA purposes.

26 Note that two time periods are represented in Table 12-1C-1 and the other tables contained in the
27 analysis of Alternative 1C. The near-term (NT) acreage effects listed in the table would occur over
28 the first 10 years of Alternative 1C implementation. The late long-term (LLT) effects contained in
29 these tables represent the cumulative effects of all activities over the entire 50-year term of the Plan.
30 This table and all impact tables in the chapter include reference to only those CMs that would
31 eliminate natural community acreage either through construction or restoration activities, or would
32 result in periodic inundation of the community. Table 3-4 in Chapter 3, *Description of Alternatives*,
33 describes the implementation schedule for all natural community protection and restoration
34 conservation measures.

1 **Table 12-1C-1. Changes in Tidal Perennial Aquatic Natural Community Associated with Alternative**
2 **1C (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	25	25	117	117	0	0
CM2	8	8	11	11	9-36	0
CM4	51	58	0	0	0	0
CM5	0	2	0	5	0	39
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	84	93	128	133	9-36	39

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-1: Changes in Tidal Perennial Aquatic Natural Community as a Result of**
5 **Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,
7 CM4, CM5, and CM6 would permanently affect an estimated 93 acres and temporarily remove 133
8 acres of tidal perennial aquatic natural community in the study area. These modifications represent
9 less than 1% of the 86,263 acres of the community that is mapped in the study area. The majority of
10 the permanent and temporary effects would happen during the first 10 years of Alternative 1C
11 implementation, as water conveyance facilities are constructed and habitat restoration is initiated.
12 Natural communities restoration would add 8,300 acres of tidal wetlands, including an estimated
13 3,400 acres of tidal perennial aquatic natural community during the same period, which would
14 expand the area of that habitat and offset the losses. The 3,400-acre increase is estimated, based on
15 modeling reported in BDCP Appendix 3.B, Table 5, by comparing existing Plan Area subtidal habitat
16 to near-term subtidal habitat with the Plan. The BDCP beneficial effects analysis (BDCP Chapter 5,
17 Section 5.4.1.2) indicates that, while there would be no minimum restoration requirement for the
18 tidal perennial aquatic natural community, an estimated approximately 27,000 acres of tidal
19 perennial aquatic natural community would be restored based on tidal restoration modeling. This
20 estimate is based on Table 5 in BDCP Appendix 3.B, subtracting late long-term without project
21 acreage from late long-term with project acreage.

22 The individual effects of each relevant conservation measure are addressed below. A summary
23 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
24 conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1C water conveyance
 2 facilities would permanently remove 25 acres and temporarily remove 117 acres of tidal
 3 perennial aquatic community. Most of the permanent loss would be where Intakes W1–5
 4 encroach on the Sacramento River’s west bank from just north of Clarksburg to just north of
 5 Courtland (see Terrestrial Biology Mapbook, a support document to the EIS/EIR, for a detailed
 6 view of proposed facilities overlain on natural community mapping). The footings and the
 7 screens at the intake sites would be placed into the river margin and would displace moderately
 8 deep to shallow, flowing open water with a mud substrate and very little aquatic vegetation. A
 9 small area of this community would also be lost to canal construction just east of Elk Slough,
 10 across the river from Hood. The temporary effects on tidal perennial aquatic habitats would
 11 occur at numerous locations, including in the Sacramento River at Intakes W1–5, and at
 12 temporary siphon, barge unloading and tunnel work areas along the western tunnel and canal
 13 alignment. Elk Slough would be temporarily affected by a tunnel work area south of Clarksburg,
 14 and a large siphon work area where the canal would cross under the slough on the west side of
 15 Merritt Island. Temporary siphon work areas would affect tidal perennial aquatic habitats on
 16 Miner Slough at the north end of Ryer Island, on Rock Slough at its head with Contra Costa Canal,
 17 and on Italian Slough immediately adjacent to the west side of Clifton Court Forebay. Barge
 18 unloading facilities would create temporary effects on the Sacramento River just upstream of its
 19 junction with Cache Slough, and on Fishermans Cut just west of Franks Tract. A control structure
 20 work area would temporarily affect the California Aqueduct just south of Clifton Court Forebay.
 21 The details of these locations can be seen in the Terrestrial Biology Mapbook. These losses
 22 would take place during the near-term construction period.

- 23 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
 24 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
 25 stilling basin improvements, Putah Creek realignment activities, Tule Canal/Toe Drain and
 26 Lisbon Weir modification and Sacramento Weir improvements. Some of these activities could
 27 involve excavation and grading in tidal perennial aquatic areas to improve passage of fish
 28 through the bypasses. Based on hypothetical construction footprints, a total of 8 acres could be
 29 permanently lost and another 11 acres could be temporarily removed. This activity would occur
 30 primarily in the near-term timeframe.

- 31 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
 32 footprints, implementation of CM4 would affect 18 acres of tidal perennial aquatic community.
 33 CM4 involves conversion of existing natural communities to a variety of tidal wetlands,
 34 including tidal perennial aquatic, tidal brackish emergent, and tidal freshwater emergent
 35 wetlands. Specific locations for these conversions are not known. The 18 acres could remain
 36 tidal perennial aquatic with a modified tidal prism, or they could eventually be converted to one
 37 of the other tidal wetland types. For purposes of this analysis, a conservative approach has been
 38 taken and the effect has been discussed simultaneously with the habitat losses associated with
 39 other conservation measures. An estimated 65,000 acres of tidal wetlands and transitional
 40 upland would be restored during tidal habitat restoration, consistent with BDCP Objective L1.3.
 41 Of these acres, an estimated 27,000 acres of tidal perennial aquatic habitat would be restored,
 42 based on modeling conducted by ESA PWA (refer to Table 5 in BDCP Appendix 3.B, *BDCP Tidal*
 43 *Habitat Evolution Assessment*). This restoration would be consistent with BDCP Objective
 44 TPANC1.1. Approximately 3,400 acres of the restoration would happen during the first 10 years
 45 of Alternative 1C implementation, which would coincide with the timeframe of water
 46 conveyance facilities construction. The remaining restoration would be spread over the
 47 following 30 years. Tidal natural communities restoration is expected to be focused in the ROAs

1 identified in Figure 12-1. Some of the restoration would occur in the lower Yolo Bypass, but
2 restoration would also be spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne
3 and West Delta ROAs.

- 4 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
5 would permanently remove 2 acres and temporarily remove 5 acres of tidal perennial aquatic
6 habitat. The construction-related losses would be considered a permanent removal of the tidal
7 perennial aquatic habitats directly affected. This activity is scheduled to start following
8 construction of water conveyance facilities, which is expected to take 10 years. Specific locations
9 for the floodplain restoration have not been identified, but it is expected that much of the
10 activity would occur in the south Delta along the major rivers. Floodplain restoration along the
11 San Joaquin River would improve connectivity for a variety of species that rely on tidal
12 perennial aquatic habitat. The regional and Plan Area landscape linkages along the San Joaquin
13 River are included in Figure 12-2.
- 14 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
15 of small amounts of tidal perennial aquatic habitat along 20 miles of river and sloughs. The
16 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity
17 would occur on tidal perennial aquatic habitat margins, including levees and channel banks. The
18 improvements would occur within the study area on sections of the Sacramento, San Joaquin
19 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

20 The following paragraphs summarize the combined effects discussed above and describe other
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
22 also included.

23 ***Near-Term Timeframe***

24 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would
25 affect the tidal perennial aquatic community through CM1 construction losses (25 acres permanent
26 and 117 acres temporary) and the CM2 construction losses (8 acres permanent and 11 acres
27 temporary). The habitat would be lost primarily along the Sacramento River at the western intake
28 sites, at slough crossings along the western canal and tunnel alignment, or in the northern Yolo
29 Bypass. Approximately 51 acres of the inundation and construction-related effects from CM4 would
30 occur during the near-term throughout the ROAs mapped in Figure 12-1.

31 The construction losses of this special-status natural community would represent an adverse effect
32 if they were not offset by avoidance and minimization measures and restoration actions associated
33 with BDCP conservation components. Loss of tidal perennial aquatic natural community would be
34 considered both a loss in acreage of a sensitive natural community and a loss of waters of the United
35 States as defined by Section 404 of the CWA. However, the creation of approximately 3,400 acres of
36 high-value tidal perennial aquatic natural community as part of CM4 during the first 10 years of
37 Alternative 1C implementation would offset this near-term loss, avoiding any adverse effect. Typical
38 project-level mitigation ratios (1:1 for restoration) would indicate 212 acres of restoration would be
39 needed to offset (i.e., mitigate) the 212 acres of effect (the total permanent and temporary near-term
40 effects listed in Table 12-1C-1) associated with near-term activities, including water conveyance
41 facilities construction.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 2 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
 3 *Barge Operation Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
 4 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
 5 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
 6 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

7 ***Late Long-Term Timeframe***

8 Implementation of Alternative 1C as a whole would result in relatively minor (less than 1%)
 9 conversions or losses of tidal perennial aquatic community in the study area. These losses or
 10 conversions (93 acres of permanent and 133 acres of temporary loss) would be largely associated
 11 with construction of the water conveyance facilities (CM1), construction of Yolo Bypass fish
 12 improvements (CM2), and inundation during tidal marsh restoration (CM4). Inundation conversions
 13 would occur through the course of the Plan’s restoration activities at various tidal restoration sites
 14 throughout the study area. By the end of the Plan timeframe, a total of more than 27,000 acres of
 15 high-value tidal perennial aquatic natural community would be restored (estimated from Table 5 in
 16 BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). The restoration would occur over a
 17 wide region of the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache
 18 Slough, and South Delta ROAs (see Figure 12-1).

19 ***NEPA Effects:*** The creation of approximately 3,400 acres of high-value tidal perennial aquatic
 20 natural community as part of CM4 during the first 10 years of Alternative 1C implementation would
 21 offset near-term losses associated with construction activities for CM1, CM2, CM4 and CM6, avoiding
 22 any adverse effect. Alternative 1C, which includes restoration of an estimated 27,000 acres of this
 23 natural community over the course of the Plan, would not result in a net long-term reduction in the
 24 acreage of a sensitive natural community; the effect would be beneficial.

25 ***CEQA Conclusion:***

26 ***Near-Term Timeframe***

27 Alternative 1C would result in the loss or conversion of approximately 212 acres of tidal perennial
 28 aquatic natural community due to construction of the water conveyance facilities (CM1) and fish
 29 passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The
 30 construction losses would be primarily along the Sacramento River at western intake sites, at slough
 31 and river crossings during canal and tunnel construction, and within the northern section of the
 32 Yolo Bypass, while inundation conversions would be at various tidal restoration sites throughout
 33 the study area. The losses and conversions would be spread across the 10-year near-term
 34 timeframe. These losses and conversions would be offset by planned restoration of an estimated
 35 3,400 acres of high-value tidal perennial aquatic natural community scheduled for the first 10 years
 36 of Alternative 1C implementation (CM4). AMM1, AMM2, AMM6, AMM7, and AMM10 would also be
 37 implemented to minimize impacts. Because of these offsetting near-term restoration activities and
 38 AMMs, impacts would be less-than-significant. Typical project-level mitigation ratios (1:1 for
 39 restoration) would indicate that 212 acres of restoration would be needed to offset (i.e., mitigate)
 40 the 212 acres of loss or conversions. The restoration would be initiated at the beginning of
 41 Alternative 1C implementation to minimize any time lag in the availability of this habitat to special-
 42 status species, and would result in a net gain in acreage of this sensitive natural community.

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, 236 acres of the natural community would be lost or converted and an
3 estimated 27,000 acres of this community would be restored. There would be no net permanent
4 reduction in the acreage of this sensitive natural community within the study area. Therefore,
5 Alternative 1C would not have a substantial adverse effect on this natural community; the impact
6 would be beneficial.

7 **Impact BIO-2: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal**
8 **Perennial Aquatic Natural Community**

9 Two Alternative 1C conservation measures would modify the water depths and flooding regimes of
10 both natural and man-made waterways in the study area. CM2, which is designed to improve fish
11 passage and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic
12 inundation of tidal perennial aquatic natural community on small acreages, while CM5 would expose
13 this community to additional flooding as channel margins are modified and levees are set back to
14 improve fish habitat along some of the major rivers and waterways throughout the study area.

- 15 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1C
16 would result in an increase in the frequency, magnitude and duration of inundation-related
17 changes in water depth and velocity of 9–36 acres of tidal perennial aquatic natural community.
18 The methods used to estimate these inundation acreages are described in BDCP Appendix 5.J,
19 *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected by
20 inundation would vary with the flow volume that would pass through the newly constructed
21 notch in the Fremont Weir. The 9-acre increase in inundation would be associated with a notch
22 flow of 1,000 cfs, and the 36-acre increase would result from a notch flow of 4,000 cfs. Plan-
23 related increases in flow through Fremont Weir would be expected in 30% of the years. Most of
24 the tidal perennial aquatic community occurs in the southern section of the bypass on Liberty
25 Island, and, to a lesser extent, along the eastern edge of the bypass, including the Tule Canal/Toe
26 Drain. The anticipated change in management of flows in the Yolo Bypass includes more
27 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some
28 years, later releases into the bypass in spring months (April and May). The modification of
29 periodic inundation events would be expected to be beneficial to the ecological function of tidal
30 perennial aquatic habitat in the bypass as it relates to BDCP covered aquatic species. The Yolo
31 Bypass waterway is the key element in the Yolo Bypass landscape linkage mapped in Figure 12-
32 2 and described in detail in BDCP Chapter 3, Table 3.2-3. The change in periodic inundation in
33 the bypass would not substantially modify its value for special-status or common terrestrial
34 species. Water depths and water flow rates would increase over Existing Conditions and the No
35 Action condition in approximately 30% of the years, but it would not fragment the habitat or
36 make it less accessible to special-status or common terrestrial species. The modifications would
37 not result in a loss of this community. The plant species associated with this community are
38 adapted to inundation. The extended inundation would be designed to expand foraging and
39 spawning habitat for Delta fishes. The effects of these changes in the inundation regime on
40 terrestrial species that rely on tidal perennial aquatic habitats are discussed in detail later in this
41 chapter, under the individual species assessments.
- 42 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a
43 seasonal increase in the frequency and duration of flooding of 39 acres of tidal perennial aquatic
44 habitat. Specific locations for this restoration activity have not been identified, but they would
45 likely be focused in the south Delta area, along the major rivers and Delta channels. The more

1 frequent exposure of these wetlands to stream flooding events would be beneficial to the
2 ecological function of tidal perennial aquatic habitats, especially as they relate to BDCP target
3 aquatic species. The plant species associated with these tidal perennial aquatic areas are
4 adapted to inundation and would not be substantially modified.

5 In summary, 48–75 acres of tidal perennial aquatic community in the study area would be subjected
6 to more frequent increases in water depth and velocity from flood flows as a result of implementing
7 two Alternative 1C conservation measures (CM2 and CM5). Tidal perennial aquatic community is
8 already, by definition, permanently inundated aquatic habitat of value to terrestrial and aquatic
9 species in the study area; therefore, periodic changes in water depth and velocity would not result in
10 a net permanent reduction in the acreage of this community in the study area.

11 **NEPA Effects:** Increasing periodic inundation of tidal perennial aquatic natural community would
12 not have an adverse effect on the community.

13 **CEQA Conclusion:** An estimated 48–75 acres of tidal perennial aquatic community in the study area
14 would be subjected to more frequent increases in water depth and velocity from inundation as a
15 result of implementing CM2 and CM5 under Alternative 1C. Tidal perennial aquatic community is
16 already, by definition, permanently inundated aquatic habitat of value to terrestrial and aquatic
17 species in the study area. The periodic inundation would not result in a net permanent reduction in
18 the acreage of this community in the study area. Therefore, there would no substantial adverse
19 effect on the community. The impact would be less than significant.

20 **Impact BIO-3: Modification of Tidal Perennial Aquatic Natural Community from Ongoing** 21 **Operation, Maintenance and Management Activities**

22 Once the physical facilities associated with Alternative 1C are constructed and the stream flow
23 regime associated with changed water management is in effect, there would be new ongoing and
24 periodic actions associated with operation, maintenance and management of the BDCP facilities and
25 conservation lands that could affect tidal perennial aquatic natural community in the study area. The
26 ongoing actions include the diversion of Sacramento River flows in the north Delta, and reduced
27 diversions from south Delta channels. These actions are associated with CM1 (see the impact
28 discussion above for effects associated with CM2). The periodic actions would involve access road
29 and conveyance facility repair, vegetation management at the various water conveyance facilities
30 and habitat restoration sites (CM13), levee and canal repair and replacement of levee armoring,
31 channel dredging, and habitat enhancement in accordance with natural community management
32 plans. The potential effects of these actions are described below.

- 33 • *Modified river flows upstream of and within the study area and reduced diversions from south*
34 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
35 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
36 channels (associated with Operational Scenario A) would not result in the permanent reduction
37 in acreage of a sensitive natural community in the study area. Flow levels in the upstream rivers
38 would not change such that the acreage of tidal perennial aquatic community would be reduced
39 on a permanent basis. Some minor increases and some decreases would be expected to occur
40 during some seasons and in some water-year types, but there would be no permanent loss.
41 Similarly, increased diversions of Sacramento River flows in the north Delta would not result in
42 a permanent reduction in tidal perennial aquatic community downstream of these diversions.
43 Tidal influence on water levels in the Sacramento River and Delta waterways would continue to

1 be dominant. Reduced diversions from the south Delta channels would not create a reduction in
2 this natural community.

3 The periodic changes in flows in the Sacramento River, Feather River, and American River
4 associated with Alternative 1C operations would affect salinity, water temperature, dissolved
5 oxygen levels, turbidity, contaminant levels, and dilution capacity in these rivers and Delta
6 waterways. These changes are discussed in detail in Chapter 8, *Water Quality*. Potentially
7 substantial increases in electrical conductivity (salinity) are predicted for the Delta and Suisun
8 Marsh as a result of increased export of Sacramento River water. These salinity changes are not
9 expected to result in a permanent reduction in the acreage or value of tidal perennial aquatic
10 natural community for terrestrial species in the study area.

- 11 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
12 conveyance facilities and levees associated with the BDCP actions have the potential to require
13 removal of adjacent vegetation and could entail earth and rock work in tidal perennial aquatic
14 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering tidal
15 perennial aquatic habitats. These activities would be subject to normal erosion, turbidity and
16 runoff control management practices, including those developed as part of *AMM2 Construction*
17 *Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
18 vegetation removal or earthwork adjacent to or within aquatic habitats would require use of
19 sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces. Proper
20 implementation of these measures would avoid permanent adverse effects on this community.
- 21 • *Vegetation management.* Vegetation management in the form of physical removal and chemical
22 treatment would be a periodic activity associated with the long-term maintenance of water
23 conveyance facilities and restoration sites. Vegetation management is also the principal activity
24 associated with *CM13 Invasive Aquatic Vegetation Control* and is consistent with BDCP Objective
25 TPANC2.1. Use of herbicides to control nuisance vegetation could pose a long-term hazard to
26 tidal perennial aquatic natural community at or adjacent to treated areas. The hazard could be
27 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
28 onto the natural community, or direct discharge of herbicides to tidal perennial aquatic areas
29 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
30 *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce
31 hazards to humans and the environment from use of various chemicals during maintenance
32 activities, including the use of herbicides. These commitments are described in Appendix 3B,
33 including the commitment to prepare and implement spill prevention, containment, and
34 countermeasure plans and stormwater pollution prevention plans. Best management practices,
35 including control of drift and runoff from treated areas, and use of herbicides approved for use
36 in aquatic environments would also reduce the risk of affecting natural communities adjacent to
37 water conveyance features and levees associated with restoration activities.

38 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
39 normal ecological function of tidal aquatic habitats in planned restoration areas. The treatment
40 activities would be conducted in concert with the California Department of Boating and
41 Waterways' invasive species removal program. Eliminating large stands of water hyacinth and
42 Brazilian waterweed would improve habitat conditions for some aquatic species by removing
43 cover for nonnative predators, improving water flow and removing barriers to movement (see
44 Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also benefit terrestrial
45 species that use tidal perennial aquatic natural community for movement corridors and for

1 foraging. Vegetation management effects on individual species are discussed in the species
2 sections on following pages.

- 3 • *Channel dredging.* Long-term operation of the Alternative 1C intakes on the Sacramento River
4 would include periodic dredging of sediments that might accumulate in front of intake screens.
5 The dredging would occur in tidal perennial aquatic natural community and would result in
6 short-term increases in turbidity and disturbance of the substrate. These conditions would not
7 eliminate the community, but would diminish its value for special-status and common species
8 that rely on it for movement corridor or foraging area. The individual species effects are
9 discussed later in this chapter.
- 10 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
11 communities within the Plan Area (CM11). For tidal perennial aquatic natural community, a
12 management plan would be prepared that specifies actions to improve the value of the habitats
13 for covered species. Actions would include control of invasive nonnative plant and animal
14 species, restrictions on vector control and application of herbicides, and maintenance of
15 infrastructure that would allow for movement through the community. The enhancement efforts
16 would improve the long-term value of this community for both special-status and common
17 species.

18 The various operations and maintenance activities described above could alter acreage of tidal
19 perennial aquatic natural community in the study area through changes in flow patterns and
20 changes in water quality. Activities could also introduce sediment and herbicides that would reduce
21 the value of this community to common and sensitive plant and wildlife species. Other periodic
22 activities associated with the Plan, including management, protection and enhancement actions
23 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
24 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
25 community. While some of these activities could result in small reductions in acreage, these
26 reductions would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural*
27 *Communities Restoration*. The management actions associated with levee repair, periodic dredging
28 and control of invasive plant species would also result in a long-term benefit to the species
29 associated with tidal perennial aquatic habitats by improving water movement.

30 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
31 Alternative 1C would not result in a net permanent reduction in this sensitive natural community
32 within the study area. Therefore, there would be no adverse effect to the community.

33 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would
34 have the potential to create minor losses in total acreage of tidal perennial aquatic natural
35 community in the study area, and could create temporary increases in turbidity and sedimentation.
36 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
37 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize
38 these impacts, and other operations and maintenance activities, including management, protection
39 and enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
40 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
41 improved water movement in these habitats. Long-term restoration activities associated with *CM4*
42 *Tidal Natural Communities Restoration* would greatly expand this natural community in the study
43 area. Ongoing operation, maintenance and management activities would not result in a net
44 permanent reduction in the acreage or value of this sensitive natural community within the study
45 area. Therefore, there would be a less-than-significant impact.

1 **Tidal Brackish Emergent Wetland**

2 Construction, operation, maintenance and management associated with the conservation
3 components of Alternative 1C would have no adverse effect on the habitats associated with the tidal
4 brackish emergent wetland natural community. Habitat restoration and construction associated
5 with CM1, CM2, CM5 and CM6 would not remove tidal brackish emergent wetland; levee breaching
6 and minor construction associated with CM4 may temporarily remove small amounts of this natural
7 community (see Table 12-1C-2). Full implementation of Alternative 1C would include the following
8 conservation actions over the term of the BDCP to benefit the tidal brackish emergent wetland
9 natural community.

- 10 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
11 accommodate sea level rise (Objective L1.3 associated with CM4).
- 12 ● Within the restored and protected tidal natural communities and transitional uplands, include
13 sufficient transitional uplands along the fringes of restored brackish and freshwater tidal
14 emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow for
15 the future upslope establishment of tidal emergent wetland communities (Objective L1.7,
16 associated with CM4).
- 17 ● Within the restored and protected tidal natural communities and transitional uplands, restore
18 or create at least 6,000 acres of tidal brackish emergent wetland in Conservation Zone 11
19 (Objective TBEWNC1.1 associated with CM4).
- 20 ● Restore connectivity to isolated patches of tidal brackish emergent marsh where isolation has
21 reduced effective use of these marshes by the species that depend on them (Objective
22 TBEWNC1.3 associated with CM4).
- 23 ● Create topographic heterogeneity in restored tidal brackish emergent wetland to provide
24 variation in inundation characteristics and vegetative composition (Objective TBEWNC1.4
25 associated with CM4).
- 26 ● Limit perennial pepperweed to no more than 10% cover in tidal brackish emergent wetland
27 natural community within the reserve system (Objective TBEWNC2.1 associated with CM11).

28 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
29 3.3, *Biological Goals and Objectives*, that would improve the value of tidal brackish emergent wetland
30 natural community for terrestrial species. As explained below, with the restoration and
31 enhancement of these amounts of habitat, in addition to implementation of AMMs, impacts on this
32 natural community would not be adverse for NEPA purposes and would be less than significant for
33 CEQA purposes.

1 **Table 12-1C-2. Changes in Tidal Brackish Emergent Wetland Natural Community Associated with**
 2 **Alternative 1C (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0	0
CM4	Unk.	Unk.	Unk.	Unk.	0	0
CM5	0	0	0	0	0	0
CM6	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-4: Changes in Tidal Brackish Emergent Wetland Natural Community as a Result of**
 5 **Implementing BDCP Conservation Measures**

6 Construction of the Alternative 1C water conveyance facilities (CM1) would not affect tidal brackish
 7 emergent wetland natural community.

8 Restoration of tidal marsh habitats associated with CM4 would require site preparation, earthwork,
 9 and other site activities that could remove tidal brackish emergent wetland. Levee modifications,
 10 grading or contouring, filling to compensate for land subsidence, and creation of new channels could
 11 also result in the removal of tidal brackish emergent wetland. All of this construction and land
 12 modification activity that could affect tidal brackish emergent wetland would occur in Suisun Marsh
 13 (CZ 11). The acreage of loss has not been calculated because the specific locations for site
 14 preparation and earthwork have not been identified, but the loss would likely be small (less than 1
 15 acre). These activities would occur in small increments during the course of the CM4 restoration
 16 program. The protection and restoration elements of CM4 would greatly exceed any of the short-
 17 term losses described above. At least 6,000 acres of tidal brackish emergent wetland would be
 18 restored in the Plan Area (BDCP Objective TBEWNC1.1, associated with CM4), with 2,000 acres of
 19 restoration occurring in the near-term timeframe. In addition, the habitat and ecosystem functions
 20 of BDCP restored tidal brackish emergent wetland would be maintained and enhanced (CM11). The
 21 BDCP beneficial effects evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.3.2) states that at
 22 least 6,000 acres of tidal brackish emergent wetland community would be restored in CZ 11, and
 23 that tidal natural communities restoration would decrease habitat fragmentation by providing
 24 additional connectivity between isolated patches of tidal brackish emergent wetland. These same
 25 conservation benefits would occur under Alternative 1C.

1 The restoration activities associated with CM4 in Suisun Marsh would result in other effects that
 2 could alter the habitat value of tidal brackish emergent wetland. Disturbances associated with levee
 3 breaching and grading or contouring would increase opportunities for the introduction or spread of
 4 invasive species. Implementation of CM11 would limit this risk through invasive species control and
 5 wetland management and enhancement activities to support native species. Tidal flooding of dry
 6 areas could also increase the bioavailability of methylmercury in Suisun Marsh. Site-specific
 7 conditions would dictate the significance of this hazard to tidal brackish marsh vegetation and
 8 associated wildlife. According to the Suisun Marsh Plan EIR/EIS (Bureau of Reclamation et al. 2010,
 9 pg. 5.2-18), marsh creation may generate less methylmercury than is currently being generated by
 10 managed wetlands. However, this has not been confirmed through comprehensive studies. Because
 11 of the difficulty in assessing this risk at a programmatic level, it will need to be considered at a
 12 project level. Site-specific restoration plans that address the creation and mobilization of mercury,
 13 and monitoring and adaptive management as described in *CM12 Methylmercury Management*, would
 14 be available to address the uncertainty of methylmercury levels in restored tidal marsh. Water
 15 temperature fluctuations in newly created marsh and the potential for increased nitrogen
 16 deposition associated with construction vehicles are also issues of concern that are difficult to
 17 quantify at the current stage of restoration design. None of these effects is expected to limit the
 18 extent or value of tidal brackish emergent wetland in the study area.

19 **NEPA Effects:** The increase of tidal brackish emergent wetland associated with CM4 would be a
 20 beneficial effect on the natural community.

21 **CEQA Conclusion:** Tidal brackish emergent wetland natural community could experience small
 22 losses in acreage in Suisun Marsh (CZ 11) as a result of the large-scale tidal marsh restoration
 23 planned as part of CM4. These losses (not expected to exceed 1 acre) would be associated with levee
 24 modification, site preparation and other earthwork needed to expose diked lands to tidal influence.
 25 Because at least 6,000 acres of tidal brackish emergent wetland would be restored in the study area
 26 as part of CM4, including 2,000 acres restored in the near-term timeframe, there would be a large
 27 increase in tidal brackish emergent wetland both in the near-term and over the life of the Plan.
 28 Indirect effects associated with the expansion of tidal brackish emergent wetland natural
 29 community, including the potential spread of invasive species, the generation of methylmercury,
 30 increases in marsh water temperatures, and increased nitrogen deposition are not expected to have
 31 a significant impact on this natural community in the study area. Therefore, this impact would be
 32 beneficial.

33 **Impact BIO-5: Modification of Tidal Brackish Emergent Wetland Natural Community from**
 34 **Ongoing Operation, Maintenance and Management Activities**

35 Once the physical facilities associated with CM4 of Alternative 1C are constructed and the water
 36 management practices associated with marsh restoration are in effect, there would be new ongoing
 37 and periodic actions that could affect tidal brackish emergent wetland natural community in the
 38 study area. The ongoing actions would include water releases and diversions, access road and levee
 39 repair, replacement of levee armoring, channel dredging, and habitat enhancement in accordance
 40 with natural community management plans. The potential effects of these actions are described
 41 below.

- 42 • *Modified river flows upstream of and within the study area and reduced diversions from south*
 43 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
 44 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta

1 channels (associated with Operational Scenario A) would not result in the permanent reduction
 2 in acreage of tidal brackish emergent wetland natural community in the study area. Flow levels
 3 in the upstream rivers would not directly affect this natural community because it does not exist
 4 upstream of the Delta. Increased diversions of Sacramento River flows in the north Delta would
 5 not result in a permanent reduction in tidal brackish emergent wetland downstream of these
 6 diversions. Salinity levels in Suisun Marsh channels would be expected to increase with reduced
 7 Sacramento River outflows (see Chapter 8, *Water Quality*), but this change would not be
 8 sufficient to change the acreage of brackish marsh. This natural community persists in an
 9 environment that experiences natural fluctuations in salinity due to tidal ebb and flow. Reduced
 10 diversions from the south Delta channels would not create a reduction in this natural
 11 community.

12 The increased diversion of Sacramento River flows in the north Delta would result in reductions
 13 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The
 14 reduction is estimated to be approximately 9% of the river's current sediment load for
 15 Alternative 4, which would have a north Delta diversion capacity of 9,000 cfs under Operational
 16 Scenario H (see BDCP Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3 for a detailed analysis of
 17 this issue). Alternative 1C, which would have a 15,000 cfs diversion capacity (Operational
 18 Scenario A), would be expected to reduce the sediment load by approximately 15%, assuming
 19 that most of the sediment would be removed during high river flow periods when north Delta
 20 pumping would normally be running at or near intake capacity. This would contribute to a
 21 decline in sediment reaching the Delta and Suisun Marsh that has been occurring over the past
 22 50-plus years due to a gradual depletion of sediment from the upstream rivers. The depletion
 23 has been caused by a variety of factors, including depletion of hydraulic mining sediment in
 24 upstream areas, armoring of river channels and a cutoff of sediment due to dam construction on
 25 the Sacramento River and its major tributaries (Wright and Schoellhamer 2004; Barnard et al.
 26 2013).

- 27 ● Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on
 28 tidal marsh, including tidal brackish emergent wetland. Sediment trapped by the marsh
 29 vegetation allows the emergent plants to maintain an appropriate water depth as water levels
 30 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The BDCP
 31 proponents have incorporated an environmental commitment (see Appendix 3B, Section
 32 3B.2.18, *Disposal and Reuse of Spoils, Reusable Tunnel Material and Dredged Material*) into the
 33 project that would lessen this potential effect. The Sacramento River water diverted at north
 34 Delta intakes would pass through sedimentation basins before being pumped to water
 35 conveyance structures. The commitment states that sediment collected in these basins would be
 36 periodically removed and reused, to the greatest extent feasible, in the Plan Area for a number of
 37 purposes, including marsh restoration, levee maintenance, subsidence reversal, flood response,
 38 and borrow area fill. The portion of the sediment re-introduced to the Delta and estuary for
 39 marsh restoration would remain available for marsh accretion. With this commitment to reuse
 40 in the Plan Area, the removal of sediment at the north Delta intakes would not result in a net
 41 reduction in the acreage and value of this special-status marsh community. The effect would not
 42 be adverse (NEPA) and would be less than significant (CEQA). *Access road and levee repair*.
 43 Periodic repair of access roads and levees associated with the BDCP actions has the potential to
 44 require removal of adjacent vegetation and could entail earth and rock work in tidal brackish
 45 emergent wetland habitats. This activity could lead to increased soil erosion, turbidity and
 46 runoff entering these habitats. The activities would be subject to normal erosion, turbidity and
 47 runoff control management practices, including those developed as part of *AMM2 Construction*

1 *Best Management Practices and Monitoring and AMM4 Erosion and Sediment Control Plan.* Any
2 vegetation removal or earthwork adjacent to or within aquatic habitats would require use of
3 sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces. Proper
4 implementation of these measures would avoid permanent adverse effects on this community.

- 5 • *Vegetation management.* Vegetation management in the form of physical removal and chemical
6 treatment (CM11) would be a periodic activity associated with the long-term maintenance of
7 restoration sites. Use of herbicides to control nuisance vegetation could pose a long-term hazard
8 to tidal brackish emergent wetland natural community at or adjacent to treated areas. The
9 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
10 stormwater onto the natural community, or direct discharge of herbicides to wetland areas
11 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
12 *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce
13 hazards to humans and the environment from use of various chemicals during maintenance
14 activities, including the use of herbicides. These commitments are described in Appendix 3B,
15 including the commitment to prepare and implement spill prevention, containment, and
16 countermeasure plans and stormwater pollution prevention plans. Best management practices,
17 including control of drift and runoff from treated areas, and use of herbicides approved for use
18 in aquatic environments would also reduce the risk of affecting natural communities adjacent to
19 levees associated with tidal wetland restoration activities.

20 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
21 normal ecological function of tidal aquatic habitats in planned restoration areas. The treatment
22 activities would be conducted in concert with the California Department of Boating and
23 Waterways' invasive species removal program. Eliminating large stands of water hyacinth and
24 Brazilian waterweed would improve habitat conditions for some aquatic species by removing
25 cover for nonnative predators, improving water flow and removing barriers to movement (see
26 Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also benefit terrestrial
27 species that use tidal brackish emergent wetland natural community for movement corridors
28 and for foraging. Vegetation management effects on individual species are discussed in the
29 species sections on following pages.

- 30 • *Channel dredging.* Long-term maintenance of tidal channels that support wetland expansion in
31 Suisun Marsh would include periodic dredging of sediments. The dredging would take place
32 adjacent to tidal brackish emergent wetland natural community and would result in short-term
33 increases in turbidity and disturbance of the substrate. These conditions would not eliminate
34 the community, but would diminish its value in the short term for special-status and common
35 species that rely on it for cover, movement corridor or foraging area. The individual species
36 effects are discussed elsewhere in this chapter.
- 37 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
38 communities within the Plan Area (CM11). For tidal brackish emergent wetland natural
39 community, a management plan would be prepared that specifies actions to improve the value
40 of the habitats for covered species. Actions would include control of invasive nonnative plant
41 and animal species, fire management, restrictions on vector control and application of
42 herbicides, and maintenance of infrastructure that would allow for movement through the
43 community. The enhancement efforts would improve the long-term value of this community for
44 both special-status and common species.

1 The various operations and maintenance activities described above could alter acreage and value of
2 tidal brackish emergent wetland natural community in the study area through water operations,
3 levee and road maintenance, channel dredging and vegetation management in or adjacent to this
4 community. Activities could also introduce sediment and herbicides that would reduce the value of
5 this community to common and sensitive plant and wildlife species. Other periodic activities
6 associated with the Plan, including management, protection and enhancement actions associated
7 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*
8 *Enhancement and Management*, would be undertaken to enhance the value of the community. While
9 some of these activities could result in small changes in acreage, these changes would be greatly
10 offset by restoration activities planned as part of *CM4 Tidal Natural Communities Restoration*. The
11 management actions associated with levee repair, periodic dredging and control of invasive plant
12 species would also result in a long-term benefit to the species associated with tidal brackish
13 emergent wetland habitats by improving water movement.

14 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net
15 permanent reduction in this sensitive natural community within the study area. Therefore, there
16 would be no adverse effect on the tidal brackish emergent wetland natural community.

17 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would
18 have the potential to create minor changes (not exceeding 1 acre) in total acreage of tidal brackish
19 emergent wetland natural community in the study area, and could create temporary increases in
20 turbidity and sedimentation. The activities could also introduce herbicides periodically to control
21 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and
22 AMM5 would minimize these impacts, and other operations and maintenance activities, including
23 management, protection and enhancement actions associated with *CM3 Natural Communities*
24 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
25 create positive effects, including improved water movement in these habitats. Long-term restoration
26 activities associated with *CM4 Tidal Natural Communities Restoration* would greatly expand tidal
27 brackish emergent wetland natural community in the study area. Ongoing operation, maintenance
28 and management activities would not result in a net permanent reduction in this sensitive natural
29 community within the study area. Therefore, there would be a less-than-significant impact.

30 **Tidal Freshwater Emergent Wetland**

31 Construction, operation, maintenance and management associated with the conservation
32 components of Alternative 1C would have no long-term adverse effects on the habitats associated
33 with the tidal freshwater emergent wetland natural community. Initial development and
34 construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary
35 removal of small acreages of this community (see Table 12-1C-3). Full implementation of Alternative
36 1C would also include the following conservation actions over the term of the BDCP to benefit the
37 tidal freshwater emergent wetland natural community.

- 38 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
39 accommodate sea level rise (Objective L1.3 associated with CM4).
- 40 ● Within the 65,000 acres of tidal natural communities and transitional uplands, include sufficient
41 transitional uplands along the fringes of restored brackish and freshwater tidal emergent
42 wetlands to accommodate up to 3 feet of sea level rise where possible and allow for the future
43 upslope establishment of tidal emergent wetland communities (Objective L1.7, associated with
44 CM4).

- 1 • Within the 65,000 acres of tidal natural communities, restore or create at least 24,000 acres of
2 tidal freshwater emergent wetland in Conservation Zones 1, 2, 4, 5, 6 and/or 7 (Objective
3 TFEWNC1.1, associated with CM4).
- 4 • Restore tidal freshwater emergent wetlands in areas that increase connectivity among
5 conservation lands (Objective TFEWNC1.2, associated with CM4).
- 6 • Restore and sustain a diversity of marsh vegetation that reflects historical species compositions
7 and high structural complexity (Objective TFEWNC2.1, associated with CM4).
- 8 • Create topographic heterogeneity in restored tidal freshwater emergent wetland to provide
9 variation in inundation characteristics and vegetative composition (Objective TFEWNC2.2,
10 associated with CM4).
- 11 • Protect and manage 50 acres of occupied or recently occupied tricolored blackbird nesting
12 habitat located within 5 miles of high-value foraging habitat in Conservation Zones 1, 2, 8 or 11.
13 Nesting habitat will be managed to provide young, lush stands of bulrush/cattail emergent
14 vegetation (Objective TRBL1.1).

15 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
16 3.3 that would improve the value of tidal freshwater emergent wetland natural community for
17 terrestrial species. As explained below, with the restoration and enhancement of these amounts of
18 habitat, in addition to implementation of AMMs, impacts on this natural community

19 **Table 12-1C-3. Changes in Tidal Freshwater Emergent Wetland Natural Community Associated**
20 **with Alternative 1C (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	1	1	0	0
CM2	6	6	0	0	24-58	0
CM4	1	1	0	0	0	0
CM5	0	1	0	1	0	3
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	7	8	1	2	24-58	3

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

21

1 **Impact BIO-6: Changes in Tidal Freshwater Emergent Wetland Natural Community as a Result**
2 **of Implementing BDCP Conservation Measures**

3 Construction and land grading activities that would accompany the implementation of CM1, CM2,
4 CM4, CM5, and CM6 would permanently eliminate an estimated 8 acres and temporarily remove 2
5 acres of tidal freshwater emergent wetland natural community in the study area. These
6 modifications represent less than 1% of the 8,856 acres of the community that is mapped in the
7 study area. The majority of the permanent and temporary losses would happen during the first 10
8 years of Alternative 1C implementation, as water conveyance facilities are constructed and habitat
9 restoration is initiated. Natural communities restoration would add at least 24,000 acres of tidal
10 freshwater emergent wetland natural community during the course of Plan restoration activities,
11 which would expand the area of that habitat and offset the losses. The BDCP beneficial effects
12 evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.4.2) states that the implementation of *CM4*
13 *Tidal Natural Communities Restoration* would restore at least 24,000 acres of tidal freshwater
14 emergent wetland community in Cache Slough (Conservation Zones 1, 2, and 3), the
15 Cosumnes/Mokelumne (Conservation Zone 4), West Delta (Conservation Zone 5 and 6), and South
16 Delta (Conservation Zone 7) ROAs. The BDCP evaluation also states that the objectives in the Plan
17 would promote vegetation diversity and structural complexity (as incorporated into the restoration
18 design) in restored tidal freshwater marsh. The same conservation actions would occur under
19 Alternative 1C.

20 The individual effects of each relevant conservation measure are addressed below. A summary
21 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
22 conservation measure discussions.

- 23 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1C water conveyance
24 facilities would temporarily remove 1 acre of tidal freshwater emergent wetland community.
25 The temporary loss would be located on Brushy Creek immediately adjacent to Byron Highway,
26 west of Clifton Court Forebay. A temporary railroad work area would be located at this point.
27 Refer to the Terrestrial Biology Mapbook to see the details of this location. This loss would take
28 place during the near-term construction period.

29 There is the potential for increased nitrogen deposition associated with construction vehicles
30 during the construction phase of CM1. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related*
31 *Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been
32 concluded that this potential deposition would pose a low risk of changing tidal freshwater
33 emergent wetland natural community because the construction would occur primarily
34 downwind of the natural community and the construction would contribute a negligible amount
35 of nitrogen to regional projected emissions. No adverse effect is expected.

- 36 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
37 construction or channel modification activities within the Yolo and Sacramento Bypasses,
38 including improvements in flow through the west side channel of the bypass, Putah Creek
39 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. All of
40 these activities could involve excavation and grading in tidal freshwater emergent wetland areas
41 to improve passage of fish through the bypasses. Based on hypothetical construction footprints,
42 a total of 6 acres could be permanently lost to these activities. The loss is expected to occur
43 during the first 10 years of Alternative 1C implementation.

- 1 • *CM4 Tidal Natural Communities Restoration*: Based on hypothetical footprints of this restoration
2 activity, initial land grading and levee modification could permanently remove 1 acre of tidal
3 freshwater emergent wetland natural community. This loss would occur during the near-term
4 timeframe in one of the ROAs identified for tidal wetland restoration. At the same time, an
5 estimated 24,000 acres of tidal freshwater emergent wetland community would be restored
6 during tidal habitat restoration (consistent with Objective TFEWNC1.1, associated with CM4).
7 Approximately 8,850 acres of the restoration would happen during the first 10 years of
8 Alternative 1C implementation, which would coincide with the timeframe of water conveyance
9 facilities construction. The remaining restoration would be spread over the following 30 years.
10 Tidal wetland communities restoration is expected to be focused in the ROAs identified in Figure
11 12-1. Restoration would be located and designed to improve habitat connectivity (Objective
12 TFEWNC1.2), improve marsh species diversity (Objective TFEWNC2.1), and provide variation in
13 inundation characteristics (Objective TFEWNC2.2). Some of the restoration would happen in the
14 lower Yolo Bypass, but restoration would also be spread among the Suisun Marsh, South Delta,
15 Cosumnes/Mokelumne and West Delta ROAs.
- 16 • The restoration activities associated with CM4 in the Plan Area ROAs would result in other
17 effects that could alter the habitat value of tidal freshwater emergent wetland. Disturbances
18 associated with levee breaching and grading or contouring would increase opportunities for the
19 introduction or spread of invasive species. Implementation of CM11 would limit this risk
20 through invasive species control and wetland management and enhancement activities to
21 support native species. Flooding of dry areas for tidal freshwater marsh creation could also
22 increase the bioavailability of methylmercury, especially in the Cache Slough,
23 Cosumnes/Mokelumne and Suisun Marsh ROAs. Site-specific conditions would dictate the
24 significance of this hazard to marsh vegetation and associated wildlife. Because of the difficulty
25 in assessing this risk at a programmatic level, it will need to be considered at a project level.
26 Site-specific restoration plans that address the creation and mobilization of mercury, and
27 monitoring and adaptive management as described in *CM12 Methylmercury Management*, would
28 be available to address the uncertainty of methylmercury levels in restored tidal marsh. Water
29 temperature fluctuations in newly created marsh is also an issue of concern that is difficult to
30 quantify at the current stage of restoration design. None of these effects is expected to limit the
31 extent or value of tidal freshwater emergent wetland in the study area.
32 *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction would permanently remove 1
33 acre and temporarily remove 1 acre of tidal freshwater emergent wetland habitat. The
34 construction-related losses would be considered a permanent removal of the habitats directly
35 affected. The majority of seasonally inundated floodplain restoration is expected to be
36 implemented along the lower San Joaquin River in the south and central Delta areas. Floodplain
37 restoration along the San Joaquin River would improve connectivity for a variety of species that
38 rely on freshwater marsh and riparian habitats. The regional and Plan Area landscape linkages
39 along the San Joaquin River are included in Figure 12-2. This activity is scheduled to start
40 following construction of water conveyance facilities, which is expected to take 10 years.
- 41 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
42 of small amounts of tidal freshwater emergent wetland habitat along 20 miles of river and
43 sloughs. The extent of this loss cannot be quantified at this time, but the majority of the
44 enhancement activity would take place on narrow strips of habitat, including levees and channel
45 banks. The improvements would occur within the study area on sections of the Sacramento, San
46 Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
3 also included.

4 ***Near-Term Timeframe***

5 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would
6 affect the tidal freshwater emergent wetland natural community through CM1 construction losses (1
7 acre temporary), CM2 construction losses (6 acres permanent), and CM4 construction losses (1 acre
8 permanent). The tidal freshwater emergent wetland natural community would be lost on Brushy
9 Creek, just west of Clifton Court Forebay and at various locations within the Yolo Bypass and the
10 tidal restoration ROAs.

11 The construction losses of this special-status natural community would represent an adverse effect
12 if they were not offset by avoidance and minimization measures and restoration actions associated
13 with BDCP conservation components. Loss of tidal freshwater emergent wetland natural community
14 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
15 defined by Section 404 of the CWA. However, the creation of 8,850 acres of tidal freshwater
16 emergent wetland natural community as part of CM4 during the first 10 years of Alternative 1C
17 implementation would more than offset this near-term loss, avoiding any adverse effect. Typical
18 project-level mitigation ratios (1:1 for restoration) would indicate that 8 acres of restoration would
19 be needed to offset (i.e., mitigate) the 8 acres of loss (the total permanent and temporary near-term
20 effects listed in Table 12-1C-3).

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
22 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
23 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
24 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
25 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
26 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

27 ***Late Long-Term Timeframe***

28 Implementation of Alternative 1C as a whole would result in relatively minor (less than 1%) losses
29 of tidal freshwater emergent wetland community in the study area. These losses (8 acres of
30 permanent and 2 acres of temporary loss) would be largely associated with construction of the
31 water conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and levee
32 modification and land grading for tidal marsh restoration (CM4) and floodplain restoration (CM5).
33 The CM4 and CM5 losses would occur during the course of the CM4 and CM5 conservation actions at
34 various tidal and floodplain restoration sites throughout the study area.

35 ***NEPA Effects:*** The creation of 8,850 acres of tidal freshwater emergent wetland natural community
36 as part of CM4 during the first 10 years of Alternative 1C implementation would more than offset
37 this near-term loss of constructing CM1, CM2, CM4 and CM5, avoiding any adverse effect. By the end
38 of the Plan timeframe, a total of 24,000 acres of this natural community would be restored over a
39 wide region of the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache
40 Slough, and South Delta ROAs (see Figure 12-1). Therefore, Alternative 1C would not result in a net
41 long-term reduction in the acreage of a sensitive natural community; the effect would be beneficial.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Alternative 1C would result in the near-term loss of approximately 8 acres of tidal freshwater
 4 emergent wetland natural community due to construction of the water conveyance facilities (CM1)
 5 and fish passage improvements (CM2), and tidal marsh restoration (CM4). The construction losses
 6 would be adjacent to Clifton Court Forebay, in the Yolo Bypass and at various locations undergoing
 7 tidal restoration (see Figure 12-1 for a map of ROAs) The losses would be spread across a 10-year
 8 near-term timeframe and would be offset by planned restoration of 8,850 acres of tidal freshwater
 9 emergent wetland natural community scheduled for the first 10 years of Alternative 1C
 10 implementation (CM4). AMM1, AMM2, AMM6, AMM7, and AMM10 would also be implemented to
 11 minimize impacts. Because of these offsetting near-term restoration activities and AMMs, impacts
 12 would be less than significant. Typical project-level mitigation ratios (1:1 for restoration) would
 13 indicate that 8 acres of restoration would be needed to offset (i.e., mitigate) the 8 acres of loss. The
 14 restoration would be initiated at the beginning of Alternative 1C implementation to minimize any
 15 time lag in the availability of this habitat to special-status species, and would result in a net gain in
 16 acreage of this sensitive natural community.

17 **Late Long-Term Timeframe**

18 At the end of the Plan period, 10 acres of tidal freshwater emergent wetland natural community
 19 would be lost to conservation activities, and 24,000 acres of this community would be restored.
 20 There would be no net permanent reduction in the acreage of this sensitive natural community
 21 within the study area. Therefore, Alternative 1C would not have a substantial adverse effect on this
 22 natural community; the impact would be beneficial.

23 **Impact BIO-7: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal**
 24 **Freshwater Emergent Wetland Natural Community**

25 Two Alternative 1C conservation measures would modify the inundation/flooding regimes of both
 26 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
 27 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
 28 of tidal freshwater emergent wetland natural community on small acreages, while CM5 would
 29 expose this community to additional inundation as channel margins are modified and levees are set
 30 back to improve fish habitat along some of the major rivers and waterways throughout the study
 31 area.

- 32 • *CM2 Yolo Bypass Fisheries Enhancement:* Operation of the Yolo Bypass under Alternative 1C
 33 would result in an increase in the frequency, magnitude and duration of inundation of 24–58
 34 acres of tidal freshwater emergent wetland natural community. The methods used to estimate
 35 these inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*
 36 *Wildlife, and Plants.* The area more frequently inundated would vary with the flow volume that
 37 would pass through the newly constructed notch in the Fremont Weir. The 24-acre increase in
 38 inundation would be associated with a notch flow of 1,000 cubic feet per second (cfs), and the
 39 58-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow
 40 through Fremont Weir would be expected in 30% of the years. Most of this community occurs in
 41 the southern section of the bypass on Liberty Island, on the fringes of tidal perennial aquatic
 42 habitats. Smaller areas are scattered among the cropland within the bypass, south of Interstate
 43 80. The anticipated change in management of flows in the Yolo Bypass includes more frequent

1 releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some years,
2 later releases into the bypass in spring months (April and May). The modification of periodic
3 inundation events would not adversely affect the ecological function of tidal freshwater
4 emergent wetland habitats and would not substantially modify its value for special-status or
5 common terrestrial species. The plants in this natural community are adapted to periodic
6 inundation events within the Yolo Bypass. The effects of this inundation on wildlife and plant
7 species are described in detail elsewhere in this chapter.

- 8 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
9 seasonal increase in the frequency and duration of inundation of 3 acres of tidal freshwater
10 emergent wetland habitats. Specific locations for this restoration activity have not been
11 identified, but they would likely be focused along the major rivers and Delta channels in the
12 south Delta. The reconnection of these wetlands to stream flooding events would be beneficial to
13 the wetlands' ecological function, especially as they relate to the BDCP's target terrestrial and
14 aquatic species. Foraging activity and refuge sites would be expanded into areas currently
15 unavailable or infrequently available to some aquatic species.

16 In summary, 27–61 acres of tidal freshwater emergent wetland natural community in the study area
17 would be subjected to more frequent inundation as a result of implementing two Alternative 1C
18 conservation measures (CM2 and CM5). Tidal freshwater emergent wetland natural community is a
19 habitat of great value to both terrestrial and aquatic species in the study area.

20 **NEPA Effects:** Periodic inundation would not result in a net permanent reduction in the acreage or
21 value of tidal freshwater emergent wetland natural community in the study area. Therefore, there
22 would be no adverse effect.

23 **CEQA Conclusion:** An estimated 27–61 acres of tidal freshwater emergent wetland natural
24 community in the study area would be subjected to more frequent inundation as a result of
25 implementing CM2 and CM5 under Alternative 1C. This community is of great value to aquatic and
26 terrestrial species in the study area. The periodic inundation would not result in a net permanent
27 reduction in the acreage of this community in the study area. Therefore, there would be a less-than-
28 significant impact on the community.

29 **Impact BIO-8: Modification of Tidal Freshwater Emergent Wetland Natural Community from** 30 **Ongoing Operation, Maintenance and Management Activities**

31 Once the physical facilities associated with Alternative 1C are constructed and the stream flow
32 regime associated with changed water management is in effect, there would be new ongoing and
33 periodic actions associated with operation, maintenance and management of the BDCP facilities and
34 conservation lands that could affect tidal freshwater emergent wetland natural community in the
35 study area. The ongoing actions include the diversion of Sacramento River flows in the north Delta,
36 and reduced diversions from south Delta channels. These actions are associated with CM1 (see the
37 impact discussion above for effects associated with CM2). The periodic actions would involve access
38 road and conveyance facilities repair, vegetation management at the various water conveyance
39 facilities and habitat restoration sites (CM11), levee and canal repair and replacement of levee
40 armoring, channel dredging, and habitat enhancement in accordance with natural community
41 management plans. The potential effects of these actions are described below.

- 42 • *Modified river flows upstream of and within the study area and reduced diversions from south*
43 *Delta channels*. Reduced diversions from the south Delta channels would not create a reduction

1 in tidal freshwater emergent wetland in the study area. However, the periodic changes in flows
2 in the Sacramento River, Feather River, and American River associated with modified reservoir
3 operations, and the increased diversion of Sacramento River flows at north Delta intakes
4 associated with Alternative 1C (Operational Scenario A) would affect salinity, water
5 temperature, dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in
6 these rivers and Delta waterways. These changes are discussed in detail in Chapter 8, *Water*
7 *Quality*. Potentially substantial increases in electrical conductivity (salinity) are predicted for the
8 west Delta and Suisun Marsh as a result of these changed water operations. These salinity
9 changes may alter the plant composition of tidal freshwater emergent wetland along the lower
10 Sacramento and San Joaquin Rivers and west Delta islands. The severity and extent of these
11 salinity changes would be complicated by anticipated sea level rise and the effects of
12 downstream tidal restoration over the life of the Plan. There is the potential that some tidal
13 freshwater marsh may become brackish. These potential changes are not expected to result in a
14 substantial reduction in the acreage and value of tidal freshwater emergent wetland natural
15 community in the study area.

16 The increased diversion of Sacramento River flows in the north Delta would result in reductions
17 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The
18 reduction is estimated to be approximately 9% of the river's current sediment load for
19 Alternative 4, which would have a north Delta diversion capacity of 9,000 cfs under Operational
20 Scenario H (see BDCP Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3, for a detailed analysis of
21 this issue). Alternative 1C, which would have a 15,000 cfs diversion capacity (Operational
22 Scenario A), would be expected to reduce the sediment load by approximately 15%, assuming
23 that most of the sediment would be removed during high river flow periods when north Delta
24 pumping would normally be running at or near intake capacity. This would contribute to a
25 decline in sediment reaching the Delta and Suisun Marsh that has been occurring over the past
26 50-plus years due to a gradual depletion of sediment from the upstream rivers. The depletion
27 has been caused by a variety of factors, including depletion of hydraulic mining sediment in
28 upstream areas, armoring of river channels and a cutoff of sediment due to dam construction on
29 the Sacramento River and its major tributaries (Wright and Schoellhamer 2004; Barnard et al.
30 2013).

31 Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on
32 tidal marsh, including tidal freshwater emergent wetland. Sediment trapped by the marsh
33 vegetation allows the emergent plants to maintain an appropriate water depth as water levels
34 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The BDCP
35 proponents have incorporated an environmental commitment (see Appendix 3B, Section
36 3B.2.18, *Disposal and Reuse of Spoils, Reusable Tunnel Material and Dredged Material*) into the
37 project that would lessen this potential effect. The Sacramento River water diverted at north
38 Delta intakes would pass through sedimentation basins before being pumped to water
39 conveyance structures. The commitment states that sediment collected in these basins would be
40 periodically removed and reused, to the greatest extent feasible, in the Plan Area for a number of
41 purposes, including marsh restoration, levee maintenance, subsidence reversal, flood response,
42 and borrow area fill. The portion of the sediment re-introduced to the Delta and estuary for
43 marsh restoration would remain available for marsh accretion. With this commitment to reuse
44 in the Plan Area, the removal of sediment at the north Delta intakes would not result in a net
45 reduction in the acreage and value of this special-status marsh community. The effect would not
46 be adverse (NEPA) and would be less than significant (CEQA).

- 1 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
2 conveyance facilities and levees associated with the BDCP actions have the potential to require
3 removal of adjacent vegetation and could entail earth and rock work in or adjacent to tidal
4 freshwater emergent wetland habitats. This activity could lead to increased soil erosion,
5 turbidity and runoff entering tidal aquatic habitats. These activities would be subject to normal
6 erosion, turbidity and runoff control management practices, including those developed as part
7 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
8 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within emergent
9 wetland habitats would require use of sediment and turbidity barriers, soil stabilization and
10 revegetation of disturbed surfaces. Proper implementation of these measures would avoid
11 permanent adverse effects on this community.
- 12 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
13 treatment, would be a periodic activity associated with the long-term maintenance of water
14 conveyance facilities and restoration sites (CM11). Use of herbicides to control nuisance
15 vegetation could pose a long-term hazard to tidal freshwater emergent wetland natural
16 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of
17 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or
18 direct discharge of herbicides to tidal aquatic areas being treated for invasive species removal.
19 Environmental commitments and *AMM5 Spill Prevention, Containment and Countermeasure Plan*
20 have been made part of the BDCP to reduce hazards to humans and the environment from use of
21 various chemicals during maintenance activities, including the use of herbicides. These
22 commitments are described in Appendix 3B, including the commitment to prepare and
23 implement spill prevention, containment, and countermeasure plans and stormwater pollution
24 prevention plans. Best management practices, including control of drift and runoff from treated
25 areas, and use of herbicides approved for use in aquatic environments would also reduce the
26 risk of affecting natural communities adjacent to water conveyance features and levees
27 associated with restoration activities.
- 28 • *Channel dredging.* Long-term operation of the Alternative 1C intakes on the Sacramento River
29 would include periodic dredging of sediments that might accumulate in front of intake screens.
30 The dredging would be done in waterways adjacent to tidal freshwater emergent wetlands and
31 would result in short-term increases in turbidity and disturbance of the substrate. These
32 conditions would not eliminate the community, but would diminish its value for special-status
33 and common species that rely on it for cover or foraging area. The individual species effects are
34 discussed later in this chapter.
- 35 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
36 communities within the Plan Area (CM11). For tidal freshwater emergent wetland community, a
37 management plan would be prepared that specifies actions to improve the value of the habitats
38 for covered species. Actions would include control of invasive nonnative plant and animal
39 species, fire management, restrictions on vector control and application of herbicides, and
40 maintenance of infrastructure that would allow for movement through the community. The
41 enhancement efforts would improve the long-term value of this community for both special-
42 status and common species.

43 The various operations and maintenance activities described above could alter acreage of tidal
44 freshwater emergent wetland natural community in the study area through changes in flow patterns
45 and resultant changes in water quality. Activities could also introduce sediment and herbicides that
46 would reduce the value of this community to common and sensitive plant and wildlife species. Other

1 periodic activities associated with the Plan, including management, protection and enhancement
2 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
3 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
4 community. While some of these activities could result in small changes in acreage, these changes
5 would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural Communities*
6 *Restoration*. The management actions associated with levee repair, periodic dredging and control of
7 invasive plant species would also result in a long-term benefit to the species associated with tidal
8 freshwater emergent wetland habitats by improving water movement.

9 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net
10 permanent reduction in the tidal freshwater emergent wetland natural community within the study
11 area. Therefore, there would be no adverse effect on this natural community.

12 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C,
13 including changed water operations in the upstream rivers, would have the potential to create
14 minor changes in total acreage of tidal freshwater emergent wetland natural community in the study
15 area, and could create temporary increases in turbidity and sedimentation. The activities could also
16 introduce herbicides periodically to control nonnative, invasive plants. Implementation of
17 environmental commitments and AMM2, AMM4, and AMM5 would minimize these impacts, and
18 other operations and maintenance activities, including management, protection and enhancement
19 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
20 *Communities Enhancement and Management*, would create positive effects, including improved
21 water movement in these habitats. Long-term restoration activities associated with *CM4 Tidal*
22 *Natural Communities Restoration* would greatly expand this natural community in the study area.
23 Ongoing operation, maintenance and management activities would not result in a net permanent
24 reduction in this sensitive natural community within the study area. Therefore, there would be a
25 less-than-significant impact on the tidal freshwater emergent wetland natural community.

26 **Valley/Foothill Riparian**

27 Construction, operation, maintenance and management associated with the conservation
28 components of Alternative 1C would have no long-term adverse effects on the habitats associated
29 with the valley/foothill riparian natural community. Initial development and construction of CM1,
30 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this
31 community (see Table 12-1C-4). Full implementation of Alternative 1C would also include the
32 following conservation actions over the term of the BDCP to benefit the valley/foothill riparian
33 natural community.

- 34 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000
35 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated
36 with CM7).
- 37 ● Protect 750 acres of existing valley/foothill riparian natural community in Conservation Zone 7
38 by year 10 (Objective VFRNC1.2, associated with CM3).
- 39 ● Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory
40 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated
41 with CM5 and CM7).
- 42 ● Maintain 500 acres of mature riparian forest in Conservation Zones 4 or 7 (Objective VFRNC2.3,
43 associated with CM3 and CM7).

- 1 • Maintain 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion of the early-
2 to late-successional riparian vegetation (VFRNC2.2), in large blocks with a minimum patch size
3 of 50 acres and minimum width of 330 feet (Objective VFRNC2.4, associated with CM3 and
4 CM7).
- 5 • Maintain or increase abundance and distribution of valley/foothill riparian natural community
6 vegetation alliances that are rare or uncommon as recognized by California Department of Fish
7 and Game (2010), such as button willow thickets alliance and blue elderberry stands alliance
8 (Objective VFRNC3.1).

9 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
10 3.3 that would improve the value of valley/foothill riparian natural community for terrestrial
11 species. As explained below, with the restoration and enhancement of these amounts of habitat, in
12 addition to implementation of AMMs, impacts on this natural community would not be adverse for
13 NEPA purposes and would be less than significant for CEQA purposes.

14 **Table 12-1C-4. Changes in Valley/Foothill Riparian Natural Community Associated with Alternative**
15 **1C (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	40	40	86	86	0	0
CM2	89	89	88	88	51-92	0
CM4	298	552	0	0	0	0
CM5	0	43	0	35	0	266
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	427	724	174	209	51-92	266

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

16
17 **Impact BIO-9: Changes in Valley/Foothill Riparian Natural Community as a Result of**
18 **Implementing BDCP Conservation Measures**

19 Construction, land grading and habitat restoration activities that would accompany the
20 implementation of CM1, CM2, CM4, CM5, and CM6 would permanently eliminate an estimated 724
21 acres and temporarily remove 209 acres of valley/foothill riparian natural community in the study
22 area. These modifications represent approximately 5% of the 17,966 acres of the community that is
23 mapped in the study area. The majority of the permanent and temporary losses would occur during

1 the first 10 years of Alternative 1C implementation, as water conveyance facilities are constructed
 2 and habitat restoration is initiated. Valley/foothill riparian protection (750 acres) and restoration
 3 (800 acres) would be initiated during the same period, which would begin to offset the losses. By the
 4 end of the Plan period, 5,000 acres of this natural community would be restored. The BDCP
 5 beneficial effects analysis (BDCP Chapter 5, Section 5.4.5.2) indicates that implementation of
 6 Alternative 4 would restore or create 5,000 acres of riparian forest and scrub in Conservation Zones
 7 1, 2, 4, 5, 6, and 7, with at least 3,000 acres occurring on restored seasonally inundated floodplain.
 8 Alternative 4 would also protect 750 acres of existing valley/foothill riparian natural community in
 9 Conservation Zone 7. These same conservation actions would occur with implementation of
 10 Alternative 1C.

11 The individual effects of each relevant conservation measure are addressed below. A summary
 12 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
 13 conservation measure discussions.

- 14 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1C water conveyance
 15 facilities would permanently remove 40 acres and temporarily remove 86 acres of
 16 valley/foothill riparian natural community. The habitat would be removed at multiple locations
 17 from the north Delta to the west Delta and in the vicinity of Discovery Bay. Almost all of the
 18 losses would occur on the narrow borders of waterways that are crossed by water conveyance
 19 facilities. In the north Delta, most of the permanent loss would be where Intakes W1–5 encroach
 20 on the Sacramento River’s west bank from just north of Clarksburg to just north of Courtland.
 21 The riparian areas here are very small patches, some dominated by valley oak and willows, and
 22 others by nonnative trees and mixed brambles (see Terrestrial Biology Mapbook). Other small
 23 patches or narrow bands of riparian vegetation dominated by valley oak and willow would be
 24 permanently removed by canal construction and borrow areas in the vicinity of Elk Slough south
 25 of Clarksburg. A long band of mixed brambles and willows would be lost adjacent to the
 26 Sacramento River Deep Water Ship Channel, north of Miner Slough. The temporary losses of
 27 valley/foothill riparian natural community would be associated with temporary canal and
 28 siphon work areas where the canal would cross Elk Slough on the west side of Merritt Island,
 29 Duck Slough west of Courtland, Miner Slough on the northwest corner of Ryer Island, and
 30 Kellogg Creek southwest of Discovery Bay. The vegetation in these areas ranges from small
 31 stands of valley oak and willow to narrow bands of alder and mixed brambles. Small temporary
 32 losses associated with transmission line construction would occur along the entire
 33 canal/pipeline route. These losses would take place during the near-term construction period.
- 34 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
 35 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
 36 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
 37 Sacramento Weir improvements. All of these activities could involve excavation and grading in
 38 valley/foothill riparian areas to improve passage of fish through the bypasses. Based on
 39 hypothetical construction footprints, a total of 89 acres could be permanently lost and another
 40 88 acres could be temporarily removed. Most of the riparian losses would occur at the north end
 41 of Yolo Bypass where major fish passage improvements are planned. This vegetation is a mix of
 42 valley oak, cottonwood, sycamore and willow trees. The riparian areas here are primarily small,
 43 disconnected patches with moderate to low value as wildlife movement corridors. Most of these
 44 patches lack structural complexity. Excavation to improve water movement in the Toe Drain and
 45 in the Sacramento Weir would remove similar linear strips of vegetation. These losses would
 46 occur primarily in the near-term timeframe.

- 1 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
2 valley/foothill riparian community. The losses would be spread among most of the ROAs
3 established for tidal restoration (see Figure 12-1). No losses would occur from Suisun Marsh
4 restoration. These ROAs support a mix of riparian vegetation types, including valley oak stands,
5 extensive willow and cottonwood stringers along waterways, and areas of scrub vegetation
6 dominated by blackberry. These areas are considered of low to moderate habitat value (BDCP
7 Chapter 5, Section 5.4.5). The actual loss of riparian habitat to marsh restoration would be
8 expected to be smaller than predicted by use of the theoretical footprint. As marsh restoration
9 projects were identified and planned, sites could be selected that avoid riparian areas as much
10 as possible.
11
- 12 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
13 would permanently remove 43 acres and temporarily remove 35 acres of valley/foothill
14 riparian natural community. The construction-related losses would be considered a permanent
15 removal of the habitats directly affected. These losses would be expected to occur along the San
16 Joaquin River and other major waterways in CZ 7 (see Figure 12-1). This activity is scheduled to
17 start following construction of water conveyance facilities, which is expected to take 10 years.
- 18 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
19 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
20 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
21 activity would occur along waterway margins where riparian habitat stringers exist, including
22 levees and channel banks. The improvements would occur within the study area on sections of
23 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 24 • *CM7 Riparian Natural Community Restoration*: The valley/foothill riparian natural community
25 would be restored primarily in association with the tidal (CM4) and floodplain (CM5)
26 restoration and channel margin enhancements. Following community-specific goals and
27 objectives in the Plan, a total of 5,000 acres of this community would be restored (Objective
28 VFRNC1.1) and 750 acres would be protected over the life of the Plan. Approximately 800 acres
29 would be restored and the entire 750 acres would be protected (Objective VFRNC1.2) during the
30 first 10 years of Plan implementation. Riparian restoration and protection would be focused in
31 CZs 4 and 7 (Objective VFRNC2.3), with a goal of adding a 500-acre portion of the restoration in
32 one or the other of these zones. A variety of successional stages would also be sought to benefit
33 the variety of sensitive plant and animal species that rely on this natural community in the study
34 area (Objective VFRNC2.4).

35 The following paragraphs summarize the combined effects discussed above and describe other
36 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
37 also included.

38 ***Near-Term Timeframe***

39 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would
40 affect the valley/foothill riparian natural community through CM1 construction losses (40 acres
41 permanent and 86 acres temporary) and the CM2 construction losses (89 acres permanent and 88
42 acres temporary). The natural community would be lost primarily along the western bank of the
43 Sacramento River at intake sites, along the western canal route in the northern and western Delta
44 areas, and in the northern Yolo Bypass. Approximately 298 acres of the inundation and

1 construction-related loss from CM4 would occur during the near-term throughout the ROAs mapped
2 in Figure 12-1.

3 The construction losses of this special-status natural community would represent an adverse effect
4 if they were not offset by avoidance and minimization measures and protection/restoration actions
5 associated with BDCP conservation components. Loss of valley/foothill riparian natural community
6 would be considered a loss in acreage of a sensitive natural community, and could be considered a
7 loss of wetlands as defined by Section 404 of the CWA. As indicated above, most of the losses would
8 be in small patches or narrow strips along waterways, with limited structural complexity. However,
9 the restoration of 800 acres and protection (including significant enhancement) of 750 acres of
10 valley/foothill riparian natural community as part of CM7 and CM3 during the first 10 years of
11 Alternative 1C implementation would minimize this near-term loss, avoiding an adverse effect. At
12 least 400 acres of the protection is planned for the first 5 years of Alternative 1C implementation.
13 The restoration areas would be large areas providing connectivity with existing riparian habitats
14 and would include a variety of trees and shrubs to produce structural complexity. Typical project-
15 level mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 601 acres of
16 protection and 601 acres of restoration would be needed to offset (i.e., mitigate) the 601 acres of
17 loss (the combination of permanent and temporary losses in the near-term listed in Table 12-1C-4).
18 The combination of the two approaches (protection and restoration) is designed to avoid a temporal
19 lag in the value of riparian habitat available to sensitive species.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
21 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
22 *Barge Operation Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*, and
23 *AMM18 Swainson's Hawk*. All of these AMMs include elements that avoid or minimize the risk of
24 affecting habitats at work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
25 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
26 *AMMs, and CMs*, of the Final EIR/EIS.

27 **Late Long-Term Timeframe**

28 Implementation of Alternative 1C as a whole would result in approximately 5% losses of
29 valley/foothill riparian community in the study area. These losses (724 acres of permanent and 209
30 acres of temporary loss) would be associated with construction of the water conveyance facilities
31 (CM1), construction of Yolo Bypass fish improvements (CM2), and inundation during tidal marsh
32 restoration (CM4). Inundation losses would occur during the course of the Plan's restoration
33 activities at various tidal restoration sites throughout the study area. By the end of the Plan
34 timeframe, a total of 5,000 acres of this natural community would be restored and 750 acres would
35 be protected (CM7 and CM3, respectively). The restoration would occur primarily in CZs 4 and 7, in
36 the Cosumnes/Mokelumne and South Delta ROAs (see Figure 12-1).

37 **NEPA Effects:** The restoration of 800 acres and protection (including significant enhancement) of
38 750 acres of valley/foothill riparian natural community as part of CM7 and CM3 during the first 10
39 years of Alternative 1C implementation would minimize the near-term loss of this community,
40 avoiding any adverse effect. Because of the Plan's commitment to restoration of 5,000 acres and
41 protection of 750 acres of valley/foothill riparian natural community during the course of the Plan,
42 Alternative 1C would not result in a net long-term reduction in the acreage of a sensitive natural
43 community; the effect would be beneficial.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Alternative 1C would result in the near-term loss of approximately 601 acres of valley/foothill
4 riparian natural community due to construction of the water conveyance facilities (CM1) and fish
5 passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The natural
6 community would be lost primarily along the western bank of the Sacramento River at intake sites,
7 along the western canal route in the northern and western Delta areas, and within the northern
8 section of the Yolo Bypass, while inundation losses would occur at various tidal restoration sites
9 throughout the study area. The construction losses would be spread across a 10-year near-term
10 timeframe. These losses would be minimized by planned restoration of 800 acres (CM7) and
11 protection (including significant enhancement) of 750 acres (CM3) of valley/foothill riparian natural
12 community scheduled for the first 10 years of Alternative 1C implementation. At least 400 acres of
13 the protection is planned for the first 5 years of Alternative 1C implementation. AMM1, AMM2,
14 AMM6, AMM7, AMM10 and AMM18 would also be implemented to minimize impacts. Because of
15 these near-term restoration and protection activities and AMMs, impacts would be less than
16 significant. Typical project-level mitigation ratios (1:1 for protection and 1:1 for restoration) would
17 indicate that 601 acres of protection and 601 acres of restoration would be needed to offset (i.e.,
18 mitigate) the 601 acres of loss. The combination of the two approaches (protection and restoration)
19 is designed to avoid a temporal lag in the value of riparian habitat available to sensitive species. The
20 restoration would be initiated at the beginning of implementation to minimize any time lag in the
21 availability of this habitat to special-status species, and would result in a net gain in acreage of this
22 sensitive natural community.

23 **Late Long-Term Timeframe**

24 At the end of the Plan period, 933 acres of valley/foothill riparian natural community would be
25 permanently or temporarily removed by conservation actions, 5,000 acres would be restored and
26 750 acres would be protected. There would be no net permanent reduction in the acreage of this
27 sensitive natural community within the study area. Therefore, Alternative 1C would not have a
28 substantial adverse effect on this natural community; the impact on the valley/foothill riparian
29 natural community would be beneficial.

30 **Impact BIO-10: Increased Frequency and Duration of Periodic Inundation of Valley/Foothill**
31 **Riparian Natural Community**

32 Two Alternative 1C conservation measures would modify the inundation/flooding regimes of both
33 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
34 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
35 of valley/foothill riparian natural community at scattered locations, while CM5 would expose this
36 community to additional flooding as channel margins are modified and levees are set back to
37 improve fish habitat along some of the major rivers and waterways of the study area.

- 38 • *CM2 Yolo Bypass Fisheries Enhancement:* Operation of the Yolo Bypass under Alternative 1C
39 would result in an increase in the frequency and duration of inundation of 51–92 acres of
40 valley/foothill riparian natural community. The area more frequently inundated would vary
41 with the flows that would be passed through the newly constructed notch in the Fremont Weir.
42 The 51 acres would be created by a notch flow of 8,000 cfs and the 92 acres would be created by
43 a notch flow of 4,000 cfs. The methods used to estimate these inundation acreages are described

1 in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife and Plants*. These increased flow
2 conditions would be expected to occur in no more than 30% of all years (see BDCP Chapter 5,
3 Section 5.4.1.2). The valley/foothill riparian community occurs throughout the bypass, including
4 a large acreage just below Fremont Weir in the north end of the bypass. There are other riparian
5 habitat areas on Liberty Island, and, to a lesser extent, along the eastern and western edges of
6 the bypass, including along the Tule Canal/Toe Drain, the west side channels and the
7 Sacramento Bypass. The anticipated change in management of flows in the Yolo Bypass includes
8 more frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in
9 some years, later releases into the bypass in spring months (April and May). The modification of
10 periodic inundation events would not adversely affect riparian habitats, as they have persisted
11 under similar high flows and extended inundation periods in the Yolo Bypass. The effects of this
12 inundation on wildlife and plant species are described in detail in later sections of this chapter.

- 13 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
14 increase in the frequency and duration of inundation of 266 acres of valley/foothill riparian
15 habitats. Specific locations for this restoration activity have not been identified, but they would
16 likely be focused in the south Delta area, along the major rivers and Delta channels in CZ 7 (see
17 Figure 12-1). The reconnection of riparian vegetation to periodic stream flooding events would
18 be beneficial to the ecological function of this natural community, especially in the germination
19 and establishment of native riparian plants as flood scour increases.

20 In summary, from 317 to 368 acres of valley/foothill riparian community in the study area would be
21 subjected to more frequent inundation as a result of implementing two Alternative 1C conservation
22 measures (CM2 and CM5). The valley/foothill riparian community is conditioned to and benefits
23 from periodic inundation; therefore, periodic inundation would not result in a net permanent
24 reduction in the acreage of this community in the study area. The increased inundation would create
25 a beneficial effect on the community as it relates to germination and establishment of native riparian
26 plants.

27 **NEPA Effects:** Increasing periodic inundation of valley/foothill riparian natural community in the
28 Yolo Bypass and along south Delta waterways would have a beneficial effect on the community.

29 **CEQA Conclusion:** An estimated 317 to 368 acres of valley/foothill riparian community in the study
30 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5
31 under Alternative 1C. The valley/foothill riparian community is conditioned to and benefits from
32 periodic inundation; therefore, periodic inundation would not result in a net permanent reduction in
33 the acreage of this community in the study area. Increasing periodic inundation of valley/foothill
34 riparian natural community in the Yolo Bypass and along south Delta waterways would have a
35 beneficial impact on the community.

36 **Impact BIO-11: Modification of Valley/Foothill Riparian Natural Community from Ongoing** 37 **Operation, Maintenance and Management Activities**

38 Once the physical facilities associated with Alternative 1C are constructed and the stream flow
39 regime associated with changed water management is in effect, there would be new ongoing and
40 periodic actions associated with operation, maintenance and management of the BDCP facilities and
41 conservation lands that could affect valley/foothill riparian natural community in the study area.
42 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento
43 River flows in the north Delta, reduced diversions from south Delta channels, and recreational use of
44 reserve areas. These actions are associated with CM1 and CM11 (see Impact BIO-10 for effects

1 associated with CM2). The periodic actions would involve access road and conveyance facility
2 repair, vegetation management at the various water conveyance facilities and habitat restoration
3 sites (CM11), levee and canal repair and replacement of levee armoring, channel dredging, and
4 habitat enhancement in accordance with natural community management plans. The potential
5 effects of these actions are described below.

- 6 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
7 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect
8 valley/foothill riparian natural community. The anticipated water levels over time with
9 Alternative 1C, as compared with no action, would be slightly lower in the October to May
10 timeframe. The small changes in frequency of higher water levels in these lakes would not
11 substantially reduce the small patches of riparian vegetation that occupy the upper fringes of
12 the reservoir pools. Changes in releases that would influence downstream river flows are
13 discussed below.
- 14 • *Modified river flows upstream of and within the study area and reduced diversions from south*
15 *Delta channels.* Changes in releases from reservoirs upstream of the study area and their
16 resultant changes in flows in the Sacramento, American and Feather Rivers (associated with
17 Operational Scenario A) would not be expected to result in the permanent reduction in acreage
18 of valley/foothill riparian natural community along these waterways. There is no evidence that
19 flow levels in the upstream rivers would change such that the acreage of this community would
20 be reduced on a permanent basis. Riparian habitats along the rivers of the Sacramento Valley
21 have historically been exposed to significant variations in river stage. Based on modeling
22 conducted for the BDCP (see Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*),
23 flow levels in these upstream rivers could be reduced by as much as 19% in the July to
24 November time frame when compared to No Action, while flow levels in the February to May
25 time frame could increase as much as 48% with implementation of Alternative 1C. Similarly,
26 increased diversions of Sacramento River flows in the north Delta would not be expected to
27 result in a permanent reduction in valley/foothill riparian community downstream of these
28 diversions, even though river flows are modeled to be reduced by 11–27% compared with No
29 Action, depending on month and water-year type (see Section 11C.4 in Appendix 11C). Reduced
30 diversions from the south Delta channels would not create a reduction in this natural
31 community.

32 The periodic changes in flows in the Sacramento River, Feather River, and American River
33 associated with modified reservoir operations, and the increased diversion of Sacramento River
34 flows at north Delta intakes associated with Alternative 1C would affect salinity, water
35 temperature, dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in
36 these rivers and Delta waterways. These changes are discussed in detail in Chapter 8, *Water*
37 *Quality*. Potentially substantial increases in electrical conductivity (salinity) are predicted for the
38 west Delta and Suisun Marsh as a result of these changed water operations. These salinity
39 changes may alter the plant composition of riparian habitats along the lower Sacramento and
40 San Joaquin Rivers and west Delta islands. The severity and extent of these salinity changes
41 would be complicated by anticipated sea level rise and the effects of downstream tidal
42 restoration over the life of the Plan. There is the potential that some valley/foothill riparian
43 natural community may be degraded immediately adjacent to river channels. The riparian
44 communities in the west Delta are dominated by willows, cottonwood and mixed brambles.
45 These potential changes are not expected to result in a significant reduction in the acreage and
46 value of valley/foothill riparian natural community in the study area.

- 1 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
2 conveyance facilities and levees associated with the BDCP actions have the potential to require
3 removal of adjacent vegetation and could entail earth and rock work in valley/foothill riparian
4 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering these
5 habitats. These activities would be subject to normal erosion, turbidity and runoff control
6 management practices, including those developed as part of *AMM2 Construction Best*
7 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
8 vegetation removal or earthwork adjacent to or within riparian habitats would require use of
9 sediment barriers, soil stabilization and revegetation of disturbed surfaces (*AMM10 Restoration*
10 *of Temporarily Affected Natural Communities*). Proper implementation of these measures would
11 avoid permanent adverse effects on this community.
- 12 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
13 treatment, would be a periodic activity associated with the long-term maintenance of water
14 conveyance facilities and restoration sites. Vegetation management is also the principal activity
15 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to
16 control nuisance vegetation could pose a long-term hazard to valley/foothill riparian natural
17 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of
18 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or
19 direct discharge of herbicides to riparian areas being treated for invasive species removal.
20 Environmental commitments and *AMM5 Spill Prevention, Containment and Countermeasure Plan*
21 have been made part of the BDCP to reduce hazards to humans and the environment from use of
22 various chemicals during maintenance activities, including the use of herbicides. These
23 commitments are described in Appendix 3B, including the commitment to prepare and
24 implement spill prevention, containment, and countermeasure plans and stormwater pollution
25 prevention plans. Best management practices, including control of drift and runoff from treated
26 areas, and use of herbicides approved for use in terrestrial environments would also reduce the
27 risk of affecting natural communities adjacent to water conveyance features and levees
28 associated with restoration activities.
- 29 • *Channel dredging.* Long-term operation of the Alternative 1C intakes on the Sacramento River
30 would include periodic dredging of sediments that might accumulate in front of intake screens.
31 The dredging could occur adjacent to valley/foothill riparian natural community. This activity
32 should not adversely affect riparian plants as long as dredging equipment is kept out of riparian
33 areas and dredge spoil is disposed of outside of riparian corridors.
- 34 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
35 communities within the Plan Area (CM11). For the valley/foothill riparian natural community, a
36 management plan would be prepared that specifies actions to improve the value of the habitats
37 for covered species. Actions would include control of invasive nonnative plant and animal
38 species, fire management, restrictions on vector control and application of herbicides, and
39 maintenance of infrastructure that would allow for movement through the community. The
40 enhancement efforts would improve the long-term value of this community for both special-
41 status and common species.
- 42 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to
43 valley/foothill riparian natural community in the reserve system. The activities could include
44 wildlife and plant viewing and hiking. *CM11 Natural Communities Enhancement and*
45 *Management* (BDCP Chapter 3, Section 3.4.11) describes this program and identifies applicable
46 restrictions on recreation that might adversely affect riparian habitat. The BDCP also includes an

1 avoidance and minimization measure (AMM37) that further dictates limits on recreation
2 activities that might affect this natural community. Priority would be given to use of existing
3 trails and roads, with some potential for new trails. Limited tree removal and limb trimming
4 could also be involved.

5 The various operations and maintenance activities described above could alter acreage of
6 valley/foothill riparian natural community in the study area through changes in flow patterns and
7 resultant changes in water quality. Activities could also introduce sediment and herbicides that
8 would reduce the value of this community to common and sensitive plant and wildlife species.
9 Recreation activities could encroach on riparian areas and require occasional tree removal. Other
10 periodic activities associated with the Plan, including management, protection and enhancement
11 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
12 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
13 community. While some of these activities could result in small changes in acreage, these changes
14 would be greatly offset by restoration and protection activities planned as part of *CM7 Riparian*
15 *Natural Community Restoration* and *CM3 Natural Communities Protection and Restoration*, or
16 minimized by implementation of AMM2, AMM4, AMM5, AMM10, and AMM37. The management
17 actions associated with levee repair, periodic dredging and control of invasive plant species would
18 also result in a long-term benefit to the species associated with riparian habitats by improving water
19 movement in adjacent waterways and by eliminating competitive, invasive species of plants.

20 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
21 implementation of Alternative 1C would not result in a net permanent reduction in valley/foothill
22 riparian natural community within the study area. Therefore, there would be no adverse effect on
23 this community.

24 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would
25 have the potential to create minor changes in total acreage of valley/foothill riparian natural
26 community in the study area, and could create temporary increases in turbidity and sedimentation.
27 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
28 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10 and AMM37
29 would minimize these impacts, and other operations and maintenance activities, including
30 management, protection and enhancement actions associated with *CM3 Natural Communities*
31 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
32 create positive effects, including reduced competition from invasive, nonnative plants in these
33 habitats. Long-term restoration and protection activities associated with *CM7 Riparian Natural*
34 *Community Restoration* and *CM3 Natural Communities Protection and Restoration* would expand this
35 natural community in the study area. Ongoing operation, maintenance and management activities
36 would not result in a net permanent reduction in this sensitive natural community within the study
37 area. Therefore, there would be a less-than-significant impact on the valley/foothill riparian natural
38 community.

39 **Nontidal Perennial Aquatic**

40 Construction, operation, maintenance and management associated with the conservation
41 components of Alternative 1C would have no long-term adverse effects on the habitats associated
42 with the nontidal perennial aquatic natural community. Initial development and construction of
43 CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this
44 community (see Table 12-1C-5). Full implementation of Alternative 1C would also include the

1 following conservation actions over the term of the BDCP to benefit the nontidal perennial aquatic
2 natural community.

- 3 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
4 and nontidal freshwater perennial emergent wetland natural communities (Objective
5 NFEW/NPANC1.1, associated with CM10).

6 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
7 3.3 that would improve the value of nontidal perennial aquatic natural community for terrestrial
8 species. As explained below, with the restoration and enhancement of these amounts of habitat, in
9 addition to implementation of AMMs, impacts on this natural community would not be adverse for
10 NEPA purposes and would be less than significant for CEQA purposes.

11 **Table 12-1C-5. Changes in Nontidal Perennial Aquatic Natural Community Associated with**
12 **Alternative 1C (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	22	22	21	21	0	0
CM2	24	24	12	12	50-77	0
CM4	34	189	0	0	0	0
CM5	0	28	0	16	0	25
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	80	263	33	49	50-77	25

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

13
14 **Impact BIO-12: Changes in Nontidal Perennial Aquatic Natural Community as a Result of**
15 **Implementing BDCP Conservation Measures**

16 Construction and land grading activities that would accompany the implementation of CM1, CM2,
17 CM4, CM5, and CM6 under Alternative 1C would permanently eliminate an estimated 263 acres and
18 temporarily remove 49 acres of nontidal perennial aquatic natural community in the study area.
19 These modifications represent approximately 6% of the 5,567 acres of the community that is
20 mapped in the study area. Approximately 36% (113 acres) of the permanent and temporary losses
21 would happen during the first 10 years of Alternative 1C implementation, as water conveyance
22 facilities are constructed and habitat restoration is initiated. Natural communities restoration would
23 add 400 acres of nontidal marsh (CM10) during the same period, which would expand the area of

1 that habitat and offset the losses. The nontidal marsh restoration would include a mosaic of nontidal
2 perennial aquatic and nontidal freshwater perennial emergent wetland natural communities, as
3 specified in Objective NFEW/NPANC1.1. The BDCP beneficial effects analysis (BDCP Chapter 5,
4 Section 5.4.6.2) indicates that implementation of Alternative 4 would result in the restoration of
5 1,200 acres of nontidal marsh, and that the restoration would occur in blocks that would be
6 contiguous with the Plan's larger reserve system. The nontidal marsh would be restored in the
7 vicinity of giant garter snake subpopulations identified in the recovery plan for this species (U.S.
8 Fish and Wildlife Service 1998). The same conservation actions would be undertaken with
9 Alternative 1C.

10 The individual effects of each relevant conservation measure are addressed below. A summary
11 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
12 conservation measure discussions.

- 13 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1C water conveyance
14 facilities would permanently remove 22 acres and temporarily remove 21 acres of nontidal
15 perennial aquatic community. The permanent losses would be created by construction of the
16 west canal where it crosses a number of north, west and south Delta waterways, including
17 Winchester Lake just west of the Sacramento River, Medora Lake just north of Miner Slough and
18 east of the deep water ship channel, the end of Duck Slough at Miner Slough, a small canal just
19 south of Clifton Court Forebay, and the northern ends of the California Aqueduct and Delta
20 Mendota Canal. Temporary losses would be created by siphon construction at Duck Slough just
21 north of North Courtland Road and at Miner Slough just east of the deep water ship channel, and
22 by control structure construction in the Delta Mendota Canal, (see Terrestrial Biology
23 Mapbook). These losses would take place during the near-term construction period.
- 24 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
25 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
26 stilling basin improvements, west side channels modifications, Putah Creek realignment
27 activities, and Sacramento Weir and Tule Canal improvements. All of these activities could
28 involve excavation and grading in nontidal perennial aquatic areas to improve passage of fish
29 through the bypasses. Based on hypothetical construction footprints, a total of 24 acres could be
30 permanently lost and another 12 acres could be temporarily removed. This activity would occur
31 primarily in the near-term timeframe.
- 32 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
33 footprints, implementation of CM4 would permanently change to tidally influenced inundation
34 or remove 189 acres of nontidal perennial aquatic community. These losses would be expected
35 to occur primarily in the Cache Slough and Cosumnes/Mokelumne ROAs (see Figure 12-1). An
36 estimated 1,200 acres of nontidal marsh would be restored. Approximately 400 acres of the
37 restoration (CM10) would happen during the first 10 years of Alternative 1C implementation,
38 which would coincide with the timeframe of water conveyance facilities construction and early
39 restoration activities. The remaining restoration would be spread over the following 30 years.
40 Nontidal natural communities restoration is expected to be focused in CZs 2, 4 and/or 5 in
41 Figure 12-1.
- 42 • *CM5 Seasonally Inundated Floodplain Restoration*: Based on theoretical footprints, floodplain
43 restoration levee construction would permanently remove 28 acres and temporarily remove 16
44 acres of nontidal perennial aquatic habitat. The construction-related losses would be considered
45 a permanent removal of the nontidal perennial aquatic habitats. It is expected that floodplain

1 restoration would be focused on the south part of the Plan Area, in CZ 7. Floodplain restoration
2 along the southern Delta rivers would improve connectivity for a variety of species that rely on
3 aquatic and riparian habitats. The regional and Plan Area landscape linkages along the San
4 Joaquin River, Middle River and Old River are included in Figure 12-2. This activity is scheduled
5 to start following construction of water conveyance facilities, which is expected to take 10 years.

- 6 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
7 of small amounts of nontidal perennial aquatic habitat along 20 miles of river and sloughs. The
8 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity
9 would be on the edges of tidal perennial aquatic habitat, including levees and channel banks.
10 Nontidal marsh adjacent to these tidal areas could be affected. Channel margin would be
11 enhanced within the study area on sections of the Sacramento, San Joaquin and Mokelumne
12 Rivers, and along Steamboat and Sutter Sloughs.

13 The following paragraphs summarize the combined effects discussed above and describe other
14 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
15 also included.

16 ***Near-Term Timeframe***

17 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would
18 affect the nontidal perennial aquatic community through CM1 construction losses (22 acres
19 permanent and 21 acres temporary) and the CM2 construction losses (24 acres permanent and 12
20 acres temporary). The natural community would be lost at scattered locations along the west canal
21 construction corridor in the north, west and south Delta and along the west side channels and
22 channels associated with the Sacramento and Lisbon Weirs in the Yolo Bypass. Approximately 34
23 acres of the inundation and construction-related losses from CM4 would occur during the near-term
24 throughout several of the ROAs mapped in Figure 12-1.

25 The construction losses of this special-status natural community would represent an adverse effect
26 if they were not offset by avoidance and minimization measures and restoration actions associated
27 with BDCP conservation components. Loss of nontidal perennial aquatic natural community would
28 be considered both a loss in acreage of a sensitive natural community and a loss of waters of the
29 United States as defined by Section 404 of the CWA. However, creating 400 acres of nontidal marsh
30 as part of CM10 during the first 10 years of Alternative 1C implementation would offset this near-
31 term loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for restoration and
32 1:1 for protection) would indicate 113 acres of restoration and 113 acres of protection would be
33 needed to offset (i.e., mitigate) the 113 acres of loss. While the Plan does not include protection of
34 nontidal perennial aquatic habitat, it includes in excess of the typical 1:1 restoration acreage (which
35 includes protection in perpetuity), and therefore compensates for the lack of protection.

36 The Plan also includes commitments to implement *AMM1 Worker Training Awareness*, *AMM2*
37 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
38 *Barge Operation Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
39 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
40 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
41 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 Implementation of Alternative 1C as a whole would result in relatively minor (5%) losses of nontidal
3 perennial aquatic community in the study area. These losses (272 acres of permanent and 46 acres
4 of temporary loss) would be largely associated with construction of the water conveyance facilities
5 (CM1), construction of Yolo Bypass fish improvements (CM2), change to tidally influenced
6 inundation during tidal marsh restoration (CM4), and floodplain restoration (CM5). The changes to
7 tidally influenced inundation would occur during the course of the CM4 restoration activities at
8 various tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of
9 1,200 acres of nontidal marsh would be restored over a wide region of the study area, including
10 within the Cosumnes/Mokelumne, Cache Slough, and South Delta ROAs (see Figure 12-1).

11 **NEPA Effects:** During the first 10 years of implementing Alternative 1C, creating 400 acres of
12 nontidal marsh as part of CM10 would offset the construction-related and inundation losses of 113
13 acres of nontidal perennial aquatic natural community. There would be no adverse effect. During the
14 full duration of Plan implementation, Alternative 1C would not result in a net reduction in the
15 acreage of a sensitive natural community; there would be an expansion of nontidal marsh and the
16 effect would be beneficial.

17 **CEQA Conclusion:**

18 **Near-Term Timeframe**

19 Alternative 1C would result in the loss of approximately 113 acres of nontidal perennial aquatic
20 natural community due to construction of the water conveyance facilities (CM1) and fish passage
21 improvements (CM2), and change to tidally influenced inundation during tidal marsh restoration
22 (CM4). The natural community would be lost at scattered locations along the western canal
23 construction corridor in the north, west and south Delta and along the west side channels and
24 channels associated with the Sacramento and Lisbon Weirs in the Yolo Bypass. The losses would be
25 spread across a 10-year near-term timeframe. These losses would be offset by planned restoration
26 of 400 acres of nontidal perennial aquatic natural community scheduled for the first 10 years of
27 Alternative 1C implementation (CM10). Also, AMM1, AMM2, AMM6, AMM7, and AMM10 would be
28 implemented to minimize impacts. Because of these offsetting near-term restoration activities and
29 AMMs, impacts would be less than significant. Typical project-level mitigation ratios (1:1 for
30 restoration and 1:1 for protection) would indicate that 113 acres of restoration and 113 acres of
31 protection would be needed to offset (i.e., mitigate) the 113 acres of loss. While the Plan does not
32 include protection in the near-term, it includes well in excess of the typical 1:1 restoration acreage
33 (which includes protection in perpetuity), and therefore compensates for the lack of protection. The
34 restoration and protection would be initiated at the beginning of Alternative 1C implementation to
35 minimize any time lag in the availability of this habitat to special-status species, and would result in
36 a net gain in acreage of this sensitive natural community.

37 **Late Long-Term Timeframe**

38 At the end of the Plan period, 312 acres of the natural community would be removed and 1,200
39 acres of nontidal marsh would be restored. The nontidal marsh would consist of a mosaic of nontidal
40 perennial aquatic and nontidal freshwater perennial emergent wetland natural communities. There
41 would be no net permanent reduction in the acreage of this sensitive natural community within the
42 study area. Therefore, Alternative 1C would not have a substantial adverse effect on this natural
43 community; the impact on the nontidal perennial aquatic natural community would be beneficial.

1 **Impact BIO-13: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
2 **Nontidal Perennial Aquatic Natural Community**

3 Two Alternative 1C conservation measures would modify the inundation/flooding regimes of both
4 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
5 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
6 of nontidal perennial aquatic natural community on small acreages, while CM5 would expose this
7 community to additional flooding as channel margins are modified and levees are set back to
8 improve fish habitat along some of the major rivers and waterways throughout the study area.

- 9
- 10 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1C
11 would result in an increase in the frequency, magnitude and duration of inundation of 50–77
12 acres of nontidal perennial aquatic natural community. The methods used to estimate these
13 inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*
14 *Wildlife, and Plants*. The area more frequently affected by inundation would vary with the flow
15 volume that would pass through the newly constructed notch in the Fremont Weir. The 50-acre
16 increase in inundation would be associated with a notch flow of 3,000 cubic feet per second
17 (cfs), and the 77-acre increase would result from a notch flow of 6,000 cfs. Plan-related
18 increases in flow through Fremont Weir would be expected in 30% of the years. This community
19 occurs in small stringers and patches throughout the bypass, including along the Tule Canal/Toe
20 Drain, the western channels north of Interstate 80, and below the Fremont and Sacramento
21 Weirs. The anticipated change in management of flows in the Yolo Bypass includes more
22 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some
23 years, later releases into the bypass in spring months (April and May). The modification of
24 periodic inundation events would not adversely affect the ecological function of this natural
25 community and would not substantially modify its value for special-status or common wildlife
26 species. Nontidal perennial aquatic habitats in the Yolo Bypass have developed under a long-
27 term regime of periodic inundation events. The extended inundation would be designed to
28 expand foraging and spawning habitat for Delta fishes. The effects of this inundation on wildlife
29 and plant species are described in detail in later sections of this chapter.
 - 30 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
31 increase in the frequency and duration of inundation of an estimated 25 acres of nontidal
32 perennial aquatic habitat. Specific locations for this restoration activity have not been identified,
33 but they would likely be focused in the south Delta area, along the major rivers and Delta
34 channels. The reconnection of these wetlands to stream flooding events would be beneficial to
35 the ecological function of nontidal perennial aquatic habitats, especially as they relate to BDCP
36 target aquatic species. The periodic flooding may also encourage the germination of nontidal
marsh vegetation.

37 In summary, 75–102 acres of nontidal perennial aquatic community in the study area would be
38 subjected to more frequent inundation as a result of implementing two Alternative 1C conservation
39 measures (CM2 and CM5). Nontidal perennial aquatic community in the Yolo Bypass has developed
40 under a long-term regime of periodic inundation events and inundation along expanded river
41 floodplains would be infrequent.

42 **NEPA Effects:** The increased inundation of nontidal perennial aquatic natural community in the Yolo
43 Bypass and along south Delta waterways would not reduce the acreage of this natural community
44 and could encourage germination of aquatic vegetation. This increased inundation would not be
45 adverse.

1 **CEQA Conclusion:** An estimated 75–102 acres of nontidal perennial aquatic community in the study
 2 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5
 3 under Alternative 1C. Nontidal perennial aquatic community would not be significantly impacted
 4 because its habitats in the Yolo Bypass have developed under a long-term regime of periodic
 5 inundation events and inundation along expanded river floodplains would be infrequent. The
 6 periodic inundation would not result in a net permanent reduction in the acreage of this community
 7 in the study area. Therefore, there would be no substantial adverse effect on the community. The
 8 impact would be less than significant.

9 **Impact BIO-14: Modification of Nontidal Perennial Aquatic Natural Community from Ongoing**
 10 **Operation, Maintenance and Management Activities**

11 Once the physical facilities associated with Alternative 1C are constructed and the stream flow
 12 regime associated with changed water management is in effect, there would be new ongoing and
 13 periodic actions associated with operation, maintenance and management of the BDCP facilities and
 14 conservation lands that could affect nontidal perennial aquatic natural community in the study area.
 15 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento
 16 River flows in the north Delta, and reduced diversions from south Delta channels. These actions
 17 would be associated with CM1 (see Impact BIO-13 for effects associated with CM2). The periodic
 18 actions would involve access road and conveyance facility repair, vegetation management at the
 19 various water conveyance facilities and habitat restoration sites (CM11), levee and canal repair and
 20 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with
 21 natural community management plans. The potential effects of these actions are described below.

- 22 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
 23 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would affect
 24 nontidal perennial aquatic natural community, in the form of the reservoir pools. The
 25 Alternative 1C operations scheme (Operational Scenario A) would alter the surface elevations of
 26 these reservoir pools as described in Chapter 6, *Surface Water*. These fluctuations would occur
 27 within historic ranges and would not adversely affect the natural community. Changes in
 28 releases that would influence downstream river flows are discussed below.
- 29 • *Modified river flows upstream of and within the study area and reduced diversions from south*
 30 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
 31 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
 32 channels (associated with Operational Scenario A) would not result in the permanent reduction
 33 in acreage of the nontidal perennial aquatic natural community in the study area. Flow levels in
 34 the upstream rivers would not change such that the acreage of nontidal perennial aquatic
 35 community would be reduced on a permanent basis. Some minor increases and some decreases
 36 would be expected to occur along the major rivers during some seasons and in some water-year
 37 types, but there would be no permanent loss. Similarly, increased diversions of Sacramento
 38 River flows in the north Delta would not result in a permanent reduction in nontidal perennial
 39 aquatic community downstream of these diversions. Nontidal wetlands below the diversions are
 40 not directly connected to the rivers, as this reach of the river is tidally influenced. Reduced
 41 diversions from the south Delta channels would not create a reduction in this natural
 42 community.
- 43 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
 44 conveyance facilities and levees associated with the BDCP actions have the potential to require
 45 removal of adjacent vegetation and could entail earth and rock work in nontidal perennial

1 aquatic habitats. This activity could lead to increased soil erosion, turbidity and runoff entering
2 nontidal perennial aquatic habitats. These activities would be subject to normal erosion,
3 turbidity and runoff control management practices, including those developed as part of *AMM2*
4 *Construction Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment*
5 *Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic habitats would
6 require use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed
7 surfaces. Proper implementation of these measures would avoid permanent adverse effects on
8 this community.

- 9 • *Vegetation management*. Vegetation management, in the form of physical removal and chemical
10 treatment, would be a periodic activity associated with the long-term maintenance of water
11 conveyance facilities and restoration sites. Vegetation management is also the principal activity
12 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to
13 control nuisance vegetation could pose a long-term hazard to nontidal perennial aquatic natural
14 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of
15 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or
16 direct discharge of herbicides to nontidal perennial aquatic areas being treated for invasive
17 species removal. Environmental commitments and *AMM5 Spill Prevention, Containment and*
18 *Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and the
19 environment from use of various chemicals during maintenance activities, including the use of
20 herbicides. These commitments are described in Appendix 3B, including the commitment to
21 prepare and implement spill prevention, containment, and countermeasure plans and
22 stormwater pollution prevention plans. Best management practices, including control of drift
23 and runoff from treated areas, and use of herbicides approved for use in aquatic environments
24 would also reduce the risk of affecting natural communities adjacent to water conveyance
25 features and levees associated with restoration activities.

26 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
27 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
28 The treatment activities would be conducted in concert with the California Department of
29 Boating and Waterways' invasive species removal program. Eliminating large stands of water
30 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
31 by removing cover for nonnative predators, improving water flow and removing barriers to
32 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
33 benefit terrestrial species that use tidal and nontidal perennial aquatic natural community for
34 movement corridors and for foraging. Vegetation management effects on individual species are
35 discussed in the species sections on following pages.

- 36 • *Habitat enhancement*. The BDCP includes a long-term management element for the natural
37 communities within the Plan Area (CM11). For nontidal perennial aquatic natural community, a
38 management plan would be prepared that specifies actions to improve the value of the habitats
39 for covered species. Actions would include control of invasive nonnative plant and animal
40 species, fire management, restrictions on vector control and application of herbicides, and
41 maintenance of infrastructure that would allow for movement through the community. The
42 enhancement efforts would improve the long-term value of this community for both special-
43 status and common species.

44 The various operations and maintenance activities described above could alter acreage of nontidal
45 perennial aquatic natural community in the study area through changes in flow patterns and
46 changes in periodic inundation of this community. Activities could also introduce sediment and

1 herbicides that would reduce the value of this community to common and sensitive plant and
2 wildlife species. Other periodic activities associated with the Plan, including management,
3 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
4 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
5 enhance the value of the community. While some of these activities could result in small changes in
6 acreage, these changes would be greatly offset by restoration activities planned as part of *CM4 Tidal*
7 *Natural Communities Restoration* and protection actions associated with *CM3 Natural Communities*
8 *Protection and Restoration*. The management actions associated with levee repair and control of
9 invasive plant species would also result in a long-term benefit to the species associated with
10 nontidal perennial aquatic habitats by improving water movement.

11 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net
12 permanent reduction in the nontidal perennial aquatic natural community within the study area.
13 Therefore, there would be no adverse effect on this natural community.

14 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would
15 have the potential to create minor changes in total acreage of nontidal perennial aquatic natural
16 community in the study area, and could create temporary increases in turbidity and sedimentation.
17 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
18 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize
19 these impacts, and other operations and maintenance activities, including management, protection
20 and enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
21 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
22 improved water movement in these habitats. Long-term restoration activities associated with *CM10*
23 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*
24 *Protection and Restoration* would expand this natural community in the study area. Ongoing
25 operation, maintenance and management activities would not result in a net permanent reduction in
26 this sensitive natural community within the study area. Therefore, there would be a less-than-
27 significant impact.

28 **Nontidal Freshwater Perennial Emergent Wetland**

29 Construction, operation, maintenance and management associated with the conservation
30 components of Alternative 1C would have no long-term adverse effects on the habitats associated
31 with the nontidal freshwater perennial emergent wetland natural community. Initial development
32 and construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary
33 removal of this community (see Table 12-1C-6). Full implementation of Alternative 1C would also
34 include the following conservation actions over the term of the BDCP to benefit the nontidal
35 freshwater perennial emergent wetland natural community.

- 36 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
37 and nontidal freshwater perennial emergent wetland natural communities (Objective
38 NFEW/NPANC1.1, associated with CM10).
- 39 ● Protect and manage 50 acres of occupied or recently occupied tricolored blackbird nesting
40 habitat located within 5 miles of high-value foraging habitat in Conservation Zones 1, 2, 8 or 11.
41 Nesting habitat will be managed to provide young, lush stands of bulrush/cattail emergent
42 vegetation (Objective TRBL1.1).

1 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
 2 3.3 that would improve the value of nontidal freshwater perennial emergent wetland natural
 3 community for terrestrial species. As explained below, with the restoration and enhancement of
 4 these amounts of habitat, in addition to implementation of AMMs, impacts on this natural
 5 community would not be adverse for NEPA purposes and would be less than significant for CEQA
 6 purposes.

7 **Table 12-1C-6. Changes in Nontidal Freshwater Perennial Emergent Wetland Natural Community**
 8 **Associated with Alternative 1C (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	5	5	0	0
CM2	25	25	1	1	6-8	0
CM4	40	99	0	0	0	0
CM5	0	0	0	0	0	8
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	65	124	6	6	6-8	8

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

9

10 **Impact BIO-15: Changes in Nontidal Freshwater Perennial Emergent Wetland Natural**
 11 **Community as a Result of Implementing BDCP Conservation Measures**

12 Construction and land grading activities that would accompany the implementation of CM1, CM2,
 13 CM4, and CM6 would permanently eliminate an estimated 124 acres and temporarily remove 6
 14 acres of nontidal freshwater perennial emergent wetland natural community in the study area.
 15 These modifications represent approximately 9% of the 1,509 acres of the community that is
 16 mapped in the study area. Approximately 55% (71 acres) of the permanent and temporary losses
 17 would occur during the first 10 years of Alternative 1C implementation, as water conveyance
 18 facilities are constructed and habitat restoration is initiated. Natural communities restoration would
 19 add 400 acres (CM10) and natural communities protection would protect 25 acres (CM3) of nontidal
 20 marsh during the same period, which would expand the area of that habitat and offset the losses.
 21 The nontidal marsh restoration would include a mosaic of nontidal perennial aquatic and nontidal
 22 freshwater perennial emergent wetland natural communities, as specified in BDCP Objective
 23 NFEW/NPANC1.1 (BDCP Chapter 3, Table 3.3-2). The nontidal marsh protection would be designed
 24 to support tricolored blackbird populations in the study area. The BDCP beneficial effects analysis

1 (BDCP Chapter 5, Section 5.4.6.2) indicates that implementation of Alternative 4 would result in the
2 restoration of 1,200 acres of nontidal marsh. The restoration would occur in blocks that are
3 contiguous with the alternative's larger reserve system. The nontidal marsh would be restored in
4 the vicinity of giant garter snake subpopulations identified in the recovery plan for this species (U.S.
5 Fish and Wildlife Service 1998). The same conservation activities would be undertaken in
6 implementing Alternative 1C.

7 The individual effects of each relevant conservation measure are addressed below. A summary
8 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
9 conservation measure discussions.

- 10 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1C water conveyance
11 facilities would temporarily remove 5 acres of tidal freshwater perennial emergent wetland
12 community. The temporary losses would be the result of canal siphon construction across Rock
13 Slough near its junction with the Contra Costa Canal, and transmission corridor construction
14 along the tunnel alignment in the west and south Delta. (see Terrestrial Biology Mapbook).
15 These wetlands are extremely small and remote water bodies. These losses would take place
16 during the near-term construction period.
- 17 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
18 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
19 stilling basin improvements, west side channels and Tule Canal modifications, Putah Creek
20 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. Some of
21 these activities could involve excavation and grading in nontidal freshwater perennial emergent
22 wetland areas to improve passage of fish through the bypasses. Based on hypothetical
23 construction footprints, a total of 25 acres could be permanently lost and 1 acre could be
24 temporarily removed. These losses would most likely occur in the Tule Canal and west side
25 channels at the north end of the bypass. The habitat there includes narrow bands within these
26 side channels of the bypass and is isolated from other marsh or open water habitats. The narrow
27 bands are bordered by riparian habitats, primarily willows and cottonwoods. This activity
28 would occur in the near-term timeframe.
- 29 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration
30 footprints, implementation of CM4 would permanently inundate or remove 99 acres of nontidal
31 freshwater perennial emergent wetland community. These losses would be expected to occur
32 primarily in the Cache Slough ROA (see Figure 12-1). An estimated 1,200 acres of nontidal
33 marsh would be restored (CM10) and 50 acres would be protected (CM3) during tidal habitat
34 restoration. Approximately 400 acres of the restoration and 35 acres of the protection would
35 occur during the first 10 years of Alternative 1C implementation, which would coincide with the
36 timeframe of water conveyance facilities construction and early tidal marsh restoration. The
37 remaining restoration would be spread over the following 30 years. Nontidal marsh natural
38 communities restoration is expected to be focused in the vicinity of giant garter snake
39 populations in the eastern Delta and near the Yolo Bypass.
- 40 • *CM5 Seasonally Inundated Floodplain Restoration:* Based on theoretical footprints, floodplain
41 restoration levee construction would not affect nontidal freshwater perennial emergent wetland
42 natural community.
- 43 • *CM6 Channel Margin Enhancement:* Channel margin habitat enhancement could result in filling
44 of small amounts of nontidal freshwater perennial emergent wetland habitat along 20 miles of
45 river and sloughs. The extent of this loss cannot be quantified at this time, but the majority of the

1 enhancement activity would occur on the edges of tidal perennial aquatic habitat, including
2 levees and channel banks. Nontidal marsh adjacent to these tidal areas could be affected. The
3 improvements would occur within the study area on sections of the Sacramento, San Joaquin
4 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

- 5 • *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal
6 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic
7 and nontidal freshwater perennial emergent natural communities. This marsh restoration
8 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and
9 would be accompanied by adjacent grassland restoration or protection.

10 The following paragraphs summarize the combined effects discussed above and describe other
11 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
12 also included.

13 ***Near-Term Timeframe***

14 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would
15 affect the nontidal freshwater perennial emergent wetland community through CM1 construction
16 losses (5 acres temporary) and the CM2 construction losses (25 acres permanent and 1 acre
17 temporary). These losses would occur along the western canal and tunnel route at various locations,
18 and in the Yolo Bypass. Approximately 40 acres of the inundation and construction-related losses
19 from CM4 would occur in the near-term. These losses would occur primarily in the Cache Slough
20 ROA mapped in Figure 12-1.

21 The construction losses of this special-status natural community would represent an adverse effect
22 if they were not offset by avoidance and minimization measures and restoration actions associated
23 with BDCP conservation components. Loss of nontidal freshwater perennial emergent wetland
24 natural community would be considered both a loss in acreage of a sensitive natural community and
25 a loss of wetland as defined by Section 404 of the CWA. However, the combination of creating 400
26 acres and protecting 25 acres of nontidal perennial marsh as part of CM3 and CM10 during the first
27 10 years of Alternative 1C implementation would offset this near-term loss, avoiding any adverse
28 effect. Typical project-level mitigation ratios (1:1 for restoration and 1:1 for protection) would
29 indicate 71 acres of restoration and 71 acres of protection would be needed to offset (i.e., mitigate)
30 the 71 acres of loss. While the Plan includes just 25 acres of protection in the near-term, it includes
31 in excess of the typical 1:1 restoration acreage (which includes protection in perpetuity), and
32 therefore compensates for the shortfall in protection.

33 The Plan also includes commitments to implement *AMM1 Worker Training Awareness*, *AMM2*
34 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
35 *Barge Operation Plan* and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
36 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
37 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
38 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

39 ***Late Long-Term Timeframe***

40 Implementation of Alternative 1C as a whole would result in 9% losses of nontidal freshwater
41 perennial emergent wetland community in the study area. These losses (124 acres of permanent
42 and 6 acres of temporary loss) would be associated with construction of the water conveyance
43 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and inundation during tidal

1 marsh restoration (CM4). Inundation losses would occur during the course of the CM4 restoration
2 activities primarily at the Cache Slough ROA. By the end of the Plan timeframe, a total of 1,200 acres
3 of nontidal marsh would be restored and 50 acres would be protected. The restoration would occur
4 near giant garter snake occupied habitat in the eastern Delta and near Yolo Bypass, in CZs 2, 4 and 5,
5 and the protection would occur in CZ 1, 2, 8 or 11 to provide nesting habitat for tri-colored blackbird
6 (see Figure 12-1).

7 **NEPA Effects:** In the near-term, the combination of creating 400 acres and protecting 25 acres of
8 nontidal perennial marsh as part of CM3 and CM10 would offset the near-term losses associated
9 with construction of CM1, CM2 and CM4 facilities, avoiding any adverse effect. With 1,200 acres of
10 nontidal marsh restoration (BDP Objective NFEW/NPANC1.1) and 50 acres of protection (BDP
11 Objective TRBL1.1) included with full implementation of the Plan, Alternative 1C would not result in
12 a net long-term reduction in the acreage of a sensitive natural community; the effect would be
13 beneficial.

14 **CEQA Conclusion:**

15 **Near-Term Timeframe**

16 Alternative 1C would result in the loss of approximately 71 acres (the sum of the permanent and
17 temporary near-term losses in Table 12-1C-6) of nontidal freshwater perennial emergent wetland
18 natural community due to construction of the water conveyance facilities (CM1) and fish passage
19 improvements (CM2), and inundation during tidal marsh restoration (CM4). The construction losses
20 would occur along the western canal route in the west and south Delta, and in the Yolo Bypass.
21 Approximately 40 acres of the inundation and construction-related losses from CM4 would occur in
22 the near-term. These losses would occur primarily in the Cache Slough ROA mapped in Figure 12-1.

23 The losses would be spread across a 10-year near-term timeframe. These losses would be offset by
24 planned restoration of 400 acres and protection of 25 acres of nontidal marsh scheduled for the first
25 10 years of Alternative 1C implementation (CM3 and CM10). AMM1, AMM2, AMM6, AMM7, and
26 AMM10 would also be implemented to minimize impacts. Because of these offsetting near-term
27 restoration activities and AMMs, impacts would be less than significant. Typical project-level
28 mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 71 acres of
29 restoration and 71 acres of protection would be needed to offset (i.e., mitigate) the 71 acres of loss.
30 While the Plan includes just 35 acres of protection in the near-term, it includes in excess of the
31 typical 1:1 restoration acreage (which includes protection in perpetuity), and therefore
32 compensates for the shortfall in protection. The restoration and protection would be initiated at the
33 beginning of Alternative 1C implementation to minimize any time lag in the availability of this
34 habitat to special-status species, and would result in a net gain in acreage of this sensitive natural
35 community.

36 **Late Long-Term Timeframe**

37 At the end of the Plan period, 131 acres of the natural community would be removed, 1,200 acres of
38 nontidal marsh would be restored (BDP Objective NFEW/NPANC1.1), and 50 acres of nontidal
39 marsh would be protected (BDP Objective TRBL1.1). There would be no net permanent reduction
40 in the acreage of this sensitive natural community within the study area. Therefore, Alternative 1C
41 would not have a substantial adverse effect on this natural community; the impact would be
42 beneficial.

1 **Impact BIO-16: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
2 **Nontidal Freshwater Perennial Emergent Wetland Natural Community**

3 Two Alternative 1C conservation measures would modify the inundation/flooding regimes of both
4 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
5 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
6 of nontidal freshwater perennial emergent wetland natural community on small acreages, while
7 CM5 would expose this community to additional flooding as channel margins are modified and
8 levees are set back to improve fish habitat along some of the major rivers and waterways
9 throughout the study area.

- 10 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1C
11 would result in an increase in the frequency and duration of inundation of 6–8 acres of nontidal
12 freshwater perennial emergent wetland natural community. The methods used to estimate
13 these inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*
14 *Wildlife, and Plants*. The area more frequently affected by inundation would vary with the flow
15 volume that would pass through the newly constructed notch in the Fremont Weir. The 6-acre
16 increase in inundation would be associated with a notch flow of 1,000 cubic feet per second
17 (cfs), and the 8-acre increase would result from a notch flow of 6,000 cfs. Plan-related increases
18 in flow through Fremont Weir would be expected in 30% of the years. This community occurs in
19 small stringers and isolated patches along the Tule Canal and western channel in the north end
20 of the bypass. These areas are not connected to other adjacent marsh and open water habitats;
21 they are surrounded by riparian habitat, scoured grassland and agricultural lands. The
22 anticipated change in management of flows in the Yolo Bypass includes more frequent releases
23 in flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later
24 releases into the bypass in spring months (April and May). The modification of periodic
25 inundation events would not adversely affect the ecological function of this natural community
26 and would not substantially modify its value for special-status or common wildlife species.
27 Nontidal freshwater perennial emergent wetland plant species in the Yolo Bypass have
28 developed under a long-term regime of periodic inundation events. The extended inundation
29 would be designed to expand foraging and spawning habitat for Delta fishes. The effects of this
30 increased inundation on terrestrial wildlife and plant species are described in detail in later
31 sections of this chapter.
- 32 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
33 increase in the frequency and duration of inundation of an estimated 8 acres of nontidal
34 freshwater perennial emergent wetland habitat. Specific locations for this restoration activity
35 have not been identified, but they would likely be focused in the south Delta area, along the
36 major rivers and Delta channels. The reconnection of these wetlands to stream flooding events
37 would be beneficial to the ecological function of nontidal freshwater perennial emergent
38 wetland habitats as they relate to BDCP target aquatic species. The added exposure to
39 inundation could also encourage germination of nontidal marsh plant species. Foraging activity
40 and refuge sites would be expanded into areas currently unavailable or infrequently available to
41 some aquatic species.

42 In summary, 14–16 acres of nontidal freshwater emergent perennial emergent wetland community
43 in the study area would be subjected to more frequent inundation as a result of implementing two
44 Alternative 1C conservation measures (CM2 and CM5). This community would not be adversely

1 affected because its habitats in the Yolo Bypass have developed under a long-term regime of
2 periodic inundation events and inundation along expanded river floodplains would be infrequent.

3 **NEPA Effects:** The increased inundation of nontidal freshwater perennial emergent wetland natural
4 community in the Yolo Bypass and in the southern Delta would not reduce the acreage of this
5 natural community and could encourage germination of emergent wetland vegetation. The
6 increased inundation would not be an adverse effect.

7 **CEQA Conclusion:** An estimated 14-16 acres of nontidal freshwater perennial emergent wetland
8 community in the study area would be subjected to more frequent inundation as a result of
9 implementing CM2 and CM5 under Alternative 1C. This community would not be significantly
10 impacted because its habitats in the Yolo Bypass have developed under a long-term regime of
11 periodic inundation events and inundation along expanded river floodplains would be infrequent.
12 The periodic inundation would not result in a net permanent reduction in the acreage of this
13 community in the study area. Therefore, there would be no substantial effect on the community. The
14 impact would be less than significant.

15 **Impact BIO-17: Modification of Nontidal Freshwater Perennial Emergent Wetland Natural**
16 **Community from Ongoing Operation, Maintenance and Management Activities**

17 Once the physical facilities associated with Alternative 1C are constructed and the stream flow
18 regime associated with changed water management is in effect, there would be new ongoing and
19 periodic actions associated with operation, maintenance and management of the BDCP facilities and
20 conservation lands that could affect nontidal freshwater perennial emergent wetland natural
21 community in the study area. The ongoing actions include modified operation of upstream
22 reservoirs, the diversion of Sacramento River flows in the north Delta, and reduced diversions from
23 south Delta channels. These actions are associated with CM1 (see the impact discussion above for
24 effects associated with CM2). The periodic actions would involve access road and conveyance facility
25 repair, vegetation management at the various water conveyance facilities and habitat restoration
26 sites (CM11), levee and canal repair and replacement of levee armoring, channel dredging, and
27 habitat enhancement in accordance with natural community management plans. The potential
28 effects of these actions are described below.

- 29
- 30 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
31 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect
32 nontidal freshwater perennial emergent wetland natural community. These reservoirs do not
33 support significant stands of freshwater emergent wetlands. Changes in releases that would
influence downstream river flows are discussed below.
 - 34 • *Modified river flows upstream of and within the study area and reduced diversions from south*
35 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
36 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
37 channels (associated with Operational Scenario A) would not result in the permanent reduction
38 in acreage of the nontidal freshwater perennial emergent wetland natural community in the
39 study area. The majority of this wetland type exists outside of the levees of the larger rivers and
40 would not be affected by flow changes in river or Delta channels. Similarly, increased diversions
41 of Sacramento River flows in the north Delta would not result in a permanent reduction in
42 nontidal freshwater perennial emergent wetland community downstream of these diversions.
43 Nontidal wetlands below the diversions are not directly connected to the rivers, as this reach of

1 the river is tidally influenced. Reduced diversions from the south Delta channels would not
2 create a reduction in this natural community.

- 3 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
4 conveyance facilities and levees associated with the BDCP actions have the potential to require
5 removal of adjacent vegetation and could entail earth and rock work in nontidal freshwater
6 perennial emergent wetland habitats. This activity could lead to increased soil erosion, turbidity
7 and runoff entering nontidal freshwater perennial habitats. These activities would be subject to
8 normal erosion, turbidity and runoff control management practices, including those developed
9 as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
10 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic
11 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation
12 of disturbed surfaces. Proper implementation of these measures would avoid permanent
13 adverse effects on this community.
- 14 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
15 treatment, would be a periodic activity associated with the long-term maintenance of water
16 conveyance facilities and restoration sites. Vegetation management is also the principal activity
17 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to
18 control nuisance vegetation could pose a long-term hazard to nontidal freshwater perennial
19 emergent wetland natural community at or adjacent to treated areas. The hazard could be
20 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
21 onto the natural community, or direct discharge of herbicides to nontidal perennial wetland
22 areas being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
23 *Prevention, Containment and Countermeasure Plan* have been made part of the BDCP to reduce
24 hazards to humans and the environment from use of various chemicals during maintenance
25 activities, including the use of herbicides. These commitments are described in Appendix 3B,
26 including the commitment to prepare and implement spill prevention, containment, and
27 countermeasure plans and stormwater pollution prevention plans. Best management practices,
28 including control of drift and runoff from treated areas, and use of herbicides approved for use
29 in aquatic environments would also reduce the risk of affecting natural communities adjacent to
30 water conveyance features and levees associated with restoration activities.

31 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
32 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
33 The treatment activities would be conducted in concert with the California Department of
34 Boating and Waterways' invasive species removal program. Eliminating large stands of water
35 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
36 by removing cover for nonnative predators, improving water flow and removing barriers to
37 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
38 benefit terrestrial species that use tidal and nontidal freshwater perennial emergent wetland
39 natural community for movement corridors and for foraging. Vegetation management effects on
40 individual species are discussed in the species sections on following pages.

- 41 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
42 communities within the Plan Area (CM11). For nontidal freshwater perennial emergent wetland
43 natural community, a management plan would be prepared that specifies actions to improve the
44 value of the habitats for covered species. Actions would include control of invasive nonnative
45 plant and animal species, fire management, restrictions on vector control and application of
46 herbicides, and maintenance of infrastructure that would allow for movement through the

1 community. The enhancement efforts would improve the long-term value of this community for
2 both special-status and common species.

3 The various operations and maintenance activities described above could alter acreage of nontidal
4 freshwater perennial emergent wetland natural community in the study area through changes in
5 flow patterns and changes in periodic inundation of this community. Activities could also introduce
6 sediment and herbicides that would reduce the value of this community to common and sensitive
7 plant and wildlife species. Other periodic activities associated with the Plan, including management,
8 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
9 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
10 enhance the value of the community. While some of these activities could result in small changes in
11 acreage, these changes would be greatly offset by restoration activities planned as part of *CM10*
12 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*
13 *Protection and Restoration*. The management actions associated with levee repair and control of
14 invasive plant species would also result in a long-term benefit to the species associated with
15 nontidal freshwater perennial emergent wetland habitats by improving water movement.

16 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
17 Alternative 1C would not result in a net permanent reduction in the nontidal freshwater perennial
18 emergent wetland natural community within the study area. Therefore, there would be no adverse
19 effect on this natural community.

20 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would
21 have the potential to create minor changes in total acreage of nontidal freshwater perennial
22 emergent wetland natural community in the study area, and could create temporary increases in
23 turbidity and sedimentation. The activities could also introduce herbicides periodically to control
24 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and
25 AMM5 would minimize these impacts, and other operations and maintenance activities, including
26 management, protection and enhancement actions associated with *CM3 Natural Communities*
27 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
28 create positive effects, including improved water movement in and adjacent to these habitats. Long-
29 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and protection actions
30 associated with *CM3 Natural Communities Protection and Restoration* would greatly expand this
31 natural community in the study area. Ongoing operation, maintenance and management activities
32 would not result in a net permanent reduction in this sensitive natural community within the study
33 area. Therefore, there would be a less-than-significant impact.

34 **Alkali Seasonal Wetland Complex**

35 Construction, operation, maintenance and management associated with the conservation
36 components of Alternative 1C would have near-term and long-term adverse effects on the habitats
37 associated with the alkali seasonal wetland complex natural community. Initial development and
38 construction of CM2 and CM4 would result in permanent removal of this community. (see Table 12-
39 1C-7). Full implementation of Alternative 1C would also include the following conservation actions
40 over the term of the BDCP to benefit the alkali seasonal wetland natural community.

- 41 • Protect 150 acres of alkali seasonal wetland in Conservation Zones 1, 8 and/or 11 among a
42 mosaic of protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with
43 CM3).

- Restore or create alkali seasonal wetlands in Conservation Zones 1, 8, and/or 11 to achieve no net loss of wetted acres (up to 72 acres of alkali seasonal wetland complex restoration) (Objective ASWNC1.2, associated with CM3 and CM9).
- Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).

There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section 3.3 that would improve the value of alkali seasonal wetland natural community for terrestrial species. As explained below, with the protection, restoration, and enhancement of the amounts of habitat listed in the BDCP objectives, in addition to implementation of AMMs and mitigation, impacts on this natural community would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1C-7. Changes in Alkali Seasonal Wetland Complex Natural Community Associated with Alternative 1C (acres)^a

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	13	13	9	9	0	0
CM2	45	45	0	0	264-744	0
CM4	13	27	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	71	85	9	9	264-744	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

Impact BIO-18: Changes in Alkali Seasonal Wetland Complex Natural Community as a Result of Implementing BDCP Conservation Measures

Construction, land grading and habitat restoration activities that would accompany the implementation of CM1, CM2, CM4, and CM6 under Alternative 1C would permanently eliminate an estimated 85 acres and temporarily eliminate an estimated 9 acres of alkali seasonal wetland complex natural community in the study area. These modifications represent approximately 3% of the 3,723 acres of the community that is mapped in the study area. Most of the losses (80 acres or 85%) would occur during the first 10 years of Alternative 1C implementation, as the water conveyance facility is constructed, Yolo Bypass improvements are initiated, and habitat restoration

1 is initiated. Alkali seasonal wetland complex protection (120 acres) and restoration (an estimated
2 58 acres, but determined by actual level of effect) would be initiated during the same period; when
3 combined, these actions would offset most of the losses. The 58 acres of restoration would be 22
4 acres fewer than the number of acres lost in the near-term. By the end of the Plan period, 150 acres
5 of this natural community would be protected and up to 72 acres would be restored. The BDCP
6 beneficial effects analysis for this community (BDCP Chapter 5, Section 5.4.7.2) states that
7 Alternative 4 would protect 150 acres of alkali seasonal wetland in Conservation Zones 1, 8, or 11, in
8 a mosaic of protected grasslands and vernal pool complex. This would protect currently unprotected
9 high-value alkali seasonal wetland complex in the Plan Area. These conservation measures would
10 also be implemented under Alternative 1C.

11 The individual effects of each relevant conservation measure are addressed below. A summary
12 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
13 conservation measure discussions.

- 14 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1C water conveyance
15 facilities would permanently eliminate 13 acres and temporarily eliminate 9 acres of alkali
16 seasonal wetland complex natural community. The permanent losses would be caused by
17 construction of the western canal just south of Rock Slough near Knightsen, and immediately
18 west of Clifton Court Forebay. Temporary losses would be created by siphon work areas at both
19 locations, and by railroad work area just west of Clifton Court Forebay (see Terrestrial Biology
20 Mapbook). All of these losses would occur in the near-term timeframe.

21 The construction activity associated with CM1 also has the potential to lead to increased
22 nitrogen deposition in alkali seasonal wetland habitats in the vicinity of Clifton Court Forebay. A
23 significant number of cars, trucks, and land grading equipment involved in construction would
24 emit small amounts of atmospheric nitrogen from fuel combustion; this material could be
25 deposited in sensitive alkali seasonal wetland areas that are located west of the major
26 construction areas at Clifton Court Forebay. Nitrogen deposition can pose a risk of adding a
27 fertilizer to nitrogen-limited soils and their associated plants. Nonnative invasive species can be
28 encouraged by the added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-
29 Related Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has
30 been concluded that this potential deposition would pose a low risk of changing the alkali
31 seasonal wetland complex in the construction area because the construction would occur
32 primarily downwind of the natural community and the construction would contribute a
33 negligible amount of nitrogen to regional projected emissions. No adverse effect is expected.

- 34 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
35 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
36 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
37 Sacramento Weir improvements. Realignment of Putah Creek could involve excavation and
38 grading in alkali seasonal wetland complex as a new channel is constructed. Based on
39 hypothetical construction footprints, a total of 45 acres could be permanently lost. This complex
40 is located immediately south of the existing Putah Creek channel within the bypass, and is a
41 relatively large, moderate to high value, contiguous expanse of this community. This loss would
42 occur in the near-term timeframe.
- 43 • *CM3 Natural Communities Protection and Restoration:* CM3 proposes to protect at least 150 acres
44 of alkali seasonal wetland complex in CZs 1, 8 and 11 (Objective ASWNC1.1). The protection
45 would occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented

1 natural landscapes supporting a diversity of native plant and wildlife species. These areas would
2 be both protected and enhanced to increase the cover of alkali seasonal wetland plants relative
3 to nonnative species.

- 4 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
5 footprints, implementation of CM4 would permanently inundate or remove 13 acres of alkali
6 seasonal wetland complex in the near-term and inundate or remove 27 acres by the end of the
7 Plan timeframe. The losses would be expected to occur in the Cache Slough and Suisun Marsh
8 ROAs established for tidal restoration (see Figure 12-1). The largest losses would likely occur in
9 the Lindsay Slough area and on the northern fringes of Suisun Marsh, north of the Potrero Hills.
10 These losses would not fragment the alkali seasonal wetland communities adjacent to these
11 sloughs because the losses would occur on the edges of the existing habitat.
- 12 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: CM9 includes both vernal
13 pool complex and alkali seasonal wetland complex restoration goals. The intent of the
14 conservation measure is to match the acreage of restoration with the actual acreage lost to other
15 conservation measures (primarily CM2 and CM4). The current estimate for alkali seasonal
16 wetland complex restoration is 58 acres in the near-term and a total of 72 acres by the end of
17 the BDCP restoration period, consistent with BDCP Objective ASWNC1.2. Restoration in the
18 Lindsay Slough area of the Cache Slough ROA and the northern region of the Suisun Marsh ROA
19 would be consistent with essential habitat connectivity goals mapped in Figure 12-2 and
20 described in Table 3.2-3 of BDCP Chapter 3.

21 The following paragraphs summarize the combined effects discussed above and describe other
22 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
23 also included.

24 ***Near-Term Timeframe***

25 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would
26 affect the alkali seasonal wetland complex natural community through CM1 construction losses (22
27 acres) and CM2 construction losses (45 acres). These losses would occur in the Yolo Bypass south of
28 Putah Creek and on land immediately west of Clifton Court Forebay. Approximately 13 acres of the
29 inundation and construction-related losses in habitat from CM4 would occur in the near-term. These
30 losses would occur primarily in the Cache Slough and Suisun Marsh ROAs mapped in Figure 12-1.

31 The construction losses of this special-status natural community would represent an adverse effect
32 if they were not offset by avoidance and minimization measures and restoration actions associated
33 with BDCP conservation components. Loss of alkali seasonal wetland complex natural community
34 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
35 defined by Section 404 of the CWA. The protection of 120 acres of alkali seasonal wetland complex
36 as part of CM3 and the restoration of an estimated 58 acres of this community as part of CM9 during
37 the first 10 years of BDCP implementation would partially offset this near-term loss. Typical project-
38 level mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 160 acres of
39 protection and 80 acres of restoration would be needed to offset (i.e., mitigate) the 80 acres of loss.
40 The restoration acreage would be 22 acres less than the near-term losses and the protection would
41 be 40 acres less than typically required for this natural community. This deficit in restoration and
42 protection would result in a near-term decrease in acreage of the natural community and would be
43 an adverse effect.

1 The Plan also includes commitments to implement *AMM1 Worker Training Awareness, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM6 Disposal and Reuse of Spoils, and AMM10*
4 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that
5 avoid or minimize the risk of affecting habitats at work areas. BDCP Appendix 3.C describes the
6 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
7 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

8 **Late Long-Term Timeframe**

9 Implementation of Alternative 1C as a whole would result in relatively minor (3%) losses of alkali
10 seasonal wetland natural community in the study area. These losses (94 acres) would be largely
11 associated with construction of the western canal in the south Delta area (CM1), Yolo Bypass fish
12 improvements (CM2) and inundation during tidal marsh restoration (CM4). Inundation losses
13 would occur during the course of the Plan's restoration activities, primarily in the Cache Slough and
14 Suisun Marsh ROAs.

15 **NEPA Effects:** In the first 10 years of implementing Alternative 1C conservation measures, 120 acres
16 of alkali seasonal wetland complex would be protected as part of CM3 and up to 58 acres of this
17 community would be restored as part of CM9. These conservation actions would not totally offset
18 the effects of Alternative 1C actions. By the end of the Plan timeframe, a total of 150 acres of this
19 natural community would be protected (CM3) and up to 72 acres would be restored (CM9). The
20 protection and restoration would occur primarily in CZs 1, 8, and 11, in the Cache Slough, Suisun
21 Marsh and Clifton Court Forebay areas. The restoration and protection acreages contained in the
22 BDCP would not be sufficient to provide the typical level of mitigation for this community; therefore,
23 the effect of Alternative 1C would be adverse.

24 **CEQA Conclusion:**

25 **Near-Term Timeframe**

26 Alternative 1C would result in the combined permanent and temporary loss of approximately 80
27 acres of alkali seasonal wetland complex natural community due to construction of the western
28 canal and tunnel (CM1), fish passage improvements (CM2) and inundation during tidal marsh
29 restoration (CM4). The construction losses would occur primarily in the south Delta in CZ 8 and CZ 9
30 and the area just south of Putah Creek in the Yolo Bypass (CZ 2), while inundation losses would
31 occur in the Cache Slough and Suisun Marsh ROAs. The losses would be spread across a 10-year
32 near-term timeframe.

33 The construction losses of this special-status natural community would represent an adverse effect
34 if they were not offset by avoidance and minimization measures and other actions associated with
35 BDCP conservation components. Loss of alkali seasonal wetland complex natural community would
36 be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
37 defined by Section 404 of the CWA. The protection of 120 acres of alkali seasonal wetland complex
38 as part of CM3 and the restoration of up to 58 acres of this community as part of CM9 during the first
39 10 years of BDCP implementation would partially offset this near-term loss. Typical project-level
40 mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 160 acres of protection
41 and 80 acres or restoration would be needed to offset (i.e., mitigate) the 80 acres of loss. AMM1,
42 AMM2, AMM3, AMM4, AMM6, and AMM10 would also be implemented to minimize impacts.
43 Because the offsetting protection and restoration activities contained in the BDCP do not provide for

1 the typical level of mitigation, the near-term impact of Alternative 1C would be significant without
2 additional mitigation. With the implementation of Mitigation Measure BIO-18, *Compensate for Loss*
3 *of Alkali Seasonal Wetland Complex*, the impact would be less than significant.

4 ***Late Long-Term Timeframe***

5 At the end of the Plan period, 94 acres of alkali seasonal wetland complex natural community would
6 be permanently removed by conservation actions, 150 acres would be protected and up to 72 acres
7 would be restored. The restoration and protection acreages contained in the BDCP would not be
8 sufficient to provide the typical level of mitigation for this community (188 acres of protection and
9 94 acres of restoration); therefore, the effect of Alternative 1C would be potentially significant. With
10 the implementation of Mitigation Measure BIO-18, the impact would be less than significant.

11 **Mitigation Measure BIO-18: Compensate for Loss of Alkali Seasonal Wetland Complex**

12 To fully compensate for loss of alkali seasonal wetland complex as a result of implementing
13 Alternative 1C, DWR shall increase near-term restoration and protection to 80 acres and 160
14 acres, respectively, and long-term restoration and protection to 94 acres and 188 acres,
15 respectively.

16 **Impact BIO-19: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 17 **Alkali Seasonal Wetland Complex Natural Community**

18 Under Alternative 1C, CM2 would modify the inundation/flooding regime of the Yolo Bypass, a man-
19 made waterway. CM2, which is designed to improve fish passage and shallow flooded habitat for
20 Delta fishes in the Yolo Bypass, would increase periodic inundation of alkali seasonal wetland
21 complex natural community at scattered locations in the central and southern sections of the
22 bypass.

23 Operation of the Yolo Bypass under Alternative 1C would result in an increase in the frequency and
24 duration of inundation on an estimated 264–744 acres of alkali seasonal wetland complex natural
25 community. The methods used to estimate these inundation acreages are described in BDCP
26 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected
27 by flooding would vary with the flow volume that would pass through the newly constructed notch
28 in the Fremont Weir. The 264-acre increase in inundation would be associated with a notch flow of
29 1,000 cubic feet per second (cfs), and the 744-acre increase would result from a notch flow of 4,000
30 cfs. Plan-related increases in flow through Fremont Weir would be expected in 30% of the years.
31 The alkali seasonal wetland complex natural community occurs primarily in the central and
32 southern reaches of the bypass, south of Putah Creek. The stands in this location are relatively large,
33 with moderate to high value for associated plant and wildlife species. The anticipated change in
34 management of flows in the Yolo Bypass includes more frequent releases in flows into the bypass
35 from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in spring
36 months (April and May).

37 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with
38 Alternative 1C would not adversely affect alkali seasonal wetland complex habitats, as they have
39 persisted under similar high flows and extended flow periods. There is the potential for some
40 change in plant species composition as a result of longer inundation periods, but the natural
41 community would persist.

1 **CEQA Conclusion:** An estimated 264–744 acres of alkali seasonal wetland complex natural
2 community in the Yolo Bypass would be subjected to more frequent inundation as a result of
3 implementing CM2 under Alternative 1C. This natural community is conditioned to periodic
4 inundation; the slight increase in periodic inundation would not result in a net permanent reduction
5 in the acreage of this community in the study area, although some change in plant species
6 composition could occur. Increasing periodic inundation of alkali seasonal wetland complex natural
7 community in the Yolo Bypass would have a less-than-significant impact on the community. The
8 effects of this inundation on wildlife and plant species are described in detail in later sections of this
9 chapter.

10 **Impact BIO-20: Modification of Alkali Seasonal Wetland Complex Natural Community from** 11 **Ongoing Operation, Maintenance and Management Activities**

12 Once the physical facilities associated with Alternative 1C are constructed and the stream flow
13 regime associated with changed water management is in effect, there would be new ongoing and
14 periodic actions associated with operation, maintenance and management of the BDCP facilities and
15 conservation lands that could affect alkali seasonal wetland complex natural community in the study
16 area. The ongoing actions include the diversion of Sacramento River flows in the north Delta,
17 reduced diversions from south Delta channels, and recreation in and adjacent to Plan reserves.
18 These actions are associated with CM1 and CM11 (see the impact discussion above for effects
19 associated with CM2). The periodic actions would involve access road and conveyance facility
20 repair, vegetation management at the various water conveyance facilities and habitat restoration
21 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat
22 enhancement in accordance with natural community management plans. The potential effects of
23 these actions are described below.

- 24 • *Modified river flows upstream of and within the study area and reduced diversions from south*
25 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
26 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
27 channels (associated with Operational Scenario A) would not affect alkali seasonal wetland
28 natural community. This natural community does not exist within or adjacent to the active
29 Sacramento River system channels and Delta waterways that would be affected by modified
30 flow levels.
- 31 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
32 conveyance facilities and levees associated with the BDCP actions have the potential to require
33 removal of adjacent vegetation and could entail earth and rock work in or adjacent to alkali
34 seasonal wetland complex habitats. This activity could lead to increased soil erosion and runoff
35 entering these habitats. These activities would be subject to normal erosion and runoff control
36 management practices, including those developed as part of *AMM2 Construction Best*
37 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
38 vegetation removal or earthwork adjacent to or within alkali seasonal wetland complex habitats
39 would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces
40 as required by *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper
41 implementation of these measures would avoid permanent adverse effects on this community.
- 42 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
43 treatment, would be a periodic activity associated with the long-term maintenance of water
44 conveyance facilities and restoration sites. Vegetation management is also the principal activity
45 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to

1 control nuisance vegetation could pose a long-term hazard to alkali seasonal wetland complex
2 natural community at or adjacent to treated areas. The hazard could be created by uncontrolled
3 drift of herbicides, uncontrolled runoff of contaminated stormwater onto the natural
4 community, or direct discharge of herbicides to alkali seasonal wetland complex areas being
5 treated for invasive species removal. Environmental commitments and *AMM5 Spill Prevention,*
6 *Containment and Countermeasure Plan* have been made part of the BDCP to reduce hazards to
7 humans and the environment from use of various chemicals during maintenance activities,
8 including the use of herbicides. These commitments are described in Appendix 3B, including the
9 commitment to prepare and implement spill prevention, containment, and countermeasure
10 plans and stormwater pollution prevention plans. Best management practices, including control
11 of drift and runoff from treated areas, and use of herbicides approved for use in terrestrial
12 environments would also reduce the risk of affecting natural communities adjacent to water
13 conveyance features and levees associated with restoration activities.

- 14 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
15 communities within the Plan Area (CM11). For the alkali seasonal wetland complex natural
16 community, a management plan would be prepared that specifies actions to improve the value
17 of the habitats for covered species. Actions would include control of invasive nonnative plant
18 and animal species, fire management, restrictions on vector control and application of
19 herbicides, and maintenance of infrastructure that would allow for movement through the
20 community. The enhancement efforts would improve the long-term value of this community for
21 both special-status and common species.
- 22 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to alkali
23 seasonal wetland natural community in the reserve system. The activities could include wildlife
24 and plant viewing and hiking. *CM11 Natural Communities Enhancement and Management* (BDCP
25 Chapter 3 Section 3.4.11) describes this program and identifies applicable restrictions on
26 recreation that might adversely affect alkali seasonal wetland habitat. BDCP also includes an
27 avoidance and minimization measure (AMM37) that further dictates limits on recreation
28 activities that might affect this natural community. Most recreation would be docent-led wildlife
29 and botanical tours, using existing trails and roads in the vicinity of the reserves. No new trails
30 would be constructed.

31 The various operations and maintenance activities described above could alter acreage of alkali
32 seasonal wetland complex natural community in the study area. Activities could introduce sediment
33 and herbicides that would reduce the value of this community to common and sensitive plant and
34 wildlife species. Other periodic activities associated with the Plan, including management,
35 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
36 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
37 enhance the value of the community. While some of these activities could result in small changes in
38 acreage, these changes would be offset by protection and restoration activities planned as part of
39 *CM3 Natural Communities Protection and Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
40 *Wetland Complex Restoration* and by Mitigation Measure BIO-18, *Compensate for Loss of Alkali*
41 *Seasonal Wetland Complex*, or minimized by implementation of AMM2, AMM4, AMM5, and AMM10.
42 The management actions associated with control of invasive plant species would also result in a
43 long-term benefit to the species associated with alkali seasonal wetland complex habitats by
44 eliminating competitive, invasive species of plants.

1 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
2 Alternative 1C would not result in a net permanent reduction in this natural community within the
3 study area. Therefore, there would be no adverse effect to the community.

4 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would
5 have the potential to create minor changes in total acreage of alkali seasonal wetland complex
6 natural community in the study area, and could create temporary increases sedimentation. The
7 activities could also introduce herbicides periodically to control nonnative, invasive plants.
8 Implementation of environmental commitments and AMM2, AMM4, AMM5, and AMM10 would
9 minimize these impacts, and other operations and maintenance activities, including management,
10 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
11 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would create positive
12 effects, including reduced competition from invasive, nonnative plants in these habitats. Long-term
13 restoration activities associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*
14 *Restoration*, protection actions associated with *CM3 Natural Communities Protection and Restoration*
15 and implementation of Mitigation Measure BIO-18, *Compensate for Loss of Alkali Seasonal Wetland*
16 *Complex*, would ensure that the acreage of this natural community would not decrease in the study
17 area. Ongoing operation, maintenance and management activities would not result in a net
18 permanent reduction in this natural community within the study area. Therefore, there would be a
19 less-than-significant impact on alkali seasonal wetland complex natural community.

20 **Mitigation Measure BIO-18: Compensate for Loss of Alkali Seasonal Wetland Complex**

21 See the discussion of Mitigation Measure BIO-18 under Impact BIO-18.

22 **Vernal Pool Complex**

23 Construction, operation, maintenance and management associated with the conservation
24 components of Alternative 1C would have a long-term adverse effect on the habitats associated with
25 the vernal pool complex natural community, requiring mitigation. Development and construction of
26 CM1 and CM4 would result in permanent removal of 401 acres and temporary removal of 37 acres
27 of this community (see Table 12-1C-8). Full implementation of Alternative 1C would also include the
28 following conservation actions over the term of the BDCP to benefit the vernal pool complex natural
29 community.

- 30 ● Protect 600 acres of existing vernal pool complex in Conservation Zones 1, 8, and 11, primarily
31 in core vernal pool recovery areas (Objective VPNC1.1, associated with CM3).
- 32 ● Restore vernal pool complex in Conservation Zones 1, 8, and/or 11 to achieve no net loss of
33 vernal pool acreage (up to 67 acres of vernal pool complex restoration, assuming that all
34 anticipated impacts [10 wetted acres] occur and that the restored vernal pool complex has 15%
35 density of vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).

36 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
37 3.3 that would improve the value of vernal pool complex natural community for terrestrial species.
38 As explained below, with the protection, restoration and enhancement of the amounts of habitat
39 listed in the BDCP objectives, in addition to implementation of AMMs and mitigation measures,
40 impacts on this natural community would not be adverse for NEPA purposes and would be less than
41 significant for CEQA purposes.

1 **Table 12-1C-8. Changes in Vernal Pool Complex Natural Community Associated with Alternative 1C**
2 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	29	29	37	37	0	0
CM2	0	0	0	0	0-4	0
CM4	201	372	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	230	401	37	37	0-4	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-21: Changes in Vernal Pool Complex Natural Community as a Result of**
5 **Implementing BDCP Conservation Measures**

6 Construction, land grading and habitat restoration activities that would accompany the
7 implementation of Alternative 1C would eliminate an estimated 438 acres of vernal pool complex
8 natural community (CM1 and CM4) in the study area. This modification represents approximately
9 4% of the 12,133 acres of the community that is mapped in the study area. An estimated 267 acres
10 of the loss would occur during the first 10 years of Alternative 1C implementation, as the western
11 canal is constructed and tidal marsh restoration is initiated. Vernal pool complex protection (400
12 acres) and restoration (an estimated 40 acres, with actual restoration based on level of effect) would
13 be initiated during the first 10 years of Alternative 1C implementation, which would partially offset
14 the losses in the near-term. By the end of the Plan period, 600 acres of this natural community
15 would be protected and an estimated 67 acres would be restored. Because of the high sensitivity of
16 this natural community and its shrinking presence in the Plan Area, avoidance and minimization
17 measures have been built into the BDCP to eliminate much of this potential loss. The BDCP beneficial
18 effect analysis (BDCP Chapter 5, Section 5.4.8.2) indicates that implementation of Alternative 4
19 would protect at least 600 acres of vernal pool complex in Conservation Zones 1, 8, and 11 and
20 additional vernal pool complex would be restored to achieve no net loss of this community. These
21 conservation measures would also be implemented for Alternative 1C.

22 The individual effects of the relevant conservation measure are addressed below. A summary
23 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
24 conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1C water conveyance
2 facilities would permanently eliminate 29 acres and temporarily eliminate 37 acres of vernal
3 pool complex natural community. All of these losses would be associated with western canal and
4 related facilities construction at the south and western sides of Clifton Court Forebay.
5 Permanent losses would be created by the canal footprint and an adjacent spoil/borrow area.
6 The temporary losses would be created by constructing a siphon under the southern extension
7 of Italian Slough and an adjacent fueling station/batch plant (see Figure 12-1 and the Terrestrial
8 Biology Mapbook). All of these effects would occur in the near-term timeframe.

9 Because of the close proximity of construction activity to adjacent vernal pool complex near
10 Clifton Court Forebay, there is also the potential for indirect loss or damage to vernal pools from
11 changes in pool hydrology or deposition of construction-related sediment. These potential
12 indirect effects are discussed in detail in the vernal pool crustaceans impact analysis later in this
13 chapter.

14 The construction activity associated with CM1 also has the potential to lead to increased
15 nitrogen deposition in vernal pool complex habitats in the vicinity of Clifton Court Forebay. A
16 significant number of cars, trucks, and land grading equipment involved in construction would
17 emit small amounts of atmospheric nitrogen from fuel combustion; this material could be
18 deposited in sensitive vernal pool areas that are located west of the major construction areas at
19 Clifton Court Forebay. Nitrogen deposition can pose a risk of adding a fertilizer to nitrogen-
20 limited soils and their associated plants. Nonnative invasive species can be encouraged by the
21 added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related Nitrogen*
22 *Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been concluded
23 that this potential deposition would pose a low risk of changing the vernal pool complex in the
24 construction areas because the construction would contribute a negligible amount of nitrogen to
25 regional projected emissions. Also, the construction at Clifton Court Forebay would occur
26 primarily downwind of the natural community. No adverse effect is expected.

- 27 • *CM3 Natural Communities Protection and Restoration*: CM3 proposes to protect at least 600 acres
28 of vernal pool complex in CZs 1, 8, and 11 (BDCP Objective VPNC1.1). The protection would
29 occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented
30 natural landscapes supporting a diversity of native plant and wildlife species. These areas would
31 be both protected and enhanced to increase the cover of vernal pool complex plants relative to
32 nonnative species.

- 33 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
34 footprints, implementation of CM4 tidal marsh restoration in CZs 1 and 11 (Cache Slough and
35 Suisun Marsh ROAs; see Figure 12-1) could permanently inundate or remove 201 acres of vernal
36 pool complex in the near-term timeframe. By the end of the Plan period, a total of 372 acres
37 could be affected. The principal areas likely to be affected include the Cache Slough drainage just
38 west of the Yolo Bypass and the Nurse Slough drainage just east of the Potrero Hills.

- 39 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: CM9 includes both vernal
40 pool complex and alkali seasonal wetland complex restoration goals. The current estimate for
41 vernal pool complex restoration is 40 acres in the near-term and a total of 67 acres by the end of
42 the BDCP restoration period. This restoration conservation measure includes the “no net loss”
43 policy normally applied to this natural community (BDCP Objective VPNC1.2).

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
3 also included.

4 ***Near-Term Timeframe***

5 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would
6 affect 267 acres of vernal pool complex natural community through inundation or construction-
7 related losses in habitat from CM1 and CM4 activities. The majority of these losses would occur
8 adjacent to Clifton Court Forebay as the western canal is constructed, and in the Cache Slough or
9 Suisun Marsh ROAs mapped in Figure 12-1.

10 The construction or inundation loss of this special-status natural community would represent an
11 adverse effect if it were not offset by avoidance and minimization measures and restoration actions
12 associated with BDCP conservation components. Loss of vernal pool complex natural community
13 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
14 defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex as part of
15 CM3 and the restoration of an estimated 40 acres of this community (with a commitment to have
16 restoration keep pace with actual losses) as part of CM9 during the first 10 years of BDCP
17 implementation would partially offset this near-term loss. Typical project-level mitigation ratios
18 (2:1 for protection and 1:1 for restoration) would indicate 534 acres of protection and 267 acres of
19 restoration would be needed to offset (i.e., mitigate) the 267 acres of loss. The BDCP conservation
20 measures would be 134 acres short of typical protection requirements and 227 acres short of the
21 typical restoration requirement for full mitigation of the loss of this natural community. Alternative
22 1C would have an adverse effect on vernal pool complex in the near-term.

23 To avoid these adverse effects, the Plan also includes commitments to implement *AMM1 Worker*
24 *Training Awareness*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*
25 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM10 Restoration*
26 *of Temporarily Affected Natural Communities* and *AMM12 Vernal Pool Crustaceans*. All of these AMMs
27 include elements that avoid or minimize the risk of affecting habitats at work areas. AMM12 limits
28 the direct removal of vernal pool crustacean habitat to no more than 10 wetted acres and the
29 indirect effect to no more than 20 wetted acres through the life of the Plan. This is equivalent to
30 approximately 67 acres of direct removal and 134 acres of indirect removal of vernal pool complex
31 natural community. BDCP Appendix 3.C describes the AMMs, which have since been updated and
32 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
33 EIR/EIS. With these AMMs in place, Alternative 1C would not adversely affect vernal pool complex
34 natural community in the near-term.

35 ***Late Long-Term Timeframe***

36 The late long-term effect on vernal pool complex natural community would be 401 acres of
37 permanent and 37 acres of temporary loss. These losses would be associated with the construction
38 of CM1 facilities in the vicinity of Clifton Court Forebay and the ongoing restoration of tidal wetland
39 in the Cache Slough and Suisun Marsh ROAs. However, 600 acres would be protected (CM3) and up
40 to 67 acres would be restored (CM9) through the course of the BDCP implementation. In addition,
41 the avoidance and minimization measures listed above would reduce the actual loss of this
42 community to no more than 10 wetted acres of vernal pool crustacean habitat from direct effects
43 and 20 acres of habitat from indirect effects.

1 **NEPA Effects:** The conservation measures associated with Alternative 1C include protection of 400
 2 acres (CM3) and restoration of an estimated 40 acres (CM9) of vernal pool complex in the near-term
 3 time frame. The Plan focuses the protection in the core vernal pool areas identified in the USFWS
 4 vernal pool recovery plan (U.S. Fish and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8 and
 5 CZ 11 (see Figure 12-1). In addition, Alternative 1C includes AMM12, which limits the removal of
 6 vernal pool crustacean habitat to no more than 10 wetted acres and the indirect effect to no more
 7 than 20 wetted acres through the life of the Plan. This is equivalent to approximately 67 acres of
 8 direct loss and 134 acres of indirect loss of vernal pool complex natural community. With this and
 9 other AMMs in place, Alternative 1C not adversely affect vernal pool complex natural community in
 10 the near-term. With these conservation measures and AMMs in effect through the entire Plan period,
 11 Alternative 1C would not have an adverse effect on the vernal pool complex natural community in
 12 the long term.

13 **CEQA Conclusion:**

14 **Near-Term Timeframe**

15 During the 10-year near-term time frame, Alternative 1C would result in the direct loss of
 16 approximately 267 acres of vernal pool complex natural community due to water conveyance
 17 construction and inundation during tidal marsh restoration (CM1 and CM4). The loss would occur in
 18 the vicinity of Clifton Court Forebay and Cache Slough or Suisun Marsh ROAs. The construction- and
 19 inundation-related loss of this special-status natural community would represent a significant
 20 impact if it were not offset by avoidance and minimization measures and other actions associated
 21 with BDCP conservation components. Loss of vernal pool complex natural community would be
 22 considered both a loss in acreage of a sensitive natural community and a loss of wetland as defined
 23 by Section 404 of the CWA. The protection of 400 acres of vernal pool complex as part of CM3 and
 24 the restoration of an estimated 40 acres of this community (with a commitment to have restoration
 25 keep pace with actual losses) as part of CM9 during the first 10 years of Alternative 1C
 26 implementation would partially offset this near-term loss. Typical project-level mitigation ratios
 27 (2:1 for protection and 1:1 for restoration) would indicate 534 acres of protection and 267 acres of
 28 restoration would be needed to offset (i.e., mitigate) the 267 acres of loss. Without additional
 29 avoidance and minimization measures to reduce the potential impact, the proposed protection and
 30 restoration would not meet the typical mitigation for vernal pool complex losses. However,
 31 Alternative 1C also includes AMM1, AMM2, AMM3, AMM4, AMM10, and AMM12 to minimize
 32 impacts. AMM12 places a strict limit on the acres of wetted vernal pool crustacean habitat that can
 33 be lost to conservation actions (10 acres of direct and 20 acres of indirect loss). Because of the
 34 offsetting protection and restoration activities and implementation of AMMs, impacts would be less
 35 than significant.

36 **Late Long-Term Timeframe**

37 At the end of the Plan period, 438 acres of vernal pool complex natural community would be
 38 permanently removed by conservation actions, 600 acres would be protected and up to 67 acres
 39 would be restored. The protection and restoration acreages and the implementation of AMM12
 40 would limit the actual impact to acceptable levels. Alternative 1C would have a less-than-significant
 41 impact on vernal pool complex natural community in the late long-term timeframe.

1 **Impact BIO-22: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
2 **Vernal Pool Complex Natural Community**

3 Under Alternative 1C, CM2 would modify the inundation/flooding regime of the Yolo Bypass, a man-
4 made waterway. CM2, which is designed to improve fish passage and shallow flooded habitat for
5 Delta fishes in the Yolo Bypass, could increase periodic inundation of a small acreage of vernal pool
6 complex natural community in the southern section of the bypass, south of Putah Creek.

7 Operation of the Yolo Bypass under Alternative 1C would result in an increase in the frequency,
8 magnitude and duration of inundation on an estimated 0–4 acres of vernal pool complex natural
9 community. The methods used to estimate this inundation acreage are described in BDCP Appendix
10 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected by
11 inundation would vary with the flow volume that would pass through the newly constructed notch
12 in the Fremont Weir. The 4-acre increase in inundation would only occur at the highest modeled
13 flow regime, 8,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in
14 30% of the years. The vernal pool complex natural community that would likely be affected occurs
15 in the southern reaches of the bypass, south of Putah Creek. There are several relatively large,
16 contiguous areas of vernal pools on the western edge of the bypass in this area. The anticipated
17 change in management of flows in the Yolo Bypass includes more frequent releases in flows into the
18 bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in
19 spring months (April and May).

20 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with
21 Alternative 1C water operations would not adversely affect vernal pool complex habitats, as they
22 have persisted under similar high flows and extended flow periods. There is the potential, however,
23 for some change in plant species composition as a result of longer inundation periods.

24 **CEQA Conclusion:** An estimated 0–4 acres of vernal pool complex natural community in the Yolo
25 Bypass would be subjected to more frequent inundation as a result of implementing CM2 under
26 Alternative 1C. This natural community is conditioned to periodic inundation; the slight increase in
27 periodic inundation would not result in a net permanent reduction in the acreage of this community
28 in the study area, although some change in plant species composition could occur. Increasing
29 periodic inundation of vernal pool complex natural community in the Yolo Bypass would have a less-
30 than-significant impact on the community.

31 **Impact BIO-23: Modification of Vernal Pool Complex Natural Community from Ongoing**
32 **Operation, Maintenance and Management Activities**

33 Once the physical facilities associated with Alternative 1C are constructed and the stream flow
34 regime associated with changed water management is in effect, there would be new ongoing and
35 periodic actions associated with operation, maintenance and management of the BDCP facilities and
36 conservation lands that could affect vernal pool complex natural community in the study area. The
37 ongoing actions include the diversion of Sacramento River flows in the north Delta, reduced
38 diversions from south Delta channels, and recreation activities in Plan reserves. These actions are
39 associated with CM1 and CM11 (see the impact discussion above for effects associated with CM2).
40 The periodic actions would involve access road and conveyance facility repair, vegetation
41 management at the various water conveyance facilities and habitat restoration sites (CM11), levee
42 repair and replacement of levee armoring, channel dredging, and habitat enhancement in
43 accordance with natural community management plans. The potential effects of these actions are
44 described below.

- 1 • *Modified river flows upstream of and within the study area and reduced diversions from south*
2 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
3 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
4 channels (associated with Operational Scenario A) would not affect vernal pool complex natural
5 community. This natural community does not exist within or adjacent to the active Sacramento
6 River system channels and Delta waterways.
- 7 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
8 conveyance facilities and levees associated with the BDCP actions have the potential to require
9 removal of adjacent vegetation and could entail earth and rock work adjacent to vernal pool
10 complex habitats. This activity could lead to increased soil erosion and runoff entering these
11 habitats. These activities would be subject to normal erosion and runoff control management
12 practices, including those developed as part of *AMM2 Construction Best Management Practices*
13 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or
14 earthwork adjacent to vernal pool complex habitats would require use of sediment barriers, soil
15 stabilization and revegetation of disturbed surfaces (*AMM10 Restoration of Temporarily Affected*
16 *Natural Communities*). Proper implementation of these measures would avoid permanent
17 adverse effects on this community.
- 18 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
19 treatment, would be a periodic activity associated with the long-term maintenance of water
20 conveyance facilities and restoration sites. Vegetation management is also the principal activity
21 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to
22 control nuisance vegetation could pose a long-term hazard to vernal pool complex natural
23 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of
24 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or
25 direct discharge of herbicides to vernal pool complex areas being treated for invasive species
26 removal. Environmental commitments and *AMM5 Spill Prevention, Containment and*
27 *Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and the
28 environment from use of various chemicals during maintenance activities, including the use of
29 herbicides. These commitments are described in Appendix 3B, including the commitment to
30 prepare and implement spill prevention, containment, and countermeasure plans and
31 stormwater pollution prevention plans. Best management practices, including control of drift
32 and runoff from treated areas, and use of herbicides approved for use in terrestrial or aquatic
33 environments would also reduce the risk of affecting natural communities adjacent to water
34 conveyance features and levees associated with restoration activities.
- 35 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
36 communities within the Plan Area (CM11). For the vernal pool complex natural community, a
37 management plan would be prepared that specifies actions to improve the value of the habitats
38 for covered species. Actions would include control of invasive nonnative plant and animal
39 species, fire management, restrictions on vector control and application of herbicides, and
40 maintenance of infrastructure that would allow for movement through the community. The
41 enhancement efforts would improve the long-term value of this community for both special-
42 status and common species.
- 43 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to vernal pool
44 complexes in the reserve system. The activities could include wildlife and plant viewing and
45 hiking. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section
46 3.4.11) describes this program and identifies applicable restrictions on recreation that might

1 adversely affect vernal pool habitat. BDCP also includes an avoidance and minimization measure
2 (AMM37) that further dictates limits on recreation activities that might affect vernal pools.
3 Recreational trails would be limited to existing trails and roads. New trail construction would be
4 prohibited within the vernal pool complex reserves. It is expected that most activities would be
5 docent-led tours of reserves, minimizing adverse effects.

6 The various operations and maintenance activities described above could alter acreage of vernal
7 pool complex natural community in the study area. Activities could introduce sediment and
8 herbicides that would reduce the value of this community to common and sensitive plant and
9 wildlife species. Other periodic activities associated with the Plan, including management,
10 protection and enhancement actions associated *CM3 Natural Communities Protection and*
11 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
12 enhance the value of the community. While some of these activities could result in small changes in
13 acreage, these changes would be greatly offset by restoration activities planned as part of *CM9*
14 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by implementation of
15 AMM2, AMM4, AMM5, AMM10, AMM12, and AMM37. The management actions associated with
16 control of invasive plant species would also result in a long-term benefit to the species associated
17 with vernal pool complex habitats by eliminating competitive, invasive species of plants.

18 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
19 Alternative 1C would not result in a net permanent reduction in the vernal pool complex natural
20 community within the study area. Therefore, there would be no adverse effect to the community.

21 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would
22 have the potential to create minor changes in total acreage of vernal pool complex natural
23 community in the study area, and could create temporary increases in sedimentation, or damage
24 from recreational activity. The activities could also introduce herbicides periodically to control
25 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4,
26 AMM5, AMM10, AMM12 and AMM37 would minimize these impacts, and other operations and
27 maintenance activities, including management, protection and enhancement actions associated with
28 *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities Enhancement*
29 *and Management*, would create positive effects, including reduced competition from invasive,
30 nonnative plants in these habitats. Long-term restoration activities associated with *CM9 Vernal Pool*
31 *and Alkali Seasonal Wetland Complex Restoration* and protection actions associated with *CM3*
32 *Natural Communities Protection and Restoration* would ensure that the acreage of this natural
33 community would not decrease in the study area. Ongoing operation, maintenance and management
34 activities would not result in a net permanent reduction in this natural community within the study
35 area. Therefore, there would be a less-than-significant impact.

36 **Managed Wetland**

37 The conservation components of Alternative 1C would reduce the acreage of managed wetland
38 currently found in the study area. Initial development and construction of CM1, CM2, CM4, and CM6
39 would result in both permanent and temporary removal of this community (see Table 12-1C-9). Full
40 implementation of Alternative 1C would also include the following conservation action over the
41 term of the BDCP to benefit the managed wetland natural community.

- 42 ● Protect and enhance 8,100 acres of managed wetland, at least 1,500 acres of which are in the
43 Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).

- Create 320 acres of managed wetlands consisting of greater sandhill crane roosting habitat in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in Conservation Zones 3, 4, 5, or 6, with consideration of sea level rise and local seasonal flood events (Objective GSHC1.3, associated with CM10).
- Create two wetland complexes within the SLNWR refuge boundary. Each complex will consist of at least three wetlands totaling 90 acres of greater sandhill crane roosting habitat. One of the wetland complexes may be replaced by 180 acres of cultivated lands that are flooded following harvest for crane roosting and foraging habitat (Objective GSHC1.4, associated with CM10).

In addition to this conservation action, creation of similar habitat values by restoring tidal brackish emergent wetland and tidal freshwater emergent wetland as part of CM4 would further offset the losses of managed wetland. The net effect would be a substantial decrease in the amount of managed wetlands, but an increase in similar habitat value for special-status and common species as the managed wetland is converted to tidal marsh. Impacts on this natural community would not be adverse for NEPA purposes and would be less than significant for CEQA purposes. Refer to the *Shorebirds and Waterfowl* impacts discussion at the end of this section (Section 12.3.3.4) for further consideration of the effects of removing managed wetland natural community.

Table 12-1C-9. Changes in Managed Wetland Associated with Alternative 1C (acres)^a

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	1	1	145	145	0	0
CM2	24	24	44	44	931-2,612	0
CM4	5,718	13,746	0	0	0	0
CM5	0	0	0	0	0	6
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	5,743	13,771	189	189	931-2,612	6

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

Impact BIO-24: Changes in Managed Wetland Natural Community as a Result of Implementing BDCP Conservation Measures

Construction, land grading and habitat restoration activities that would accompany the implementation of CM1, CM2, CM4, and CM6 would eliminate an estimated 13,960 acres of managed wetland in the study area. This modification represents approximately 20% of the 70,798 acres of

1 managed wetland that is mapped in the study area. This loss would occur through the course of the
 2 BDCP restoration program, as construction activity and tidal marsh restoration proceeds. Managed
 3 wetland protection (8,100 acres) and restoration (500 acres) would take place over the same
 4 period, but would not replace the acreage lost. The BDCP beneficial effects analysis for Alternative 4
 5 (Chapter 5, Section 5.4.9.2) states that at least 8,100 acres of managed wetlands would be protected,
 6 of which at least 1,500 acres would be located within the Grizzly Island marsh complex, consistent
 7 with the U.S. Fish and Wildlife Service salt marsh harvest mouse recovery plan. Although the
 8 primary purpose of the 1,500 acres of protection is to protect and enhance habitat for the salt marsh
 9 harvest mouse, it is also expected to benefit the managed wetland natural community and the
 10 diversity of species that use it, including migratory waterfowl and the western pond turtle. These
 11 conservation measures would also be implemented under Alternative 1C.

12 The individual effects of the relevant conservation measures are addressed below. A summary
 13 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
 14 conservation measure discussions.

- 15 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1C water conveyance
 16 facilities would permanently remove 1 acre and temporarily remove 145 acres of managed
 17 wetland community. The permanent loss would be created by construction of the main
 18 transmission line for this alternative, which would extend westward through CZs 1 and 2 and
 19 open lands west of the Plan Area. The effect would occur approximately one mile west of Liberty
 20 Island Road. The temporary losses would occur primarily on lands just east of Miner Slough on
 21 Ryer Island. Small patches of managed wetland would be temporarily lost as a result of
 22 constructing Intake 5 adjacent to the west bank of the Sacramento River, constructing a siphon
 23 under Duck Slough just north of North Courtland Road, and constructing electrical transmission
 24 lines adjacent to the tunnel alignment and to the west of the Plan Area, west of CZ 1(see
 25 Terrestrial Biology Mapbook). These losses would take place during the near-term construction
 26 period.
- 27 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
 28 construction activities that could permanently or temporarily remove managed wetland,
 29 including west side channels modifications, Putah Creek realignment activities, Lisbon Weir
 30 modification and Sacramento Weir improvements. All of these activities could involve
 31 excavation and grading in managed wetland areas to improve passage of fish through the
 32 bypasses. Based on hypothetical construction footprints, a total of 24 acres could be
 33 permanently removed and 44 acres could be temporarily removed. This activity would occur
 34 primarily in the near-term timeframe.
- 35 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration
 36 footprints, implementation of CM4 would permanently inundate or remove 13,746 acres of
 37 managed wetland community. These losses would be expected to occur primarily in the Suisun
 38 Marsh ROA, but could also occur in the Cache Slough and West Delta ROAs (see Figure 12-1).
 39 These acres of managed wetland would be converted to natural wetland, including large
 40 acreages of tidal brackish emergent wetland and tidal freshwater emergent wetland. These
 41 natural wetlands provide comparable or improved habitat for the special-status species that
 42 occupy managed wetland. The newly created tidal marsh would not create a barrier or result in
 43 fragmentation of managed wetland, as most species are capable of utilizing both communities.
 44 An estimated 500 acres of managed wetland would be restored and 8,100 acres would be
 45 enhanced and protected through *CM3 Natural Communities Protection and Restoration*. All of the
 46 restoration and 4,800 acres of the protection would happen during the first 10 years of

1 Alternative 1C implementation, which would coincide with the timeframe of water conveyance
2 facilities construction and early implementation of CM4. The remaining restoration would be
3 spread over the following 30 years. Managed wetland restoration is expected to include at least
4 320 acres in CZs 3, 4, 5, and 6 (Figure 12-1) to benefit sandhill crane, as stated in BDCP Objective
5 GSHC1.3. The enhancement and protection would be focused in Suisun Marsh, but could also
6 occur in CZs with existing managed wetland (CZs 1, 2, 4, 5, 6, and 7).

- 7 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
8 of small amounts of managed wetland habitat along 20 miles of river and sloughs. The extent of
9 this loss cannot be quantified at this time, but the majority of the enhancement activity would
10 occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.
11 Managed wetland adjacent to these tidal areas could be affected. The improvements would
12 occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers,
13 and along Steamboat and Sutter Sloughs.

14 The following paragraphs summarize the combined effects discussed above and describe other
15 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
16 also included.

17 ***Near-Term Timeframe***

18 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would
19 permanently remove 5,743 acres and temporarily remove 189 acres of managed wetland through
20 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. An
21 estimated 1 acre of permanent loss and 145 acres of temporary loss would be associated with
22 construction of the water conveyance facilities (CM1). These near-term losses would occur in
23 various locations, but the majority would occur in Suisun Marsh and the lower Yolo Bypass as tidal
24 marsh is restored.

25 The construction or inundation loss of this special-status natural community would represent an
26 adverse effect if it were not offset by other conservation actions. Loss of managed wetland natural
27 community would be considered both a loss in acreage of a sensitive natural community and
28 potentially a loss of wetland as defined by Section 404 of the CWA. Many managed wetland areas are
29 interspersed with small natural wetlands that would be regulated under Section 404. The
30 restoration of 500 acres (CM10) and protection and enhancement of 4,800 acres of managed
31 wetland (CM3) during the first 10 years of Alternative 1C implementation would fully offset the
32 losses associated with CM1, but would only partially offset the total near-term loss. Typical project-
33 level mitigation ratios (1:1 for protection) would indicate 146 acres of protection would be needed
34 to offset the 146 acres of loss associated with CM1; a total of 5,932 acres of protection would be
35 needed to offset (i.e., mitigate) the 5,932 acres of permanent and temporary loss from all near-term
36 actions (see Table 12-1C-9). The combined protection and restoration proposed for managed
37 wetland in the near-term would fall 632 acres short of full replacement. However, the CM4 marsh
38 restoration activities that would be creating this loss would be simultaneously creating 2,000 acres
39 of tidal brackish emergent wetland and 8,850 acres of tidal freshwater emergent wetland in place of
40 the managed wetland in the near-term. This acreage would significantly exceed the number of acres
41 of managed wetland lost. Mitigation measures would also be undertaken to reduce the effects of
42 managed wetland loss on waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the
43 Yolo/Delta basins (Mitigation Measure 179b) if the protection and enhancement actions of CM3 and

1 CM10 were not sufficient to replace the value of managed wetlands for waterfowl in these basins.
2 Refer to the *General Terrestrial Biology Effects* discussion later in this section.

3 The Plan also includes commitments to implement *AMM1 Worker Training Awareness*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*
6 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting
7 habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and
8 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
9 EIR/EIS.

10 In spite of the managed wetland protection, restoration and avoidance measures contained in
11 Alternative 1C, there would be a net reduction in the acreage of this special-status natural
12 community in the near-term. This would be an adverse effect when judged by the significance
13 criteria listed earlier in this chapter. However, the conversion of these managed habitats to natural
14 tidal wetland types that support similar ecological functions (2,000 acres of tidal brackish emergent
15 wetland and 8,850 acres of tidal freshwater emergent wetland) would offset this adverse effect.
16 Also, there are other conservation actions contained in the BDCP (CM3 and CM11) that would
17 improve management and enhance existing habitat values, further offsetting the effects of managed
18 wetland loss on covered and noncovered special-status terrestrial species and on common species
19 that rely on this natural community for some life phase. As a result, there would be no adverse
20 effect.

21 ***Late Long-Term Timeframe***

22 At the end of the Plan period, 13,960 acres of managed wetland natural community would be
23 removed by conservation actions, 8,100 acres would be protected and 500 acres would be restored.
24 There would be a net permanent reduction in the acreage of this special-status natural community
25 within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal brackish
26 emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this managed
27 wetland.

28 ***NEPA Effects:*** During the near-term timeframe (the first 10 years of BDCP implementation),
29 Alternative 1C would permanently remove 5,743 acres and temporarily remove 189 acres of
30 managed wetland through inundation or construction-related losses in habitat from CM1, CM2, and
31 CM4 activities. Through the entire Plan period, Alternative 1C would result in a loss 13,960 acres of
32 managed wetland within the study area; however, it would also protect and enhance 8,100 acres
33 and restore 500 acres of this habitat. In addition, Alternative 1C would restore 6,000 acres of tidal
34 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland that support
35 similar ecological functions to those of managed wetland. Therefore, there would be no adverse
36 effect on managed wetland natural community.

37 ***CEQA Conclusion:***

38 ***Near-Term Timeframe***

39 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would
40 permanently remove 5,743 acres and temporarily remove 189 acres of managed wetland through
41 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. An
42 estimated 146 acres of this loss would be associated with construction of the water conveyance

1 facilities (CM1). These losses would occur in various locations, but the majority of the near-term loss
2 would occur in Suisun Marsh and the lower Yolo Bypass as tidal marsh is restored.

3 The construction or inundation loss of this special-status natural community would represent a
4 significant impact if it were not offset by other conservation actions. Loss of managed wetland
5 natural community would be considered both a loss in acreage of a sensitive natural community and
6 potentially a loss of wetland as defined by Section 404 of the CWA. The restoration of 500 acres and
7 protection and enhancement of 4,800 acres of managed wetland as part of CM3 during the first 10
8 years of Alternative 1C implementation would fully offset the losses associated with CM1, but would
9 only partially offset the total near-term loss. Typical project-level mitigation ratios (1:1 for
10 protection) would indicate 146 acres of protection would be needed to offset the 146 acres of loss
11 associated with CM1; a total of 5,932 acres of protection would be needed to offset (i.e., mitigate) the
12 5,932 acres of permanent and temporary loss from all near-term actions. The combined protection
13 and restoration proposed for managed wetland in the near-term would fall 632 acres short of full
14 replacement. However, the CM4 marsh restoration activities that would be creating this loss would
15 be simultaneously creating 2,000 acres of tidal brackish emergent wetland and 8,850 acres of tidal
16 freshwater emergent wetland in place of the managed wetland in the near-term. This acreage would
17 significantly exceed the number of acres of managed wetlands lost. Mitigation measures would also
18 be undertaken to reduce the effects of managed wetland loss on waterfowl in Suisun Marsh
19 (Mitigation Measure BIO-179a) and the Yolo/Delta basins (Mitigation Measure 179b) if the
20 protection and enhancement actions of CM3 and CM10 were not sufficient to replace the value of
21 managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial Biology Effects*
22 discussion later in this section.

23 The Plan also includes commitments to implement *AMM1 Worker Training Awareness*, *AMM2*
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*
26 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting
27 habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and
28 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
29 EIR/EIS.

30 In spite of the managed wetland protection, restoration and avoidance measures contained in
31 Alternative 1C, there would be a net reduction in the acreage of this special-status natural
32 community in the near-term. This would be a significant impact when judged by the significance
33 criteria listed earlier in this chapter. However, the conversion of these managed habitats to natural
34 tidal wetland types that support similar ecological functions (2,000 acres of tidal brackish emergent
35 wetland and 8,850 acres of tidal freshwater emergent wetland) would offset this significant impact.
36 Also, there are other conservation actions contained in the BDCP (CM3 and CM11) that would
37 improve management and enhance existing habitat values, further offsetting the impacts of
38 managed wetland loss on covered and noncovered special-status terrestrial species and on common
39 species that rely on this natural community for some life phase. As a result, there would be a less-
40 than-significant impact.

41 ***Late Long-Term Timeframe***

42 At the end of the Plan period, 13,960 acres of managed wetland natural community would be
43 removed by conservation actions, 8,100 acres would be protected and 500 acres would be restored.
44 There would be a net permanent reduction in the acreage of this special-status natural community

1 within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal brackish
2 emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this managed
3 wetland. Because these natural wetlands support similar ecological functions to those of managed
4 wetland, there would be a less-than-significant impact.

5 **Impact BIO-25: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
6 **Managed Wetland Natural Community**

7 Two Alternative 1C conservation measures would modify the inundation/flooding regimes of both
8 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
9 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
10 of managed wetland on wildlife management areas and duck clubs scattered up and down the
11 central and southern bypass. CM5 would expose this community to additional flooding as channel
12 margins are modified and levees are set back to improve fish habitat along some of the major rivers
13 and waterways in the south Delta.

- 14 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1C
15 would result in an increase in the frequency, magnitude and duration of inundation of 931-2,612
16 acres of managed wetland natural community. The methods used to estimate these inundation
17 acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and*
18 *Plants*. The area more frequently affected by inundation would vary with the flow volume that
19 would pass through the newly constructed notch in the Fremont Weir. The 931-acre increase in
20 inundation would be associated with a notch flow of 8,000 cubic feet per second (cfs), and the
21 2,612-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow
22 through Fremont Weir would be expected in 30% of the years. Based on the theoretical
23 modeling that has been completed to-date, the largest acreages would be associated with the
24 Sacramento Bypass Wildlife Area, the Yolo Bypass Wildlife Area, and private managed wetlands
25 south of Putah Creek. The anticipated change in management of flows in the Yolo Bypass
26 includes more frequent releases in flows into the bypass from the Fremont and Sacramento
27 Weirs, and in some years, later releases into the bypass in spring months (April and May). With
28 larger flows, the water depths may also increase over Existing Conditions. While the managed
29 wetlands of the Yolo Bypass are conditioned to periodic inundation events, the more frequent
30 and extended inundation periods may make it more difficult to actively manage the areas for
31 maximum food production for certain species (waterfowl primarily) and may alter the plant
32 assemblages in some years. The effects of this periodic inundation on birds and other terrestrial
33 species are discussed later in this chapter. The additional inundation would not be expected to
34 reduce the acreage of managed wetland on a permanent basis. The extended inundation would
35 be designed to expand foraging and spawning habitat for Delta fishes.
- 36 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
37 increase in the frequency and duration of inundation of an estimated 6 acres of managed
38 wetland. Specific locations for this restoration activity have not been identified, but they would
39 likely be focused in the south Delta area, along the major rivers and Delta channels. The
40 connection of these wetlands to stream flooding events would be beneficial to the ecological
41 function of managed wetlands, especially as they relate to BDCP target aquatic species. Foraging
42 activity and refuge sites would be expanded into areas currently unavailable or infrequently
43 available to some aquatic species. The more frequent flooding would periodically interfere with
44 management activities associated with terrestrial species (primarily waterfowl) and may result
45 in changes in plant composition and management strategies over time.

1 In summary, from 937-2,618 acres of managed wetland community in the study area would be
2 subjected to more frequent inundation as a result of implementing two Alternative 1C conservation
3 measures (CM2 and CM5).

4 **NEPA Effects:** Managed wetland community would not be adversely affected because much of the
5 acreage affected is conditioned to periodic inundation. The more frequent inundation could create
6 management problems associated with certain species, especially waterfowl, and result in changes
7 over time in plant species composition. The total acreage of managed wetland would not be
8 expected to change permanently as a result of the periodic inundation.

9 **CEQA Conclusion:** An estimated 937-2,618 acres of managed wetland community in the study area
10 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under
11 Alternative 1C. Managed wetland community would not be significantly impacted because periodic
12 inundation is already experienced by most of the land that would be affected. There could be
13 increased management problems and a long-term shift in plant species composition. The periodic
14 inundation would not be expected to result in a net permanent reduction in the acreage of this
15 community in the study area. Therefore, there would be a less-than-significant impact on the
16 community.

17 **Impact BIO-26: Modification of Managed Wetland Natural Community from Ongoing** 18 **Operation, Maintenance and Management Activities**

19 Once the physical facilities associated with Alternative 1C are constructed and the stream flow
20 regime associated with changed water management is in effect, there would be new ongoing and
21 periodic actions associated with operation, maintenance and management of the BDCP facilities and
22 conservation lands that could affect managed wetland natural community in the study area. The
23 ongoing actions include the diversion of Sacramento River flows in the north Delta, reduced
24 diversions from south Delta channels, and recreational use of reserve areas. These actions are
25 associated with CM1 and CM11 (see the impact discussion above for effects associated with CM2).
26 The periodic actions would involve access road and conveyance facility repair, vegetation
27 management at the various water conveyance facilities and habitat restoration sites (CM11), levee
28 and canal repair and replacement of levee armoring, channel dredging, and habitat enhancement in
29 accordance with natural community management plans. The potential effects of these actions are
30 described below.

- 31 ● *Modified river flows upstream of and within the study area and reduced diversions from south*
32 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
33 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
34 channels (associated with Operational Scenario A) would not result in the reduction in acreage
35 of the managed wetland natural community in the study area. Flow levels in the upstream rivers
36 would not change to the degree that water levels in adjacent managed wetlands would be
37 altered. Similarly, increased diversions of Sacramento River flows in the north Delta would not
38 result in a permanent reduction in the managed wetland community downstream of these
39 diversions. The majority of the managed wetlands below the diversions is not directly connected
40 to the rivers. Reduced diversions from the south Delta channels would not create a reduction in
41 this natural community.
- 42 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
43 conveyance facilities and levees associated with the BDCP actions have the potential to require
44 removal of adjacent vegetation and could entail earth and rock work in managed wetland

1 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering
 2 managed wetlands. These activities would be subject to normal erosion, turbidity and runoff
 3 control management practices, including those developed as part of *AMM2 Construction Best*
 4 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
 5 vegetation removal or earthwork adjacent to or within managed wetland habitats would require
 6 use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces.
 7 Proper implementation of these measures would avoid permanent adverse effects on this
 8 community.

- 9 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical
 10 treatment, would be a periodic activity associated with the long-term maintenance of water
 11 conveyance facilities and restoration sites. Vegetation management is also the principal activity
 12 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to
 13 control nuisance vegetation could pose a long-term hazard to managed wetland natural
 14 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of
 15 herbicides, uncontrolled runoff of contaminated stormwater onto the community, or direct
 16 discharge of herbicides to managed wetland areas being treated for invasive species removal.
 17 Environmental commitments and *AMM5 Spill Prevention, Containment and Countermeasure Plan*
 18 have been made part of the BDCP to reduce hazards to humans and the environment from use of
 19 various chemicals during maintenance activities, including the use of herbicides. These
 20 commitments are described in Appendix 3B, including the commitment to prepare and
 21 implement spill prevention, containment, and countermeasure plans and stormwater pollution
 22 prevention plans. Best management practices, including control of drift and runoff from treated
 23 areas, and use of herbicides approved for use in aquatic and terrestrial environments would also
 24 reduce the risk of affecting natural communities adjacent to water conveyance features and
 25 levees associated with restoration activities.

26 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
 27 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
 28 The treatment activities would be conducted in concert with the California Department of
 29 Boating and Waterways' invasive species removal program. Eliminating large stands of water
 30 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
 31 by removing cover for nonnative predators, improving water flow and removing barriers to
 32 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
 33 benefit terrestrial species that use managed wetland natural community for movement
 34 corridors and for foraging. Vegetation management effects on individual species are discussed in
 35 the species sections on following pages.

- 36 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural
 37 communities within the Plan Area (CM11). For the managed wetland natural community, a
 38 management plan would be prepared that specifies actions to improve the value of the habitats
 39 for covered species. Actions would include control of invasive nonnative plant and animal
 40 species, fire management, restrictions on vector control and application of herbicides, and
 41 maintenance of infrastructure that would allow for movement through the community. The
 42 enhancement efforts would improve the long-term value of this community for both special-
 43 status and common species.
- 44 ● *Recreation.* The BDCP would allow hunting, fishing and hiking in managed wetland reserve
 45 areas. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section
 46 3.4.11) describes this program and identifies applicable restrictions on recreation that might

1 adversely affect managed wetland habitat. BDCP also includes an avoidance and minimization
2 measure (AMM37) that further dictates limits on recreation activities that might affect this
3 natural community. Hunting would be the dominant activity in fall and winter months, while
4 fishing and hiking would be allowed in non-hunting months.

5 The various operations and maintenance activities described above could alter acreage of managed
6 wetland natural community in the study area through facilities maintenance, vegetation
7 management, and recreation. Activities could also introduce sediment and herbicides that would
8 reduce the value of this community to common and sensitive plant and wildlife species. Other
9 periodic activities associated with the Plan, including management, protection and enhancement
10 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
11 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
12 community. While some of these activities could result in small changes in acreage, these changes
13 would be offset by restoration activities planned as part of *CM10 Nontidal Marsh Restoration and*
14 *CM4 Tidal Natural Communities Restoration*, and protection and restoration actions associated with
15 *CM3 Natural Communities Protection and Restoration*. Recreation activity effects would be
16 minimized by AMM37 (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). The
17 management actions associated with levee repair and control of invasive plant species would also
18 result in a long-term benefit to the species associated with managed wetland habitats by improving
19 water movement.

20 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
21 Alternative 1C would not result in a net permanent reduction in acreage of the managed wetland
22 natural community within the study area. Therefore, there would be no adverse effect on this
23 natural community.

24 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would
25 have the potential to create minor changes in total acreage of managed wetland natural community
26 in the study area, and could create temporary increases in turbidity and sedimentation. The
27 activities could also introduce herbicides periodically to control nonnative, invasive plants. Hunting
28 could intermittently reduce the availability of this community to special-status and common wildlife
29 species. Implementation of environmental commitments and AMM2, AMM4, AMM5 and AMM37
30 would minimize these impacts, and other operations and maintenance activities, including
31 management, protection and enhancement actions associated with *CM3 Natural Communities*
32 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
33 create positive effects, including improved water movement in and adjacent to these habitats. Long-
34 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and *CM4 Tidal Natural*
35 *Communities Restoration*, and protection and restoration actions associated with *CM3 Natural*
36 *Communities Protection and Restoration* would greatly expand the ecological functions of this natural
37 community in the study area. Ongoing operation, maintenance and management activities would not
38 result in a net permanent reduction in this sensitive natural community within the study area.
39 Therefore, there would be a less-than-significant impact.

40 **Other Natural Seasonal Wetland**

41 The other natural seasonal wetlands natural community encompasses all the remaining natural (not
42 managed) seasonal wetland communities other than vernal pools and alkali seasonal wetlands.
43 These areas mapped by CDFW (Hickson and Keeler-Wolf 2007) and ICF biologists (the western area
44 of additional analysis; see Figure 12-1) consist of seasonally ponded, flooded, or saturated soils

1 dominated by grasses, sedges, or rushes. The largest segments of this community in the study area
 2 are located along the Cosumnes River northeast of Thornton, and in the western extension of the
 3 study area northwest of Rio Vista. Most of the smaller mapped areas are located in the Suisun Marsh
 4 ROA on the western edge of the Montezuma Hills, in the interior of the Potrero Hills, and in the
 5 western transmission corridor that extends west from CZ 1. There are also other natural seasonal
 6 wetlands mapped along Old River and Middle River in CZ 7 (Figure 12-1). The only BDCP
 7 conservation measures that would potentially affect this natural community are construction of
 8 water conveyance facilities (CM1) and seasonally inundated floodplain restoration (CM5) (see Table
 9 12-1C-10). These conservation measures would have an adverse effect on other natural seasonal
 10 wetland complex, but with the implementation of restoration actions associated with alkali seasonal
 11 wetland complex and vernal pool complex, and Mitigation Measure BIO-27, the effects would not be
 12 adverse for NEPA purposes and less than significant for CEQA purposes.

13 **Table 12-1C-10. Changes in Other Natural Seasonal Wetland Associated with Alternative 1C**
 14 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	2	2	2	2	0	0
CM2	0	0	0	0	0	0
CM4	0	0	0	0	0	0
CM5	0	0	0	0	0	2
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	2	2	2	2	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

Unk. = unknown

15

16 **Impact BIO-27: Modification of Other Natural Seasonal Wetland Natural Community as a**
 17 **Result of Implementing BDCP Conservation Measures**

18 Construction that would be required for implementing Alternative 1C *CM1 Water Facilities and*
 19 *Operation* would result in the permanent and temporary loss of other natural seasonal wetland
 20 community (2 acres permanent loss and 2 acres temporary loss). The 4-acre loss would represent
 21 less than 1% of the 842 acres of this community mapped in the study area. The losses would occur
 22 in the near-term timeframe along the permanent transmission corridor that would extend westward
 23 from the Plan Area just northwest of Rio Vista along Flannery, Goose Haven and Lambie Roads (see
 24 Terrestrial Biology Mapbook). These natural seasonal wetlands occupy low areas that extend both
 25 north and south of these roads.

1 Restoration activities planned as part of *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*
2 *Restoration* would increase the amount of seasonal wetlands in the study area by 139 acres; 98 acres
3 would be restored in the near-term. *CM3 Natural Communities Protection and Restoration* would
4 protect 750 acres of seasonal wetland (vernal pool complex and alkali seasonal wetland complex)
5 over the course of Alternative 1C implementation; 520 of these acres would be protected in the
6 near-term. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would
7 indicate 8 acres of protection and 4 acres of restoration would be needed to offset (i.e., mitigate) the
8 4-acre loss.

9 Based on theoretical footprints, *CM5 Seasonally Inundated Floodplain Restoration* could expose 2
10 acres of other natural seasonal wetland community to additional flooding as channel margins are
11 modified and levees are set back to improve fish habitat along some of the major rivers and
12 waterways throughout the study area. Specific locations for this restoration activity have not been
13 identified, but they would likely be focused in the south Delta area, along the major rivers and Delta
14 channels, including the channel of Old River. The exposure of these seasonal wetlands to increased
15 but infrequent episodes of stream flooding would not alter their ecological function or species
16 composition. Their value to special-status and common plants and wildlife in the study area would
17 not be affected. The effects of this inundation on wildlife and plant species are described in detail in
18 later sections of this chapter.

19 **NEPA Effects:** As indicated in discussion of impacts on alkali seasonal wetland complex above, the
20 Plan does not include sufficient protection and restoration to fully offset effects created by
21 Alternative 1C on alkali seasonal wetland complex, so its protection and restoration activity cannot
22 be used to offset effects on other natural seasonal wetland. Similarly, vernal pool restoration
23 provided in the Plan (up to 67 acres) is only sufficient to offset anticipated Plan effects. Vernal pool
24 protection (600 acres) more than offsets the estimated 438-acre loss. Without additional mitigation
25 in the form of seasonal wetland restoration, the modification of the other natural seasonal wetland
26 natural community under Alternative 1C would have an adverse effect on other natural seasonal
27 wetland. Mitigation Measure BIO-27, *Compensate for Loss of Other Natural Season Wetland*, is
28 available to address this effect. The small increase in periodic flooding due to CM5 would not alter
29 the function or general species makeup of the other natural wetland natural community and,
30 therefore, would have no adverse effect.

31 **CEQA Conclusion:** An estimated 2 acres of other natural seasonal wetland community in the study
32 area would be subjected to more frequent inundation from flood flows as a result of implementing
33 CM5 under Alternative 1C. A small seasonal increase in periodic flooding would not alter the natural
34 community's ecological function or species composition, and the periodic inundation would not
35 result in a net permanent reduction in the acreage of this community in the study area. Therefore,
36 increased periodic flooding due to CM5 would have a less-than-significant impact on the other
37 seasonal wetland natural community.

38 Alternative 1C would eliminate 4 acres of other natural seasonal wetland complex through
39 construction of the western transmission corridor northwest of Rio Vista. The construction loss of
40 this special-status natural community would represent a significant impact if it were not offset by
41 other conservation actions. Loss of other natural seasonal wetland natural community would be
42 considered both a loss in acreage of a sensitive natural community and potentially a loss of wetland
43 as defined by Section 404 of the CWA. The restoration of 139 acres (CM9) and protection and
44 enhancement of 750 acres (CM3) of vernal pool complex and alkali seasonal wetland complex over
45 the course of Alternative 1C implementation would fully offset the losses associated with CM1.

1 Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 8
2 acres of protection and 4 acres of restoration would be needed to offset (i.e., mitigate) the 4 acre
3 loss. However, because Alternative 1C would remove more vernal pool complex and alkali seasonal
4 wetland complex than provided for in BDCP conservation measures, there would be no restoration
5 actions that would fully offset the loss of other natural seasonal wetland. There would be a net
6 reduction in the acreage of this natural community in the study area. Therefore, Alternative 1C
7 would have a significant impact on other natural seasonal wetland. Implementation of Mitigation
8 Measure BIO-27 would reduce this impact to a less-than-significant level.

9 **Mitigation Measure BIO-27: Compensate for Loss of Other Natural Seasonal Wetland**

10 To fully compensate for loss of other natural seasonal wetland as a result of implementing
11 Alternative 1C, DWR shall increase the near-term and late long-term goals for restoration of
12 seasonal wetland by 4 acres.

13 **Impact BIO-28: Modification of Other Natural Seasonal Wetland Natural Community from** 14 **Ongoing Operation, Maintenance and Management Activities**

15 Once the physical facilities associated with Alternative 1C are constructed and the stream flow
16 regime associated with changed water management is in effect, there would be new ongoing and
17 periodic actions associated with operation, maintenance and management of the BDCP facilities and
18 conservation lands that could affect other natural seasonal wetland natural community in the study
19 area. The ongoing actions include the diversion of Sacramento River flows in the north Delta, and
20 reduced diversions from south Delta channels. These actions are associated with CM1. The periodic
21 actions would involve access road and conveyance facility repair, vegetation management at the
22 various water conveyance facilities and habitat restoration sites (CM11), levee repair and
23 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with
24 natural community management plans. The potential effects of these actions are described below.

- 25 • *Modified river flows upstream of and within the study area and reduced diversions from south*
26 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
27 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
28 channels (associated with Operational Scenario A) would not affect other natural seasonal
29 wetland natural community. The small areas mapped in the study area are not in or adjacent to
30 streams that would experience changes in water levels as a result of these operations.
- 31 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
32 conveyance facilities and levees associated with the BDCP actions have the potential to require
33 removal of adjacent vegetation and could entail earth and rock work in other natural seasonal
34 wetland habitats. This activity could lead to increased soil erosion and runoff entering these
35 habitats. These activities would be subject to normal erosion and runoff control management
36 practices, including those developed as part of *AMM2 Construction Best Management Practices*
37 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or
38 earthwork adjacent to or within other natural seasonal wetland habitats would require use of
39 sediment barriers, soil stabilization and revegetation of disturbed surfaces as required by
40 *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper implementation of
41 these measures would avoid permanent adverse effects on this community.
- 42 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
43 treatment, would be a periodic activity associated with the long-term maintenance of water

1 conveyance facilities and restoration sites. Vegetation management is also the principal activity
 2 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to
 3 control nuisance vegetation could pose a long-term hazard to the other natural seasonal wetland
 4 natural community at or adjacent to treated areas. The hazard could be created by uncontrolled
 5 drift of herbicides, uncontrolled runoff of contaminated stormwater onto the natural
 6 community, or direct discharge of herbicides to wetland areas being treated for invasive species
 7 removal. Environmental commitments and *AMM5 Spill Prevention, Containment and*
 8 *Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and the
 9 environment from use of various chemicals during maintenance activities, including the use of
 10 herbicides. These commitments are described in Appendix 3B, including the commitment to
 11 prepare and implement spill prevention, containment, and countermeasure plans and
 12 stormwater pollution prevention plans. Best management practices, including control of drift
 13 and runoff from treated areas, and use of herbicides approved for use in terrestrial or aquatic
 14 environments would also reduce the risk of affecting natural communities adjacent to water
 15 conveyance features and levees associated with restoration activities.

- 16 ● *Habitat enhancement*. The BDCP includes a long-term management element for the natural
 17 communities within the Plan Area (CM11). For the other natural seasonal wetland natural
 18 community, a management plan would be prepared that specifies actions to improve the value
 19 of the habitats for covered species. Actions would include control of invasive nonnative plant
 20 and animal species, fire management, restrictions on vector control and application of
 21 herbicides, and maintenance of infrastructure that would allow for movement through the
 22 community. The enhancement efforts would improve the long-term value of this community for
 23 both special-status and common species.

24 The various operations and maintenance activities described above could alter acreage of other
 25 natural seasonal wetland natural community in the study area. Activities could introduce sediment
 26 and herbicides that would reduce the value of this community to common and sensitive plant and
 27 wildlife species. Other periodic activities associated with the Plan, including management,
 28 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
 29 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
 30 enhance the value of the community. While some of these activities could result in small changes in
 31 acreage, these changes would be minor. The restoration activities planned as part of *CM9 Vernal*
 32 *Pool and Alkali Seasonal Wetland Complex Restoration*, the protection activities planned as part of
 33 *CM3 Natural Communities Protection and Restoration*, the mitigation measure proposed above for
 34 other seasonal wetland, and implementation of AMM2, AMM4, AMM5, and AMM10 would offset any
 35 loss of this community. The vernal pool complex conservation measure includes restoration of 139
 36 acres of seasonal wetlands with similar ecological values as the other natural seasonal wetland
 37 community. The management actions associated with control of invasive plant species would also
 38 result in a long-term benefit to the species associated with other natural seasonal wetland habitats
 39 by eliminating competitive, invasive species of plants.

40 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
 41 Alternative 1C would not result in a net permanent reduction in the other natural seasonal wetland
 42 natural community within the study area. Therefore, there would be no adverse effect to the
 43 community.

1 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would
2 have the potential to create minor changes in total acreage of other natural seasonal wetland natural
3 community in the study area, and could create temporary increases in sedimentation. The activities
4 could also introduce herbicides periodically to control nonnative, invasive plants. Implementation of
5 environmental commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts,
6 and other operations and maintenance activities, including management, protection and
7 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
8 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
9 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration
10 activities associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*,
11 protection actions associated with *CM3 Natural Communities Protection and Restoration*, and
12 Mitigation Measure BIO-27, *Compensate for Loss of Other Natural Seasonal Wetland*, would ensure
13 that the ecological values provided by this small natural community would not decrease in the study
14 area. Ongoing operation, maintenance and management activities would not result in a net
15 permanent reduction in this natural community within the study area. Therefore, there would be a
16 less-than-significant impact.

17 **Grassland**

18 Construction, operation, maintenance and management associated with the conservation
19 components of Alternative 1C would have no long-term adverse effects on the habitats associated
20 with the grassland natural community. Initial development and construction of CM1, CM2, CM4,
21 CM5, CM6, CM7, CM11 and CM18 would result in both permanent and temporary removal of this
22 community (see Table 12-1C-11). Full implementation of Alternative 1C would also include the
23 following conservation actions over the term of the BDCP to benefit the grassland natural
24 community.

- 25 ● Protect 8,000 acres of grassland with at least 2,000 acres protected in Conservation Zone 1, at
26 least 1,000 acres protected in Conservation Zone 8, and at least 2,000 acres protected in
27 Conservation Zone 11 (Objective GNC1.1, associated with CM3)
- 28 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland and to
29 provide upland habitat adjacent to riparian, tidal, and nontidal natural communities for wildlife
30 foraging and upland refugia (Objective GNC1.2, associated with CM3 and CM8)
- 31 ● Of the 8,000 acres of grassland protected and at least 2,000 acres of grassland restored, protect
32 or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide 200 feet
33 of adjacent grasslands beyond the sea level rise accommodation (Objective GNC1.4, associated
34 with CM3 and CM8)

35 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
36 3.3 that would improve the value of grassland natural community for terrestrial species. As
37 explained below, with the protection, restoration and enhancement of the amounts of habitat listed
38 in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural community
39 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-11. Changes in Grassland Natural Community Associated with Alternative 1C (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	358	358	320	320	0	0
CM2	388	388	239	239	385-1,277	0
CM4	448	1,122	0	0	0	0
CM5	0	51	0	34	0	514
CM6	Unk.	Unk.	Unk.	Unk.	0	0
CM7	4	410	0	0	0	0
CM11	13	50	0	0	0	0
CM18	35	35	0	0	0	0
TOTAL IMPACTS	1,246	2,414	559	593	385-1,277	514

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

2

3 **Impact BIO-29: Changes in Grassland Natural Community as a Result of Implementing BDCP**
4 **Conservation Measures**

5 Construction, land grading and habitat restoration activities that would accompany the
6 implementation of CM1, CM2, CM4, CM5, CM6, CM7, CM11 and CM18 would permanently eliminate
7 an estimated 2,364 acres and temporarily remove 593 acres of grassland natural community in the
8 study area. These modifications represent approximately 4% of the 78,047 acres of the community
9 that is mapped in the study area. Approximately 60% of the permanent and temporary losses would
10 happen during the first 10 years of Alternative 1C implementation, as water conveyance facilities
11 are constructed and habitat restoration is initiated. Grassland protection (2,000 acres), restoration
12 (1,140 acres) and enhancement would be initiated during the same period, which would partially
13 offset the losses. By the end of the Plan period, 2,000 acres of this natural community would be
14 restored and 8,000 acres would be protected. The BDCP beneficial effects analysis for grassland
15 (BDCP Chapter 5, Section 5.4.11.2) indicates that 8,000 acres of grasslands would be protected in
16 Conservation Zones 1, 2, 4, 5, 7, 8, and 11, and 2,000 acres of grassland would be restored. Grassland
17 protection and restoration would improve connectivity among habitat areas in and adjacent to the
18 Plan Area, improve genetic interchange among native species' populations, and contribute to the
19 long-term conservation of grassland-associated covered species. The same conservation actions
20 would be implemented with Alternative 1C.

1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1C water conveyance
5 facilities would permanently remove 358 acres and temporarily remove 320 acres of grassland
6 natural community. The permanent losses would occur at various locations along the western
7 canal route and at the intake sites along the Sacramento River. Small areas of primarily ruderal
8 herbaceous grasses and forbs would be permanently removed at all five intakes on the west
9 bank of the Sacramento River and along the canal route at Winchester Lake and the east bank of
10 the Sacramento River Deep Water Ship Channel. Larger areas of annual grassland would be
11 permanently removed by canal construction south of Rock Slough, south of Discovery Bay and
12 immediately west of Clifton Court Forebay. Both temporary and permanent losses of grassland
13 would be created by constructing transmission corridors west of the Plan Area and along the
14 tunnel alignment in the west Delta. Temporary losses would be at siphon construction areas at
15 Elk Slough, Miner Slough, Rock Slough and Italian Slough; at safe haven work areas on Bethel
16 Island and just south of Dutch Slough; and at railroad work areas just southwest of Clifton Court
17 Forebay (see the Terrestrial Biology Mapbook for locations). These losses would take place
18 during the near-term construction period.

19 The construction activity associated with CM1 also has the potential to lead to increased
20 nitrogen deposition in grassland habitats in the vicinity of Clifton Court Forebay. A significant
21 number of cars, trucks, and land grading equipment involved in construction in and around the
22 forebay would emit small amounts of atmospheric nitrogen from fuel combustion; this material
23 could be deposited in sensitive grassland areas that are located west of the major construction
24 areas at Clifton Court Forebay. Nitrogen deposition can pose a risk of adding a fertilizer to
25 nitrogen-limited soils and their associated plants. Nonnative invasive species can be encouraged
26 by the added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related*
27 *Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been
28 concluded that this potential deposition would pose a low risk of changing the grassland in and
29 adjacent to the construction areas because the construction would contribute a negligible
30 amount of nitrogen to regional projected emissions and the existing grassland is dominated by
31 nonnative invasive species of plants. Also, the construction at Clifton Court Forebay would occur
32 primarily downwind of the natural community. No adverse effect is expected.

- 33 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of
34 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
35 stilling basin improvements, Putah Creek realignment activities, Toe Drain/Tule Canal and
36 Lisbon Weir modification and Sacramento Weir improvements. All of these activities could
37 involve excavation and grading in grassland areas to improve passage of fish through the
38 bypasses. Based on hypothetical construction footprints, a total of 388 acres could be
39 permanently lost and another 239 acres could be temporarily removed. Most of the grassland
40 losses would occur at the north end of the bypass below Fremont Weir where a large expanse of
41 grassland is present, along the Toe Drain/Tule Canal, and along the west side channels. These
42 grasslands are composed primarily of upland annual grassland and forbs. Some of this grassland
43 removal along the side channels of the bypass could pose barriers to grassland species moving
44 within the bypass. These losses would occur primarily in the near-term timeframe.
- 45 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
46 footprints, implementation of CM4 would permanently inundate or remove 448 acres of

1 grassland in the near-term and inundate or remove 1,122 acres of grassland by the end of the
2 Plan timeframe. The losses would occur in a number of ROAs established for tidal restoration
3 (see Figure 12-1). The largest losses would likely occur in the vicinity of Cache Slough, on
4 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
5 bands adjacent to waterways in the South Delta ROA. Most of this grassland is ruderal and
6 herbaceous vegetation with low habitat value; some of the larger patches of grassland in the
7 Cache Slough ROA are annual grassland with higher values.

- 8 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
9 would permanently remove 51 acres and temporarily remove 34 acres of grassland natural
10 community. The construction-related losses would be considered a permanent removal of the
11 habitats affected. These losses would be expected to occur along the San Joaquin River and other
12 major waterways in CZ 7 (see Figure 12-1). The grassland in this area is primarily composed of
13 narrow bands and small patches of ruderal herbaceous grasses and forbs. This activity is
14 scheduled to start following construction of water conveyance facilities, which is expected to
15 take 10 years.
- 16 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
17 removal of small amounts of grassland natural community along 20 miles of river and sloughs.
18 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
19 activity would occur along waterway margins where grassland habitat stringers exist, including
20 along levees and channel banks. The improvements would occur within the study area on
21 sections of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter
22 Sloughs.
- 23 ● *CM7 Riparian Natural Community Restoration*; Riparian natural community restoration would
24 occur in a variety of settings in the Plan Area, with an emphasis on improving connectivity of
25 existing riparian areas and stream/river corridors, to benefit the movement and interchange of
26 special-status and common species that use these areas. Large tracts would be restored in
27 concert with floodplain restoration (CM5), while narrower bands would be developed as part of
28 channel margin enhancement (CM6) and tidal marsh restoration (CM4). In the process of
29 expanding woody riparian habitat, existing nonnative grassland would be removed. While
30 specific locations for these restoration activities have not been fully developed, use of
31 theoretical footprints for this activity indicate that up to 410 acres of grassland could be lost
32 through the course of Alternative 1C implementation. A majority of this activity would occur in
33 the South Delta and Cosumnes/Mokelumne ROAs (see Figure 12-1).
- 34 ● *CM8 Grassland Natural Community Restoration*: The grassland natural community would be
35 restored primarily on the fringes of the Delta, where upland areas merge with Delta wetland and
36 agricultural lands. Restoration would focus on CZs 1, 8, and 11, as proposed by BDCP Objective
37 GNC1.1 (Figure 12-1), with a goal of improving habitat connectivity and increasing the diversity
38 of grassland species (BDCP Objective GNC1.2). Some of the planned 2,000 acres of restoration
39 would occur around existing populations of giant garter snake in the east Delta and the Yolo
40 Bypass area.
- 41 ● *CM11 Natural Communities Enhancement and Management*: Natural communities enhancement
42 and management would include a wide range of activities designed to improve habitat
43 conditions in restored and protected lands associated with the BDCP. This measure also
44 promotes sound use of pesticides, vector control activities, invasive species control and fire
45 management in preserve areas. To improve the public's ability to participate in recreational

1 activities in and adjacent to restored and protected habitats, a system of trails is proposed. The
2 location and extent of this system are not yet known, so the analysis of this activity is
3 programmatic. At the current level of planning, it is assumed that the trail system would be
4 located entirely in grassland habitats and would include up to 50 acres of habitat loss.

- 5 • *CM18. Conservation Hatcheries:* The BDCP includes a proposal to design and construct a
6 conservation hatchery to maintain populations of delta smelt and longfin smelt. The location of
7 this facility is not yet firmly established, but for planning purposes it has been assumed that it
8 would be constructed in the vicinity of Rio Vista and would be located in grassland habitat. The
9 grassland in the Rio Vista area includes both California annual grassland and ruderal herbaceous
10 grasses and forbs. The current estimate of the land needed for this facility is 35 acres.

11 The following paragraphs summarize the combined effects discussed above and describe other
12 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
13 also included.

14 ***Near-Term Timeframe***

15 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 1C would
16 affect the grassland natural community through CM1 construction losses (358 acres permanent and
17 320 acres temporary), CM2 construction losses (388 acres permanent and 239 acres temporary),
18 CM11 recreational trail construction (13 acres permanent), CM18 fish hatchery construction (35
19 acres permanent), and CM7 riparian habitat restoration (4 acres permanent). These losses would
20 occur at Sacramento River intake sites, at various locations along the west canal corridor, along
21 transmission corridors west of the Plan Area and along the tunnel route, in the northern Yolo
22 Bypass, and along the east and west channels within the Yolo Bypass. Approximately 448 acres of
23 the inundation and construction-related losses in habitat from CM4 would occur in the near-term.
24 These losses would occur throughout the ROAs mapped in Figure 12-1.

25 The construction losses of this natural community would not represent an adverse effect based on
26 the significance criteria used for this chapter because grassland is not considered a special-status or
27 sensitive natural community. Most Central Valley grasslands are dominated by nonnative annual
28 grasses and herbs. However, the importance of grassland as a habitat that supports life stages of
29 numerous special-status plants and wildlife is well documented (see BDCP Chapter 3, *Conservation*
30 *Strategy*). The significance of losses in grassland habitat is, therefore, discussed in more detail in
31 species analyses later in this chapter. The combination of restoring 1,140 acres (CM8) and
32 protecting 2,000 acres (CM3) of grassland natural community during the first 10 years of
33 Alternative 1C implementation, and the commitment to restore temporarily affected grassland (559
34 acres) to its pre-project condition within one year of completing construction as required by *AMM10*
35 *Restoration of Temporarily Affected Natural Communities*, would offset this near-term loss and avoid
36 any loss in the availability of this habitat for special-status species. The restoration of grassland
37 would include protection in perpetuity, and the protected and restored habitat would be managed
38 and enhanced to benefit special-status and common wildlife species (CM3 and CM11). Typical
39 project-level mitigation ratios (2:1 for protection) would indicate that 3,584 acres of protection
40 would be needed to offset (i.e., mitigate) the 1,792 acres of combined temporary and permanent
41 loss. The combination of restoration and protection, along with the enhancement and management
42 associated with CM3 and CM11 contained in the BDCP, is designed to avoid a temporal lag in the
43 value of grassland habitat available to sensitive species.

1 The Plan also includes commitments to implement *AMM1 Worker Training Awareness*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, and
3 *AMM7 Barge Operation Plan*. All of these AMMs include elements that avoid or minimize the risk of
4 affecting habitats at work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
5 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
6 *AMMs*, and *CMs*, of the Final EIR/EIS.

7 **Late Long-Term Timeframe**

8 Implementation of Alternative 1C as a whole would result in relatively minor (less than 4%) losses
9 of grassland natural community in the study area. These losses (2,364 acres of permanent and 593
10 acres of temporary loss) would be largely associated with construction of the water conveyance
11 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), inundation during tidal
12 marsh restoration (CM4), and riparian habitat restoration (CM7). Inundation losses would occur
13 during the course of the Plan's restoration activities at various tidal restoration sites throughout the
14 study area.

15 **NEPA Effects:** By the end of the Plan timeframe, a total of 2,000 acres of this natural community
16 would be restored (CM8) and 8,000 acres would be protected (CM3). The restoration would occur
17 primarily in CZs 1, 8, and 11, in the Cache Slough, Suisun Marsh and Clifton Court Forebay areas.
18 Temporarily affected grassland would also be restored following construction activity. The 2,000
19 acres of restoration associated with CM8, and the restoration of temporarily affected grassland
20 required by AMM10 (593 acres for Alternative 1C) would not totally replace the grassland acres lost
21 through the Plan timeframe (2,957 acres). There would be a permanent loss of 364 acres of
22 grassland in the study area. However, the combination of restoration, protection and enhancement
23 of grassland associated with Alternative 1C would improve the habitat value of this community in
24 the study area; there would not be an adverse effect on the grassland natural community.

25 **CEQA Conclusion:**

26 **Near-Term Timeframe**

27 Alternative 1C would result in the loss of approximately 1,792 acres of grassland natural community
28 due to construction of the water conveyance facilities (CM1), fish passage improvements (CM2),
29 recreational trails (CM11) and a fish hatchery (CM18); riparian habitat restoration (CM7) and
30 inundation during tidal marsh restoration (CM4). These losses would occur at Sacramento River
31 intake sites, at various locations along the western canal corridor, along the western and tunnel
32 transmission corridors, at currently unspecified sites for hatchery and recreational trail
33 construction and riparian habitat restoration, in the northern Yolo Bypass, along the east and west
34 channels within the Yolo Bypass, and at inundation sites at various tidal restoration sites throughout
35 the study area. The construction losses would be spread across a 10-year near-term timeframe.

36 The construction losses of this natural community would not represent a significant impact based
37 on the significance criteria used for this chapter because grassland is not considered a special-status
38 or sensitive natural community. These losses would be offset by planned restoration of 1,140 acres
39 of grassland (CM8), protection of 2,000 acres of grassland (CM3), and the commitment to restore
40 temporarily affected grassland (559 acres) to its pre-project condition within one year of
41 completing construction (required by *AMM10 Restoration of Temporarily Affected Natural*
42 *Communities*). All of these offsets would be scheduled for the first 10 years of Alternative 1C
43 implementation. Typical project-level mitigation ratios (2:1 for protection) would indicate that

1 3,584 acres of protection would be needed to offset (i.e., mitigate) the 1,792 acres of loss. AMM1,
2 AMM2, AMM6, and AMM7 would also be implemented to minimize impacts. Because of these
3 offsetting near-term restoration and protection activities and AMMs, and because grassland is not a
4 special-status natural community, the impacts would be less than significant.

5 **Late Long-Term Timeframe**

6 At the end of the Plan period, 2,957 acres of grassland natural community would be permanently or
7 temporarily removed by conservation actions, 2,000 acres would be restored and 8,000 acres would
8 be protected. Temporarily affected areas would also be restored (593 acres for Alternative 1C).
9 While there would be a net permanent reduction in the acreage of this natural community within
10 the study area (total loss of 364 acres), there would be an increase in the value of grassland for
11 special-status and common species in the study area through the combination of conservation
12 actions (CM3 and CM8) and avoidance and minimization measures (AMM1, AMM2, AMM6, AMM7,
13 and AMM10). Therefore, Alternative 1C would have a less-than-significant impact on this natural
14 community.

15 **Impact BIO-30: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
16 **Grassland Natural Community**

17 Two Alternative 1C conservation measures would modify the inundation/flooding regimes of both
18 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
19 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
20 of grassland natural community at scattered locations, while CM5 would expose this community to
21 additional flooding as channel margins are modified and levees are set back to improve fish habitat
22 along some of the major rivers and waterways of the study area.

- 23 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 1C
24 would result in an increase in the frequency, magnitude and duration of inundation of 385–
25 1,277 acres of grassland natural community. The methods used to estimate this inundation
26 acreage are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*.
27 The area more frequently affected by inundation would vary with the flow volume that would
28 pass through the newly constructed notch in the Fremont Weir. The 385-acre increase in
29 inundation would occur at the 1,000 cfs flow regime, while the 1,277-acre increase would occur
30 at the 4,000 cfs flow regime. Plan-related increases in flow through Fremont Weir would be
31 expected in 30% of the years. The grassland community occurs throughout the bypass, including
32 a large acreage just below Fremont Weir in the north end of the bypass, in stringers along the
33 internal waterways of the bypass and in larger patches in the lower bypass. The anticipated
34 change in management of flows in the Yolo Bypass includes more frequent releases in flows into
35 the bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the
36 bypass in spring months (April and May). The modification of periodic inundation events would
37 not adversely affect grassland habitats, as they have persisted under similar high flows and
38 extended inundation periods. There is the potential for some change in grass species
39 composition as a result of longer inundation periods. The effects of this inundation on wildlife
40 and plant species are described in detail in later sections of this chapter.
- 41 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
42 increase in the frequency and duration of inundation of 514 acres of grassland habitats. Specific
43 locations for this restoration activity have not been identified, but they would likely be focused
44 in the south Delta area, along the major rivers and Delta channels in CZ 7 (see Figure 12-1). The

1 increase in periodic stream flooding events would not adversely affect the habitat values and
2 functions of grassland natural community.

3 In summary, from 899–1,791 acres of grassland natural community in the study area would be
4 subjected to more frequent inundation as a result of implementing two Alternative 1C conservation
5 measures (CM2 and CM5).

6 **NEPA Effects:** The grasslands in the Yolo Bypass and along river floodplains in the south Delta are
7 conditioned to periodic inundation; therefore, periodic inundation would not result in a net
8 permanent reduction in the acreage of this community in the study area. Increasing periodic
9 inundation of grassland natural community in the Yolo Bypass and along south Delta waterways
10 would not constitute an adverse effect.

11 **CEQA Conclusion:** An estimated 899–1,791 acres of grassland natural community in the study area
12 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under
13 Alternative 1C. The grassland natural community is conditioned to periodic inundation; therefore,
14 periodic inundation would not result in a net permanent reduction in the acreage of this community
15 in the study area. Increasing periodic inundation of grassland natural community in the Yolo Bypass
16 and along south Delta waterways would have a less-than-significant impact on the community.

17 **Impact BIO-31: Modification of Grassland Natural Community from Ongoing Operation,** 18 **Maintenance and Management Activities**

19 Once the physical facilities associated with Alternative 1C are constructed and the stream flow
20 regime associated with changed water management is in effect, there would be new ongoing and
21 periodic actions associated with operation, maintenance and management of the BDCP facilities and
22 conservation lands that could affect grassland natural community in the study area. The ongoing
23 actions include the diversion of Sacramento River flows in the north Delta, and reduced diversions
24 from south Delta channels. These actions are associated with CM1 (see the impact discussion above
25 for effects associated with CM2). The periodic actions would involve access road and conveyance
26 facility repair, vegetation management at the various water conveyance facilities and habitat
27 restoration sites (CM11), levee repair and replacement of levee armoring, channel dredging, and
28 habitat enhancement in accordance with natural community management plans. The potential
29 effects of these actions are described below.

- 30 • *Modified river flows upstream of and within the study area and reduced diversions from south*
31 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
32 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
33 channels (associated with Operational Scenario A) would not result in the permanent reduction
34 in acreage of grassland natural community in the study area. Flow levels in the upstream rivers
35 would not change such that the acreage of this community would be reduced on a permanent
36 basis. The grassland along rivers upstream of planned north Delta diversions is primarily
37 ruderal vegetation on levee banks and is dependent on winter and spring rains for germination
38 and growth rather on than river levels. Similarly, increased diversions of Sacramento River
39 flows in the north Delta would not result in a permanent reduction in grassland natural
40 community downstream of these diversions. The reductions in flows below the intakes would
41 occur primarily in the wet months when the existing nonnative annual grasslands along river
42 levees are dormant, and like upstream grassland, this community is dependent on winter and
43 spring rains for germination and growth in the winter and spring months, not on river stage.
44 Anticipated small changes in river salinity in the west Delta and Suisun Marsh would not create

1 a substantial change in grassland acreage in these areas. Reduced diversions from south Delta
2 channels would not create a reduction in this natural community.

- 3 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
4 conveyance facilities and levees associated with the BDCP actions have the potential to require
5 removal of adjacent vegetation and could entail earth and rock work in grassland habitats. This
6 activity could lead to increased soil erosion and runoff entering these habitats. These activities
7 would be subject to normal erosion and runoff control management practices, including those
8 developed as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4*
9 *Erosion and Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within
10 grassland habitats would require use of sediment barriers, soil stabilization and revegetation of
11 disturbed surfaces (*AMM10 Restoration of Temporarily Affected Natural Communities*). Proper
12 implementation of these measures would avoid permanent adverse effects on this community.
- 13 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical
14 treatment, would be a periodic activity associated with the long-term maintenance of water
15 conveyance facilities and restoration sites. Vegetation management is also the principal activity
16 associated with *CM11 Natural Communities Enhancement and Management*. Use of herbicides to
17 control nuisance vegetation could pose a long-term hazard to grassland natural community at or
18 adjacent to treated areas. The hazard could be created by uncontrolled drift of herbicides,
19 uncontrolled runoff of contaminated stormwater onto the natural community, or direct
20 discharge of herbicides to grassland areas being treated for invasive species removal.
21 Environmental commitments and *AMM5 Spill Prevention, Containment and Countermeasure Plan*
22 have been made part of the BDCP to reduce hazards to humans and the environment from use of
23 various chemicals during maintenance activities, including the use of herbicides. These
24 commitments are described in Appendix 3B, including the commitment to prepare and
25 implement spill prevention, containment, and countermeasure plans and stormwater pollution
26 prevention plans. Best management practices, including control of drift and runoff from treated
27 areas, and use of herbicides approved for use in terrestrial environments would also reduce the
28 risk of affecting natural communities adjacent to water conveyance features and levees
29 associated with restoration activities.
- 30 ● *Channel dredging.* Long-term operation of the Alternative 1C intakes on the Sacramento River
31 would include periodic dredging of sediments that might accumulate in front of intake screens.
32 The dredging could occur adjacent to grassland natural community. This activity should not
33 permanently reduce the acreage of grassland natural community because it is periodic in
34 nature; the grassland in the vicinity of the proposed intakes is ruderal grasses and herbs with
35 low habitat value.
- 36 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural
37 communities within the Plan Area (CM11). For the grassland natural community, a management
38 plan would be prepared that specifies actions to improve the value of the habitats for covered
39 species. Actions would include control of invasive nonnative plant and animal species, fire
40 management, restrictions on vector control and application of herbicides, and maintenance of
41 infrastructure that would allow for movement through the community. The enhancement efforts
42 would improve the long-term value of this community for both special-status and common
43 species.

1 The various operations and maintenance activities described above could alter acreage of grassland
2 natural community in the study area through changes in flow patterns and changes in periodic
3 inundation of this community. Activities could also introduce sediment and herbicides that would
4 reduce the value of this community to common and sensitive plant and wildlife species. Other
5 periodic activities associated with the Plan, including management, protection and enhancement
6 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
7 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
8 community. While some of these activities could result in small changes in acreage, these changes
9 would be greatly offset by restoration activities planned as part of *CM8 Grassland Natural*
10 *Community Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, and AMM10. The
11 management actions associated with levee repair, periodic dredging and control of invasive plant
12 species would also result in a long-term benefit to the species associated with grassland habitats by
13 improving water movement in adjacent waterways and by eliminating competitive, invasive species
14 of plants.

15 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
16 Alternative 1C would not result in a net permanent reduction in the grassland natural community
17 within the study area. Therefore, there would be no adverse effect on this natural community.

18 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 1C would
19 have the potential to create minor changes in total acreage of grassland natural community in the
20 study area, and could create temporary increases in sedimentation. The activities could also
21 introduce herbicides periodically to control nonnative, invasive plants. Implementation of
22 environmental commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts,
23 and other operations and maintenance activities, including management, protection and
24 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
25 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
26 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration
27 activities associated with *CM8 Grassland Natural Community Restoration* and protection actions
28 associated with *CM3 Natural Communities Protection and Restoration* would increase the value of
29 this natural community in the study area. Ongoing operation, maintenance and management
30 activities would not result in a net permanent reduction in this natural community within the study
31 area. Therefore, there would be a less-than-significant impact.

32 **Inland Dune Scrub**

33 The inland dune scrub natural community is composed of vegetated, stabilized sand dunes
34 associated with river and estuarine systems. In the study area, the inland dune scrub community
35 includes approximately 20 acres of remnants of low-lying ancient stabilized dunes related to the
36 Antioch Dunes formation located near the town of Antioch (CZ 10; see Figure 12-1). While inland
37 dune scrub natural community is within the BDCP Plan Area, none of the Alternative 1C
38 conservation measures or covered actions is expected to affect this natural community.

39 **Cultivated Lands**

40 Cultivated lands is the major land-cover type in the study area (487,106 acres, see Table 12-1). The
41 Delta, the Yolo Bypass and the Cache Slough drainage are dominated by various types of agricultural
42 activities, with crop production the dominant element (see Figure 12-1). Major crops and cover
43 types in agricultural production include grain and hay crops (wheat, oats and barley), field crops
44 (corn, beans and safflower), truck crops (tomatoes, asparagus and melons), pasture (alfalfa, native

1 and nonnative pasture), rice, orchards, and vineyards. There are approximately 511,832 acres of
2 cultivated lands in the study area. Tables 12-2 and 12-3 list special-status wildlife species supported
3 by cultivated lands.

4 The effects of Alternative 1C on cultivated lands are discussed from various perspectives in this
5 document. Chapter 14, *Agricultural Resources*, contains a detailed analysis of cropland conversion as
6 it relates to agricultural productivity. Many of the discussions of individual terrestrial plant and
7 wildlife species later in this chapter also focus on the relevance of cultivated land loss. Because
8 cultivated lands is not a natural community and because the effects of its loss are captured in the
9 individual species analyses below, there is no separate analysis of this land cover type presented
10 here. Table 14-8 in Chapter 14 provides a comparison of important farmland losses from
11 construction of CM1 water conveyance facilities for each alternative, and Table 14A-1 in Appendix
12 14A, *Individual Crop Effects as a Result of BDCP Water Conveyance Facility Construction*, provides a
13 similar comparison for losses of individual crops. Table 12-ES-1 in this chapter's Summary of Effects
14 identifies the total cultivated land loss for all project alternatives. For Alternative 1C, the total
15 temporary and permanent loss is estimated to be 67,895 acres. The majority of the permanent loss
16 would be associated with habitat restoration activities, including Yolo Bypass fisheries enhancement
17 (CM2; 629 acres), tidal marsh restoration (CM4; 39,565 acres), floodplain restoration (CM5; 2,087
18 acres), riparian natural community restoration (CM7; 960 acres), grassland restoration (CM8; 2,000
19 acres) and nontidal marsh restoration (CM10; 1,950 acres). Construction of the western canal
20 alignment water conveyance facilities (CM1) would permanently remove 5,225 acres of cultivated
21 land.

22 **Developed Lands**

23 Additional lands in the study area that were not designated with a natural community type have
24 been characterized here as developed lands (90,660 acres). Developed lands include lands with
25 residential, industrial, and urban land uses, as well as landscaped areas, riprap, road surfaces and
26 other transportation facilities. (see Figure 12-1 and the Terrestrial Biology Mapbook). Developed
27 lands support some common plant and wildlife species, whose abundance and species richness vary
28 with the intensity of development. One special-status species, the giant garter snake, is closely
29 associated with a small element of developed lands; specifically, embankments and levees near
30 water that are covered with riprap provide giant garter snake habitat. As with cultivated lands, no
31 effort has been made to analyze the effects of BDCP covered actions on this land cover type. It is not
32 a natural community. The effects of its conversion are discussed in Chapter 13, *Land Use*. Where the
33 loss of developed lands may affect individual special-status species or common species, the impact
34 analysis is contained in that species discussion.

35 **Wildlife Species**

36 **Vernal Pool Crustaceans**

37 This section describes the effects of Alternative 1C, including water conveyance facilities
38 construction and implementation of other conservation components, on vernal pool crustaceans
39 (California linderiella, Conservancy fairy shrimp, longhorn fairy shrimp, midvalley fairy shrimp,
40 vernal pool fairy shrimp, and vernal pool tadpole shrimp). The habitat model used to assess effects
41 for the vernal pool crustaceans consists of: vernal pool complex, which consists of vernal pools and
42 uplands that display characteristic vernal pool and swale visual signatures that have not been
43 significantly affected by agricultural or development practices; alkali seasonal wetlands in CZ 8; and

1 degraded vernal pool complex, which consists of low-value ephemeral habitat ranging from areas
2 with vernal pool and swale visual signatures that display clear evidence of significant disturbance
3 due to plowing, disking, or leveling to areas with clearly artificial basins such as shallow agricultural
4 ditches, depressions in fallow fields, and areas of compacted soils in pastures. For the purpose of the
5 effects analysis, vernal pool complex is categorized as high-value for vernal pool crustaceans and
6 degraded vernal pool complex is categorized as low-value for these species. Alkali seasonal wetlands
7 in CZ 8 were included in the model as high-value habitat for vernal pool crustaceans. Also included
8 as low-value habitat for vernal pool crustaceans are areas along the eastern boundary of CZ 11 that
9 are mapped as vernal pool complex because they flood seasonally and support typical vernal pool
10 plants, but which do not include topographic depressions that are characteristic of vernal pool
11 crustacean habitat.

12 Construction and restoration associated with Alternative 1C conservation measures would result in
13 permanent losses (see Table 12-1C-12) and indirect conversions of vernal pool crustacean modeled
14 habitat. The majority of the losses would take place over an extended period of time as tidal marsh is
15 restored in the Plan Area. Full implementation of Alternative 1C would also include the following
16 conservation actions over the term of the BDCP to benefit vernal pool crustaceans (BDCP Chapter 3,
17 *Conservation Strategy*).

- 18 ● Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool
19 recovery areas (Objective VPNC1.1, associated with CM3).
- 20 ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool
21 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective
22 VPNC1.2, associated with CM9).
- 23 ● Increase size and connectivity of protected vernal pool complexes in plan area and increase
24 connectivity with complexes outside the Plan Area (Objective VPNC1.3)
- 25 ● Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective
26 VPNC1.4)
- 27 ● Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for
28 supporting and sustaining vernal pool species (Objective VPNC2.1)
- 29 ● Protect one currently unprotected occurrence of conservancy fairy shrimp (Objective VPC1.1)

30 As explained below, with the restoration or protection of these amounts of habitat, in addition to
31 implementation of AMMs and Mitigation Measure BIO-32, *Restore and Protect Vernal Pool*
32 *Crustacean Habitat*, impacts on vernal pool crustaceans would not be adverse for NEPA purposes
33 and would be less than significant for CEQA purposes.

1
2

Table 12-1C-12. Changes in Vernal Pool Crustacean Modeled Habitat Associated with Alternative 1C (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1 ^c	High-value	42	42	33	33	NA	NA
	Low-value	0	0	6	6	NA	NA
Total Impacts CM1		42	42	39	39	NA	NA
CM2–CM18 ^b	High-value	0	0	0	0	0–4	0
	Low-value	201	372	0	0	0	0
Total Impacts CM2–CM18		201	372	0	0	0–4	0
TOTAL IMPACTS		243	414	39	39	0–4	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-32: Loss or Conversion of Habitat for and Direct Mortality of Vernal Pool**
5 **Crustaceans**

6 Alternative 1C conservation measures would result in the direct, permanent and temporary loss of
7 up to 453 acres modeled vernal pool crustacean habitat be from conveyance facility construction
8 (CM1) and tidal natural communities restoration (CM4). In addition, the conservation measures
9 could result in the indirect conversion due to hydrologic changes of an additional 196 acres of vernal
10 pool crustacean habitat (140 acres of high-value habitat and 56 acres of low-value habitat) from
11 conveyance facilities construction (CM1) and hypothetical footprints for tidal restoration (CM4).
12 Construction of the water conveyance facilities and restoration activities may result in the
13 modification of hardpan and changes to the perched water table, which could lead to alterations in
14 the rate, extent, and duration of inundation of nearby vernal pool crustacean habitat. USFWS
15 typically considers construction within 250 feet of vernal pool crustacean habitat to constitute a
16 possible conversion of crustacean habitat unless more detailed information is provided to further
17 refine the limits of any such effects. For the purposes of this analysis, the 250-foot buffer was
18 applied to the water conveyance facilities work areas where surface and subsurface disturbance
19 activities would take place and to restoration hypothetical footprints. Habitat enhancement and
20 management activities (CM11), which include disturbance or removal of nonnative vegetation, could
21 result in local adverse habitat effects.

1 Alternative 1C would also result in impacts on critical habitat for Conservancy fairy shrimp (248
2 acres), vernal pool fairy shrimp (281 acres), and vernal pool tadpole shrimp (270 acres). The
3 hypothetical tidal restoration (CM4) footprints in CZ 11 account for all of the effects on critical
4 habitat for Conservancy fairy shrimp and vernal pool tadpole shrimp. Vernal pool fairy shrimp
5 critical habitat would also be affected by CM4 in this same area and would be affected by
6 conveyance facilities construction (CM1) west of Clifton Court Forebay. AMM12 Vernal Pool
7 Crustaceans would ensure that there would be no adverse modification of the primary constituent
8 elements of critical habitat for these species.

9 Because the estimates of habitat loss resulting from tidal inundation are based on projections of
10 where restoration may occur, actual effects are expected to be lower because sites would be selected
11 and restoration projects designed to minimize or avoid effects on the covered vernal pool
12 crustaceans. As specified in the *AMM12 Vernal Pool Crustaceans* and *CM9 Vernal Pool and Alkali*
13 *Seasonal Wetland Complex Restoration*, the BDCP Implementation Office would ensure that tidal
14 restoration projects and other covered activities would be designed such that no more than a total of
15 10 wetted acres of vernal pool crustacean habitat would be permanently lost. *AMM12* would also
16 ensure that no more than 20 wetted acres of vernal pool crustacean habitat are indirectly affected
17 by alterations to hydrology by adjacent BDCP covered activities. The term *wetted acres* refers to an
18 area that would be defined by the three parameter wetland delineation method used by USACE to
19 determine the limits of a wetland, which involves an evaluation of wetland soil, vegetation, and
20 hydrology characteristics. This acreage differs from vernal pool complex acreages in that a vernal
21 pool complex is composed of individual wetlands (vernal pools) and those upland areas that are in
22 between and surrounding them, which provide the supporting hydrology (surface runoff and
23 groundwater input), organic and nutrient inputs, and refuge for the terrestrial phase of some vernal
24 pool species.

25 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the
26 individual conservation measure discussions.

- 27 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would
28 result in the permanent and temporary loss of 81 acres of vernal pool crustacean habitat (42
29 permanent and 39 temporary). These impacts would occur from transmission line construction
30 in the western area of additional analysis and the construction of the canal from southeast of the
31 town of Brentwood to the area just west of Clifton Court Forebay. These impacts would be on 45
32 acres of high-value habitat and 6 acres of low-value habitat. The construction of the canal west
33 of Clifton Court Forebay would impact one CNDDDB record for vernal pool fairy shrimp and the
34 construction of the transmission line in the western area of additional analysis would result in
35 permanent and temporary disturbance to an area with one CNDDDB record for vernal pool fairy
36 shrimp (California Department of Fish and Wildlife 2013). In addition, 61 acres of vernal pool
37 crustacean habitat (51 acres of high-value habitat and 10 acres of low value habitat) could be
38 indirectly affected by the construction of the CM1 canal and the transmission line within the
39 western area of additional analysis. Approximately 11 acres of critical habitat for vernal pool
40 fairy shrimp would be impacted by a potential borrow and spoil area west of Clifton Court
41 Forebay. This area of impacted critical habitat does not overlap with modeled habitat for vernal
42 pool crustaceans and a review of the BDCP natural community data shows these areas
43 dominated by grassland and cultivated lands.
- 44 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
45 in the permanent loss of approximately 372 acres of low-value vernal pool crustacean habitat,

1 which consists of degraded vernal pool complex. The BDCP describes degraded vernal pool
 2 complex as areas of low-value ephemeral habitat ranging from areas with vernal pool and swale
 3 visual signatures that display clear evidence of significant disturbance due to plowing, disking,
 4 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions
 5 in fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or
 6 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery
 7 found that these habitats appear to generally have low densities. However, areas mapped as
 8 degraded vernal pool complex may still provide habitat for vernal pool crustaceans as evidenced
 9 by records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella
 10 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Game
 11 2012). Helm (1998) notes that many vernal pool crustaceans can occur in degraded vernal pool
 12 habitats and artificial habitats. In CZs 2 and 4, there are several records of covered vernal pool
 13 crustaceans occurring outside of modeled habitat in areas that appear to be road side ditches. So
 14 though degraded vernal pool complexes may not represent botanically diverse vernal pools they
 15 still can provide habitat for vernal pool crustaceans and thus the loss of 372 acres of degraded
 16 vernal pool complex may result in the loss of occupied vernal pool crustacean habitat. In
 17 addition, tidal restoration could result in the indirect conversion of 135 acres of vernal pool
 18 crustacean habitat, which consist of 89 acres of high-value and 45 acres of low-value habitat.
 19 The hypothetical restoration footprints overlap with a CNDDDB record for vernal pool fairy
 20 shrimp near the current edge of Suisun Marsh. Tidal natural community restoration under
 21 Alternative 1C would also result in impacts on critical habitat for Conservancy fairy shrimp (248
 22 acres), vernal pool tadpole shrimp (270 acres), and vernal pool fairy shrimp (270 acres). *AMM12*
 23 *Vernal Pool Crustaceans* would ensure that there would be no adverse modification of the
 24 primary constituent elements of critical habitat for these species.

- 25 ● *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,
 26 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of
 27 vernal pool complex would benefit vernal pool crustaceans (Table 12-1C-12). A variety of
 28 habitat management actions included in CM11 that are designed to enhance wildlife values in
 29 BDCP-protected habitats may result in localized ground disturbances that could temporarily
 30 affect vernal pool crustacean habitat. Ground-disturbing activities, such as removal of nonnative
 31 vegetation and road and other infrastructure maintenance, are expected to have minor effects
 32 on vernal pool crustacean habitat and are expected to result in overall improvements to and
 33 maintenance of vernal pool crustacean habitat values over the term of the BDCP. Human
 34 presence for recreation activities could result in the injury or mortality of, and degradation of
 35 habitat for, vernal pool crustaceans through trampling pool edges, increased turbidity,
 36 unauthorized collection, and introduction of trash. These effects cannot be quantified, but are
 37 expected to be minimal and would be avoided and minimized by the AMMs listed below.

38 The following paragraphs summarize the combined effects discussed above and describe other
 39 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
 40 also included. Table 12-1C-13 was prepared to further analyze BDCP effects on vernal pool
 41 crustaceans using wetted acres of vernal pools in order to compare the effects of this alternative
 42 with the effect limits established in BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*,
 43 which are measured in wetted acres of vernal pools. Wetted acres were estimated by using the
 44 BDCP's assumption that restored vernal pool complexes would have a 15% density of vernal pools
 45 (i.e., of 100 acres of vernal pool complex 15 acres would constitute vernal pools and the remaining
 46 85 acres supporting uplands). Based on an informal evaluation of aerial photographs of the Plan

1 Area, it is likely that the actual densities within the Plan Area are approximately 10%, but the 15%
2 density value was chosen as a conservative estimate for determining effects.

3 **Table 12-1C-13. Estimated Effects on Wetted Vernal Pool Crustacean Habitat under Alternative 1C**
4 **(acres)^a**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit ^a		5	10	10	20
Alternative 1C Impact ^b	CM1	12.2	12.2	9.2	9.2
	CM4 ^c	30.2	55.8	11.0	20.3
Total		42.4	68	20.2	29.5

^a Because roughly half of the impacts occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

^b These acreages were generated by assuming that the modeled habitat identified in Table 12-1C-12 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.

^c These impacts are based on the hypothetical restoration footprints and would likely be lower based on the BDCP's commitment to minimize and avoid effects on vernal pool crustacean habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

5

6 ***Near-Term Timeframe***

7 Because the water conveyance facilities construction is being evaluated at the project level, the near-
8 term BDCP conservation strategy has been evaluated to determine whether it would provide
9 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
10 construction would not be adverse under NEPA and would be less than significant under CEQA.
11 Table 12-1C-12 above lists the impacts on modeled vernal pool crustacean habitat that are based on
12 the natural community mapping done within the study area. The impacts from tidal natural
13 communities restoration (CM4) are based on hypothetical footprints and do not reflect actual
14 impacts to vernal pool crustacean habitat considering the BDCP's commitment to design restoration
15 projects to minimize or avoid effects on covered vernal pool crustaceans (see AMM12). As seen in
16 Table 12-1C-13, the effects of CM1 alone would exceed the near-term limit and use 8 of the 10
17 indirect conversion effects acres allowed in the near-term. Alternative 1C would not meet the Plan's
18 near-term biological goals and objectives for direct effects. Near-term tidal restoration projects
19 would have to be designed to ensure that there are no direct effects on wetted vernal pool acreage
20 (permanent or temporary) and no more than 2 wetted acres of indirect conversions of vernal pools
21 in order to meet the near-term goal for indirect effects.

22 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be
23 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are mitigated by
24 protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 12.2 wetted
25 acres of vernal pool crustacean habitat (or 81 acres of vernal pool complex) should be restored and
26 42.8 wetted acres (or 285 acres of vernal pool complex) protected to mitigate the CM1 direct and
27 indirect effects on vernal pool crustacean habitat. Assuming that the BDCP would apply the impact
28 limits presented in Table 12-1C-13, impacts on wetted vernal pools resulting from tidal restoration
29 in the near-term would have to avoid direct effects on wetted vernal pool acreage and not exceed 1.6

1 wetted acres of indirect effects. The BDCP would need to restore 12.2 wetted acres (81 acres of
2 vernal pool complex) and protect up to 30 wetted acres (200 acres of vernal complex) in the near-
3 term to offset the effects of CM1 and CM4.

4 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
5 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
6 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
7 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
8 restoration would be determined during implementation based on the following criteria.

- 9 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to
10 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly
11 affected (1:1 ratio).
- 12 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
13 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
14 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

15 The species-specific biological goals and objectives would also inform the near-term protection and
16 restoration efforts. These Plan goals represent performance standards for considering the
17 effectiveness of restoration actions.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
22 *Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM37 Recreation*. All of these AMMs
23 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
24 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
25 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

26 **Late Long-Term Timeframe**

27 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
28 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
29 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-1C-13, the effects of CM1 alone
30 would exceed 10 acres of direct effect and roughly half of the acres of indirect effects allowed under
31 the BDCP. Alternative 1C would not meet Objective VPNC1.2 and the limits set in AMM12. For
32 Alternative 1C to be in compliance with the indirect effects limits established under AMM12, tidal
33 restoration projects would have to be designed to ensure that there are no direct effects on wetted
34 vernal pool acreage (permanent or temporary) and no more than 11.6 wetted acres of indirect
35 effects on vernal pools.

36 The Plan has committed to a late long-term goal of protecting 600 acres of vernal pool complex in
37 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
38 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
39 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
40 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection
41 and restoration would be achieved using the criteria presented above as well as by the following the
42 other specific biological goals and objectives.

- 1 • Increasing the size and connectivity of protected vernal pool complexes (VPNC1.3).
- 2 • Protecting the range of inundation characteristics that are currently represented by vernal pool
- 3 throughout the Plan Area (VPNC1.4).
- 4 • Protecting one currently unprotected occurrence of conservancy fairy shrimp (VPC1.1).

5 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
6 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
7 restoration and protection of alkali seasonal wetlands that could overlap with the species model,
8 could result in the restoration of 51 acres and the protection of 608 acres of modeled habitat for
9 vernal pool crustaceans.

10 **NEPA Effects:** The near-term loss of vernal pool crustacean habitat under Alternative 1C would
11 exceed the limit for permanent and temporary impacts set by BDCP Objective VPNC1.2 and AMM12,
12 which states the Plan would restore up to 67 acres of vernal pool complex (or 10 wetted acres of
13 vernal pool). Though the BDCP has measures to redesign restoration projects to limit effects on
14 covered species, it does not provide for redesigning the conveyance alignment to minimize effects.
15 The loss of vernal pool crustacean habitat under Alternative 1C in the near-term would represent an
16 adverse effect. Even though the Plan has a commitment to avoid and minimize effects on vernal pool
17 crustaceans to the maximum extent practicable it is assumed that by the long-term the needs for
18 satisfying the tidal restoration requirements (CM4) would result in additional indirect effects that
19 could exceed the limits established by the plan. Alternative 1C would result in adverse effects on
20 vernal pool crustaceans under NEPA over the Plan's term. Mitigation Measure BIO-32, *Restore and*
21 *Protect Vernal Pool Crustacean Habitat*, would reduce these effects.

22 **CEQA Conclusion:**

23 **Near-Term Timeframe**

24 Because the water conveyance facilities construction is being evaluated at the project level, the near-
25 term BDCP conservation strategy has been evaluated to determine whether it would provide
26 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
27 construction would be less than significant. Table 12-1C-12 above lists the impacts on modeled
28 vernal pool crustacean habitat that are based on the natural community mapping done within the
29 study area. The impacts from tidal natural communities restoration (CM4) are based on hypothetical
30 footprints and do not reflect actual impacts on vernal pool crustacean habitat considering the
31 BDCP's commitment to design restoration projects to minimize or avoid effects on covered vernal
32 pool crustaceans. As seen in Table 12-1C-13, the impacts of CM1 alone would exceed the near-term
33 limit and use 8 of the 10 indirect effects acres allowed in the near-term. Alternative 1C would not
34 meet the Plan's near-term biological goals and objectives for direct effects. Near-term tidal
35 restoration projects would have to be designed to ensure that there are no direct effects on wetted
36 vernal pool acreage (permanent or temporary) and no more than 2 wetted acres of indirect effects
37 on vernal pools in order to meet the near-term goal for indirect effects.

38 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be
39 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are mitigated by
40 protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 12.2 wetted
41 acres of vernal pool crustacean habitat (or 81 acres of vernal pool complex) should be restored and
42 42.8 wetted acres (or 285 acres of vernal pool complex) protected to mitigate the CM1 direct and
43 indirect effects on vernal pool crustacean habitat. Assuming that the BDCP would apply the impact

1 limits presented in Table 12-1C-13, impacts on wetted vernal pools resulting from tidal restoration
2 in the near-term would have to avoid direct effects on wetted vernal pool acreage and not exceed 1.6
3 wetted acres of indirect effects. The BDCP would need to restore 12.2 wetted acres (81 acres of
4 vernal pool complex) and protect up to 30 wetted acres (200 acres of vernal complex) in the near-
5 term to offset the effects of CM1 and CM4.

6 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex by
7 protecting at least 2 wetted acres of vernal pools for each wetted acre directly or indirectly affected.
8 The BDCP has also committed to restoring/creating vernal pools such that there is no net loss of
9 vernal pool acreage. The amount of restoration would be determined during implementation based
10 on the following criteria.

- 11 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to
12 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly
13 affected (1:1 ratio).
- 14 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
15 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
16 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

17 The species-specific biological goals and objectives would also inform the near-term protection and
18 restoration efforts. These Plan goals represent performance standards for considering the
19 effectiveness of restoration actions.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
24 *Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM37 Recreation*. All of these AMMs
25 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
26 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
27 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

28 The near-term loss of vernal pool crustacean habitat under Alternative 1C would exceed the limit for
29 permanent and temporary impacts set by AMM12, which states that the Plan would not exceed 10
30 wetted acres of vernal pool crustacean habitat loss. Though the BDCP has measures to redesign
31 restoration projects to limit effects on covered species, it does not provide for redesigning the
32 conveyance alignment to minimize effects. The loss of vernal pool crustacean habitat under
33 Alternative 1C in the near-term would represent an adverse effect. Alternative 1C would result in a
34 significant impacts on vernal pool crustaceans under CEQA in the near-term. Implementation of
35 Mitigation Measure BIO-32, *Restore and Protect Vernal Pool Crustacean Habitat*, would reduce
36 impacts to a less-than-significant level.

37 **Late Long-Term Timeframe**

38 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
39 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
40 term. As seen in Table 12-1C-13, the impacts of CM1 alone would exceed 10 acres of direct effect and
41 would indirectly affect roughly half of the acres of indirect effects allowed under the BDCP.
42 Alternative 1C would not meet Objective VPNC1.2 and the limits set under AMM12. For Alternative
43 1C to be in compliance with the indirect effects limits established under AMM12, tidal restoration

1 projects would have to be designed to ensure that there are no direct effects on wetted vernal pool
2 acreage (permanent or temporary) and no more than 11.6 wetted acres of indirect effects on vernal
3 pools.

4 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in
5 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
6 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
7 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
8 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection
9 and restoration would be achieved using the criteria presented above as well as by following these
10 other specific biological goals and objectives.

- 11 ● Increasing the size and connectivity of protected vernal pool complexes (VPNC1.3).
- 12 ● Protecting the range of inundation characteristics that are currently represented by vernal pool
13 throughout the Plan Area (VPNC1.4).
- 14 ● Protecting one currently unprotected occurrence of conservancy fairy shrimp (VPC1.1).

15 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
16 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
17 restoration and protection of alkali seasonal wetlands that could overlap with the species model,
18 could result in the restoration of 51 acres and the protection of 608 acres of modeled habitat for
19 vernal pool crustaceans.

20 Even though the Plan has a commitment to avoid and minimize effects on vernal pool crustaceans to
21 the maximum extent practicable it is assumed that by the long-term the needs for satisfying the tidal
22 restoration requirements (CM4) would result in additional indirect effects that could exceed the
23 limits established by the plan. Alternative 1C would result in a significant impacts on vernal pool
24 crustaceans under CEQA over the Plan's term. Mitigation Measure BIO-32, *Restore and Protect*
25 *Vernal Pool Crustacean Habitat*, would reduce this impacts to a less-than significant level.

26 **Mitigation Measure BIO-32: Restore and Protect Vernal Pool Crustacean Habitat**

27 To reduce the effects on modeled vernal pool crustacean habitat, DWR will ensure that there is
28 no net loss of vernal pool wetted acreage. DWR will restore vernal pools as follows:

- 29 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior
30 to impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre
31 directly affected (1:1 ratio).
- 32 ● If restoration takes place concurrent with impacts (i.e., restoration construction is
33 completed, but restored habitat has not met all success criteria, prior to impacts occurring),
34 then 1.5 wetted acres of vernal pools would be restored for each wetted acre directly
35 affected (1.5:1 ratio).

36 DWR will also ensure that protected vernal pool complex includes wetted vernal pool area that
37 meets or exceeds a 2:1 ratio of protected to directly and indirectly impacted vernal pools. These
38 protected areas will be in place prior to or concurrent with the effects. Protection will occur in
39 CZs 1, 8, or 11, will target vernal pool recovery areas, and will be coordinated with other BDCP
40 conservation efforts. In lieu of restoration, an equivalent amount of vernal pool restoration
41 credit may be purchased at a USFWS- and CDFW-approved mitigation bank if the bank occurs in

1 the Plan Area. Restoration areas, including banks where credits are purchased, will meet the
2 following site selection criteria described below and presented in BDCP Chapter 3, Section
3 3.4.9.3.2.

4 Vernal pool restoration sites will meet the following site selection criteria.

- 5 • The site is in Conservation Zone 1, 8, or 11.
- 6 • The site has evidence of historical vernal pools based on soils, remnant topography,
7 remnant vegetation, historical aerial photos, or other historical or site-specific data.
- 8 • The site supports suitable soils and landforms for vernal pool restoration.
- 9 • The adjacent land use is compatible with restoration and long-term management to
10 maintain natural community functions (e.g., not adjacent to urban or rural residential
11 areas).
- 12 • Sufficient land is available for protection to provide the necessary vernal pool complex
13 restoration and surrounding grasslands to provide the local watershed for sustaining vernal
14 pool hydrology, with a vernal pool density representative of intact vernal pool complex in
15 the vicinity of the restoration site.

16 Acquisition of vernal pool restoration sites will be prioritized based on the following criteria.

- 17 • The site will contribute to establishment of a large, interconnected vernal pool and alkali
18 seasonal wetland complex reserve system (e.g., adjacent to existing protected vernal pool
19 complex or alkali seasonal wetland complex).
- 20 • The site is close to known populations of covered vernal pool species.

21 **Impact BIO-33: Indirect Effects of Plan Implementation on Vernal Pool Crustaceans**

22 Construction and maintenance activities associated with water conveyance facilities, and restoration
23 actions could indirectly affect vernal pool crustaceans and their habitat in the vicinity of
24 construction and restoration areas, and maintenance activities. These potential effects would be
25 minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would be in effect
26 throughout the Plan’s construction phase.

27 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly
28 affect vernal pool crustaceans and their habitat in the vicinity of construction areas. Ground-
29 disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment could
30 result in the inadvertent release of sediment and hazardous substances into this habitat. These
31 potential effects would be avoided and minimized through AMM1–AMM6, which would be in effect
32 throughout the Plan’s construction phase. Vernal pool crustaceans and their habitat could be
33 periodically indirectly affected by maintenance activities at water conveyance facilities.
34 Embankment maintenance activities around Clifton Court Forebays could result in the inadvertent
35 discharge of sediments and hazardous materials into vernal pool crustacean habitat that occurs
36 along the southern and western boundaries of the forebays. These potential effects would be
37 avoided and minimized through AMM1–AMM6, which would be in effect throughout the term of the
38 Plan. The indirect effects of Alternative 1C on vernal pool crustacean habitat would not be adverse
39 under NEPA.

1 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance
2 facilities, and restoration actions could indirectly impact vernal pool crustaceans and their habitat in
3 the vicinity of construction and restoration areas, and maintenance activities. These potential
4 impacts would be minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would
5 be in effect throughout the construction phase. The indirect impacts of Alternative 1C would be less-
6 than significant under CEQA.

7 **Impact BIO-34: Periodic Effects of Inundation of Vernal Pool Crustacean Habitat as a Result of**
8 **Implementation of Conservation Components**

9 Flooding of the Yolo Bypass under *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
10 0 to 4 acres of modeled vernal pool crustacean habitat (Table 12-1C-12). There would be no periodic
11 effects resulting from *CM5 Seasonally Inundated Floodplain Restoration*

12 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the
13 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,
14 periodic inundation could affect vernal pool crustaceans occupying areas ranging from 0 acres of
15 habitat during most notch flows to an estimated 4 acres during a notch flow of 6,000 cubic feet per
16 second (cfs). BDCP-associated inundation of areas that would not otherwise have been inundated is
17 expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop
18 the remaining 70% of all years, and during those years notch operations would not typically affect
19 the maximum extent of inundation. In more than half of all years under Existing Conditions, an area
20 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass
21 flooding is expected to have a minimal effect on vernal pool crustaceans and would thus not be
22 adverse under NEPA.

23 **CEQA Conclusion:** Alternative 1C would periodically inundate up to 4 acres of vernal pool
24 crustacean habitat during the maximum flows over the Fremont Weir. The periodic inundation is
25 not anticipated to result in a conversion of vernal pool crustacean habitat into different wetland
26 habitat. BDCP-associated inundation of areas that would not otherwise have been inundated is
27 expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop
28 the remaining 70% of all years, and during those years notch operations would not typically affect
29 the maximum extent of inundation. In more than half of all years under Existing Conditions, an area
30 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass
31 flooding is expected to have a minimal effect on vernal pool crustaceans and would thus result in
32 less-than-significant impacts on the species.

33 **Valley Elderberry Longhorn Beetle**

34 That habitat model used to assess the effects for valley elderberry longhorn beetle is based on
35 riparian habitat and nonriparian habitat (channels and grasslands within 200 feet of channels).
36 Construction and restoration associated with Alternative 1C conservation measures would result in
37 both temporary and permanent losses of valley elderberry longhorn beetle modeled habitat as
38 indicated in Table 12-1C-14. The majority of the losses would take place over an extended period of
39 time as the restoration conservation measures are being implemented. In addition, an estimated 41
40 elderberry shrubs could be impacted by the Alternative 1C conveyance alignment (CM1). Full
41 implementation of Alternative 1C would also include the following conservation actions over the
42 term of the BDCP to benefit valley elderberry longhorn beetle (BDCP Chapter 3, *Conservation*
43 *Strategy*).

- 1 • Mitigate impacts on elderberry shrubs consistent with USFWS conservation guidelines for the
- 2 species (Objective VELB1.1)
- 3 • Site elderberry longhorn beetle habitat restoration adjacent to occupied habitat (Objective
- 4 VELB1.2)
- 5 • Restore 5,000 acres of valley/foothill riparian (Objective VFRNC1.1, associated with CM7)
- 6 • Protect 750 acres of valley/foothill riparian (Objective VFRNC1.2, associated with CM3)
- 7 • Maintain or increase the abundance and distribution of rare or uncommon vegetation alliances,
- 8 such as *Sambuca nigra* (blue elderberry stands) alliance (Objective VFRNC3.1, associated with
- 9 CM7 and CM11)

10 As explained below, with the restoration or protection of these amounts of habitat, impacts on valley
 11 elderberry longhorn beetle would not be adverse for NEPA purposes and would be less than
 12 significant for CEQA purposes.

13 **Table 12-1C-14. Changes in Valley Elderberry Longhorn Beetle Modeled Habitat Associated with**
 14 **Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	40	40	86	86	NA	NA
	Non-riparian	69	69	147	147	NA	NA
Total Impacts CM1		109	109	233	233	NA	NA
CM2-CM18	Riparian	381	678	76	111	44-80	266
	Non-riparian	142	311	94	108	103-244	287
Total Impacts CM2-CM18		523	989	170	219	155-332	553
TOTAL IMPACTS		632	1,098	403	452	161-325	553

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

15

16 **Impact BIO-35: Loss of Valley Elderberry Longhorn Beetle Habitat**

17 Alternative 1C conservation measures would result in the permanent and temporary loss combined
 18 of up to 1,550 acres of modeled valley elderberry longhorn beetle habitat (915 acres of riparian
 19 habitat and 635 acres of nonriparian habitat), and an estimated 41 elderberry shrubs from CM1,
 20 which represent potential habitat for the species (Table 12-1C-14). Due to the limitation of the
 21 habitat suitability model, all of these effects are assumed to be a large overestimate of the true effect

1 on potential valley elderberry longhorn beetle habitat. Conservation measures that would result in
 2 these losses are conveyance facilities and transmission line construction, and establishment and use
 3 of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat
 4 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management
 5 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could
 6 result in local adverse habitat effects. In addition, maintenance activities associated with the long-
 7 term operation of the water conveyance facilities and other BDCP physical facilities could degrade
 8 or eliminate valley elderberry longhorn beetle habitat. Timely implementation of the near-term
 9 habitat protection and restoration contained in the Plan and implementation of AMMs committed to
 10 in the Plan would result in no adverse effects under NEPA and less-than-significant impacts under
 11 CEQA. Each of these activities is described below.

- 12 • *CM1 Water Facilities and Operation:* Construction of Alternative 1C conveyance facilities would
 13 result in the permanent and temporary combined loss of approximately 342 acres of modeled
 14 valley elderberry longhorn beetle habitat, composed of 126 acres of riparian habitat and 216
 15 acres of nonriparian habitat (Table 12-1C-14). In addition, an estimated 41 shrubs could be
 16 potentially removed as a result of conveyance facility construction. The exact number of shrubs
 17 to be impacted would be determined during pre-construction surveys of the footprints of the
 18 conveyance facility and associated work areas as part of the implementation of *AMM15 Valley*
 19 *Elderberry Longhorn Beetle*. Most of these impacts are associated with the intake and forebay
 20 construction in the north delta. There are no records of valley elderberry longhorn beetle within
 21 these impact areas. The portion of the above impacts that result from temporary habitat loss
 22 includes 233 acres of modeled valley elderberry longhorn beetle habitat (86 acres riparian and
 23 147 acres nonriparian habitat). Elderberry shrubs could be affected from ground-disturbing
 24 activities associated with conveyance construction footprints, temporary access roads, and
 25 staging areas.
- 26 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries
 27 improvements in the Yolo Bypass would result in the permanent and temporary removal of
 28 approximately 295 acres of modeled valley elderberry longhorn beetle habitat, composed of 159
 29 acres of riparian habitat and 136 acres of nonriparian habitat. Approximately 265 acres of
 30 permanent impacts (83 acres of riparian and 41 acres of nonriparian) would mostly occur at the
 31 north end of the Yolo Bypass from Fremont Weir improvements. The 170 acres of temporary
 32 impacts (76 acres of riparian and 94 acres of nonriparian) would mostly be from work on the
 33 Fremont Weir, the Sacramento Weir, and levees along the Bypass. Elderberry shrubs could be
 34 affected from ground-disturbing activities associated with the re-contouring of surface
 35 topography, excavation or modification of channels, levee modification, and removal of riprap
 36 and other protections from channel banks.
- 37 • *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration would result
 38 in the permanent loss of approximately 813 acres of modeled valley elderberry longhorn beetle
 39 habitat, composed of 552 acres of riparian and 260 acres of nonriparian habitat. The majority of
 40 these impacts would be associated with tidal restoration in the Delta and only 42 acres of these
 41 impacts (all nonriparian) would be from tidal restoration in Suisun Marsh. Elderberry shrubs
 42 could be affected from ground-disturbing activities associated with the re-contouring of surface
 43 topography, excavation or modification of channels, type conversion from riparian and
 44 grasslands to tidal habitat, levee removal and modification, and removal of riprap and other
 45 protections from channel banks.

- 1 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
2 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
3 approximately 101 acres of valley elderberry longhorn beetle habitat, composed of 78 acres of
4 riparian and 23 acres of nonriparian. Approximately half of these impacts (52 acres) would be
5 permanent impacts from levee construction and the other half (49 acres) would be temporary
6 impacts associated with the levee construction. There is one CNDDDB record of valley elderberry
7 longhorn beetle occurring in CZ 7 just wet of Middle River on Union Island. This record and
8 other elderberry shrubs could be affected from ground-disturbing activities associated with the
9 re-contouring of surface topography, excavation or modification of channels, levee removal and
10 modification, and removal of riprap and other protections from channel banks.
- 11 • *CM11 Natural Communities Enhancement and Management*: Activities associated with natural
12 communities enhancement and management, such as grazing practices and ground disturbance
13 or herbicide use in the control of nonnative vegetation, intended to maintain and improve
14 habitat functions of BDCP protected habitats for covered species could result in loss of
15 elderberry shrubs and the potential for injury or mortality to beetles. These effects cannot be
16 quantified, but are expected to be minimal and would be avoided and minimized by the AMMs
17 listed below.
- 18 • *Operations and maintenance*: Postconstruction operation and maintenance of the above-ground
19 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
20 disturbances that could affect valley elderberry beetle. Maintenance activities would include
21 vegetation management, levee and structure repair, and re-grading of roads and permanent
22 work areas could affect elderberry shrubs occupied by the species. These effects, however,
23 would be reduced by AMMs listed below.

24 The following paragraphs summarize the combined effects discussed above and describe other
25 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
26 also included.

27 ***Near-Term Timeframe***

28 Because the water conveyance facilities construction is being evaluated at the project level, the near-
29 term BDCP conservation strategy has been evaluated to determine whether it would provide
30 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
31 construction would not be adverse under NEPA and would be less than significant under CEQA.
32 Alternative 1C would result in permanent and temporary impacts on 1,035 acres of modeled habitat
33 (583 acres of riparian and 452 acres of nonriparian) for valley elderberry longhorn beetle in the
34 study area in the near-term. These effects would result from the construction of the water
35 conveyance facilities (CM1, 126 acres of riparian and 216 acres of nonriparian), and implementing
36 other conservation measures (Yolo Bypass fisheries improvements [CM2] and tidal restoration
37 [CM4], 693 acres of modeled habitat). The other conservation measures account for 457 of the 583
38 acres (78%) of impacts on riparian habitat. Based on the DHCCP survey data of the Conveyance
39 Planning Area (see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*
40 *Data Report*), an estimated 41 elderberry shrubs would be impacted in the near-term by CM1 (see
41 Section 12.3.2.3 for a discussion on the methods used to make this estimate).

42 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
43 CM1 and that are identified as habitat for valley elderberry longhorn beetle in Chapter 3 of the BDCP
44 would be 1:1 for restoration and 1:1 for protection for riparian habitat. Using these typical ratios

1 would indicate that 126 acres of the riparian habitat should be restored/created and 126 acres of
 2 existing riparian should be protected to mitigate the CM1 losses of valley elderberry longhorn beetle
 3 habitat. The near-term effects of other conservation actions would require 457 acres of riparian
 4 restoration and 457 acres of riparian protection using the same typical NEPA and CEQA ratios (1:1
 5 for restoration and 1:1 for protection).

6 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800
 7 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same
 8 timeframe as the construction and early restoration losses, thereby minimizing adverse effects on
 9 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB 1.1 and 1.2, which call for
 10 implementing the USFWS conservation guidelines for valley elderberry longhorn beetle
 11 (transplanting elderberry shrubs and planting elderberry seedlings and associated natives) and
 12 siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites
 13 confirmed to be occupied by valley elderberry longhorn beetle (U.S. Fish and Wildlife Service
 14 1999a). These objectives would be met through the implementation of *CM7 Riparian Natural
 15 Community Restoration*. *CM7 Riparian Natural Community Restoration* specifically calls for the
 16 planting of elderberry shrubs in in large, contiguous clusters with a mosaic of associated natives as
 17 part of riparian restoration consistent with USFWS conservation guidelines (U.S. Fish and Wildlife
 18 Service 1999a). These Plan goals represent performance standards for considering the effectiveness
 19 of restoration actions. The acres of protection and restoration contained in the near-term Plan goals
 20 and the additional species specific measures within CM7 satisfy the typical mitigation that would be
 21 applied to the project-level effects of CM1, as well as mitigating the near-term effects of the other
 22 conservation measures.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2
 24 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention
 25 Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and
 26 Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM15 Valley Elderberry Longhorn
 27 Beetle*. AMM15 requires surveys for elderberry shrubs within 100 feet of any ground disturbing
 28 activities, the implementation of avoidance and minimize measures for any shrubs that are
 29 identified within this 100-foot buffer, and transplanting shrubs that can't be avoided. All of these
 30 AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to
 31 work areas and RTM storage sites. BDCP Appendix 3.C describes the AMMs, which have since been
 32 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
 33 the Final EIR/EIS.

34 ***Late Long-Term Timeframe***

35 Based on modeled habitat, the study area supports approximately 34,456 acres of modeled habitat
 36 (17,786 acres of riparian and 16,670 acres of nonriparian) for valley elderberry longhorn beetle.
 37 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 1,550
 38 acres of modeled valley elderberry longhorn beetle habitat (915 acres of riparian habitat and 635
 39 acres of nonriparian habitat)during the term of the Plan (5% of the modeled habitat in the study
 40 area). The locations of these losses are described above in the analyses of individual conservation
 41 measures. These losses would not fragment any known populations of valley elderberry longhorn
 42 beetle. The Plan includes a commitment to protect 750 acres of riparian habitat and
 43 restoring/creating 5,000 acres of riparian habitat in the Plan Area. According to Objective VELB1.2,
 44 the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied habitat,
 45 which would provide connectivity between occupied and restored habitats and improve the species'

1 ability to disperse within and outside the Plan Area. Other factors relevant to effects on valley
2 elderberry longhorn beetle include:

- 3 • Habitat loss is widely dispersed throughout the study area and would not be concentrated in
4 any one location.
- 5 • There would be a temporal loss of riparian habitat during the near-term evaluation period
6 because most of the affected riparian vegetation would be removed during the near-term
7 timeframe, while large quantities of riparian habitat would not be restored until the early and
8 late long-term timeframes. Effects on valley elderberry longhorn beetle of this temporal loss of
9 riparian vegetation are expected to be minimal because much of the riparian habitat in the Plan
10 Area is not known to be currently occupied by the species, because all elderberry shrubs that
11 are suitable for transplantation would be moved to conservation areas in the Plan Area, and
12 because most of the affected community is composed of small patches of riparian scrub and
13 herbaceous vegetation that are fragmented and distributed across the agricultural landscape of
14 the Plan Area and thus are likely to provide no or low-value habitat for the beetle.
- 15 • Temporarily disturbed areas would be restored within 1 year following completion of
16 construction and management activities. Under AMM10, a restoration and monitoring plan
17 would be developed prior to initiating any construction-related activities associated with the
18 conservation measures or other covered activities that would result in temporary effects on
19 natural communities.

20 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
21 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as other
22 actions that overlap with the nonriparian portions of the species model, could result in the
23 restoration of 4,857 acres (riparian) and the protection of 2,363 acres (729 acres of riparian and
24 1,634 acres of nonriparian channels and grassland) of modeled habitat for valley elderberry
25 longhorn beetle.

26 **NEPA Effects:** The near-term loss of valley elderberry longhorn beetle habitat under Alternative 1C
27 would not be adverse because the BDCP has committed to restoring and protecting an acreage that
28 exceeds the typical mitigation ratios described above, in addition to avoiding impacts on shrubs and
29 transplanting those that can't be avoided. In the absence of other conservation actions, the losses of
30 valley elderberry longhorn beetle habitat and potential for direct mortality of a special-status
31 species associated with Alternative 1C in the late long-term would represent an adverse effect.
32 However, with habitat protection and restoration associated with CM7, guided by species-specific
33 goals and objectives and by AMM1-AMM6, AMM10, and AMM15, which would be in place
34 throughout the construction period, the effects of Alternative 1C as a whole on valley elderberry
35 longhorn beetle would not be adverse under NEPA.

36 **CEQA Conclusion:**

37 **Near-Term Timeframe**

38 Because the water conveyance facilities construction is being evaluated at the project level, the near-
39 term BDCP conservation strategy has been evaluated to determine whether it would provide
40 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
41 construction would be less than significant. Alternative 1C would result in permanent and
42 temporary impacts on 1,035 acres of modeled habitat (583 acres of riparian and 452 acres of
43 nonriparian) for valley elderberry longhorn beetle in the study area in the near-term. These impacts

1 would result from the construction of the water conveyance facilities (CM1, 126 acres of riparian
2 and 216 acres of nonriparian), and implementing other conservation measures (Yolo Bypass
3 fisheries improvements [CM2] and tidal restoration [CM4], 693 acres of modeled habitat). The other
4 conservation measures account for 457 of the 583 acres (78%) of impacts on riparian habitat. Based
5 on the DHCCP survey data of the Conveyance Planning Area, an estimated 41 elderberry shrubs
6 would be impacted in the near-term by CM1 (see Section 12.3.2.3 for a discussion on the methods
7 used to make this estimate).

8 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
9 CM1 and that are identified in the biological goals and objectives for valley elderberry longhorn
10 beetle in Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection for riparian
11 habitat. Using these typical ratios would indicate that 126 acres of the riparian habitat should be
12 restored/created and 126 acres of existing riparian should be protected to mitigate the CM1 losses
13 of valley elderberry longhorn beetle habitat. The near-term impacts of other conservation actions
14 would require 457 acres of riparian restoration and 457 acres of riparian protection using the same
15 typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

16 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800
17 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same
18 timeframe as the construction and early restoration losses, thereby minimizing adverse effects on
19 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB 1.1 and 1.2, which call for
20 implementing the USFWS conservation guidelines for valley elderberry longhorn beetle
21 (transplanting elderberry shrubs and planting elderberry seedlings and associated natives) and
22 siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites
23 confirmed to be occupied by valley elderberry longhorn beetle (U.S. Fish and Wildlife Service
24 1999a). These objectives would be met through the implementation of *CM7 Riparian Natural
25 Community Restoration*. CM7 specifically calls for the planting of elderberry shrubs in large,
26 contiguous clusters with a mosaic of associated natives as part of riparian restoration consistent
27 with USFWS conservation guidelines (U.S. Fish and Wildlife Service 1999a).

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2
29 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention
30 Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and
31 Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM15 Valley Elderberry Longhorn
32 Beetle*. AMM15 requires surveys for elderberry shrubs within 100 feet of any ground disturbing
33 activities, the implementation avoidance and minimize measures for any shrubs that are identified
34 within this 100-foot buffer, and transplanting shrubs that can't be avoided. All of these AMMs
35 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
36 areas and RTM storage sites. BDCP Appendix 3.C describes the AMMs, which have since been
37 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
38 the Final EIR/EIS.

39 The natural community restoration and protection activities are expected to be concluded in the
40 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts to
41 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with
42 the AMMs, are more than sufficient to support the conclusion that the near-term effects of
43 Alternative 1C would be less than significant under CEQA.

1 **Late Long-Term Timeframe**

2 Alternative 1C as a whole would result in the permanent loss of and temporary impacts on 1,550
3 acres of modeled valley elderberry longhorn beetle habitat (915 acres of riparian habitat and 635
4 acres of nonriparian habitat) during the term of the Plan (5% of the modeled habitat in the study
5 area). The locations of these losses are described above in the analyses of individual conservation
6 measures. These losses would not fragment any known populations of valley elderberry longhorn
7 beetle. The Plan includes a commitment to protect 750 acres of riparian habitat and
8 restoring/creating 5,000 acres of riparian habitat in the Plan Area. According to Objective VELB1.2,
9 the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied habitat,
10 which would provide connectivity between occupied and restored habitats and improve the species'
11 ability to disperse within and outside the Plan Area. The BDCP also includes a number of AMMs
12 (AMM1–AMM6, AMM10, and AMM15) directed at minimizing or avoiding potential impacts on
13 valley elderberry longhorn beetle. The large acreages of conservation would adequately compensate
14 for the modeled habitats lost to construction and restoration activities.

15 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
16 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as
17 others actions that overlap with the nonriparian portions of the species model, could result in the
18 restoration of 4,857 acres (riparian) and the protection of 2,363 acres (729 acres of riparian and
19 1,634 acres of nonriparian channels and grassland) of modeled habitat for valley elderberry
20 longhorn beetle.

21 Considering these protection and restoration provisions, which would provide acreages of new or
22 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction
23 and restoration activities, implementation of Alternative 1C as a whole would not result in a
24 substantial adverse effect through habitat modifications and would not substantially reduce the
25 number or restrict the range of the species. Therefore, the alternative would have a less-than-
26 significant impact on valley elderberry longhorn beetle.

27 **Impact BIO-36: Indirect Effects on Valley Elderberry Longhorn Beetle and its Habitat**

28 Construction activities associated with water conveyance facilities, conservation components and
29 ongoing habitat enhancement, as well as operation and maintenance of above-ground water
30 conveyance facilities, including the transmission facilities, could result in ongoing periodic
31 postconstruction disturbances with localized impacts on valley elderberry longhorn beetle over the
32 term of the BDCP. Construction related effects could result from ground-disturbing activities,
33 stockpiling of soils, and maintenance and refueling of heavy equipment could result in dust and the
34 inadvertent release of hazardous substances in areas where elderberry shrubs occur. A GIS analysis
35 (see Section 12.3.2.3 for a discussion on the methods used to make this estimate) estimates that
36 approximately 12 shrubs could be indirectly affected by conveyance facilities construction (CM1).
37 Restoration activities could result in excavation or modification of channels, type conversion from
38 riparian and grasslands to tidal habitat, levee removal and modification, and removal of riprap and
39 other protections from channel banks that occur within 100 feet of an elderberry shrubs. These
40 potential effects would be minimized or avoided through AMM1–AMM6, AMM10, and AMM15,
41 which would be in effect throughout the Plan's construction phase.

42 **NEPA Effects:** The indirect effects on valley elderberry longhorn beetle as a result of implementing
43 Alternative 1C conservation actions would not have an adverse effect on valley elderberry longhorn
44 beetle.

1 **CEQA Conclusion:** Ground-disturbing activities, stockpiling of soils, and the potential release of dust
2 and hazardous substances would accompany construction of the water conveyance facilities. An
3 estimated 12 shrubs could be indirectly affected by conveyance facilities construction (CM1). In
4 addition, ground-disturbing activities associated with the re-contouring of surface topography,
5 excavation or modification of channels, type conversion from riparian and grasslands to tidal
6 habitat, levee removal and modification, and removal of riprap and other protections from channel
7 banks could indirectly affected elderberry shrubs that occur within 100 feet of these restoration
8 activities. With the implementation of AMM1–AMM6, AMM10, and AMM15 as part of Alternative 1C
9 construction, operation, and maintenance, the BDCP would avoid the potential for substantial
10 adverse indirect effects on valley elderberry longhorn beetle in that the Plan would not result in a
11 substantial reduction in numbers or a restriction in the range of valley elderberry longhorn beetle.
12 Therefore, the indirect effects under this alternative would have a less-than-significant impact on
13 valley elderberry longhorn beetle.

14 **Impact BIO-37: Periodic Effects of Inundation of Valley Elderberry Longhorn Beetle Habitat**
15 **as a Result of Implementation of Conservation Components**

16 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
17 161 to 325 acres of modeled valley elderberry longhorn beetle habitat (Table 12-1C-14). *CM5*
18 *Seasonally Inundated Floodplain Restoration* would periodically inundate 553 acres of modeled
19 valley elderberry longhorn beetle habitat (Table 12-1C-14).

20 It is unknown at this time how much of the modeled habitat that would be inundated as a result of
21 CM2 and CM5 actually contains elderberry shrubs. Elderberry shrubs have been found to be
22 intolerant of long periods of inundation and there is evidence that they die very quickly after even
23 short periods of flooding (River Partners 2008). During monitoring of a restoration project at the
24 San Joaquin River National Wildlife Refuge, River Partners found that nearly all (99% to 100%) of
25 the 4-year-old elderberry shrubs in restoration plots died after 15-17 weeks of inundation, and
26 River Partners noted in general that the shrubs died very quickly after even short periods of
27 flooding (River Partners 2008). Talley et al (2006) in their report assisting the USFWS 5-year review
28 of the species, note that elderberry shrubs respond negatively to saturated soil conditions and that
29 they can only tolerate temporary root crown inundation. Therefore, in the areas that would be
30 periodically inundated by the implementation of CM2 it is likely that there are few, if any, mature
31 shrubs in these areas because under current conditions they would be inundated in about 50% of all
32 years for approximately 7 weeks. The areas affected by CM5 are not currently inundated and thus
33 elderberry shrubs could present in these areas.

34 The periodic effects on modeled habitat for valley elderberry longhorn beetle associated with
35 implementing Alternative 1C could adversely affect valley elderberry longhorn beetle habitat
36 (elderberry shrubs) and make modeled habitat there unsuitable for future elderberry
37 establishment. Based on the information presented above, the current conditions in those areas that
38 would be periodically inundated in Yolo Bypass (CM2) are not likely very suitable for elderberry
39 shrubs and, thus, CM2 would likely have minimal effects, if any, on the species. The modeled habitat
40 that would be periodically inundated from the implementation of CM5 could result in adverse effects
41 on valley elderberry longhorn beetle.

42 **NEPA Effects:** Periodic effects of the inundation of valley elderberry longhorn beetle habitat as a
43 result of implementing Alternative 1C conservation actions would not be adverse under NEPA when
44 taking into consideration CM7 habitat protection and restoration. This habitat protection and

1 restoration would be guided by species-specific goals and objectives, and by AMM1–AMM6, AMM10,
2 and AMM15, which would be in place throughout the time period when periodic effects would occur.

3 **CEQA Conclusion:** Alternative 1C (CM2 and CM5) would have periodic impacts on modeled valley
4 elderberry longhorn beetle habitat. The periodic inundation of between 161 and 325 acres (CM2)
5 and 553 acres (CM5) of modeled habitat could result in the death of elderberry shrubs that may
6 occur there and thus potentially impact valley elderberry longhorn beetle. The Plan includes the
7 restoration of 5,000 acres of riparian habitat (Objective VFRNC1.1) and the protection of 750 acres
8 riparian habitat (Objective VFRNC1.2) would include areas for elderberry restoration and
9 protection. The BDCP also includes AMM1–AMM6, AMM10, and AMM15 that would minimize and
10 avoid impacts on valley elderberry longhorn beetle prior to Yolo Bypass fisheries enhancement and
11 floodplain restoration activities. AMM15, which includes a measure for following the USFWS
12 conservation guidelines for valley elderberry longhorn beetle, would be used to identify shrubs for
13 transplanting to conservation areas that otherwise could be adversely affected by periodic
14 inundation in Yolo Bypass and floodplain restoration areas (U.S. Fish and Wildlife Service 1999a).
15 These conservation actions would compensate for the periodic impacts on valley elderberry
16 longhorn beetle.

17 Considering these protection and restoration provisions and avoidance and minimization measures,
18 implementation of Alternative 1C as a whole would not result in a substantial adverse effect through
19 habitat modifications and would not substantially reduce the number or restrict the range of the
20 species. Therefore, periodic effects of inundation resulting from Alternative 1C would have a less-
21 than-significant impact on valley elderberry longhorn beetle.

22 **Nonlisted vernal pool invertebrates**

23 This section describes the effects of Alternative 1C, including water conveyance facilities
24 construction and implementation of other conservation components, on nonlisted vernal pool
25 invertebrates that are not covered by the Plan (Blennosperma vernal pool andrenid bee, hairy water
26 flea, Ricksecker’s water scavenger beetle, curved-foot hygrotus beetle, molestan blister beetle).
27 Little is known about the range of these species so it is assumed that they have potential to occur in
28 the same areas described by the vernal pool crustacean modeled habitat. That habitat model
29 consists of: vernal pool complex, which consists of vernal pools and uplands that display
30 characteristic vernal pool and swale visual signatures that have not been significantly affected by
31 agricultural or development practices; alkali seasonal wetlands in CZ 8; and degraded vernal pool
32 complex, which consists of low-value ephemeral habitat ranging from areas with vernal pool and
33 swale visual signatures that display clear evidence of significant disturbance due to plowing, discing,
34 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in
35 fallow fields, and areas of compacted soils in pastures. For the purpose of the effects analysis, vernal
36 pool complex is categorized as high-value and degraded vernal pool complex is categorized as low-
37 value for these species. Alkali seasonal wetlands in CZ 8 were also included as high-value habitat for
38 vernal pool crustaceans in the model. Also included as low-value for vernal pool habitat are areas
39 along the eastern boundary of CZ 11 that are mapped as vernal pool complex because they flood
40 seasonally and support typical vernal pool plants, but do not include topographic depressions that
41 are characteristic of vernal pools.

42 Construction and restoration associated with Alternative 1C conservation measures would result in
43 permanent losses of habitat for nonlisted vernal pool invertebrates as indicated in Table 12-1C-15
44 and indirect conversions of vernal pool habitat. The majority of the losses would take place over an

1 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of
2 Alternative 1C would also include the following conservation actions over the term of the BDCP that
3 would benefit nonlisted vernal pool invertebrates (BDCP Chapter 3, *Conservation Strategy*).

- 4 • Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool
5 recovery areas (Objective VPNC1.1, associated with CM3).
- 6 • Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool
7 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective
8 VPNC1.2, associated with CM9).
- 9 • Increase size and connectivity of protected vernal pool complexes in plan area and increase
10 connectivity with complexes outside the Plan Area (Objective VPNC1.3)
- 11 • Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective
12 VPNC1.4)
- 13 • Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for
14 supporting and sustaining vernal pool species (Objective VPNC2.1)

15 However, as explained below the impacts on nonlisted vernal pool invertebrates would be adverse
16 for NEPA purposes and would be significant for CEQA purposes. Mitigation Measure BIO-32, *Restore
17 and Protect Vernal Pool Crustacean Habitat*, would reduce the effects under NEPA and reduce the
18 impacts to a less-than-significant level under CEQA.

19 **Table 12-1C-15. Changes in Nonlisted Vernal Pool Invertebrate Habitat Associated with Alternative**
20 **1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	42	42	33	33	NA	NA
	Low-value	0	0	6	6	NA	NA
Total Impacts CM1		42	42	39	39	NA	NA
CM2–CM18	High-value	0	0	0	0	0–4	0
	Low-value	201	372	0	0	0	0
Total Impacts CM2–CM18		201	372	0	0	0–4	0
TOTAL IMPACTS		243	414	39	39	0–4	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

21

1 **Impact BIO-38: Loss or Conversion of Habitat for and Direct Mortality of Nonlisted Vernal**
2 **Pool Invertebrates**

3 Alternative 1C conservation measures would result in the direct permanent loss of up to 453 acres
4 of vernal pool habitat from conveyance facility construction (CM1) and tidal natural communities
5 restoration (CM4). In addition, the conservation measures could result in the indirect conversion
6 due to hydrologic changes of an additional 196 acres of vernal pool habitat (140 acres of high-value
7 habitat and 56 acres of low-value habitat) from conveyance facilities construction (CM1) and tidal
8 restoration (CM4). Construction of the water conveyance facilities and restoration activities may
9 result in the modification of hardpan and changes to the perched water table, which could lead to
10 alterations in the rate, extent, and duration of inundation of nearby vernal pool habitat. USFWS
11 typically considers construction within 250 feet of vernal pools to constitute a possible conversion
12 of the habitat unless more detailed information is provided to further refine the limits of any such
13 effects. For the purposes of this analysis, the 250-foot buffer was applied to the water conveyance
14 facilities work areas where surface and subsurface disturbance activities would take place and to
15 restoration hypothetical footprints. Habitat enhancement and management activities (CM11), which
16 include disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.

17 Because the estimates of habitat loss resulting from tidal inundation are based on projections of
18 where restoration may occur, actual effects are expected to be lower because sites would be selected
19 and restoration projects designed to minimize or avoid effects on the covered vernal pools. As
20 specified in the BDCP, the BDCP Implementation Office would ensure that tidal restoration projects
21 and other covered activities would be designed such that no more than a total of 10 wetted acres of
22 vernal pool habitat would be permanently lost. *AMM12 Vernal Pool Crustaceans* would ensure that
23 no more than 20 wetted acres of vernal pool habitat are indirectly affected by BDCP covered
24 activities. The term *wetted acres* refers to an area that would be defined by the three parameter
25 wetland delineation method used by USACE to determine the limits of a wetland, which involves an
26 evaluation of wetland soil, vegetation, and hydrology characteristics. This acreage differs from
27 vernal pool complex acreages in that a vernal pool complex is comprised of individual wetlands
28 (vernal pools) and those upland areas that are in between and surrounding them, which provide the
29 supporting hydrology (surface runoff and groundwater input), organic and nutrient inputs, and
30 refuge for the terrestrial phase of some vernal pool species.

31 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the
32 individual conservation measure discussions.

- 33
- 34 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would
35 result in the permanent and temporary loss of 81 acres of vernal pool habitat (42 permanent
36 and 39 temporary). These impacts would occur from transmission line construction in the
37 western area of additional analysis and the construction of the canal from southeast of the town
38 of Brentwood to the area just west of Clifton Court Forebay. These impacts would be on 45 acres
39 of high-value habitat and 6 acres of low-value habitat. In addition, 61 acres of vernal pool habitat
40 (51 acres of high-value habitat and 10 acres of low-value habitat) could be indirectly affected by
41 the construction of the CM1 canal and the transmission line within the western area of
42 additional analysis.
 - 43 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
44 in the permanent loss of approximately 372 acres of low-value vernal pool habitat, which
45 consists of degraded vernal pool complex. The BDCP describes degraded vernal pool complex as

1 areas of low-value ephemeral habitat ranging from areas with vernal pool and swale visual
2 signatures that display clear evidence of significant disturbance due to plowing, disking, or
3 leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in
4 fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or
5 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery
6 found that these habitats appear to generally have low densities. However, areas mapped as
7 degraded vernal pool complex may still provide habitat for nonlisted vernal pool invertebrates.
8 So though degraded vernal pool complexes may not represent botanically diverse vernal pools
9 they still can provide habitat for nonlisted vernal pool invertebrates and thus the loss of 372
10 acres of degraded vernal pool complex may result in the loss of occupied nonlisted vernal pool
11 invertebrate habitat. In addition, tidal restoration could result in the indirect conversion of 135
12 acres of vernal pool habitat, which consist of 89 acres of high-value and 45 acres of low-value
13 habitat. No records of nonlisted vernal pool invertebrates would be directly impacted by CM4.

- 14 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,
15 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of
16 vernal pool complex would benefit vernal pool invertebrates (Table 12-1C-15). A variety of
17 habitat management actions included in CM11 that are designed to enhance wildlife values in
18 BDCP-protected habitats may result in localized ground disturbances that could temporarily
19 affect vernal pool invertebrate habitat. Ground-disturbing activities, such as removal of
20 nonnative vegetation and road and other infrastructure maintenance, are expected to have
21 minor effects on vernal pool invertebrate habitat and are expected to result in overall
22 improvements to and maintenance of vernal pool habitat values over the term of the BDCP.
23 These effects cannot be quantified, but are expected to be minimal and would be avoided and
24 minimized by the AMMs listed below.

25 The following paragraphs summarize the combined effects discussed above and describe other
26 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
27 also included. Table 12-1C-16 was prepared to further analyze BDCP effects on vernal pools using
28 wetted acres of vernal pools in order to compare to the effects of this alternative with the effect
29 limits established in BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*, which are
30 measured in wetted acres of vernal pools. Wetted acres were estimated by using the BDCP's
31 assumption that vernal pool and degraded vernal pool complexes would have a 15% density of
32 vernal pools (i.e., of 100 acres of vernal pool complex 15 acres would constitute vernal pools and the
33 remaining 85 acres supporting uplands). Based on an informal evaluation of aerial photographs of
34 the Plan Area, it is likely that the actual densities within the Plan Area are approximately 10%, but
35 the 15% density value was chosen as a conservative estimate for determining effects.

1 **Table 12-1C-16. Estimated Effects on Wetted Vernal Pools Associated with Alternative 1C (acres)^a**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit		5	10	10	20
Alternative 1C Impact ^a	CM1	12.2	12.2	9.2	9.2
	CM4 ^b	30.2	55.8	11.0	20.3
Total		42.4	68.0	20.2	29.5

^a Because roughly half of the impacts occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

^b These acreages were generated by assuming that the modeled habitat identified in Table 12-1C-15 has densities of wetted vernal pools at 15%. The direct effects numbers include permanent and temporary impacts.

^c These impacts are based on the hypothetical restoration footprints and would likely be lower based on the BDCP's commitment to minimize and avoid effects on vernal pool habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

2

3 ***Near-Term Timeframe***

4 Because the water conveyance facilities construction is being evaluated at the project level, the near-
5 term BDCP conservation strategy has been evaluated to determine whether it would provide
6 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
7 construction would not be adverse under NEPA and would be less than significant under CEQA.
8 Table 12-1C-15 above lists the impacts on vernal pool habitat that are based on the natural
9 community mapping done within the study area. The impacts from tidal natural communities
10 restoration (CM4) are based on hypothetical footprints and do not reflect actual impacts on vernal
11 pool habitat considering the BDCP's commitment to design restoration projects to minimize or avoid
12 effects on nonlisted vernal pool invertebrates (see AMM12). As seen in Table 12-1C-16, the effects of
13 CM1 alone would exceed the near-term limit and use 9 of the 10 indirect effects acres allowed in the
14 near-term. Alternative 1C would not meet the Plan's near-term biological goals and objectives for
15 direct effects. Near-term tidal restoration projects would have to be designed to ensure that there
16 are no direct effects on wetted vernal pool acreage (permanent or temporary) and no more than 2
17 wetted acres of indirect effects on vernal pools in order to meet the near-term goal for indirect
18 effects.

19 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be
20 1:1 for restoration and 2:1 for protection. Typically, indirect impacts are mitigated by protecting
21 vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 12.2 wetted acres of vernal
22 pools (or 81 acres of vernal pool complex) should be restored and 42.8 wetted acres (or 285 acres of
23 vernal pool complex) protected to mitigate the CM1 direct and indirect effects on vernal pool
24 habitat. Assuming that the BDCP would apply the impact limits presented in Table 12-1C-16,
25 impacts on wetted vernal pools resulting from tidal restoration in the near-term would have to
26 avoid direct effects on wetted vernal pool acreage and not exceed 1.6 wetted acres of indirect
27 effects. The BDCP would need to restore 12.2 wetted acres (81 acres of vernal pool complex) and
28 protect up to 30 wetted acres (200 acres of vernal complex) in the near-term to offset the effects of
29 CM1 and CM4.

1 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
2 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
3 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
4 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
5 restoration would be determined during implementation based on the following criteria.

- 6 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to
7 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly
8 affected (1:1 ratio).
- 9 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
10 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
11 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

12 The Plans biological goals and objectives would also inform the near-term protection and
13 restoration efforts. These Plan goals represent performance standards for considering the
14 effectiveness of restoration actions.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
19 *Natural Communities*, and *AMM37 Recreation*. *AMM12 Vernal Pool Crustaceans*, though developed for
20 vernal pool crustaceans, includes measures to avoid and minimize direct and indirect effects on
21 vernal pools and would thus be applicable to nonlisted vernal pool invertebrates as well. All of these
22 AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to
23 work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
24 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

25 **Late Long-Term Timeframe**

26 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
27 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
28 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-1C-16, the effects of CM1 alone
29 would exceed 10 acres of direct effect and roughly half of the acres of indirect effects allowed under
30 the BDCP. In order for Alternative 1C to meet the biological goals and objectives of the Plan, tidal
31 restoration projects would have to be designed to ensure that there are no direct effects on wetted
32 vernal pool acreage (permanent or temporary) and no more than 11.6 wetted acres of indirect
33 effects on vernal pools.

34 The Plan has committed to a late long-term goal of protecting 600 acres of vernal pool complex in
35 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
36 VPNC1,1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
37 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
38 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection
39 and restoration would be achieved using the criteria presented above as well as by following these
40 other specific biological goals and objectives.

- 41 • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3).
- 42 • Protecting the range of inundation characteristics that are currently represented by vernal pool
43 throughout the Plan Area (Objective VPNC1.4).

1 **NEPA Effects:** The near-term loss of vernal pool habitat under Alternative 1C would exceed the limit
2 for permanent and temporary impacts set by BDCP Objective VPNC1.2, which states the Plan would
3 restore up to 67 acres of vernal pool complex (or 10 wetted acres of vernal pool). Though the BDCP
4 has measures to redesign restoration projects to limit effects to natural communities and species it
5 does not provide for redesigning the conveyance alignment to minimize effects. The loss of nonlisted
6 vernal pool species habitat under Alternative 1C in the near-term would represent an adverse effect.
7 Even though the Plan has a commitment to avoid and minimize effects on vernal pools to the
8 maximum extent practicable it is assumed that by the long-term the needs for satisfying the tidal
9 restoration requirements (CM4) would result in additional indirect effects that could exceed the
10 limits established by the plan. Alternative 1C would result in adverse effects on nonlisted vernal
11 pool species under NEPA over the Plan's term. Mitigation Measure BIO-32, *Restore and Protect*
12 *Vernal Pool Crustacean Habitat*, would reduce these effects.

13 **CEQA Conclusion:**

14 **Near-Term Timeframe**

15 Because the water conveyance facilities construction is being evaluated at the project level, the near-
16 term BDCP conservation strategy has been evaluated to determine whether it would provide
17 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
18 construction would be less than significant. Table 12-1C-15 above lists the impacts on vernal pool
19 habitat that is based on the natural community mapping done within the study area. The impacts
20 from tidal natural communities restoration (CM4) are based on hypothetical footprints and do not
21 reflect actual impacts on vernal pool habitat considering the BDCP's commitment to design
22 restoration projects to minimize or avoid effects on vernal pools. As seen in Table 12-1C-16, the
23 effects of CM1 alone would exceed the near-term limit and use 9 of the 10 indirect effects acres
24 allowed in the near-term. Alternative 1C would not meet the Plan's near-term biological goals and
25 objectives for direct effects. Near-term tidal restoration projects would have to be designed to
26 ensure that there are no direct effects on wetted vernal pool acreage (permanent or temporary) and
27 no more than 2 wetted acres of indirect effects on vernal pools in order to meet the near-term goal
28 for indirect effects.

29 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be
30 1:1 for restoration and 2:1 for protection. Typically, indirect impacts are mitigated by protecting
31 vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 12.2 wetted acres of vernal
32 pools (or 81 acres of vernal pool complex) should be restored and 42.8 wetted acres (or 285 acres of
33 vernal pool complex) protected to mitigate the CM1 direct and indirect effects on vernal pool
34 habitat. Assuming that the BDCP would apply the impact limits presented in Table 12-1C-16,
35 impacts on wetted vernal pools resulting from tidal restoration in the near-term would have to
36 avoid direct effects to wetted vernal pool acreage and not exceed 1.6 wetted acres of indirect effects.
37 The BDCP would need to restore 12.2 wetted acres (81 acres of vernal pool complex) and protect up
38 to 30 wetted acres (200 acres of vernal complex) in the near-term to offset the effects of CM1 and
39 CM4.

40 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex by
41 protecting at least 2 wetted acres of vernal pools for each wetted acre directly or indirectly affected.
42 The BDCP has also committed to restoring/creating vernal pools such that there is no net loss of
43 vernal pool acreage. The amount of restoration would be determined during implementation based
44 on the following criteria.

- 1 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to
2 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly
3 affected (1:1 ratio).
- 4 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
5 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
6 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

7 The species-specific biological goals and objectives would also inform the near-term protection and
8 restoration efforts. These Plan goals represent performance standards for considering the
9 effectiveness of restoration actions.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
14 *Natural Communities*, and *AMM37 Recreation*. *AMM12 Vernal Pool Crustaceans*, though developed for
15 vernal pool crustaceans, includes measures to avoid and minimize direct and indirect effects to
16 vernal pools and would thus be applicable to nonlisted vernal pool invertebrates as well. All of these
17 AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to
18 work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
19 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

20 The near-term loss of nonlisted vernal pool species habitat under Alternative 1C would exceed the
21 limit for permanent and temporary impacts on wetted vernal pool acreage set by BDCP Objective
22 VPNC1.2, which states that the Plan would restore up to 67 acres of vernal pool complex (or 10
23 wetted acres of vernal pool). Though the BDCP has measures to redesign restoration projects to
24 limit effects to natural communities and species it does not provide for redesigning the conveyance
25 alignment to minimize effects. The loss of nonlisted vernal pool species habitat under Alternative 1C
26 in the near-term would represent an adverse effect. Alternative 1C would result in a significant
27 impacts on nonlisted vernal pool species under CEQA in the near-term. Implementation of
28 Mitigation Measure BIO-32, *Restore and Protect Vernal Pool Crustacean Habitat*, would reduce
29 impacts to a less-than-significant level.

30 **Late Long-Term Timeframe**

31 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
32 and no more than 20 wetted acres of indirect effects on vernal pools by the late long-term. As seen
33 in Table 12-1C-16, the effects of CM1 alone would exceed 10 acres of direct effect and roughly half of
34 the acres of indirect effects allowed under the BDCP. In order for Alternative 1C to meet the
35 biological goals and objectives of the Plan, tidal restoration projects would have to be designed to
36 ensure that there are no direct effects on wetted vernal pool acreage (permanent or temporary) and
37 no more than 11.6 wetted acres of indirect effects on vernal pools.

38 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in
39 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
40 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
41 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
42 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection

1 and restoration would be achieved using the criteria presented above as well as by following these
2 other specific biological goals and objectives.

- 3 • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 4 • Protecting the range of inundation characteristics that are currently represented by vernal pool
5 throughout the Plan Area (Objective VPNC1.4)

6 Even though the Plan has a commitment to avoid and minimize effects on vernal pool habitats to the
7 maximum extent practicable it is assumed that by the long-term the needs for satisfying the tidal
8 restoration requirements (CM4) would result in additional indirect effects that could exceed the
9 limits established by the plan. Alternative 1C would result in a significant impacts on nonlisted
10 vernal pool species under CEQA over the Plan's term. Mitigation Measure BIO-32, *Restore and*
11 *Protect Vernal Pool Crustacean Habitat*, would reduce this impacts on a less-than significant level.

12 **Mitigation Measure BIO-32: Restore and Protect Vernal Pool Crustacean Habitat**

13 See Mitigation Measure BIO-32 under Impact BIO-32.

14 **Impact BIO-39: Indirect Effects of Plan Implementation on Nonlisted Vernal Pool** 15 **Invertebrates**

16 Construction and maintenance activities associated with water conveyance facilities, and restoration
17 actions could indirectly affect nonlisted vernal pool invertebrates and their habitat in the vicinity of
18 construction and restoration areas, and maintenance activities. These potential effects would be
19 minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would be in effect
20 throughout the Plan's construction phase.

21 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly
22 affect nonlisted vernal pool invertebrates and their habitat in the vicinity of construction areas.
23 Ground-disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment
24 could result in the inadvertent release of sediment and hazardous substances into this habitat.
25 These potential effects would be avoided and minimized through AMM1–AMM6, which would be in
26 effect throughout the Plan's construction phase. Nonlisted vernal pool invertebrates and their
27 habitat could be periodically indirectly affected by maintenance activities at water conveyance
28 facilities. Embankment maintenance activities around Clifton Court Forebays could result in the
29 inadvertent discharge of sediments and hazardous materials into vernal pool habitat that occurs
30 along the southern and western boundaries of the forebays. These potential effects would be
31 avoided and minimized through AMM1–AMM6, which would be in effect throughout the term of the
32 Plan. The indirect effects of Alternative 1C implementation would not be adverse.

33 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance
34 facilities, and restoration actions could indirectly impact nonlisted vernal pool invertebrates and
35 their habitat in the vicinity of construction and restoration areas, and maintenance activities. These
36 potential impacts would be minimized or avoided through AMM1–AMM6, AMM10, and AMM12,
37 which would be in effect throughout the Plan's construction phase. The indirect impacts of
38 Alternative 1C would be less than significant.

1 **Impact BIO-40: Periodic Effects of Inundation of Nonlisted Vernal Pool Invertebrates' Habitat**
2 **as a Result of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass under *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
4 0 to 4 acres of modeled habitat for nonlisted vernal pool invertebrates (Table 12-1C-15). There
5 would be no periodic effects resulting from *CM5 Seasonally Inundated Floodplain Restoration*

6 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the
7 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,
8 periodic inundation could affect nonlisted vernal pool invertebrates occupying areas ranging from 0
9 acres of habitat during most notch flows to an estimated 4 acres during a notch flow of 6,000 cfs.
10 BDCP-associated inundation of areas that would not otherwise have been inundated is expected to
11 occur in no more than 30% of all years, because Fremont Weir is expected to overtop the remaining
12 70% of all years, and during those years notch operations would not typically affect the maximum
13 extent of inundation. In more than half of all years under Existing Conditions, an area greater than
14 the BDCP-related inundation area already inundates in the bypass. Yolo Bypass flooding is expected
15 to have a minimal effect on nonlisted vernal pool invertebrates and would thus not be adverse.

16 **CEQA Conclusion:** Alternative 1C would periodically inundate up to 4 acres of nonlisted vernal pool
17 invertebrates' habitat during the maximum flows over the Fremont Weir. The periodic inundation is
18 not anticipated to result in a conversion of nonlisted vernal pool invertebrates' habitat into different
19 wetland habitat. BDCP-associated inundation of areas that would not otherwise have been
20 inundated is expected to occur in no more than 30% of all years, because Fremont Weir is expected
21 to overtop the remaining 70% of all years, and during those years notch operations would not
22 typically affect the maximum extent of inundation. In more than half of all years under Existing
23 Conditions, an area greater than the BDCP-related inundation area already inundates in the bypass.
24 Yolo Bypass flooding is expected to have a minimal effect on nonlisted vernal pool invertebrates and
25 would thus result in less-than-significant impacts on the species.

26 **Sacramento and Antioch Dunes Anthicid Beetles**

27 This section describes the effects of Alternative 1C, including water conveyance facilities
28 construction and implementation of other conservation components, on Sacramento and Antioch
29 Dunes anthicid beetles. Potential habitat in the study area includes inland dune scrub habitat at
30 Antioch Dunes NWR, sand bars along the Sacramento and San Joaquin Rivers, and sandy dredge
31 spoil piles (California Department of Fish and Game 2006c and 2006d).

32 The construction, and operations and maintenance of the water conveyance facilities under
33 Alternative 1C would not likely affect Sacramento and Antioch Dunes anthicid beetles. The
34 construction of the water conveyance structure and associated infrastructure would generally avoid
35 affects to channel margins where sand bars are likely to form. Conveyance construction would not
36 affect inland dune scrub at Antioch Dunes NWR. No dredge spoil areas that could be occupied by
37 Sacramento anthicid beetle were identified within conveyance facilities footprints during a review
38 of Google Earth imagery. Also, a review of the locations of the Alternative 1C water intake facilities
39 on aerial imagery did not reveal any sandbars along the channel margins. These portions of the
40 Sacramento River have steep, riprap lined channel banks that are likely not conducive to the
41 formation of sandbars.

42 Implementation of Alternative 1C restoration-based conservation measures could affect habitat for
43 Sacramento and Antioch Dunes anthicid beetles. Both species are known to utilize interior sand

1 dunes and sandbar habitat. The only interior sand dune habitat within the Plan Area is at Antioch
2 Dunes, which would not be impacted by the Alternative 1C conservation measures. Both species are
3 known to occur along the Sacramento River and San Joaquin Rivers. The implementation of BDCP
4 restoration actions, and other covered activities could affect habitat for Sacramento and Antioch
5 Dunes anthicid beetles along channels throughout the Plan Area; however the extent of these
6 habitats in the Plan Area is unknown because these areas were not identified at the scale of mapping
7 done within the study area. Because of current and historic channel modifications (channel
8 straightening and dredging) and levee construction throughout the Delta, sandbar habitat is likely
9 very limited and restricted to channel margins. The implementation of *CM4 Tidal Natural*
10 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM6 Channel Margin*
11 *Enhancement* could impact sandbar habitat along the river channels and possibly sandy, dredge
12 piles on Delta islands.

13 Over the term of the BDCP, Alternative 1C would likely result in beneficial effects on Sacramento and
14 Antioch Dunes anthicid beetles. The following Alternative 1C objectives would generally increase
15 opportunities for the formation of sandbars in the Plan Area.

- 16 • Restore 10,000 acres of seasonally inundated floodplain (Objective L2.11, associated with CM5),
- 17 • Enhance 20 miles of channel margin habitat (Objective L2.12, associated with CM6),
- 18 • Restore 5,000 acres of riparian habitat, with at least 3,000 acres occurring on restored
19 seasonally inundated floodplain. (VFRNC1.1, associated with CM7).

20 These measures would improve shoreline conditions by creating benches along levees, shallow
21 habitat along margins and in floodplains, and increasing shoreline vegetation, all of which would
22 likely contribute to the formation of sandbars along Delta river channels where these measures
23 would be implemented. Increasing the structural diversity of Delta river channel margins and
24 floodplains would create opportunities for sand to be deposited and for sandbars to subsequently
25 form. As explained below, potential impacts on Sacramento and Antioch Dunes anthicid beetles
26 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-17. Changes in Sacramento and Antioch Dunes Anthicid Beetle Habitat Associated**
2 **with Alternative 1C (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2-CM18	0	0	0	0	0	0
	0	0	0	0	0	0
Total Impacts CM2-CM18	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-41: Loss or Conversion of Habitat for and Direct Mortality of Sacramento and**
5 **Antioch Dunes Anthicid Beetles**

6 Implementation of Alternative 1C conservation measures could affect Sacramento and Antioch
7 Dunes anthicid beetles and their habitat. As mentioned above, the extent of this habitat in the study
8 area is unknown but it is assumed that sand bars likely occur along to some degree along the
9 Sacramento and San Joaquin Rivers and that some islands in the Delta may contain sandy dredge
10 spoil piles. A review of aerial Google Earth imagery of the north Delta did identify three general
11 areas that appear to have accumulations of sandy soils (with some vegetation), possibly from dredge
12 disposal, are Decker Island, the western portion of Bradford Island, and the southwestern tip of
13 Grand Island. A review of Google Earth imagery of the south Delta did identify sandbar habitat along
14 the San Joaquin River from the southern end of the Plan Area downstream to an area just west of
15 Lathrop. An additional area along Paradise Cut was identified just north of I-5. Conservation
16 measures that could result in impacts on Sacramento and Antioch Dunes anthicid beetles are tidal
17 natural communities restoration (CM4), seasonally inundated floodplain restoration (CM5), and
18 channel margin enhancement (CM6). In addition, maintenance activities associated with the long-
19 term operation of the water conveyance facilities and other BDCP physical facilities could degrade
20 or eliminate habitat for Sacramento and Antioch Dunes anthicid beetles. Each of these individual
21 activities is described below. A summary statement of the combined impacts and NEPA and CEQA
22 conclusions follows the individual conservation measure discussions.

- 23 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration could impact
24 the areas of sandy soils identified from aerial photographs on Decker Island, the western
25 portion of Bradford Island, and on the southwestern tip of Grand Island because these areas fall

1 within the West Delta Restoration Opportunity Area (ROA). The West Delta ROA has been
2 identified in the BDCP (BDCP Chapter 3, Section 3.4.4, *Conservation Measure 4 Tidal Natural*
3 *Communities Restoration*) as providing opportunities for creating subtidal aquatic and tidal
4 marsh habitats. The methods and techniques identified in the BDCP that may be used for tidal
5 restoration include the recontouring of lands so that they have elevations suitable for the
6 establishment of marsh plains and the eventual breaching of levees. There are three CNDDDB
7 records of Sacramento anthonid beetle (just north of Rio Vista, one just south of Rio Vista along
8 the west shore of the Sacramento River, and one on Grand Island) and one CNDDDB record of
9 Antioch Dunes anthonid beetle (just north of Rio Vista) that fall within the West Delta ROA
10 (California Department of Fish and Wildlife 2013). Tidal restoration actions in the West Delta
11 ROA may eliminate potential habitat and impact occupied habitat of both Sacramento and
12 Antioch Dunes anthonid beetles.

- 13 ● *CM5 Seasonally Inundated Floodplain Restoration*: Seasonally inundated floodplain restoration
14 could impact areas with sandbars that were identified in a review of aerial photographs. The
15 sandbars identified along the San Joaquin River and Paradise Cut are within the conceptual
16 corridors (Corridors 1a, 1b, 2a, and 4) identified in Figure 3.4-20 of the BDCP. There are four
17 CNDDDB records for Sacramento anthonid beetle in the conceptual corridor along the San Joaquin
18 River (California Department of Fish and Wildlife 2013). Floodplain restoration actions in these
19 conceptual corridors could impact potential habitat for both these species and occupied habitat
20 of Sacramento anthonid beetle.
- 21 ● *CM6 Channel Margin Enhancement*: Channel margin enhancement could result in impacts on 20
22 miles of channel margin that could contain sandbars.

23 The following paragraphs summarize the combined effects discussed above and describe other
24 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
25 also included.

26 Alternative 1C could result in substantial affects to Sacramento and Antioch Dunes anthonid beetles
27 because all of the habitat identifiable from aerial photo review falls within either the West Delta
28 ROA, which is being considered for tidal restoration (CM4), or within three of the conceptual
29 corridors being considered for floodplain restoration (CM5). Furthermore, all seven of the records
30 for Sacramento anthonid beetle within the study area fall within areas being considered for
31 restoration (CM4 and CM5), which represent over half of the extant records for this species range
32 wide (7 of 13), and the only extant record for Antioch Dunes anthonid beetle, which represent one of
33 five extant records range wide, falls within the West Delta ROA that is just north of Rio Vista. These
34 occurrences could be affected by restoration if these areas are chosen as restoration projects.
35 However, over the term of the BDCP, implementation of conservation components would likely
36 benefit Sacramento and Antioch Dunes anthonid beetles. CM5, CM6, and CM7 would generally
37 contribute to the formation of sandbar habitat in the Plan Area. These measures would improve
38 shoreline conditions by creating benches along levees (CM6), creating shallow margin and
39 floodplain habitat (CM5), and increasing shoreline vegetation (CM7), all of which would likely
40 contribute to the formation of sandbars along Delta river channels where these measures would be
41 implemented. Increasing the structural diversity of Delta river channel margins would create areas
42 of slow water that would allow for sand to be deposited and for sandbars to subsequently form.
43 Three other factors are relevant to effects on Sacramento and Antioch Dunes anthonid beetles.

- 44 ● The actual extent of suitable and occupied habitat for these species in the plan is unknown.

- 1 • The sandbar habitat occupied by Sacramento anthicid beetle along the San Joaquin River would
2 likely not be directly impacted where floodplain restoration occurs because the physical
3 disturbance would be to adjacent levees and agricultural areas. Though these actions would
4 change hydrologic conditions that could overtime remove the existing sandbars, the expanded
5 floodplain would create conditions suitable for the formation of new and possibly larger
6 sandbars.
- 7 • Floodplain restoration would be phased over a period of 30 years so that not all sandbar habitat
8 within these areas would be affected at once. Furthermore, as floodplain restoration is being
9 implemented new sandbar habitat would likely be forming prior and/or concurrent with future
10 floodplain restoration projects that may affect sandbar habitat on the San Joaquin River and/or
11 Paradise Cut.

12 **NEPA Effects:** The potential impacts on Sacramento and Antioch Dunes anthicid beetles associated
13 with Alternative 1C as a whole would represent an adverse effect as a result of habitat modification
14 of a special-status species and potential for direct mortality in the absence of other conservation
15 actions. However, with implementation of restoration associated with CM5, CM6, and CM7, which
16 would be phased throughout the time period when the impacts would be occurring, the effects of
17 Alternative 1C as a whole on Sacramento and Antioch Dunes anthicid beetles would not be adverse
18 under NEPA.

19 **CEQA Conclusion:** Alternative 1C would impact Sacramento and Antioch Dunes anthicid beetle
20 habitat and could impact seven occurrences of Sacramento anthicid beetle and one occurrence of
21 Antioch Dunes anthicid beetle. However, over the term of the BDCP, implementation of conservation
22 components would likely benefit Sacramento and Antioch Dunes anthicid beetles. BDCP
23 conservation components, particularly conservation measures CM5, CM6, and CM7, would generally
24 contribute to the formation of sandbar habitat in the Plan Area. Floodplain restoration (CM5) would
25 be phased over a period of 30 years so that not all sandbar habitat within these areas would be
26 affected at once. Furthermore, as floodplain restoration is being implemented new sandbar habitat
27 would likely be forming prior and/or concurrent with future floodplain restoration projects that
28 may affect sandbar habitat on the San Joaquin River and/or Paradise Cut.

29 Considering that floodplain (CM5), channel margin enhancement (CM6), and riparian restoration
30 (CM7) would contribute to the replacement of and possible expansion of sandbar habitat in the
31 Delta and be phased throughout the time period when the impacts would be occurring, the
32 implementation of Alternative 1C as a whole would not result in a substantial adverse effect though
33 habitat modification and would not substantially reduce the number or restrict the range of these
34 species. Therefore, the alternative would have a less-than significant impact on Sacramento and
35 Antioch Dunes anthicid beetle.

36 **Delta Green Ground Beetle**

37 Suitable habitat for delta green ground beetle in the study area would be vernal pool complexes and
38 annual grasslands in the general Jepson Prairie area. The construction, and operations and
39 maintenance of the water conveyance facilities under Alternative 1C would not affect delta green
40 ground beetle because the facilities and construction area are outside the known range of the
41 species. Implementation of Alternative 1C could affect delta green ground beetle through the
42 protection of grasslands and vernal pool complex (CM3) in the vicinity of Jepson Prairie and the
43 subsequent implementation of habitat enhancement and management actions and recreational trail
44 construction (CM11) in these areas. In addition, tidal natural communities restoration (CM4) and

1 vernal pool and alkali seasonal wetland complex restoration (CM9) could result in potential impacts
2 on delta green ground beetle and its habitat. Full implementation of Alternative 1C would likely
3 result in beneficial effects on delta green ground beetle through the following conservation actions.

- 4 • Protect 2,000 acres of grassland in CZ 1 (Objective GNC1.1, associated with CM3).
- 5 • Protect 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective VPNC1.1, associated with
6 CM3).
- 7 • Restore up to 67 acres of vernal pool complex in CZs 1, 8, and/or 11 (Objective VPNC1.2,
8 associated with CM9).

9 These areas could contain currently occupied habitat for delta green ground beetle and/or create
10 conditions suitable for eventual range expansion. As explained below, potential impacts on delta
11 green ground beetle would be adverse for NEPA purposes and would be significant for CEQA
12 purposes. Mitigation Measure BIO-42, *Avoid Impacts on Delta Green Ground Beetle and its Habitat*,
13 would reduce the effects under NEPA and reduce the impacts to a less-than-significant level under
14 CEQA.

15 **Table 12-1C-18. Changes in Delta Green Ground Beetle Habitat Associated with Alternative 1C**
16 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2-CM18	0	0	0	0	0	0
	0	0	0	0	0	0
Total Impacts CM2-CM18	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

17
18 **Impact BIO-42: Loss or Conversion of Habitat for and Direct Mortality of Delta Green Ground**
19 **Beetle**

20 Alternative 1C conservation measures could result in the conversion of habitat and/or direct
21 mortality to delta green ground beetle. Conservation measures that could affect delta green ground
22 beetle include tidal natural communities habitat restoration (CM4), vernal pool and alkali seasonal

1 wetland complex restoration (CM9), and habitat enhancement and management activities (CM11) in
2 CZ 1. CZ 1 is the only portion of the Plan Area that contains occupied and potential habitat for delta
3 green ground beetle. The range of the delta green ground beetle is currently believed to be generally
4 bound by Travis Air Force Base to the west, SR 113 to the east, Hay Road to the north, and Creed
5 Road to the south (Arnold and Kavanaugh 2007; U.S. Fish and Wildlife Service 2009). Further
6 discussion of this potential effect is provided below, and NEPA and CEQA conclusions follow.

- 7 • *CM4 Tidal Natural Communities Restoration:* Tidal restoration in the Cache Slough ROA could
8 result in the loss of delta green ground beetle habitat if restoration is planned in areas known to
9 be or potentially occupied by the species. CM4 identifies 5,000 acres of freshwater tidal natural
10 communities restoration in the Cache Slough ROA and Lindsey Slough and Calhoun Cut have
11 been identified as areas suitable for restoration. Lindsey Slough is just west of Jepson Prairie
12 and Calhoun Cut, which is off of Lindsey Slough (see Figure 12-1), goes into the general Jepson
13 Prairie area and is adjacent to areas of potential habitat for delta green ground beetle. The tidal
14 restoration methods and techniques identified in CM4 (see BDCP Chapter 3, Section 3.4.4.3.3)
15 include excavating channels; modifying ditches, cuts, and levees to encourage tidal circulation;
16 and scalping higher elevation areas to create marsh plains. These disturbances could affect
17 delta green ground beetle through habitat modification, either directly or indirectly through
18 hydrologic modifications, and/or result in direct mortality to the species. No CNDDB records for
19 delta green ground beetle are intersected by the hypothetical tidal restoration footprints being
20 used by the BDCP.
- 21 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration:* Vernal pool restoration may
22 occur in CZ 1 and could result in disturbance to delta green ground beetle habitat if restoration
23 is planned in areas known to be or potentially occupied by the species. These restoration
24 activities would most likely take place in areas that were historically vernal pool complexes that
25 have since been highly degraded, but which are suitable for vernal pool restoration. These areas
26 would not likely provide habitat for delta green ground beetle. However, if these activities do
27 take place in suitable habitat, then disturbances could result in direct mortality of the species.
28 Still, restoration ultimately would expand habitat available to the species.
- 29 • *CM11 Natural Communities Enhancement and Management:* As described in *CM3 Natural*
30 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in
31 CZ 1 and a portion of the 600 acres of protection and possibly some of the up to 10 wetted acres
32 of vernal pool restoration could also occur in CZ 1. Potential effects from CM11 could include
33 direct mortality to larvae and adults from the implementation of grassland management
34 techniques, which may include livestock grazing, prescribed burning, and mowing. In addition to
35 these grassland and vernal pool complex management actions, CM11 also includes guidelines
36 and techniques for invasive plant control, which may include manual control (hand-pulling and
37 digging), mechanical control (large equipment), and chemical control, though some of these
38 methods would be restricted in areas where rare plants occur or in critical habitat for vernal
39 pool species. The creation of new recreation trails as part of CM11 would result in impacts on
40 15.5 acres of grasslands within CZ 1, which could affect delta green ground beetle if present.

41 **NEPA Effects:** The protection of 2,000 acres of grassland in CZ 1 (CM3) and the protection of 600
42 acres of vernal pool complex and up to 10 wetted acres of vernal pool complex restoration, some of
43 which could occur in CZ 1 (CM3 and CM9) could benefit delta green ground beetle if these areas
44 occur within the range of the species. Tidal natural communities restoration (CM4), vernal pool and
45 alkali seasonal wetland complex restoration (CM9), and recreational trail construction and
46 subsequent enhancement and management actions (CM11) could impact delta green ground beetle.

1 The management of these grasslands and vernal pool complexes according to CM11 *Natural*
2 *Communities Enhancement and Management* and the construction of recreational trails in CZ 1 has a
3 potential to affect this species. AMM37 would ensure that new trails in vernal pool complexes be
4 sited at least 250 feet from wetland features, or closer if site-specific information indicates that local
5 watershed surrounding a vernal pools is not adversely affected. Direct mortality and/or the affects
6 to delta green ground beetle habitat would be an adverse effect under NEPA. Implementation of
7 Mitigation Measure BIO-42 would reduce this effect.

8 **CEQA Conclusion:** The implementation of grassland and vernal pool complex protection (CM3), tidal
9 natural communities restoration (CM4), vernal pool and alkali seasonal wetland complex
10 restoration (CM9), and recreational trail construction and subsequent enhancement and
11 management actions (CM11) could impact delta green ground beetle. Tidal restoration projects
12 around Calhoun Cut and possible Lindsey Slough could affect habitat and result in direct mortality to
13 the species from excavating channels; modifying ditches, cuts, and levees to encourage tidal
14 circulation; and scalping higher elevation areas to create marsh plains. Potential impacts from CM11
15 could include direct mortality to larvae and adults resulting from the implementation of recreation
16 trail construction in 15.5 acres of grassland in CZ 1 and from grassland management techniques,
17 which may include livestock grazing, prescribed burning, and mowing. AMM37 would ensure that
18 new trails in vernal pool complexes be sited at least 250 feet from wetland features, or closer if site-
19 specific information indicates that local watershed surrounding a vernal pools is not adversely
20 affected. In addition to these grassland and vernal pool complex management actions, CM11 also
21 includes guidelines and techniques for invasive plant control, which may include manual control
22 (hand-pulling and digging), mechanical control (large equipment), and chemical control, though
23 some of these methods would be restricted in areas where rare plants occur and in critical habitat
24 for vernal pool species. These actions could result in adverse effects through habitat modification
25 and a possible reduction in the number of the species or restrict its range, and therefore result in
26 significant impacts on delta green ground beetle. Implementation of Mitigation Measure BIO-42
27 would reduce these potential impacts to a less-than-significant level.

28 **Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat**

29 As part of the design and development of management plans for conservation areas in the area of
30 Jepson Prairie, BDCP proponents will implement the following measures to avoid effects on
31 delta green ground beetle.

- 32 • If habitat restoration or protection is planned for the lands adjacent to Calhoun Cut and
33 noncultivated lands on the western side of Lindsey Slough, these area will be evaluated by a
34 USFWS approved biologist for potential delta green ground beetle habitat (large playa pools,
35 or other similar aquatic features, with low growing vegetation or bare soils around the
36 perimeter). The biologist will have previous experience with identifying suitable habitat
37 requirements for delta green ground beetle.
- 38 • Any suitable habitat identified by the biologist (with previous experience with delta green
39 ground beetle) within the species current range will be considered potentially occupied and
40 all ground disturbing covered activities in these areas will be avoided, which for the Plan
41 Area is generally the area west of State Route 113.
- 42 • Any other areas identified as suitable habitat outside of the current range of the species will
43 be surveyed by a biologist with previous experience in surveying for and identifying delta

1 green ground beetle. No ground disturbing covered activities will occur in areas identified as
2 occupied by delta green ground beetle.

- 3 • Based on the results of the habitat evaluations and surveys, site-specific restoration and
4 management plans will be developed so that they don't conflict with the recovery goals for
5 delta green ground beetle in the USFWS's 2005 Recovery Plan for Vernal Pool Ecosystems of
6 California and Southern Oregon (U.S. Fish and Wildlife Service 2005). Plans will include
7 measures to protect and manage for delta green ground beetle so that they continue to
8 support existing populations or allow for future colonization.

9 **Callippe Silverspot Butterfly**

10 Suitable habitats for callippe silverspot butterfly are typically in areas influenced by coastal fog with
11 hilltops that support the species' host-plant, Johnny jump-ups. Preferred nectar flowers used by
12 adults include thistles, blessed milk thistle, and coyote wild mint. Other native nectar sources
13 include hairy false goldeneaster, coast buckwheat, mourning bride, and California buckeye. The
14 construction, and operations and maintenance of the water conveyance facilities under Alternative
15 1C would not result in impacts on callippe silverspot butterfly or its habitat. If Cordelia Hills and
16 Potrero Hills are identified for grassland protection opportunities as part of *CM3 Natural*
17 *Communities Protection and Restoration*, the subsequent implementation of *CM11 Natural*
18 *Communities Enhancement and Management* could affect callippe silverspot butterfly. Callippe
19 silverspot butterfly has been documented in the western most portion of the Plan Area (CZ 11) in
20 the Cordelia Hills (Solano County Water Agency 2009). Potential habitat for the species (grassy hills
21 with *Viola pedunculata*) is present in the Potrero Hills, but it has not been observed there (EDAW
22 2005, California Department of Fish and Wildlife 2013). Though CZ 11 has been identified as
23 potential area for grassland restoration in *CM8 Grassland Natural Community Restoration*, the
24 primary goal there is to restore small patches of grassland to connect to Jepson Prairie and/or the
25 restoration of upland grasses adjacent to tidal brackish emergent wetland in Suisun Marsh, both of
26 which would not be areas suitable for callippe silverspot butterfly. The full implementation
27 Alternative 1C would protect up to 2,000 acres of grassland in CZ 11 (Objective GNC1.1, associated
28 with CM3), some of which may contain habitat for callippe silverspot butterfly. As explained below,
29 potential impacts on callippe silverspot would be adverse for NEPA purposes and would be
30 significant for CEQA purposes. Mitigation Measure BIO-43, *Avoid and Minimize Loss of Callippe*
31 *Silverspot Butterfly Habitat*, would reduce the effects under NEPA and reduce the impacts to a less-
32 than-significant level under CEQA.

1 **Table 12-1C-19. Changes in Callippe Silverspot Butterfly Habitat Associated with Alternative 1C**
2 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2-CM18	0	0	0	0	0	0
	0	0	0	0	0	0
Total Impacts CM2-CM18	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

^e Restored/created and protected habitat acreages represent planned conservation activities that would be implemented over the lifetime of the BDCP (see BDCP Chapter 3, *Conservation Strategy*, for specifics).

NT = near-term

LLT = late long-term

NA = not applicable

3
4 **Impact BIO-43: Loss or Conversion of Habitat for and Direct Mortality of Callippe Silverspot**
5 **Butterfly**

6 Alternative 1C conservation measures could result in the conversion of habitat and/or direct
7 mortality to callippe silverspot butterfly. Only one conservation measure was identified as
8 potentially affecting callippe silverspot butterfly, *CM11 Natural Communities Enhancement and*
9 *Management*, which could result in the disturbance of callippe silverspot butterfly habitat if such
10 areas are acquired as part of grassland protection under *CM3 Natural Communities Protection and*
11 *Restoration*. Further discussion of this potential effect is provided below and NEPA and CEQA
12 conclusions follow.

- 13 • *CM11 Natural Communities Enhancement and Management*: As described in *CM3 Natural*
14 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in
15 CZ 11. If areas chosen for protection include Cordelia Hills or Potrero Hills, where there is
16 known and potential habitat, respectively, then grassland enhancement and management
17 actions could affect the callippe silverspot butterfly. Potential effects from CM11 could include
18 the loss of larval host and nectar sources and direct mortality to larvae and adults from the
19 installation of artificial nesting burrows and structures and the implementation of grassland
20 management techniques, which may include livestock grazing, prescribed burning, and mowing.
21 In addition to these grassland management actions, CM11 also includes guidelines and
22 techniques for invasive plant control, which may include manual control (hand-pulling and

1 digging), mechanical control (large equipment), and chemical control. Several of the preferred
2 nectar sources are thistles, some of which have been identified by the California Invasive Plant
3 Council as having limited to moderate ecological impacts (California Invasive Plant Council
4 2006).

5 **NEPA Effects:** The protection of 2,000 acres of grassland within CZ 11 could benefit callippe
6 silverspot butterfly if these protected areas include occupied and potential habitat on the hill tops in
7 Cordelia Hills and Potrero Hills. The management of these grasslands according to *CM11 Natural*
8 *Communities Enhancement and Management* has potential to adversely affect this species. Direct
9 mortality and/or the removal of larval host plants and nectar sources for adults would be an adverse
10 effect under NEPA. Implementation of Mitigation Measure BIO-43, *Avoid and Minimize Loss of*
11 *Callippe Silverspot Butterfly Habitat*, would ensure the effect is not adverse.

12 **CEQA Conclusion:** If grasslands within the Cordelia Hills and Potrero Hills are protected as part of
13 *CM3 Natural Communities Protection and Restoration* then the subsequent management of these
14 grasslands according to *CM11 Natural Communities Enhancement and Management* has affect this
15 species. Potential impacts from CM11 could include the loss of larval host and nectar sources and
16 direct mortality to larvae and adults resulting from the installation of artificial nesting burrows and
17 structures and the implementation of grassland management techniques, which may include
18 livestock grazing, prescribed burning, and mowing. In addition to these grassland management
19 actions, CM11 also includes guidelines and techniques for invasive plant control, which may include
20 manual control (hand-pulling and digging), mechanical control (large equipment), and chemical
21 control, which could result in direct and indirect effects on larval host plants and nectar plants.
22 These actions could result in adverse effects through habitat modification and a possible reduction
23 in the number of the species or restrict its range and would therefore result in significant impacts on
24 the species under CEQA. However, over the term of BDCP callippe silverspot butterfly could benefit
25 from the protection of occupied and potential habitat for the species with the implementation of
26 Mitigation Measure BIO-43, which would avoid and minimize effects from management actions and
27 thus reduce the potential impacts on a less-than-significant level.

28 **Mitigation Measures BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly** 29 **Habitat**

30 As part of the development of site-specific management plans on protected grasslands in the
31 Cordelia Hills and/or Potrero Hills, BDCP proponents will implement the following measures to
32 avoid and minimize the loss of callippe silverspot habitat.

- 33 • Hilltops in Cordelia Hills and Potrero Hills will be surveyed for callippe silverspot larval host
34 plants (Johnny jump-ups) by a biologist familiar with identifying this plant species. These
35 surveys should occur during the plant's blooming period (typically early January through
36 April)
- 37 • If larval host plants are present, then presence/absence surveys for callippe silverspot
38 butterfly larvae will be conducted according to the most recent USFWS approved survey
39 methods by a biologist with previous experience in surveying for and identifying callippe
40 larvae and/or signs of larval presence. These surveys should be conducted prior to the adult
41 flight season, which usually starts in mid-May.
- 42 • If larvae are detected then no further surveys are necessary. If larvae are not detected then
43 surveys for adults will be conducted by a biologist familiar with surveying for and

1 identifying callippe silverspot. Surveys typically start in mid-May and continue weekly for 8
2 to 10 weeks.

- 3 • If callippe silverspot butterflies are detected, then the site-specific management plans will
4 be written to include measures to protect and manage for larval host plants and nectar
5 sources so that they continue to support existing populations and/or allow for future
6 colonization. Mapping of both larval host plants and nectar sources will be incorporated into
7 the management plans.

8 **California Red-Legged Frog**

9 Modeled California red-legged frog habitat in the study area is restricted to freshwater aquatic and
10 grassland habitat, and immediately adjacent cultivated lands along the study area's southwestern
11 edge in CZ 7, CZ 8, CZ 9, and CZ 11. Pools in perennial and seasonal streams and stock ponds provide
12 potential aquatic habitat for this species. While stock ponds are underrepresented as a modeled
13 habitat, none is expected to be affected by BDCP actions. Construction and restoration associated
14 with Alternative 1C conservation measures would result in both temporary and permanent losses of
15 California red-legged frog modeled habitat as indicated in Table 12-1C-20. Factors considered in
16 assessing the value of affected habitat for the California red-legged frog, to the extent that
17 information is available, are presence of limiting habitat (aquatic breeding habitat), known
18 occurrences and clusters of occurrences, proximity of the affected habitat to existing protected
19 lands, and the overall degraded or fragmented nature of the habitat. The study area represents the
20 extreme eastern edge of the species' coastal range, and species' occurrences are reported only from
21 CZ 8 and CZ 11. Full implementation of Alternative 1C would also include the following biological
22 objectives over the term of the BDCP to benefit the California red-legged frog (BDCP Chapter 3,
23 *Conservation Strategy*).

- 24 • Increase native species diversity and relative cover of native plant species, and reduce the
25 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11,
26 CM13, and CM20).
- 27 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 28 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic
29 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with
30 CM3)
- 31 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
32 CM11).
- 33 • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and
34 duration and suitable composition of vegetative cover to support breeding for covered
35 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

36 As explained below, with the restoration and protection of these amounts of habitat, in addition to
37 implementation of AMMs, impacts on California red-legged frog would not be adverse for NEPA
38 purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-20. Changes in California Red-Legged Frog Modeled Habitat Associated with**
2 **Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic	1	1	1	1	NA	NA
	Upland	61	61	10	10	NA	NA
Total Impacts CM1		62	62	11	11	NA	NA
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	8	24	0	0	0	0
Total Impacts CM2-CM18		8	24	0	0	0	0
TOTAL IMPACTS		70	86	11	11	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-44: Loss or Conversion of Habitat for and Direct Mortality of California Red-**
5 **Legged Frog**

6 Alternative 1C conservation measures would result in the permanent and temporary loss combined
7 of up to 2 acres of modeled aquatic habitat and 95 acres of modeled upland habitat for California
8 red-legged frog (Table 12-1C-20). There is one California red-legged frog occurrence that overlap
9 with the Plan footprint. Conservation measures that would result in these losses are conveyance
10 facilities and transmission line construction (CM1) and recreational facility construction for CM11.
11 Construction activities associated with the water conveyance facilities and recreational facilities,
12 including operation of construction equipment, could result in temporary effects on, as well as
13 injury and mortality of, California red-legged frogs. In addition, natural enhancement and
14 management activities (CM11), which include ground disturbance or removal of nonnative
15 vegetation, could result in local adverse habitat effects. In addition, maintenance activities
16 associated with the long-term operation of the water conveyance facilities and other BDCP physical
17 facilities could degrade or eliminate California red-legged frog habitat including injury and mortality
18 of California red-legged frogs. Each of these individual activities is described below. A summary
19 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual
20 conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C, including transmission line
22 construction, would result in the permanent loss of up to 1 acre of aquatic habitat and 61 acres
23 of upland habitat for California red-legged frog in CZ 8 (Table 12-1C-20). Permanent effects
24 would be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension
25 and installation of cross culverts, installation of structural hardscape, and installation and

1 relocation of utilities. Construction-related effects would temporarily disturb 1 acre of aquatic
2 habitat and 10 acres of upland habitat for the California red-legged frog (Table 12-1C-20).

- 3 • *CM11 Natural Communities Enhancement and Management*: Based on the recreation
4 assumptions described in BDCP Chapter 4, *Covered Activities and Associated Federal Actions*, an
5 estimated 24 acres of upland cover and dispersal habitat for the California red-legged frog
6 would be removed as a result of constructing trails and associated recreational facilities. Passive
7 recreation in the reserve system could result in trampling and disturbance of egg masses in
8 water bodies, degradation of water quality through erosion and sedimentation, and trampling of
9 sites adjacent to upland habitat used for cover and movement. However, *AMM37 Recreation*
10 requires protection of water bodies from recreational activities and requires trail setbacks from
11 wetlands. With these restrictions, recreation related effects on California red-legged frog are
12 expected to be minimal.

13 Activities associated with natural community enhancement and management in protected
14 California red-legged frog habitat, such as ground disturbance or herbicide use to control
15 nonnative vegetation, could result in local adverse habitat effects on, and injury or mortality of,
16 California red-legged frogs. These effects would be avoided and minimized with implementation
17 of the AMMs discussed below. Herbicides would only be used in California red-legged frog
18 habitat in accordance with the written recommendation of a licensed, registered pest control
19 advisor and in conformance with label precautions and federal, state, and local regulations in a
20 manner that avoids or minimizes harm to the California red-legged frog.

- 21 • *Critical habitat*: Several conservation measures would be implemented in California red-legged
22 frog habitat and designated critical habitat in CZ 8 and CZ 11. Approximately 2,460 acres of
23 designated critical habitat for the California red-legged frog overlaps with the study area along
24 the western edge of CZ 11 in critical habitat unit SOL-1. An additional 862 acres of designated
25 critical habitat is also present along the western edge of CZ 8 in critical habitat unit ALA-2.
26 Conservation actions to protect and enhance grassland habitat for covered species, including
27 California red-legged frog, in CZ 8 could include acquisition and enhancement of designated
28 critical habitat for the California red-legged frog and California tiger salamander. Any habitat
29 enhancement actions for these species in designated critical habitat are expected to enhance the
30 value of any affected designated critical habitat for conservation of California red-legged frog.
31 These actions would result in an overall benefit to California red-legged frog within the study
32 area through protection and management of grasslands with associated intermittent stream
33 habitat and through restoration of vernal pool complex habitat and its associated grassland
34 habitat.

- 35 • *Operations and maintenance*: Ongoing water conveyance facilities operation and maintenance is
36 expected to have little if any adverse effect on the California red-legged frog. Postconstruction
37 operation and maintenance of the above-ground water conveyance facilities could result in
38 ongoing but periodic postconstruction disturbances that could affect California red-legged frog
39 use of the surrounding habitat. Operation of maintenance equipment, including vehicle use
40 along transmission corridors in CZ 8, could also result in injury or mortality of California red-
41 legged frogs if present in work sites. Implementation conservation actions and AMM1–AMM6,
42 AMM10, AMM14, and AMM37, described below, would reduce these effects.

- 43 • *Injury and direct mortality*: Construction activities associated with the water conveyance
44 facilities, vernal pool complex restoration, and habitat and management enhancement-related
45 activities, including operation of construction equipment, could result in injury or mortality of

1 California red-legged frogs. Breeding, foraging, dispersal, and overwintering behavior may be
2 altered during construction activities, resulting in injury or mortality of California red-legged
3 frog. Frogs occupying burrows could be trapped and crushed during ground-disturbing
4 activities. Degradation and loss of estivation habitat is also anticipated to result from the
5 removal of vegetative cover and collapsing of burrows. Injury or mortality would be avoided and
6 minimized through implementation of seasonal constraints and preconstruction surveys in
7 suitable habitat, collapsing unoccupied burrows, and relocating frogs outside of the construction
8 area as described in AMM1–AMM6, AMM10, AMM14, and AMM37.

9 The following paragraphs summarize the combined effects discussed above and describe other
10 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
11 also included.

12 ***Near-Term Timeframe***

13 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
14 the near-term BDCP conservation strategy has been evaluated to determine whether it would
15 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
16 effects of construction would not be adverse under NEPA.

17 Alternative 1C would permanently remove approximately 2 acres of aquatic habitat and 79 acres of
18 upland terrestrial cover habitat for California red-legged frog. The effects would result from
19 construction of the water conveyance facilities (CM1, 73 acres) and recreational facilities (CM11, 8
20 acres).

21 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
22 and that are identified in the biological goals and objectives for California’s red-legged frog in
23 Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and
24 2:1 for protection of grassland habitats. Using these ratios would indicate that 1 acre of aquatic
25 habitat should be restored, 1 acre of aquatic habitat should be protected, and 158 acres of grassland
26 should be protected for California red-legged frog to mitigate the near-term losses.

27 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area
28 (Table 3-4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8, west of Byron
29 Highway, would benefit California red-legged frog by providing habitat in the portion of the Plan
30 Area with the highest long-term conservation value for the species based on known species
31 occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with Objective
32 GNC1.3, ponds and other aquatic features within the grasslands would be protected to provide
33 aquatic habitat for this species, and surrounding grassland would provide dispersal and aestivation
34 habitat which would compensate for the loss of 1 acre of aquatic habitat. In addition, aquatic
35 features in grasslands would be maintained and enhanced to provide suitable inundation depth and
36 duration to support breeding habitat for covered amphibians (Objective GNC2.5).

37 These conservation actions would occur in the same timeframe as the construction losses, thereby
38 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives
39 represent performance standards for considering the effectiveness of CM3 protection and
40 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
41 and the additional detail in the biological objectives for California red-legged frog satisfy the typical
42 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-
43 term effects of the other conservation measures.

1 The plan also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM10 Restoration of Temporarily Affected*
5 *Natural Communities, AMM14 California Red-Legged Frog, and AMM37 Recreation.* These AMMs
6 include elements that avoid or minimize the risk of affecting individuals and species habitats
7 adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since
8 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs,*
9 of the Final EIR/EIS.

10 **Late Long-Term Timeframe**

11 The habitat model indicates that the study area supports approximately 159 acres of aquatic and
12 7,766 acres of upland habitat for California red-legged frog. Alternative 1C as a whole would result
13 in the permanent loss of and temporary effects on 2 acres of aquatic habitat and 79 acres of upland
14 habitat for California red-legged frog for the term of the plan (less than 1% of the total aquatic
15 habitat in the study area and 2% of the total habitat in the study area). The 2 acres of aquatic habitat
16 that would be permanently lost is not known to be used for breeding. Most of the California red-
17 legged frog upland habitat that would be removed consists of naturalized grassland or cultivated
18 land in a highly disturbed or modified setting on lands immediately adjacent to Clifton Court
19 Forebay. The removed upland cover and dispersal habitat is within 0.5 mile of a cluster of known
20 California red-legged frog occurrences to the west. However, this habitat consists mostly of
21 cultivated lands and small patches of grasslands, and past and current surveys in this area have not
22 found any evidence that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta*
23 *Conservation Plan EIR/EIS Environmental Data Report*).

24 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
25 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would
26 benefit the California red-legged frog by providing habitat in the portion of the study area with the
27 highest long-term conservation value for the species based on known species occurrences and large,
28 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other
29 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,
30 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in
31 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation
32 depth and duration and suitable composition of vegetative cover to support breeding California red-
33 legged frogs (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and other
34 measures would be implemented as described in CM11 to promote growth of aquatic vegetation
35 with appropriate cover characteristics favorable to California red-legged frogs. Lands protected in
36 CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP* and the
37 extensive Los Vaqueros Watershed lands, including grassland areas supporting this species. This
38 objective would ensure that California red-legged frog upland and associated aquatic habitats would
39 be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat within
40 and adjacent to the Plan Area.

41 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
42 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
43 restoration of tidal freshwater emergent wetland, grassland, valley/foothill riparian, and vernal pool
44 complex that could overlap with the species model, would result in the restoration of 16 acres of
45 aquatic and 351 acres of upland modeled habitat for California red-legged frog. In addition,

1 protection of managed wetland, grassland, valley/foothill riparian, and vernal pool complex could
2 overlap with the species model and would result in the protection of 3 acres of aquatic and 1,047
3 acres of upland California red-legged frog modeled habitat.

4 **NEPA Effects:** In the near-term, the loss of California red-legged frog habitat under Alternative 1C
5 would be not be adverse because the BDCP has committed to protecting and restoring the acreage
6 required to meet the typical mitigation ratios described above. In the late long-term, the losses of
7 California red-legged frog aquatic and upland habitat associated with Alternative 1C, in the absence
8 of other conservation actions, would represent an adverse effect as a result of habitat modification
9 and potential direct mortality of a special-status species. However, with habitat protection and
10 restoration associated with the conservation components, guided by landscape-scale goals and
11 objectives and by AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative 1C as a
12 whole on California red-legged frog would not be adverse.

13 **CEQA Conclusion:**

14 **Near-Term Timeframe**

15 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
16 the near-term BDCP conservation strategy has been evaluated to determine whether it would
17 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
18 effects of construction would be less than significant under CEQA.

19 Alternative 1C would permanently remove approximately 2 acres of aquatic habitat and 79 acres of
20 upland terrestrial cover habitat for California red-legged frog. The effects would result from
21 construction of the water conveyance facilities (CM1, 73 acres) and recreational facilities (CM11, 8
22 acres).

23 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
24 and that are identified in the biological goals and objectives for California’s red-legged frog in
25 Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and
26 2:1 for protection of grassland habitats. Using these ratios would indicate that 1 acre of aquatic
27 habitat should be restored, 1 acre of aquatic habitat should be protected, and 158 acres of grassland
28 should be protected for California red-legged frog to mitigate the near-term losses.

29 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area
30 (Table 3-4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8, west of Byron
31 Highway, would benefit California red-legged frog by providing habitat in the portion of the Plan
32 Area with the highest long-term conservation value for the species based on known species
33 occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with Objective
34 GNC1.3, ponds and other aquatic features within the grasslands would be protected to provide
35 aquatic habitat for this species, and surrounding grassland would provide dispersal and aestivation
36 habitat which would compensate for the loss of 1 acre of aquatic habitat. In addition, aquatic
37 features in grasslands would be maintained and enhanced to provide suitable inundation depth and
38 duration to support breeding habitat for covered amphibians (Objective GNC2.5).

39 These conservation actions would occur in the same timeframe as the construction losses, thereby
40 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives
41 represent performance standards for considering the effectiveness of CM3 protection and
42 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
43 and the additional detail in the biological objectives for California red-legged frog satisfy the typical

1 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-
2 term effects of the other conservation measures.

3 The BDCP also contains commitments to implement AMM1-AMM6, AMM10, AMM14, and AMM37.
4 These AMMs include elements that avoid or minimize the risk of affecting individuals and species
5 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
6 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
7 *AMMs, and CMs*, of the Final EIR/EIS.

8 These commitments are more than sufficient to support the conclusion that the near-term effects of
9 Alternative 1C on California red-legged frog would be less than significant, because the number of
10 acres required to meet the typical ratios described above would be only 1 acre of aquatic habitat
11 restored, 1 acre of aquatic habitat protected, and 158 acres of upland communities protected.

12 **Late Long-Term Timeframe**

13 The habitat model indicates that the study area supports approximately 159 acres of aquatic and
14 7,766 acres of upland habitat for California red-legged frog. Alternative 1C as a whole would result
15 in the permanent loss of and temporary effects on 2 acres of aquatic habitat and 79 acres of upland
16 habitat for California red-legged frog for the term of the plan (less than 1% of the total aquatic
17 habitat in the study area and 2% of the total habitat in the study area). The 2 acres of aquatic habitat
18 that would be permanently lost is not known to be used for breeding. Most of the California red-
19 legged frog upland habitat that would be removed consists of naturalized grassland or cultivated
20 land in a highly disturbed or modified setting on lands immediately adjacent to Clifton Court
21 Forebay. The removed upland cover and dispersal habitat is within 0.5 mile of a cluster of known
22 California red-legged frog occurrences to the west. However, this habitat consists mostly of
23 cultivated lands and small patches of grasslands, and past and current surveys in this area have not
24 found any evidence that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta*
25 *Conservation Plan EIR/EIS Environmental Data Report*).

26 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
27 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would
28 benefit the California red-legged frog by providing habitat in the portion of the study area with the
29 highest long-term conservation value for the species based on known species occurrences and large,
30 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other
31 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,
32 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in
33 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation
34 depth and duration and suitable composition of vegetative cover to support breeding California red-
35 legged frogs (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and other
36 measures would be implemented as described in CM11 to promote growth of aquatic vegetation
37 with appropriate cover characteristics favorable to California red-legged frogs. Lands protected in
38 CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP* and the
39 extensive Los Vaqueros Watershed lands, including grassland areas supporting this species. This
40 objective would ensure that California red-legged frog upland and associated aquatic habitats would
41 be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat within
42 and adjacent to the Plan Area.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
2 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
3 restoration of tidal freshwater emergent wetland, grassland, valley/foothill riparian, and vernal pool
4 complex that could overlap with the species model, would result in the restoration of 16 acres of
5 aquatic and 351 acres of upland modeled habitat for California red-legged frog. In addition,
6 protection of managed wetland, grassland, valley/foothill riparian, and vernal pool complex could
7 overlap with the species model and would result in the protection of 3 acres of aquatic and 1,047
8 acres of upland California red-legged frog modeled habitat.

9 In the absence of other conservation actions, the losses of California red-legged frog aquatic and
10 upland habitat associated with Alternative 1C would represent an adverse effect as a result of
11 habitat modification and potential direct mortality of a special-status species. However, with habitat
12 protection and restoration associated with the conservation components, guided by landscape-scale
13 goals and objectives and by AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative
14 1C would have a less-than-significant impact on California red-legged frog.

15 **Impact BIO-45: Indirect Effects of Plan Implementation on California Red-Legged Frog**

16 Noise and visual disturbance including artificial nighttime lighting outside the project footprint but
17 within 500 feet of construction activities are indirect effects that could temporarily affect the use of
18 California red-legged frog habitat, all of which is upland cover and dispersal habitat. The areas to be
19 affected are near Clifton Court Forebay, and no California red-legged frogs were detected during
20 recent surveys conducted in this area (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
21 *EIR/EIS Environmental Data Report*).

22 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment
23 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability
24 of California red-legged frog habitat downstream of the construction area by filling in pools and
25 smothering eggs. Accidental spills of toxic fluids also could result in the subsequent loss of California
26 red-legged frog if these materials enter the aquatic system. Hydrocarbon and heavy metal pollutants
27 associated with roadside runoff also have the potential to enter the aquatic system, affecting water
28 quality and California red-legged frog.

29 Noise and visual disturbance outside the project footprint but within 500 feet of construction
30 activities are indirect effects that could temporarily affect the use of California red-legged frog
31 habitat, all of which is upland cover and dispersal habitat. The areas to be affected are near Clifton
32 Court Forebay, and no California red-legged frogs were detected during recent surveys conducted in
33 this area (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data*
34 *Report*).

35 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM14, and AMM37 as part of
36 implementing Alternative 1C would avoid the potential for substantial adverse effects on California
37 red-legged frogs, either indirectly or through habitat modifications. These AMMs would also avoid
38 and minimize effects that could substantially reduce the number of California red-legged frogs, or
39 restrict the species' range. Therefore, the indirect effects of Alternative 1C would not have an
40 adverse effect on California red-legged frog.

41 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance, as well
42 as construction-related noise and visual disturbances including artificial nighttime lighting, could
43 impact California red-legged frog in aquatic and upland habitats. The use of mechanical equipment

1 during construction could cause the accidental release of petroleum or other contaminants that
2 could impact California red-legged frog or its prey. The inadvertent discharge of sediment or
3 excessive dust adjacent to California red-legged frog habitat could also have a negative impact on the
4 species or its prey. With implementation of AMM1–AMM6, AMM10, AMM14, and AMM37,
5 construction, operation, and maintenance under Alternative 1C would avoid the potential for
6 substantial adverse effects on California red-legged frog, either indirectly or through habitat
7 modifications, and would not result in a substantial reduction in numbers or a restriction in the
8 range of California red-legged frogs. The indirect effects of Alternative 1C would have a less-than-
9 significant impact on California red-legged frogs.

10 **California Tiger Salamander**

11 Modeled California tiger salamander habitat in the study area contains two habitat types: terrestrial
12 cover and aestivation habitat, and aquatic breeding habitat and is restricted to CZ 1, CZ 2, CZ 4, CZ 5,
13 CZ 7, CZ 8, and CZ 11 (Figure 12-14). Modeled terrestrial cover and aestivation habitat contains all
14 grassland types and alkali seasonal wetland with a minimum patch size of 100 acres and within a
15 geographic area defined by species records and areas most likely to support the species. Patches of
16 grassland that were below the 100-acre minimum patch size but were contiguous with grasslands
17 outside of the study area boundary were included. Modeled aquatic breeding habitat for the
18 California tiger salamander includes vernal pools and seasonal and perennial ponds.

19 Factors considered in assessing the value of affected habitat for California tiger salamander, to the
20 extent that information is available, include presence of limiting habitat (aquatic breeding habitat),
21 known occurrences and clusters of occurrences, proximity of the affected habitat to existing
22 protected lands, and the overall degraded or fragmented nature of the habitat. While conservation
23 measures implemented in other CZs could have potential effects on California tiger salamander,
24 those activities in CZ 8 and CZ 11 are considered to have a proportionately larger effect due to their
25 closer proximity to known occurrences of the species.

26 Alternative 1C is expected to result in the temporary, permanent, and periodic removal of upland
27 habitat that California tiger salamander uses for cover and dispersal (Table 12-1C-21). While stock
28 ponds are underrepresented as a modeled habitat, none is expected to be affected by BDCP actions.
29 Full implementation of Alternative 1C would also include the following biological objectives over the
30 term of the BDCP to benefit the California tiger salamander (BDCP Chapter 3, *Conservation Strategy*).

- 31 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
32 between existing conservation lands (Objective L1.6, associated with CM3).
- 33 ● Increase native species diversity and relative cover of native plant species, and reduce the
34 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 35 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to
36 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
37 associated with CM3, CM8, and CM11).
- 38 ● Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and CZ 11 among a mosaic of
39 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 40 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali
41 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).

- 1 • Increase burrow availability for burrow-dependent species in grasslands surrounding alkali
2 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective
3 ASWNC2.3, associated with CM11).
- 4 • Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and CZ 11, primarily in core
5 vernal pool recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of*
6 *California and Southern Oregon* (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,
7 associated with CM3).
- 8 • Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool acreage
9 (up to 67 acres of vernal pool complex restoration, assuming that all anticipated impacts [10
10 wetted acres] occur and that the restored vernal pool complex has 15% density of vernal pools)
11 (Objective VPNC1.2, associated with CM3 and CM9).
- 12 • Increase the size and connectivity of protected vernal pool complex within the Plan Area and
13 increase connectivity with protected vernal pool complex adjacent to the Plan Area (Objective
14 VPNC1.3, associated with CM3).
- 15 • Protect the range of inundation characteristics that are currently represented by vernal pools
16 throughout the Plan Area (Objective VPNC1.4, associated with CM3).
- 17 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 18 • Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective
19 GNC1.2, associated with CM3 and CM8).
- 20 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic
21 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with
22 CM3).
- 23 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
24 CM11).
- 25 • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and
26 duration and suitable composition of vegetative cover to support breeding for covered
27 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

28 As explained below, with the restoration or protection of these amounts of habitat, in addition to the
29 implementation of AMMs, impacts on California tiger salamander would not be adverse for NEPA
30 purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-21. Changes in California Tiger Salamander Modeled Habitat Associated with**
2 **Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic	2	2	2	2	NA	NA
	Upland	70	70	8	8	NA	NA
Total Impacts CM1		72	72	10	10	NA	NA
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	292	634	0	0	191-639	0
Total Impacts CM2-CM18		292	634	0	0	191-639	0
TOTAL IMPACTS		364	706	10	10	191-639	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3
4 **Impact BIO-46: Loss or Conversion of Habitat for and Direct Mortality of California Tiger**
5 **Salamander**

6 Alternative 1C conservation measures would result in the permanent and temporary loss combined
7 of up to 4 acres of modeled aquatic habitat and 712 acres of modeled upland habitat for California
8 tiger salamander (Table 12-1C-21). There is one California tiger salamander occurrence that
9 overlaps with the CM1 footprint. Conservation measures that would result in these losses are
10 conveyance facilities and transmission line construction, and establishment and use of RTM, borrow,
11 and spoils areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal natural community
12 restoration (CM4), construction of recreational facilities (CM11), and construction of a conservation
13 fish hatchery (CM18). Habitat enhancement and management activities (CM11), which include
14 ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.
15 In addition, maintenance activities associated with the long-term operation of the water conveyance
16 facilities and other BDCP physical facilities could degrade or eliminate California tiger salamander
17 habitat. Each of these individual activities is described below. A summary statement of the combined
18 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure
19 discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities,
21 including transmission lines, would result in the permanent loss of 2 acres of aquatic habitat and
22 70 acres of upland habitat for California tiger salamander habitat, primarily in CZ 8 (Table 12-
23 1C-21). Permanent effects would be associated with RTM, borrow, and spoils areas, grading,
24 paving, excavating, extension and installation of cross culverts, installation of structural

1 hardscape, and installation and relocation of utilities. Construction-related effects would
 2 temporarily disturb 2 acres of aquatic habitat and 8 acres of upland habitat for the California
 3 tiger salamander (Table 12-1C-21). In addition, there is one California tiger salamander
 4 occurrence just west of Clifton Court Forebay that overlaps with the area of temporary effects.
 5 The area that would be affected by conveyance facilities construction is south of Clifton Court
 6 Forebay, where modeled California tiger salamander habitat is of relatively low value in that it
 7 consists of fragmented patches of primarily terrestrial habitat surrounded by actively cultivated
 8 lands. The highest concentration of California tiger salamander occurrences are in CZ 8 and west
 9 of the conveyance facilities alignment, while lands to the east consist primarily of actively
 10 cultivated lands that are not suitable for the species. Habitat loss in this area is not expected to
 11 contribute to habitat fragmentation or impede important California tiger salamander dispersal.

- 12 ● *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the
 13 permanent removal of approximately 42 acres of terrestrial cover and aestivation habitat for the
 14 California tiger salamander in the late-longterm. The modeled habitat in the Yolo Bypass is of
 15 low potential for California tiger salamander: There have been no observations of California
 16 tiger salamander in this area based on the results of a number of surveys for vernal pool
 17 invertebrates and plants and the bypass lacks vernal pool complexes with large, deep pools or
 18 large grassland areas with stock ponds and similar aquatic features that hold water long enough
 19 to provide potential breeding habitat for this species.
- 20 ● *CM4 Tidal Natural Communities Restoration*: This activity would result in the permanent
 21 removal of approximately 517 acres of terrestrial cover and aestivation habitat in the study area
 22 in the late longterm. Tidal restoration in the Cache Slough area would result in habitat loss along
 23 the edges of Lindsey Slough and Duck Slough, and adjacent to cultivated land along the eastern
 24 edge of a block of modeled habitat. The modeled aquatic breeding habitat nearby the
 25 hypothetical tidal restoration footprint is of relatively high value, consisting of vernal pool
 26 complex along Lindsey Slough within the Jepson Prairie area in and near open space. The Jepson
 27 Prairie area includes numerous California tiger salamander CNDDDB recorded occurrences and
 28 overlaps with Critical Habitat Unit 2, Jepson Prairie Unit, for this species; however, the
 29 hypothetical tidal restoration footprint does not overlap with critical habitat or recorded
 30 occurrences in this area. The tidal restoration at Lindsey Slough would occur along the
 31 northeastern edge of the Jepson Prairie block of habitat and would not contribute to
 32 fragmentation. Because the estimates of habitat loss resulting from tidal inundation are based
 33 on projections of where restoration may occur, actual effects are expected to be lower because
 34 of the ability to select sites that minimize effects on California tiger salamander.
- 35 ● *CM11 Natural Communities Enhancement and Management*: Based on the recreation
 36 assumptions described in BDCP Chapter 3, *Conservation Strategy*, an estimated 40 acres of
 37 California tiger salamander terrestrial cover and aestivation habitat, primarily in CZ 8, would be
 38 removed in the late long-term as a result of constructing trails and associated recreational
 39 facilities. Passive recreation in the reserve system could result in trampling and disturbance of
 40 eggs and larvae in water bodies, degradation of water quality through erosion and
 41 sedimentation, and trampling of sites adjacent to upland habitat used for cover and movement.
 42 However, *AMM37 Recreation* requires protection of water bodies from recreational activities
 43 and requires trail setbacks from wetlands. With these restrictions, recreation related effects on
 44 California tiger salamander are expected to be minimal.

45 Habitat enhancement- and management-related activities in protected California tiger
 46 salamander habitats would result in overall improvements to and maintenance of California

1 tiger salamander habitat values over the term of the BDCP. Activities associated with natural
 2 community enhancement and management over the term of the BDCP in protected California
 3 tiger salamander habitat, such as ground disturbance or herbicide use to control nonnative
 4 vegetation, could result in local adverse habitat effects and injury or mortality of California tiger
 5 salamander and disturbance effects if individuals are present in work sites. Implementation of
 6 AMM1–AMM6, AMM10, AMM13, and AMM37 would reduce these effects. Herbicides would only
 7 be used in California tiger salamander habitat in accordance with the written recommendation
 8 of a licensed, registered Pest Control Advisor and in conformance with label precautions and
 9 federal, state, and local regulations in a manner that avoids or minimizes harm to the California
 10 tiger salamander.

- 11 ● *CM18 Conservation Hatcheries*: This activity could result in the permanent removal of
 12 approximately 35 acres of terrestrial cover and aestivation habitat for California tiger
 13 salamander in the Yolo Bypass area (CZ 2). The specifications and operations of this facility have
 14 not been developed, although the facility is expected to be constructed near Rio Vista on
 15 cultivated lands in low-value habitat for the species.
- 16 ● *Critical habitat*: Approximately 1,781 acres of designated Critical Habitat Unit 2, Jepson Prairie
 17 Unit, for California tiger salamander overlap the study area in CZ 1. While this area is located
 18 within the Cache Slough Complex, it is not expected to be affected by BDCP tidal habitat
 19 restoration actions. Tidal habitat would be restored approximately 2 miles east of SR 113, with
 20 some restoration taking place along the Barker and Lindsey Slough channels west to
 21 approximately SR 113 and a small amount (0.4 acre) taking place along the Lindsey Slough
 22 Channel west of SR 113 into Critical Habitat Unit 2.
- 23 ● *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have
 24 little if any adverse effect on the California tiger salamander. Postconstruction operation and
 25 maintenance of the above-ground water conveyance facilities could result in ongoing but
 26 periodic disturbances that could affect California tiger salamander use of the surrounding
 27 habitat. Operation of maintenance equipment, including vehicle use along transmission
 28 corridors in CZ 8, could also result in injury or mortality of California tiger salamanders if
 29 present in work sites. These effects, however, would be minimized with implementation of the
 30 California tiger salamander measures described in AMM1–AMM6, AMM10, AMM13, and
 31 AMM37.
- 32 ● *Injury and direct mortality*: Construction activities associated with the water conveyance
 33 facilities, vernal pool complex restoration, and habitat and management enhancement-related
 34 activities, including operation of construction equipment, could result in injury or mortality of
 35 California tiger salamanders. Foraging, dispersal, and overwintering behavior may be altered
 36 during construction activities, resulting in injury or mortality of California tiger salamander if
 37 the species is present. Salamanders occupying burrows could be trapped and crushed during
 38 ground-disturbing activities. Degradation and loss of estivation habitat is also anticipated to
 39 result from the removal of vegetative cover and collapsing of burrows. Injury or mortality would
 40 be avoided and minimized through implementation of seasonal constraints and preconstruction
 41 surveys in suitable habitat, collapsing unoccupied burrows, and relocating salamanders outside
 42 of the construction area as described in AMM1-AMM6, AMM10, AMM13, and AMM37.

43 The following paragraphs summarize the combined effects discussed above and describe other
 44 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are
 45 also included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-
3 term BDCP conservation strategy has been evaluated to determine whether it would provide
4 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
5 construction effects would not be adverse under NEPA.

6 Alternative 1C would permanently remove approximately 4 acres of aquatic habitat and 370 acres of
7 upland terrestrial cover habitat for California tiger salamander. The effects would result from
8 construction of the water conveyance facilities (CM1, 82 acres), Yolo Bypass improvements (CM2, 42
9 acres), tidal habitat restoration (CM4, 203 acres), construction of recreational facilities (CM11, 12
10 acres), and construction of conservation hatcheries (CM18, 35 acres).

11 Typical NEPA project-level mitigation ratios of 1:1 for restored and 2:1 for protected nontidal
12 wetlands (aquatic habitat) and a ratio of 2:1 for protected grassland habitats would indicate that 4
13 acres of aquatic habitat should be restored and 8 acres of aquatic habitat should be protected. In
14 addition, 740 acres of grassland should be protected in the near-term for California tiger salamander
15 to mitigate the near-term losses.

16 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective
17 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic habitat
18 (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective GNC1.1).
19 The landscape-scale goals and objectives would inform the near-term protection and restoration
20 efforts. The natural community restoration and protection activities are expected to be concluded
21 during the first 10 years of Plan implementation, which is close enough in time to the occurrence of
22 impacts to constitute adequate mitigation for NEPA purposes.

23 In addition, the plan contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
26 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
27 *Natural Communities*, *AMM13 California Tiger Salamander*, and *AMM37 Recreation*. These AMMs
28 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
29 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
30 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
31 EIR/EIS.

32 **Late Long-Term Timeframe**

33 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and
34 29,459 acres of upland modeled habitat for California tiger salamander. Alternative 1C as a whole
35 would result in the permanent loss of, and temporary effects on, 4 acres of aquatic habitat and 714
36 acres of upland habitat for California tiger salamander for the term of the plan (less than 3% of the
37 total upland habitat in the study area). The location of these losses is described above in the
38 discussions of CM1, CM2, CM4, CM11, and CM18.

39 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
40 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would
41 benefit the California tiger salamander by providing habitat in the portion of the study area with the
42 highest long-term conservation value for the species based on known species occurrences and large,
43 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other

1 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,
2 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in
3 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation
4 depth and duration and suitable composition of vegetative cover to support breeding California tiger
5 salamanders (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and
6 other measures would be implemented as described in CM11 to promote growth of aquatic
7 vegetation with appropriate cover characteristics favorable to California tiger salamanders. Lands
8 protected in CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP*
9 and the extensive Los Vaqueros Watershed lands, including grassland areas supporting this species.
10 This objective would ensure that California tiger salamander upland and associated aquatic habitats
11 would be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat
12 within and adjacent to the study area.

13 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
14 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
15 restoration of alkali seasonal wetland complex, vernal pool complex, and grassland that could
16 overlap with the species model, would result in the restoration of 88 acres of aquatic and 598 acres
17 of upland modeled habitat for California tiger salamander. In addition, protection of alkali seasonal
18 wetland complex, vernal pool complex, and grassland that could overlap with the species model,
19 would result in the protection of 750 acres of aquatic and 5,000 acres of upland California tiger
20 salamander modeled habitat.

21 **NEPA Effects:** In the near-term, the loss of California tiger salamander habitat under Alternative 1C
22 would be not be adverse because the BDCP has committed to protecting the acreage required to
23 meet the typical mitigation ratios described above. In the late long-term, the losses of California tiger
24 salamander upland habitat associated with Alternative 1C, in the absence of other conservation
25 actions, would represent an adverse effect as a result of habitat modification and potential direct
26 mortality of a special-status species. However, with habitat protection and restoration associated
27 with the conservation components, guided by landscape-scale goals and objectives and by AMM1–
28 AMM6, AMM10, AMM13, and AMM37, the effects of Alternative 1C as a whole on California tiger
29 salamander would not be adverse.

30 **CEQA Conclusion:**

31 **Near-Term Timeframe**

32 Because the water conveyance facilities construction is being evaluated at the project level, the near-
33 term BDCP conservation strategy has been evaluated to determine whether it would provide
34 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
35 construction effects would be less than significant.

36 Alternative 1C would permanently remove approximately 4 acres of aquatic habitat and 370 acres of
37 upland terrestrial cover habitat for California tiger salamander. The effects would result from
38 construction of the water conveyance facilities (CM1, 82 acres), Yolo Bypass improvements (CM2, 42
39 acres), tidal habitat restoration (CM4, 203 acres), construction of recreational facilities (CM11, 12
40 acres), and construction of conservation hatcheries (CM18, 35 acres).

41 Typical CEQA project-level mitigation ratios of 1:1 for restored and 2:1 for protected nontidal
42 wetlands (aquatic habitat) and a ratio of 2:1 for protected grassland habitats would indicate that 4
43 acres of aquatic habitat should be restored and 8 acres of aquatic habitat should be protected. In

1 addition, 740 acres of grassland should be protected in the near-term for California tiger salamander
2 to mitigate the near-term losses.

3 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective
4 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic habitat
5 (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective GNC1.1).
6 The landscape-scale goals and objectives would inform the near-term protection and restoration
7 efforts. The natural community restoration and protection activities are expected to be concluded
8 during the first 10 years of Plan implementation, which is close enough in time to the occurrence of
9 impacts to constitute adequate mitigation.

10 In addition, the plan contains commitments to implement AMM1–AMM6, AMM10, AMM13, and
11 AMM37 which include elements that avoid or minimize the risk of affecting habitats and species
12 adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since
13 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
14 of the Final EIR/EIS. These commitments are more than sufficient to support the conclusion that the
15 near-term impacts of Alternative 1C on California tiger salamander would be less than significant,
16 because the number of acres required to meet the typical ratios described above would be only 740
17 acres of upland communities protected.

18 **Late Long-Term Timeframe**

19 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and
20 29,459 acres of upland modeled habitat for California tiger salamander. Alternative 1C as a whole
21 would result in the permanent loss of, and temporary effects on, 4 acres of aquatic habitat and 714
22 acres of upland habitat for California tiger salamander for the term of the plan (less than 3% of the
23 total upland habitat in the study area). The location of these losses is described above in the
24 discussions of CM1, CM2, CM4, CM11, and CM18.

25 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
26 4 in Chapter 3). Protection of at least 1,000 acres of grassland in CZ 8 west of Byron Highway would
27 benefit the California tiger salamander by providing habitat in the portion of the study area with the
28 highest long-term conservation value for the species based on known species occurrences and large,
29 contiguous habitat areas (Objective GNC1.1). Consistent with Objective GNC1.3, ponds and other
30 aquatic features in the grasslands would also be protected to provide aquatic habitat for this species,
31 and the surrounding grassland would provide dispersal and aestivation habitat. Aquatic features in
32 the protected grasslands in CZ 8 would be maintained and enhanced to provide suitable inundation
33 depth and duration and suitable composition of vegetative cover to support breeding California tiger
34 salamanders (Objective GNC2.5). Additionally, livestock exclusion from streams and ponds and
35 other measures would be implemented as described in CM11 to promote growth of aquatic
36 vegetation with appropriate cover characteristics favorable to California tiger salamanders. Lands
37 protected in CZ 8 would connect with lands protected under the *East Contra Costa County HCP/NCCP*
38 and the extensive Los Vaqueros Watershed lands, including grassland areas supporting this species.
39 This objective would ensure that California tiger salamander upland and associated aquatic habitats
40 would be protected and enhanced in the largest possible patch sizes adjacent to occupied habitat
41 within and adjacent to the study area.

42 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
43 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
44 restoration of alkali seasonal wetland complex, vernal pool complex, and grassland that could

1 overlap with the species model, would result in the restoration of 88 acres of aquatic and 598 acres
2 of upland modeled habitat for California tiger salamander. In addition, protection of alkali seasonal
3 wetland complex, vernal pool complex, and grassland that could overlap with the species model,
4 would result in the protection of 750 acres of aquatic and 5,000 acres of upland California tiger
5 salamander modeled habitat.

6 In the absence of other conservation actions, the losses of California tiger salamander upland habitat
7 associated with Alternative 1C would represent an adverse effect as a result of habitat modification
8 and potential direct mortality of a special-status species. However, with habitat protection and
9 restoration associated with the conservation components, guided by landscape-scale goals and
10 objectives and by AMM1–AMM6, AMM10, AMM13, and AMM37, which would be in place throughout
11 the construction phase, the impacts of Alternative 1C as a whole on California tiger salamander
12 would be less than significant.

13 **Impact BIO-47: Indirect Effects of Plan Implementation on California Tiger Salamander**

14 Indirect effects could occur outside of the construction footprint but within 500 feet of California
15 tiger salamander habitat. Activities associated with conservation component construction and
16 ongoing habitat enhancement, as well as operation and maintenance of above-ground water
17 conveyance facilities, including the transmission facilities, could result in ongoing but periodic
18 postconstruction disturbances with localized effects on California tiger salamander and its habitat,
19 and temporary noise and visual disturbances, including artificial night lighting at a worksite, over
20 the term of the BDCP. Most of the areas indirectly affected are associated with the construction of
21 Byron Forebay and its borrow and spoil areas in CZ 8.

22 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment
23 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability
24 of California tiger salamander habitat downstream of the construction area by filling in pools and
25 smothering eggs. Accidental spills of toxic fluids into the aquatic system could result in the
26 subsequent loss of California tiger salamander habitat. Hydrocarbon and heavy metal pollutants
27 associated with roadside runoff also have the potential to enter the aquatic system, affecting water
28 quality and California tiger salamander.

29 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 under Alternative 1C
30 would avoid or minimize the potential for substantial adverse effects on California tiger
31 salamanders, either indirectly or through habitat modifications. These AMMs would also avoid and
32 minimize effects that could substantially reduce the number of California tiger salamanders or
33 restrict the species' range. Therefore, the indirect effects of Alternative 1C would not have an
34 adverse effect on California tiger salamander.

35 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
36 as construction-related noise and visual disturbances including artificial night lighting at a worksite
37 could impact California tiger salamander in aquatic and upland habitats. The use of mechanical
38 equipment during construction could cause the accidental release of petroleum or other
39 contaminants that could impact California tiger salamander or its prey. The inadvertent discharge of
40 sediment or excessive dust adjacent to California tiger salamander habitat could also have a negative
41 impact on the species or its prey. With implementation of AMM1–AMM6, AMM10, AMM13, and
42 AMM37 as part of Alternative 1C, the BDCP would avoid the potential for substantial adverse effects
43 on California tiger salamander, either indirectly or through habitat modifications, and would not
44 result in a substantial reduction in numbers or a restriction in the range of California tiger

1 salamanders. The indirect effects of Alternative 1C would have a less-than-significant impact on
2 California tiger salamander.

3 **Impact BIO-48: Periodic Effects of Inundation of California Tiger Salamander Habitat as a**
4 **Result of Implementation of Conservation Components**

5 *CM2 Yolo Bypass Fisheries Enhancement* is the only conservation measure expected to result in
6 periodic inundation of California tiger salamander habitat. Periodic inundation of Yolo Bypass could
7 affect from an estimated 191 acres of terrestrial habitat during a notch flow of 1,000 cfs, to an
8 estimated 639 acres of terrestrial habitat during a notch flow of 4,000 cfs in CZ 1 (Table 12-1C-21).
9 This effect would only occur during an estimated maximum of 30% of years and in areas that are
10 already inundated in more than half of all years; therefore, these areas are expected to provide only
11 marginal terrestrial habitat for the California tiger salamander under Existing Conditions. No aquatic
12 breeding habitat would be affected (Table 12-1C-21). The modeled habitat in the Yolo Bypass in the
13 vicinity of terrestrial habitat is of low value in that there are no California tiger salamander records
14 in this area and the bypass lacks vernal pool complexes with large, deep pools, or large grassland
15 areas with stock ponds and similar aquatic features that provide the habitat of highest value for this
16 species. Therefore, the terrestrial habitat to be affected has a small likelihood of supporting
17 California tiger salamanders, and Yolo Bypass operations are expected to have a minimal effect on
18 the species, if any.

19 **NEPA Effects:** The effects of periodic inundation from Alternative 1C would not have an adverse
20 effect on California tiger salamander.

21 **CEQA Conclusion:** Flooding of the Yolo Bypass from Fremont Weir operations would periodically
22 increase the frequency and duration of inundation of 191–639 acres of terrestrial habitat for
23 California tiger salamander. Because this area is considered low-value habitat and there are no
24 California tiger salamander records in the area, and because of the lack of suitable breeding habitat
25 in this area, the effects of periodic inundation of California tiger salamander habitat from Alternative
26 1C would have a less-than-significant impact.

27 **Giant Garter Snake**

28 The habitat model used to assess effects for the giant garter snake is based on aquatic habitat and
29 upland habitat. Modeled aquatic habitat is composed of tidal perennial aquatic (except in Suisun
30 Marsh), tidal freshwater perennial emergent wetland, nontidal freshwater emergent wetland, and
31 nontidal perennial aquatic natural communities; rice fields; and artificial canals and ditches.
32 Modeled upland habitat is composed of all nonwetland and nonaquatic natural communities
33 (primarily grassland and cropland) within 200 feet of modeled aquatic habitat features. The
34 modeled upland habitat is ranked as high-, moderate-, or low-value based on giant garter snake
35 associations between vegetation and cover types (U.S. Fish and Wildlife Service 2012) and historical
36 and recent occurrence records (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*
37 *Environmental Data Report*), and presence of features necessary to fulfill the species' life cycle
38 requirements. Modeled habitat is expressed in acres for aquatic and upland habitats, and in miles for
39 linear movement corridors in aquatic habitat. Other factors considered in assessing the value of
40 affected habitat for the giant garter snake, to the extent that information is available, are proximity
41 to conserved lands and recorded occurrences of the species, proximity to giant garter snake
42 subpopulations (Yolo Basin/Willow Slough and Coldani Marsh/White Slough) in the study area that

1 are identified in the draft recovery plan for this species (U.S. Fish and Wildlife Service 1999b), and
2 contribution to connectivity between giant garter snake subpopulations.

3 Construction and restoration associated with Alternative 1C conservation measures would result in
4 both temporary and permanent losses of giant garter snake modeled habitat as indicated in Table
5 12-1C-22. The majority of the losses would take place over an extended period of time as tidal
6 marsh is restored in the study area. Full implementation of Alternative 1C would also include the
7 following biological objectives over the term of the BDCP to benefit the giant garter snake (BDCP
8 Chapter 3, *Conservation Strategy*).

- 9 • Increase native species diversity and relative cover of native plant species, and reduce the
10 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 11 • Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of
12 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective
13 TFEWNC1.1, associated with CM3 and CM4).
- 14 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
15 and nontidal freshwater emergent wetland natural communities, with suitable habitat
16 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,
17 associated with CM3 and CM10).
- 18 • Protect 48,625 acres of cultivated lands that provide suitable habitat for covered and other
19 native wildlife species (Objective CLNC1.1, associated with CM3 and CM11).
- 20 • Target cultivated land conservation to provide connectivity between other conservation lands
21 (Objective CLNC1.2, associated with CM3).
- 22 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
23 lands that occur in cultivated lands within the reserve system, including isolated valley oak
24 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
25 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
26 with CM3 and CM11).
- 27 • Of the at least 1,200 acres of nontidal marsh created under (Objective NFEW/NPANC1.1), create
28 600 acres of aquatic habitat giant garter snake aquatic habitat that is connected to the 1,500
29 acres of rice land or equivalent-value habitat described below in Objective GGS1.4 (Objective
30 GGS1.1, associated with CM3, CM4, and CM10).
- 31 • Of the 8,000 acres of grassland protected under Objective GNC1.1 and 2,000 acres restored
32 under Objective GNC1.2, create or protect 200 acres of high-value upland giant garter snake
33 habitat adjacent to the at least 600 acres of nontidal perennial habitat being restored and/or
34 created in CZ 4 and/or CZ 5 (Objective GGS1.2, associated with CM3 and CM8).
- 35 • Protect giant garter snakes on restored and protected nontidal marsh and adjacent uplands
36 (Objectives GGS1.1 and GGS1.2) from incidental injury or mortality by establishing 200-foot
37 buffers between protected giant garter snake habitat and roads (other than those roads
38 primarily used to support adjacent cultivated lands and levees). Establish giant garter snake
39 reserves at least 2,500 feet from urban areas or areas zoned for urban development (Objective
40 GGS1.3, associated with CM3).

- 1 • Create connections from the White Slough population to other areas in the giant garter snake’s
2 historical range in the Stone Lakes vicinity by protecting, restoring, and/or creating at least
3 1,500 acres of rice land or equivalent-value habitat (e.g., perennial wetland) for the giant garter
4 snake in CZ 4 and/or CZ 5. Any portion of the 1,500 acres may consist of tidal freshwater
5 emergent wetland and may overlap with the 24,000 acres of tidally restored freshwater
6 emergent wetland if it meets specific giant garter snake habitat criteria described in CM4. Up to
7 500 (33%) of the 1,500 acres may consist of suitable uplands adjacent to protected or restored
8 aquatic habitat (Objective GGS1.4, associated with CM3 and CM4).
- 9 • Of the at least 1,200 acres of nontidal marsh created under Objective NFEW/NPANC1.1, create
10 600 acres of connected aquatic giant garter snake habitat outside the Yolo Bypass in CZ 2
11 (Objective GGS2.1, associated with CM3 and CM10).
- 12 • Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres restored
13 under Objective GNC1.2, create or protect 200 acres of high-value upland habitat adjacent to the
14 600 acres of nontidal marsh created in CZ 2 outside of Yolo Bypass (GGS2.1) (Objective GGS2.2,
15 associated with CM3 and CM8).
- 16 • To expand upon and buffer the newly restored/created nontidal perennial habitat in CZ 2,
17 protect 700 acres of cultivated lands, with 500 acres consisting of rice land and the remainder
18 consisting of compatible cultivated land that can support giant garter snakes. The cultivated
19 lands may be a subset of lands protected for the cultivated lands natural community and other
20 covered species (Objective GGS2.3, associated with CM3).
- 21 • Protect giant garter snakes on created nontidal marsh (Objective GGS2.1) and created or
22 protected adjacent uplands (Objective GGS2.2) from incidental injury or mortality by
23 establishing 200-foot buffers between protected giant garter snake habitat and roads, and
24 establishing giant garter snake reserves at least 2,500 feet from urban areas or areas zoned for
25 urban development (Objective GGS2.4, associated with CM3).
- 26 • Protect, restore, and/or create 2,740 acres of rice land or equivalent-value habitat (e.g.,
27 perennial wetland) for the giant garter snake in CZ 1, CZ 2, CZ 4, or CZ 5. Up to 500 acres may
28 consist of tidal freshwater emergent wetland and may overlap with the at least 5,000 acres of
29 tidally restored freshwater emergent wetland in the Cache Slough ROA if this portion meets
30 giant garter snake habitat criteria specified in CM4. Up to 1,700 acres may consist of rice fields
31 in the Yolo Bypass if this portion meets the criteria specified in CM3, *Reserve Design*
32 *Requirements by Species*. Any remaining acreage will consist of rice land or equivalent-value
33 habitat outside the Yolo Bypass. Up to 915 (33%) of the 2,740 acres may consist of suitable
34 uplands adjacent to protected or restored aquatic habitat (Objective GGS3.1, associated with
35 CM3, CM4, and CM10).

36 As explained below, with the restoration or protection of these amounts of habitat, in addition to the
37 implementation of AMMs, impacts on giant garter snake would not be adverse for NEPA purposes
38 and would be less than significant for CEQA purposes.

1 **Table 12-1C-22. Changes in Giant Garter Snake Modeled Habitat Associated with Alternative 1C^a**

Conservation Measure ^b	Habitat Type ^c	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT ^d	CM2	CM5
CM1	Aquatic (acres)	38	38	66	66	NA	NA
	Upland (acres)	203	203	473	473	NA	NA
	Aquatic (miles)	16	16	22	22	NA	NA
Total Impacts CM1 (acres)		241	241	539	539	NA	NA
CM2–CM18	Aquatic (acres)	179	498	15	38	NA	NA
	Upland (acres)	1,467	2,443	219	261	582–1,402	606
	Aquatic (miles)	49	189	9	10	NA	NA
Total Impacts CM2–CM18 (acres)		1,646	2,941	234	299	582–1,402	606
TOTAL IMPACTS CM1-CM18 (acres)		1,887	3,182	773	838	582–1,402	606

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c Aquatic acres represent tidal and nontidal habitat combined, and upland acres represent low-, moderate-, and high-value acreages combined.

^d LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^e Periodic effects were estimated for the late long-term only. CM2 periodic impacts on upland habitats only are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-49: Loss or Conversion of Habitat for and Direct Mortality of Giant Garter Snake**

4 Alternative 1C conservation measures would result in the permanent and temporary loss combined
5 of up to 640 acres of modeled aquatic habitat (tidal and nontidal combined), up to 3,380 acres of
6 modeled upland habitat, and up to 237 miles of channels providing aquatic movement habitat for
7 the giant garter snake (Table 12-1C-22). There are no giant garter snake occurrences that overlap
8 with the Plan footprint. Conservation measures that would result in these losses are conveyance
9 facilities and transmission line construction, and establishment and use of RTM, borrow, and spoils
10 areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal natural communities
11 restoration (CM4), floodplain restoration (CM5), and construction of a conservation fish hatchery
12 (CM18). Habitat enhancement and management activities (CM11), which include ground
13 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In
14 addition, maintenance activities associated with the long-term operation of the water conveyance
15 facilities and other BDCP physical facilities could degrade or eliminate giant garter snake habitat.
16 Each of these individual activities is described below. A summary statement of the combined
17 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure
18 discussions.

- 1 • *CM1 Water Facilities and Operation:* Construction of Alternative 1C conveyance facilities would
2 result in the permanent loss of approximately 241 acres of modeled giant garter snake habitat,
3 composed of 38 acres of aquatic habitat and 203 acres of upland habitat (Table 12-1C-22). The
4 203 acres of upland habitat that would be removed for the construction of the conveyance
5 facilities consists of 59 acres of high-, 125 acres of moderate-, and 19 acres of low-value habitat.
6 In addition, approximately 16 miles of channels providing giant garter snake movement habitat
7 would be removed as a result of conveyance facilities construction. Development of the water
8 conveyance facilities would also result in the temporary removal of 539 acres including 66 acres
9 of giant garter snake aquatic habitat and up to 473 acres of adjacent upland habitat in areas near
10 construction (see Table 12-1C-22 and Terrestrial Biology Map Book). In addition, approximately
11 22 miles of channels providing giant garter snake movement habitat would be temporarily
12 removed as a result of conveyance facilities construction.

13 Most of the habitat that would be lost is located in the central Delta, in CZ 3 (Ryer Island), CZ 5
14 (Twitchell and Brannan Islands), CZ 6 (Bradford Island, Webb Tract, and Bethel Island), and CZ
15 8 and 9. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1C
16 construction locations. The aquatic habitat in CZ 6 consists primarily of cultivated lands and
17 associated irrigation ditches and is considered to have low to moderate potential for adverse
18 effects on giant garter snake because it is not located near or between subpopulations identified
19 in the draft recovery plan. Water facilities construction and operation is expected to have little
20 to no adverse effect on giant garter snake aquatic habitat in the remaining CZs because it is not
21 near or between subpopulations identified in the draft recovery plan.

- 22 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries
23 improvements in the Yolo Bypass would result in the permanent and temporary removal of
24 approximately 83 acres of aquatic habitat and 458 acres of upland habitat for the giant garter
25 snake in the late long-term. The upland habitat that would be removed is composed of 336 acres
26 of high-value, 121 acres of moderate-value, and 1 acre of low-value habitat. Approximately 14
27 miles (less than 1% of total miles in Plan Area) of channels providing giant garter snake habitat
28 for movements would be removed as a result of Fremont Weir/Yolo Bypass Improvements.
29 Approximately 14 miles (less than 1% of total miles in Plan Area) of channels providing giant
30 garter snake habitat for movements would be removed as a result of Fremont Weir/Yolo
31 Bypass Improvements. Most of this habitat removal would occur at the north end of the Yolo
32 Bypass, near Fremont Weir. Construction is expected to have adverse effects on giant garter
33 snake aquatic habitat in the Yolo Bypass area because it is near the Yolo Basin/Willow Slough
34 subpopulation.

35 In addition to habitat loss from construction-related activities in Yolo Bypass, late season
36 flooding in the bypass may result in loss of rice habitat (considered aquatic habitat for giant
37 garter snake) by precluding the preparation and planting of rice fields. The methods for
38 estimating loss of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment
39 5J.E, *Estimation of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo*
40 *Bypass*. This analysis concludes that the estimated loss of rice is 1,662 acres which was
41 considered to occur late long-term.

- 42 • *CM4 Tidal Natural Communities Restoration:* Tidal natural community restoration would result
43 in the permanent loss of approximately 395 acres of aquatic habitat and 2,123 acres of upland
44 habitat for the giant garter snake to tidal marsh in the late long-term. The upland habitat
45 affected by tidal inundation includes 594 acres of high-value, 1,375 acres of moderate-value, and
46 154 acres of low-value habitat. In addition, approximately 138 miles of channels providing giant

1 garter snake movement habitat would be removed as a result of tidal natural communities
2 restoration.

3 Most of the effects of tidal natural community restoration would occur in the Cache Slough and
4 Yolo Bypass areas (CZ 1 and CZ 2). This aquatic habitat is of low to moderate value: it is in and
5 near Category 1 open space but is not near any giant garter snake occurrences and is not near or
6 between giant garter snake subpopulations identified in the draft recovery plan. Tidal natural
7 communities restoration is expected to have little to no adverse effects on giant garter snake
8 aquatic or upland habitat in the Cache Slough ROA. There are no giant garter snake occurrences
9 in this area, which is already tidally influenced so it has limited value for the giant garter snake
10 (giant garter snakes may occur in tidally muted areas but are not likely to use aquatic areas with
11 a strong tidal influence).

- 12 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
13 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
14 approximately 60 acres of aquatic and 89 acres of upland habitat for giant garter snake. The
15 upland habitat to be removed is composed of 51 acres of moderate-value and 38 acres of low-
16 value upland habitat. Approximately 2 miles of channels providing giant garter snake movement
17 habitat would be removed as a result of floodplain restoration. Seasonally inundated floodplain
18 restoration is expected to have little to no adverse effects on giant garter snake aquatic habitat
19 because the site is not located near or between giant garter snake subpopulations identified in
20 the draft recovery plan. As with CM4, the estimates of the effect of seasonal floodplain levee
21 construction and inundation are based on projections of where restoration may occur. Actual
22 effects are expected to be lower because sites would be selected to minimize effects on giant
23 garter snake habitat. *CM11 Natural Communities Enhancement and Management*: A variety of
24 habitat management actions included in CM11 that are designed to enhance wildlife values in
25 BDCP-protected habitats may result in localized ground disturbances that could temporarily
26 remove small amounts of giant garter snake habitat. Ground-disturbing activities, such as
27 removal of nonnative vegetation and road and other infrastructure maintenance, are expected
28 to have minor effects on available giant garter snake habitat and are expected to result in overall
29 improvements to and maintenance of giant garter snake habitat values over the term of the
30 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
31 and minimized by the AMMs listed below.

32 Passive recreation in the reserve system could result in human disturbance of giant garter
33 snakes basking in upland areas and compaction of upland burrow sites used for brumation.
34 However, AMM37 requires setbacks for trails in giant garter snake habitat (see Appendix 3B,
35 *Environmental Commitments, AMMs, and CMs*). With this measure in place, recreation-related
36 effects on giant garter snake are expected to be minimal.

- 37 ● *CM18 Conservation Hatcheries*: Construction for conservation hatcheries could result in the
38 permanent removal of 35 acres of moderate-value upland habitat for the giant garter snake in
39 the Yolo Bypass area (CZ 2).
- 40 ● *Operations and maintenance*: Postconstruction operation and maintenance of the above-ground
41 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
42 disturbances that could affect giant garter snake use of the surrounding habitat in the Yolo
43 Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, CZ 7,
44 and CZ 8). Maintenance activities would include vegetation management, levee and structure

1 repair, and regrading of roads and permanent work areas. These effects, however, would be
2 reduced by AMMs and conservation actions as described below.

- 3 • Injury and direct mortality: Construction vehicle activity may cause injury or mortality of the
4 giant garter snake. If snakes reside where activities take place (most likely in the vicinity of the
5 two subpopulations: Yolo Basin/Willow Slough [CZ 2] and the Coldani Marsh/White Slough [CZ
6 4 and 5]), the operation of equipment for land clearing, construction, conveyance facilities
7 operation and maintenance, and habitat restoration, enhancement, and management could
8 result in injury or mortality of giant garter snakes. This risk is highest from late fall through
9 early spring, when the snakes are dormant. Increased vehicular traffic associated with BDCP
10 actions could contribute to a higher incidence of road kill. However, preconstruction surveys
11 would be implemented after the project planning phase and prior to any ground-disturbing
12 activity. Any disturbance to suitable aquatic and upland sites in or near the project footprint
13 would be avoided to the extent feasible, and the loss of aquatic habitat and grassland vegetation
14 would be minimized through adjustments to project design, as practicable. Construction
15 monitoring and other measures would be implemented to avoid and minimize injury or
16 mortality of this species during construction as described in *AMM16 Giant Garter Snake*.

17 The following paragraphs summarize the combined effects discussed above and describe other
18 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
19 also included.

20 ***Near-Term Timeframe***

21 Because the water conveyance facilities construction is being evaluated at the project level, the near-
22 term BDCP conservation strategy has been evaluated to determine whether it would provide
23 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
24 construction would not be adverse under NEPA.

25 Alternative 1C would permanently and temporarily remove 298 acres of aquatic habitat and 2,362
26 acres of upland habitat for giant garter snake in the study area during the near-term. These effects
27 would result from the construction of the water conveyance facilities (CM1, 104 acres of aquatic and
28 676 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458
29 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres of upland
30 habitat), and conservation hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses
31 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat
32 losses would occur in cropland and grassland communities. In addition, approximately 96 miles of
33 channels (irrigation and drainage canals) providing giant garter snake movement habitat would be
34 removed. The habitat model likely overestimates the relative value of irrigation and drainage canals
35 in the vicinity of White Slough and south due to its proximity to records that likely represent single
36 displaced snakes, not viable populations.

37 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
38 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the
39 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection
40 of upland habitats. Using these ratios would indicate that 298 acres of aquatic habitat should be
41 restored, 298 acres of aquatic habitat should be protected, and 4,724 acres of upland habitat should
42 be protected for giant garter snake to mitigate the near-term losses.

43 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to
44 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to

1 be protected and restored in the near-term specifically for the giant garter snake total 3,900 acres
 2 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least
 3 500 acres of rice) in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.
 4 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900
 5 acres under Objective GGS3.1) would be restored or protected to create connections from the
 6 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.
 7 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected
 8 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected
 9 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in
 10 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage
 11 ditches located in cultivated lands and suitable for giant garter snake movement would be
 12 maintained and protected within the reserve system, which would include isolated valley oak trees,
 13 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water
 14 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

15 These habitat protection and restoration measures would benefit the giant garter snake and the
 16 plan's species-specific biological goals and objectives would inform the near-term protection and
 17 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and
 18 providing connectivity between protected areas, is considered the most effective approach to giant
 19 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
 20 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and
 21 are identified as important for the recovery of the species in the draft recovery plan for the species
 22 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat
 23 would focus on these two important subpopulations.

24 The species-specific biological goals and objectives would inform the near-term protection and
 25 restoration efforts. The natural community restoration and protection activities are expected to be
 26 concluded during the first 10 years of Plan implementation, which is close enough in time to the
 27 occurrence of impacts to constitute adequate mitigation for NEPA purposes. These commitments are
 28 more than sufficient to support the conclusion that the near-term effects of Alternative 1C would be
 29 not be adverse under NEPA, because the number of acres required to meet the typical ratios
 30 described above would be only 298 acres of aquatic communities restored, 298 acres of aquatic
 31 communities protected, and 4,724 acres of upland communities protected.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
 36 *Restoration of Temporarily Affected Natural Communities*, *AMM16 Giant Garter Snake*, and *AMM37*
 37 *Recreation*. All of these AMMs include elements that avoid or minimize the risk of BDCP activities
 38 affecting habitats and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes
 39 the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
 40 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

41 **Late Long-Term Timeframe**

42 The habitat model indicates that the study area supports approximately 31,281 acres of aquatic and
 43 53,285 acres of upland habitat for giant garter snake. Alternative 1C as a whole would result in the
 44 permanent loss of and temporary effects on 640 acres of aquatic habitat and to 3,380 acres of

1 upland habitat for giant garter snake during the term of the plan (2% of the total aquatic habitat and
2 6% of the total upland habitat in the study area). The locations of these losses are described above in
3 the analyses of individual conservation measures.

4 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands
5 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of
6 grasslands in the study area. Lands to be protected and restored specifically for the giant garter
7 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated
8 lands including at least 500 acres of rice) in CZ 2, and acres of rice or habitat of equivalent value in
9 CZ 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under
10 Objective GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create
11 connections from the Coldani Marsh/White Slough population to other areas in the giant garter
12 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under
13 Objective GGS 3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of
14 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice
15 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of
16 high value habitat targeted specifically for giant garter snake, the protection and restoration of other
17 natural communities is expected to provide additional restoration of 4,430 acres and protection of
18 3,733 acres of garter snake habitat.

19 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter
20 snake by providing connectivity and maintaining irrigation and drainage channels that provide
21 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake
22 movement habitat on the protected cultivated lands is proportional to the modeled habitat on
23 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support
24 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by
25 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

26 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the
27 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter
28 snake. Protecting and expanding existing giant garter snake subpopulations, and providing
29 connectivity between protected areas, is considered the most effective approach to giant garter
30 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
31 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area
32 and are identified as important for the recovery of the species in the draft recovery plan for the
33 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake
34 habitat would focus on these two important subpopulations. BDCP's beneficial effects analysis
35 (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and Plant Species*) estimates that the
36 restoration and protection actions discussed above, as well as the restoration of managed wetland,
37 nontidal freshwater perennial emergent wetland, nontidal perennial aquatic, tidal freshwater
38 emergent wetland, alkali seasonal wetland, grassland, and vernal pool complex that could overlap
39 with the species model, would result in the restoration of 3,450 acres of aquatic and 980 acres of
40 upland modeled habitat for giant garter snake. In addition, protection of cultivated land, grassland,
41 alkali seasonal wetland, and vernal pool complex could overlap with the species model and would
42 result in the protection of 1,547 acres of aquatic and 2,185 acres of upland giant garter snake
43 modeled habitat.

44 **NEPA Effects:** In the near-term, the loss of giant garter snake habitat under Alternative 1C would not
45 be adverse because the BDCP has committed to protecting and restoring the acreage required to

1 meet the typical mitigation ratios described above. In the late long-term, the losses of giant garter
2 snake associated with Alternative 1C, in the absence of other conservation actions, would represent
3 an adverse effect as a result of habitat modification and potential direct mortality of a special-status
4 species. However, with habitat protection and restoration associated with the conservation
5 components, guided by landscape-scale goals and objectives and AMM1–AMM7, AMM10, AMM16,
6 and AMM37, the effects of Alternative 1C as a whole on giant garter snake would not be adverse.

7 ***CEQA Conclusion:***

8 ***Near-Term Timeframe***

9 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
10 the near-term BDCP conservation strategy has been evaluated to determine whether it would
11 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
12 impacts of construction would be less than significant under CEQA.

13 Alternative 1C would permanently and temporarily remove 298 acres of aquatic habitat and 2,362
14 acres of upland habitat for giant garter snake in the study area during the near-term. These effects
15 would result from the construction of the water conveyance facilities (CM1, 104 acres of aquatic and
16 676 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458
17 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres of upland
18 habitat), and conservation hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses
19 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat
20 losses would occur in cropland and grassland communities. In addition, approximately 96 miles of
21 irrigation and drainage channels providing giant garter snake movement habitat would be removed.
22 The habitat model likely overestimates the relative value of irrigation and drainage canals in the
23 vicinity of White Slough and south due to its proximity to records that likely represent single
24 displaced snakes, not viable populations.

25 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
26 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the
27 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection
28 of upland habitats. Using these ratios would indicate that 298 acres of aquatic habitat should be
29 restored, 298 acres of aquatic habitat should be protected, and 4,724 acres of upland habitat should
30 be protected for giant garter snake to mitigate the near-term losses.

31 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to
32 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to
33 be protected and restored in the near term specifically for the giant garter snake total 3,900 acres
34 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least
35 500 acres of rice) in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.
36 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900
37 acres under Objective GGS3.1) would be restored or protected to create connections from the
38 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.
39 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected
40 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected
41 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in
42 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage
43 ditches located in cultivated lands and suitable for giant garter snake movement would be
44 maintained and protected within the reserve system, which would include isolated valley oak trees,

1 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water
2 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

3 These habitat protection and restoration measures would benefit the giant garter snake and the
4 plan's species-specific biological goals and objectives would inform the near-term protection and
5 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and
6 providing connectivity between protected areas, is considered the most effective approach to giant
7 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
8 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and
9 are identified as important for the recovery of the species in the draft recovery plan for the species
10 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat
11 would focus on these two important subpopulations.

12 The species-specific biological goals and objectives would inform the near-term protection and
13 restoration efforts. The natural community restoration and protection activities are expected to be
14 concluded during the first 10 years of Plan implementation, which is close enough in time to the
15 occurrence of impacts to constitute adequate mitigation for CEQA purposes. These commitments are
16 more than sufficient to support the conclusion that the near-term effects of Alternative 1C would be
17 not be adverse under CEQA, because the number of acres required to meet the typical ratios
18 described above would be only 298 acres of aquatic communities restored, 298 acres of aquatic
19 communities protected, and 4,724 acres of upland communities protected.

20 The Plan also includes commitments to implement AMM1–AMM7, AMM10, AMM16, and AMM37. All
21 of these AMMs include elements that avoid or minimize the risk of BDCP activities affecting habitats
22 and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
23 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
24 *AMMs, and CMs*, of the Final EIR/EIS.

25 ***Late Long-Term Timeframe***

26 The habitat model indicates that the study area supports approximately 31,281 acres of aquatic and
27 53,285 acres of upland habitat for giant garter snake. Alternative 1C as a whole would result in the
28 permanent loss of and temporary effects on 640 acres of aquatic habitat and to 3,380 acres of
29 upland habitat for giant garter snake during the term of the plan (2% of the total aquatic habitat and
30 6% of the total upland habitat in the study area). The locations of these losses are described above in
31 the analyses of individual conservation measures.

32 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands
33 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of
34 grasslands in the study area. Lands to be protected and restored specifically for the giant garter
35 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated
36 lands including at least 500 acres of rice) in CZ 2, and acres of rice or habitat of equivalent value in
37 CZ 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under
38 Objective GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create
39 connections from the Coldani Marsh/White Slough population to other areas in the giant garter
40 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under
41 Objective GGS3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of
42 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice
43 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of
44 high value habitat targeted specifically for giant garter snake, the protection and restoration of other

1 natural communities is expected to provide additional restoration of 4,430 acres and protection of
2 3,733 acres of garter snake habitat.

3 Protection and management of cultivated lands (*CM3 and CM11*) would also benefit the giant garter
4 snake by providing connectivity and maintaining irrigation and drainage channels that provide
5 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake
6 movement habitat on the protected cultivated lands is proportional to the modeled habitat on
7 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support
8 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by
9 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

10 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the
11 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter
12 snake. Protecting and expanding existing giant garter snake subpopulations, and providing
13 connectivity between protected areas, is considered the most effective approach to giant garter
14 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
15 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area
16 and are identified as important for the recovery of the species in the draft recovery plan for the
17 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake
18 habitat would focus on these two important subpopulations.

19 BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and Plant*
20 *Species*) estimates that the restoration and protection actions discussed above, as well as the
21 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal
22 perennial aquatic, tidal freshwater emergent wetland, alkali seasonal wetland, grassland, and vernal
23 pool complex that could overlap with the species model, would result in the restoration of 3,450
24 acres of aquatic and 980 acres of upland modeled habitat for giant garter snake. In addition,
25 protection of cultivated land, grassland, alkali seasonal wetland, and vernal pool complex could
26 overlap with the species model and would result in the protection of 1,547 acres of aquatic and
27 2,185 acres of upland giant garter snake modeled habitat.

28 The BDCP also includes AMM1–AMM7, AMM10, AMM16, and AMM37, which are directed at
29 minimizing or avoiding potential impacts on adjacent habitats during construction and operation of
30 the conservation measures. Considering the protection and restoration provisions, which would
31 provide acreages of new or enhanced habitat in amounts greater than necessary to compensate for
32 habitats lost to construction and restoration activities, implementation of Alternative 1C as a whole
33 would not result in a substantial adverse effect through habitat modifications and would not
34 substantially reduce the number or restrict the range of the species. Therefore, the loss of giant
35 garter snake habitat and potential mortality of snakes would have a less-than-significant impact on
36 giant garter snake under CEQA.

37 **Impact BIO-50: Indirect Effects of Plan Implementation on Giant Garter Snake**

38 Construction activities outside the project footprint but within 200 feet of construction associated
39 with water conveyance facilities, conservation components and ongoing habitat enhancement, as
40 well as operation and maintenance of above-ground water conveyance facilities, including the
41 transmission facilities, could result in ongoing periodic postconstruction disturbances with localized
42 effects on giant garter snake habitat, and temporary noise and visual disturbances over the term of
43 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM7, AMM10,
44 AMM16, and AMM37, which would be in effect throughout the plan's construction phase.

1 The use of mechanical equipment during water conveyance facilities construction could cause the
2 accidental release of petroleum or other contaminants that could affect giant garter snake or its
3 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to giant garter snake
4 habitat could also have a negative effect on the species or its prey. AMM1–AMM6 would minimize
5 the likelihood of such spills and would ensure measures are in place to prevent runoff from the
6 construction area and potential effects of sediment or dust on giant garter snake or its prey.

7 Covered activities have the potential to exacerbate bioaccumulation of mercury in covered species
8 that feed on aquatic species, including giant garter snake. The operational impacts of new flows
9 under CM1 were analyzed to assess potential effects on mercury concentration and bioavailability.
10 Results indicated that changes in total mercury levels in water and fish tissues due to future
11 operational conditions were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and
12 5D.4-5).

13 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to
14 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
15 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
16 floodplains. Thus, BDCP restoration activities that create newly inundated areas could increase
17 bioavailability of mercury. Increased methylmercury associated with natural community and
18 floodplain restoration may indirectly affect giant garter snake, which feeds on small fishes, tadpoles,
19 and small frogs, especially introduced species, such as small bullfrogs (*Rana catesbeiana*) and their
20 larvae, carp (*Cyprinus carpio*), and mosquitofish (*Gambusia affinis*). In general, the highest
21 methylation rates are associated with high tidal marshes that experience intermittent wetting and
22 drying and associated anoxic conditions (Alpers et al. 2008). Along with avoidance and minimization
23 measures and adaptive management and monitoring, *CM12 Methylmercury Management* is expected
24 to reduce the amount of methylmercury resulting from the restoration of natural communities and
25 floodplains.

26 Extant populations of giant garter snake within the study area are known only from the upper Yolo
27 Basin and at the Coldani Marsh/White Slough area. Davis et al. (2007) found mercury
28 concentrations in fish at White Slough (and the Central Delta in general) to be relatively low
29 compared to other areas of the Delta. No restoration activities involving flooding (and subsequent
30 methylation of mercury) are planned within the known range of the Coldani Marsh/White Slough
31 giant garter snake population. Effects on giant garter snake from increased methylmercury
32 exposures is more likely in the Yolo Basin, where some of the highest concentrations of mercury and
33 methylmercury have been documented (Foe et al. 2008). Effects from exposure to methylmercury
34 may include decreased predator avoidance, reduced success in prey capture, difficulty in shedding,
35 and reduced ability to move between shelter and foraging or thermoregulation areas (Wylie et al.
36 2009). Planned floodplain restoration activities in the Yolo Basin are expected to seasonally increase
37 methylmercury production, although production would be minimized by *CM12 Methylmercury*
38 *Mitigation*. Further, the periods of production and increased exposure to methylmercury do not
39 overlap with giant garter snake seasonal activity periods. This seasonal trend should help to
40 decrease risk to the giant garter snake, although snakes could prey on individuals that have been
41 exposed to methylmercury during the previous season.

42 The potential mobilization or creation of methylmercury within the study area varies with site-
43 specific conditions and would need to be assessed at the project level. Measures described in *CM12*
44 *Methylmercury Management* include provisions for project-specific Mercury Management Plans.
45 Along with avoidance and minimization measures and adaptive management and monitoring, *CM12*

1 is expected to reduce the effects of methylmercury resulting from BDCP natural communities and
2 floodplain restoration on giant garter snake.

3 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1C
4 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or
5 through habitat modifications. These AMMs would also avoid and minimize effects that could
6 substantially reduce the number of giant garter snakes or restrict the species' range. Therefore, the
7 indirect effects of Alternative 1C would not have an adverse effect on giant garter snake.

8 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
9 as construction-related noise and visual disturbances could impact giant garter snake in aquatic and
10 upland habitats. The use of mechanical equipment during construction could cause the accidental
11 release of petroleum or other contaminants that could impact giant garter snake or its prey. The
12 inadvertent discharge of sediment or excessive dust adjacent to giant garter snake habitat could also
13 have a negative impact on the species or its prey. With implementation of AMM1-AMM7, AMM10,
14 AMM16, and AMM37 as part of Alternative 1C construction, operation and maintenance, the BDCP
15 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or
16 through habitat modifications. Alternative 1C would not result in a substantial reduction in numbers
17 or a restriction in the range of giant garter snakes. Therefore, the indirect effects of Alternative 1C
18 would have a less-than-significant impact on giant garter snakes. Giant garter snake could
19 experience indirect effects from increased exposure to methylmercury as a result of tidal habitat
20 restoration (CM4). With implementation of CM12, the potential indirect effects of methylmercury
21 would not result in a substantial reduction in numbers or a restriction in the range of giant garter
22 snakes, and, therefore, would have a less-than-significant impact on giant garter snakes.

23 **Impact BIO-50a: Loss of Connectivity among Giant Garter Snakes in the Coldani Marsh/White** 24 **Slough Subpopulation, Stone Lakes National Wildlife Refuge, and the Delta**

25 Implementation of Alternative 1C would not introduce a substantial barrier to the movement among
26 giant garter snakes in the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife
27 Refuge, and the Delta in the study area.

28 **NEPA Effects:** Alternative 1C would not adversely affect connectivity among giant garter snakes in
29 the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife Refuge, and the Delta
30 in the study area.

31 **CEQA Conclusion:** Alternative 1C would have a less-than-significant impact on connectivity between
32 giant garter snakes in the study area.

33 **Impact BIO-51: Periodic Effects of Inundation of Giant Garter Snake Habitat as a Result of** 34 **Implementation of Conservation Components**

35 *CM2 Yolo Bypass Fisheries Enhancement:* The proposed changes in Fremont Weir operations would
36 occur intermittently from as early as mid-November through as late as mid-May. The core
37 operations would occur during the winter/spring period, which corresponds mostly with the giant
38 garter snake's inactive season. During this time, snakes are overwintering underground. Giant garter
39 snakes that occur in the bypass during the active season could overwinter in the bypass during the
40 inactive season: these snakes may be vulnerable to inundation of the bypass and could be drowned
41 or displaced from overwintering sites. However, most typically, Fremont Weir "notch" operations
42 would occur on the shoulders of time periods in which the Sacramento River raises enough for

1 Fremont Weir to overtop passively, without the proposed project. Project-associated inundation of
2 areas that would not otherwise have been inundated is expected to occur in no more than 30% of all
3 years, since Fremont Weir is expected to overtop the remaining estimated 70% of all years, and
4 during those years notch operations would not typically affect the maximum extent of inundation.
5 Currently, in more than half of all years, an area greater than the area that would be inundated as a
6 result of covered activities is already inundated during the snake's inactive season (Kirkland pers.
7 comm.). Duration of inundation may also be an important factor determining effects on
8 overwintering giant garter snakes. Radiotelemetry studies have revealed giant garter snakes
9 surviving in burrows that had been inundated for 2 to 3 weeks, but it is unknown what duration of
10 inundation the snakes can survive while overwintering in their burrows.

11 BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, provides the method used to
12 estimate periodic inundation effects in the Yolo Bypass. Based on this method, periodic inundation
13 could affect giant garter snakes overwintering in upland areas ranging from an estimated 582 acres
14 of upland habitat during notch flow of 1,000 cfs to an estimated 1,402 acres during a 4,000-cfs notch
15 flow. The 4,000-cfs notch flow would affect an estimated 888 acres of high value habitat and 514
16 acres of moderate value habitat.

17 As noted above under the discussion of habitat loss from construction-related activities in Yolo
18 Bypass, late season flooding in the bypass may result in loss of rice habitat (considered aquatic
19 habitat for giant garter snake) by precluding the preparation and planting of a maximum of 1,662
20 acres of rice fields (BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter
21 Snake Summer Foraging Habitat in the Yolo Bypass*). This analysis concludes that the estimated loss
22 of rice is 1,662 acres which was considered to occur late long-term. Restoration and protection of
23 2,740 acres of rice land or habitat of equivalent value for the giant garter snake would achieve a 1:1
24 ratio of habitat conserved to habitat affected (habitat affected includes uplands periodically flooded
25 and rice lost due to late season flooding in Yolo Bypass as a result of CM2).

26 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 606 acres of upland
27 habitat for the giant garter snake in the south Delta (CZ 7). The upland habitat to be inundated
28 contains 432 acres of moderate-value and 174 acres of low-value habitat. The area between existing
29 levees would be breached and the newly constructed setback levees would be inundated through
30 seasonal flooding. The restored floodplain will include a range of elevations from low-lying areas
31 that flood frequently (e.g., every 1 to 2 years) to high-elevation areas that flood infrequently (e.g.,
32 every 10 years or more). There are no records of giant garter snakes in the vicinity of where
33 floodplain restoration is expected to occur.

34 Based on modeled habitat for the giant garter snake, the study area supports approximately 53,285
35 acres of upland habitat for giant garter snake. Approximately 2,008 acres of giant garter snake
36 upland habitat (4% of total upland habitat in the study area) may be adversely affected by periodic
37 flooding as a consequence of floodplain restoration and the operation of the Fremont Weir.

38 **NEPA Effects:** Periodic effects on upland habitat for giant garter snake associated with
39 implementing Alternative 1C are not expected to result in substantial adverse effects on giant garter
40 snakes, either directly or through habitat modifications, as it would not result in a substantial
41 reduction in numbers or a restriction in the range of giant garter snakes. Therefore, Alternative 1C
42 would not adversely affect the species.

1 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in
2 various parts of the study area would periodically affect a total of approximately 2,008 acres of
3 upland habitat for giant garter snake. The inundation could affect overwintering snakes. Project-
4 associated inundation of areas that would not otherwise have been inundated is expected to occur in
5 no more than 30% of all years, since Fremont Weir is expected to overtop the remaining estimated
6 70% of all years, and during those years notch operations would not typically affect the maximum
7 extent of inundation. Currently, in more than half of all years, an area greater than the area that will
8 be inundated as a result of covered activities is already inundated during the snake's inactive season
9 (Kirkland pers. comm.). Therefore, increased inundation in the Yolo Bypass as a result of BDCP is
10 expected to have a minimal effect on the Yolo Basin/Willow Slough population.

11 Implementing Alternative 1C, including AMM1–AMM7, AMM10, and AMM16, would not be expected
12 to result in substantial adverse effects on giant garter snakes, either directly or through habitat
13 modifications, because it would not result in a substantial reduction in numbers or a restriction in
14 the range of giant garter snakes. Periodic effects of inundation under Alternative 1C would have a
15 less-than-significant impact on the species.

16 **Western Pond Turtle**

17 The habitat model used to assess effects on the western pond turtle is based on aquatic and upland
18 nesting and overwintering habitat. Further details regarding the habitat model, including
19 assumptions on which the model is based, are provided in BDCP Appendix 2A, Section 2A.30,
20 *Western Pond Turtle*. The model quantified two types of upland nesting and overwintering habitat,
21 including upland habitat in natural communities as well as upland in agricultural areas adjacent to
22 aquatic habitats. Both of these upland habitat types are combined for this analysis. Factors
23 considered in assessing the value of affected aquatic habitat are natural community type and
24 availability of adjacent nesting and overwintering habitat. The highest value aquatic habitat types in
25 the study area consist of nontidal freshwater perennial emergent wetlands and ponds adjacent to
26 suitable nesting and overwintering habitat (Patterson pers. comm.). Less detail is provided on
27 effects on dispersal habitat because, although dispersal habitat is important for maintaining and
28 increasing distribution and genetic diversity, turtles have been known to travel over many different
29 land cover types; therefore, this habitat type is not considered limiting. The value of dispersal
30 habitat depends less on the habitat type itself than on the proximity of that habitat type to high-
31 value aquatic and nesting and overwintering habitat.

32 Construction and restoration associated with Alternative 1C conservation measures would result in
33 both temporary and permanent losses of western pond turtle modeled habitat, as indicated in Table
34 12-1C-23. The majority of these losses would take place over an extended period of time as tidal
35 marsh is restored in the study area. Full implementation of Alternative 1C would also include the
36 following biological objectives over the term of the BDCP to benefit the western pond turtle (BDCP
37 Chapter 3, *Conservation Strategy*).

- 38 ● Protect or restore 142,200 acres of high-value natural communities and covered species
39 habitats (Objective L1.1, associated with CM3).
- 40 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
41 accommodate sea level rise. Minimum restoration targets for tidal natural communities in
42 each ROA are 7,000 acres in Suisun Marsh ROA, 5,000 acres in Cache Slough ROA, 1,500 acres in
43 Cosumnes/Mokelumne ROA, 2,100 acres in West Delta ROA, and 5,000 acres in South Delta ROA
44 (Objective L1.3, associated with CM2, CM3, and CM4).

- 1 ● Within the 65,000 acres of tidal natural communities and transitional uplands (Objective L1.3),
2 include sufficient transitional uplands along the fringes of restored brackish and freshwater
3 tidal emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow
4 for the future upslope establishment of tidal emergent wetland communities (Objective L1.7,
5 associated with CM3, CM4, and CM8).
- 6 ● Allow floods to promote fluvial processes, such that bare mineral soils are available for natural
7 recolonization of vegetation, desirable natural community vegetation is regenerated, and
8 structural diversity is promoted, or implement management actions that mimic those natural
9 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 10 ● Allow lateral river channel migration (Objective L2.2, associated with CM3 and CM5).
- 11 ● Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of
12 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective
13 TFEWNC1.1, associated with CM3 and CM4).
- 14 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
15 and nontidal freshwater emergent wetland natural communities, with suitable habitat
16 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,
17 associated with CM3 and CM10).
- 18 ● Protect and enhance 8,100 acres of managed wetland, 1,500 acres of which are in the Grizzly
19 Island Marsh Complex (Objective MWNC1.1, associated with CM3 and CM11).
- 20 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 21 ● Protect stock ponds and other aquatic features within protected grasslands to provide aquatic
22 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with
23 CM3).
- 24 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
25 lands that occur in cultivated lands within the reserve system, including isolated valley oak
26 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
27 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
28 with CM3 and CM11).
- 29 As explained below, with the restoration and protection of these amounts of habitat, in addition to
30 implementation of AMMs, impacts on western pond turtle would not be adverse for NEPA purposes
31 and would be less than significant for CEQA purposes.

1 **Table 12-1C-23. Changes in Western Pond Turtle Modeled Habitat Associated with Alternative 1C^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic (acres)	27	27	86	86	NA	NA
	Upland (acres) ^e	129	129	139	139	NA	NA
	Aquatic (miles)	17	17	24	24		
Total Impacts CM1 (acres)		156	156	225	225		
CM2–CM18	Aquatic (acres)	82	114	23	44	NA	NA
	Upland (acres) ^e	414	1,028	119	136	283–798	331
	Aquatic (miles)	25	109	3	4		
Total Impacts CM2–CM18 (acres)		496	1,142	142	180	283–798	331
TOTAL IMPACTS CM1–CM18 (acres)		652	1,298	367	405	283–798	331

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

^e Upland acres represent upland nesting and overwintering habitat acreages combined for both natural communities and agricultural lands adjacent to aquatic habitats.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-52: Loss or Conversion of Habitat for and Direct Mortality of Western Pond Turtle**

4 Alternative 1C conservation measures would result in the permanent and temporary loss of up to
5 271 acres of aquatic habitat and 1,432 acres of upland nesting and overwintering habitat (Table 12-
6 1C-23). There are 4 western pond turtle occurrences that overlap with the CM1 footprint and a
7 number of additional occurrences within the vicinity (Figure 12-16). Activities that would result in
8 the temporary and permanent loss of western pond turtle modeled habitat are conveyance facilities
9 and transmission line construction, and establishment and use of RTM, borrow, and spoils areas
10 (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), seasonally inundated
11 floodplain restoration (CM5), and riparian restoration (CM7). Habitat enhancement and
12 management activities (CM11), such as ground disturbance or removal of nonnative vegetation,
13 could result in local adverse habitat effects. In addition, maintenance activities associated with the
14 long-term operation of the water conveyance facilities and other BDCP physical facilities could
15 degrade or eliminate western pond turtle habitat. The activity accounting for most (80%) of the
16 habitat loss or conversion would be *CM4 Tidal Natural Communities Restoration*. Each of these
17 individual activities is described below. A summary statement of the combined impacts and NEPA
18 effects and a CEQA conclusion follow the individual conservation measure discussions.

- 1 ● *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would
2 result in the permanent loss of approximately 27 acres of aquatic habitat and 129 acres of
3 upland nesting and overwintering habitat for the western pond turtle in the study area (Table
4 12-1C-23). Development of the water conveyance facilities would also result in the temporary
5 removal of up to 86 acres of aquatic habitat and 139 acres of nesting and overwintering habitat
6 for the western pond turtle in the study area (see Table 12-1C-23). Approximately 17 miles of
7 channels providing western pond turtle movement habitat would be removed and 24 miles
8 would be temporarily disturbed. There are four western pond turtle occurrences that overlap
9 with the CM1 footprint in CZ 2 around Clifton Court Forebay and in CZ 5 scattered throughout
10 the Delta. The majority of the permanent loss of aquatic habitat and nesting and overwintering
11 habitat would be near Clifton Court Forebay in CZ 8. Refer to the Terrestrial Biology Map Book
12 for a detailed view of Alternative 1C construction locations. The aquatic habitat in the Clifton
13 Court Forebay area is considered to be of reasonably high value because it consists of
14 agricultural ditches in or near known species occurrences. The nesting and overwintering and
15 dispersal habitat that would be lost consists primarily of cultivated lands with some small
16 portion of ruderal grassland habitat. Except for remnant, uncultivated patches, the cultivated
17 lands are not suitable for nesting and overwintering unless left fallow. Construction of the water
18 conveyance facilities would also affect dispersal habitat, which is primarily cultivated lands.
19 While there are western pond turtle occurrences scattered throughout CZ 3, CZ 4, CZ 5, and CZ 6,
20 this effect is widely dispersed because of the long, linear nature of the canal footprint.
- 21 ● *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the
22 permanent and temporary removal of approximately 60 acres of aquatic habitat and 249 acres of
23 upland nesting and overwintering habitat for the western pond turtle. Approximately 4 miles of
24 channels providing western pond turtle movement habitat would be permanently or
25 temporarily removed as a result of Yolo Bypass improvements. Although there are no CNDDDB
26 occurrences for western pond turtle in the Yolo Bypass, the species is known to be present in
27 the Yolo Bypass Wildlife Area (California Department of Fish and Wildlife 2013).
- 28 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural community restoration would result
29 in the conversion of approximately 45 acres of aquatic habitat and 872 acres of upland nesting
30 and overwintering habitat for western pond turtle to tidal marsh. Approximately 106 miles of
31 channels providing western pond turtle movement habitat would be removed as a result of
32 restoration. Tidal habitat restoration is expected to change existing salinity and flow conditions
33 rather than lead to complete loss of aquatic habitat. Restoration of tidal flow where habitat
34 consists of the calm waters of managed freshwater ponds and wetlands could have an adverse
35 effect on the western pond turtle. Tidal restoration outside Suisun Marsh is likely to create
36 suitable, slow-moving freshwater slough and marsh habitat.

37 Although the aquatic habitat model includes all tidal perennial aquatic, tidal brackish emergent
38 wetland, and managed wetland as habitat, most of the Suisun Marsh pond turtle observations
39 have been in the interior drainage ditches or near water control structures not hydrologically
40 connected to Suisun Marsh (Patterson pers. comm.). While the model does not include an
41 aquatic class type called drainage ditches and therefore an effect on this habitat type cannot be
42 calculated, it is likely that this general type of habitat accounts for a very small portion of the
43 total modeled aquatic effects; almost certainly less than 5%, or less than 287 acres of the
44 modeled aquatic habitat affected by tidal restoration. The suitable nesting and overwintering
45 habitat that would be affected in the interior of Suisun Marsh is limited, because the levees likely
46 function as the primary nesting and overwintering habitat. The nesting and overwintering

1 habitat of highest value to be affected is on the fringe of the marsh where the aquatic habitat is
2 adjacent to undeveloped grassland habitat.

3 The habitat affected in the interior Delta (West Delta and South Delta) is of low value, consisting
4 of levees and intensively farmed cultivated lands, while the Cache Slough and Cosumnes-
5 Mokelumne ROAs are less intensively farmed and have higher-value habitat for the turtle.
6 Because the estimates of the effect of tidal inundation are based on projections of where
7 restoration may occur, actual effects are expected to be lower because sites would be selected to
8 minimize effects on western pond turtle habitat (see AMM17 in Appendix 3B, *Environmental*
9 *Commitments, AMMs, and CMs*).

- 10 ● *CM5 Seasonally Inundated Floodplain Restoration* Levee construction associated with floodplain
11 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
12 approximately 53 acres of aquatic habitat 33 acres of upland habitat for western pond turtle.
13 Approximately 3 miles of channels providing western pond turtle movement habitat would be
14 removed as a result of floodplain restoration. Although there are no CNDDDB occurrences of the
15 western pond turtle in the areas where floodplain restoration is likely to occur, the species is
16 known to occur along the San Joaquin River to the south in the San Joaquin River National
17 Wildlife Refuge. As with CM4, the estimates of the effect of seasonal floodplain levee
18 construction and inundation are based on projections of where restoration may occur. Actual
19 effects are expected to be lower because sites would be selected to minimize effects on western
20 pond turtle habitat.
- 21 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration that is part of tidal natural
22 communities restoration in CZ 1 and CZ 2, would result in the permanent removal of 10 acres of
23 upland nesting and overwintering habitat for western pond turtle.
- 24 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
25 actions included in CM11 that are designed to enhance wildlife values in BDCP protected
26 habitats may result in localized ground disturbances that could temporarily remove small
27 amounts of western pond turtle habitat. Ground-disturbing activities, such as removal of
28 nonnative vegetation and road and other infrastructure maintenance, are expected to have
29 minor adverse effects on available western pond turtle habitat and are expected to result in
30 overall improvements to and maintenance of western pond turtle habitat values over the term
31 of the BDCP. In addition, effects would be avoided and minimized by the AMMs listed below.
- 32 ● Management of the 6,600 acres of managed wetlands to be protected for waterfowl and
33 shorebirds is not expected to result in overall adverse effects for the western pond turtle.
34 Management actions that would improve wetland quality and diversity on managed wetlands
35 include control and eradication of invasive plants; maintenance of a diversity of vegetation types
36 and elevations, including upland areas to provide flood refugia; water management and leaching
37 to reduce salinity; and enhancement of water management infrastructure (improvements to
38 enhance drainage capacity, levee maintenance). These management actions could benefit the
39 western pond turtle. The 6,600 acres of protected managed wetlands would be monitored and
40 adaptively managed to ensure that management options are implemented to avoid adverse
41 effects on the western pond turtle.
- 42 ● Operations and maintenance: Ongoing maintenance of BDCP facilities is expected to have little if
43 any adverse effect on the western pond turtle. Postconstruction operation and maintenance of
44 the above-ground water conveyance facilities and restoration infrastructure could result in
45 ongoing but periodic disturbances that could affect western pond turtle use where there is

1 suitable habitat in the study area. Maintenance activities would include vegetation management,
2 levee and structure repair, and regrading of roads and permanent work areas. These effects,
3 however, would be minimized by AMMs and conservation actions described below.

- 4 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
5 western pond turtles. If turtles reside where conservation measures are implemented (most
6 likely in the vicinity of aquatic habitats in the study area), the operation of equipment for land
7 clearing, construction, conveyance facilities operation and maintenance, and habitat restoration,
8 enhancement, and management could result in injury or mortality of western pond turtles.
9 However, to avoid injury or mortality, preconstruction surveys would be conducted in suitable
10 aquatic and upland habitat for the western pond turtle, and turtles found would be relocated
11 outside the construction areas, as required by the AMMs listed below.

12 The following paragraphs summarize the combined effects discussed above and describe other
13 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
14 also included.

15 ***Near-Term Timeframe***

16 Because the water conveyance facilities construction is being evaluated at the project level, the near-
17 term BDCP conservation strategy has been evaluated to determine whether it would provide
18 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
19 construction would not be adverse under NEPA.

20 Alternative 1C would permanently or temporarily remove 218 acres of aquatic habitat and 801
21 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These
22 effects would result from water conveyance facilities construction (CM1, 113 acres of aquatic and
23 268 acres of upland habitat), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of
24 upland habitat), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland habitat),
25 and riparian restoration (CM7, 4 acres of upland habitat).

26 Typical project-level mitigation ratios for those natural communities that would be affected and that
27 are identified in the biological goals and objectives for western pond turtle in Chapter 3 of the BDCP
28 would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection of
29 upland habitats. Using these ratios would indicate that 218 acres of aquatic habitat should be
30 restored, 218 acres of aquatic habitat should be protected, and 1,602 acres of upland habitat should
31 be protected for western pond turtle to mitigate the near-term losses.

32 The conservation strategy for western pond turtle involves restoration and protection of aquatic
33 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
34 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
35 addressed at the landscape and natural community levels. The BDCP has committed to near-term
36 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,
37 Objective NFEW/NPANC1.1, MWNC1.1) and up to 2,000 acres of upland habitat (Objective GNC1.1).
38 In addition, the protection and management of existing managed wetland habitat in Suisun Marsh
39 may increase the value of aquatic habitat. The most beneficial restoration would occur in freshwater
40 emergent wetland consisting of slow-moving slough and marsh adjacent to protected, undisturbed
41 grassland. Additionally, basking platforms will be installed as needed in restored freshwater marsh
42 to benefit the western pond turtle.

1 The natural community restoration and protection activities are expected to be concluded in the
2 first 10 years of Plan implementation, which is close enough in time to the impacts of construction to
3 constitute adequate mitigation. Because the number of acres required to meet the typical ratios
4 described above would be only 218 acres of aquatic communities protected, 218 acres restored, and
5 1,602 acres of upland communities protected, the 24,350 acres of aquatic and 2,000 acres of upland
6 habitats restored or created in the near-term Plan goals, and the additional detail in the biological
7 goals for western pond turtle, are more than sufficient to support the conclusion that the near-term
8 impacts of habitat loss and direct mortality under Alternative 1C on western pond turtles would not
9 be adverse.

10 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
14 *Natural Communities*, and *AMM17 Western Pond Turtle*. These AMMs include elements that would
15 avoid or minimize the risk of affecting habitats and species adjacent to work areas and storage sites.
16 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in
17 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

18 **Late Long-Term Timeframe**

19 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and
20 28,864 acres of upland habitat for western pond turtle. Alternative 1C would remove 271 acres of
21 aquatic habitat and 1,432 acres of upland nesting and overwintering habitat for western pond turtle
22 in the late long-term.

23 Implementation of Alternative 1C as a whole would increase the extent and distribution of high-
24 value aquatic and upland nesting and overwintering habitat for western pond turtle in the study
25 area. While the extent of dispersal habitat is expected to be reduced by approximately 9%, this
26 habitat is abundant in the study area (composed primarily of cultivated lands), is not believed to be
27 a factor limiting the turtle, and would be replaced with higher-value habitats for western pond
28 turtle.

29 The conservation strategy for western pond turtle involves restoration and protection of aquatic
30 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
31 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
32 addressed at the landscape and natural community levels. The BDCP has committed to late long-
33 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective
34 L1.3, Objective NFEW/NPANC1.1, and MWNC1.1) and up to 8,000 acres of upland habitat (Objective
35 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun
36 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in
37 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,
38 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are
39 preserved and managed as part of the 48,625 acres of protected cultivated lands described above for
40 giant garter snake are also expected to benefit the species. Additionally, basking platforms would be
41 installed as needed in restored freshwater marsh to benefit the western pond turtle.

42 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and
43 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow
44 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species

1 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to
2 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat
3 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle
4 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident
5 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the
6 rabbit.

7 The study area represents only a small portion of the range of the western pond turtle in California
8 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and
9 temporary loss or conversion of habitat for the western pond turtle, and other effects described
10 above, are not expected to result in an adverse effect on the long-term survival and recovery of
11 western pond turtle because for the following reasons.

- 12 • The study area represents a small portion of the species' entire range.
- 13 • Only 1% of the habitat in the study area would be removed or converted.

14 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
15 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
16 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal
17 perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland, grassland,
18 valley foothill riparian, that could overlap with the species model, would result in the restoration of
19 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western pond turtle. In
20 addition, protection of cultivated land, managed wetland, grassland, and valley/foothill riparian
21 could overlap with the species model and would result in the protection of 1,281 acres of aquatic
22 and 4,993 acres of upland western pond turtle modeled habitat.

23 **NEPA Effects:** In the near-term, the loss of western pond turtle habitat under Alternative 1C would
24 not have an adverse effect because the BDCP has committed to protecting and restoring the acreage
25 required to meet the typical mitigation ratios described above. In the late long-term, the losses of
26 western pond turtle habitat associated with Alternative 1C, in the absence of other conservation
27 actions, would represent an adverse effect as a result of habitat modification and potential direct
28 mortality of a special-status species. However, with habitat protection and restoration associated
29 with the conservation components, guided by landscape-scale goals and objectives and by AMM1-
30 AMM6, AMM10, and AMM17, the effects of Alternative 1C as a whole on western pond turtle would
31 not be adverse.

32 **CEQA Conclusion:**

33 **Near-Term Timeframe**

34 Because the water conveyance facilities construction is being evaluated at the project level, the near-
35 term BDCP conservation strategy has been evaluated to determine whether it would provide
36 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
37 construction would be less than significant under CEQA.

38 Alternative 1C would permanently or temporarily remove 218 acres of aquatic habitat and 801
39 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These
40 effects would result from water conveyance facilities construction (CM1, 113 acres of aquatic and
41 268 acres of upland habitat), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of

1 upland habitat), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland habitat),
2 and riparian restoration (CM7, 4 acres of upland habitat).

3 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
4 and that are identified in the biological goals and objectives for western pond turtle in Chapter 3 of
5 the BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for
6 protection of upland habitats. Using these ratios would indicate that 218 acres of aquatic habitat
7 should be restored, 218 acres of aquatic habitat should be protected, and 1,602 acres of upland
8 habitat should be protected for western pond turtle to mitigate the near-term losses.

9 The conservation strategy for western pond turtle involves restoration and protection of aquatic
10 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
11 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
12 addressed at the landscape and natural community levels. The BDCP has committed to near-term
13 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,
14 Objective NFEW/NPANC1.1, and Objective MWNC1.1) and up to 2,000 acres of upland habitat
15 (Objective GNC1.1). In addition, the protection and management of existing managed wetland
16 habitat in Suisun Marsh may increase the value of aquatic habitat. The most beneficial restoration
17 would occur in freshwater emergent wetland consisting of slow-moving slough and marsh adjacent
18 to protected, undisturbed grassland. Additionally, basking platforms will be installed as needed in
19 restored freshwater marsh to benefit the western pond turtle.

20 The natural community restoration and protection activities are expected to be concluded in the
21 first 10 years of Plan implementation, which is close enough in time to the impacts of construction to
22 constitute adequate mitigation for CEQA purposes. Because the number of acres required to meet
23 the typical ratios described above would be only 218 acres of aquatic communities protected, 218
24 acres restored, and 1,602 acres of upland communities protected, the 24,350 acres of aquatic and
25 2,000 acres of upland habitats restored or created in the near-term Plan goals, and the additional
26 detail in the biological goals for western pond turtle, are more than sufficient to support the
27 conclusion that the near-term impacts of habitat loss and direct mortality under Alternative 1C on
28 western pond turtles would be less than significant.

29 In addition, the plan also contains commitments to implement AMM1-6, AMM10, and AMM17 which
30 include elements that would avoid or minimize the risk of directly and indirectly affecting habitats
31 and species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the
32 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
33 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

34 **Late Long-Term Timeframe**

35 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and
36 28,864 acres of upland habitat for western pond turtle. Alternative 1C would remove 271 acres of
37 aquatic habitat and 1,432 acres of upland nesting and overwintering habitat for western pond turtle
38 in the late long-term.

39 Implementation of Alternative 1C as a whole would increase the extent and distribution of high-
40 value aquatic and upland nesting and overwintering habitat for western pond turtle in the study
41 area. While the extent of dispersal habitat is expected to be reduced by approximately 9%, this
42 habitat is abundant in the study area (composed primarily of cultivated lands), is not believed to be

1 a factor limiting the turtle, and would be replaced with higher-value habitats for western pond
2 turtle.

3 The conservation strategy for western pond turtle involves restoration and protection of aquatic
4 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
5 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
6 addressed at the landscape and natural community levels. The BDCP has committed to late long-
7 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective
8 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) and up to 8,000 acres of upland habitat (Objective
9 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun
10 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in
11 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,
12 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are
13 preserved and managed as part of the 48,625 acres of protected cultivated lands described above for
14 giant garter snake are also expected to benefit the species. Additionally, basking platforms would be
15 installed as needed in restored freshwater marsh to benefit the western pond turtle.

16 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and
17 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow
18 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species
19 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to
20 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat
21 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle
22 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident
23 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the
24 rabbit.

25 The study area represents only a small portion of the range of the western pond turtle in California
26 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and
27 temporary loss or conversion of habitat for the western pond turtle, and other effects described
28 above, are not expected to result in an adverse effect on the long-term survival and recovery of
29 western pond turtle because for the following reasons.

- 30 • The study area represents a small portion of the species' entire range.
- 31 • Only 1% of the habitat in the study area would be removed or converted.

32 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
33 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
34 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal
35 perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland, grassland,
36 valley foothill riparian, that could overlap with the species model, would result in the restoration of
37 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western pond turtle. In
38 addition, protection of cultivated land, managed wetland, grassland, and valley/foothill riparian
39 could overlap with the species model and would result in the protection of 1,281 acres of aquatic
40 and 4,993 acres of upland western pond turtle modeled habitat.

41 The loss of western pond turtle habitat associated with Alternative 1C as a whole would represent
42 an adverse effect as a result of special-status species habitat modification and the potential direct
43 mortality of turtles. However, considering the habitat restoration and protection associated with the
44 conservation components, guided by landscape-scale goals and objectives and by AMM1-AMM6,

1 AMM10, and AMM17, which would be in place throughout the construction phase, the loss of habitat
2 and potential mortality would not have an adverse effect on western pond turtle. Therefore, the loss
3 of western pond turtle habitat and potential mortality of turtles resulting from Alternative 1C would
4 have a less-than-significant impact on western pond turtle.

5 **Impact BIO-53: Indirect Effects of Plan Implementation on Western Pond Turtle**

6 Indirect effects on western pond turtle within 200 feet of construction activities could temporarily
7 affect the use of aquatic habitat and upland nesting, overwintering, and dispersal habitat for the
8 western pond turtle. Construction activities outside of the construction footprint but within 200 feet
9 of water conveyance facilities, conservation components and ongoing habitat enhancement, as well
10 as operation and maintenance of above-ground water conveyance facilities, including the
11 transmission facilities, could result in ongoing periodic postconstruction disturbances with localized
12 impacts on western pond turtle habitat, and temporary noise and visual disturbances over the term
13 of the BDCP.

14 The use of mechanical equipment during water conveyance facilities construction could cause the
15 accidental release of petroleum or other contaminants that could affect western pond turtle or its
16 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond
17 turtle aquatic habitat could also have a negative effect on the species or its prey. AMM1–AMM6, and
18 AMM10 would minimize the likelihood of such spills and would ensure measures are in place to
19 prevent runoff from the construction area and potential effects of sediment or dust on western pond
20 turtle or its prey.

21 Water operations would affect salinity gradients in Suisun Marsh. This effect mechanism cannot be
22 disaggregated from tidal natural community restoration in Suisun Marsh. It is expected that the
23 salinity of water in Suisun Marsh would generally increase as a result of water operations and
24 operation of salinity control gates to mimic a more natural water flow. Results of modeling for full
25 implementation of the BDCP show salinity to double by the late long-term compared with current
26 conditions during late fall and winter months. Changes in salinity would not be uniform across
27 Suisun Marsh, as salinity would likely be more pronounced in some tidal channels and sloughs than
28 others, and most of the salinity increase would occur during the fall and winter. Western pond
29 turtles are primarily a freshwater species, although they can also be found in brackish marsh, and
30 could respond negatively to increased salinity in Suisun Marsh. However, most of the Suisun Marsh
31 pond turtle observations have been in the interior drainage ditches or near water control structures
32 not connected to tidal channels and sloughs in Suisun Marsh which is where increases in salinity
33 would occur. Therefore, the potential effects associated with changes in salinity are not expected to
34 adversely affect western pond turtles.

35 **NEPA Effects:** With implementation of AMM1–AMM6, AMM10, and AMM17 as part of Alternative 1C,
36 the BDCP would avoid the potential for substantial adverse effects on western pond turtles, either
37 directly or through habitat modifications. These AMMs would also avoid and minimize effects that
38 could substantially reduce the number of western pond turtles or restrict the species range.
39 Therefore, the indirect effects of Alternative 1C would not have an adverse effect on western pond
40 turtle.

41 **CEQA Conclusion:** Indirect effects resulting from conservation measure operations and maintenance
42 as well as construction-related noise and visual disturbances could impact western pond turtle in
43 aquatic and upland habitats. The use of mechanical equipment during construction could cause the
44 accidental release of petroleum or other contaminants that could affect western pond turtle or its

1 prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond turtle
 2 habitat could also have a negative effect on the species or its prey. Changes in water salinity would
 3 have a less-than-significant impact on western pond turtles because most of the salinity increases
 4 would occur in areas not used extensively by western pond turtles. With implementation of AMM1–
 5 AMM6, AMM10, and AMM17 as part of Alternative 1C construction, operation, and maintenance, the
 6 BDCP would avoid the potential for substantial adverse effects on western pond turtles, either
 7 indirectly or through habitat modifications, and would not result in a substantial reduction in
 8 numbers or a restriction in the range of western pond turtles. The indirect effects of Alternative 1C
 9 would have a less-than-significant impact on western pond turtles.

10 **Impact BIO-54: Periodic Effects of Inundation of Western Pond Turtle Habitat as a Result of**
 11 **Implementation of Conservation Components**

12 *CM2 Yolo Bypass Fisheries Enhancement* would result in periodic inundation that could affect
 13 western pond turtle and its upland habitat. BDCP Appendix 5.J, *Effects on Natural Communities,*
 14 *Wildlife, and Plants*, provides the method used to estimate periodic inundation effects in the Yolo
 15 Bypass. Based on this method, periodic inundation could affect from an estimated 283 acres of
 16 habitat during 1,000 cfs notch flow to an estimated 798 acres of habitat during 4,000 cfs notch flow
 17 (Table 12-1C-23). This effect would occur during an estimated maximum of 30% of years, in areas
 18 that are already inundated in more than half of all years; therefore, these areas are expected to
 19 provide only marginal overwintering habitat for the western pond turtle under Existing Conditions.
 20 Furthermore, Yolo Bypass inundation is not expected to affect nesting western pond turtles because
 21 operations would not occur during the nesting season (approximately May through October).
 22 Therefore, Yolo Bypass operations are expect to have a minimal effect, if any, on western pond
 23 turtles in the Yolo Bypass.

24 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 331 acres of upland
 25 habitat for the western pond turtle in the south Delta (CZ 7). Seasonal flooding in restored
 26 floodplains is not expected to adversely affect aquatic and dispersal habitat, because these habitat
 27 functions are expected to remain in the seasonally inundated floodplains. Floodplains are not
 28 expected to be inundated during the nesting season, however, turtle hatchlings may overwinter in
 29 the nest and could be affected by flooding. Restored floodplains would transition for areas that flood
 30 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more);
 31 adverse effects on turtle hatchlings are most likely at the lower elevations of the restored floodplain,
 32 where frequent flooding occurs.

33 **NEPA Effects:** Periodic effects on upland habitat for western pond turtle from CM2 and CM5
 34 associated with implementing Alternative 1C are not expected to result in substantial adverse
 35 effects either directly or through habitat modifications, as it would not result in a substantial
 36 reduction in numbers or a restriction in the range of western pond turtles. Therefore, Alternative 1C
 37 would not adversely affect the species.

38 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in
 39 various parts of the study area would periodically affect 283-798 acres from CM2 and approximately
 40 331 acres from CM5 of upland habitat for western pond turtle. These acreages represent only 1% of
 41 the total upland western pond turtle habitat in the study area. Most of the increase in inundation
 42 would occur in the winter and early spring months, when western pond turtles may be in the water
 43 or overwintering and occupying upland habitats. Therefore, implementing Alternative 1C, including
 44 AMM1–AMM6, AMM10, and AMM17, would not be expected to result in substantial adverse effects

1 on western pond turtle, either directly or through habitat modifications, because it would not result
2 in a substantial reduction in numbers or a restriction in the range of western pond turtles. Periodic
3 effects of inundation under Alternative 1C would have a less-than-significant impact on the species.

4 **Silvery Legless Lizard, San Joaquin Coachwhip, and Blainville's Horned Lizard**

5 This section describes the effects of Alternative 1C on the silvery legless lizard, San Joaquin
6 coachwhip and Blainville's horned lizard (special-status reptiles). The habitat types used to assess
7 effects on silvery legless lizard are limited to inland sand dunes near Antioch (CZ 9 and CZ 10),
8 which would not be affected by construction or restoration activities. This species is not discussed
9 any further.

10 The habitat types used to assess effects on the San Joaquin coachwhip are alkali seasonal wetland
11 complex, grassland, and inland dune scrub west of Byron Highway (CZ 7) and west of Old River and
12 West Canal (CZ 8). The habitat types used to assess effects on the Blainville's horned lizard are the
13 same as those for the whipsnake in CZ 7 and CZ 8. There is also potential habitat for the horned
14 lizard to occur in grassland habitat around Stone Lake (CZ 4) Although the expected range for San
15 Joaquin coachwhip and Blainville's horned lizard extends into the study area, there are no records
16 for either of these species within the study area (California Department of Fish and Wildlife 2013).
17 In addition, historic museum records show that Blainville's horned lizard occurrences could have been
18 extirpated within the study area (Jennings and Hayes 1994).

19 Alternative 1C is expected to result in the temporary and permanent removal of habitat that special-
20 status reptiles uses for cover and dispersal (Table 12-1C-24). BDCP actions that could affect this
21 habitat are limited to construction and maintenance of the water conveyance facilities in the vicinity
22 of Clifton Court Forebay, and grassland restoration, protection and management. Full
23 implementation of Alternative 1C would also include the following biological objectives over the
24 term of the BDCP that would also benefit special-status reptiles (BDCP Chapter 3, *Conservation*
25 *Strategy*).

- 26 • Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
27 between existing conservation lands (Objective L1.6, associated with CM3).
- 28 • Increase native species diversity and relative cover of native plant species, and reduce the
29 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 30 • Protect and improve habitat linkages that allow native terrestrial species to move between
31 protected habitats within and adjacent to the Plan Area (Objective L3.1, associated with CM3,
32 CM8, and CM11).
- 33 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 34 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland
35 (Objective GNC1.2, associated with CM3 and CM8).

36 As explained below, with the restoration or protection of these amounts of habitat, in addition to
37 implementation of AMMs, impacts on special-status reptiles would not be adverse for NEPA
38 purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-24. Changes in Special-Status Reptile Habitat Associated with Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Grassland	204	204	146	146	NA	NA
Total Impacts CM1		204	204	146	146	NA	NA
CM2–CM18	Grassland	0	0	0	0	0	0
Total Impacts CM2–CM18		0	0	0	0	0	0
TOTAL IMPACTS		204	204	146	146	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities. Impact acres represent the maximum reported for both species, however, there were 13 fewer acres of permanent habitat loss and 2 fewer acres of temporary habitat loss for the Blainville’s horned lizard than for the coachwhip.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-55: Loss or Conversion of Habitat for and Direct Mortality of Special-Status**
4 **Reptiles**

5 Alternative 1C conservation measures would result in the permanent and temporary loss of 350
6 acres of potential habitat for special-status reptiles in the study area (Table 12-1C-24). Water
7 conveyance facilities and transmission line construction, including establishment and use of borrow
8 and spoil areas, (CM1) would cause the loss of special-status reptile habitat. In addition, habitat
9 enhancement and management activities (CM11), such as ground disturbance or removal of
10 nonnative vegetation, could result in local adverse habitat effects for special-status reptiles. For
11 purposes of this analysis, the acres of total effect are considered the same for both San Joaquin
12 coachwhip and Blainville’s horned lizard, even though this would result in slightly more acres of
13 permanent effect on the San Joaquin coachwhip resulting from water conveyance facilities activities
14 in CZ 4 where it does not occur.

15 In addition to habitat loss and conversion, construction activities, such as grading, the movement of
16 construction vehicles or heavy equipment, and the installation of water conveyance facilities
17 components and new transmission lines, may result in the direct mortality, injury, or harassment of
18 special-status reptiles, including the potential crushing of individuals and disruption of essential
19 behaviors. Construction of access roads could fragment suitable habitat, impede upland movements
20 in some areas, and increase the risk of road mortality. Construction activities related to conservation
21 components could have similar affects. Each of these individual activities is described below. A
22 summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the
23 individual conservation measure discussions.

- 1 ● *CM1 Water Facilities and Operation*: Development of the conveyance facilities would result in the
2 permanent loss of approximately 204 acres of potential habitat for special-status reptiles in the
3 vicinity of Clifton Court Forebay. Construction-related effects would temporarily disturb 146
4 acres of suitable habitat for special-status reptiles in the study area.
- 5 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
6 actions included in CM11 that are designed to enhance wildlife values in BDCP-protected
7 habitats may result in localized ground disturbances that could temporarily remove small
8 amounts of special-status reptile habitat. Ground-disturbing activities, such as removal of
9 nonnative vegetation and road and other infrastructure maintenance, are expected to have
10 minor adverse effects on available special-status reptile habitat and are expected to result in
11 overall improvements to and maintenance of species habitat values over the term of the BDCP.
12 These effects cannot be quantified, but are expected to be minimal and would be reduced
13 through implementation of Mitigation Measure BIO-55, *Conduct Preconstruction Surveys for*
14 *Noncovered Special-Status Reptiles and Implement Applicable AMMs*.
- 15 ● Operations and maintenance: Ongoing facilities operation and maintenance is expected to have
16 little if any adverse effect on special-status reptiles. Postconstruction operation and
17 maintenance of the above-ground water conveyance facilities could result in ongoing but
18 periodic disturbances that could affect special-status reptiles' use of suitable habitat in study
19 area. These effects, however, would be minimized with implementation of Mitigation Measure
20 BIO-55.
- 21 ● Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
22 special-status reptiles. The operation of equipment for land clearing, construction, operation
23 and maintenance, and restoration, enhancement, and management activities could result in
24 injury or mortality. This risk is highest from late fall through early spring, when special-status
25 reptiles are not as active. However, the risk of crushing Blainville's horned lizard would not
26 necessarily be lower during the active season, because the species uses crypsis to hide from
27 predators and would be hard to spot from a moving vehicle. Seasonal risk reduction may be
28 more appropriate for the coachwhip, but there is still a risk of crushing the horned lizard during
29 the active season. In addition, both species would not be active under conditions of extreme
30 temperatures and could be taking cover in burrows or crevices or under structures such as
31 rocks or logs (Morey 2000). They could also burrow beneath the soil and be crushed by vehicles.
32 *P. blainvillii* may only be active during the early morning and evening hours in the summer
33 (Morey 2000). Increased vehicular traffic associated with BDCP actions could contribute to a
34 higher incidence of road kill. However, conducting construction during the late-spring through
35 early fall periods when feasible, and when temperatures are 67–100 degrees F, and
36 implementation of Mitigation Measure BIO-55 would avoid and minimize injury or mortality of
37 special-status reptiles during construction.

38 The following paragraphs summarize the combined effects discussed above and describe other
39 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
40 also included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-
3 term BDCP conservation strategy has been evaluated to determine whether it would provide
4 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
5 construction effects would not be adverse under NEPA.

6 Alternative 1C would remove 350 acres of grassland habitat for special-status reptiles in the study
7 area. The typical NEPA mitigation ratio (2:1 for protection) for this natural community would
8 indicate that up to 700 acres should be protected for both species in the near-term to offset CM1
9 losses.

10 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection
11 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all
12 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and
13 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

14 Considering the BDCP conservation strategy and the implementation of Mitigation Measure BIO-55,
15 which would avoid and minimize injury or mortality of special-status reptiles during construction,
16 the permanent and temporary loss of special-status reptile habitat and the potential mortality of
17 either species from Alternative 1C would not be an adverse effect.

18 **Late Long-Term Timeframe**

19 Alternative 1C as a whole would result in the permanent loss of up to 350 acres of special-status
20 reptile habitat over the life of the plan.

21 Effects of water conveyance facilities construction would be offset through the plan's long-term
22 commitment to protect 8,000 acres of grassland, and grassland associated with alkali seasonal
23 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the Plan Area.
24 Grassland protection would focus in particular on acquiring the largest remaining contiguous
25 patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (Objective
26 GNC1.1). This area connects to more than 620 acres of existing habitat that is protected under the
27 East Contra Costa County HCP/NCCP.

28 Other effects, specifically injury or mortality of special-status reptiles, would be addressed through
29 implementation of Mitigation Measure BIO-55. The plan as a whole is expected to benefit special-
30 status reptiles that could be present by protecting potential habitat from loss or degradation that
31 otherwise could occur with future changes in existing land use. To the extent that grassland habitat
32 is restored in CZ 8, restoration would remove unsuitable special-status reptile habitat, such as
33 cultivated land, and replace it with high-value cover, foraging, and dispersal habitat. The overall
34 effect would be beneficial because Alternative 1C would result in a net increase in acreage of
35 grassland habitat in the Plan Area.

36 BDCP's commitment to protect the largest remaining contiguous habitat patches (including
37 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in
38 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities
39 construction.

40 **NEPA Effects:** In the near-term and late long-term, the loss of special-status reptile habitat under
41 Alternative 1C would not be adverse because the BDCP has committed to protecting the acreage
42 required to meet the typical mitigation ratios described above. However, injury or mortality of

1 special-status reptiles as a result of Alternative 1C implementation would be an adverse effect.
2 Mitigation Measure BIO-55 would be available to address this effect.

3 ***CEQA Conclusion:***

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction is being evaluated at the project level, the near-
6 term BDCP conservation strategy has been evaluated to determine whether it would provide
7 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
8 construction effects would be less than significant under CEQA.

9 Alternative 1C would remove 350 acres of grassland habitat for special-status reptiles in the study
10 area. The typical CEQA mitigation ratio (2:1 for protection) for this natural community would
11 indicate that up to 700 acres should be protected for both species in the near-term to offset CM1
12 losses.

13 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection
14 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all
15 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and
16 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

17 The natural community restoration and protection activities are expected to be concluded during
18 the first 10 years of Plan implementation, which is close enough to the timing of construction
19 impacts to constitute mitigation for CEQA purposes. Considering the BDCP conservation strategy
20 and the implementation of Mitigation Measure BIO-55, which would reduce the impact of injury or
21 mortality of special-status reptiles, the permanent and temporary loss of special-status reptile
22 habitat and the potential mortality of either species would be a less-than-significant impact.

23 ***Late Long-Term Timeframe***

24 Alternative 1C as a whole would result in the permanent loss of 350 acres of habitat for special-
25 status reptiles over the life of the plan.

26 Effects of water conveyance facilities construction would be offset through the plan's long-term
27 commitment to protect up to 8,000 acres of grassland, and grassland associated with alkali seasonal
28 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the Plan area
29 (Objective GNC1.1 and Objective GNC1.2). Grassland protection would focus in particular on
30 acquiring the largest remaining contiguous patches of unprotected grassland habitat, which are
31 located south of SR 4 in CZ 8 (Objective GNC1.1). This area connects to more than 620 acres of
32 existing habitat that is protected under the East Contra Costa County HCP/NCCP.

33 Injury or mortality of special-status reptiles would be a significant impact that would be reduced
34 through implementation of Mitigation Measure BIO-55.

35 The plan as a whole is expected to benefit special-status reptiles that could be present by protecting
36 potential habitat from loss or degradation that otherwise could occur with future changes in existing
37 land use. To the extent that grassland habitat is restored in CZ 8, restoration would remove
38 unsuitable special-status reptile habitat, such as cultivated land, and replace it with high-value
39 cover, foraging, and dispersal habitat. The overall effect would be beneficial because Alternative 1C
40 would result in a net increase in acreage of grassland habitat in the study area.

1 BDCP's commitment to protect the largest remaining contiguous habitat patches (including
2 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in
3 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities
4 construction. Considering the BDCP conservation strategy, the permanent and temporary loss of
5 special-status reptile habitat under Alternative 1C would not result in a significant impact. Injury or
6 mortality of special-status reptiles as a result of Alternative 1C implementation would have a
7 significant impact on these species. Implementation of Mitigation Measure BIO-55 would reduce this
8 impact to a less-than-significant level.

9 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**
10 **Status Reptiles and Implement Applicable AMMs**

11 DWR will retain a qualified biologist to conduct a habitat assessment in construction and
12 restoration areas that are relatively undisturbed or have a moderate to high potential to support
13 noncovered special-status reptiles (Blainville's horned lizard and San Joaquin coachwhip) in CZ
14 4, CZ 7, and CZ 8. The qualified biologist will survey for noncovered special-status reptiles in
15 areas of suitable habitat concurrent with the preconstruction surveys for covered species in CZ
16 4, CZ 7, and CZ 8. If special-status reptiles are found in work areas, the biologist will first attempt
17 to allow these species to move out of the work area on their own but if conditions do not allow
18 this, individuals will be captured by the biologist and relocated to the nearest suitable habitat
19 outside of the work area as determined in consultation with CDFW. To the extent feasible, work
20 in areas with suitable habitat for Blainville's horned lizard and San Joaquin coachwhip should
21 not be conducted during periods of cold and hot temperatures (below 67 degrees F and above
22 100 degrees F), because both species would be relatively inactive during these periods and
23 could be taking cover in loose soil, in burrows or crevices, or under structures such as rocks or
24 logs (Morey 2000). This would reduce the impact of being crushed by vehicles and equipment.

25
26 In addition, *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices*
27 *and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
28 *Affected Natural Communities*, would be implemented for all noncovered special-status reptiles
29 adversely affected by the BDCP to avoid, minimize, or compensate for impact.

30 **Impact BIO-56: Indirect Effects of Plan Implementation on Special-Status Reptile Species**

31 Construction activities associated with water conveyance facilities, conservation components and
32 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
33 conveyance facilities, including the transmission facilities, could result in ongoing periodic
34 postconstruction disturbances and noise with localized effects on special-status reptiles and their
35 habitat over the term of the BDCP. In addition, construction activities could indirectly affect special-
36 status reptiles if construction resulted in the introduction of invasive weeds that create vegetative
37 cover that is too dense for the species to navigate. Construction vehicles and equipment can
38 transport in their tires and various parts under the vehicles invasive weed seeds and vegetative
39 parts from other regions to construction sites, resulting in habitat degradation. These potential
40 effects would be reduced through implementation of *AMM10 Restoration of Temporarily Affected*
41 *Natural Communities*.

1 Water conveyance facilities operations and maintenance activities would include vegetation and
2 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
3 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance
4 activities are not expected to remove special-status reptile habitat, operation of equipment could
5 disturb small areas of vegetation around maintained structures and could result in injury or
6 mortality of individual special-status reptiles, if present.

7 **NEPA Effects:** Implementation of the Mitigation Measure BIO-55 would avoid the potential for
8 substantial adverse effects on these species, either indirectly or through habitat modifications. The
9 mitigation measure would also avoid and minimize effects that could substantially reduce the
10 number of special-status reptiles, or restrict either species' range. Therefore, with implementation
11 of Mitigation Measure BIO-55, the indirect effects of Alternative 1C on special-status reptiles would
12 not be adverse under NEPA.

13 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
14 as construction-related noise and visual disturbances could impact special-status reptiles. In
15 addition, construction activities could indirectly affect special-status reptiles if construction resulted
16 in the introduction of invasive weeds that create vegetative cover that is too dense for the species to
17 navigate. Water conveyance facilities operations and maintenance activities, such as vegetation and
18 weed control, and road maintenance, are not expected to remove special-status reptile habitat, but
19 operation of equipment could disturb small areas of vegetation around maintained structures and
20 could result in injury or mortality of individual special-status reptiles, if present. Mitigation Measure
21 BIO-55, *Conduct Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement*
22 *Applicable AMMs*, would reduce these impacts.

23 With implementation of Mitigation Measure BIO-55 as part of Alternative 1C construction,
24 operation, and maintenance, the BDCP would avoid the potential for significant effects on special-
25 status reptile species, either indirectly or through habitat modifications, and would not result in a
26 substantial reduction in numbers or a restriction in the range of either species. With implementation
27 of Mitigation Measures BIO-55, the indirect effects of Alternative 1C would have a less-than-
28 significant impact on special-status reptiles.

29 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-** 30 **Status Reptiles and Implement Applicable AMMs**

31 See description of Mitigation Measure BIO-55 under Impact BIO-55.

32 **California Black Rail**

33 This section describes the effects of Alternative 1C, including water conveyance facilities
34 construction and implementation of other conservation components, on the California black rail.
35 The habitat model used to assess effects for the California black rail is based on primary breeding
36 habitat and secondary habitat. Primary (breeding) habitat for this species within the Delta includes
37 all *Schoenoplectus* and *Typha*-dominated tidal and nontidal freshwater emergent wetland in patches
38 greater than 0.55 acre (essentially instream islands of the San Joaquin River and its tributaries and
39 White Slough Wildlife Area). In Suisun Marsh, primary habitat includes all *Schoenoplectus* and
40 *Typha*-dominated, and *Salicornia*-dominated patches greater than 0.55 acre, with the exception that
41 all low marsh habitats dominated by *Schoenoplectus acutus* and *S. californicus* and all managed
42 wetlands, in general, are considered secondary habitat with lesser ecological value. Upland
43 transitional zones, providing refugia during high tides, within 150 feet of the tidal wetland edge

1 were also included as secondary habitat. Secondary habitats generally provide only a few ecological
2 functions such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland
3 transition zones), while primary habitats provide multiple functions, including breeding, effective
4 predator cover, and value foraging opportunities.

5 Construction and restoration associated with Alternative 1C conservation measures would result in
6 both temporary and permanent losses of California black rail modeled habitat as indicated in Table
7 12-1C-25. Full implementation of Alternative 1C would also include the following conservation
8 actions over the term of the BDCP to benefit the California black rail (BDCP Chapter 3, Section 3.3,
9 *Biological Goals and Objectives*).

- 10 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11, including at
11 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
12 with CM4).
- 13 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
14 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 15 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
16 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 17 ● Create 1,700 acres of black rail habitat between restored tidal freshwater emergent wetlands
18 and transitional uplands to provide upland refugia (Objective CBR1.1, associated with CM4).
- 19 ● Create topographic heterogeneity in restored tidal brackish and freshwater emergent wetlands
20 (Objectives TBEWNC1.4 and TFEWNC2.2, associated with CM4).
- 21 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
22 natural community within the reserve system (Objective TBEWNC2.1, associated with CM11).

23 As explained below, with the restoration and protection of these amounts of habitat, in addition to
24 natural community enhancement and management commitments (including *CM12 Methylmercury*
25 *Management*) and the implementation of AMM1–AMM7, AMM38 *California Black Rail*, and AMM27
26 *Selenium Management*, impacts on the California black rail would not be adverse for NEPA purposes
27 and would be less than significant for CEQA purposes.

1
2

Table 12-1C-25. Changes in California Black Rail Modeled Habitat Associated with Alternative 1C (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0	0	5	5	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		0	0	5	5	NA	NA
CM2–CM18	Primary	76	84	0	0	0	0
	Secondary	986	3,044	0	0	0	0
Total Impacts CM2–CM18		1,062	3,128	0	0	0	0
TOTAL IMPACTS		1,062	3,128	5	5	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-57: Loss or Conversion of Habitat for and Direct Mortality of California Black Rail**

5 Alternative 1C conservation measures would result in the combined permanent and temporary loss
6 of up to permanent loss of and temporary effects on up to 89 acres of primary habitat and 3,044
7 acres of secondary habitat for California black rail (Table 12-1C-25). Conservation measures that
8 would result in these losses are conveyance facilities and transmission line construction, and
9 establishment and use of borrow and spoil areas (CM1) and tidal natural communities restoration
10 (CM4). Habitat enhancement and management activities (CM11), which include ground disturbance
11 or removal of nonnative vegetation, could result in local adverse habitat effects. In addition,
12 maintenance activities associated with the long-term operation of the water conveyance facilities
13 and other BDCP physical facilities could degrade or eliminate California black rail habitat. Each of
14 these individual activities is described below. A summary statement of the combined impacts, NEPA
15 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 16 • *CM1 Water Facilities and Operation*: There would be no permanent loss of California black rail
17 habitat from the construction of the Alternative 1C conveyance facilities, however 5 acres of
18 primary habitat would be temporarily impacted (Table 12-1C-25). This loss would be the result
19 of canal siphon construction across Rock Slough near its junction with the Contra Costa Canal,
20 and transmission corridor construction along the tunnel alignment in the west and south Delta
21 (see the Terrestrial Mapbook for details of construction locations). The construction footprint
22 for CM1 does not overlap with any California black rail occurrences. The implementation of
23 *AMM38 California Black Rail* would minimize the effects of construction on adjacent rails if
24 present in the area (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Habitat loss
25 from CM1 would occur within the first 10 years of Alternative 1C implementation.

1 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction or channel modification from fish passage
2 improvements associated with the Yolo Bypass would result in the permanent removal of
3 approximately 5 acres of primary California black rail habitat in CZ 2. There are no occurrences
4 of California black rail that intersect with the CM1 footprint. The loss is expected to occur during
5 the first 10 years of Alternative 1C implementation.

6 • *CM4 Tidal Natural Communities Restoration*: California black rail modeled habitat would be
7 affected by tidal marsh restoration. Some California black rail modeled habitat would be
8 permanently lost such that it no longer serves as habitat, while other modeled habitat would
9 change value through conversion from one habitat type to another. Tidal habitat restoration site
10 preparation and inundation would result in the permanent loss of 79 acres of primary habitat
11 and 3,044 acres of secondary habitat for California black rail. Of the 79 acres of primary habitat
12 lost, an estimated 76 acres would be converted to low marsh, or secondary habitat, for the
13 species due to increased water elevations.

14 The majority of the effects of tidal natural communities restoration would occur in Suisun Marsh
15 (CZ 11). Much of the natural wetland habitat that would be removed occurs in isolated patches
16 and would be replaced by larger continuous areas of tidal wetlands that are expected to support
17 higher habitat functions for the rail than the impacted wetlands. As described in the BDCP,
18 restoration of up to 24,000 acres of tidal freshwater emergent wetland in the Delta and at least
19 6,000 acres of tidal brackish emergent wetland natural communities in CZ 11 by the late long-
20 term would benefit California black rail. The primary habitat for the species in the Delta consists
21 of in channel islands, which are in areas that are most vulnerable to the effects of sea level rise in
22 the study area. Tidal restoration under CM4 would ensure that land is protected adjacent to
23 current habitat in the delta with the consideration of sea level rise. Tidal restoration projects
24 would include an ecotone between wetlands and transitional uplands which would provide
25 upland refugia for the species.

26 The tidal natural communities restoration would be phased through the course of the BDCP
27 restoration program to allow for recovery of some areas before the initiation of restoration
28 actions in other areas. However, California black rails have a greater use of mature tidal marshes
29 and, therefore, it would be years before the newly restored marshes provided suitable habitat
30 for the species. In the long-term, tidal natural communities restoration is expected to have little
31 to no adverse effects on California black rail habitat because the habitat removed would be
32 replaced by a greater acreage of high-value tidal wetland and, thus, is expected to provide a
33 benefit for California black rail.

34 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
35 actions contained in *CM11 Natural Communities Enhancement and Management* that are
36 designed to enhance wildlife values in restored and protected tidal wetland habitats may result
37 in localized ground disturbances that could temporarily remove small amounts of California
38 black rail habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
39 road and other infrastructure maintenance activities, are expected to have minor adverse effects
40 on available California black rail habitat and are expected to result in overall improvements and
41 maintenance of California black rail habitat values over the term of the BDCP. Noise and visual
42 disturbances during implementation of habitat management actions could also result in
43 temporary disturbances that affect California black rail use of the surrounding habitat. These
44 effects cannot be quantified, but would be avoided and minimized by the AMMs listed below.
45 Additional actions under CM11 include the control of nonnative predators to reduce nest
46 predation as needed.

- 1 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
2 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
3 disturbances that could affect California black rail use of the surrounding habitat in Suisun and
4 the central Delta. Maintenance activities would include vegetation management, levee and
5 structure repair, and re-grading of roads and permanent work areas. These effects, however,
6 would be reduced by AMMs and conservation actions as described below.
- 7 • Injury and Direct Mortality: Construction vehicle activity may cause injury or mortality to
8 California black rail. If rails are present adjacent to covered activities, the operation of
9 equipment for land clearing, construction, conveyance facilities operation and maintenance, and
10 habitat restoration, enhancement, and management could result in injury or mortality of
11 California black rail. Increased vehicular traffic associated with BDCP actions could contribute to
12 a higher incidence of road kill. However, conducting construction outside of the breeding season
13 where feasible (reducing the risk of impacting active nests), construction monitoring, and other
14 measures would be implemented to avoid and minimize injury or mortality of the species during
15 construction, as required by AMM1–AMM7 and *AMM38 California Black Rail*.

16 The following paragraphs summarize the combined effects discussed above and describe other
17 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
18 included.

19 ***Near-Term Timeframe***

20 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
21 the near-term BDCP conservation strategy has been evaluated to determine whether it would
22 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
23 effects of construction would not be adverse under NEPA. With Alternative 1C implementation,
24 there would be a loss of 1,067 acres of modeled habitat for California black rail in the study area in
25 the near-term. These effects would result from the construction of the water conveyance facilities
26 (CM1, 5 acres of temporary loss of primary habitat), and implementing other conservation measures
27 (CM2 Yolo Bypass Fisheries Enhancement and CM4 Tidal Natural Communities Restoration–76
28 acres of primary habitat, 986 acres of secondary habitat).

29 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
30 be affected and that are identified in the biological goals and objectives for California black rail in
31 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such
32 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.
33 Using this ratio would indicate that 5 acres of tidal natural communities should be restored/created
34 to compensate for the CM1 losses of California black rail habitat. The near-term effects of other
35 conservation actions would remove 1,062 acres of tidal natural communities, therefore requiring
36 1,062 acres of tidal natural communities restoration using the same typical NEPA and CEQA ratio
37 (1:1 for restoration).

38 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
39 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in
40 the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are all
41 associated with CM4 and would occur in the same timeframe as the construction and early
42 restoration losses, thereby avoiding adverse effects of habitat loss on California black rail. The tidal
43 brackish emergent wetland would be restored in CZ 11 among the Western Suisun/Hill Slough
44 Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton

1 Marsh complex (Objective TBEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and the tidal
2 freshwater emergent wetland would be restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7
3 (Objective TFEWNC1.1). In addition, tidal brackish and tidal freshwater emergent wetlands would
4 be restored in a way that creates topographic heterogeneity and in areas that increase connectivity
5 among protected lands (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of
6 managed wetland protected and enhanced in CZ 11 would benefit the California black rail through
7 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
8 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
9 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). These Plan
10 objectives represent performance standards for considering the effectiveness of CM4 restoration
11 actions. The acres of restoration and protection contained in the near-term Plan goals and the
12 additional detail in the biological objectives for California black rail satisfy the typical mitigation that
13 would be applied to the project-level effects of CM1, as well as mitigate the near-term effects of the
14 other conservation measures.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM38*
19 *California Black Rail*. All of these AMMs include elements that would avoid or minimize the risk of
20 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
21 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
22 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

23 ***Late Long-Term Timeframe***

24 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary
25 habitat for California black rail. Alternative 1C as a whole would result in the permanent loss of and
26 temporary effects on 89 acres of primary habitat and 3,044 acres of secondary habitat for California
27 black rail during the term of the Plan (1% of the total primary habitat in the study area and 17% of
28 the total secondary habitat in the study area). The locations of these losses are described above in
29 the analyses of individual conservation measures. The Plan includes conservation commitments
30 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000 acres of tidal
31 brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres of tidal
32 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). These tidal
33 wetlands would be restored as a mosaic of large, interconnected and biologically diverse patches,
34 and at least 1,500 acres of restored marsh would consist of middle-and high-marsh vegetation with
35 dense, tall stands of pickleweed and bulrush cover serving as primary habitat for California black
36 rail in Suisun Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for
37 California black rail would be created between the restored tidal freshwater emergent wetlands and
38 transitional uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and
39 CBR1.1). Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of
40 *CM3 Natural Communities Protection and Restoration* would benefit the California black rail through
41 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
42 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
43 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional
44 pressures on the species such as loss of habitat from invasive species and mortality from nest
45 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes
46 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more

1 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11 (Objective
2 TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if
3 necessary through *CM11 Natural Communities Enhancement and Management*.

4 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
5 *Plant Species*) estimates that the restoration and protection actions discussed above would result in
6 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for
7 California black rail and the protection of 275 acres of secondary habitat for the species.

8 **NEPA Effects:** The loss of California black rail habitat and potential direct mortality of this special-
9 status species under Alternative 1C would represent an adverse effect in the absence of other
10 conservation actions. However, with habitat protection and restoration associated with CM4, guided
11 by the biological objectives for the species and by *AMM1 Worker Awareness Training*, *AMM2*
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM38*
15 *California Black Rail*, which would be in place throughout the construction period, the effects of
16 Alternative 1C as a whole on California black rail would not be adverse under NEPA.

17 **CEQA Conclusion:**

18 **Near-Term Timeframe**

19 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
20 the near-term BDCP conservation strategy has been evaluated to determine whether it would
21 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
22 effects of construction would be less than significant under CEQA. With Alternative 1C
23 implementation, there would be a loss of 1,067 acres of modeled habitat for California black rail in
24 the study area in the near-term. These effects would result from the construction of the water
25 conveyance facilities (CM1, 5 acres of temporary loss of primary habitat), and implementing other
26 conservation measures (CM2 Yolo Bypass Fisheries Enhancement and CM4 Tidal Natural
27 Communities Restoration—76 acres of primary habitat, 986 acres of secondary habitat).

28 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
29 be affected and that are identified in the biological goals and objectives for California black rail in
30 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such
31 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.
32 Using this ratio would indicate that 5 acres of tidal natural communities should be restored/created
33 to compensate for the CM1 losses of California black rail habitat. The near-term effects of other
34 conservation actions would remove 1,062 acres of tidal natural communities, therefore requiring
35 1,062 acres of tidal natural communities restoration using the same typical NEPA and CEQA ratio
36 (1:1 for restoration).

37 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
38 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in
39 the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are all
40 associated with CM4 and would occur in the same timeframe as the construction and early
41 restoration losses, thereby avoiding adverse effects of habitat loss on California black rail. The tidal
42 brackish emergent wetland would be restored in CZ 11 among the Western Suisun/Hill Slough
43 Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton

1 Marsh complex (Objective TBEWNC1.1) and the tidal freshwater emergent wetland would be
 2 restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition, tidal
 3 brackish and tidal freshwater emergent wetlands would be restored in a way that creates
 4 topographic heterogeneity and in areas that increase connectivity among protected lands
 5 (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of managed wetland
 6 protected and enhanced in CZ 11 would benefit the California black rail through the enhancement of
 7 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists
 8 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-
 9 American bulrush plant associations (Objective MWNC1.1). These Plan objectives represent
 10 performance standards for considering the effectiveness of CM4 restoration actions.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM38*
 15 *California Black Rail*. All of these AMMs include elements that would avoid or minimize the risk of
 16 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
 17 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
 18 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

19 The natural community restoration and protection activities would be concluded in the first 10
 20 years of Alternative 1C implementation, which is close enough in time to the occurrence of impacts
 21 to constitute adequate mitigation for CEQA purposes. In addition, *AMM38 California Black Rail* and
 22 *AMM1–AMM7* would avoid and minimize potential impacts on the species from construction-related
 23 habitat loss and noise and disturbance. Because the number of acres required to meet the typical
 24 mitigation ratio described above would be only 3,608 acres of restored/created tidal natural
 25 communities, the 10,850 acres of tidal brackish and tidal freshwater emergent wetland restoration
 26 and the 4,100 acres of managed wetland protection and enhancement contained in the near-term
 27 Plan goals, and the additional detail in the biological objectives for California black rail, are more
 28 than sufficient to support the conclusion that the near-term impacts of habitat loss and direct
 29 mortality under Alternative 1C would be less than significant under CEQA.

30 ***Late Long-Term Timeframe***

31 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary
 32 habitat for California black rail. Alternative 1C as a whole would result in the permanent loss of and
 33 temporary effects on 89 acres of primary habitat and 3,044 acres of secondary habitat for California
 34 black rail during the term of the Plan (1% of the total primary habitat in the study area and 17% of
 35 the total secondary habitat in the study area). The locations of these losses are described above in
 36 the analyses of individual conservation measures. The Plan includes conservation commitments
 37 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000 acres of tidal
 38 brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres of tidal
 39 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (TFEWNC1.1). These tidal wetlands would
 40 be restored as a mosaic of large, interconnected and biologically diverse patches and much of the
 41 restored marsh would consist of middle-and high-marsh vegetation with dense, tall stands of
 42 pickleweed and bulrush cover, serving as primary habitat for California black rail in Suisun Marsh
 43 (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for California black rail
 44 would be created between the restored tidal freshwater emergent wetlands and transitional
 45 uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and CBR1.1).

1 Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of *CM3*
2 *Natural Communities Protection and Restoration* would benefit the California black rail through the
3 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
4 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
5 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional
6 pressures on the species such as loss of habitat from invasive species and mortality from nest
7 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes
8 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more
9 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11
10 (TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if
11 necessary through *CM11 Natural Communities Enhancement and Management*.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM38*
16 *California Black Rail*. All of these AMMs include elements that would avoid or minimize the risk of
17 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
18 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
19 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

20 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
21 *Plant Species*) estimates that the restoration and protection actions discussed above would result in
22 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for
23 California black rail and the protection of 275 acres of secondary habitat for the species.

24 Considering these protection and restoration provisions, which would provide acreages of new or
25 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction
26 and restoration activities, loss of habitat or direct mortality through implementation of Alternative
27 1C would not result in a substantial adverse effect through habitat modifications and would not
28 substantially reduce the number or restrict the range of the species. Therefore, the alternative
29 would have a less-than-significant impact on California black rail.

30 **Impact BIO-58: Effects on California Black Rail Associated with Electrical Transmission** 31 **Facilities**

32 New transmission lines would increase the risk for bird-power line strikes, which could result in
33 injury or mortality of California black rail. A variety of rail species are known to suffer mortality
34 from transmission line collision, likely associated with migration and flights between foraging areas
35 (Eddleman et al 1994). Due to their wing shape and body size, rails have low to moderate flight
36 maneuverability (Rayner 1988 and Bevanger 1998), increasing susceptibility to collision mortality.
37 However, there are relatively few records of California black rail collisions with overhead wires.
38 California black rails exhibit daytime site fidelity and a lack of long-distance night migration, two
39 factors which are associated with low collision risk in avian species (Eddleman et al. 1994).
40 California black rail movements in the study area are likely short, seasonal, and at low altitudes,
41 typically less than 16 feet (5 meters) (Eddleman et al 1994). However, although the species may
42 have low to moderate flight maneuverability, the bird's behavior (e.g., sedentary, nonmigratory,
43 ground-nesting and foraging, solitary, no flocking, secretive) reduces potential exposure to
44 overhead wires and vulnerability to collision mortality (BDCP Appendix 5.J, Attachment 5J.C,

1 *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). Marking transmission lines with
2 flight diverters that make the lines more visible to birds has been shown to reduce the incidence of
3 bird mortality (Brown and Drewien 1995). For example, Yee (2008) estimated that marking devices
4 in the Central Valley could reduce avian mortality by 60%. As described in *AMM20 Greater Sandhill*
5 *Crane*, all new project transmission lines would be fitted with flight diverters, which would eliminate
6 any potential for mortality of California black rail individuals from powerline collisions.

7 Transmission line poles and towers also provide perching substrate for raptors, which are predators
8 on California black rail. Although there is potential for transmission lines constructed in the Delta to
9 increase perching opportunities for raptors and result in increased predation pressure on local
10 black rails, little is currently known about the seasonal movements of black rails or the potential for
11 increased predation on rails near power poles. However, transmission facilities are expected to have
12 few adverse effects on the black rail population. Therefore, because of the limited area over which
13 poles would be installed relative to the amount of California black rail habitat in the Delta, it is
14 assumed that the increase in predation risk on California black rail from an increase in raptor
15 perching opportunities would be negligible.

16 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
17 adverse effect because the risk of bird strike is considered to be minimal based on the species' flight
18 behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike
19 diverters on all new powerlines and select existing powerlines, which would minimize the risk of
20 bird strike for California black rails in the Delta. The increase in predation risk on California black
21 rail from an increase in raptor perching opportunities would be negligible because of the limited
22 area over which poles would be installed relative to the amount of California black rail habitat in the
23 Delta. Therefore, the construction and operation of new transmission lines would not result in an
24 adverse effect on California black rail.

25 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
26 significant impact on California black rail because the risk of bird strike is considered to be minimal
27 based on the species' flight behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the
28 commitment to place bird strike diverters on all new powerlines and select existing powerlines,
29 which would minimize the risk of bird strike for California black rails in the Delta. The increase in
30 predation risk on California black rail from an increase in raptor perching opportunities would be
31 negligible because of the limited area over which poles would be installed relative to the amount of
32 California black rail habitat in the Delta. Therefore, the construction and operation of new
33 transmission lines under Alternative 1C would result in a less-than-significant impact on California
34 black rail.

35 **Impact BIO-59: Indirect Effects of Plan Implementation on California Black Rail**

36 **Indirect Construction-Related Effects:** Both primary and secondary habitat for California black
37 rail within the vicinity of proposed construction areas could be indirectly affected by construction
38 activities. Indirect effects associated with construction include noise, dust, and visual disturbance
39 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
40 footprint but within 500 feet from the construction edge. Construction noise above background
41 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
42 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
43 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
44 the extent to which these noise levels could affect California black rail. The use of mechanical

1 equipment during water conveyance facilities construction could cause the accidental release of
2 petroleum or other contaminants that could affect California black rail in the surrounding habitat.
3 The inadvertent discharge of sediment or excessive dust adjacent to California black rail habitat
4 could also affect the species.

5 If construction occurs during the nesting season, these indirect effects could result in the loss or
6 abandonment of nests, and mortality of any eggs and/or nestlings. However, there is a commitment
7 in AMM38 that preconstruction surveys of potential breeding habitat would be conducted within
8 700 feet of project activities, and a 500-foot no-disturbance buffer would be established around any
9 territorial call-centers during the breeding season (see Appendix 3B, *Environmental Commitments*,
10 *AMMs*, and *CMs*). In addition, construction would be avoided altogether if breeding territories cannot
11 be accurately delimited.

12 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients
13 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would
14 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh
15 would generally increase as a result of water operations and operations of salinity-control gates to
16 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland
17 plant communities tolerant of more brackish environments, which should be beneficial to California
18 black rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

19 **Methylmercury Exposure:**

20 The modeled primary habitat for California black rail includes tidal brackish emergent wetland and
21 tidal freshwater emergent wetland in Suisun Marsh and the Delta west of Sherman Island, and
22 instream islands and White Slough Wildlife Area in the central Delta. Black rails typically occur in
23 the high marsh zone near the upper limit of tidal flooding in salt and brackish habitats. Low marsh,
24 managed wetlands, and the upland fringe are considered secondary habitat. California black rails are
25 a top predator in the benthic food chain; they nest and forage in dense vegetation and prey on
26 isopods, insects and arthropods from the surface of mud and vegetation. They also consume insects
27 and seeds from bulrushes (*Schoenoplectus* spp.) and cattails (*Typha* spp.) (Eddleman et al. 1994).

28 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
29 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
30 species would overestimate the effects on Black rail. Organisms feeding within pelagic-based (algal)
31 foodwebs have been found to have higher concentrations of methylmercury than those in benthic or
32 epibenthic foodwebs; this has been attributed to food chain length and dietary segregation
33 (Grimaldo et al. 2009). Modeled effects of mercury concentrations from changes in water operations
34 under CM1 on largemouth bass did not differ substantially from existing conditions; therefore,
35 results also indicate that black rail mercury tissue concentrations would not measurably increase as
36 a result of CM1 implementation.

37 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
38 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
39 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
40 mercury. In general, the highest methylation rates are associated with high tidal marshes (primary
41 black rail habitat) that experience intermittent wetting and drying and associated anoxic conditions
42 (Alpers et al. 2008); however, the majority of the overlap between restoration areas and black rail
43 habitat is within Suisun Marsh, where conversion of managed wetlands to tidal wetlands is expected
44 to result in an overall reduction in mercury methylation. Mercury is generally elevated throughout

1 the Delta, and restoration of the lower potential areas in total may result in generalized, very low
2 level increases of mercury. Given that some species have elevated mercury tissue levels pre-BDCP,
3 these low level increases could result in some level of effects. Conservation Measure CM 12,
4 described below, will be implemented to address this risk of low level increases in methylmercury
5 which could add to the current elevated tissue concentrations.

6 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
7 into the foodweb, *CM12 Methylmercury Management*, is included to provide for site-specific
8 evaluation for each restoration project. If a project is identified where there is a high potential for
9 methylmercury production that could not be fully addressed through restoration design and
10 adaptive management, alternate restoration areas would be considered. CM12 would be
11 implemented in coordination with other similar efforts to address mercury in the Delta, and
12 specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
13 would include the following actions.

- 14 • Assess pre-restoration conditions to determine the risk that the project could result in increased
15 mercury methylation and bioavailability
- 16 • Define design elements that minimize conditions conducive to generation of methylmercury in
17 restored areas.
- 18 • Define adaptive management strategies that can be implemented to monitor and minimize
19 actual postrestoration creation and mobilization of methylmercury.

20 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
21 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
22 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
23 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
24 2009). The effect of selenium toxicity differs widely between species and also between age and sex
25 classes within a species. In addition, the effect of selenium on a species can be confounded by
26 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
27 2009).

28 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
29 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
30 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
31 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
32 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
33 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
34 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
35 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
36 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
37 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
38 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
39 levels of selenium have a higher risk of selenium toxicity.

40 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
41 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
42 exacerbate bioaccumulation of selenium in avian species, including California black rail. Marsh (tidal
43 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
44 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP

1 restoration activities that create newly inundated areas could increase bioavailability of selenium
2 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
3 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
4 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
5 increases in selenium concentrations in water in the Delta under any alternative. However, it is
6 difficult to determine whether the effects of potential increases in selenium bioavailability
7 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
8 effects on California black rail.

9 Because of the uncertainty that exists at this programmatic level of review, there could be a
10 substantial effect on California black rail from increases in selenium associated with restoration
11 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
12 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
13 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
14 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
15 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
16 separately for each restoration effort as part of design and implementation. This avoidance and
17 minimization measure would be implemented as part of the tidal habitat restoration design
18 schedule.

19 **NEPA Effects:** Noise and visual disturbances related to construction-related activities from
20 conservation measures could disturb California black rail habitat adjacent to work sites. Potential
21 effects of noise and visual disturbances on California black rail would be minimized with *AMM38*
22 *California Black Rail*. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
23 *Monitoring*, would minimize the likelihood of spills from occurring and ensure that measures were
24 in place to prevent runoff from the construction area and to avoid negative effects of dust on the
25 species.

26 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
27 habitat restoration are expected to increase water salinity in Suisun Marsh, which would be
28 expected to establish tidal marsh similar to historic conditions.

29 Changes in water operations under CM1 would not be expected to result in increased mercury
30 bioavailability or exposures to Delta foodwebs. Restoration actions that would create high and low
31 tidal marsh, which is black rail habitat, could provide biogeochemical conditions for methylation of
32 mercury in the newly inundated soils. There is potential for increased exposure of the foodwebs to
33 methylmercury in these areas, with the level of exposure dependent on the amounts of mercury
34 available in the soils and the biogeochemical conditions. However, the planned ROA's do not overlap
35 with the areas of highest mercury concentrations, which are in the in Yolo Bypass. Also, the
36 conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected to reduce the
37 overall production of methylmercury, resulting in a net benefit to species. Implementation of CM12
38 which contains measures to assess the amount of mercury before project development, followed by
39 appropriate design and adaptation management, would minimize the potential for increased
40 methylmercury exposure, and would result in no adverse effect on the species.

41 Tidal habitat restoration could result in increased exposure of California black rail to selenium. This
42 effect would be addressed through the implementation of *AMM27 Selenium Management* which
43 would provide specific tidal habitat restoration design elements to reduce the potential for
44 bioaccumulation of selenium and its bioavailability in tidal habitats.

1 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities and other
2 conservation measures could disturb primary and secondary California black rail habitat adjacent to
3 work sites. *AMM38 California Black Rail* would avoid and minimize impacts on California black rail
4 from noise and visual disturbance. The use of mechanical equipment during water conveyance
5 facilities construction could cause the accidental release of petroleum or other contaminants that
6 could affect California black rail in the surrounding habitat. The inadvertent discharge of sediment
7 or excessive dust adjacent to California black rail habitat could also affect the species. These impacts
8 on California black rail would be less than significant with the incorporation of AMM1–AMM7,
9 including *AMM2 Construction Best Management Practices and Monitoring*, into the BDCP.

10 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
11 habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity gradient
12 changes should have a beneficial impact on California black rail through the establishment of tidal
13 marsh similar to historic conditions.

14 Tidal habitat restoration could result in increased exposure of California black rail to selenium. This
15 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
16 would provide specific tidal habitat restoration design elements to reduce the potential for
17 bioaccumulation of selenium and its bioavailability in tidal habitats. With implementation of
18 *AMM27*, potential for increased selenium exposure would result in no adverse effect on the species.

19 Changes in water operations under CM1 would not be expected to result in increased mercury
20 bioavailability or exposures to Delta foodwebs. Restoration Actions that would create high and low
21 tidal marsh, which is Black Rail habitat, could provide biogeochemical conditions for methylation of
22 mercury in the newly inundated soils. There is potential for increased exposure of the foodwebs to
23 methylmercury in these areas, with the level of exposure dependent on the amounts of mercury
24 available in the soils and the biogeochemical conditions. However, the planned ROA's do not overlap
25 with the areas of highest mercury concentrations, which are in the in Yolo Bypass. Also, the
26 conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected to reduce the
27 overall production of methylmercury, resulting in a net benefit to species. Implementation of CM12
28 which contains measures to assess the amount of mercury before project development, followed by
29 appropriate design and adaptation management, would minimize the potential for increased
30 methylmercury exposure, and would result in no adverse effect on the species.

31 With these measures in place, indirect effects of plan implementation would not result in a
32 substantial adverse effect on the species through habitat modification or potential mortality of a
33 special-status species. Therefore, the indirect effects of Alternative 1C implementation would have a
34 less-than-significant impact on California black rail. No mitigation would be required.

35 **Impact BIO-60: Fragmentation of California Black Rail Habitat as a Result of Conservation** 36 **Component Implementation**

37 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create
38 temporary barriers to California black rail movements. Grading, filling, contouring and other initial
39 ground-disturbing activities could remove habitat along movement corridors used by individuals
40 and potentially temporarily reduce access to adjacent habitat areas. The temporary adverse effects
41 of fragmentation of tidal brackish emergent wetland habitat for California black rail or restoration
42 activities resulting in barriers to movement would be minimized through sequencing of *CM4 Tidal*
43 *Natural Community Restoration* activities. The tidal natural communities restoration would be
44 phased through the course of the BDCP restoration program to allow for recovery of some areas

1 before restoration actions are initiated in other areas. In addition, *AMM38 California Black Rail*
2 would avoid and minimize effects on California black rail.

3 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to
4 movement would not represent an adverse effect on California black rail as a result of habitat
5 modification of a special-status species because *CM4 Tidal Natural Communities Restoration* would
6 be phased to allow for the recovery of some areas before restoration actions are initiated in other
7 areas. In addition, *AMM38 California Black Rail* would avoid and minimize effects on California black
8 rail.

9 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to
10 movement would represent a less-than-significant impact on California black rail as a result of
11 habitat modification of a special-status species because *CM4 Tidal Natural Communities Restoration*
12 would be phased to allow for the recovery of some areas before restoration actions are initiated in
13 other areas. In addition, *AMM38 California Black Rail* would avoid and minimize impacts on
14 California black rail.

15 **Impact BIO-61: Periodic Effects of Inundation of California Black Rail Habitat as a Result of** 16 **Implementation of Conservation Components**

17 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would not result in the
18 periodic inundation of modeled habitat for California black rail. There are no records for California
19 black rails in the Yolo Bypass, although the species is highly secretive and the extent to which the
20 area has been surveyed for California black rails is unknown. Therefore, there is potential for the
21 species to occur in the Yolo Bypass. In addition, rails may occur in the bypass after restoration
22 activities are completed. However, periodic inundation would not result in permanent habitat loss
23 and would not prevent use of the bypass by current or future rail populations.

24 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,
25 construction of setback levees could result in increased magnitude, frequency and duration of
26 periodic inundation by up to 6 acres of modeled California black rail habitat in CZ 7. The risk of
27 changes in inundation frequency, magnitude, and duration through implementation of CM2 and CM5
28 affecting California black rail are considered to be low, and would not be expected to result in
29 adverse effects on the species.

30 **NEPA Effects:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*
31 *Seasonally Inundated Floodplain Restoration* would not represent an adverse effect on California
32 black rail as a result of habitat modification of a special-status species because periodic inundation
33 would not result in permanent habitat loss and would not prevent use of the bypass by current or
34 future rail populations. The risk of changes in inundation frequency and duration through CM2 and
35 CM5 implementation affecting California black rail is considered to be low.

36 **CEQA Conclusion:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*
37 *Seasonally Inundated Floodplain Restoration* would represent a less-than-significant impact on
38 California black rail because periodic inundation would not result in permanent habitat loss and
39 would not prevent use of the bypass by current or future rail populations. The risk of changes in
40 inundation frequency and duration as a result of implementation of CM2 and CM5 affecting
41 California black rail is considered to be low.

1 **California Clapper Rail**

2 This section describes the effects of Alternative 1C, including water conveyance facilities
3 construction and implementation of other conservation components, on California clapper rail.
4 California clapper rail habitat includes mostly middle marsh habitat with select emergent wetland
5 plant alliances. Secondary habitats generally provide only a few ecological functions such as foraging
6 (low marsh) or high-tide refuge (upland transition zones), while primary habitats provide multiple
7 functions including breeding, effective predator cover, and forage. Further details regarding the
8 habitat model, including assumptions on which the model is based, are provided in BDCP Appendix
9 2.A, *Covered Species Accounts*.

10 Construction and restoration associated with Alternative 1C conservation measures would result in
11 both temporary and permanent losses of California clapper rail modeled habitat as indicated in
12 Table 12-1C-26. Full implementation of Alternative 1C would result in both temporary and
13 permanent losses of California clapper rail modeled habitat as indicated in Table 12-1C-26. Full
14 implementation of Alternative 1C would also include the following conservation actions over the
15 term of the BDCP to benefit the California clapper rail (BDCP Chapter 3, Section 3.3, *Biological Goals*
16 *and Objectives*).

- 17 • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at
18 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
19 with CM4).

20 As explained below, with the restoration and protection of these amounts of habitat, in addition to
21 natural community enhancement and management commitments (including CM12 *Methylmercury*
22 *Management*) and the implementation of AMM1–AMM7, *AMM19 California Clapper Rail*, and *AMM27*
23 *Selenium Management*, impacts on the California clapper rail would not be adverse for NEPA
24 purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-26. Changes to California Clapper Rail Modeled Habitat Associated with Alternative**
2 **1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2-CM18	Primary	26	27	0	0	0	0
	Secondary	50	50	0	0	0	0
Total Impacts CM2-CM18		76	77	0	0	0	0
TOTAL IMPACTS		76	77	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-62: Loss or Conversion of Habitat for and Direct Mortality of California Clapper**
5 **Rail**

6 Alternative 1C conservation measures would result in the total loss or conversion of up to 35 acres
7 of modeled clapper rail habitat consisting of 27 acres of primary habitat and 50 acres of secondary
8 habitat (Table 12-1C-26). The conservation measure that would result in these losses is tidal natural
9 communities restoration (CM4). Habitat enhancement and management activities (CM11), which
10 include ground disturbance or removal of nonnative vegetation, could also result in local adverse
11 habitat effects. Each of these individual activities is described below. A summary statement of the
12 combined impacts and NEPA and CEQA conclusions follows the individual conservation measure
13 discussions.

- 14 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would convert
15 approximately 77 acres of modeled California clapper rail habitat (27 acres of primary habitat,
16 50 acres of secondary habitat), the majority of which would occur in CZ 11. The tidal marsh
17 restoration action would not result in the permanent loss of any California clapper rail habitat in
18 the study area. However, approximately 27 acres of primary habitat would be converted to
19 secondary low marsh habitat and 50 acres of secondary habitat would be converted to middle or
20 high marsh. Full implementation of CM4 would restore or create at least 6,000 acres of tidal
21 brackish emergent wetland in CZ 11. Tidal wetlands would be restored as a mosaic of large,
22 interconnected, and biologically diverse patches that supported a natural gradient extending
23 from subtidal to the upland fringe. Much of the restored tidal brackish emergent wetland would
24 meet the primary habitat requirements of the California clapper rail, including development of
25 mid- and high-marsh vegetation with dense, tall stands of pickleweed cover. Restoration would

1 be sequenced and spaced in a manner that minimizes any temporary, initial loss of habitat and
2 habitat fragmentation.

- 3 • *CM11 Natural Communities Enhancement and Management*: Because the entire California
4 clapper rail population is restricted to the San Francisco Bay Area estuary, BDCP enhancement
5 and restoration actions would be expected to benefit the species by creating the potential for
6 extending its abundance and distribution in Suisun Marsh. Occupied California clapper rail
7 habitat would be monitored to determine if there is a need for predator control actions. If
8 implemented, nonnative predators would be controlled as needed to reduce nest predation and
9 to help maintain species abundance. A variety of habitat management actions included in *CM11*
10 *Natural Communities Enhancement and Management* that are designed to enhance wildlife
11 values in restored and protected tidal wetland habitats could result in localized ground
12 disturbances that could temporarily remove small amounts of California clapper rail habitat.
13 Ground-disturbing activities, such as removal of nonnative vegetation and road and other
14 infrastructure maintenance activities, would be expected to have minor adverse effects on
15 available California clapper rail habitat. These potential effects are currently not quantifiable,
16 but would be minimized with implementation *AMM19, California Clapper Rail* (see Appendix 3B,
17 *Environmental Commitments, AMMs, and CMs*).
- 18 • *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration
19 infrastructure could result in ongoing but periodic disturbances that could affect California
20 clapper rail use of the surrounding habitat in Suisun. Maintenance activities could include
21 vegetation management, and levee repair. These effects, however, would be reduced by AMMs
22 and conservation actions as described below.
- 23 • *Injury and Direct Mortality*: Construction vehicle activity may cause injury or mortality to
24 California black rail. If rails are present adjacent to covered activities, the operation of
25 equipment for land clearing, and habitat restoration, enhancement, and management could
26 result in injury or mortality of California clapper rail. Operation of construction equipment could
27 result in injury or mortality of California clapper rails. Risk would be greatest to eggs and
28 nestlings susceptible to land clearing activities, nest abandonment, or increased exposure to the
29 elements or to predators. Injury to adults and fledged juveniles is less likely as these individuals
30 are expected to avoid contact with construction equipment. However, nest sites would be
31 avoided during the nesting season as required by AMM1–AMM7 and *AMM19 California Clapper*
32 *Rail*.

33 The following paragraphs summarize the combined effects discussed above and describe other
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
35 included.

36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would
39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
40 effects of construction would not be adverse under NEPA. There would be no impacts resulting from
41 the construction of the water conveyance facilities (CM1). However, there would be a loss of 76
42 acres of modeled habitat for California clapper rail in the study area in the near-term. These effects
43 would result from implementing *CM4 Tidal Natural Communities Restoration* (26 acres of primary
44 and 50 acres of secondary habitat).

1 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
 2 CM4 and that are identified in the biological goals and objectives for California clapper rail in
 3 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
 4 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be
 5 restored/created to compensate for the CM4 losses of California clapper rail habitat.

6 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
 7 wetland in the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation
 8 actions are associated with CM4 and would occur in the same timeframe as the early restoration
 9 losses, thereby avoiding adverse effects on California clapper rail. The tidal brackish emergent
 10 wetland would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the
 11 Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex
 12 (Objective TBEWNC1.1) and would be restored in a way that creates topographic heterogeneity and
 13 in areas that increase connectivity among protected lands (Objectives TBEWNC1.4). These biological
 14 goals and objectives would inform the near-term restoration efforts and represent performance
 15 standards for considering the effectiveness of restoration actions. These Plan objectives represent
 16 performance standards for considering the effectiveness of CM4 restoration actions. The acres of
 17 restoration contained in the near-term Plan goals satisfy the typical mitigation that would be
 18 applied to the near-term effects of tidal restoration.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
 23 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
 24 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
 25 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
 26 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

27 ***Late Long-Term Timeframe***

28 The habitat model indicates that the study area supports approximately 296 acres of primary and
 29 6,420 acres of secondary habitat for California clapper rail. Alternative 1C as a whole would result in
 30 the permanent loss of and temporary effects on 27 acres of primary habitat and 50 acres of
 31 secondary habitat for California clapper rail during the term of the Plan (9% of the total primary
 32 habitat in the study area and less than 1% of the total secondary habitat in the study area). The
 33 locations of these losses are described above in the analyses of individual conservation measures.
 34 The Plan includes a commitments through *CM4 Tidal Natural Communities Restoration* to restore or
 35 create at least 6,000 acres of tidal brackish emergent wetlands for California clapper rail in Suisun
 36 Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would be restored as a mosaic of large,
 37 interconnected and biologically diverse patches and at least 1,500 acres of the restored marsh
 38 would consist of middle-and high-marsh vegetation, serving as primary habitat for California
 39 clapper rail in Suisun Marsh (Objectives TBEWNC1.1 and TBEWNC1.2). Additional pressures on the
 40 species such as loss of habitat from invasive species and mortality from nest predators would also
 41 be addressed through the BDCP. Perennial pepperweed, which outcompetes suitable clapper rail
 42 habitat (such as pickleweed) would be reduced to no more than 10% cover in the tidal brackish
 43 emergent wetland natural community within CZ 11 (Objective TBEWNC2.1). In addition, nonnative
 44 predators would be controlled to reduce nest predation if necessary through *CM11 Natural*
 45 *Communities Enhancement and Management*.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, *Effects Analysis*) estimates that the
2 restoration and protection actions discussed above, would result in the restoration of 1,500 acres of
3 primary habitat and 4,500 acres of secondary habitat for California clapper rail.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
8 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
9 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
10 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
11 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

12 **NEPA Effects:** The loss of California clapper rail habitat associated with Alternative 1C would
13 represent an adverse effect as a result of habitat modification of a special-status species and
14 potential for direct mortality in the absence of other conservation actions. However, with habitat
15 protection and restoration associated with CM4, guided by biological goals and objectives and by
16 *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*,
17 *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*
18 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge*
19 *Operations Plan*, and *AMM19 California Clapper Rail*, which would be in place throughout the
20 construction period, the effects of Alternative 1C as a whole on California clapper rail would not be
21 adverse under NEPA.

22 **CEQA Conclusion:**

23 **Near-Term Timeframe**

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
27 effects of construction would be less than significant under CEQA. There would be no impacts
28 resulting from the construction of the water conveyance facilities (CM1). However, there would be a
29 loss of 76 acres of modeled habitat for California clapper rail in the study area in the near-term from
30 the implementation of *CM4 Tidal Natural Communities Restoration* (26 acres of primary and 50 acres
31 of secondary habitat).

32 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
33 CM4 and that are identified in the biological goals and objectives for California clapper rail in
34 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
35 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be
36 restored/created to mitigate the CM4 losses of California clapper rail habitat.

37 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
38 wetland in the study area. These conservation actions are associated with CM4 and would occur in
39 the same timeframe as the early restoration losses, thereby avoiding adverse effects on California
40 clapper rail. The tidal brackish emergent wetland would be restored in CZ 11 among the Western
41 Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse
42 Slough/Denverton Marsh complex (Objective TBEWNC1.1) and would be restored in a way that

1 creates topographic heterogeneity and in areas that increase connectivity among protected lands
2 (Objectives TBEWNC1.4).

3 These biological goals and objectives would inform the near-term restoration efforts and represent
4 performance standards for considering the effectiveness of restoration actions. These Plan
5 objectives represent performance standards for considering the effectiveness of CM4 restoration
6 actions.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
11 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
12 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
13 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
14 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

15 The natural community restoration and protection activities would be concluded in the first 10
16 years of Plan implementation, which is close enough in time to the occurrence of restoration impacts
17 to constitute adequate mitigation for CEQA purposes. In addition, *AMM19 California Clapper Rail* and
18 *AMM1–AMM7* would avoid and minimize potential impacts on the species from construction-related
19 habitat loss and noise and disturbance. Because the number of acres required to meet the typical
20 mitigation ratio described above would be only 76 acres of restored tidal natural communities, the
21 2,000 acres of tidal brackish emergent wetland restoration contained in the near-term Plan goals,
22 and the additional detail in the biological objectives for California clapper rail, are more than
23 sufficient to support the conclusion that the near-term impacts of habitat loss and direct mortality
24 under Alternative 1C would be less than significant under CEQA.

25 ***Late Long-Term Timeframe***

26 The habitat model indicates that the study area supports approximately 296 acres of primary and
27 6,420 acres of secondary habitat for California clapper rail. Alternative 1C as a whole would result in
28 the permanent loss of and temporary effects on 27 acres of primary habitat and 8 acres of secondary
29 habitat for California clapper rail during the term of the Plan (9% of the total primary habitat in the
30 study area and less than 1% of the total secondary habitat in the study area). The locations of these
31 losses are described above in the analyses of individual conservation measures. The Plan includes a
32 commitment to restore or create at least 6,000 acres of tidal brackish emergent wetlands for
33 California clapper rail in Suisun Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would
34 be restored as a mosaic of large, interconnected and biologically diverse patches and much of the
35 restored marsh would consist of middle-and high-marsh vegetation with dense, tall stands of
36 pickleweed, serving as primary habitat for clapper rail in Suisun Marsh (Objective TBEWNC1.1).
37 Additional pressures on the species such as loss of habitat from invasive species and mortality from
38 nest predators would also be addressed through the BDCP. Perennial pepperweed, which
39 outcompetes suitable clapper rail habitat (such as pickleweed) would be reduced to no more than
40 10% cover in the tidal brackish emergent wetland natural community within CZ 11 (Objective
41 TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if
42 necessary through *CM11 Natural Communities Enhancement and Management*.

43 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
44 *Plant Species*) estimates that the restoration and protection actions discussed above, would result in

1 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat for California
2 clapper rail.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
7 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
8 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
9 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
10 *Commitments, AMMs, and CMs*, of the Final EIR/EIS. Considering Alternative 1C's protection and
11 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
12 greater than necessary to compensate for habitats lost to construction and restoration activities,
13 loss of habitat or direct mortality through implementation of Alternative 1C would not result in a
14 substantial adverse effect through habitat modifications and would not substantially reduce the
15 number or restrict the range of California clapper rail. Therefore, the alternative would have a less-
16 than-significant impact on California clapper rail.

17 **Impact BIO-63: Indirect Effects of Plan Implementation on California Clapper Rail**

18 **Indirect Construction-Related Effects:** California clapper rail habitat within the vicinity of
19 proposed restoration areas could be indirectly affected by construction activities. Indirect effects
20 associated with construction include noise, dust, and visual disturbance caused by grading, filling,
21 contouring, and other ground-disturbing operations outside the project footprint but within 500
22 feet from the construction edge. Construction noise above background noise levels (greater than 50
23 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,
24 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
25 *Crane*, Table 4), although there are no available data to determine the extent to which these noise
26 levels could affect California clapper rail. The use of mechanical equipment during construction-
27 related restoration activities could cause the accidental release of petroleum or other contaminants
28 that could affect clapper rail in the surrounding habitat. The inadvertent discharge of sediment or
29 excessive dust adjacent to California clapper rail habitat could also affect the species. If construction
30 occurs during the nesting season, these indirect effects could result in the loss or abandonment of
31 nests, and mortality of any eggs and/or nestlings. However, there is a commitment in *AMM19*
32 *California Clapper Rail* that preconstruction surveys of potential breeding habitat would be
33 conducted within 500 feet of project activities, and a 500-foot no-disturbance buffer would be
34 established around any territorial call-centers during the breeding season (see Appendix 3B,
35 *Environmental Commitments, AMMs, and CMs*). In addition, construction would be avoided altogether
36 if breeding territories cannot be accurately delimited.

37 Preconstruction surveys conducted under *AMM19 California Clapper Rail and California Black Rail*
38 would ensure construction-related noise and visual disturbances would not have an adverse effect
39 on California clapper rail. AMM1–AMM7, including *AMM2 Construction Best Management Practices*
40 *and Monitoring*, would minimize the likelihood of such spills from occurring and ensure measures
41 were in place to prevent runoff from the construction area and to avoid negative effects of dust on
42 the species. Therefore, with the implementation of AMM1–AMM7 and *AMM19 California Clapper Rail*
43 *and California Black Rail*, there would be no adverse effect on California clapper rail.

1 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients
2 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would
3 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh
4 would generally increase as a result of water operations and operations of salinity-control gates to
5 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland
6 plant communities tolerant of more brackish environments, which would be beneficial to California
7 clapper rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

8 **Methylmercury Exposure:** California clapper rail modeled habitat includes primarily middle marsh
9 habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is also used if it is
10 of high value, and low marsh provides foraging habitat for the species. California clapper rails are a
11 top predator in the benthic food chain; they forage by probing their beaks into the mud (Zembal and
12 Fancher 1988) and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects
13 (Eddleman and Conway 1998).

14 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
15 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
16 species would overestimate the effects on California clapper rail. Organisms feeding within pelagic-
17 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
18 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
19 segregation (Grimaldo et al. 2009).

20 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
21 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
22 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
23 mercury. Concentrations of methylmercury known to be toxic to bird embryos have been found in
24 the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003); however, currently,
25 it is unknown how much of the sediment-derived methylmercury enters the food chain in Suisun
26 Marsh or what tissue concentrations are actually harmful to the California clapper rail. In general,
27 the highest methylation rates are associated with high tidal marshes that experience intermittent
28 wetting and drying and associated anoxic conditions (Alpers et al. 2008). In Suisun Marsh, the
29 conversion of managed wetlands to tidal wetlands is expected to result in an overall reduction in
30 mercury methylation. Due to the complex and very site-specific factors that will determine if
31 mercury becomes mobilized into the foodweb, *CM12 Methylmercury Management*, is included to
32 provide for site-specific evaluation for each restoration project. If a project is identified where there
33 is a high potential for methylmercury production that could not be fully addressed through
34 restoration design and adaptive management, alternate restoration areas would be considered.
35 CM12 would be implemented in coordination with other similar efforts to address mercury in the
36 Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This conservation
37 measure would include the following actions.

- 38 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
39 mercury methylation and bioavailability
- 40 ● Define design elements that minimize conditions conducive to generation of methylmercury in
41 restored areas.

42 Define adaptive management strategies that can be implemented to monitor and minimize actual
43 postrestoration creation and mobilization of methylmercury.

1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 5 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 6 classes within a species. In addition, the effect of selenium on a species can be confounded by
 7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 8 2009).

9 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 10 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 11 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 12 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 13 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 14 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 15 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 16 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 17 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 18 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
 19 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 20 levels of selenium have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 22 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 23 exacerbate bioaccumulation of selenium in avian species, including California clapper rail. Marsh
 24 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
 25 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
 26 BDCP restoration activities that create newly inundated areas could increase bioavailability of
 27 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
 28 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
 29 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
 30 long-term increases in selenium concentrations in water in the Delta under any alternative.
 31 However, it is difficult to determine whether the effects of potential increases in selenium
 32 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
 33 lead to adverse effects on California clapper rail.

34 Because of the uncertainty that exists at this programmatic level of review, there could be a
 35 substantial effect on California clapper rail from increases in selenium associated with restoration
 36 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
 37 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
 38 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
 39 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
 40 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
 41 separately for each restoration effort as part of design and implementation. This avoidance and
 42 minimization measure would be implemented as part of the tidal habitat restoration design
 43 schedule.

44 **NEPA Effects:** Noise and visual disturbances related to construction-related activities from
 45 conservation measures could disturb California clapper rail habitat adjacent to work sites. Potential

1 effects of noise and visual disturbances on California clapper rail would be minimized with *AMM19*
2 *California Clapper Rail*. *AMM1–AMM7*, including *AMM2 Construction Best Management Practices and*
3 *Monitoring*, would minimize the likelihood of spills from occurring and ensure that measures were
4 in place to prevent runoff from the construction area and to avoid negative effects of dust on the
5 species.

6 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
7 habitat restoration are expected to increase water salinity in Suisun Marsh, which would be
8 expected to establish tidal marsh similar to historic conditions.

9 Tidal habitat restoration could result in increased exposure of California clapper rail to selenium.
10 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
11 would provide specific tidal habitat restoration design elements to reduce the potential for
12 bioaccumulation of selenium and its bioavailability in tidal habitats.

13 Restoration Actions that would create tidal marsh could provide biogeochemical conditions for
14 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
15 the California clapper rail foodweb to methylmercury in these areas, with the level of exposure
16 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
17 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
18 to reduce the overall production of methylmercury, resulting in a net benefit to species.
19 Implementation of *CM12* which contains measures to assess the amount of mercury before project
20 development, followed by appropriate design and adaptation management, would minimize the
21 potential for increased methylmercury exposure, and would result in no adverse effect on the
22 species.

23 The indirect effects associated with noise and visual disturbances, potential spills of hazardous
24 material, changes in salinity, and increased exposure to selenium from Alternative 1C
25 implementation would not have an adverse effect on California clapper rail.

26 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities from the
27 conservation measures could disturb California clapper rail habitat adjacent to work sites. *AMM19*
28 *California Clapper Rail* would avoid and minimize impacts on California clapper rail from noise and
29 visual disturbance. The use of mechanical equipment during restoration activities could cause the
30 accidental release of petroleum or other contaminants or the inadvertent discharge of sediment or
31 excessive dust adjacent to California clapper rail habitat could also affect the species. These impacts
32 on California clapper rail would be less than significant with the incorporation of *AMM1–AMM7* into
33 the BDCP.

34 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
35 habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity gradient
36 changes should have a beneficial impact on California clapper rail through the establishment of tidal
37 marsh similar to historic conditions.

38 Tidal habitat restoration could result in increased exposure of California clapper rail to selenium.
39 This effect would be addressed through the implementation of *AMM27 Selenium Management* which
40 would provide specific tidal habitat restoration design elements to reduce the potential for
41 bioaccumulation of selenium and its bioavailability in tidal habitats.

42 Restoration Actions that would create tidal marsh could provide biogeochemical conditions for
43 methylation of mercury in the newly inundated soils. There is potential for increased exposure of

1 the California clapper rail foodweb to methylmercury in these areas, with the level of exposure
2 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
3 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
4 to reduce the overall production of methylmercury, resulting in a net benefit to species.
5 Implementation of CM12 which contains measures to assess the amount of mercury before project
6 development, followed by appropriate design and adaptation management, would minimize the
7 potential for increased methylmercury exposure, and would result in no adverse effect on the
8 species.

9 With these measures in place, indirect effects of plan implementation would not result in a
10 substantial adverse effect on the species through habitat modification or potential mortality of a
11 special-status species. Therefore, the indirect effects of Alternative 1C implementation would have a
12 less-than-significant impact on California clapper rail.

13 **Impact BIO-64: Effects on California Clapper Rail Associated with Electrical Transmission** 14 **Facilities**

15 Isolated patches of suitable California clapper rail habitat may occur in the study area as far east as
16 (but not including) Sherman Island. Home range and territory of the California clapper rail is not
17 known, but in locations outside of California, clapper rail territory ranges 0.3 acre to 8 acres (0.1 to
18 3.2 hectares) (Rush et al. 2012), indicating that known occurrences are not likely to intersect with
19 the proposed lines (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at*
20 *Proposed BDCP Transmission Lines*). The location of the current population and suitable habitat for
21 the species make collision with the proposed transmission lines highly unlikely.

22 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse
23 effect on California clapper rail because the location of the current population and suitable habitat
24 for the species would make collision with the proposed transmission lines highly unlikely.

25 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
26 significant impact on California clapper rail because the location of the current population and
27 suitable habitat for the species would make collision with the proposed transmission lines highly
28 unlikely.

29 **Impact BIO-65: Fragmentation of California Clapper Rail Habitat as a Result of Conservation** 30 **Component Implementation**

31 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create
32 temporary barriers to movements of California clapper rail. Grading, filling, contouring and other
33 initial ground-disturbing activities could remove habitat along movement corridors used by
34 individuals and, thus, temporarily reduce access to adjacent habitat areas. The temporary adverse
35 effects of fragmentation of tidal brackish emergent wetland habitat for California clapper rail or
36 restoration activities resulting in barriers to movement would be minimized through sequencing of
37 restoration activities to minimize effects of temporary habitat loss. The tidal natural communities
38 restoration would be phased through the course of the BDCP restoration program to allow for
39 recovery of some areas before restoration actions are initiated in other areas. In addition, *AMM19*
40 *California Clapper Rail* would avoid and minimize effects on California clapper rail.

41 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to
42 movement would not represent an adverse effect on California clapper rail as a result of special-

1 status species habitat modification because *CM4 Tidal Natural Communities Restoration* would be
2 phased to allow for the recovery of some areas before restoration actions are initiated in other
3 areas. In addition, *AMM19 California Clapper Rail* would avoid and minimize effects on California
4 clapper rail.

5 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to
6 movement would represent a less-than-significant impact on California clapper rail as a result of
7 habitat modification of a special status species because Tidal Natural Communities Restoration
8 (CM4) would be phased to allow for the recovery of some areas before initiating restoration actions
9 in other areas. In addition, *AMM19 California Clapper Rail* would avoid and minimize
10 effects on California clapper rail.

11 **California Least Tern**

12 This section describe the effects of Alternative 1C, including water conveyance facilities construction
13 and implementation of other conservation components on California least tern. California least tern
14 modeled habitat identifies foraging habitat as all tidal perennial aquatic natural community in the
15 study area. Breeding habitat is not included in the model because most of the natural shoreline in
16 the study area that historically provided nesting sites has been modified or removed.

17 Construction and restoration associated with Alternative 1C conservation measures would result in
18 both temporary and permanent losses of California least tern modeled habitat as indicated in Table
19 12-1C-27. Full implementation of Alternative 1C also include the following conservation actions
20 over the term of the BDCP to benefit California least tern (BDCP Chapter 3, Section 3.3, *Biological*
21 *Goals and Objectives*).

- 22 ● Restore and protect at least 65,000 acres of tidal natural communities and transitional uplands
23 to accommodate sea level rise (Objective L1.3, associated with CM4).
- 24 ● Within the at least 65,000 acres of tidal natural communities and transitional uplands, restore or
25 create tidal perennial aquatic natural community as necessary when creating tidal emergent
26 wetland (Objective TPANC1.1, associated with CM4).
- 27 ● Control invasive aquatic vegetation that adversely affects native fish habitat (Objective
28 TPANC2.1, associated with CM13).

29 Least terns currently nest on artificial fill adjacent to tidal perennial aquatic habitat in the vicinity of
30 Suisun Marsh and west Delta, and additional nesting could occur at the edge of tidal perennial
31 waters whenever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy
32 or gravelly substrates with sparse vegetation).

33 As explained below, with the restoration and protection of tidal perennial aquatic foraging habitat,
34 in addition to natural community enhancement and management commitments (including CM12
35 *Methylmercury Management*) and the implementation of AMM1–AMM7, *AMM27 Selenium*
36 *Management*, and Mitigation Measure BIO-66, impacts on the California least tern would not be
37 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-27. Changes in California Least Tern Modeled Habitat Associated with Alternative 1C**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Foraging	25	25	117	117	NA	NA
Total Impacts CM1		25	25	117	117	NA	NA
CM2–CM18	Foraging	38	46	11	16	NA	NA
Total Impacts CM2–CM18		38	46	11	16	NA	NA
TOTAL IMPACTS		63	71	128	133	NA	NA

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-66: Loss or Conversion of Habitat for and Direct Mortality of California Least Tern**

5 Alternative 1C conservation measures would result in the combined permanent and temporary loss
6 of up to 204 acres of modeled foraging habitat for California least tern (Table 12-1C-27). The
7 conservation measures that would result in these losses are construction of water conveyance
8 facilities and operation (CM1), *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural*
9 *Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. Habitat
10 enhancement and management activities (CM11), which include ground disturbance or removal of
11 nonnative vegetation, could also result in local adverse habitat effects. In addition, maintenance
12 activities associated with the long-term operation of the water conveyance facilities and other BDCP
13 physical facilities could degrade or eliminate California least tern foraging habitat. Each of these
14 individual activities is described below. A summary statement of the combined impacts, NEPA
15 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 16 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would
17 result in the combined permanent and temporary loss of up to 142 acres of modeled California
18 least tern aquatic foraging habitat (Table 12-1C-27). Of the 142 acres of modeled habitat that
19 would be removed for the construction of the conveyance facilities, 117 acres would be a
20 temporary loss. Most of the permanent loss would occur where Intakes 1-5 encroach on the
21 Sacramento River’s west bank between north of Clarksburg and Courtland. The temporary
22 effects on tidal perennial aquatic habitats would occur at numerous locations, including in the
23 Sacramento River at Intakes W1–5, and at temporary siphon, barge unloading and tunnel work
24 areas along the western tunnel and canal alignment. The CM1 construction footprint would not
25 overlap with any occurrences of California least tern. Mitigation Measure BIO-66, *California*
26 *Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*
27 (described below) would require preconstruction surveys and the establishment of no-

1 disturbance buffers and would be available to address potential effects on terns were they to
2 nest in the vicinity of the construction footprint. Refer to the Terrestrial Biology Map Book for a
3 detailed view of Alternative 1C construction locations. Impacts from CM1 would occur within
4 the first 10 years of Alternative 1C implementation.

- 5 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancement
6 would result in the permanent loss of 8 acres and the temporary loss of 11 acres of modeled
7 aquatic foraging habitat for California least tern in CZ 2. Activities from Fremont and
8 Sacramento Weir improvements, Putah Creek realignment, and Lisbon Weir modification could
9 involve excavation and grading in tidal perennial aquatic areas to improve passage of fish
10 through the bypasses. The loss is expected to occur during the first 10 years of Alternative 1C
11 implementation.
- 12 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration actions would result in the
13 permanent loss of 36 acres of modeled aquatic foraging habitat for California least tern. An
14 estimated 65,000 acres of tidal wetlands would be restored during tidal habitat restoration,
15 consistent with BDCP Objective L1.3. Of these acres, an estimated 27,000 acres of tidal perennial
16 aquatic would be restored, based on modeling conducted by ESAPWA (refer to Table 5 in BDCP
17 Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). This restoration is consistent with
18 BDCP Objective TPANC1.1. Tidal perennial aquatic restoration would be expected to
19 substantially increase the primary productivity of fish, increasing the prey base for California
20 least tern. Approximately 3,400 acres of the restoration would happen during the first 10 years
21 of BDCP implementation, which would coincide with the timeframe of water conveyance
22 facilities construction. The remaining restoration would be phased over the following 30 years.
23 Some of the restoration would occur in the lower Yolo Bypass, but restoration would also be
24 spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.
- 25 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
26 seasonally inundated floodplain would result in the permanent loss of 2 acres and the
27 temporary loss of 5 acres of modeled aquatic foraging habitat for California least tern. This
28 activity is scheduled to start following construction of water conveyance facilities, which is
29 expected to take 10 years. Specific locations for the floodplain restoration have not been
30 identified, but it is expected that much of the activity would occur in the south Delta along the
31 major rivers.
- 32 • *CM11 Natural Communities Enhancement and Management*: Noise and visual disturbances
33 during implementation of habitat management actions could result in temporary disturbances
34 that affect California least tern use of the surrounding habitat. These effects cannot be
35 quantified, but are expected to be minimal because few management activities would be
36 implemented in aquatic habitat and because terns are not expected to nest on protected lands.
37 Surveys would be conducted prior to ground disturbance in any areas that have suitable nesting
38 substrate for California least tern (flat, unvegetated areas near aquatic foraging habitat) and
39 injury mortality and noise and visual disturbance of nesting terns would be avoided and
40 minimized by the AMMs and Mitigation Measure BIO-66, *California Least Tern Nesting Colonies
41 Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, described below.
- 42 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
43 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
44 postconstruction disturbances, localized impacts on California least tern foraging habitat, and
45 temporary noise and disturbances over the term of the BDCP. Maintenance activities would

1 include vegetation management, levee and structure repair, and re-grading of roads and
2 permanent work areas which could be adjacent to California least tern foraging habitat. These
3 effects, however, would be reduced by AMMs described below.

- 4 • Injury and Direct Mortality: California least terns currently nest in the vicinity of potential
5 restoration sites in Suisun Marsh and west Delta area (CZ 10 and CZ 11). New nesting colonies
6 could establish if suitable nesting habitat is created during restoration activities (e.g., placement
7 of unvegetated fill to raise surface elevations prior to breaching levees during restoration
8 efforts). If nesting occurs where covered activities are undertaken, the operation of equipment
9 for land clearing, construction, conveyance facilities operation and maintenance, and habitat
10 restoration, enhancement, and management could result in injury or mortality of California least
11 tern. Risk of injury or disturbance would be greatest to eggs and nestlings susceptible to land-
12 clearing activities, abandonment of nests and nesting colonies, or increased exposure to the
13 elements or to predators. Injury to adults or fledged juveniles is less likely as these individuals
14 would be expected to avoid contact with construction equipment. However, injury or mortality
15 would be avoided through planning and preconstruction surveys to identify nesting colonies,
16 the design of projects to avoid locations with least tern colonies, and the provision for 500-foot
17 buffers as required by Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be*
18 *Avoided and Indirect Effects on Colonies Will Be Minimized.*

19 The following paragraphs summarize the combined effects discussed above and describe other
20 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
21 included.

22 ***Near-Term Timeframe***

23 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
24 the near-term BDCP conservation strategy has been evaluated to determine whether it would
25 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
26 the effects of construction would not be adverse under NEPA. With Alternative 1C implementation,
27 there would be a loss of 191 acres of modeled foraging habitat for California least tern in the study
28 area in the near-term. These effects would result from the construction of the water conveyance
29 facilities (CM1, 142 acres), and implementing other conservation measures (Yolo Bypass fisheries
30 improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled foraging habitat
31 impacts would occur in tidal perennial aquatic natural communities.

32 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
33 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would
34 indicate that 191 acres of the tidal perennial aquatic natural community should be restored/created
35 to compensate for the CM1 losses of California least tern foraging habitat. The near-term effects of
36 other conservation actions would remove 49 acres of tidal perennial aquatic habitat, and therefore
37 require 49 acres of tidal perennial aquatic natural community restoration using the same typical
38 NEPA and CEQA ratio (1:1 for restoration).

39 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities
40 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3). This
41 conservation action would result in the creation of approximately 3,400 acres of high quality tidal
42 perennial aquatic natural community, based on modeling conducted by ESAPWA (refer to Table 5 in
43 BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). Tidal perennial aquatic restoration

1 would occur in the same timeframe as the construction and early restoration losses, thereby
2 avoiding adverse effects on California least tern from loss of foraging habitat.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
7 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
8 species habitats at or adjacent to work areas and storage sites. BDCP Appendix 3.C describes the
9 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
10 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

11 The California least tern is not a species that is covered under the BDCP. Although nesting by
12 California least tern is not expected to occur, restoration sites could attract individuals wherever
13 disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly
14 substrates with sparse vegetation). If nesting were to occur, construction activities could have an
15 adverse effect on California least tern. Mitigation Measure BIO-66, *California Least Tern Nesting*
16 *Colonies Shall be Avoided and Indirect Effects on Colonies*, would be available to address this effect on
17 nesting California least terns.

18 **Late Long-Term Timeframe**

19 The habitat model indicates that the study area supports approximately 86,263 acres of foraging
20 habitat for California least tern. Alternative 1C as a whole would result in the permanent loss of and
21 temporary effects on 204 acres of foraging habitat during the term of the Plan (less than 1% of the
22 total habitat in the study area). The locations of these losses are described above in the analyses of
23 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*
24 *Natural Communities Restoration* would restore an estimated 27,000 acres of high quality tidal
25 perennial aquatic natural community would be restored (estimated from Table 5 in BDCP Appendix
26 3.B, *BDCP Tidal Habitat Evolution Assessment*). The restoration would occur over a wide region of
27 the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South
28 Delta ROAs (see Figure 12-1).

29 **NEPA Effects:** The loss of California least tern foraging habitat and potential direct mortality
30 associated with Alternative 1C would represent an adverse effect in the absence of other
31 conservation actions. Although nesting by California least tern is not expected to occur, restoration
32 sites could attract individuals wherever disturbed or artificial sites mimic habitat conditions sought
33 for nesting (i.e., sandy or gravelly substrates with sparse vegetation). If nesting were to occur,
34 construction activities could have an adverse effect on California least tern. Mitigation Measure BIO-
35 66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies will be*
36 *Minimized*, would be available to address this effect on nesting California least terns. With habitat
37 restoration associated with CM4 and guided by *AMM1 Worker Awareness Training*, *AMM2*
38 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
39 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
40 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*, which
41 would be in place throughout the construction period, the effects of Alternative 1C as a whole on
42 California least tern would not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
6 the effects of construction would be less than significant under CEQA. With Alternative 1C
7 implementation, there would be a loss of 191 acres of modeled foraging habitat for California least
8 tern in the study area in the near-term. These effects would result from the construction of the
9 water conveyance facilities (CM1, 142 acres), and implementing other conservation measures (Yolo
10 Bypass fisheries improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled
11 foraging habitat impacts would occur in tidal perennial aquatic natural communities.

12 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
13 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would
14 indicate that 191 acres of the tidal perennial aquatic natural community should be restored/created
15 to compensate for the CM1 losses of California least tern foraging habitat. The near-term effects of
16 other conservation actions would remove 49 acres of tidal perennial aquatic habitat, and therefore
17 require 49 acres of tidal perennial aquatic natural community restoration using the same typical
18 NEPA and CEQA ratio (1:1 for restoration).

19 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities
20 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3).
21 Modeling conducted by ESA PWA indicates that this conservation action would result in the creation
22 of approximately 3,400 acres of high-value tidal perennial aquatic natural community (refer to Table
23 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). Tidal perennial aquatic
24 restoration would occur in the same timeframe as the construction and early restoration losses,
25 thereby avoiding adverse effects on California least tern.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
27 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
28 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
29 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
30 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
31 species habitats at or adjacent to work areas and storage sites. BDCP Appendix 3.C describes the
32 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
33 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

34 Although nesting by California least tern is not expected to occur, restoration sites could attract
35 individuals wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e.,
36 sandy or gravelly substrates with sparse vegetation). If nesting were to occur, construction activities
37 could have an adverse effect on California least tern. Implementation of Mitigation Measure BIO-66,
38 *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies will be*
39 *Minimized*, would reduce the impact on nesting California least terns to a less-than-significant level.

40 The natural community restoration and protection activities would be concluded in the first 10
41 years of Plan implementation, which is close enough in time to the occurrence of impacts to
42 constitute adequate mitigation for CEQA purposes. In addition, AMM1–AMM7 and Mitigation
43 Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on*

1 *Colonies will be Minimized*, would avoid and minimize potential impacts on the species from
2 construction-related habitat loss and noise and disturbance. Because the number of acres required
3 to meet the typical mitigation ratio described above would be only 191 acres of restored tidal
4 perennial aquatic habitat, the 3,400 acres of tidal perennial aquatic restoration estimated in the
5 near-term, are more than sufficient to support the conclusion that the near-term impacts of habitat
6 loss and direct mortality under Alternative 1C would be less than significant under CEQA.

7 **Late Long-Term Timeframe**

8 The habitat model indicates that the study area supports approximately 86,263 acres of foraging
9 habitat for California least tern. Alternative 1C as a whole would result in the permanent loss of and
10 temporary effects on 204 acres of foraging habitat during the term of the Plan (less than 1% of the
11 total habitat in the study area). The locations of these losses are described above in the analyses of
12 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*
13 *Natural Communities Restoration* to restore an estimated 27,000 acres of high-value tidal perennial
14 aquatic natural community (estimated from Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat*
15 *Evolution Assessment*). The restoration would occur over a wide region of the study area, including
16 within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure
17 12-1).

18 In the absence of other conservation actions, the loss of California least tern foraging habitat and
19 potential direct mortality associated with Alternative 1C would represent an adverse effect as a
20 result of habitat modification of a special-status species and potential for direct mortality. Although
21 nesting by California least tern is not expected to occur, restoration sites could attract individuals
22 wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or
23 gravelly substrates with sparse vegetation). If nesting were to occur, construction activities could
24 have a significant impact on California least tern. The loss of California least tern foraging habitat
25 and potential direct mortality associated with Alternative 1C would represent a significant impact in
26 the absence of other conservation actions.

27 However, with habitat restoration associated with CM4 and guided by *AMM1 Worker Awareness*
28 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater*
29 *Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention,*
30 *Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations*
31 *Plan*, and implementation of Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall*
32 *Be Avoided and Indirect Effects on Colonies Will Be Minimized*, the loss of habitat or mortality under
33 this alternative would have a less-than-significant impact on California least tern.

34 **Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and** 35 **Indirect Effects on Colonies Will Be Minimized**

36 If suitable nesting habitat for California least tern (flat unvegetated areas near aquatic foraging
37 habitat) is identified during planning level surveys, DWR will ensure that a qualified biologist
38 with experience observing the species and its nests conducts at least three preconstruction
39 surveys for this species during the nesting season. DWR will design projects to avoid the loss of
40 California least tern nesting colonies. No construction will take place within 500 feet of
41 California least tern nests during the nesting season (April 15 to August 15 or as determined
42 through surveys). Only inspection, maintenance, research, or monitoring activities may be

1 performed during the least tern breeding season in areas within or adjacent to least tern
2 breeding habitat with USFWS and CDFW approval under the supervision of a qualified biologist.

3 **Impact BIO-67: Indirect Effects of Plan Implementation on California Least Tern**

4 **Indirect Construction- and Operation-Related Effects:** Indirect effects associated with
5 construction that could affect California least tern include noise, dust, and visual disturbance caused
6 by grading, filling, contouring, and other ground-disturbing operations outside the project footprint
7 but within 500 feet from the construction edge. Construction noise above background noise levels
8 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
9 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
10 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
11 which these noise levels could affect California least tern. The use of mechanical equipment during
12 water conveyance facilities construction could cause the accidental release of petroleum or other
13 contaminants that could affect California least tern or their prey species in the surrounding habitat.
14 The inadvertent discharge of sediment or excessive dust adjacent to foraging habitat could also
15 affect the species. Noise and visual disturbance is not expected to have an adverse effect on
16 California least tern foraging behavior. As described in Mitigation Measure BIO-66, *California Least*
17 *Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, if least tern
18 nests were found during planning or preconstruction surveys, no construction would take place
19 within 500 feet of active nests. In addition, AMM1–AMM7, including construction best management
20 practices, would minimize the likelihood of spills from occurring or excessive dust being created
21 during construction. Should a spill occur, implementation of these AMMs would greatly reduce the
22 likelihood of individuals being affected.

23 **Methylmercury Exposure:** Covered activities have the potential to exacerbate the bioaccumulation
24 of mercury in the California least tern. The operational impacts of new flows under CM1 were
25 analyzed using a DSM-2 based model to assess potential effects on mercury concentration and
26 bioavailability. Largemouth bass were used as a surrogate species for this analysis and results would
27 be expected to be similar or lower for the California least tern. Results indicated that changes in total
28 mercury levels in water and large mouth bass tissues were insignificant (see BDCP Appendix 5.D,
29 Tables 5D.4-3, 5D.4-4, and 5D.4-5).

30 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to
31 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
32 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
33 flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase
34 bioavailability of mercury. Increased methylmercury associated with natural community and
35 floodplain restoration may indirectly affect California least tern, via uptake through consumption of
36 prey (as described in BDCP Appendix 5.D, *Contaminants*).

37 Schwarzbach and Adelsbach (2003) investigated mercury exposure in 15 species of birds inhabiting
38 the Bay-Delta ecosystem. Among the species studied, the highest concentrations of mercury were
39 found in the eggs of piscivorous birds (terns and cormorants) that bioaccumulate mercury from
40 their fish prey. The very highest concentrations were found in Caspian and Forster's terns, especially
41 those inhabiting South San Francisco Bay. Based on three California least tern eggs collected from
42 Alameda Naval Air Station in the San Francisco Central Bay, concentrations in California least tern
43 eggs were a third (0.3 ppm) those of the eggs of the other two terns. Because of the small sample
44 size, there is a high degree of uncertainty regarding the levels of mercury that may be present in

1 California least tern eggs. If the mercury levels measured at Alameda Naval Air Station are
2 representative of the population in the San Francisco Bay, they would not be expected to result in
3 adverse effects on tern hatchlings. Hatching and fledging success were not reduced in common tern
4 eggs in Germany with mercury concentrations of 6.7 ppm (Hothem and Powell 2000).

5 Mercury is generally elevated throughout the Delta, and restoration of the lower potential areas in
6 total may result in generalized, very low level increases of mercury. Given that some species have
7 elevated mercury tissue levels pre-BDCP, these low level increases could result in some level of
8 effects. CM12, described below, will be implemented to address this risk of low level increases in
9 methylmercury which could add to the current elevated tissue concentrations.

- 10 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
11 mercury methylation and bioavailability
- 12 ● Define design elements that minimize conditions conducive to generation of methylmercury in
13 restored areas.
- 14 ● Define adaptive management strategies that can be implemented to monitor and minimize
15 actual postrestoration creation and mobilization of methylmercury.

16 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
17 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
18 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
19 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
20 2009). The effect of selenium toxicity differs widely between species and also between age and sex
21 classes within a species. In addition, the effect of selenium on a species can be confounded by
22 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
23 2009).

24 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
25 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
26 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
27 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
28 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
29 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
30 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
31 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
32 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
33 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
34 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
35 levels of selenium have a higher risk of selenium toxicity.

36 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
37 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
38 exacerbate bioaccumulation of selenium in avian species, including California least tern. Marsh (tidal
39 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
40 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP
41 restoration activities that create newly inundated areas could increase bioavailability of selenium
42 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
43 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
44 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term

1 increases in selenium concentrations in water in the Delta under any alternative. However, it is
2 difficult to determine whether the effects of potential increases in selenium bioavailability
3 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
4 effects on California least tern.

5 Because of the uncertainty that exists at this programmatic level of review, there could be a
6 substantial effect on California least tern from increases in selenium associated with restoration
7 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
8 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
9 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the
10 effectiveness of selenium management to reduce selenium concentrations and/or bioaccumulation
11 would be evaluated separately for each restoration effort as part of design and implementation. This
12 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
13 design schedule.

14 **NEPA Effects:** Noise and visual disturbances within 500 feet of construction-related activities from
15 the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation
16 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*
17 *Colonies Will Be Minimized*, would be available to address this potential adverse effect. AMM1–
18 AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would minimize
19 the likelihood of spills from occurring and ensure that measures were in place to prevent runoff
20 from the construction area and to avoid negative effects of dust on the species.

21 Tidal habitat restoration could result in increased exposure of California least tern to selenium. This
22 effect would be addressed through the implementation of *AMM27 Selenium Management* which
23 would provide specific tidal habitat restoration design elements to reduce the potential for
24 bioaccumulation of selenium and its bioavailability in tidal habitats.

25 Changes in water operations under CM1 would not be expected to result in increased mercury
26 bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased
27 exposure of California least tern to methylmercury. There is potential for increased exposure of the
28 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
29 mercury available in the soils and the biogeochemical conditions. However, it is unknown what
30 concentrations of methylmercury are harmful to the species, and the potential for increased
31 exposure varies substantially within the study area. Implementation of CM12 which contains
32 measures to assess the amount of mercury before project development, followed by appropriate
33 design and adaptation management, would minimize the potential for increased methylmercury
34 exposure, and would result in no adverse effect on the species.

35 **CEQA Conclusion:** Noise and visual disturbances within 500 feet of construction-related activities
36 from the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation
37 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*
38 *Colonies Will Be Minimized*, would avoid this potential adverse effect.

39 AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would
40 minimize the likelihood of spills from occurring and ensure that measures were in place to prevent
41 runoff from the construction area and to avoid negative effects of dust on the species.

42 Tidal habitat restoration could result in increased exposure of California least tern to selenium. This
43 effect would be addressed through the implementation of *AMM27 Selenium Management*, which

1 would provide specific tidal habitat restoration design elements to reduce the potential for
2 bioaccumulation of selenium and its bioavailability in tidal habitats.

3 Changes in water operations under CM1 would not be expected to result in increased mercury
4 bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased
5 exposure of California least tern to methylmercury. There is potential for increased exposure of the
6 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
7 mercury available in the soils and the biogeochemical conditions. However, it is unknown what
8 concentrations of methylmercury are harmful to the species, and the potential for increased
9 exposure varies substantially within the study area. Implementation of CM12 which contains
10 measures to assess the amount of mercury before project development, followed by appropriate
11 design and adaptation management, would minimize the potential for increased methylmercury
12 exposure, and would result in no adverse effect on the species.

13 With AMM1-AMM7, AMM12, AMM27, and CM12 in place, in addition to the implementation of
14 Mitigation Measure BIO-66, the indirect effects of plan implementation would not result in a
15 substantial adverse effect on the species through habitat modification or potential mortality of a
16 special-status species. Therefore, the indirect effects of Alternative 1C implementation would have a
17 less-than-significant impact on California least tern.

18 **Mitigation Measure BIO-66, California Least Tern Nesting Colonies Shall Be Avoided and**
19 **Indirect Effects on Colonies Will Be Minimized**

20 See Mitigation Measure BIO-66 under Impact BIO-66.

21 **Impact BIO-68: Effects on California Least Tern Associated with Electrical Transmission**
22 **Facilities**

23 The risk of mortality of California least tern from the construction of new transmission lines is
24 considered to be minimal based on tern flight behaviors and its unlikely use of habitats near the
25 transmission line corridors. Terns exhibit low wing loading and high aspect-ratio wings and as a
26 result can maneuver relatively quickly around an obstacle such as a transmission line. Their wing
27 structure and design allows for rapid flight and quick, evasive actions (see BDCP Appendix 5.J,
28 Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). Marking
29 transmission lines with flight diverters that make the lines more visible to birds has been shown to
30 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
31 marking devices in the Central Valley could reduce avian mortality by 60%. All new project
32 transmission lines would be fitted with flight diverters. Bird flight diverters would make
33 transmission lines highly visible to California least terns and would substantially reduce the
34 potential for powerline collisions.

35 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
36 adverse effect on California least tern as a result of direct mortality of a special-status species
37 because they are uncommon in the vicinity of proposed transmission lines and because the
38 probability of bird-powerline strikes is highly unlikely due to tern flight behaviors. All new
39 transmission lines constructed for the project would be fitted with bird diverters, which have been
40 shown to reduce avian mortality by 60%. With implementation of AMM20 *Greater Sandhill Crane*,
41 the construction and operation of transmission lines would not result in an adverse effect on
42 California least tern.

1 **CEQA Conclusion:** The construction and presence of new transmission lines would represent a less-
2 than-significant impact on California least tern as a result of direct mortality of a special-status
3 species because they are uncommon in the vicinity of proposed transmission lines and because the
4 probability of bird-powerline strikes is highly unlikely due to tern flight behaviors. All new
5 transmission lines constructed for the project would be fitted with bird diverters, which have been
6 shown to reduce avian mortality by 60%. With implementation of *AMM20 Greater Sandhill Crane*,
7 the construction and operation of transmission lines would result in a less-than-significant impact
8 on California least tern

9 **Greater Sandhill Crane**

10 This section describes the effects of Alternative 1C, including water conveyance facilities
11 construction and implementation of other conservation components, on greater sandhill crane.
12 Greater sandhill cranes in the study area are almost entirely dependent on privately owned
13 agricultural lands for foraging. Long-term sustainability of the species is thus dependent on
14 providing a matrix of compatible crop types that afford suitable foraging habitat and maintaining
15 compatible agricultural practices, while sustaining and increasing the extent of other essential
16 habitat elements such as night roosting habitat. The habitat model for greater sandhill crane
17 includes “roosting and foraging” and “foraging” habitat. These habitat types include certain
18 agricultural types, specific grassland types, irrigated pastures and hay crops, managed seasonal
19 wetland, and other natural seasonal wetland. Roosting and foraging habitat includes known,
20 traditional roost sites that also provide foraging habitat (BDCP Appendix 2.A *Covered Species*
21 *Accounts*). Both temporary and permanent roost sites were identified for greater Sandhill crane.
22 Permanent roosting and foraging sites are those used regularly, year after year, while temporary
23 roosting and foraging sites are those used in some years. Factors included in assessing the loss of
24 foraging habitat for the greater sandhill crane includes the relative habitat value of specific crop or
25 land cover types, and proximity to known roost sites. Foraging habitat for greater sandhill crane
26 included crop types and natural communities up to 4 miles from known roost sites, within the
27 boundary of the winter crane use area (BDCP Appendix 2A, *Covered Species Accounts*).

28 Construction and restoration associated with Alternative 1C conservation measures would result in
29 both temporary and permanent losses of foraging and roosting habitat for greater sandhill crane as
30 indicated in Table 12-1C -28. Full implementation of Alternative 1C would also include the following
31 conservation actions over the term of the BDCP to benefit the greater sandhill crane (BDCP Chapter
32 3, Section 3.3, *Biological Goals and Objectives*).

- 33 ● Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at
34 least 80% maintained in very high-value types in any given year. This protected habitat will be
35 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
36 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
37 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective
38 GSHC1.1, associated with CM3).
- 39 ● To create additional high-value greater sandhill crane winter foraging habitat, 10% of the
40 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or
41 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be
42 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
43 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
44 habitat loss (Objective GSHC1.2, associated with CM3).

- 1 • Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the
2 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise
3 and local seasonal flood events. The wetlands will be located within 2 miles of existing
4 permanent roost sites and protected in association with other protected natural community
5 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide
6 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 7 • Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge
8 project boundary. The complexes will be no more than 2 miles apart and will help provide
9 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each
10 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane
11 roosting habitat, and will be protected in association with other protected natural community
12 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,
13 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be
14 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
15 support roosting cranes and provide highest-value foraging habitat, provided such substitution
16 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for
17 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
- 18 • Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost
19 sites. The habitat will consist of active cornfields that are flooded following harvest to support
20 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least
21 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will
22 be sited with consideration of the location of roosting habitat loss and will be in place prior to
23 roosting habitat loss (Objective GSCH1.5, associated with CM3).
- 24 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
25 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 26 • Target cultivated land conservation to provide connectivity between other conservation lands
27 (Objective CLNC1.2, associated with CM3).
- 28 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
29 lands that occur in cultivated lands within the reserve system, including, water conveyance
30 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

31 As explained below, with the restoration and protection of these amounts of habitat, in addition to
32 natural community enhancement and management commitments (including *CM12 Methylmercury*
33 *Management*) and the implementation of AMM1–AMM7, AMM20 *Greater Sandhill Crane*, AMM27
34 *Selenium Management*, and AMM30 *Transmission Line Design and Alignment Guidelines*, impacts on
35 the greater sandhill crane would not be adverse for NEPA purposes and would be less than
36 significant for CEQA purposes.

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2

Table 12-1C-28. Changes in Greater Sandhill Crane Modeled Habitat Associated with Alternative 1C (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	0	0	NA	NA
	Roosting and Foraging - Temporary	0	0	1	1	NA	NA
	Foraging	1,445	1,445	2,259	2,259	NA	NA
Total Impacts CM1		1,445	1,445	2,260	2,260		
CM2-CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	2,776	4,367	0	0	0	0
Total Impacts CM2-CM18		2,776	4,408	0	0	0	0
Roosting and Foraging - Permanent		0	0	0	0	0	0
Roosting and Foraging - Temporary		0	41	1	1	0	0
Total Foraging		4,221	5,812	2,259	2,259	0	0
TOTAL IMPACTS		4,221	5,853	2,260	2,260	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-69: Loss or Conversion of Habitat for and Direct Mortality of Greater Sandhill**
5 **Crane**

6 Alternative 1C conservation measures would result in the temporary loss of up to 42 acres of
7 temporary roosting and foraging habitat and 8,071 acres of foraging habitat for greater sandhill
8 crane (5,812 acres of permanent loss, 2,259 acres of temporary loss, Table 12-1C-28). Conservation
9 measures that would result in these losses are conveyance facilities and transmission line
10 construction, and establishment and use of borrow and spoil areas from *CM1 Water Facilities and*
11 *Operation, CM4 Tidal Natural Communities Restoration, CM8 Grassland Natural Community*
12 *Restoration, and CM10 Nontidal Marsh Restoration, and CM11 Natural Communities Enhancement and*
13 *Management*. The majority of habitat loss would result from conversion to tidal natural communities
14 through CM4. Habitat enhancement and management activities (CM11), which include ground
15 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In
16 addition, maintenance activities associated with the long-term operation of the water conveyance

1 facilities and other BDCP physical facilities could degrade or eliminate greater sandhill crane
2 modeled habitat. Each of these individual activities is described below. A summary statement of the
3 combined impacts, NEPA effects and a CEQA conclusion follow the individual conservation measure
4 discussions.

- 5 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities as they
6 are currently designed would result in the combined permanent and temporary loss of up to
7 3,705 acres of modeled greater sandhill crane habitat. This would consist of the permanent
8 removal of 1,445 acres of foraging habitat (Table 12-1C-28). Foraging habitat that would be
9 permanently impacted by CM1 would consist of 525 acres of very high-value, 9 acres of high-
10 value, and 541 acres of medium-value foraging habitat (Table 12-1C-29). In addition, 1 acre of
11 temporary roosting and foraging habitat and 2,259 acres of foraging habitat would be
12 temporarily affected due to construction. The temporarily removed foraging habitat would
13 consist primarily of cultivated lands and it would be restored within one year following
14 construction. However, it would not necessarily be restored to its original topography and it
15 could be restored as grasslands in the place of cultivated lands. Approximately half of the acres
16 of foraging habitat that would be impacted would be a result of borrow and spoil areas
17 associated with the construction of the intakes and the canal.

18 The acre of temporary roosting and foraging habitat that would be temporarily impacted is
19 located on Webb Tract, east of Bradford Island and the loss would be a result of the installation
20 of a temporary transmission line along the southern border of the roost site. However, the
21 implementation of *AMM20 Greater Sandhill Crane* would require that CM1 activities be designed
22 to avoid direct loss of crane roost sites. Avoidance of crane roost sites would be accomplished
23 either by siting activities outside of identified roost sites or by relocating the roost site if it
24 consisted of cultivated lands. Relocated roost sites would be established prior to construction
25 activities affecting the original roost site (as described in *AMM20 Greater Sandhill Crane* in
26 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Therefore there would be no loss of
27 crane roosting and foraging habitat as a result of water conveyance facility construction once
28 the facilities were fully designed.

29 Approximately 617 acres of the permanent loss of foraging habitat would be from the storage of
30 reusable tunnel material on Brannan Island and northeast of Knightsen. This material would
31 likely be moved to other sites for use in levee build-up and restoration, and the affected area
32 would likely eventually be restored. While this effect is categorized as permanent because there
33 is no assurance that the material would eventually be moved, the effect would likely be
34 temporary. The actual footprint of the storage areas required for reusable tunnel material is
35 flexible, and the actual acreage of habitat affected by this activity could be reduced based on the
36 height of the storage piles in addition to other considerations. The implementation of *AMM6*
37 *Disposal and Reuse of Spoils* would require that the areas used for reusable tunnel material
38 storage be minimized in crane foraging habitat and completely avoid crane roost sites.
39 Conveyance construction impacts would primarily occur west of the highest crane use areas in
40 the central Delta. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1C
41 construction locations. Impacts from CM1 would occur within the first 10 years of Plan
42 implementation.

1 **Table 12-1C-29. Total Amount of Affected Greater Sandhill Crane Foraging Habitat**

Foraging Habitat Value Class	Land Cover Type	Acres Affected by CM1 permanent (temporary)	Acres Affected by CM2–CM18 permanent (temporary)
Very high	Corn, rice	525 (350)	1,155 (0)
High	Wheat, managed wetlands,	9 (53)	489 (0)
Medium	Alfalfa and alfalfa mixtures, irrigated mixed pasture, irrigated native pasture, irrigated pasture, irrigated other pasture, grain and hay crops, miscellaneous grain and hay, mixed grain and hay, nonirrigated mixed grain and hay, other grain crops, sudan, miscellaneous grasses, grassland, alkali seasonal wetlands, vernal pool complex	541 (836)	1,403 (0)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry), native vegetation	370(1,020)	1,320 (0)
Total		1,445 (2,259)	4,367 (0)

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- CM4 Tidal Natural Communities Restoration:* Based on the hypothetical tidal restoration footprint, this activity would result in the permanent loss or conversion of approximately 2,754 acres of greater sandhill crane habitat, consisting of 41 acres of temporary roosting and foraging habitat and 2,713 acres of foraging habitat. Loss of foraging habitat from CM4 would consist of 716 acres of very high-value, 304 acres of high-value, 873 acres of medium-value, and 821 acres of low-value foraging habitat. This loss would occur in the Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ 4 could occur between the high crane use areas of the central Delta and the Cosumnes River Preserve. However, the conversion of grasslands and cultivated lands to tidal wetlands would not prohibit crane movement or reduce use of these areas. In CZ 5, loss of modeled habitat would occur along the western edge of the greater sandhill crane winter use area and therefore would not result in fragmentation of traditional crane habitats. Therefore fragmentation of habitat from tidal restoration activities would be expected to be minimal. Approximately 1,951 acres of foraging habitat would be impacted within the first 10 years of Alternative 1C implementation.
 - CM8 Grassland Natural Community Restoration:* Approximately 300 acres of cultivated lands that provide foraging habitat for greater sandhill crane would be converted to grassland by the late long-term timeframe. No roosting/foraging habitat would be impacted by grassland restoration activities. The restored grasslands would continue to provide foraging habitat value for the greater sandhill crane. Approximately 257 acres would be impacted within the first 10 years of Plan implementation.
 - CM10 Nontidal Marsh Restoration:* Nontidal marsh restoration would result in the permanent conversion of approximately 1,350 acres of modeled foraging habitat for the greater sandhill

1 crane. A portion of the restored nontidal marsh would be expected to continue to provide
2 roosting and foraging habitat value for the greater sandhill crane. However, some of this
3 restored marsh would be unsuitable as it would lack emergent vegetation and consist of open
4 water that would be too deep to provide suitable roosting or foraging habitat. Approximately
5 567 acres of habitat would be converted to nontidal marsh within the first 10 years of
6 Alternative 1C implementation.

- 7 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
8 actions included in CM11 that are designed to enhance wildlife values in restored or protected
9 habitats could result in localized ground disturbances that could temporarily remove small
10 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
11 vegetation and road and other infrastructure maintenance activities, would be expected to have
12 minor adverse effects on available habitat and would be expected to result in overall
13 improvements to and maintenance of habitat values over the term of the BDCP. The potential for
14 these activities to result in direct mortality of greater sandhill crane would be minimized with
15 the implementation of *AMM20 Greater Sandhill Crane*. CM11 would also include the construction
16 of recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP
17 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead
18 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
19 disturbed areas when and where possible. If new ground disturbance was necessary, greater
20 sandhill crane habitat would be avoided, with the exception of a permanent loss of 4 acres of
21 grassland foraging habitat (1 acre of which would be impacted within the first 10 years of plan
22 implementation).
- 23 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
24 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
25 disturbances that could affect greater sandhill crane use of the surrounding habitat.
26 Maintenance activities would include vegetation management, levee and structure repair, and
27 re-grading of roads and permanent work areas. These effects, could be adverse as sandhill
28 cranes are sensitive to disturbance. However, potential effects would be reduced by AMMs and
29 conservation actions as described below.
- 30 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
31 direct mortality of greater sandhill crane if they were present in the study area, because they
32 would be expected to avoid contact with construction and other equipment. Potential effects
33 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.
34 The potential for injury and direct mortality from electrical transmission facilities is discussed
35 below under Impact BIO-70.

36 The following paragraphs summarize the combined effects discussed above and describe other
37 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
38 included.

39 ***Near-Term Timeframe***

40 Because the water conveyance facilities construction is being evaluated at the project level, the near-
41 term BDCP conservation strategy has been evaluated to determine whether it would provide
42 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
43 construction would not be adverse under NEPA. Based on current design footprints, the Plan would
44 remove 1 acre of roosting and foraging habitat in the study area in the near-term as a result of the

1 construction of the water conveyance facilities (CM1). In addition, 6,480 acres of foraging habitat
 2 would be removed or converted in the near-term (CM1, 3,704 acres; *CM4 Tidal Natural Communities*
 3 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural Communities*
 4 *Enhancement and Management*—2,776 acres). Of these near-term acres of foraging habitat impact,
 5 4,248 acres would be moderate- to very high-value habitat (CM1, 2,313 acres, CM4-11, 1,935 acres).
 6 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
 7 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in
 8 Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1
 9 protection of high- to very high-value foraging habitat for loss of moderate- to very high-value
 10 foraging habitat. Using these ratios would indicate that 1 acres of greater roosting habitat should be
 11 restored/created and 1 acres should be protected to compensate for the CM1 losses of greater
 12 sandhill crane roosting and foraging habitat. In addition, 2,313 acres of high- to very high-value
 13 foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane moderate-
 14 to very high-value foraging habitat. The near-term effects of other conservation actions would
 15 remove 1,935 acres of moderate- to very high-value foraging habitat, and therefore require 1,927
 16 acres of protection of high- to very high-value foraging habitat using the same typical NEPA and
 17 CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1
 18 protection for the loss of foraging habitat).

19 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane
 20 roost sites were directly impacted by CM1 covered activities (including transmission lines and their
 21 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
 22 result of water conveyance facility construction once the facilities were fully designed, which would
 23 avoid the CM1 impact on the acre of roosting and foraging habitat once the project design was final.
 24 Methods to avoid direct impacts on crane roost sites are described in *AMM20 Greater Sandhill Crane*.

25 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
 26 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3, *Description of*
 27 *Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in the
 28 same timeframe as the construction and early restoration losses.

29 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
 30 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
 31 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
 32 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
 33 Sandhill Crane Winter Use Area, and would be in place prior to construction. Of the 500 acres of
 34 managed wetlands to be created for roosting habitat, 320 acres would be created in minimum patch
 35 sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective
 36 GSHC1.3). Restoration sites would be identified with consideration of sea level rise and local
 37 seasonal flood events. These wetlands would be created within 2 miles of existing permanent roost
 38 sites and protected in association with other protected natural community types at a ratio of 2:1
 39 upland to wetland habitat to provide buffers that will protect cranes from the types of disturbances
 40 that would otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual
 41 disturbance, lighting). The remaining 180 acres of crane roosting habitat would be constructed
 42 within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be
 43 designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill crane
 44 populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would provide
 45 additional conservation to address the threats of vineyard conversion, urbanization to the east, and
 46 sea level rise to the west of greater sandhill crane wintering habitat.

1 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
2 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
3 BIO-69a, *Compensate for the Loss of Medium- to Very High-Value Greater Sandhill Crane Foraging*
4 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the
5 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were
6 compensated for with appropriate crop types and natural communities.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
11 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
12 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
13 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
14 of the Final EIR/EIS.

15 **Late Long-Term Timeframe**

16 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676
17 acres of foraging habitat for greater sandhill crane. Alternative 1C as a whole would result in the
18 permanent loss of and temporary effects on 42 acres of roosting and foraging habitat (less than 1%
19 of the total habitat in the study area) and 8,071 acres of foraging habitat (5% of the total habitat in
20 the study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost
21 by the late long-term timeframe would consist of 5,360 acres of medium- to very high-value foraging
22 habitat. The locations of these losses are described above in the analyses of individual conservation
23 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites
24 were directly affected by water conveyance facilities including transmission lines and associated
25 footprints. In addition, temporarily removed habitat would be restored within 1 year following
26 construction. However, it would not necessarily be restored to its original topography and it could
27 result in the conversion of cultivated lands to grasslands.

28 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
29 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
30 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
31 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
32 GSHC1.1).

33 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
34 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
35 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
36 and local seasonal flood events. These wetlands would be created within 2 miles of existing
37 permanent roost sites and protected in association with other protected natural community types at
38 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
39 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
40 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
41 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and
42 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
43 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
44 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The

1 large patch sizes of these wetland complexes would provide additional conservation to address the
2 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
3 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
4 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
5 active cornfields that are flooded following harvest to support roosting cranes and also provide the
6 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
7 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with
8 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat
9 loss.

10 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
11 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
12 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
13 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
14 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
15 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives
16 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
17 economically driven agricultural practices, protecting crane habitat would provide enhanced
18 stability to agricultural habitat value within the crane use area that does not currently exist.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
23 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
24 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
25 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
26 of the Final EIR/EIS.

27 Considering habitat protection, restoration, management, and enhancement would be guided by
28 performance standards, and the aforementioned AMMs, which would be in place throughout the
29 period of construction, greater sandhill crane habitat losses and conversions under Alternative 1C
30 would not be an adverse effect under NEPA.

31 **CEQA Conclusion:**

32 **Near-Term Timeframe**

33 Because the water conveyance facilities construction is being evaluated at the project level, the near-
34 term BDCP conservation strategy has been evaluated to determine whether it would provide
35 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
36 construction would be less than significant under CEQA. Based on current design footprints, the Plan
37 would remove 1 acre of roosting and foraging habitat in the study area in the near-term as a result
38 of the construction of the water conveyance facilities (CM1). In addition, 6,480 acres of foraging
39 habitat would be removed or converted in the near-term (CM1, 3,704 acres; *CM4 Tidal Natural*
40 *Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*
41 *Communities Enhancement and Management*—2,776 acres). Of these near-term acres of foraging
42 habitat impact, 4,248 acres would be moderate- to very high-value habitat (CM1, 2,313 acres, CM4-
43 11, 1,935 acres). Typical NEPA and CEQA project-level mitigation ratios for those natural
44 communities affected by CM1 and that are identified in the biological goals and objectives for

1 greater sandhill crane in Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss
2 of roost sites and 1:1 protection of high- to very high-value foraging habitat for loss of moderate- to
3 very high-value foraging habitat. Using these ratios would indicate that 1 acres of greater roosting
4 habitat should be restored/created and 1 acres should be protected to compensate for the CM1
5 losses of greater sandhill crane roosting and foraging habitat. In addition, 2,313 acres of high- to
6 very high-value foraging habitat should be protected to mitigate the CM1 losses of greater sandhill
7 crane moderate- to very high-value foraging habitat. The near-term effects of other conservation
8 actions would remove 1,935 acres of moderate- to very high-value foraging habitat, and therefore
9 require 1,935 acres of protection of high- to very high-value foraging habitat using the same typical
10 NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging
11 habitat; 1:1 protection for the loss of foraging habitat).

12 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane
13 roost sites were directly impacted by CM1 covered activities (including transmission lines and their
14 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
15 result of water conveyance facility construction once the facilities were fully designed, which would
16 avoid the CM1 impact on the acre of roosting and foraging habitat once the project design was final.
17 Methods to avoid direct impacts on crane roost sites are described in *AMM20 Greater Sandhill Crane*.

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19 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3, *Description of*
20 *Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in the
21 same timeframe as the construction and early restoration losses.

22 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
23 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
24 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
25 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
26 Sandhill Crane Winter Use Area, and would be in place prior to construction. Of the 500 acres of
27 managed wetlands to be created for roosting habitat, 320 acres would be created in minimum patch
28 sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective
29 GSHC1.3). Restoration sites would be identified with consideration of sea level rise and local
30 seasonal flood events. These wetlands would be created within 2 miles of existing permanent roost
31 sites and protected in association with other protected natural community types at a ratio of 2:1
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33 that would otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual
34 disturbance, lighting). The remaining 180 acres of crane roosting habitat would be constructed
35 within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be
36 designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill crane
37 populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would provide
38 additional conservation to address the threats of vineyard conversion, urbanization to the east, and
39 sea level rise to the west of greater sandhill crane wintering habitat.

40 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
41 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
42 BIO-69a would be available to guide the near-term protection of cultivated lands to ensure that the
43 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were
44 compensated for with appropriate crop types and natural communities.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
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11 acres of foraging habitat for greater sandhill crane. Alternative 1C as a whole would result in the
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13 of the total habitat in the study area) and 8,071 acres of foraging habitat (5% of the total habitat in
14 the study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost
15 by the late long-term timeframe would consist of 6,268 acres of medium- to very high-value foraging
16 habitat. The locations of these losses are described above in the analyses of individual conservation
17 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites
18 were directly affected by water conveyance facilities including transmission lines and associated
19 footprints. In addition, temporarily removed habitat would be restored within 1 year following
20 construction. However, it would not necessarily be restored to its original topography and it could
21 result in the conversion of cultivated lands to grasslands.

22 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
23 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
24 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
25 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
26 GSHC1.1).

27 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
28 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
29 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
30 and local seasonal flood events. These wetlands would be created within 2 miles of existing
31 permanent roost sites and protected in association with other protected natural community types at
32 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
33 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
34 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
35 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and
36 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
37 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
38 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The
39 large patch sizes of these wetland complexes would provide additional conservation to address the
40 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
41 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
42 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
43 active cornfields that are flooded following harvest to support roosting cranes and also provide the
44 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
45 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with

1 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat
2 loss.

3 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
4 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
5 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
6 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
7 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
8 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives
9 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
10 economically driven agricultural practices, protecting crane habitat would provide enhanced
11 stability to agricultural habitat value within the crane use area that does not currently exist.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
16 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
17 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
18 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
19 of the Final EIR/EIS.

20 In the absence of other conservation actions, the effects on greater sandhill crane habitat from
21 Alternative 1C would represent an adverse effect as a result of habitat modification of a special-
22 status species and potential for direct mortality. Considering Alternative 1C's protection and
23 restoration provisions, in addition to Mitigation Measure BIO-69a, which would compensate for the
24 loss of medium- to very high-value foraging habitat at a ratio of 1:1 prior to or concurrent with
25 impacts, loss of habitat and direct mortality through implementation of Alternative 1C would not
26 result in a substantial adverse effect through habitat modifications and would not substantially
27 reduce the number or restrict the range of the species. Therefore, the alternative would have a less-
28 than-significant impact on greater sandhill crane.

29 **Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value** 30 **Greater Sandhill Crane Foraging Habitat**

31 DWR will compensate for the loss of greater sandhill crane medium- to very high-value foraging
32 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan
33 Area. Compensation must occur prior to or concurrent within the impacts to minimize the
34 effects of habitat loss. The crop types and natural communities that are included in foraging
35 habitat value categories are listed in Table 12-1C-29. Foraging habitat conservation must occur
36 within the greater sandhill crane winter use area and the location of protected habitat or
37 conservation easements must be preapproved by USFWS and CDFW.

38 **Impact BIO-70: Effects on Greater Sandhill Crane Associated with Electrical Transmission** 39 **Facilities**

40 Greater sandhill cranes are susceptible to collision with power lines and other structures during
41 periods of inclement weather and low visibility (Avian Power Line Interaction Committee 1994,
42 Brown and Drewien 1995, Manville 2005). There are extensive existing transmission and
43 distribution lines in the sandhill crane winter use area. These include a network of distribution lines

1 that are between 11- and 22-kV. In addition, there are two 115-kV lines that cross the study area,
 2 one that overlaps with the greater sandhill crane winter use area between Antioch and I-5 east of
 3 Hood, and one that crosses the northern tip of the crane winter use area north of Clarksburg. There
 4 are 69-kV lines within the study area that parallel Twin Cities Road, Herzog Road, Lambert Road,
 5 and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes National Wildlife Refuge. At the
 6 south end of the winter use area, there are three 230-kV transmission lines that follow I-5, and then
 7 cut southwest through Holt, and two 500-kV lines cross the southwestern corner of the winter use
 8 area. This existing network of power lines in the study currently poses a collision and electrocution
 9 risk for sandhill cranes, because they cross over or surround sandhill crane roost sites in the study
 10 area.

11 Both permanent and temporary electrical transmission lines would be constructed to supply
 12 construction and operational power to Alternative 1C facilities as described below. The potential for
 13 birdstrikes could also be exacerbated by construction-related effects, especially in low-visibility
 14 conditions. The potential mortality of greater sandhill crane in the area of the proposed
 15 transmission lines under Alternative 1C was estimated using collision mortality rates by Brown and
 16 Drewien (1995) and an estimate of potential crossings along the proposed lines (methods are
 17 described in BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*
 18 *BDCP Powerlines*). This analysis concluded that mortality risk could be substantially reduced by
 19 marking new transmission lines to increase their visibility to sandhill cranes.

20 Typically, higher-voltage (230-kilovolt [kV]) lines vary in height from 90 to 110 feet, while “sub”
 21 transmission (69-kV) lines vary from 50 to 70 feet (Avian Power Line Interaction Committee 2006).
 22 The Alternative 1C alignment would require the installation of approximately 36 miles of permanent
 23 transmission line (18 miles of 230-kV lines and 18 miles of 69-kV lines) extending north and south,
 24 to the west of the high-use crane areas. The temporary transmission lines would total approximately
 25 71 miles (14 miles of 69-kV line and 57 miles of 12-kV line). Temporary lines would be removed
 26 after construction of the water conveyance facilities, within 10 years.

27 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
 28 transmission line alignment, such as co-locating transmission lines when it would minimize effects
 29 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. After the
 30 Draft EIR/EIS was issued in December 2013, additional avoidance features were added to *AMM20*
 31 *Greater Sandhill Crane*. *AMM20 Greater Sandhill Crane* requires that Alternative 1C meet the
 32 performance standard of no mortality of greater sandhill crane associated with the new facilities.
 33 This would be achieved by implementing one or any combination of the following: 1) siting new
 34 transmission lines in lower bird strike risk zones; 2) removing, relocating or undergrounding
 35 existing lines where feasible; 3) using natural gas generators in lieu of installing transmission lines
 36 in high-risk zones of the greater sandhill crane winter use area; 4) undergrounding new lines in
 37 high-risk zones of the greater sandhill crane winter use area; 5) permanently installing flight
 38 diverters on existing lines over lengths equal to or greater than the length of the new transmission
 39 lines in the crane winter use area; 6) for areas outside of the Stone Lakes NWR project boundary,
 40 shifting locations of flooded areas that provide crane roosts to lower risk areas. These measures are
 41 described in detail in *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental Commitments,*
 42 *AMMs, and CMs*.

43 The implementation of the measures described above under *AMM20 Greater Sandhill Crane* would
 44 substantially reduce the potential for crane collisions with transmission lines. Potential measures
 45 that would eliminate this risk include using natural gas generators in lieu of transmission lines or

1 undergrounding new lines in high-risk zones in the greater sandhill crane winter use area. Marking
 2 transmission lines with flight diverters that make the lines more visible to birds has been shown to
 3 reduce the incidence of bird mortality, including for sandhill cranes (Brown and Drewien 1995). Yee
 4 (2008) estimated that marking devices in the Central Valley could reduce avian mortality by 60%.
 5 All new transmission lines would be fitted with flight diverters. The installation of flight diverters on
 6 existing permanent lines would be prioritized in the highest risk zones for greater sandhill crane (as
 7 described in BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*
 8 *BDCP Powerlines*) and diverters would be installed in a configuration that research indicates would
 9 reduce bird strike risk by at least 60%. The length of existing line to be fitted with bird strike
 10 diverters would be equal to the length of new transmission lines constructed for the project, in an
 11 area with the same or higher greater sandhill crane strike risk to provide a net benefit to the species.
 12 For optimum results, the recommended spacing distance for bird flight diverters is 15 to 16.5 feet
 13 (4.5 to 5 meters) (Avian Power Line Interaction Committee 1994). Placing diverters on existing lines
 14 would be expected to reduce existing mortality in the Plan Area and therefore result in a net benefit
 15 to the greater sandhill crane population because these flight diverters would be maintained in
 16 perpetuity.

17 **NEPA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
 18 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
 19 current proposed transmission line alignment under Alternative 1C is not fully designed, and line
 20 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the
 21 final transmission line alignment avoid crane roost sites and achieve the performance standard of
 22 no mortality of greater sandhill crane associated with the new facilities. *AMM30 Transmission Line*
 23 *Design and Alignment Guidelines* would require design features for the transmission line alignment,
 24 such as co-locating transmission lines when it would minimize effects on sandhill cranes, to avoid
 25 impacts on sensitive habitats to the maximum extent feasible. All new transmission lines
 26 constructed for the project would be fitted with bird diverters, which have been shown to reduce
 27 avian mortality by 60%. With incorporation of *AMM30 Transmission Line Design and Alignment*
 28 *Guidelines* and one or a combination of the measures to greatly reduce the risk of bird strike
 29 described in *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines
 30 under Alternative 1C would not result in an adverse effect on greater sandhill crane.

31 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
 32 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
 33 current proposed transmission line alignment under Alternative 1C is not fully designed, and line
 34 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the
 35 final transmission line alignment avoid crane roost sites and achieve the performance standard of
 36 no mortality of greater sandhill crane associated with the new facilities. *AMM30 Transmission Line*
 37 *Design and Alignment Guidelines* would require design features for the transmission line alignment,
 38 such as co-locating transmission lines when it would minimize effects on sandhill cranes, to avoid
 39 impacts on sensitive habitats to the maximum extent feasible. All new transmission lines
 40 constructed for the project would be fitted with bird diverters, which have been shown to reduce
 41 avian mortality by 60%. With incorporation of *AMM30 Transmission Line Design and Alignment*
 42 *Guidelines* and one or a combination of the measures to greatly reduce the risk of bird strike
 43 described in *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines
 44 under Alternative 1C would have a less-than-significant impact on greater sandhill crane.

Impact BIO-71: Indirect Effects of Plan Implementation on Greater Sandhill Crane

Indirect Construction- and Operation-Related Effects: Sandhill cranes are sensitive to disturbance. Noise and visual disturbances from the construction of water conveyance facilities and other conservation measures could reduce greater sandhill crane use of modeled habitat adjacent to work areas. Indirect effects associated with construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations outside the project footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise and visual disturbances that could affect greater sandhill crane use of surrounding habitat. These effects could result from periodic vehicle use along the conveyance corridor, inspection and maintenance of aboveground facilities, and similar activities. These potential effects would be minimized with implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*.

The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would result from the construction of the Alternative 4 water conveyance facilities on greater sandhill crane (BDCP Appendix 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*). The same methods were employed to address the potential noise effects on cranes from Alternative 1C and to determine that as much as 3,186-10,204 acres of crane foraging habitat could potentially be affected by general construction noise above baseline level (50–60 dBA). In addition, 1,720 – 7,382 acres of crane foraging habitat could be affected by noise from pile driving that would be above baseline level (50–60 dBA, Table 12-1C-30). The analysis was conducted based on the assumption that there would be direct line-of-sight from sandhill crane habitat areas to the construction site, and, therefore, provides a worst-case estimate of effects. In many areas the existing levees would partially or completely block the line-of-sight and would function as effective noise barriers, substantially reducing noise transmission. However, there is insufficient data to assess the effects that increased noise levels would have on sandhill crane behavior.

Table 12-1C-30. Greater Sandhill Crane Habitat Affected by General Construction and Pile Driving Noise Under Alternative 1C (acres)

Habitat Type	General Construction		Pile Driving	
	Above 60 dBA	Above 50 dBA	Above 60 dBA	Above 50 dBA
Permanent Roosting	0	0	0	0
Temporary Roosting	0	0	0	0
Foraging	3,186	10,204	1,720	7,382
Total Habitat	3,186	10,204	1,720	7,382

Evening and nighttime construction activities would require the use of extremely bright lights. Nighttime construction could also result in headlights flashing into roost sites when construction vehicles are turning onto or off of construction access routes. Proposed surge towers would require the use of safety lights that would alert low-flying aircraft to the presence of these structures because of their height. Little data is available on the effects of impact of artificial lighting on roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting

1 include a reduction in the cranes' quality of nocturnal rest, and effects on their sense of photo-period
2 which might cause them to shift their physiology towards earlier migration and breeding (BDCP
3 Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes' overall
4 fitness and reproductive success (which could in turn have population-level impacts). A change in
5 photo-period interpretation could also cause cranes to fly out earlier from roost sites to forage and
6 might increase their risk of power line collisions if they were to leave roosts before dawn (BDCP
7 Chapter 5, *Effects Analysis*).

8 The effects of noise and visual disturbance on greater sandhill crane would be minimized through
9 the implementation of *AMM20 Greater Sandhill Crane* (Appendix 3B, *Environmental Commitments*,
10 *AMMs*, and *CMs*). Activities within 0.75 mile of crane roosting habitat would reduce construction
11 noise during night time hours (from one hour before sunset to one hour after sunrise) such that
12 construction noise levels do not exceed 50 dBA L_{eq} (1 hour) at the nearest temporary or permanent
13 roosts during periods when the roost sites are available (flooded). In addition, the area of crane
14 foraging habitat that would be affected during the day (from one hour after sunrise to one hour
15 before sunset) by construction noise exceeding 50 dBA L_{eq} (1 hour) would also be minimized.
16 Unavoidable noise related effects would be compensated for by the enhancement of 0.1 acre of
17 foraging habitat for every acre indirectly affected within the 50 dBA L_{eq} (1 hour) construction noise
18 contour. With these measures in place, indirect effects of noise and visual disturbance from
19 construction activities are not expected to reduce the greater sandhill crane population in the study
20 area.

21 The use of mechanical equipment during water conveyance facilities construction could cause the
22 accidental release of petroleum or other contaminants that could affect greater sandhill crane in the
23 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to greater
24 sandhill crane habitat could also affect the species. AMM1–AMM7, including *AMM2 Construction Best*
25 *Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that
26 measures were in place to prevent runoff from the construction area and negative effects of dust on
27 foraging habitat.

28 **Methylmercury Exposure:** Largemouth bass was used as a surrogate species for analysis
29 (Appendix 11F, *Substantive BDCP Revisions*). Results of the quantitative modeling of mercury effects
30 on largemouth bass as a surrogate species would overestimate the effects on greater sandhill crane.
31 Organisms feeding within pelagic-based (algal) foodwebs have been found to have higher
32 concentrations of methylmercury than those in benthic or epibenthic foodwebs; this has been
33 attributed to food chain length and dietary segregation (Grimaldo et al. 2009). Therefore, potential
34 indirect effects of increased mercury exposure is likely low for greater sandhill crane because they
35 primarily forage on cultivated crops. Modeled effects of mercury concentrations from changes in
36 water operations under CM1 on largemouth bass did not differ substantially from existing
37 conditions; therefore, results also indicate that greater sandhill crane tissue concentrations would
38 not measurably increase as a result of CM1 implementation.

39 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
40 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
41 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
42 mercury. Increased methylmercury associated with natural community and floodplain restoration
43 may indirectly affect greater sandhill crane via uptake in lower trophic levels (see Appendix 5.D,
44 *Contaminants*, of the BDCP). Mercury is generally elevated throughout the Delta, and restoration of
45 the lower potential areas in total may result in generalized, very low level increases of mercury.

1 Given that some species have elevated mercury tissue levels pre-BDCP, these low level increases
2 could result in some level of effects.

3 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
4 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
5 each restoration project. If a project is identified where there is a high potential for methylmercury
6 production that could not be fully addressed through restoration design and adaptive management,
7 alternate restoration areas would be considered. CM12 would be implemented in coordination with
8 other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury
9 Monitoring and Analysis Section. This conservation measure would include the following actions.

- 10 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
11 mercury methylation and bioavailability
- 12 ● Define design elements that minimize conditions conducive to generation of methylmercury in
13 restored areas.

14 Define adaptive management strategies that can be implemented to monitor and minimize actual
15 postrestoration creation and mobilization of methylmercury.

16 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
17 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
18 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
19 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
20 2009). The effect of selenium toxicity differs widely between species and also between age and sex
21 classes within a species. In addition, the effect of selenium on a species can be confounded by
22 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
23 2009).

24 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
25 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
26 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
27 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
28 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
29 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
30 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
31 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
32 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
33 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
34 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
35 levels of selenium have a higher risk of selenium toxicity.

36 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
37 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
38 exacerbate bioaccumulation of selenium in avian species, including greater sandhill crane. Marsh
39 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
40 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
41 BDCP restoration activities that create newly inundated areas could increase bioavailability of
42 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
43 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
44 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,

1 long-term increases in selenium concentrations in water in the Delta under any alternative.
2 However, it is difficult to determine whether the effects of potential increases in selenium
3 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
4 lead to adverse effects on greater sandhill crane.

5 Because of the uncertainty that exists at this programmatic level of review, there could be a
6 substantial effect on greater sandhill crane from increases in selenium associated with restoration
7 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
8 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
9 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
10 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
11 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
12 separately for each restoration effort as part of design and implementation. This avoidance and
13 minimization measure would be implemented as part of the tidal habitat restoration design
14 schedule.

15 **NEPA Effects:** Crane habitat could potentially be affected by general construction noise above
16 baseline level (50–60 dBA). Construction in certain areas would take place 7 days a week and 24
17 hours a day and evening and nighttime construction activities would require the use of extremely
18 bright lights, which could adversely affect roosting cranes by impacting their sense of photo-period
19 and by exposing them to predators. Effects of noise and visual disturbance could substantially alter
20 the suitability of habitat for greater sandhill crane. *AMM20 Greater Sandhill Crane* would include
21 requirements (described above) to minimize the effects of noise and visual disturbance on greater
22 sandhill cranes and to mitigate effects on habitat.

23 Tidal habitat restoration could result in increased exposure of greater sandhill crane to selenium
24 which could result in the potential mortality of a special-status species. This effect would be
25 addressed through the implementation of *AMM27 Selenium Management*, which would provide
26 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
27 selenium and its bioavailability in tidal habitats.

28 The implementation of tidal natural communities restoration or floodplain restoration could result
29 in increased exposure of greater sandhill crane to methylmercury. The potential indirect effects of
30 increased mercury exposure is likely low for greater sandhill crane because they primarily forage on
31 cultivated crops. Implementation of CM12 which contains measures to assess the amount of
32 mercury before project development, followed by appropriate design and adaptation management,
33 would minimize the potential for increased methylmercury exposure, and would result in no
34 adverse effect on the species.

35 **CEQA Conclusion:** Crane foraging habitat could potentially be affected by general construction noise
36 and pile driving above baseline level (50–60 dBA). Construction in certain areas would take place 7
37 days a week and 24 hours a day and evening and nighttime construction activities would require the
38 use of extremely bright lights, which could adversely affect roosting cranes by impacting their sense
39 of photo-period and by exposing them to predators.

40 Effects of noise and visual disturbance could substantially alter the suitability of habitat for greater
41 sandhill crane. This would be a significant impact. *AMM20 Greater Sandhill Crane* would include
42 requirements (described above) to minimize the effects of noise and visual disturbance on greater
43 sandhill cranes and to mitigate effects on habitat.

1 Tidal habitat restoration could result in increased exposure of greater sandhill crane to selenium
2 which could result in the potential mortality of a special-status species. This would be a significant
3 impact. This effect would be addressed through the implementation of *AMM27 Selenium*
4 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
5 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

6 Methylmercury tissue concentrations in greater sandhill cranes would not be expected to
7 measurably increase as a result of water operations under CM1 compared to the No Action
8 Alternative. The implementation of tidal natural communities restoration or floodplain restoration
9 could result in increased exposure of greater sandhill crane to methylmercury. This would be a
10 significant impact. The potential indirect effects of increased mercury exposure is likely low for
11 greater sandhill crane because they primarily forage on cultivated crops. Implementation of CM12
12 which contains measures to assess the amount of mercury before project development, followed by
13 appropriate design and adaptation management, would minimize the potential for increased
14 methylmercury exposure, and would result in no adverse effect on the species.

15 With AMM1–AMM7, AMM20, AMM27, and CM12 in place, the indirect effects of plan implementation
16 under Alternative 1C would not substantially reduce the number or restrict the range of greater
17 sandhill cranes. Therefore, the indirect effects of Alternative 1C implementation would have a less-
18 than-significant impact on greater sandhill crane.

19 **Lesser Sandhill Crane**

20 This section describes the effects of Alternative 1C, including water conveyance facilities
21 construction and implementation of other conservation components, on lesser sandhill crane. Lesser
22 sandhill cranes in the study area are almost entirely dependent on privately owned agricultural
23 lands for foraging. Long-term sustainability of the lesser sandhill crane is thus dependent on
24 providing a matrix of compatible crop types that afford suitable foraging habitat and maintaining
25 compatible agricultural practices, while sustaining and increasing the extent of other essential
26 habitat elements such as night roosting habitat. The habitat model for lesser sandhill crane includes
27 “roosting and foraging” and “foraging” habitat. These habitat types include suitable foraging and
28 roosting habitat in the study area as certain agricultural types, specific grassland types, irrigated
29 pastures and hay crops, managed seasonal wetland, and other natural seasonal wetland. Roosting
30 and foraging habitat includes traditional roost sites that are known to be used by sandhill cranes
31 (both greater and lesser) and also provide foraging habitat. Detail regarding the roosting and
32 foraging modeled habitat for both subspecies of sandhill crane is included in the BDCP (BDCP
33 Appendix 2.A *Covered Species Accounts*). Both temporary and permanent roost sites were identified
34 for sandhill cranes. Permanent roosting and foraging sites are those used regularly, year after year,
35 while temporary roosting and foraging sites are those used in some years. Factors included in
36 assessing the loss of foraging habitat for the lesser sandhill crane considers the relative habitat value
37 of specific crop or land cover types. Although both the greater and the lesser Sandhill crane use
38 similar crop or land cover types, these provide different values of foraging habitat for the two
39 subspecies based on proportional use of these habitats. Lesser sandhill cranes are less traditional
40 than greater sandhill cranes and are more likely to move between different roost site complexes and
41 different wintering regions (Ivey pers. comm.) The wintering range is ten times larger than the
42 greater sandhill crane and their average foraging flight radius from roost sites is twice that of
43 greater sandhill cranes. Because of this higher mobility, lesser sandhill cranes are more flexible in
44 their use of foraging areas than the greater sandhill crane.

1 Construction and restoration associated with Alternative 1C conservation measures would result in
2 both temporary and permanent losses of foraging and roosting habitat for lesser sandhill crane as
3 indicated in Table 12-1C-31. Full implementation of Alternative 1C would include the following
4 conservation actions over the term of the BDCP for the greater sandhill crane (BDCP Chapter 3,
5 Section 3.3, *Biological Goals and Objectives*) that would also benefit the lesser sandhill crane.

- 6 • Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at
7 least 80% maintained in very high-value types in any given year. This protected habitat will be
8 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
9 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
10 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective
11 GSHC1.1, associated with CM3).
- 12 • To create additional high-value greater sandhill crane winter foraging habitat, 10% of the
13 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or
14 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be
15 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
16 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
17 habitat loss (Objective GSHC1.2, associated with CM3).
- 18 • Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the
19 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise
20 and local seasonal flood events. The wetlands will be located within 2 miles of existing
21 permanent roost sites and protected in association with other protected natural community
22 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide
23 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 24 • Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge
25 project boundary. The complexes will be no more than 2 miles apart and will help provide
26 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each
27 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane
28 roosting habitat, and will be protected in association with other protected natural community
29 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,
30 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be
31 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
32 support roosting cranes and provide highest-value foraging habitat, provided such substitution
33 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for
34 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
- 35 • Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost
36 sites. The habitat will consist of active cornfields that are flooded following harvest to support
37 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least
38 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will
39 be sited with consideration of the location of roosting habitat loss and will be in place prior to
40 roosting habitat loss (Objective GSCH1.5, associated with CM3).
- 41 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
42 other native wildlife species (Objective CLNC1.1, associated with CM3).

- 1 • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
- 2 cultivated lands as Swainson’s hawk foraging habitat with at least 50% in very high-value
- 3 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 4 • Target cultivated land conservation to provide connectivity between other conservation lands
- 5 (Objective CLNC1.2, associated with CM3).
- 6 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
- 7 lands that occur in cultivated lands within the reserve system, including, water conveyance
- 8 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

9 As explained below, with the restoration and protection of these amounts of habitat, in addition to
 10 natural community enhancement and management commitments (including CM12 *Methylmercury*
 11 *Management*) and the implementation of AMM1–AMM7, AMM20 *Greater Sandhill Crane*, AMM27
 12 *Selenium Management*, and AMM30 *Transmission Line Design and Alignment Guidelines*, impacts on
 13 the lesser sandhill crane would not be adverse for NEPA purposes and would be less than significant
 14 for CEQA purposes.

15 **Table 12-1C-31. Changes in Lesser Sandhill Crane Modeled Habitat Associated with Alternative 1C**
 16 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	0	0	NA	NA
	Roosting and Foraging - Temporary	0	0	1	1	NA	NA
	Foraging	3,639	3,639	5,679	5,679	NA	NA
Total Impacts CM1		3,639	3,639	5,680	5,680		
CM2–CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	3,610	12,131	2	4	0	0
Total Impacts CM2–CM18		3,610	12,172	2	4	0	0
Total Roosting and Foraging - Permanent		0	0	0	0	0	0
Total Roosting and Foraging - Temporary		0	41	1	1	0	0
Total Foraging		7,249	15,770	5,681	5,683		
TOTAL IMPACTS		7,249	15,811	5,682	5,684	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-72: Loss or Conversion of Habitat for and Direct Mortality of Lesser Sandhill Crane

Alternative 1C conservation measures would not impact lesser sandhill crane roosting habitat. However, they would result in the temporary loss of up to 1 acre of modeled roosting and foraging habitat and 21,453 acres of foraging habitat (15,770 acres of permanent loss and 5,681 acres of temporary loss) for lesser sandhill crane (Table 12-1C-31). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass Fisheries Improvements (CM2), Tidal Natural Communities Restoration (CM4), Grassland Natural Community Restoration (CM8), Nontidal Marsh Natural Community Restoration (CM10), and Natural Communities Enhancement and Management (CM11). The majority of habitat loss would result from water conveyance facility construction and conversion of habitat to tidal natural communities through CM4. Habitat enhancement and management activities through CM11, which include ground disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate lesser sandhill crane modeled habitat. Each of these individual activities is described below. A summary statement of the combined impacts, NEPA effects and a CEQA conclusion follow the individual conservation measure discussions.

- CM1 Water Facilities and Operation:* Construction of Alternative 1C conveyance facilities as they are currently designed would result in the combined permanent and temporary loss of up to 9,318 acres of modeled lesser sandhill crane habitat. This would consist of the permanent removal of 3,639 acres of foraging habitat. Foraging habitat that would be permanently impacted by CM1 would consist of 1,467 acres of very high-value, 502 acres of high-value, and 882 acres of medium-value foraging habitat (Table 12-1C-32). In addition, 1 acre of temporary roosting and foraging habitat and 5,679 acres of foraging habitat would be temporarily removed (Table 12-1C-31). The temporarily removed foraging habitat would consist primarily of cultivated lands and it would be restored within one year following construction. However, it would not necessarily be restored to its original topography and it could be restored as grasslands in the place of cultivated lands. Approximately half of the acres of foraging habitat that would be impacted would be a result of borrow and spoil areas associated with the construction of the intakes and the canal.

The acre of temporary roosting and foraging habitat that would be temporarily impacted is located on Webb Tract, east of Bradford Island and the loss would be a result of the installation of a temporary transmission line along the southern border of the roost site. However, the implementation of *AMM20 Greater Sandhill Crane* would require that CM1 activities be designed to avoid direct loss of crane roost sites. Avoidance of crane roost sites would be accomplished either by siting activities outside of identified roost sites or by relocating the roost site if it consisted of cultivated lands. Relocated roost sites would be established prior to construction activities affecting the original roost site (as described in *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Therefore, there would be no loss of crane roosting and foraging habitat as a result of water conveyance facility construction once the facilities were fully designed.

Approximately 617 acres of the permanent loss of foraging habitat would be from the storage of reusable tunnel material on Brannan Island and northeast of Knightsen. This material would likely be moved to other sites for use in levee build-up and restoration, and the affected area would likely eventually be restored. While this effect is categorized as permanent because there

1 is no assurance that the material would eventually be moved, the effect would likely be
 2 temporary. The actual footprint of the storage areas required for reusable tunnel material is
 3 flexible, and the actual acreage of habitat affected by this activity could be reduced based on the
 4 height of the storage piles in addition to other considerations. The implementation of *AMM6*
 5 *Disposal and Reuse of Spoils* would require that the areas used for reusable tunnel material
 6 storage be minimized in crane foraging habitat and completely avoid crane roost sites.
 7 Conveyance construction impacts would primarily occur west of the highest crane use areas in
 8 the central Delta. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1C
 9 construction locations. Impacts from CM1 would occur within the first 10 years of Plan
 10 implementation.

11 **Table 12-1C-32. Total Amount of Affected Lesser Sandhill Crane Foraging Habitat**

Foraging Habitat Value Class	Land Cover Type	CM1 Permanent (Temporary)	CM2-CM18 Permanent (Temporary)
Very high	Corn, alfalfa and alfalfa mixtures	1,467 (2,143)	4,083 (0)
High	Mixed pasture, native pasture, other pasture, irrigated pasture, native vegetation, rice	502 (687)	2,058 (0)
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, non-irrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, wheat, other grain crops, managed wetlands	882 (1,039)	2,220 (2)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	788 (1,810)	3,745 (2)

- 12
- 13 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction under CM2 would result in a permanent
 14 loss of 267 acres and a temporary loss of 2 acres of lesser sandhill crane foraging habitat in CZ 2.
 15 Lesser sandhill crane use in this area is less common than in the central Delta. Construction
 16 impacts from CM2 would occur within the first 10 years of Plan implementation.
- 17 ● *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration
 18 footprint, this activity would result in the permanent loss or conversion of approximately
 19 10,248 acres of lesser sandhill crane habitat, consisting of 41 acres of temporary roosting and
 20 foraging habitat and 10,207 acres of foraging habitat. Loss of foraging habitat from CM4 would
 21 consist of 3,642 acres of very high-value, 1,529 acres of high value, 2,040 acres of medium-value,

1 and 2,983 acres of low-value foraging habitat (Table 12-1C-32). Habitat loss would primarily
 2 occur in the Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ 4
 3 could occur between the high crane use areas of the central Delta and the Cosumnes River
 4 Preserve. However, the conversion of grasslands and cultivated lands to tidal wetlands would
 5 not prohibit crane movement or reduce use of these areas. Lesser sandhill cranes are less
 6 traditional than greater sandhill cranes and would be more adaptable to changes in land use.
 7 Approximately 2,516 acres of foraging habitat would be removed within the first 10 years of
 8 Plan implementation.

- 9 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees would result in
 10 the loss of 2 acres of low-value lesser sandhill crane foraging habitat (1 acre of permanent loss, 1
 11 acres of temporary loss). This impact would occur after the first 10 years of Plan
 12 implementation.
- 13 ● *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands
 14 (foraging habitat) would be converted to grassland. No roosting/foraging habitat would be
 15 impacted by grassland restoration activities. The restored grasslands would continue to provide
 16 foraging habitat value for the lesser sandhill crane. Approximately 257 acres would be impacted
 17 within the first 10 years of plan implementation.
- 18 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent
 19 conversion of approximately 1,350 acres of modeled foraging habitat for the lesser sandhill
 20 crane. A portion of the restored nontidal marsh would be expected to continue to provide
 21 roosting and foraging habitat value for the lesser sandhill crane. However, some of this restored
 22 marsh would be unsuitable as it would lack emergent vegetation and consist of open water that
 23 would be too deep to provide suitable roosting or foraging habitat. Approximately 567 acres of
 24 habitat would be converted to nontidal marsh within the first 10 years of Plan implementation.
- 25 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
 26 actions included in *CM11* that are designed to enhance wildlife values in restored or protected
 27 habitats could result in localized ground disturbances that could temporarily remove small
 28 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
 29 vegetation and road and other infrastructure maintenance activities, would be expected to have
 30 minor adverse effects on available habitat and would be expected to result in overall
 31 improvements to and maintenance of habitat values over the term of the BDCP. The potential for
 32 these activities to result in direct mortality of lesser sandhill crane would be minimized with the
 33 implementation of *AMM20 Greater Sandhill Crane*. *CM11* would also include the construction of
 34 recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP
 35 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead
 36 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
 37 disturbed areas when and where possible. If new ground disturbance was necessary, sandhill
 38 crane habitat would be avoided, with the exception of a permanent loss of 4 acres of grassland
 39 foraging habitat (1 acre of which would be impacted within the first 10 years of plan
 40 implementation).
- 41 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
 42 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
 43 disturbances that could affect lesser sandhill crane use of the surrounding habitat. Maintenance
 44 activities would include vegetation management, levee and structure repair, and re-grading of
 45 roads and permanent work areas. These effects, could be adverse as sandhill cranes are

1 sensitive to disturbance. However, potential effects would be reduced by AMMs and
2 conservation actions as described below.

- 3 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
4 direct mortality of lesser sandhill crane if they were present in the study area, because they
5 would be expected to avoid contact with construction and other equipment. Potential effects
6 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.
7 Injury and mortality from electrical transmission facilities are described below under Impact
8 BIO-73.

9 The following paragraphs summarize the combined effects discussed above and describe other
10 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
11 included.

12 ***Near-Term Timeframe***

13 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
14 the near-term BDCP conservation strategy has been evaluated to determine whether it would
15 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
16 effects of construction would not be adverse under NEPA. Based on current design footprints, the
17 Plan would remove 1 acre of roosting and foraging habitat in the study area in the near-term as a
18 result of the construction of the water conveyance facilities (CM1). In addition, 12,931 acres of
19 foraging habitat would be removed or converted in the near-term (CM1, 9,318 acres; *CM4 Tidal*
20 *Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*
21 *Communities Enhancement and Management*—3,612 acres). Of these near-term acres of foraging
22 habitat impacted, 9,226 acres would be medium- to very high-value habitat (CM1, 6,720 acres, CM2-
23 11, 2,507 acres).

24 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
25 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging
26 habitat. Using these ratios would indicate that 1 acre of lesser sandhill crane roosting habitat should
27 be restored/created and 1 acre should be protected to compensate for the CM1 losses of lesser
28 sandhill crane roosting and foraging habitat. In addition, 6,720 acres of high- to very high-value
29 foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane medium- to
30 very high-value foraging habitat. The near-term effects of other conservation actions would remove
31 2,507 acres of medium- to very high-value foraging habitat, and therefore require 2,507 acres of
32 protection of high- to very high-value foraging habitat using the same typical NEPA and CEQA ratios
33 (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1 protection for
34 the loss of foraging habitat).

35 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost
36 sites were directly impacted by CM1 covered activities (including transmission lines and their
37 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
38 result of water conveyance facility construction once the facilities were fully designed, which would
39 avoid the CM1 impact on the acre of roosting and foraging habitat once the project design is final.
40 Indirect effects of construction-related noise and visual disturbance are discussed below under
41 Impact BIO-74.

42 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
43 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These

1 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as
2 the construction and early restoration losses.

3 The BDCP also includes the following objectives for the greater sandhill crane which would also
4 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
5 winter use areas.

6 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
7 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
8 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
9 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
10 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting
11 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed
12 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of
13 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).
14 Restoration sites would be identified with consideration of sea level rise and local seasonal flood
15 events. These wetlands would be created within 2 miles of existing permanent roost sites and
16 protected in association with other protected natural community types at a ratio of 2:1 upland to
17 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would
18 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,
19 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone
20 Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and would be designed to provide
21 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Objective
22 GSHC1.4). The large patch sizes of these wetland complexes would provide additional conservation
23 to address the threats of vineyard conversion, urbanization to the east, and sea level rise to the west
24 of greater sandhill crane wintering habitat.

25 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
26 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
27 *BIO-72, Compensate for the Loss of Medium- to Very High-Value Lesser Sandhill Crane Foraging*
28 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the
29 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were
30 compensated for with appropriate crop types and natural communities.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
35 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
36 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
37 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
38 of the Final EIR/EIS.

39 **Late Long-Term Timeframe**

40 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475
41 acres of foraging habitat for lesser sandhill crane. Alternative 1C as a whole would result in the
42 permanent loss of and temporary effects on 42 acres of roosting and foraging habitat (less than 1%
43 of the total habitat in the study area) and 21,453 acres of foraging habitat (9% of the total habitat in
44 the study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by

1 the late long-term timeframe would consist of 15,083 acres of medium- to very high-value foraging
2 habitat. The locations of these losses are described above in the analyses of individual conservation
3 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no crane roost
4 sites were directly affected by water conveyance facilities including transmission lines and
5 associated footprints. In addition, temporarily removed habitat would be restored within 1 year
6 following construction. However, it would not necessarily be restored to its original topography and
7 it could result in the conversion of cultivated lands to grasslands.

8 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
9 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
10 sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
11 7,300 acres of high- to very high-value foraging habitat for greater sandhill crane (Objective
12 GSHC1.1). These croptypes would also provide high-value habitat for the lesser sandhill crane.

13 The BDCP also includes the following objectives for the greater sandhill crane which would also
14 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
15 winter use areas.

16 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
17 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
18 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
19 and local seasonal flood events. These wetlands would be created within 2 miles of existing
20 permanent roost sites and protected in association with other protected natural community types at
21 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
22 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
23 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
24 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and
25 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
26 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
27 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The
28 large patch sizes of these wetland complexes would provide additional conservation to address the
29 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
30 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
31 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
32 active cornfields that are flooded following harvest to support roosting cranes and also provide the
33 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
34 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with
35 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat
36 loss.

37 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
38 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
39 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
40 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
41 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
42 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives
43 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
44 economically driven agricultural practices, protecting crane habitat would provide enhanced
45 stability to agricultural habitat value within the crane use area that does not currently exist.

1 Although lesser sandhill cranes are less traditional in their use of roost sites in the Delta, these
2 objectives for the greater sandhill crane would also benefit the lesser sandhill crane.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
7 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
8 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
9 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
10 of the Final EIR/EIS.

11 **NEPA Effects:** The loss of lesser sandhill crane habitat and potential for direct mortality of this
12 special status species under Alternative 1C would represent an adverse effect in the absence of other
13 conservation actions. However, with habitat protection and restoration associated with *CM3 Natural*
14 *Communities Protection and Restoration* and *CM10 Nontidal Marsh Restoration*, guided by biological
15 goals and objectives for the species and by *AMM1–AMM7*, *AMM20 Greater Sandhill Crane*, which
16 would be in place throughout the construction period, and Mitigation Measure BIO-72, which would
17 be available to compensate for loss of medium- to very high-value foraging habitat, the effects of
18 habitat loss and potential mortality on lesser sandhill crane would not be adverse under NEPA.

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
22 the near-term BDCP conservation strategy has been evaluated to determine whether it would
23 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
24 effects of construction would be less than significant under CEQA. Based on current design
25 footprints, the Plan would remove 1 acre of roosting and foraging habitat in the study area in the
26 near-term as a result of the construction of the water conveyance facilities (CM1). In addition,
27 12,931 acres of foraging habitat would be removed or converted in the near-term (CM1, 9,318 acres;
28 *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and
29 *CM11 Natural Communities Enhancement and Management*—3,612 acres). Of these near-term acres
30 of foraging habitat impacted, 9,226 acres would be medium- to very high-value habitat (CM1, 6,720
31 acres, CM2-11, 2,507 acres).

32 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
33 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging
34 habitat. Using these ratios would indicate that 1 acre of lesser sandhill crane roosting habitat should
35 be restored/created and 1 acre should be protected to compensate for the CM1 losses of lesser
36 sandhill crane roosting and foraging habitat. In addition, 6,720 acres of high- to very high-value
37 foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane medium- to
38 very high-value foraging habitat. The near-term effects of other conservation actions would remove
39 2,507 acres of medium- to very high-value foraging habitat, and therefore require 2,507 acres of
40 protection of high- to very high-value foraging habitat using the same typical NEPA and CEQA ratios
41 (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1 protection for
42 the loss of foraging habitat).

1 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost
2 sites were directly impacted by CM1 covered activities (including transmission lines and their
3 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
4 result of water conveyance facility construction once the facilities were fully designed, which would
5 avoid the CM1 impact on the acre of roosting and foraging habitat once the project design is final.
6 Indirect effects of construction-related noise and visual disturbance are discussed below under
7 Impact BIO-74.

8 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
9 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These
10 conservation actions are associated with CM3 and CM10 and would occur in the same timeframe as
11 the construction and early restoration losses.

12 The BDCP also includes the following objectives for the greater sandhill crane which would also
13 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
14 winter use areas.

15 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
16 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
17 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
18 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
19 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting
20 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed
21 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of
22 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).
23 Restoration sites would be identified with consideration of sea level rise and local seasonal flood
24 events. These wetlands would be created within 2 miles of existing permanent roost sites and
25 protected in association with other protected natural community types at a ratio of 2:1 upland to
26 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would
27 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,
28 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone
29 Lakes National Wildlife Refuge project boundary (BDCP Chapter 3, Figure 3.3-6) and would be
30 designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill crane
31 populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would provide
32 additional conservation to address the threats of vineyard conversion, urbanization to the east, and
33 sea level rise to the west of greater sandhill crane wintering habitat.

34 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
35 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
36 *BIO-72, Compensate for the Loss of Medium- to Very High-Value Lesser Sandhill Crane Foraging*
37 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the
38 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were
39 compensated for with appropriate crop types and natural communities.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
41 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
42 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
43 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
44 these AMMs include elements that would avoid or minimize the risk of affecting individuals and

1 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
2 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
3 of the Final EIR/EIS.

4 **Late Long-Term Timeframe**

5 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475
6 acres of foraging habitat for lesser sandhill crane. Alternative 1C as a whole would result in the
7 permanent loss of and temporary effects on 42 acres of roosting and foraging habitat (less than 1%
8 of the total habitat in the study area) and 21,453 acres of foraging habitat (9% of the total habitat in
9 the study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by
10 the late long-term timeframe would consist of 15,083 acres of medium- to very high-value foraging
11 habitat. The locations of these losses are described above in the analyses of individual conservation
12 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no crane roost
13 sites were directly affected by water conveyance facilities including transmission lines and
14 associated footprints. In addition, temporarily removed habitat would be restored within 1 year
15 following construction. However, it would not necessarily be restored to its original topography and
16 it could result in the conversion of cultivated lands to grasslands.

17 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
18 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
19 sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
20 7,300 acres of high- to very high-value foraging habitat for greater sandhill crane (Objective
21 GSHC1.1). These croptypes would also provide high-value habitat for the lesser sandhill crane.

22 The BDCP also includes the following objectives for the greater sandhill crane which would also
23 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
24 winter use areas.

25 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
26 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
27 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
28 and local seasonal flood events. These wetlands would be created within 2 miles of existing
29 permanent roost sites and protected in association with other protected natural community types at
30 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
31 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
32 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
33 constructed within the Stone Lakes NWR project boundary (BDCP Chapter 3, Figure 3.3-6) and
34 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
35 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
36 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The
37 large patch sizes of these wetland complexes would provide additional conservation to address the
38 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
39 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
40 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
41 active cornfields that are flooded following harvest to support roosting cranes and also provide the
42 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
43 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with

1 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat
2 loss.

3 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
4 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
5 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
6 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
7 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
8 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives
9 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
10 economically driven agricultural practices, protecting crane habitat would provide enhanced
11 stability to agricultural habitat value within the crane use area that does not currently exist.
12 Although lesser sandhill cranes are less traditional in their use of roost sites in the Delta, these
13 objectives for the greater sandhill crane would also benefit the lesser sandhill crane.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
18 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
19 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
20 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
21 of the Final EIR/EIS.

22 Considering Alternative 1C's protection and restoration provisions, in addition to Mitigation
23 Measure BIO-72, which would compensate for the loss of medium- to very high-value foraging
24 habitat at a ratio of 1:1, loss of habitat or direct mortality through implementation of Alternative 1C
25 would not result in a substantial adverse effect through habitat modifications and would not
26 substantially reduce the number or restrict the range of the species. Therefore, the alternative
27 would have a less-than-significant impact on lesser sandhill crane.

28 **Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value** 29 **Lesser Sandhill Crane Foraging Habitat**

30 DWR must compensate for the loss of lesser sandhill crane medium- to very high-value foraging
31 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan
32 Area. Compensation must occur prior to or concurrent with the impacts to minimize the effects
33 of habitat loss. The crop types and natural communities that are included in foraging value
34 categories are listed in Table 12-1C-32. Foraging habitat conservation must occur within 10
35 kilometers of traditional sandhill crane roost sites and the location of protected habitat or
36 conservation easements must be preapproved by CDFW.

37 **Impact BIO-73: Effects on Lesser Sandhill Crane Associated with Electrical Transmission** 38 **Facilities**

39 Sandhill cranes are susceptible to collision with power lines and other structures during periods of
40 inclement weather and low visibility (Avian Power Line Interaction Committee 1994, Brown and
41 Drewien 1995, Manville 2005). There are extensive existing transmission and distribution lines in
42 the sandhill crane winter use area. These include a network of distribution lines that are between
43 11- and 22-kV. In addition, there are two 115-kV lines that cross the study area, one that overlaps

1 with the greater sandhill crane winter use area between Antioch and I-5 east of Hood, and one that
 2 crosses the northern tip of the crane winter use area north of Clarksburg. There are 69-kV lines
 3 within the study area that parallel Twin Cities Road, Herzog Road, Lambert Road, and the Southern
 4 Pacific Dredge Cut in the vicinity of Stone Lakes National Wildlife Refuge. At the south end of the
 5 winter use area, there are three 230-kV transmission lines that follow I-5, and then cut southwest
 6 through Holt, and two 500-kV lines cross the southwestern corner of the winter use area. This
 7 existing network of power lines in the study currently poses a collision and electrocution risk for
 8 sandhill cranes, because they cross over or surround sandhill crane roost sites in the study area.

9 Both permanent and temporary electrical transmission lines would be constructed to supply
 10 construction and operational power to BDCP facilities. The potential mortality of greater sandhill
 11 crane in the area of the proposed transmission lines under Alternative 1C was estimated using
 12 collision mortality rates by Brown and Drewien (1995) and an estimate of potential crossings along
 13 the proposed lines (methods are described in BDCP Appendix 5.J, Attachment 5J.C, *Analysis of*
 14 *Potential Bird Collisions at Proposed BDCP Powerlines*). This analysis concluded that mortality risk
 15 could be substantially reduced by marking new transmission lines to increase their visibility to
 16 sandhill cranes. Mortality risk would be similarly reduced for lesser sandhill cranes by marking new
 17 transmission lines.

18 Typically, higher-voltage (230-kilovolt [kV]) lines vary in height from 90 to 110 feet, while “sub”
 19 transmission (69-kV) lines vary from 50 to 70 feet (Avian Power Line Interaction Committee 2006).
 20 The Alternative 1C alignment would require the installation of approximately 36 miles of permanent
 21 transmission line (18 miles of 230-kV lines and 18 miles of 69-kV lines) extending north and south,
 22 to the west of the high-use crane areas. The temporary transmission lines would total approximately
 23 71 miles (14 miles of 69-kV line and 57 miles of 12-kV line). Temporary lines would be removed
 24 after construction of the water conveyance facilities, within 10 years.

25 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
 26 transmission line alignment, such as co-locating transmission lines when it would minimize effects
 27 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. After the
 28 Draft EIR/EIS was issued in December 2013, additional avoidance features were added to *AMM20*
 29 *Greater Sandhill Crane*. *AMM20 Greater Sandhill Crane* requires that Alternative 1C meet the
 30 performance standard of no mortality of greater sandhill crane associated with the new facilities.
 31 This would be achieved by implementing one or any combination of the following: 1) siting new
 32 transmission lines in lower bird strike risk zones; 2) removing, relocating or undergrounding
 33 existing lines where feasible; 3) using natural gas generators in lieu of installing transmission lines
 34 in high-risk zones of the greater sandhill crane winter use area; 4) undergrounding new lines in
 35 high-risk zones of the greater sandhill crane winter use area; 5) permanently installing flight
 36 diverters on existing lines over lengths equal to or greater than the length of the new transmission
 37 lines in the crane winter use area; 6) for areas outside of the Stone Lakes National Wildlife Refuge
 38 project boundary, shifting locations of flooded areas that provide crane roosts to lower risk areas.
 39 These measures are described in detail in *AMM20 Greater Sandhill Crane* in Appendix 3B,
 40 *Environmental Commitments, AMMs, and CMs*.

41 The implementation of the measures described above under *AMM20 Greater Sandhill Crane* would
 42 substantially reduce the potential for lesser sandhill crane collisions with transmission lines.
 43 Potential measures that would eliminate this risk include using natural gas generators in lieu of
 44 transmission lines or undergrounding new lines in high-risk zones in the greater sandhill crane
 45 winter use area. Marking transmission lines with flight diverters that make the lines more visible to

1 birds has been shown to reduce the incidence of bird mortality, including for sandhill cranes (Brown
2 and Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce
3 avian mortality by 60%. All new transmission lines would be fitted with flight diverters. The
4 installation of flight diverters on existing permanent lines would be prioritized in the highest risk
5 zones for greater sandhill crane (as described in BDCP Appendix 5.J, Attachment 5J.C, *Analysis of*
6 *Potential Bird Collisions at Proposed BDCP Powerlines*) and diverters would be installed in a
7 configuration that research indicates would reduce bird strike risk by at least 60%. The length of
8 existing line to be fitted with bird strike diverters would be equal to the length of new transmission
9 lines constructed for the project, in an area with the same or higher greater sandhill crane strike risk
10 to provide a net benefit to the species. For optimum results, the recommended spacing distance for
11 bird flight diverters is 15 to 16.5 feet (4.5 to 5 meters) (Avian Power Line Interaction Committee
12 1994). Placing diverters on existing lines would be expected to reduce existing lesser and greater
13 sandhill crane mortality in the Plan Area and therefore result in a net benefit to the lesser sandhill
14 crane population because these flight diverters would be maintained in perpetuity.

15 **NEPA Effects:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
16 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
17 current proposed transmission line alignment under Alternative 1C is not fully designed, and line
18 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the
19 final transmission line alignment avoided crane roost sites and achieve the performance standard of
20 no mortality of greater sandhill crane associated with the new facilities, which would also benefit
21 the lesser sandhill crane. *AMM30 Transmission Line Design and Alignment Guidelines* would require
22 design features for the transmission line alignment, such as co-locating transmission lines when it
23 would minimize effects on sandhill cranes, to avoid impacts on sensitive habitats to the maximum
24 extent feasible. All new transmission lines constructed for the project would be fitted with bird
25 diverters, which have been shown to reduce avian mortality by 60%. With incorporation of *AMM30*
26 *Transmission Line Design and Alignment Guidelines* and one or a combination of the measures to
27 greatly reduce the risk of bird strike described in *AMM20 Greater Sandhill Crane*, the construction
28 and operation of transmission lines under Alternative 1C would not result in an adverse effect on
29 lesser sandhill crane.

30 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
31 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
32 current proposed transmission line alignment under Alternative 1C is not fully designed, and line
33 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the
34 final transmission line alignment avoid crane roost sites and achieve the performance standard of
35 no mortality of greater sandhill crane associated with the new facilities, which would also benefit
36 lesser sandhill crane. *AMM30 Transmission Line Design and Alignment Guidelines* would require
37 design features for the transmission line alignment, such as co-locating transmission lines when it
38 would minimize effects on sandhill cranes, to avoid impacts on sensitive habitats to the maximum
39 extent feasible. All new transmission lines constructed for the project would be fitted with bird
40 diverters, which have been shown to reduce avian mortality by 60%. With incorporation of *AMM30*
41 *Transmission Line Design and Alignment Guidelines* and one or a combination of the measures to
42 greatly reduce the risk of bird strike described in *AMM20 Greater Sandhill Crane*, the construction
43 and operation of transmission lines under Alternative 1C would would have a less-than-significant
44 impact on lesser sandhill crane.

1 **Impact BIO-74: Indirect Effects of Plan Implementation on Lesser Sandhill Crane**

2 **Indirect Construction- and Operation-Related Effects:** Sandhill cranes are sensitive to
 3 disturbance. Noise and visual disturbances from the construction of water conveyance facilities and
 4 other conservation measures could reduce lesser sandhill crane use of modeled habitat adjacent to
 5 work areas. Indirect effects associated with construction include noise, dust, and visual disturbance
 6 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
 7 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the
 8 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise
 9 and visual disturbances that could affect lesser sandhill crane use of surrounding habitat. These
 10 effects could result from periodic vehicle use along the conveyance corridor, inspection and
 11 maintenance of aboveground facilities, and similar activities. These potential effects would be
 12 minimized with implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3B,
 13 *Environmental Commitments, AMMs, and CMs*.

14 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would
 15 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill
 16 crane (BDCP Appendix 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*
 17 *Sandhill Crane*). The same methods were employed to addresses the potential noise effects on
 18 cranes from Alternative 1C and to determine that as much as 3,186-10,204 acres of crane foraging
 19 habitat could potentially be affected by general construction noise above baseline level (50–60 dBA).
 20 In addition, 1,720 – 7,382 acres of crane foraging habitat could be affected by noise from pile driving
 21 that would be above baseline level (50–60dBA, Table 12-1C-30 under Impact-BIO-71). The analysis
 22 was conducted based on the assumption that there would be direct line-of-sight from sandhill crane
 23 habitat areas to the construction site, and, therefore, provides a worst-case estimate of effects. In
 24 many areas the existing levees would partially or completely block the line-of-sight and would
 25 function as effective noise barriers, substantially reducing noise transmission. However, there is
 26 insufficient data to assess the effects that increased noise levels would have on sandhill crane
 27 behavior. Similar acreages of lesser sandhill crane habitat would be expected to be indirectly
 28 affected. However, lesser sandhill cranes are less traditional in their winter roost sites and may be
 29 more likely to travel away from disturbed areas to roost and forage in more suitable habitat.

30 Evening and nighttime construction activities would require the use of extremely bright lights.
 31 Nighttime construction could also result in headlights flashing into roost sites when construction
 32 vehicles are turning onto or off of construction access routes. Proposed surge towers would require
 33 the use of safety lights that would alert low-flying aircraft to the presence of these structures
 34 because of their height. Little data is available on the effects of impact of artificial lighting on
 35 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes
 36 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP
 37 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to
 38 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting
 39 include a reduction in the cranes’ quality of nocturnal rest, and effects on their “sense of photo-
 40 period which might cause them to shift their physiology towards earlier migration and breeding.”
 41 (BDCP Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes’
 42 overall fitness and reproductive success (which could in turn have population-level impacts). A
 43 change in photo-period interpretation could also cause cranes to fly out earlier from roost sites to
 44 forage and might increase their risk of power line collisions if they were to leave roosts before dawn
 45 (BDCP Chapter 5, *Effects Analysis*).

1 The effects of noise and visual disturbance on lesser sandhill crane would be minimized through the
 2 implementation of AMM20 (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Activities
 3 within 0.75 mile of crane roosting habitat would reduce construction noise during night time hours
 4 (from one hour before sunset to one hour after sunrise) such that construction noise levels do not
 5 exceed 50 dBA L_{eq} (1 hour) at the nearest temporary or permanent roosts during periods when the
 6 roost sites are available (flooded). In addition, the area of crane foraging habitat that would be
 7 affected during the day (from one hour after sunrise to one hour before sunset) by construction
 8 noise exceeding 50 dBA L_{eq} (1 hour) would also be minimized. Unavoidable noise related effects
 9 would be compensated for by the enhancement of 0.1 acre of foraging habitat for every acre
 10 indirectly affected within the 50 dBA L_{eq} (1 hour) construction noise contour. With these measures
 11 in place, indirect effects of noise and visual disturbance from construction activities are not expected
 12 to reduce the lesser sandhill crane population in the study area.

13 The use of mechanical equipment during water conveyance facilities construction could cause the
 14 accidental release of petroleum or other contaminants that could affect lesser sandhill cranes in the
 15 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to lesser
 16 sandhill crane habitat could also affect the subspecies. AMM1–AMM7, including *AMM2 Construction*
 17 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure
 18 that measures were in place to prevent runoff from the construction area and negative effects of
 19 dust on foraging habitat.

20 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
 21 mercury in lesser sandhill cranes. Largemouth bass was used as a surrogate species for analysis
 22 (Appendix 11F, *Substantive BDCP Revisions*). Results of the quantitative modeling of mercury effects
 23 on largemouth bass as a surrogate species would overestimate the effects on lesser sandhill crane as
 24 they primarily forage on cultivated crops and invertebrates. Organisms feeding within pelagic-based
 25 (algal) foodwebs have been found to have higher concentrations of methylmercury than those in
 26 benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
 27 segregation (Grimaldo et al. 2009). Modeled effects of mercury concentrations from changes in
 28 water operations under CM1 on largemouth bass did not differ substantially from existing
 29 conditions; therefore, results also indicate that lesser sandhill crane tissue concentrations would not
 30 measurably increase as a result of CM1 implementation.

31 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
 32 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
 33 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
 34 mercury. Increased methylmercury associated with natural community and floodplain restoration
 35 may indirectly affect lesser sandhill crane via uptake in lower trophic levels (see BDCP Appendix
 36 5.D, *Contaminants*). Mercury is generally elevated throughout the Delta, and restoration of the lower
 37 potential areas in total may result in generalized, very low level increases of mercury. Given that
 38 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in
 39 some level of effects.

40 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
 41 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
 42 each restoration project. If a project is identified where there is a high potential for methylmercury
 43 production that could not be fully addressed through restoration design and adaptive management,
 44 alternate restoration areas would be considered. CM12 would be implemented in coordination with

1 other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury
2 Monitoring and Analysis Section. This conservation measure would include the following actions.

- 3 • Assess pre-restoration conditions to determine the risk that the project could result in increased
4 mercury methylation and bioavailability
- 5 • Define design elements that minimize conditions conducive to generation of methylmercury in
6 restored areas.

7 Define adaptive management strategies that can be implemented to monitor and minimize actual
8 postrestoration creation and mobilization of methylmercury.

9 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
10 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
11 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
12 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
13 2009). The effect of selenium toxicity differs widely between species and also between age and sex
14 classes within a species. In addition, the effect of selenium on a species can be confounded by
15 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
16 2009).

17 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
18 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
19 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
20 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
21 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
22 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
23 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
24 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
25 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
26 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
27 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
28 levels of selenium have a higher risk of selenium toxicity.

29 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
30 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
31 exacerbate bioaccumulation of selenium in avian species, including the lesser sandhill crane. Marsh
32 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
33 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
34 BDCP restoration activities that create newly inundated areas could increase bioavailability of
35 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
36 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
37 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
38 long-term increases in selenium concentrations in water in the Delta under any alternative.
39 However, it is difficult to determine whether the effects of potential increases in selenium
40 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
41 lead to adverse effects on lesser sandhill crane.

42 Because of the uncertainty that exists at this programmatic level of review, there could be a
43 substantial effect on lesser sandhill crane from increases in selenium associated with restoration
44 activities. This effect would be addressed through the implementation of *AMM27 Selenium*

1 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
2 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
3 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
4 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
5 separately for each restoration effort as part of design and implementation. This avoidance and
6 minimization measure would be implemented as part of the tidal habitat restoration design
7 schedule.

8 **NEPA Effects:** Crane foraging habitat could potentially be affected by general construction noise and
9 pile driving above baseline level (50–60 dBA). However, lesser sandhill cranes are less traditional in
10 their winter roost sites than greater sandhill cranes and may be more likely to travel away from
11 disturbed areas to roost in more suitable habitat. Construction in certain areas would take place 7
12 days a week and 24 hours a day and evening and nighttime construction activities would require the
13 use of extremely bright lights, which could adversely affect roosting cranes by impacting their sense
14 of photo-period and by exposing them to predators. Effects of noise and visual disturbance could
15 substantially alter the suitability of habitat for lesser sandhill crane. *AMM20 Greater Sandhill Crane*
16 would include requirements (described above) to minimize the effects of noise and visual
17 disturbance on sandhill cranes and to mitigate effects on habitat.

18 Tidal habitat restoration could result in increased exposure of lesser sandhill crane to selenium
19 which could result in the mortality of a special-status species. This effect would be addressed
20 through the implementation of *AMM27 Selenium Management*, which would provide specific tidal
21 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its
22 bioavailability in tidal habitats.

23 The implementation of tidal natural communities restoration or floodplain restoration could result
24 in increased exposure of lesser sandhill crane to methylmercury. The potential indirect effects of
25 increased mercury exposure is likely low for lesser sandhill crane because they primarily forage on
26 cultivated crops and associated invertebrates. Implementation of CM12 which contains measures to
27 assess the amount of mercury before project development, followed by appropriate design and
28 adaptation management, would minimize the potential for increased methylmercury exposure, and
29 would result in no adverse effect on the species.

30 **CEQA Conclusion:** Crane foraging habitat could potentially be affected by general construction noise
31 and pile driving above baseline level (50–60 dBA). However, lesser sandhill cranes are less
32 traditional in their winter roost sites and may be more likely to travel away from disturbed areas to
33 roost in more suitable habitat. Construction in certain areas would take place 7 days a week and 24
34 hours a day and evening and nighttime construction activities would require the use of extremely
35 bright lights, which could adversely affect roosting cranes by impacting their sense of photo-period
36 and by exposing them to predators.

37 Effects of noise and visual disturbance could substantially alter the suitability of habitat for lesser
38 sandhill crane. This would be a significant impact. With *AMM20 Greater Sandhill Crane* in place,
39 which would include requirements (described above) to minimize the effects of noise and visual
40 disturbance on sandhill cranes and to mitigate effects on habitat, there would not be an adverse
41 effect on lesser sandhill crane.

42 Tidal habitat restoration could result in increased exposure of lesser sandhill crane to selenium
43 which could result in the potential mortality of a special-status species. This would be a significant
44 impact. This effect would be addressed through the implementation of *AMM27 Selenium*

1 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
2 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

3 Methylmercury tissue concentrations in lesser sandhill crane would not be expected to measurably
4 increase as a result of water operations under CM1 compared to the No Action Alternative. The
5 implementation of tidal natural communities restoration or floodplain restoration could result in
6 increased exposure of lesser sandhill crane to methylmercury. This would be a significant impact.
7 The potential indirect effects of increased mercury exposure is likely low for lesser sandhill crane
8 because they primarily forage on cultivated crops and associated invertebrates. Implementation of
9 CM12 which contains measures to assess the amount of mercury before project development,
10 followed by appropriate design and adaptation management, would minimize the potential for
11 increased methylmercury exposure, and would result in no adverse effect on lesser sandhill crane.

12 With AMM1–AMM7, AMM20, AMM27, and CM12 in place, the indirect effects of plan implementation
13 under Alternative 1C would not substantially reduce the number or restrict the range of lesser
14 sandhill cranes. Therefore, the indirect effects of Alternative 1C implementation would have a less-
15 than-significant impact on lesser sandhill crane.

16 **Least Bell's Vireo and Yellow Warbler**

17 This section describes the effects of Alternative 1C, including water conveyance facilities
18 construction and implementation of other conservation components, on the least Bell's vireo and
19 yellow warbler. Least Bell's vireo and yellow warbler modeled habitat identifies suitable nesting and
20 migratory habitat as those plant alliances from the valley/foothill riparian modeled habitat that
21 contain a dense shrub component, including all willow-dominated alliances.

22 Construction and restoration associated with Alternative 1C conservation measures would result in
23 both temporary and permanent losses of least Bell's vireo and yellow warbler modeled habitat as
24 indicated in Table 12-1C-33. Full implementation of Alternative 1C would also include the following
25 conservation actions over the term of the BDCP to benefit least Bell's vireo and yellow warbler
26 (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 27 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community with at least
28 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
29 associated with CM7).
- 30 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
31 10 (Objective VFRNC1.2, associated with CM7).
- 32 ● Maintain and enhance structural heterogeneity (Objective VFRNC2.1, associated with CM7).
- 33 ● Maintain at least 1,000 acres of early- to mid-successional vegetation (Objective VFRNC2.2,
34 associated with CM7).
- 35 ● Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,
36 associated with CM3 and CM7).
- 37 ● Maintain the at least 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion
38 of the early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a
39 minimum patch size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4,
40 associated with CM3 and CM7).

1 As explained below, with the restoration and protection of these amounts of habitat, in addition to
 2 natural community enhancement and management commitments and the implementation of
 3 AMM1–AMM7, AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell’s Vireo, Western
 4 Yellow-Billed Cuckoo, and Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird Surveys
 5 and Avoid Disturbance of Nesting Birds, impacts on least Bell’s vireo and yellow warbler would not be
 6 adverse for NEPA purposes and would be less than significant for CEQA purposes.

7 **Table 12-1C-33. Changes in Least Bell’s Vireo and Yellow Warbler Modeled Habitat Associated**
 8 **with Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Migratory and Breeding	14	14	44	44	NA	NA
Total Impacts CM1		14	14	44	44	NA	NA
CM2–CM18	Migratory and Breeding	382	656	88	109	48–85	148
Total Impacts CM2–CM18		382	656	88	109	48–85	148
TOTAL IMPACTS		396	670	132	153	48–85	148

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

9

10 **Impact BIO-75: Loss or Conversion of Habitat for and Direct Mortality of Least Bell’s Vireo**
 11 **and Yellow Warbler**

12 Alternative 1C conservation measures would result in the combined permanent and temporary loss
 13 of up to 823 acres of modeled habitat (670 acres of permanent loss and 153 acres of temporary loss)
 14 for least Bell’s vireo and yellow warbler (Table 12-1C-33). Conservation measures that would result
 15 in these losses are conveyance facilities and transmission line construction, and establishment and
 16 use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2),
 17 tidal natural communities restoration (CM4), and seasonally inundated floodplain restoration
 18 (CM5). Habitat enhancement and management activities (CM11) which include ground disturbance
 19 or removal of nonnative vegetation, could result in local adverse habitat effects. In addition,
 20 maintenance activities associated with the long-term operation of the water conveyance facilities
 21 and other BDCP physical facilities could degrade or eliminate least Bell’s vireo and yellow warbler
 22 habitat. Each of these individual activities is described below. A summary statement of the combined
 23 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure
 24 discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would
2 result in the combined permanent and temporary loss of up to 58 acres of modeled least Bell's
3 vireo and yellow warbler habitat (Table 12-1C-33). Of the 58 acres of modeled habitat that
4 would be removed for the construction of the conveyance facilities, 14 acres would be a
5 permanent loss and 44 acres would be a temporary loss of habitat. Almost all of the losses would
6 occur on the narrow borders of waterways that are crossed by water conveyance facilities. In
7 the north Delta, most of the permanent loss would be where Intakes 1–5 encroach on the
8 Sacramento River's west bank from just north of Clarksburg to just north of Courtland. The
9 riparian areas here are very small patches, some dominated by valley oak and willows, and
10 others by nonnative trees and mixed brambles (see Terrestrial Biology Mapbook). Other small
11 patches or narrow bands of riparian vegetation dominated by valley oak and willow would be
12 permanently removed by canal construction and borrow areas in the vicinity of Elk Slough south
13 of Clarksburg. A long band of mixed brambles and willows would be lost adjacent to the
14 Sacramento River Deep Water Ship Channel, north of Miner Slough. The temporary losses of
15 valley/foothill riparian natural community would be associated with temporary canal and
16 siphon work areas where the canal would cross Elk Slough on the west side of Merritt Island,
17 Duck Slough west of Courtland, Miner Slough on the northwest corner of Ryer Island, and
18 Kellogg Creek southwest of Discovery Bay. The vegetation in these areas ranges from small
19 stands of valley oak and willow to narrow bands of alder and mixed brambles. Small temporary
20 losses associated with transmission line construction would occur along the entire
21 canal/pipeline route.

22 Temporarily affected areas would be restored as riparian habitat within 1 year following
23 completion of construction activities as described in *AMM10 Restoration of Temporarily Affected*
24 *Natural Communities*. Although the effects are considered temporary, the restored riparian
25 habitat would require at least four years for ecological succession to occur and for restored
26 riparian habitat to functionally replace habitat that has been affected. However, restored
27 riparian vegetation can have the habitat structure to support breeding vireos within 3 to 5
28 years, particularly if the restored vegetation is adjacent to established riparian areas (Kus
29 2002), and similar habitat would be suitable for yellow warbler. The majority of the riparian
30 vegetation to be temporarily removed is early- to mid-successional; therefore, the replaced
31 riparian vegetation would be expected to have structural components comparable to the
32 temporarily removed vegetation within the first 5 to 10 years after the initial restoration
33 activities are complete. There are no occurrences of least Bell's vireo or yellow warbler that
34 intersect with the CM1 footprint. Refer to the Terrestrial Biology Map Book for a detailed view of
35 Alternative 1C construction locations. Impacts from CM1 would occur within the first 10 years of
36 Alternative 1C implementation.

- 37 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancements
38 would permanently remove approximately 83 acres and temporarily remove 88 acres of
39 modeled least Bell's vireo and yellow warbler habitat in the Yolo Bypass in CZ 2. The loss is
40 expected to occur during the first 10 years of Alternative 1C implementation.
- 41 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
42 inundation would permanently remove an estimated 545 acres of modeled least Bell's vireo and
43 yellow warbler habitat.
- 44 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
45 seasonally inundated floodplain would permanently remove approximately 28 acres and
46 temporarily remove 21 acres of modeled least Bell's vireo and yellow warbler habitat. Based on

1 the riparian habitat restoration assumptions, a minimum of 3,000 acres of valley/foothill
2 riparian habitat would be restored as a component of seasonally inundated floodplain
3 restoration actions.

4 The actual number of acres of valley/foothill riparian habitat that CM4 and CM5 would restore
5 may differ from these estimates, depending on how closely the actual outcome of tidal habitat
6 restoration approximates the assumed outcome. However, riparian restoration from CM4 and
7 CM5 would increase the extent of least Bell's vireo and yellow warbler habitat within the study
8 area once the restored riparian vegetation has developed habitat functions for these species.

- 9 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
10 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
11 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
12 activity would occur along waterway margins where riparian habitat stringers exist, including
13 levees and channel banks. The improvements would occur within the study area on sections of
14 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 15 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
16 activities that could be implemented in protected least Bell's vireo and yellow warbler habitats
17 are expected to maintain and improve the functions of the habitat over the term of the BDCP.
18 Least Bell's vireo and yellow warbler would be expected to benefit from the increase in
19 protected habitat, which would maintain conditions favorable for future species establishment
20 in the study area. If least Bell's vireo and yellow warbler established breeding populations in
21 restored riparian habitats in the study area, occupied habitat would be monitored to determine
22 if there were a need to implement controls on brood parasites (brown-headed cowbird) or nest
23 predators. If implemented, these actions would be expected to benefit the least Bell's vireo and
24 yellow warbler by removing a potential stressor that could, if not addressed, adversely affect the
25 stability of newly established populations.

26 Habitat management- and enhancement-related activities could disturb least Bell's vireo and
27 yellow warbler nests. If either species were to nest in the vicinity of a worksite, equipment
28 operation could destroy nests, and noise and visual disturbances could lead to their
29 abandonment, resulting in mortality of eggs and nestlings. The potential for these activities to
30 result in direct mortality of least Bell's vireo or yellow warbler would be minimized with the
31 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
32 *Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
33 *Surveys and Avoid Disturbance of Nesting Birds*.

- 34 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
35 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
36 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding
37 habitat. Maintenance activities would include vegetation management, levee and structure
38 repair, and re-grading of roads and permanent work areas. These effects, however, would be
39 reduced by AMMs and conservation actions as described below.
- 40 ● *Injury and Direct Mortality*: Although least Bell's vireo nesting has not been confirmed in the
41 study area, recent occurrences in the Yolo Bypass and at the San Joaquin River National Wildlife
42 Refuge suggest that the reestablishment of a breeding population is a possibility over the
43 duration of the BDCP. If present in the study area, construction -related activities would not be
44 expected to result in direct mortality of least Bell's vireo or yellow warbler because adults and
45 fledged young would be expected to avoid contact with construction and other equipment. If

1 either species were to nest in the construction area, equipment operation, noise and visual
2 disturbances could destroy nests or lead to their abandonment, resulting in mortality of eggs
3 and nestlings. These effects would be avoided and minimized with the implementation of
4 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
5 *Cuckoo*. In addition, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*
6 *and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects on nesting
7 yellow warblers.

8 The following paragraphs summarize the combined effects discussed above and describe other
9 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
10 included.

11 ***Near-Term Timeframe***

12 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
13 the near-term BDCP conservation strategy has been evaluated to determine whether it would
14 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
15 effects of construction would not be adverse under NEPA. Alternative 1C would remove 528 acres of
16 modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-term. These
17 effects would result from the construction of the water conveyance facilities (CM1, 58 acres of
18 habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements
19 [CM2] tidal habitat restoration [CM4], seasonally inundated floodplain restoration [CM5]— 470
20 acres of habitat).

21 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
22 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter
23 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby
24 successional valley/foothill riparian habitat. Using these ratios would indicate that 58 acres of
25 valley/foothill riparian habitat should be restored/created and 58 acres should be protected to
26 compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects
27 of other conservation actions would remove 470 acres of modeled habitat, and therefore require
28 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using
29 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

30 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
31 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*
32 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the
33 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
34 habitat loss on least Bell's vireo and yellow warbler. The majority of the riparian restoration acres
35 would occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of
36 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3,
37 *Conservation Strategy*). This restoration would provide the large contiguous patches needed for
38 suitable least Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for
39 riparian restoration also include the restoration, maintenance and enhancement of structural
40 heterogeneity with adequate vertical and horizontal overlap among vegetation components and
41 over adjacent riverine channels, freshwater emergent wetlands, and grasslands (Objective
42 VFRNC2.1). These Plan objectives represent performance standards for considering the
43 effectiveness of CM7 restoration and CM3 protection actions. The acres of protection contained in
44 the near-term Plan goals and the additional detail in the biological objectives for least Bell's vireo

1 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1, as well
2 as mitigate the near-term effects of the other conservation measures. The restored riparian habitat
3 could require 5 years to several decades, for ecological succession to occur and for restored riparian
4 habitat to functionally replace habitat that has been affected. However, because the modeled habitat
5 impacted largely consists of small patches of blackberry, willow, and riparian scrub, and because
6 least Bell's vireo and yellow warbler are not known to be established breeders in the study area,
7 BDCP actions would not be expected to have an adverse population-level effect on either species.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
12 *Restoration of Temporarily Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-*
13 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements
14 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
15 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
16 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
17 EIR/EIS. The yellow warbler is not a species that is covered under the BDCP. Although
18 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest
19 in the study area over the course of the BDCP), in order to have a less than adverse effect on
20 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
21 yellow warbler nests were detected and avoided. Mitigation Measure BIO-75 would be available to
22 address adverse effects on nesting yellow warblers.

23 ***Late Long-Term Timeframe***

24 The habitat model indicates that the study area supports approximately 14,850 acres of modeled
25 habitat for least Bell's vireo and yellow warbler. Alternative 1C as a whole would result in the
26 permanent loss of and temporary effects on 823 acres of habitat for these species during the term of
27 the Plan (6% of the total habitat in the study area). These losses would occur from the construction
28 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4*
29 *Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The
30 locations of these losses would be in fragmented riparian habitat throughout the study area.

31 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
32 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
33 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
34 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
35 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
36 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives
37 in the Plan for riparian restoration also include the maintenance and enhancement of structural
38 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for
39 the least Bell's vireo and yellow warbler.

40 The BDCP's beneficial effects analysis (BDCP Chapter 5.6, *Effects on Covered Wildlife and Plant*
41 *Species*) estimates that the restoration and protection actions discussed above could result in the
42 restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo, which
43 would also be suitable habitat for the yellow warbler.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
 2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
 3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, AMM10*
 5 *Restoration of Temporarily Affected Natural Communities, and AMM22 Suisun Song Sparrow, Yellow-*
 6 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements
 7 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
 8 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
 9 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
 10 EIR/EIS.

11 **NEPA Effects:** The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality
 12 of these special-status species under Alternative 1C would represent an adverse effect in the
 13 absence of other conservation actions. However, neither species is an established breeder in the
 14 study area and impacts would likely be limited to loss of migratory habitat. In addition, with habitat
 15 protection and restoration associated with CM3 and CM7, guided by biological goals and objectives
 16 and by *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and*
 17 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan,*
 18 *AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils,*
 19 *AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural Communities, and*
 20 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,*
 21 which would be in place during all project activities, the effects of habitat loss and potential
 22 mortality on least Bell's vireo, and the effect of habitat loss on yellow warbler under Alternative 1C
 23 would not be adverse. The yellow warbler is not a species that is covered under the BDCP and
 24 potential mortality would be an adverse effect without preconstruction surveys to ensure that nests
 25 are detected and avoided. Mitigation Measure BIO-75 would be available to address this effect.

26 **CEQA Conclusion:**

27 **Near-Term Timeframe**

28 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 29 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 30 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
 31 the impacts of construction would be less than significant under CEQA. Alternative 1C would remove
 32 528 acres of modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-
 33 term. These effects would result from the construction of the water conveyance facilities (CM1, 58
 34 acres of habitat), and implementing other conservation measures (Yolo Bypass fisheries
 35 improvements [CM2] tidal habitat restoration [CM4], seasonally inundated floodplain restoration
 36 [CM5]— 470 acres of habitat).

37 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
 38 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter
 39 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby
 40 successional valley/foothill riparian habitat. Using these ratios would indicate that 58 acres of
 41 valley/foothill riparian habitat should be restored/created and 58 acres should be protected to
 42 compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects
 43 of other conservation actions would remove 470 acres of modeled habitat, and therefore require

1 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using
2 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

3 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
4 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*
5 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the
6 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
7 habitat loss on least Bell's vireo and yellow warbler. The majority of the riparian restoration acres
8 would occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of
9 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3,
10 *Conservation Strategy*). This restoration would provide the large contiguous patches needed for
11 suitable least Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for
12 riparian restoration also include the restoration, maintenance and enhancement of structural
13 heterogeneity with adequate vertical and horizontal overlap among vegetation components and
14 over adjacent riverine channels, freshwater emergent wetlands, and grasslands (Objective
15 VFRNC2.1). These Plan objectives represent performance standards for considering the
16 effectiveness of CM7 restoration and CM3 protection actions. biological goals and objectives would
17 inform the near-term protection and restoration efforts and represent performance standards for
18 considering the effectiveness of restoration actions. The acres of protection contained in the near-
19 term Plan goals and the additional detail in the biological objectives for least Bell's vireo satisfy the
20 typical mitigation ratios that would be applied to the project-level effects of CM1, as well as mitigate
21 the near-term effects of the other conservation measures. The restored riparian habitat could
22 require 5 years to several decades, for ecological succession to occur and for restored riparian
23 habitat to functionally replace habitat that has been affected. However, because the modeled habitat
24 impacted largely consists of small patches of blackberry, willow, and riparian scrub, and because
25 least Bell's vireo and yellow warbler are not known to be established breeders in the study area,
26 BDCP actions would not be expected to have an adverse population-level effect on either species.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
28 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
29 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
30 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, AMM10*
31 *Restoration of Temporarily Affected Natural Communities, and AMM22 Suisun Song Sparrow, Yellow-*
32 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements
33 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
34 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
35 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
36 EIR/EIS. The yellow warbler is not a species that is covered under the BDCP. Although
37 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest
38 in the Plan Area over the course of the BDCP), in order to have a less than adverse effect on
39 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
40 yellow warbler nests are detected and avoided. Mitigation Measure BIO-75 would reduce the
41 potential impact on nesting yellow warblers to a less-than-significant impact, should they become
42 established in the Plan Area. Considering the conservation actions described above, and AMM1--
43 AMM7, AMM 22, and Mitigation Measure BIO-75, Alternative 1C, over the term of the BDCP would
44 not result in a substantial adverse effect through habitat modifications and would not substantially
45 reduce the number or restrict the range of either species. Therefore, Alternative 1C would have a
46 less-than-significant impact on least Bell's vireo and yellow warbler.

1 **Late Long-Term Timeframe**

2 The habitat model indicates that the study area supports approximately 14,850 acres of modeled
3 habitat for least Bell's vireo and yellow warbler. Alternative 1C as a whole would result in the
4 permanent loss of and temporary effects on 823 acres of habitat for these species during the term of
5 the Plan (6% of the total habitat in the study area). These losses would occur from the construction
6 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4*
7 *Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain Restoration*. The
8 locations of these losses would be in fragmented riparian habitat throughout the study area.

9 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
10 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
11 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
12 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
13 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
14 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives
15 in the Plan for riparian restoration also include the maintenance and enhancement of structural
16 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for
17 the least Bell's vireo and yellow warbler. The restored riparian habitat could require 5 years to
18 several decades, for ecological succession to occur and for restored riparian habitat to functionally
19 replace habitat that has been affected. Therefore, there would be a time-lag before the restored
20 habitat would benefit either species. However, neither species are established breeders in the study
21 area and impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow
22 warbler.

23 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
24 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
25 the restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo,
26 which would also be suitable habitat for the yellow warbler.

27 The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality of these
28 special-status species under Alternative 1C would represent an adverse effect in the absence of
29 other conservation actions. However, neither species is an established breeder in the study area and
30 impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow warbler.
31 In addition, with habitat protection and restoration associated with CM3 and CM7, guided by
32 biological goals and objectives and by *AMM1 Worker Awareness Training, AMM2 Construction Best*
33 *Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion*
34 *and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6*
35 *Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily*
36 *Affected Natural Communities, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
37 *Vireo, Western Yellow-Billed Cuckoo*, which would be in place during all project activities, the effects
38 of habitat loss and potential mortality on least Bell's vireo under Alternative 1C would be less than
39 significant. The yellow warbler is not a species that is covered under the BDCP. Although
40 preconstruction surveys for least Bell's vireo may also detect nesting yellow warblers, in order for
41 the BDCP to have a less-than-significant impact on individuals, preconstruction surveys for
42 noncovered avian species would be required to ensure that yellow warbler nests are detected and
43 avoided. Mitigation Measure BIO-75 would reduce this potential impact on nesting yellow warblers,
44 if present in the study area, to a less-than-significant level.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 To reduce impacts on nesting birds, DWR will implement the measures listed below prior to
4 construction and operations and maintenance activities.

- 5 • To the maximum extent feasible, vegetation removal and trimming will be scheduled during
6 the nonbreeding season of birds (September 1–January 31). If vegetation removal cannot be
7 removed in accordance with this timeframe, preconstruction/preactivity surveys for nesting
8 birds and additional protective measures will be implemented as described below.
- 9 • A qualified wildlife biologist with knowledge of the relevant species will conduct nesting
10 surveys before the start of construction. A minimum of three separate surveys will be
11 conducted within 30 days prior to construction, with the last survey within 3 days prior to
12 construction. Surveys will include a search of all suitable nesting habitat in the construction
13 area. In addition, a 500-foot radius around the construction area, where accessible, will be
14 surveyed for nesting raptors and species of special concern (except the Modesto song
15 sparrow), and an area within 50 feet of construction will be surveyed for other non-special
16 status nesting birds or birds protected by the MBTA. If no active nests are detected during
17 these surveys, no additional measures are required.
- 18 • If active nests are found in the survey area, no-disturbance buffers will be established
19 around the nest sites to avoid disturbance or destruction of the nest site until the end of the
20 breeding season (approximately September 1) or until a qualified wildlife biologist
21 determines that the young have fledged and moved out of the project area (this date varies
22 by species). A qualified wildlife biologist will monitor construction activities in the vicinity
23 of the nests to ensure that construction activities do not affect nest success. The extent of the
24 buffers will be determined by DWR biologists in consultation with USFWS and CDFW and
25 will depend on the level of noise or construction disturbance, line-of-sight between the nest
26 and the disturbance, ambient levels of noise and other disturbances, and other
27 topographical or artificial barriers. Suitable buffer distances may vary between species.

28 **Impact BIO-76: Fragmentation of Least Bell's Vireo and Yellow Warbler Habitat**

29 Grading, filling, contouring, and other initial ground-disturbing operations may temporarily
30 fragment modeled least Bell's vireo and yellow warbler habitat. This could temporarily reduce the
31 affected habitat's extent and functions, including exposure to cowbird parasitism, a nest parasite of
32 both species. Preconstruction surveys under *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
33 *Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct*
34 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds,* would identify any
35 nesting pairs and the potential for habitat fragmentation to affect either species. If a nesting pair of
36 either species were detected where fragmentation has occurred, nests would be monitored for edge
37 effects or other effects caused by the disturbance. The habitat would be adaptively managed to avoid
38 or minimize impacts (e.g., cowbird control) under CM11, which includes the control of nonnative
39 predators through habitat manipulation techniques or trapping to reduce nest predation.

40 **NEPA Effects:** Because there are only two recent occurrences of least Bell's vireo within the Plan
41 Area, and no occurrences of yellow warbler breeding in the Plan Area, habitat fragmentation
42 resulting from ground-disturbing operations is not expected to affect either species. If nesting pairs
43 of either species were detected where fragmentation has occurred, nests would be monitored for

1 edge effects or other effects caused by the disturbance. The habitat would be adaptively managed to
2 avoid or minimize impacts (e.g., cowbird control) under CM11. Therefore, habitat fragmentation as a
3 result of implementing Alternative 1C would not have an adverse effect on least Bell's vireo or
4 yellow warbler.

5 **CEQA Conclusion:** Because there are only two recent occurrences of least Bell's vireo within the Plan
6 Area, and no occurrences of yellow warbler breeding in the Plan Area, habitat fragmentation
7 resulting from ground-disturbing operations would not be expected to substantially modify habitat
8 or result in the direct mortality of special status species. If nesting pairs of either species were
9 detected where fragmentation has occurred, nests would be monitored for edge effects or other
10 effects caused by the disturbance. The habitat would be adaptively managed to avoid or minimize
11 impacts (e.g., cowbird control) under CM11. Therefore, habitat fragmentation as a result of
12 Alternative 1C would have a less-than-significant impact on least Bell's vireo and yellow warbler.

13 **Impact BIO-77: Effects on Least Bell's Vireo and Yellow Warbler Associated with Electrical** 14 **Transmission Facilities**

15 Both least Bell's vireo and yellow warbler typically occur in early to mid-successional riparian
16 habitat, which is used to meet all of its life requisites. Least Bell's vireo are rarely observed in open
17 habitats away from riparian vegetation. Neither species form flocks and individuals generally
18 remain at or below the riparian canopy, below the height of proposed transmission lines (see
19 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*, of
20 the BDCP). The behavior and habitat requirements of least Bell's vireo and yellow warbler make
21 collision with the proposed transmission lines unlikely. *AMM30 Transmission Line Design and*
22 *Alignment Guidelines* would ensure that the transmission lines, poles, and towers are designed to
23 avoid sensitive terrestrial habitats (including riparian) to the maximum extent feasible, which would
24 minimize the potential for collision. Marking transmission lines with flight diverters that make the
25 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
26 Drewien 1995). For example, Yee (2008) estimated that marking devices in the Central Valley could
27 reduce avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new project
28 transmission lines would be fitted with flight diverters, which would substantially reduce any
29 potential for mortality of least Bell's vireo or yellow warbler individuals from powerline collisions.

30 **NEPA Effects:** Installation and presence of new transmission lines would not result in an adverse
31 effect on least Bell's vireo or yellow warbler because the probability of bird-powerline strikes is
32 unlikely due to the behavior and habitat requirements of these species. *AMM30 Transmission Line*
33 *Design and Alignment Guidelines* would avoid impacts on riparian habitat to the maximum extent
34 feasible, which would minimize the potential for collision. *AMM20 Greater Sandhill Crane* contains
35 the commitment to place bird strike diverters on all new powerlines, which would substantially
36 reduce the risk of mortality from bird strike for least Bell's vireo and yellow warbler as a result of
37 the project. Therefore, the construction and operation of new transmission lines would not result in
38 an adverse effect on least Bell's vireo or yellow warbler.

39 **CEQA Conclusion:** Installation and presence of new transmission lines would result in less-than-
40 significant impact on least Bell's vireo or yellow warbler because the probability of bird-powerline
41 strikes is unlikely due to the behavior and habitat requirements of these species. *AMM30*
42 *Transmission Line Design and Alignment Guidelines* would avoid impacts on riparian habitat to the
43 maximum extent feasible, which will minimize the potential for collision. *AMM20 Greater Sandhill*
44 *Crane* contains the commitment to place bird strike diverters on all new powerlines, which would

1 substantially reduce the risk of mortality from bird strike for least Bell's vireo and yellow warbler as
2 a result of the project. Therefore, the construction and operation of new transmission lines would
3 result in a less-than-significant impact on least Bell's vireo or yellow warbler.

4 **Impact BIO-78: Indirect Effects of Plan Implementation on Least Bell's Vireo and Yellow** 5 **Warbler**

6 **Indirect Construction- and Operation-Related Effects:** If least Bell's vireo or yellow warbler were
7 to nest in or adjacent to work areas, construction and subsequent maintenance-related noise and
8 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
9 functions of suitable nesting habitat for these species. Construction noise above background noise
10 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
11 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
12 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
13 the extent to which these noise levels could affect least Bell's vireo or yellow warbler. *AMM22 Suisun*
14 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would reduce
15 the potential for adverse effects of construction-related activities on survival and productivity of
16 nesting least Bell's vireo and a 500 foot no-disturbance buffer would be established around the
17 active nest. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
18 *Disturbance of Nesting Birds*, would be available to reduce the potential for adverse effects of
19 construction-related activities on nesting yellow warbler. The use of mechanical equipment during
20 water conveyance facilities construction could cause the accidental release of petroleum or other
21 contaminants that could affect least Bell's vireo and yellow warbler in the surrounding habitat. The
22 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an
23 adverse effect on these species. *AMM2 Construction Best Management Practices and Monitoring*
24 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff
25 from the construction area and negative effects of dust on active nests.

26 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
27 mercury in avian species, including the least Bell's vireo and yellow warbler. Marsh (tidal and
28 nontidal) and floodplain restoration have the potential to increase exposure to methylmercury.
29 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
30 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains
31 (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas could
32 increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of
33 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of
34 uncertainty with respect to species-specific effects. Increased methylmercury associated with
35 natural community and floodplain restoration could indirectly affect least Bell's vireo and yellow
36 warbler, via uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

37 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
38 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
39 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
40 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
41 adaptive management as described in CM12 would be available to address the uncertainty of
42 methylmercury levels in restored tidal marsh and potential impacts on least Bell's vireo and yellow
43 warbler.

1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
5 2009). The effect of selenium toxicity differs widely between species and also between age and sex
6 classes within a species. In addition, the effect of selenium on a species can be confounded by
7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
8 2009).

9 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
10 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
11 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
12 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
13 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
14 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
15 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
16 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
17 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
18 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
19 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
20 have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
22 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
23 exacerbate bioaccumulation of selenium in avian species, including least Bell's vireo and yellow
24 warbler. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
25 selenium, and, therefore, increase avian exposure from ingestion of prey items with elevated
26 selenium levels. Thus, Alternative 1C restoration activities that create newly inundated areas could
27 increase bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of
28 restoration). Changes in selenium concentrations are analyzed in Chapter 8, *Water Quality*, which
29 concludes that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
30 in substantial, long-term increases in selenium concentrations in water in the Delta under any
31 alternative. However, it is difficult to determine whether the effects of potential increases in
32 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)
33 would lead to adverse effects on least Bell's vireo and yellow warbler.

34 Because of the uncertainty that exists at this programmatic level of review, there could be a
35 substantial effect on least Bell's vireo and yellow warbler from increases in selenium associated with
36 restoration activities. This effect would be addressed through the implementation of *AMM27*
37 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
38 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
39 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
40 selenium management to reduce selenium concentrations and/or bioaccumulation would be
41 evaluated separately for each restoration effort as part of design and implementation. This
42 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
43 design schedule.

1 **NEPA Effects:** Impacts of noise, the potential for hazardous spills, increased dust and sedimentation,
2 and operations and maintenance of the water conveyance facilities on least Bell's vireo would not be
3 adverse with the implementation of AMM1-AMM7, and AMM22 *Suisun Song Sparrow, Yellow-*
4 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct*
5 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
6 address adverse effects on nesting yellow warblers.

7 The implementation of tidal natural communities restoration or floodplain restoration could result
8 in increased exposure of least Bell's vireo or yellow warbler to methylmercury, should they begin to
9 nest in the study area. However, it is unknown what concentrations of methylmercury are harmful
10 to these species. Site-specific restoration plans that address the creation and mobilization of
11 mercury, as well as monitoring and adaptive management as described in *CM12 Methylmercury*
12 *Management*, would be available to address the uncertainty of methylmercury levels in restored
13 tidal marsh and potential effects of methylmercury on least Bell's vireo and yellow warbler.

14 Tidal habitat restoration could result in increased exposure of least Bell's vireo and yellow warbler
15 to selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
16 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
17 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

18 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
19 operations and maintenance of the water conveyance facilities would have a less-than-significant
20 impact on least Bell's vireo and yellow warbler with the implementation of *AMM2 Construction Best*
21 *Management Practices and Monitoring, AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least*
22 *Bell's Vireo, Western Yellow-Billed Cuckoo*, and Mitigation Measure BIO-75, *Conduct Preconstruction*
23 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*.

24 The implementation of tidal natural communities restoration or floodplain restoration could result
25 in increased exposure of least Bell's vireo or yellow warbler to methylmercury, should they begin to
26 nest in the study area. However, it is unknown what concentrations of methylmercury are harmful
27 to these species. Sites-specific restoration plans that address the creation and mobilization of
28 mercury, as well as monitoring and adaptive management as described in *CM12 Methylmercury*
29 *Management*, would be available to address the uncertainty of methylmercury levels in restored
30 tidal marsh and potential significant impacts on least Bell's vireo and yellow warbler.

31 Tidal habitat restoration could result in increased exposure of least Bell's vireo and yellow warbler
32 to selenium. With implementation of *AMM27 Selenium Management*, which would provide specific
33 tidal habitat restoration design elements to reduce the potential for bioaccumulation of selenium
34 and its bioavailability in tidal habitats, the impact of increased selenium exposure would be less
35 than significant.

36 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
37 **Disturbance of Nesting Birds**

38 See Mitigation Measure BIO-75 under Impact BIO-75.

39 **Impact BIO-79: Periodic Effects of Inundation of Least Bell's Vireo and Yellow Warbler**
40 **Habitat as a Result of Implementation of Conservation Components**

41 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
42 duration of inundation of approximately 48-85 acres of modeled least Bell's vireo and yellow

1 warbler habitat in CZ 2. No adverse effects of increased inundation frequency on least Bell's vireo,
2 yellow warbler, or their habitat would be expected, because riparian vegetation supporting habitat
3 has persisted under the existing Yolo Bypass flooding regime and changes to frequency and
4 inundation would be within the tolerance of these vegetation types.

5 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,
6 construction of setback levees could result in periodic inundation of up to 148 acres of modeled
7 least Bell's vireo and yellow warbler habitat in CZ 7. Inundation of restored floodplains would not be
8 expected to affect least Bell's vireo, yellow warbler, or their habitat because the breeding period is
9 outside the period when floodplains would likely be inundated. Additionally, periodic inundation of
10 floodplains would be expected to restore a more natural flood regime in support of riparian
11 vegetation types that support least Bell's vireo and yellow warbler habitat. The overall effect of
12 seasonal inundation in existing riparian natural communities would be beneficial, because,
13 historically, flooding was the main natural disturbance regulating ecological processes in riparian
14 areas, and flooding promotes the germination and establishment of many native riparian plants.

15 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85 acres
16 (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler. However,
17 periodic effects of inundation would not result in an adverse effect on least Bell's vireo or yellow
18 warbler because inundation would occur primarily during the nonbreeding season and would
19 promote a more natural flood regime in support of habitat for these species.

20 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85
21 acres (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler.
22 However, periodic effects of inundation would have a less-than-significant impact on least Bell's
23 vireo or yellow warbler because inundation would occur during the nonbreeding season and would
24 not be expected to adversely modify habitat or result in direct mortality of either species. Flooding
25 promotes the germination and establishment of many native riparian plants. Therefore, the overall
26 impact of seasonal inundation in existing riparian natural communities would be beneficial for least
27 Bell's vireo and yellow warbler.

28 **Suisun Song Sparrow and Saltmarsh Common Yellowthroat**

29 This section describes the effects of Alternative 1C on Suisun song sparrow and saltmarsh common
30 yellowthroat. The habitat model used to assess effects for Suisun song sparrow and saltmarsh
31 common yellowthroat is based on primary breeding habitat and secondary habitat. Suisun song
32 sparrow primary breeding habitat consists of all *Salicornia*-dominated tidal brackish emergent
33 wetland and all *Typha*-, *Scirpus*-, and *Juncus*-dominated tidal freshwater emergent wetland in the
34 Plan Area west of Sherman Island, with the exception that *Scirpus acutus* and *S. californicus* plant
35 communities (low marsh) and all of the plant communities listed below that occur in managed
36 wetlands were classified as secondary habitat. Upland transitional zones, providing refugia during
37 high tides, within 150 feet of the wetland edge were also included as secondary habitat. Secondary
38 habitats generally provide only a few ecological functions such as foraging (low marsh and managed
39 wetlands) or extreme high tide refuge (upland transition zones), while primary habitats provide
40 multiple functions, including breeding, effective predator cover, and valuable forage. Construction
41 and restoration associated with Alternative 1C conservation measures would result in both
42 temporary and permanent losses of Suisun song sparrow and saltmarsh common yellowthroat
43 modeled habitat as indicated in Table 12-1C-34. The majority of the losses would take place over an
44 extended period of time as tidal marsh is restored in the study area. Full implementation of

Alternative 1C would also include the following conservation actions over the term of the BDCP to benefit the Suisun song sparrow (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated with CM4).
- Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3)
- Protect at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective GNC1.4, associated with CM3)

As explained below, with the restoration and protection of these amounts of habitat, in addition to natural community enhancement and management commitments (including *CM12 Methylmercury Management*) and the implementation of *AMM1-AMM7*, *AMM22 Suisun Song Sparrow*, *Yellow-breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo*, and mitigation to minimize potential effects, impacts on Suisun song sparrow and saltmarsh common yellowthroat would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1C-34. Changes in Suisun Song Sparrow Saltmarsh Common Yellowthroat Modeled Habitat Associated with Alternative 1C (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2-CM18	Primary	54	55	0	0	0	0
	Secondary	1,098	3,633	0	0	0	0
Total Impacts CM2-CM18		1,152	3,688	0	0	0	0
TOTAL IMPACTS		1,152	3,688	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-80: Loss or Conversion of Habitat for and Direct Mortality of Suisun Song Sparrow and Saltmarsh Common Yellowthroat

Alternative 1C conservation measures would result in the permanent loss of up to 3,510 acres of modeled secondary habitat, the conversion of 55 acres of primary habitat to secondary low marsh,

1 and the conversion of 123 acres of secondary habitat to middle or high marsh (for a total impact of
2 55 acres primary habitat and 3,633 acres of secondary habitat, Table 12-1C-34). The only
3 conservation measure that would affect modeled habitat for Suisun song sparrow and saltmarsh
4 common yellowthroat is *CM4 Tidal Natural Communities Restoration*. Habitat enhancement and
5 management activities (CM11), which include ground disturbance or removal of nonnative
6 vegetation, could also result in local adverse habitat effects. Each of these individual activities is
7 described below. A summary statement of the combined impacts and NEPA and CEQA conclusions
8 follows the individual conservation measure discussions.

- 9 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would
10 permanently remove approximately 3,510 acres of modeled secondary Suisun song sparrow and
11 saltmarsh common yellowthroat habitat from CZ 11 (Table 12-1C-34). In addition, 55 acres of
12 primary habitat would be converted to secondary low marsh, and 123 acres of secondary
13 habitat would be converted to middle or high marsh. Most areas proposed for removal would be
14 managed wetlands that serve as relatively marginal habitat for Suisun song sparrow and
15 saltmarsh common yellowthroat, which primarily use brackish tidal wetlands. Approximately
16 2% of primary habitat for these species would be converted to foraging habitat. Full
17 implementation of CM4 would restore or create at least 6,000 acres of tidal brackish emergent
18 wetland natural community in CZ 11, which would be expected to support Suisun song sparrow
19 and saltmarsh common yellowthroat habitat. It is expected that restoring tidal wetland
20 communities that are self-sustaining and not reliant on ongoing management actions necessary
21 to maintain the existing managed wetland habitats would better ensure the long-term viability
22 of these populations. Furthermore, effects of tidal habitat restoration on sparrow and
23 yellowthroat abundance and distribution would be monitored, and the restoration of tidal
24 habitat would be sequenced and located in a manner that minimizes effects on occupied habitats
25 until functional habitats were restored (see BDCP Chapter 3, Section 3.4.4, *Conservation Measure 4*
26 *Tidal Natural Communities Restoration*, and Section 3.6, *Adaptive Management and Monitoring*
27 *Program*).
- 28 • *CM11 Natural Communities Enhancement and Management*: Control of nonnative Suisun song
29 sparrow and saltmarsh common yellowthroat predators, if deemed necessary, would be
30 expected to reduce predation loss of nests and, consequently, increase and maintain the
31 abundance of Suisun song sparrow and saltmarsh common yellowthroat in restored tidal
32 habitats over the term of the BDCP. Habitat management- and enhancement-related activities
33 could disturb Suisun song sparrow or saltmarsh common yellowthroat nests if they are located
34 near work sites. The potential for these activities to have an adverse effect on Suisun song
35 sparrow would be avoided and minimized through *AMM22 Suisun Song Sparrow, Yellow-*
36 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure
37 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,
38 would be available to address these effects on saltmarsh common yellowthroat. A variety of
39 CM11 habitat management actions that are designed to enhance wildlife values in restored and
40 protected tidal wetland habitats may result in localized ground disturbances that could
41 temporarily remove small amounts of Suisun song sparrow and saltmarsh common
42 yellowthroat habitat in CZ 11. Ground-disturbing activities, such as removal of nonnative
43 vegetation and road and other infrastructure maintenance activities, are expected to have minor
44 adverse effects on available species' habitat.
- 45 • *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration
46 infrastructure could result in ongoing but periodic disturbances that could affect Suisun song

1 sparrow and saltmarsh common yellowthroat use of the surrounding habitat in Suisun.
2 Maintenance activities could include vegetation management, and levee repair. These effects,
3 however, would be reduced by AMMs and conservation actions as described below.

- 4 • Construction-related activities could result in nest destruction or disturbance resulting in
5 mortality of eggs and nestlings if restoration activities took place within the nesting period for
6 these species. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
7 *Yellow-Billed Cuckoo* would minimize these potential effects on Suisun song sparrow. Mitigation
8 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
9 *Birds*, would be available to address these effects on saltmarsh common yellowthroat. Grading,
10 filling, contouring, and other initial ground-disturbing operations during restoration activities
11 could temporarily fragment existing modeled tidal brackish emergent wetland habitat for
12 Suisun song sparrow and saltmarsh common yellowthroat which could temporarily reduce the
13 extent and functions of the affected habitat. These temporary effects would be minimized
14 through sequencing of restoration activities and through *AMM22 Suisun Song Sparrow, Yellow-*
15 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75.

16 The following paragraphs summarize the combined effects discussed above and describe other
17 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
18 included.

19 ***Near-Term Timeframe***

20 There would be no impacts resulting from the construction of the water conveyance facilities (CM1).
21 However, there would be a permanent loss of 1,040 acres of modeled secondary habitat for Suisun
22 song sparrow and saltmarsh common yellowthroat in the study area in the near-term. In addition,
23 54 acres of primary habitat would be converted to secondary foraging habitat, and 58 acres of
24 secondary habitat would be converted to mid to high marsh, which would provide primary nesting
25 habitat for these species. Although there would be a temporal lag in these conversions, there would
26 be no net loss of primary habitat in the near-term. These effects would result from implementing
27 CM4 tidal restoration in CZ 11. The typical NEPA and CEQA project-level mitigation ratio for those
28 natural communities affected by CM4 and that are identified in the biological goals and objectives in
29 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
30 Using this ratio would indicate that 1,152 acres of tidal brackish emergent wetland should be
31 restored/created to mitigate the CM4 permanent losses of Suisun song sparrow and saltmarsh
32 common yellowthroat habitat in the near-term.

33 The BDCP has committed to near-term goals of restoring 1,000 acres of tidal brackish emergent
34 wetlands in the study area. Although this 1,000 acres is slightly less than the 1:1 restoration ratio,
35 the secondary habitat that would be permanently lost would be primarily lower value managed
36 wetlands, and this would be replaced with higher value tidal brackish marsh foraging habitat. These
37 conservation actions would occur in the same timeframe as the early restoration losses. To ensure
38 that this natural community conservation benefits the species, the Plan's biological goals and
39 objectives (BDCP Chapter 3, Section 3.3) further specify that within the 6,000 acres of tidal brackish
40 emergent marsh restored in the late long-term, at least 1,500 acres would be restored as high and
41 mid marsh, providing primary habitat for these species. In addition, of the 8,000 acres of protected
42 and 2,000 acres of restored grassland, in the late long-term, grasslands adjacent to restored tidal
43 brackish emergent wetlands would be protected or restored, to provide at least 200 feet of adjacent
44 grasslands beyond the sea level rise accommodation. This adjacent upland habitat would provide

1 high tide refugia during high tide events, benefitting both species. These biological goals and
 2 objectives would inform the near-term restoration efforts and represent performance standards for
 3 considering the effectiveness of restoration actions. Tidal wetlands would be restored in a mosaic of
 4 large, interconnected and biologically diverse patches. Larger and more interconnected patches of
 5 suitable habitat would be expected to reduce the effects of habitat fragmentation that currently exist
 6 in Suisun Marsh in CZ 11. Nonnative predators would be controlled as needed to reduce nest
 7 predation and to help maintain species abundance (CM11). Restoration would be sequenced over
 8 the term of the Plan and occur in a manner that would minimize any temporary, initial loss and
 9 fragmentation of habitat. The acres of restoration contained in the near-term Plan goals with the
 10 management and enhancement actions (CM11), and the incorporation of the additional measures in
 11 the biological goals and objectives (BDCP Chapter 3, Section 3.3) would be sufficient to mitigate the
 12 near-term effects of tidal restoration.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 16 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
 17 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Yellow-Billed Cuckoo*. All of these
 18 AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to
 19 work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
 20 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. The
 21 saltmarsh common yellowthroat is not a species that is covered under the BDCP. Although
 22 preconstruction surveys for Suisun song sparrow would likely also detect nesting saltmarsh
 23 common yellowthroat, in order to avoid adverse effects on individuals, preconstruction surveys for
 24 noncovered avian species would be required to ensure that saltmarsh common yellowthroat nests
 25 are detected and avoided.

26 ***Late Long-Term Timeframe***

27 Based on modeled habitat, the study area supports approximately 3,761 acres of primary and
 28 23,997 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.
 29 Alternative 1C as a whole would result in the permanent loss of 3,510 acres of secondary habitat
 30 (15% of the total secondary habitat in the study area). In addition, 55 acres of primary habitat
 31 would be converted to secondary foraging habitat, and 123 acres of secondary habitat would be
 32 converted to primary habitat. The Plan includes a commitment to restore or create at least 3,000
 33 acres of tidal brackish emergent wetlands in Suisun Marsh in CZ 11 (Table 12-1C-34). The secondary
 34 habitat that would be permanently lost would be primarily lower value managed wetlands, and this
 35 would be replaced with higher value tidal brackish marsh foraging habitat. These conservation
 36 actions would occur in the same timeframe as the early restoration losses. To ensure that this
 37 natural community conservation benefits the species, the Plan's biological goals and objectives
 38 (BDCP Chapter 3, Section 3.3) further specify that within the 3,000 acres of tidal brackish emergent
 39 marsh restored in the late long-term, at least 1,500 acres would be restored as high and mid marsh,
 40 providing primary habitat for these species. In addition, of the 8,000 acres of protected and 2,000
 41 acres of restored grassland, in the late long-term, grasslands adjacent to restored tidal brackish
 42 emergent wetlands would be protected or restored, to provide at least 200 feet of adjacent
 43 grasslands beyond the sea level rise accommodation. This adjacent upland habitat would provide
 44 high tide refugia during high tide events, benefitting both species. These biological goals and
 45 objectives would inform the near-term restoration efforts and represent performance standards for
 46 considering the effectiveness of restoration actions. Tidal wetlands would be restored in a mosaic of

1 large, interconnected and biologically diverse patches. Larger and more interconnected patches of
2 suitable habitat would be expected to reduce the effects of habitat fragmentation that currently exist
3 in Suisun marsh in CZ 11. Nonnative predators would be controlled as needed to reduce nest
4 predation and to help maintain species abundance (CM11). Restoration would be sequenced over
5 the term of the Plan and occur in a manner that would minimize any temporary, initial loss and
6 fragmentation of habitat.

7 The loss of secondary habitat associated with Alternative 1C would represent an adverse effect as a
8 result of habitat modification of a special-status species and potential for direct mortality in the
9 absence of other conservation actions. However, with habitat protection and restoration associated
10 with CM4, with the management and enhancement actions (CM11), and with the incorporation of
11 the additional measures in the biological goals and objectives (BDCP Chapter 3, Section 3.3), guided
12 by AMM1–AMM7, and AMM22, which would be in place throughout the construction phase, the
13 effects of habitat loss and conversion on Suisun song sparrow would not be adverse under
14 Alternative 1C. Although preconstruction surveys for Suisun song sparrow would likely also detect
15 nesting saltmarsh common yellowthroat, in order to avoid adverse effects on individuals,
16 preconstruction surveys for noncovered avian species would be required to ensure that saltmarsh
17 common yellowthroat nests are detected and avoided.

18 **NEPA Effects:** The loss of Suisun song sparrow and saltmarsh common yellowthroat habitat and
19 potential direct mortality of these special status species under Alternative 1C would represent an
20 adverse effect in the absence of other conservation actions. However, with habitat protection and
21 restoration associated with CM4, with the management and enhancement actions (CM11), and with
22 the incorporation of the additional measures in the biological goals and objectives, AMM1–AMM7
23 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
24 *Cuckoo*, which would be in place throughout the construction period, the effects of habitat loss and
25 potential mortality on Suisun song sparrow, and the effects of habitat loss on saltmarsh common
26 yellowthroat would not be adverse under Alternative 1C. The saltmarsh common yellowthroat is not
27 a species that is covered under the BDCP. Although preconstruction surveys for Suisun song
28 sparrow would likely also detect nesting saltmarsh common yellowthroat, in order for the BDCP to
29 avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would be
30 required to ensure that saltmarsh common yellowthroat nests are detected and avoided. Mitigation
31 Measure BIO-75 would be available to address this adverse effect.

32 **CEQA Conclusion:** Alternative 1C (CM4) would have permanent impacts on Suisun song sparrow
33 and saltmarsh common yellowthroat and their modeled habitat, and the operation of construction
34 equipment could injure or disturb individuals.

35 **Near-Term Timeframe**

36 There would be no impacts resulting from the construction of the water conveyance facilities (CM1).
37 However, there would be a permanent loss of 1,040 acres of modeled secondary habitat for Suisun
38 song sparrow and saltmarsh common yellowthroat in the study area in the near-term. In addition,
39 54 acres of primary habitat would be converted to secondary foraging habitat, and 58 acres of
40 secondary habitat would be converted to mid to high marsh, which would provide primary nesting
41 habitat for these species. Although there would be a temporal lag in these conversions, there would
42 be no net loss of primary habitat in the near-term. These effects would result from implementing
43 CM4 tidal restoration in CZ 11. Typical NEPA and CEQA project-level mitigation ratios for those
44 natural communities affected by CM4 and that are identified in the biological goals and objectives in

1 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
2 Using these typical ratios would indicate that 1,152 acres of tidal brackish emergent wetland should
3 be restored/created to mitigate the CM4 permanent losses of Suisun song sparrow and saltmarsh
4 common yellowthroat habitat in the near-term.

5 The BDCP has committed to near-term goals of restoring 1,000 acres of tidal brackish emergent
6 wetlands in the study area in CZ 11. Although this 1,000 acres is slightly less than the 1:1 restoration
7 ratio, the secondary habitat that would be permanently lost would be primarily lower value
8 managed wetlands, and this would be replaced with higher value tidal brackish marsh foraging
9 habitat. These conservation actions would occur in the same timeframe as the early restoration
10 losses. To ensure that this natural community conservation benefits the species, the Plan's biological
11 goals and objectives (BDCP Chapter 3, Section 3.3) further specify that within the 3,000 acres of tidal
12 brackish emergent marsh restored in the late long-term, at least 1,500 acres would be restored as
13 high and mid marsh, providing primary habitat for these species. In addition, of the 8,000 acres of
14 protected and 2,000 acres of restored grassland, in the late long-term, grasslands adjacent to
15 restored tidal brackish emergent wetlands would be protected or restored, to provide at least 200
16 feet of adjacent grasslands beyond the sea level rise accommodation. This adjacent upland habitat
17 would provide high tide refugia during high tide events, benefitting both species. These biological
18 goals and objectives would inform the near-term restoration efforts and represent performance
19 standards for considering the effectiveness of restoration actions. Tidal wetlands would be restored
20 in a mosaic of large, interconnected and biologically diverse patches. Larger and more
21 interconnected patches of suitable habitat would be expected to reduce the effects of habitat
22 fragmentation that currently exist in Suisun Marsh in CZ 11. Nonnative predators would be
23 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
24 Restoration would be sequenced over the term of the Plan and occur in a manner that would
25 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration
26 contained in the near-term Plan goals with the management and enhancement actions (CM11), and
27 the incorporation of the additional measures in the biological goals and objectives would be
28 sufficient to mitigate the near-term effects of tidal restoration.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness, AMM2 Construction*
30 *Best Management Practices and Monitoring, AMM5 Spill Prevention, Containment and*
31 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operation Plan and AMM22*
32 *Suisun Song Sparrow, Yellow-breasted Chat, Least Bell's Vireo, Yellow-Billed Cuckoo*. All of these AMMs
33 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
34 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
35 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
36 EIR/EIS. The saltmarsh common yellowthroat is not a species that is covered under the BDCP.
37 Although preconstruction surveys for Suisun song sparrow may also detect nesting saltmarsh
38 common yellowthroat, in order to have a less-than-significant effect on individuals, preconstruction
39 surveys for noncovered avian species would be required to ensure that saltmarsh common
40 yellowthroat nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*
41 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce the potential impact on
42 nesting saltmarsh common yellowthroat to a less-than-significant impact.

43 The 1,000 acres of restoration contained in the near-term Plan goals, the additional direction in the
44 biological goals and objectives, and management and enhancement activities in CM11, would be
45 sufficient to support the conclusion that the near-term effects of habitat loss and direct mortality
46 under Alternative 1C would be less than significant under CEQA, as AMM1-AMM7, AMM22, and

1 Mitigation Measure BIO-75 would avoid and minimize potential impacts on the species from
2 construction-related habitat loss.

3 **Late Long-Term Timeframe**

4 The habitat model indicates that the study area supports approximately 3,722 acres of primary and
5 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.
6 Alternative 1C as a whole would result in the permanent loss of 3,688 acres of habitat (15% of the
7 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*
8 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary
9 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

10 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or
11 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)
12 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse
13 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh
14 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for
15 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,
16 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to
17 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This
18 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise
19 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be
20 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more
21 interconnected patches of suitable habitat would be expected to reduce the effects of habitat
22 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be
23 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
24 Restoration would be sequenced over the term of the Plan and occur in a manner that would
25 minimize any temporary, initial loss and fragmentation of habitat.

26 The BDCP's beneficial effects analysis (BDCP Chapter 5.6, *Effects on Covered Wildlife and Plant*
27 *Species*) estimates that the restoration and protection actions discussed above could result in the
28 restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat in addition to the
29 protection of 384 acres of secondary habitat for Suisun song sparrow, which would also benefit the
30 saltmarsh common yellowthroat.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
35 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
36 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
37 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
38 which have since been updated and which are provided in Appendix 3B, *Environmental*
39 *Commitments, AMMs, and CMs*, of the Final EIR/EIS. The saltmarsh common yellowthroat is not a
40 covered species under the BDCP. Although preconstruction surveys for Suisun song sparrow may
41 detect nesting saltmarsh common yellowthroat, for the BDCP to have a less-than-significant impact
42 on individuals, preconstruction surveys for noncovered avian species would be required to ensure
43 that saltmarsh common yellowthroat nests are detected and avoided. Mitigation Measure BIO-75

1 would reduce this potential impact on nesting saltmarsh common yellowthroat to a less-than-
2 significant level.

3 Considering these restoration provisions, which would replace low-value secondary habitat with
4 high-value tidal brackish emergent habitat, including both foraging and primary habitat, and provide
5 upland refugia for Suisun song sparrow and saltmarsh common yellowthroat, the acreages of
6 restoration would be sufficient to compensate for habitats lost to construction and restoration
7 activities. Loss of habitat or direct mortality through implementation of Alternative 1C, with the
8 implementation of AMM1–AMM7, AMM22, and Mitigation Measure BIO-75, *Conduct Preconstruction*
9 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would not result in a substantial adverse
10 effect through habitat modifications and would not substantially reduce the number or restrict the
11 range of the species. Therefore, the loss of habitat or potential mortality under this alternative
12 would have a less-than-significant impact on Suisun song sparrow and saltmarsh common
13 yellowthroat.

14 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
15 **Disturbance of Nesting Birds**

16 See Mitigation Measure BIO-75 under Impact BIO-75.

17 **Impact BIO-81: Indirect Effects of Plan Implementation on Suisun Song Sparrow and**
18 **Saltmarsh Common Yellowthroat**

19 **Indirect Construction-Related Effects:** If Suisun song sparrow or saltmarsh common yellowthroat
20 were to nest in or adjacent to work areas, construction and subsequent maintenance-related noise
21 and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
22 functions of suitable nesting habitat for these species. Suisun song sparrow and saltmarsh common
23 yellowthroat habitat adjacent to restoration work areas could be affected by such disturbances,
24 which could temporarily result in diminished use of habitat. Construction noise above background
25 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
26 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
27 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
28 the extent to which these noise levels could affect either species. If construction occurred during the
29 nesting season, these indirect effects could result in the loss or abandonment of nests and mortality
30 of any eggs and/or nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*
31 *Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
32 *Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse effects of
33 construction-related activities on survival and productivity of Suisun song sparrow and saltmarsh
34 common yellowthroat by requiring preconstruction surveys and, if nests are present, the
35 establishment of a no-disturbance buffer within 250 feet of a nest site. The use of mechanical
36 equipment during water conveyance facilities construction could cause the accidental release of
37 petroleum or other contaminants that could affect species in the surrounding habitat. The
38 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an
39 adverse effect on Suisun song sparrow and saltmarsh common yellowthroat. *AMM2 Construction*
40 *Best Management Practices and Monitoring* would minimize the likelihood of such spills and ensure
41 that measures are in place to prevent runoff from the construction area and any adverse effects of
42 dust on active nests.

1 **Salinity:** Water conveyance facilities operations would have an effect on salinity gradients in Suisun
2 Marsh; however, these effects cannot be reasonably disaggregated from effects resulting from tidal
3 habitat restoration. It is expected that the salinity of water in Suisun Marsh would generally increase
4 as a result of water conveyance facilities operations and operations of salinity control gates to mimic
5 a more natural water flow. This would likely encourage the establishment of tidal wetland plant
6 communities tolerant of more saline environments, which should have a beneficial effect on Suisun
7 song sparrow and saltmarsh common yellowthroat because their historical natural Suisun Marsh
8 habitat is brackish tidal marsh. However, the degree to which salinity changes in all tidal channels
9 and sloughs in and around Suisun Marsh would be highly variable.

10 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
11 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
12 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
13 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
14 newly inundated areas could increase bioavailability of mercury. Although tidal habitat restoration
15 might increase methylation of mercury export to other habitats, restoration is unlikely to
16 significantly increase the exposure of methylmercury to Suisun song sparrow or saltmarsh common
17 yellowthroat, as they currently reside in tidal marshes where elevated methylmercury levels exist.
18 Robinson et al. (2011) found toxic levels of methylmercury levels in song sparrow populations from
19 southern San Francisco Bay, although populations near Suisun Marsh (i.e., San Pablo and Simas
20 Creeks) were much lower. The potential mobilization or creation of methylmercury within the study
21 area varies with site-specific conditions and would need to be assessed at the project level. The
22 Suisun Marsh Plan anticipates that restored tidal wetlands would generate less methylmercury than
23 the existing managed wetlands to be restored (Bureau of Reclamation et al. 2010).

24 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
25 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
26 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
27 project-specific basis, where high potential for methylmercury production is identified that
28 restoration design and adaptive management cannot fully address while also meeting restoration
29 objectives, alternate restoration areas will be considered. CM12 would be implemented in
30 coordination with other similar efforts to address mercury in the Delta, and specifically with the
31 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
32 following actions.

- 33 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
34 mercury methylation and bioavailability
- 35 ● Define design elements that minimize conditions conducive to generation of methylmercury in
36 restored areas.
- 37 ● Define adaptive management strategies that can be implemented to monitor and minimize
38 actual postrestoration creation and mobilization of methylmercury.

39 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
40 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
41 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
42 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
43 2009). The effect of selenium toxicity differs widely between species and also between age and sex
44 classes within a species. In addition, the effect of selenium on a species can be confounded by

1 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
2 2009).

3 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
4 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
5 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
6 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
7 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
8 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
9 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
10 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
11 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
12 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
13 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
14 have a higher risk of selenium toxicity.

15 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
16 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
17 exacerbate bioaccumulation of selenium in avian species, including Suisun song sparrow and
18 saltmarsh common yellowthroat. Marsh (tidal and nontidal) and floodplain restoration have the
19 potential to mobilize selenium, and, therefore, increase avian exposure from ingestion of prey items
20 with elevated selenium levels. Thus, Alternative 1C restoration activities that create newly
21 inundated areas could increase bioavailability of selenium (see BDCP Chapter 3, *Conservation*
22 *Strategy*, for details of restoration). Changes in selenium concentrations are analyzed in Chapter 8,
23 *Water Quality*, which concludes that, relative to Existing Conditions and the No Action Alternative,
24 CM1 would not result in substantial, long-term increases in selenium concentrations in water in the
25 Delta under any alternative. However, it is difficult to determine whether the effects of potential
26 increases in selenium bioavailability associated with restoration-related conservation measures
27 (CM4 and CM5) would lead to adverse effects on Suisun song sparrow and saltmarsh common
28 yellowthroat.

29 Because of the uncertainty that exists at this programmatic level of review, there could be a
30 substantial effect on Suisun song sparrow and saltmarsh common yellowthroat from increases in
31 selenium associated with restoration activities. This effect would be addressed through the
32 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
33 restoration design elements to reduce the potential for bioaccumulation of selenium and its
34 bioavailability in tidal habitats (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*).
35 Furthermore, the effectiveness of selenium management to reduce selenium concentrations and/or
36 bioaccumulation would be evaluated separately for each restoration effort as part of design and
37 implementation. This avoidance and minimization measure would be implemented as part of the
38 tidal habitat restoration design schedule.

39 **NEPA Effects:** Noise and visual disturbances would not have an adverse effect on Suisun song
40 sparrow with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
41 *Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
42 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects of
43 noise and visual disturbance on saltmarsh common yellowthroat. AMM1–AMM7, including *AMM2*
44 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of spills, and

1 ensure that measures were in place to prevent runoff from the construction area and to avoid
2 negative effects of dust on the species.

3 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
4 habitat restoration would be expected to increase water salinity in Suisun Marsh, which would be
5 expected to establish tidal marsh similar to historic conditions.

6 Tidal habitat restoration is unlikely to have a substantial impact on Suisun song sparrow and
7 saltmarsh common yellowthroat through increased exposure to methylmercury, as these species
8 currently reside in tidal marshes where elevated methylmercury levels exist. However, it is
9 unknown what concentrations of methylmercury are harmful to the species and the potential for
10 increased exposure varies substantially within the study area. Implementation of CM12 which
11 contains measures to assess the amount of mercury before project development, followed by
12 appropriate design and adaptation management, would minimize the potential for increased
13 methylmercury exposure, and would result in no adverse effect on Suisun song sparrow and
14 saltmarsh common yellowthroat.

15 Tidal habitat restoration could result in increased exposure of Suisun song sparrow and saltmarsh
16 common yellowthroat to selenium. This effect would be addressed through the implementation of
17 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
18 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
19 habitats.

20 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
21 sedimentation, and operations and maintenance of the water conveyance facilities would be less
22 than significant with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
23 *Least Bell's Vireo, Western Yellow-Billed Cuckoo,* Mitigation Measure BIO-75, *Conduct Preconstruction*
24 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds,* and *AMM2 Construction Best*
25 *Management Practices and Monitoring.* Changes in salinity gradients would be expected to have a
26 beneficial impact on Suisun song sparrow and saltmarsh common yellowthroat through the
27 establishment of tidal marsh similar to historic conditions.

28 The implementation of tidal natural communities restoration (CM4) is unlikely to significantly
29 increase the exposure of methylmercury to Suisun song sparrow or saltmarsh common
30 yellowthroat, as they currently reside in tidal marshes where elevated methylmercury levels exist.
31 However, it is unknown what concentrations of methylmercury are harmful to these species.
32 Implementation of CM12 which contains measures to assess the amount of mercury before project
33 development, followed by appropriate design and adaptation management, would minimize the
34 potential for increased methylmercury exposure, and would result in no adverse effect on Suisun
35 song sparrow and saltmarsh common yellowthroat.

36 Tidal habitat restoration could result in increased exposure of Suisun song sparrow and saltmarsh
37 common yellowthroat to selenium. This effect would be addressed through the implementation of
38 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
39 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
40 habitats.

41 With implementation of these avoidance and minimization measures, Mitigation Measure BIO-75,
42 and CM12, indirect effects of Plan implementation would have a less-than-significant impact on
43 Suisun song sparrow and saltmarsh common yellowthroat.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 See Mitigation Measure BIO-75 under Impact BIO-75.

4 **Impact BIO-82: Effects on Suisun Song Sparrow and Saltmarsh Common Yellowthroat**
5 **Associated with Electrical Transmission Facilities**

6 The range of the Suisun song sparrow extends eastward into the study area to approximately
7 Kimball Island. There are several reported occurrences from Kimball Island, Browns Island, and in
8 the Suisun Marsh in the western portion of the study area. The easternmost range of the saltmarsh
9 common yellowthroat also ends in Suisun Marsh. These species ranges, along with areas of suitable
10 habitat, are far from the proposed transmission line routes (BDCP Appendix 5.J, Attachment 5.J.C,
11 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Location of the current
12 populations, species ranges, and suitable habitat in the plan area make collision with the proposed
13 transmission lines highly unlikely. Therefore the construction and presence of new transmission
14 lines would not have an adverse effect on Suisun song sparrow and saltmarsh common
15 yellowthroat.

16 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse
17 effect on Suisun song sparrow and saltmarsh common yellowthroat because the location of the
18 current populations, species ranges, and suitable habitat for the species make collision with the
19 proposed transmission lines highly unlikely.

20 **CEQA Conclusion:** The construction and presence of new transmission lines would not be expected
21 to have an adverse effect on Suisun song sparrow and saltmarsh common yellowthroat because the
22 location of the current populations, species ranges, and suitable habitat for the species make
23 collision with the proposed transmission lines highly unlikely. Therefore, the construction and
24 presence of new transmission lines under Alternative 1C would have a less-than-significant impact
25 on Suisun song sparrow and saltmarsh common yellowthroat.

26 **Swainson's Hawk**

27 This section describes the effects of Alternative 1C, including water conveyance facilities
28 construction and implementation of other conservation components, on Swainson's hawk. The
29 habitat model used to assess impacts on Swainson's hawk includes plant alliances and land cover
30 types associated with Swainson's hawk nesting and foraging habitat. Construction and restoration
31 associated with Alternative 1C conservation measures would result in both temporary and
32 permanent losses of Swainson's hawk modeled habitat as indicated in Table 12-1C-35. The majority
33 of the losses would take place over an extended period of time as tidal marsh is restored in the study
34 area. Although protection and restoration for the loss of nesting and foraging habitat would be
35 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)
36 for restored habitats to replace the functions of habitat lost. This time lag between impacts and
37 restoration of habitat function would be minimized through specific requirements of *AMM18*
38 *Swainson's Hawk*, including transplanting mature trees in the near-term time period. Full
39 implementation of Alternative 1C would also include the following conservation actions over the
40 term of the BDCP to benefit the Swainson's hawk (BDCP Chapter 3, Section 3.3, *Biological Goals and*
41 *Objectives*).

- 1 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
2 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
3 associated with CM7)
 - 4 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
5 10 (Objective VFRNC1.2, associated with CM3).
 - 6 • Plant and maintain native trees along roadsides and field borders within protected cultivated
7 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM3 and CM11).
 - 8 • Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey
9 populations throughout protected cultivated lands (Objective SH2.2, associated with CM3 and
10 CM11).
 - 11 • Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,
12 VPNC2.5, and GNC2.4, associated with CM11).
 - 13 • Conserve at least 1 acre of Swainson’s hawk foraging habitat for each acre of lost foraging
14 habitat (Objective SH1.1, associated with CM3).
 - 15 • Protect at least 42,275 acres of cultivated lands as Swainson’s hawk foraging habitat with at
16 least 50% in very high-value habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated
17 with CM3).
 - 18 • Of the at least 42,275 acres of cultivated lands protected as Swainson’s hawk foraging habitat
19 under Objective SH1.2, up to 1,500 acres can occur in CZs 5 and 6, and must have land surface
20 elevations greater than –1 foot NAVD88 (Objective SH1.3, associated with CM3).
 - 21 • Protect at least 10,750 acres of grassland, vernal pool, and alkali seasonal wetland as Swainson’s
22 hawk foraging habitat (Objective SH1.4, associated with CM3).
 - 23 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
24 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
 - 25 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
26 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
27 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
28 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 29 As explained below, with the restoration or protection of these amounts of habitat, in addition to
30 management activities that would enhance these natural communities for the species and the
31 implementation of AMM1–AMM7 and *AMM18 Swainson’s Hawk*, impacts on Swainson’s hawk would
32 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-35. Changes in Swainson’s Hawk Modeled Habitat Associated with Alternative 1C**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Breeding	32	32	64	64	NA	NA
	Foraging	4,920	4,920	6,895	6,895	NA	NA
Total Impacts CM1		4,952	4,952	6,959	6,959	NA	NA
CM2–CM18	Breeding	252	412	54	85	41–70	189
	Foraging	8,903	48,511	504	1,540	3,025–6,635	8,008
Total Impacts CM2–CM18		9,155	48,923	558	1,625	3,066-6,705	8,197
Total Breeding		284	444	118	149		189
Total Foraging		13,823	53,431	7,399	8,435		8,008
TOTAL IMPACTS		14,107	53,875	7517	8584		8,197

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-83: Loss or Conversion of Habitat for and Direct Mortality of Swainson’s Hawk**

5 Alternative 1C conservation measures would result in the combined permanent and temporary loss
6 of up to 62,459 acres of modeled habitat (593 acres of nesting habitat and 61,866 acres of foraging
7 habitat) for Swainson’s hawk (Table 12-1C-35). Conservation measures that would result in these
8 losses are conveyance facilities and transmission line construction, and establishment and use of
9 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration
10 (CM4), floodplain restoration (CM5), riparian habitat restoration, (CM7), grassland restoration
11 (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and
12 construction of conservation hatcheries (CM18). Habitat enhancement and management activities
13 (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local
14 habitat effects. In addition, maintenance activities associated with the long-term operation of the
15 water conveyance facilities and other BDCP physical facilities could affect Swainson’s hawk modeled
16 habitat. Each of these individual activities is described below. A summary statement of the combined
17 impacts and NEPA effects, and a CEQA conclusion follow the individual conservation measure
18 discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C water conveyance facilities
20 would result in the combined permanent and temporary loss of up to 96 acres of Swainson’s
21 hawk nesting habitat (32 acres of permanent loss habitat and 64 acres of temporary loss). Most

1 of the permanent loss of nesting habitat would occur where Intakes 1–5 impact the Sacramento
 2 River’s west bank between just north of Clarksburg and Courtland. The riparian areas here are
 3 very small patches, dominated by valley oak, scrub vegetation, and nonnative trees. In addition,
 4 11,815 acres of foraging habitat would be removed (4,920 acres of permanent loss, 6,895 acres
 5 of temporary loss; Table 12-1C-35). The permanent losses of foraging habitat would occur at
 6 various locations along the western canal route, at the intake sites along the Sacramento River,
 7 construction of the new forebay, and associated RTM storage areas. Both temporary and
 8 permanent losses of foraging habitat would occur from the transmission line corridors west of
 9 the study area and along the tunnel alignment in the west Delta. Temporary losses would occur
 10 from siphon construction areas, safe haven work areas, railroad work areas, and potential
 11 borrow and spoil sites along the canal alignment. habitat impacts from CM1 would include the
 12 permanent loss of 1,012 acres and the temporary loss of 1,256 acres of very high-value habitat
 13 (alfalfa; Table 12-1C-36). Refer to the Terrestrial Biology Map Book for a detailed view of
 14 Alternative 1C construction locations. The CM1 construction footprint overlaps with 20
 15 Swainson’s hawk occurrences in the study area. Eight occurrences overlap with permanent
 16 impacts from the construction of the canal, the permanent transmission line, intakes, shafts and
 17 siphons. In addition, twelve occurrences overlap with temporary impacts from work areas and
 18 the temporary transmission line alignment. The implementation of *AMM18 Swainson’s Hawk*,
 19 would require preconstruction surveys and the establishment of no-disturbance buffers and
 20 would minimize potential effects on nesting Swainson’s hawks present within or adjacent to
 21 construction areas. Impacts from CM1 would occur within the first 10 years of Alternative 1C
 22 implementation.

23 **Table 12-1C-36. Acres of Impacted Swainson’s Hawk Foraging Habitat by Value Classes**

Foraging Habitat Value Class	Cultivated Land and Other Land Cover Types	CM1 Permanent (temporary)	CM2-18 permanent (temporary)
Very high	Alfalfa hay	1,012 (1,256)	13,898 (432)
Moderate	Irrigated pasture, other hay crops, tomatoes, grain crops (wheat, barley, oats), fallow fields	1,441 (2,450)	15,136 (477)
Low	Other irrigated field and truck crops, dry pasture, grasslands, alkali seasonal wetlands, vernal pool complex, sudan	944 (1,413)	10,535 (349)
Very low	Safflower, sunflower, corn, grain sorghum, managed wetlands	1,522 (1,777)	8,943 (281)

24

25 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 26 would result in the combined permanent and temporary loss of up to 133 acres of nesting
 27 habitat (79 acres of permanent loss, 54 acres of temporary loss) in the Yolo Bypass in CZ 2. In
 28 addition, 1,500 acres of foraging habitat would be removed (996 acres of permanent loss, 554
 29 acres of temporary loss). Activities through CM2 could involve excavation and grading in
 30 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
 31 riparian losses would occur at the north end of Yolo Bypass where major fish passage
 32 improvements are planned. Excavation to improve water movement in the Toe Drain and in the

1 Sacramento Weir would also remove Swainson's hawk habitat. The loss is expected to occur
2 during the first 10 years of Alternative 1C implementation.

- 3 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
4 inundation would permanently remove an estimated 295 acres of Swainson's hawk nesting
5 habitat and 37,359 acres of foraging habitat. The majority of the acres lost would consist of
6 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity
7 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,
8 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
9 directly impact and fragment grassland just north of Rio Vista in and around French and
10 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
11 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
12 the northern fringes of Suisun Marsh. Impacts on foraging habitat from CM4 would consist of
13 10,757 acres of very high-value (alfalfa), 11,706 acres of moderate-value, and 7,973 acres of
14 low-value habitat (See Table 12-1C-36 for land cover types classified by habitat value). Because
15 the species is highly mobile and wide-ranging, habitat fragmentation is not expected to reduce
16 the use of remaining cultivated lands or preclude access to surrounding lands. However, the
17 conversion of cultivated lands to tidal wetlands over fairly broad areas within the tidal
18 restoration footprints could result in the removal or abandonment of nesting territories that
19 occur within or adjacent to the restoration areas. Trees would not be actively removed but tree
20 mortality would be expected over time as areas became tidally inundated. Depending on the
21 extent and value of remaining habitat, this could reduce the local nesting population. There are
22 at least 27 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for
23 CM4, suggesting that numerous nest sites could be directly affected by inundation from tidal
24 restoration activities.
- 25 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
26 seasonally inundated floodplain and riparian restoration actions would remove approximately
27 69 acres of Swainson's hawk nesting habitat (38 acres of permanent loss, 31 acres of temporary
28 loss) and 2,856 acres of foraging habitat (1,820 acres of permanent loss, 1,036 acres of
29 temporary loss). These losses would be expected after the first 10 years of Alternative 1C
30 implementation along the San Joaquin River and other major waterways in CZ 7.
- 31 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
32 approximately 953 acres of Swainson's hawk foraging habitat as part of tidal restoration and
33 3,991 acres as part of seasonal floodplain restoration through CM7. There are at least 27
34 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for CM7.
- 35 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
36 implemented on agricultural lands and would result in the conversion of 1,849 acres of
37 Swainson's hawk agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,
38 and 11. If agricultural lands supporting higher value foraging habitat than the restored
39 grassland were removed, there would be a loss of Swainson's hawk foraging habitat value.
- 40 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would
41 result in the permanent removal of 1,440 acres of Swainson's hawk foraging habitat in CZ 2 and
42 CZ 4. Small patches of riparian vegetation that support Swainson's hawk nesting habitat may
43 develop along the margins of restored nontidal marsh if appropriate site conditions are present.

- 1 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and
2 enhancement-related activities could disturb Swainson’s hawk nests if they were present near
3 work sites. A variety of habitat management actions that are designed to enhance wildlife values
4 in BDCP-protected habitats may result in localized ground disturbances that could temporarily
5 remove small amounts of Swainson’s hawk habitat and reduce the functions of habitat until
6 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
7 and road and other infrastructure maintenance, are expected to have minor effects on available
8 Swainson’s hawk habitat and are expected to result in overall improvements to and
9 maintenance of habitat values over the term of the BDCP. These effects cannot be quantified, but
10 are expected to be minimal and would be avoided and minimized by the AMMs listed below.
11 CM11 would also include the construction of recreational-related facilities including trails,
12 interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal*
13 *Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms,
14 etc. would be placed on existing, disturbed areas when and where possible. However,
15 approximately 50 acres of Swainson’s hawk grassland foraging habitat would be lost from the
16 construction of trails and facilities.
- 17 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
18 Swainson’s hawk foraging habitat for the development of a delta and longfin smelt conservation
19 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.
- 20 Permanent and temporary nesting habitat losses from the above conservation measures, would
21 primarily consist of small, fragmented riparian stands. Temporarily affected nesting habitat
22 would be restored as riparian habitat within 1 year following completion of construction
23 activities. The restored riparian habitat would require 1 to several decades to functionally
24 replace habitat that has been affected and for trees to attain sufficient size and structure suitable
25 for nesting by Swainson’s hawks. *AMM18 Swainson’s Hawk* contains actions described below to
26 reduce the effect of temporal loss of nesting habitat, including the transplanting of mature trees
27 and planting of trees near high-value foraging habitat. The functions of cultivated lands and
28 grassland communities that provide foraging habitat for Swainson’s hawk are expected to be
29 restored relatively quickly.
- 30 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
31 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
32 disturbances that could affect Swainson’s hawk use of the surrounding habitat. Maintenance
33 activities would include vegetation management, levee and structure repair, and re-grading of
34 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7
35 and *AMM18 Swainson’s Hawk* in addition to conservation actions as described below.
- 36 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
37 direct mortality of adult or fledged Swainson’s hawk if they were present in the study area,
38 because they would be expected to avoid contact with construction and other equipment.
39 However, if Swainson’s hawk were to nest in the construction area, construction-related
40 activities, including equipment operation, noise and visual disturbances could affect nests or
41 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects
42 would be avoided and minimized with the incorporation of *AMM18 Swainson’s Hawk* into the
43 BDCP.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
3 included.

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
7 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
8 the effect of construction would not be adverse under NEPA. Alternative 1C would remove 402 acres
9 (284 permanent, 118 temporary) of Swainson’s hawk nesting habitat in the study area in the near-
10 term. These effects would result from the construction of the water conveyance facilities (CM1, 96
11 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,
12 *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*,
13 *CM7 Riparian Natural Community Restoration*—306 acres). In addition, 21,222 acres of Swainson’s
14 hawk foraging habitat would be removed or converted in the near-term (CM1, 11,815 acres; *CM2*
15 *Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5, Seasonally*
16 *Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland*
17 *Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*,
18 *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—
19 9,407 acres).

20 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and
21 those that are identified in the biological goals and objectives for Swainson’s hawk in Chapter 3 of
22 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
23 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 96
24 acres of nesting habitat should be restored/created and 96 acres should be protected to compensate
25 for the CM1 losses of Swainson’s hawk nesting habitat. In addition, 11,815 acres of foraging habitat
26 should be protected to mitigate the CM1 losses of Swainson’s hawk foraging habitat. The near-term
27 effects of other conservation actions would remove 306 acres of modeled nesting habitat, and
28 therefore require 306 acres of restoration and 306 acres of protection of nesting habitat. Similarly,
29 the near-term effects of other conservation actions would remove 9,407 acres of modeled foraging
30 habitat, and therefore require 9,407 acres of protection of foraging habitat using the same typical
31 NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting habitat; 1:1
32 protection for the loss of foraging habitat).

33 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
34 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
35 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
36 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
37 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3, *Description of*
38 *Alternatives*). These conservation actions are associated with CM3, CM5, CM7, and CM8, and would
39 occur in the same timeframe as the construction and early restoration losses.

40 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
41 system with extensive wide bands or large patches of valley/foothill riparian natural community
42 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
43 restoration would expand the patches of existing riparian forest in order to support nesting habitat
44 for the species. The distribution and abundance of potential Swainson’s hawk nest trees would be

1 increased by planting and maintaining native trees along roadsides and field borders within
 2 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small
 3 but essential nesting habitat for Swainson’s hawk associated with cultivated lands would also be
 4 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
 5 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

6 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 7 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
 8 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
 9 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
 10 provide foraging habitat for Swainson’s hawk and reduce the effects of current levels of habitat
 11 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
 12 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
 13 Foraging opportunities would also be improved by enhancing prey populations through the
 14 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
 15 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
 16 would also be protected and maintained as part of the cultivated lands reserve system which would
 17 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
 18 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
 19 components) that dry during the spring would also serve as foraging habitat for Swainson’s hawks
 20 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
 21 would inform the near-term protection and restoration efforts and represent performance
 22 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated
 23 lands that provide habitat for covered and other native wildlife species would be protected in the
 24 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the
 25 late long-term time period would be in very high- and high-value crop types for Swainson’s hawk
 26 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated
 27 lands protected in the near-term time period which would provide high-value habitat for Swainson’s
 28 hawk. The acres of restoration and protection contained in the near-term Plan goals and the
 29 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
 30 the project-level effects of CM1 on Swainson’s hawk foraging habitat, as well as mitigate the near-
 31 term effects of the other conservation measures.

32 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
 33 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
 34 other near-term impacts on Swainson’s hawk nesting habitat. The 800 acres of restored riparian
 35 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
 36 require one to several decades to functionally replace habitat that has been affected and for trees to
 37 attain sufficient size and structure suitable for nesting by Swainson’s hawks. This time lag between
 38 the removal and restoration of nesting habitat could have a substantial impact on Swainson’s hawk
 39 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting
 40 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
 41 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat
 42 would further reduce this limited resource and could reduce or restrict the number of active
 43 Swainson’s hawk nests within the Plan Area until restored riparian habitat is sufficiently developed.

44 *AMM18 Swainson’s Hawk* would implement a program to plant large mature trees, including
 45 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson’s hawk
 46 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)

1 within the 125-acre block are removed. These mature trees would be supplemented with additional
2 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
3 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
4 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
5 system for every tree removed by construction during the near-term period that was suitable for
6 nesting by Swainson's hawks (20 feet or taller). A variety of native tree species would be planted to
7 provide trees with differing growth rates, maturation, and life span. Trees would be planted within
8 the BDCP reserve system in areas that support high value foraging habitat Swainson's hawk foraging
9 habitat to increase nest sites, or within riparian plantings as a component of the riparian restoration
10 (CM5, CM7) where they are in close proximity to suitable foraging habitat. Replacement trees that
11 were incorporated into the riparian restoration would not be clustered in a single region of the
12 study area, but would be distributed throughout the lands protected as foraging habitat for
13 Swainson's hawk.

14 Swainson's hawk foraging habitat would be protected within 3 miles of a known Swainson's hawk
15 nest tree and within 50 miles of the project footprint on land not subject to threat of seasonal
16 flooding, construction disturbances, or other conditions that would reduce the foraging value of the
17 land. Further details of AMM18 are provided in Appendix 3B, *Environmental Commitments, AMMs,*
18 *and CMs*, of the Final EIR/EIS. With this program in place, Alternative 1C would not have a
19 substantial adverse effect on Swainson's hawk in the near-term timeframe, either through direct
20 mortality or through habitat modifications.

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
22 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
23 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
24 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
25 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
26 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
27 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs,*
28 of the Final EIR/EIS.

29 ***Late Long-Term Timeframe***

30 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of
31 modeled foraging habitat for Swainson's hawk. Alternative 1C as a whole would result in the
32 permanent loss of and temporary effects on 593 acres of potential nesting habitat (6% of the
33 potential nesting habitat in the study area) and 61,866 acres of foraging habitat (13% of the foraging
34 habitat in the study area).

35 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
36 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community*
37 *Restoration, and CM8 Grassland Natural Community Restoration* to restore or create at least 5,000
38 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000
39 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool
40 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed
41 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
42 species (Table 3-4 in Chapter 3, *Description of Alternatives*).

1 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
2 system with extensive wide bands or large patches of valley/foothill riparian natural community
3 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
4 restoration would expand the patches of existing riparian forest in order to support nesting habitat
5 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be
6 increased by planting and maintaining native trees along roadsides and field borders within
7 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but
8 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be
9 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
10 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

11 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
12 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
13 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
14 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
15 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat
16 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
17 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
18 Foraging opportunities would also be improved by enhancing prey populations through the
19 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
20 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would
21 also be protected and maintained as part of the cultivated lands reserve system which would
22 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
23 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
24 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks
25 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
26 would inform the near-term protection and restoration efforts and represent performance
27 standards for considering the effectiveness of restoration actions. Foraging habitat would be
28 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that
29 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which
30 would be in very high-value habitat production in CZs 1-4, 7- 9, and 11 (Objective SH1.2).

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
35 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
36 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
37 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
38 of the Final EIR/EIS.

39 **NEPA Effects:** The loss of Swainson's hawk habitat and potential for direct mortality of this special-
40 status species under Alternative 1C would represent an adverse effect in the absence of other
41 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,
42 CM9, and CM11, guided by biological goals and objectives and by AMM1-AMM7 and *AMM18*
43 *Swainson's Hawk*, which would be in place throughout the construction period, the effects of habitat
44 loss and potential mortality on Swainson's hawk under Alternative 1C would not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
6 the effect of construction would be less than significant under CEQA. Alternative 1C would remove
7 402 acres (284 permanent, 118 temporary) of Swainson's hawk nesting habitat in the study area in
8 the near-term. These effects would result from the construction of the water conveyance facilities
9 (CM1, 96 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
10 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*
11 *Restoration, CM7 Riparian Natural Community Restoration—306 acres). In addition, 21,222 acres of*
12 *Swainson's hawk foraging habitat would be removed or converted in the near-term (CM1, 11,815*
13 *acres; CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5*
14 *Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8*
15 *Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex*
16 *Restoration, CM11 Natural Communities Enhancement and Management and CM18 Conservation*
17 *Hatcheries—9,407 acres).*

18 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and
19 those that are identified in the biological goals and objectives for Swainson's hawk in Chapter 3 of
20 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
21 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 96
22 acres of nesting habitat should be restored/created and 96 acres should be protected to compensate
23 for the CM1 losses of Swainson's hawk nesting habitat. In addition, 11,815 acres of foraging habitat
24 should be protected to mitigate the CM1 losses of Swainson's hawk foraging habitat. The near-term
25 effects of other conservation actions would remove 306 acres of modeled nesting habitat, and
26 therefore require 306 acres of restoration and 306 acres of protection of nesting habitat. Similarly,
27 the near-term effects of other conservation actions would remove 9,407 acres of modeled foraging
28 habitat, and therefore require 9,407 acres of protection of foraging habitat using the same typical
29 NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting habitat; 1:1
30 protection for the loss of foraging habitat).

31 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
32 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
33 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
34 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
35 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3, *Description of*
36 *Alternatives*). These conservation actions are associated with CM3, CM5, CM7, and CM8, and would
37 occur in the same timeframe as the construction and early restoration losses.

38 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
39 system with extensive wide bands or large patches of valley/foothill riparian natural community
40 (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation Strategy*). Riparian restoration
41 would expand the patches of existing riparian forest in order to support nesting habitat for the
42 species. The distribution and abundance of potential Swainson's hawk nest trees would be increased
43 by planting and maintaining native trees along roadsides and field borders within protected
44 cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small but

1 essential nesting habitat for Swainson’s hawk associated with cultivated lands would also be
2 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
3 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

4 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
5 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
6 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
7 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
8 provide foraging habitat for Swainson’s hawk and reduce the effects of current levels of habitat
9 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
10 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
11 Foraging opportunities would also be improved by enhancing prey populations through the
12 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
13 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
14 would also be protected and maintained as part of the cultivated lands reserve system which would
15 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
16 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
17 components) that dry during the spring would also serve as foraging habitat for Swainson’s hawks
18 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
19 would inform the near-term protection and restoration efforts and represent performance
20 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated
21 lands that provide habitat for covered and other native wildlife species would be protected in the
22 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the
23 late long-term time period would be in very high- and high-value crop types for Swainson’s hawk
24 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated
25 lands protected in the near-term time period which would provide high-value habitat for Swainson’s
26 hawk. The acres of restoration and protection contained in the near-term Plan goals and the
27 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
28 the project-level effects of CM1 on Swainson’s hawk foraging habitat, as well as mitigate the near-
29 term effects of the other conservation measures.

30 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
31 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
32 other near-term impacts on Swainson’s hawk nesting habitat. The 800 acres of restored riparian
33 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
34 require one to several decades to functionally replace habitat that has been affected and for trees to
35 attain sufficient size and structure suitable for nesting by Swainson’s hawks. This time lag between
36 the removal and restoration of nesting habitat could have a substantial impact on Swainson’s hawk
37 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting
38 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
39 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat
40 would further reduce this limited resource and could reduce or restrict the number of active
41 Swainson’s hawk within the Plan Area until restored riparian habitat is sufficiently developed.

42 *AMM18 Swainson’s Hawk* would implement a program to plant large mature trees, including
43 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson’s hawk
44 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
45 within the 125-acre block are removed. These mature trees would be supplemented with additional
46 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The

1 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
2 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
3 system for every tree removed by construction during the near-term period that was suitable for
4 nesting by Swainson's hawks (20 feet or taller). A variety of native tree species would be planted to
5 provide trees with differing growth rates, maturation, and life span. Trees would be planted within
6 the BDCP reserve system in areas that support high value Swainson's hawk foraging habitat to
7 increase nest sites, or within riparian plantings as a component of the riparian restoration (CM5,
8 CM7) where they are in close proximity to suitable foraging habitat. Replacement trees that are
9 incorporated into the riparian restoration would not be clustered in a single region of the Plan Area,
10 but would be distributed throughout the lands protected as foraging habitat for Swainson's hawk.

11 Swainson's hawk foraging habitat would be protected within 3 miles of a known Swainson's hawk
12 nest tree and within 50 miles of the project footprint on land not subject to threat of seasonal
13 flooding, construction disturbances, or other conditions that would reduce the foraging value of the
14 land. With this program in place, Alternative 1C would not have a substantial adverse effect on
15 Swainson's hawk in the near-term timeframe, either through direct mortality or through habitat
16 modifications. Further details of AMM18 are provided in Appendix 3B, *Environmental Commitments,*
17 *AMMs, and CMs*, of the Final EIR/EIS.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
19 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
20 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
21 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
22 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
23 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
24 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs,*
25 of the Final EIR/EIS.

26 ***Late Long-Term Timeframe***

27 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of
28 modeled foraging habitat for Swainson's hawk. Alternative 1C as a whole would result in the
29 permanent loss of and temporary effects on 593 acres of potential nesting habitat (6% of the
30 potential nesting habitat in the study area) and 61,866 acres of foraging habitat (13% of the foraging
31 habitat in the study area).

32 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
33 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community*
34 *Restoration, and CM8 Grassland Natural Community Restoration* to restore or create at least 5,000
35 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000
36 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool
37 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed
38 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
39 species (Table 3-4 in Chapter 3, *Description of Alternatives*).

40 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
41 system with extensive wide bands or large patches of valley/foothill riparian natural community
42 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
43 restoration would expand the patches of existing riparian forest in order to support nesting habitat
44 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be

1 increased by planting and maintaining native trees along roadsides and field borders within
2 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but
3 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be
4 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
5 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

6 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
7 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
8 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
9 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
10 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat
11 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
12 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
13 Foraging opportunities would also be improved by enhancing prey populations through the
14 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
15 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would
16 also be protected and maintained as part of the cultivated lands reserve system which would
17 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
18 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
19 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks
20 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
21 would inform the near-term protection and restoration efforts and represent performance
22 standards for considering the effectiveness of restoration actions. Foraging habitat would be
23 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that
24 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which
25 would be in very high-value habitat production in CZs 1-4, 7-9, and 11 (Objective SH1.2).

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
30 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
31 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
32 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
33 of the Final EIR/EIS.

34 Considering Alternative 1C's protection and restoration provisions, which would provide acreages
35 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of
36 restoring riparian and foraging habitats lost to construction and restoration activities, and with
37 implementation of AMM1-AMM7 and *AMM18 Swainson's Hawk*, the loss of habitat or direct
38 mortality through implementation of Alternative 1C would not result in a substantial adverse effect
39 through habitat modifications and would not substantially reduce the number or restrict the range
40 of the species. Therefore, the loss of habitat or potential mortality under this alternative would have
41 a less-than-significant impact on Swainson's hawk.

1 **Impact BIO-84: Effects on Swainson’s Hawk Associated with Electrical Transmission Facilities**

2 New transmission lines would increase the risk that Swainson’s hawks could be subject to power
3 line strikes, which could result in injury or mortality of Swainson’s hawks. This species would be at
4 low risk of bird strike mortality based on factors assessed in the bird strike vulnerability analysis
5 (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP*
6 *Transmission Lines*). Factors analyzed include the height of the new transmission lines and the flight
7 behavior of the species. The existing network of transmission lines in the Plan Area currently poses
8 the same small risk for Swainson’s hawk, and any incremental risk associated with the new power
9 line corridors would also be expected to be low. Marking transmission lines with flight diverters that
10 make the lines more visible to birds has been shown to reduce the incidence of bird mortality
11 (Brown and Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could
12 reduce avian mortality by 60%. All new project transmission lines would be fitted with flight
13 diverters. Bird flight diverters would make transmission lines highly visible to Swainson’s hawks
14 and would further reduce any potential for powerline collisions.

15 **NEPA Effects:** New transmission lines would minimally increase the risk for Swainson’s hawk power
16 line strikes. All new transmission lines constructed for the project would be fitted with bird
17 diverters, which have been shown to reduce avian mortality by 60%. With implementation of
18 *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines would not
19 result in an adverse effect on Swainson’s hawk.

20 **CEQA Conclusion:** New transmission lines would minimally increase the risk for Swainson’s hawk
21 power line strikes. All new transmission lines constructed for the project would be fitted with bird
22 diverters, which have been shown to reduce avian mortality by 60%. With implementation of
23 *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines would result in
24 a less-than-significant impact on Swainson’s hawk.

25 **Impact BIO-85: Indirect Effects of Plan Implementation on Swainson’s Hawk**

26 Noise and visual disturbances from the construction of water conveyance facilities and other
27 conservation measures could reduce Swainson’s hawk use of modeled habitat adjacent to work
28 areas. Construction noise above background noise levels (greater than 50 dBA) could extend 1,900
29 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*
30 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there
31 are no available data to determine the extent to which these noise levels could affect Swainson’s
32 hawk. Moreover, operation and maintenance of the water conveyance facilities, including the
33 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could
34 affect Swainson’s hawk use of the surrounding habitat. These construction activities would include
35 water conveyance construction, tidal restoration activities, floodplain restoration, and Fremont
36 Weir/Yolo Bypass Enhancements. Swainson’s hawks are seasonally abundant across much of the
37 study area wherever adequate nest trees occur within a cultivated landscape that supports suitable
38 foraging habitat. There would be a potential for noise and visual disturbances associated with BDCP
39 actions to temporarily displace Swainson’s hawks and temporarily reduce the use of suitable habitat
40 adjacent to construction areas. These adverse effects would be minimized with the implementation
41 of *AMM18 Swainson’s Hawk*.

1 The use of mechanical equipment during water conveyance facilities construction could cause the
2 accidental release of petroleum or other contaminants that could affect Swainson's hawk foraging in
3 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
4 suitable habitat could also have an adverse effect on these species. *AMM2 Construction Best*
5 *Management Practices and Monitoring* would minimize the likelihood of such spills and ensure that
6 measures are in place to prevent runoff from the construction area and negative effects of dust on
7 habitat.

8 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
9 could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover, operation
10 and maintenance of the water conveyance facilities, including the transmission facilities, could result
11 in ongoing but periodic postconstruction disturbances that could affect Swainson's hawk use of the
12 surrounding habitat. The effects of noise, the potential for hazardous spills, increased dust and
13 sedimentation, and operations and maintenance of the water conveyance facilities would not have
14 an adverse effect on Swainson's hawk with the implementation of AMM1-AMM7, AMM10, and
15 *AMM18 Swainson's Hawk*.

16 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
17 facilities could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover,
18 operation and maintenance of the water conveyance facilities, including the transmission facilities,
19 could result in ongoing but periodic postconstruction disturbances that could affect Swainson's
20 hawk use of the surrounding habitat. The effects of noise, the potential for hazardous spills,
21 increased dust and sedimentation, and operations and maintenance of the water conveyance
22 facilities would result in a less-than-significant impact on Swainson's hawk with the implementation
23 of AMM1-AMM7, AMM10, and *AMM18 Swainson's Hawk*.

24 **Impact BIO-86: Periodic Effects of Inundation of Swainson's Hawk Nesting and Foraging** 25 **Habitat as a Result of Implementation of Conservation Components**

26 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
27 *Enhancement*) would increase the frequency and duration of inundation on approximately 3,066-
28 6,706 acres of modeled Swainson's hawk habitat (consisting of approximately 41-70 acres of
29 nesting habitat and 3,025-6,635 acres of foraging habitat; Table 12-1C-35). However, project-
30 associated inundation of areas that would not otherwise have been inundated would be expected to
31 occur in no more than 30% of all years, since Fremont Weir is expected to overtop the remaining
32 estimated 70% of all years, and during those years notch operations would not typically affect the
33 maximum extent of inundation. In more than half of all years under Existing Conditions, an area
34 greater than the project-related inundation area already inundates in the bypass. Therefore, habitat
35 conditions in the bypass would not be expected to change substantially as a result of Yolo Bypass
36 operations. However, increased duration of inundation during years of Fremont Weir operation,
37 may delay the period for which foraging habitat is available to Swainson's hawks by up to several
38 weeks.

39 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
40 *Restoration* could result in the periodic inundation of up to approximately 8,197 acres of modeled
41 Swainson's hawk habitat (Table 12-1C-35), consisting of 189 acres of nesting and 8,008 acres of
42 foraging habitat. Floodplain restoration would be expected to restore a more natural flood regime
43 and sustain riparian vegetation types that support regeneration of Swainson's hawk nesting habitat.
44 The restored floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years)

1 to areas that flood infrequently (e.g., every 10 years or more). Foraging habitat that is inundated
2 after Swainson's hawks arrive in the Central Valley in mid-March could result in a periodic loss of
3 available foraging habitat due to the reduction in available prey. Inundated habitats would be
4 expected to recover following draw-down and provide suitable foraging conditions until the
5 following inundation period. Thus, this is considered a periodic and short term effect that is unlikely
6 to affect Swainson's hawk distribution and abundance, or foraging use of the study area.

7 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
8 sites because trees in which nest sites are situated already withstand floods, the increase in
9 inundation frequency and duration is expected to remain within the range of tolerance of riparian
10 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically
11 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.
12 This would be considered a short-term effect that would not result in an adverse effect on
13 Swainson's hawk.

14 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
15 nest sites because trees in which nest sites are situated already withstand floods, the increase in
16 inundation frequency and duration is expected to remain within the range of tolerance of riparian
17 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically
18 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.
19 This would be considered a short-term effect that would not have a significant impact on Swainson's
20 hawk.

21 **Tricolored Blackbird**

22 This section describes the effects of Alternative 1C, including water conveyance facilities
23 construction and implementation of other conservation components, on tricolored blackbird.
24 Although nesting colonies have been documented along the fringe of Suisun Marsh, in the Yolo
25 Bypass and along the southwestern perimeter of the Plan Area, breeding colonies are uncommon in
26 the Plan Area. Modeled breeding habitat includes bulrush/cattail wetlands and shrub communities
27 that may provide suitable nesting substrate, and adjacent high-value foraging areas within 5 miles of
28 nesting colonies documented in the Plan Area. The foraging component includes cultivated lands
29 and noncultivated land cover types known to support abundant insect populations such as
30 grasslands, pasturelands (including alfalfa), natural seasonal wetlands, and sunflower croplands.
31 The Delta is recognized as a major wintering area for tricolored blackbird (Hamilton 2004, Beedy
32 2008). Modeled nonbreeding habitat includes emergent wetlands and shrub stands that provide
33 suitable roosting habitat, as well as cultivated lands and noncultivated lands that provide foods
34 sought by tricolored blackbirds during the winter. Outside of the breeding season, tricolored
35 blackbirds are primarily granivores that forage opportunistically across the Plan Area in grasslands,
36 pasturelands, croplands, dairies, and livestock feed lots. Factors considered in assessing the value of
37 affected habitat for the tricolored blackbird, include patch size, suitability of vegetation, and
38 proximity to recorded occurrences.

39 Construction and restoration associated with Alternative 1C conservation measures would result in
40 both temporary and permanent losses of tricolored blackbird modeled habitat as indicated in Table
41 12-1C-37. Full implementation of Alternative 1C would also include the following conservation
42 actions over the term of the BDCP to benefit the tricolored blackbird (BDCP Chapter 3, Section 3.3,
43 *Biological Goals and Objectives*).

- 1 • Protect and manage at least 50 acres of occupied or recently occupied (within the last 15 years)
2 tricolored blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs
3 1, 2, 8, or 11. (TRBL1.1).
- 4 • Protect at least 26,300 acres of moderate-, high-, or very high-value cultivated lands as
5 nonbreeding foraging habitat, 50% of which is of high or very high value (TRBL1.2).
- 6 • Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat within 5 miles
7 of occupied or recently occupied (within the last 15 years) tricolored blackbird nesting habitat
8 in CZs 1, 2, 3, 4, 7, 8, or 11. At least 1,000 acres of which will be within 5 miles of the at least 50
9 acres of nesting habitat protected under Objective TRBL1.1 (Objective TRBL1.3).
- 10 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
11 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
12 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
13 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 14 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
15 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
16 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 17 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 18 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
19 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 20 • Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,
21 VPNC2.5, and GNC2.4, associated with CM11).

22 As explained below, with the restoration or protection of these amounts of habitat, in addition to
23 management activities that would enhance these natural communities for the species and the
24 implementation of AMM1–AMM7 and AMM21 *Tricolored Blackbird*, impacts on tricolored blackbird
25 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-37. Changes in Tricolored Modeled Habitat Associated with Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d		
		NT	LLT	NT	LLT	CM2	CM5	
CM1	Breeding	Nesting	3	3	5	5	NA	NA
		Foraging-cultivated	1,274	1,274	1,942	1,942	NA	NA
		Foraging-noncultivated	230	230	190	190	NA	NA
	Non-breeding	Roosting	0	0	11	11	NA	NA
		Foraging-cultivated	2,259	2,259	2,567	2,567	NA	NA
		Foraging-noncultivated	148	145	148	145	NA	NA
Total Impacts CM1		3,914	3,911	4,863	4,860			
CM2–CM18	Breeding	Nesting	13	72	75	77	11–26	30
		Foraging-cultivated	1,657	9,525	84	359	1,837–2,598	2,124
		Foraging noncultivated	704	1,991	155	184	600–1,689	355
	Non-breeding	Roosting	570	1,642	0	1	0–4	29
		Foraging-cultivated	3,747	23,955	54	420	222–1,057	2,506
		Foraging-noncultivated	459	1,341	0	3	42–191	158
Total Impacts CM2–CM18		7,150	38,526	368	1,044	2,711	5,766	
Total Breeding		3,881	13,095	2,451	2,757	2,447–4,312	2,509	
Total Nonbreeding		7,183	29,342	2,780	3,147	263–1,252	2,694	
TOTAL IMPACTS		11,064	42,437	5,231	5,904	2,711	5,766	

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-87: Loss or Conversion of Habitat for and Direct Mortality of Tricolored Blackbird**

4 Alternative 1C conservation measures would result in the combined permanent and temporary loss
 5 of up to 48,341 acres of modeled habitat (15,852 acres of breeding habitat and 32,489 habitat) for
 6 tricolored blackbird (Table 12-1C-37). Conservation measures that would result in these losses are
 7 conveyance facilities and transmission line construction, and establishment and use of borrow and
 8 spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain

1 restoration (CM5), riparian habitat restoration (CM7), grassland restoration (CM8), marsh
2 restoration (CM10), and construction of conservation hatcheries (CM18). Habitat enhancement and
3 management activities (CM11), which include ground disturbance or removal of nonnative
4 vegetation, could result in local adverse habitat effects. In addition, maintenance activities
5 associated with the long-term operation of the water conveyance facilities and other BDCP physical
6 facilities could degrade or eliminate tricolored blackbird habitat. Each of these individual activities
7 is described below. A summary statement of the combined impacts and NEPA effects and a CEQA
8 conclusion follow the individual conservation measure discussions.

- 9 • *CM1 Water Facilities and Operation:* Construction of Alternative 1C conveyance facilities would
10 result in the permanent loss of 1,507 acres of tricolored blackbird breeding habitat (3 acres
11 nesting habitat, 1,274 acres of cultivated lands, and 230 acres of noncultivated lands suitable for
12 foraging) and 2,407 acres of nonbreeding habitat (0 acres roosting habitat, 2,259 acres of
13 cultivated lands, and 148 acres of noncultivated lands suitable for foraging (Table 12-1C-37).
14 Approximately 602 of the 3,914 acres permanently impacted would be lost as reusable tunnel
15 material storage areas, which would likely be moved to other sites for use in levee build-up and
16 restoration, and the affected area would likely be restored. While this effect is categorized as
17 permanent because there is no assurance that the material would eventually be moved, the
18 effect would likely be temporary.

19 In addition, CM1 would result in the temporary removal of 2,137 acres of breeding habitat (5
20 acres nesting habitat, 1,942 acres of cultivated lands, and 190 acres of noncultivated lands
21 suitable for foraging) and 2,726 acres of nonbreeding habitat (11 acres roosting habitat, 2,567
22 acres of cultivated lands, and 148 acres of noncultivated lands suitable for foraging, Table 12-
23 1C-37). Most of the habitat that would be lost is located in the central Delta, from CZs 3, 5, 6, 8,
24 and 9. There are no occurrences of tricolored blackbird that overlap with the construction
25 footprint for CM1. However, records exist throughout the study area. The implementation of
26 *AMM21 Tricolored Blackbird* would require preconstruction surveys and the establishment of
27 no-disturbance buffers and would minimize potential effects on nesting tricolored blackbirds
28 (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Refer to the Terrestrial Biology
29 Map Book for a detailed view of Alternative 1C construction locations. Impacts from CM1 would
30 occur within the first 10 years of Alternative 1C implementation.

- 31 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries
32 improvements in the Yolo Bypass would permanent loss of 595 acres of tricolored blackbird
33 breeding habitat (13 acres nesting habitat, 477 acres of cultivated lands, and 105 acres of
34 noncultivated lands suitable for foraging) and 8 acres of nonbreeding habitat (consisting
35 entirely of roosting habitat). In addition, CM2 construction would result in the temporary
36 removal of 314 acres of breeding habitat (75 acres nesting habitat, 84 acres of cultivated lands,
37 and 155 acres of noncultivated lands suitable for foraging) and 54 acres of nonbreeding habitat
38 (consisting entirely of cultivated lands). The loss is expected to occur during the first 10 years of
39 Alternative 1C implementation.

- 40 • *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration would result
41 in the inundation of approximately 3,937 acres of tricolored blackbird breeding habitat (21
42 acres of nesting, 2,814 acres of cultivated lands, and 1,102 acres of noncultivated lands suitable
43 for foraging) and 10,794 acres of nonbreeding habitat (1,633 acres of roosting, 18,489 acres of
44 cultivated lands, and 672 acres of noncultivated lands suitable for foraging). An estimated
45 13,692 acres of the 28,424 acres to be permanently lost would be expected to convert to tidal
46 emergent wetland communities that could provide nonbreeding season roosting habitat for

1 tricolored blackbirds, depending on future vegetation density and composition. Conversion
 2 would result in the loss of an estimated 4,316 acres of tricolored blackbird breeding habitat (34
 3 acres of nesting habitat; plus 3,635 acres of cultivated lands and 647 acres of noncultivated
 4 habitats suitable for foraging) and 9,375 acres of nonbreeding habitat (8,716 acres of cultivated
 5 lands and 659 acres of noncultivated habitats suitable for foraging). These habitat losses and
 6 conversions would occur in CZs 1, 2, 4, 5, 6, 7, 8, and 11. Although considered to be a permanent
 7 loss, due to the uncertainty of the quantity of restored suitable habitat, any areas that develop
 8 into riparian scrub-shrub could provide suitable nesting and roosting habitat for tricolored
 9 blackbird.

- 10 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction and riparian restoration
 11 associated with floodplain restoration in the south Delta (CZ 7) would result in the permanent
 12 removal of up to 554 acres of tricolored blackbird breeding habitat (4 acres of nesting habitat,
 13 503 acres of cultivated lands, and 47 acres of noncultivated habitats suitable for foraging) and
 14 656 acres of nonbreeding habitat (1 acre of roosting habitat, 652 acres of cultivated lands, and 3
 15 acres of noncultivated habitats suitable for foraging) in CZ 7. Patches of riparian scrub
 16 associated with the restoration of approximately 1,000 acres of valley/foothill riparian habitat
 17 managed as early- to mid-successional habitats (as a component of CM5) could provide suitable
 18 nesting, roosting or foraging habitat for tricolored blackbird once these restored habitats have
 19 developed habitat functions for the species.
- 20 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland would result in the
 21 permanent removal of 1,521 acres of tricolored breeding habitat and 210 acres of nonbreeding
 22 habitat. Grassland restoration would be implemented on cultivated lands and would therefore
 23 result in the conversion of tricolored blackbird cultivated foraging habitat to high-value
 24 grassland foraging habitat in CZs 2, 4, and 5.
- 25 ● *CM10 Nontidal Marsh Restoration*: Marsh restoration activities would result in the permanent
 26 removal or conversion of approximately 568 acres of tricolored blackbird breeding habitat and
 27 945 acres of nonbreeding habitat (all cultivated lands suitable for foraging). About two-thirds of
 28 the restored nontidal marsh would be open water, and the remainder would support emergent
 29 wetland vegetation that could provide low-value roosting habitat for tricolored blackbird
 30 depending on vegetation density and composition.
- 31 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
 32 actions that are designed to enhance wildlife values in BDCP-protected habitats could result in
 33 localized ground disturbances that could temporarily remove small amounts of tricolored
 34 blackbird habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
 35 road and other infrastructure maintenance, would be expected to have minor effects on
 36 available tricolored blackbird habitat and are expected to result in overall improvements to and
 37 maintenance of tricolored blackbird habitat values over the term of the BDCP. These effects
 38 cannot be quantified, but are expected to be minimal and would be avoided and minimized by
 39 the AMMs listed below. CM11 would also include the construction of recreational-related
 40 facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities*
 41 *and Associated Federal Actions*). Trailhead facilities, signs, staging areas, picnic areas, bathrooms,
 42 etc. would be placed on existing, disturbed areas when and where possible. However,
 43 approximately 43.5 acres of breeding habitat and 6.5 acres of nonbreeding habitat (all grassland
 44 suitable for foraging) would be lost as a result of construction of trails and facilities. Impacts
 45 from recreational-related facilities that would occur within the first 10 years of Alternative 1C
 46 implementation would include a loss of 13 acres of breeding habitat.

- 1 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
2 tricolored blackbird grassland foraging habitat in CZ 1.
- 3 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
4 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
5 disturbances that could affect tricolored blackbird use of the surrounding habitat in or adjacent
6 to work areas. Maintenance activities would include vegetation management, levee and
7 structure repair, and re-grading of roads and permanent work areas. These effects, however,
8 would be reduced by AMMs and conservation actions as described below.
- 9 • Injury and Direct Mortality: Operation of construction equipment may cause injury to or
10 mortality of tricolored blackbirds. Risk would be greatest to eggs and nestlings susceptible to
11 land clearing activities, nest abandonment, or increased exposure to the elements or to
12 predators. Injury to or mortality of adults and fledged juveniles would not be expected as
13 individuals would be expected to avoid contact with construction equipment. Construction
14 activities could temporarily fragment existing tricolored blackbird habitat during grading, filling,
15 contouring, and other initial ground-disturbing operations that could temporarily reduce the
16 extent and functions supported by the affected habitat. To the maximum extent practicable,
17 construction activity will be avoided up to 1,300 feet, but not less than a minimum of 250 feet,
18 from an active tricolored blackbird nesting colony. Construction and restoration projects would
19 also be designed, in consultation with CDFW, to avoid construction activity within at least 300
20 feet from occupied active tricolored blackbird roosting habitat. If monitoring determines an
21 activity is adversely affecting a nesting colony, construction will be modified, as practicable, by
22 either delaying construction until the colony site is abandoned or until the end of the breeding
23 season, whichever occurs first, by temporarily relocating staging areas, or temporarily rerouting
24 access to the construction site. These measures to avoid injury or mortality of nesting and
25 roosting tricolored blackbirds are described in *AMM21 Tricolored Blackbird* (Appendix 3B,
26 *Environmental Commitments, AMMs, and CMs*).

27 The following paragraphs summarize the combined effects discussed above and describe other
28 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
29 included.

30 ***Near-Term Timeframe***

31 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
32 the near-term BDCP conservation strategy has been evaluated to determine whether it would
33 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
34 effects of construction would not be adverse under NEPA. Alternative 1C would remove 6,332 acres
35 of breeding habitat (96 acres of nesting, 4,957 acres of cultivated lands, and 1,279 acres of
36 noncultivated lands suitable for foraging) and 9,963 acres of nonbreeding habitat (581 acres of
37 roosting, 8,627 acres of cultivated lands, and 755 acres of noncultivated lands suitable for foraging)
38 for tricolored blackbird in the study area in the near-term. These effects would result from the
39 construction of the water conveyance facilities (CM1, 3,644 acres of breeding, 5,133 acres of
40 nonbreeding habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries
41 Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain
42 Restoration, CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres of
43 nonbreeding habitat).

1 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and
2 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of
3 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1
4 protection for the loss of cultivated lands.

5 Using these ratios would indicate that the compensation for loss or conversion of tricolored
6 blackbird habitat from CM1 would require 8 acres of restoration and 8 acres of protection of nesting
7 habitat, 11 acres of restoration and 11 acres of protection of roosting habitat, 1,432 acres of
8 protection of noncultivated lands that provide foraging habitat, 3,216 acres of protection of
9 cultivated lands suitable for foraging during the breeding season, and 4,826 acres of cultivated lands
10 that provide foraging habitat during the nonbreeding season. The near-term effects of other
11 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting
12 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that
13 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the
14 nonbreeding season. Compensation for these losses from other conservation measures would
15 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of
16 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of
17 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands
18 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide
19 foraging habitat during the nonbreeding season.

20 Total compensation for near-term loss or conversion of tricolored blackbird required using the
21 typical ratios above would be 96 acres of restoration and 96 acres of protection for nesting habitat,
22 581 acres of restoration and 581 acres of protection for roosting habitat, 4,068 acres of protection of
23 noncultivated foraging habitat, 4,957 acres of protection for cultivated lands that provide foraging
24 habitat during the breeding season, and 8,627 acres of cultivated lands that provide foraging habitat
25 during the nonbreeding season.

26 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750
27 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres
28 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool
29 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of
30 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,
31 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater
32 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3).
33 These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and would occur in
34 the same timeframe as the construction and early restoration losses. Some proportion of these
35 natural communities provide suitable habitat for tricolored blackbird as described below.

36 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding
37 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent
38 wetland, in close association with highly productive foraging areas that support abundant insect
39 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some
40 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs
41 1, 2, 8, or 11 (see Table 12-1C-38 for foraging habitat values) and would be actively managed to
42 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical
43 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*
44 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the
45 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,

1 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored
 2 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of
 3 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section
 4 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands
 5 restored in the near-term, approximately 64 acres of valley/foothill riparian and 198 acres of
 6 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

7 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal
 8 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,
 9 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial*
 10 *Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the
 11 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140
 12 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley
 13 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated
 14 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of
 15 valley/foothill riparian, 720 acres managed wetland).

16 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 17 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
 18 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a
 19 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The
 20 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would
 21 provide improved foraging opportunities for tricolored blackbirds during both the breeding and
 22 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high
 23 reproductive success in tricolored blackbirds. These natural communities are known to support
 24 large insect populations, a vital food resource for successful rearing and fledging of young. Those
 25 conservation lands that lie within a few miles of active nesting colonies would provide high-value
 26 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*
 27 *Enhancement and Management*, insect prey populations would be increased on protected lands,
 28 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,
 29 and GNC2.4).

30 Cultivated lands that provide habitat for covered and other native wildlife species would provide
 31 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term
 32 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total
 33 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-
 34 term. Assuming that lands would be protected proportional to the conservation objectives for
 35 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat
 36 consisting of cultivated lands would be protected in the near-term. These lands would be protected
 37 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,
 38 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late
 39 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in
 40 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very
 41 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of
 42 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the
 43 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential
 44 habitats for species including tricolored blackbird would also be protected that occur within the
 45 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,

1 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for
2 tricolored blackbird (Objective CLNC1.3).

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
7 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
8 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
9 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
10 of the Final EIR/EIS.

11 The acres of protection and restoration contained in the near-term Plan goals, in addition to the
12 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to
13 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the
14 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands
15 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the
16 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for
17 by this acreage and temporary impacts on grassland would be restored to preproject conditions
18 (including revegetation with native vegetation if within 1 year of completion of construction) under
19 *AMM2 Construction Best Management Practices and Monitoring*. With the enhancement of grasslands
20 described above, and the restoration of temporary habitat impacts, this difference between
21 impacted and conserved grassland acreages in the near-term time period would not result in an
22 adverse effect on tricolored blackbird.

23 **Table 12-1C-38. Tricolored Blackbird Foraging Habitat Value Classes**

Foraging Habitat Value Class	Agricultural Crop Type/Habitats	
	Breeding Season ^a Foraging Habitat	Nonbreeding Season Foraging Habitat
Very high	Native pasture, nonirrigated native pasture, annual grasslands, vernal pool grasslands, alkali grasslands	Livestock feed lots
High	Sunflower, alfalfa and mixed alfalfa, mixed pasture, induced high water table native pasture, nonirrigated mixed pasture, dairies	Corn, sunflower, millet, alfalfa and mixed alfalfa, mixed pasture, native pasture, induced high water table native pasture, nonirrigated native pasture, rice, dairies, annual grasslands, vernal pool grasslands, alkali grasslands
Moderate	Miscellaneous grass pasture, fallow lands cropped within 3 years, new lands prepped for crop production, livestock feed lots	Miscellaneous grass pasture, nonirrigated mixed pasture, fallow lands cropped within 3 years, new lands prepped for crop production
Low	Wheat, mixed grain and hay, farmsteads	Wheat, oats, mixed grain and hay, farmsteads
Marginal	Rice	None
None	All remaining crop types	All remaining crop types

^a Generally March through August; occasional breeding in fall (September through November).

24

1 **Late Long-Term Timeframe**

2 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093
3 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for
4 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled
5 breeding habitat available, the study area does not currently support many nesting tricolored
6 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo
7 Bypass, and along the southwestern perimeter of the study area (BDCP Chapter 5, *Effects Analysis*).
8 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 15,852
9 acres of breeding habitat and 32,489 acres of nonbreeding habitat for tricolored blackbird during
10 the term of the Plan (10% of the total breeding habitat in the study area and 13% of the total
11 nonbreeding habitat in the study area). The locations of these losses are described above in the
12 analyses of individual conservation measures.

13 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
14 *Restoration, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*
15 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Community*
16 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
17 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
18 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
19 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that
20 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of*
21 *Alternatives*). In addition,

22 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or
23 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored
24 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11
25 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-
26 1C-38. To ensure that natural community conservation benefits tricolored blackbird, the Plan
27 further specifies that cultivated lands protected for tricolored blackbird retain residual wetland,
28 grassland patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting,
29 foraging or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of
30 moderate-, high-, or very high-value cultivated lands would be conserved and managed as
31 nonbreeding foraging habitat, 50% of which would be of high- or very high-value (Objective
32 TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very high breeding foraging
33 habitat would be conserved within 5 miles of occupied or recently occupied (within the last 15
34 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of
35 the loss of breeding and nonbreeding habitat would be to cultivated lands that are abundant
36 throughout the study area, so the loss is not expected to adversely affect the population in the study
37 area.

38 The BDCP's beneficial effects analysis (BDCP Chapter 5.6, *Effects on Covered Wildlife and Plant*
39 *Species*) estimates that the restoration and protection actions discussed above could result in the
40 protection of an estimated 46,566 acres of tricolored blackbird habitat (16,476 acres breeding
41 habitat and 31,090 acres nonbreeding habitat) and restoration of 31,001 acres of tricolored
42 blackbird habitat (2,190 acres breeding habitat and 28,811 acres nonbreeding habitat).

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
44 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
45 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
2 *these AMMs include elements that would avoid or minimize the risk of affecting individuals and*
3 *species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since*
4 *been updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs,*
5 *of the Final EIR/EIS.*

6 **NEPA Effects:** The losses of tricolored blackbird habitat and potential for direct mortality of a
7 special-status species under Alternative 1C would represent an adverse effect in the absence of
8 other conservation actions. However, with habitat protection and restoration associated with CM3,
9 CM4, CM5, CM7, CM8, and CM11, guided by species-specific goals and objectives and by AMM1–
10 AMM7 and AMM21 *Tricolored Blackbird*, which would be in place throughout the construction
11 period, the effects of habitat loss or potential for mortality on tricolored blackbird would not be
12 adverse under Alternative 1C.

13 **CEQA Conclusion:**

14 **Near-Term Timeframe**

15 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
16 the near-term BDCP conservation strategy has been evaluated to determine whether it would
17 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
18 effects of construction would be less than significant under CEQA. Alternative 1C would remove
19 6,332 acres of breeding habitat (96 acres of nesting, 4,957 acres of cultivated lands, and 1,279 acres
20 of noncultivated lands suitable for foraging) and 9,963 acres of nonbreeding habitat (581 acres of
21 roosting, 8,627 acres of cultivated lands, and 755 acres of noncultivated lands suitable for foraging)
22 for tricolored blackbird in the study area in the near-term. These effects would result from the
23 construction of the water conveyance facilities (CM1, 3,644 acres of breeding, 5,133 acres of
24 nonbreeding), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries*
25 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*
26 *Restoration, CM7 Riparian Natural Community Restoration—2,688 acres of breeding, 4,830 acres of*
27 *nonbreeding).*

28 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and
29 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of
30 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1
31 protection for the loss of cultivated lands.

32 Using these ratios would indicate that the compensation for loss or conversion of tricolored
33 blackbird habitat from CM1 would require 8 acres of restoration and 8 acres of protection of nesting
34 habitat, 11 acres of restoration and 11 acres of protection of roosting habitat, 1,432 acres of
35 protection of noncultivated lands that provide foraging habitat, 3,216 acres of protection of
36 cultivated lands suitable for foraging during the breeding season, and 4,826 acres of cultivated lands
37 that provide foraging habitat during the nonbreeding season. The near-term effects of other
38 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting
39 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that
40 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the
41 nonbreeding season. Compensation for these losses from other conservation measures would
42 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of
43 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of
44 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands

1 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide
2 foraging habitat during the nonbreeding season.

3 Total compensation for near-term loss or conversion of tricolored blackbird required using the
4 typical ratios above would be 96 acres of restoration and 96 acres of protection for nesting habitat,
5 581 acres of restoration and 581 acres of protection for roosting habitat, 4,068 acres of protection of
6 noncultivated foraging habitat, 4,957 acres of protection for cultivated lands that provide foraging
7 habitat during the breeding season, and 8,627 acres of cultivated lands that provide foraging habitat
8 during the nonbreeding season.

9 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750
10 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres
11 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool
12 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of
13 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,
14 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater
15 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3).
16 These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and would occur in
17 the same timeframe as the construction and early restoration losses. Some proportion of these
18 natural communities provide suitable habitat for tricolored blackbird as described below.

19 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding
20 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent
21 wetland, in close association with highly productive foraging areas that support abundant insect
22 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some
23 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs
24 1, 2, 8, or 11 (see Table 12-1C-38 for foraging habitat values) and would be actively managed to
25 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical
26 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities
27 Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the
28 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,
29 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored
30 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of
31 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section
32 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands
33 restored in the near-term, approximately 64 acres of valley/foothill riparian and 198 acres of
34 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

35 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal
36 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,
37 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial
38 Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the
39 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140
40 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley
41 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated
42 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of
43 valley/foothill riparian, 720 acres managed wetland).

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 2 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
 3 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a
 4 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The
 5 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would
 6 provide improved foraging opportunities for tricolored blackbirds during both the breeding and
 7 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high
 8 reproductive success in tricolored blackbirds. These natural communities are known to support
 9 large insect populations, a vital food resource for successful rearing and fledging of young. Those
 10 conservation lands that lie within a few miles of active nesting colonies would provide high-value
 11 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*
 12 *Enhancement and Management*, insect prey populations would be increased on protected lands,
 13 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,
 14 and GNC2.4).

15 Cultivated lands that provide habitat for covered and other native wildlife species would provide
 16 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term
 17 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total
 18 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-
 19 term. Assuming that lands would be protected proportional to the conservation objectives for
 20 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat
 21 consisting of cultivated lands would be protected in the near-term. These lands would be protected
 22 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,
 23 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late
 24 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in
 25 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very
 26 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of
 27 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the
 28 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential
 29 habitats for species including tricolored blackbird would also be protected that occur within the
 30 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,
 31 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for
 32 tricolored blackbird (Objective CLNC1.3).

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 37 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 38 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 39 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 40 of the Final EIR/EIS.

41 The acres of protection and restoration contained in the near-term Plan goals, in addition to the
 42 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to
 43 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the
 44 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands
 45 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the
 46 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for

1 by this acreage and temporary impacts on grassland would be restored to preproject conditions
2 (including revegetation with native vegetation if within 1 year of completion of construction) under
3 *AMM2 Construction Best Management Practices and Monitoring*. With the enhancement of grasslands
4 described above, and the restoration of temporary habitat impacts, this difference between
5 impacted and conserved grassland acreages in the near-term time period would not result in a
6 significant impact on tricolored blackbird.

7 **Late Long-Term Timeframe**

8 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093
9 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for
10 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled
11 breeding habitat available, the study area does not currently support many nesting tricolored
12 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo
13 Bypass, and along the southwestern perimeter of the study area (BDCP Chapter 5, *Effects Analysis*).
14 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 15,852
15 acres of breeding habitat and 32,489 acres of nonbreeding habitat for tricolored blackbird during
16 the term of the Plan (10% of the total breeding habitat in the study area and 13% of the total
17 nonbreeding habitat in the study area). The locations of these losses are described above in the
18 analyses of individual conservation measures.

19 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
20 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
21 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*
22 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
23 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
24 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
25 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that
26 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3). In addition,

27 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or
28 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored
29 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11
30 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-
31 1C-38. To ensure that natural community conservation benefits tricolored blackbird, the Plan
32 further specifies that cultivated lands protected for tricolored blackbird retain residual wetland,
33 grassland patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting,
34 foraging or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of
35 moderate-, high-, or very high-value cultivated lands would be conserved and managed as
36 nonbreeding foraging habitat, 50% of which would be of high- or very high-value (Objective
37 TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very high breeding foraging
38 habitat would be conserved within 5 miles of occupied or recently occupied (within the last 15
39 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of
40 the loss of breeding and nonbreeding habitat would be to cultivated lands that are abundant
41 throughout the study area, so the loss is not expected to adversely affect the population in the study
42 area.

43 The BDCP's beneficial effects analysis (BDCP Chapter 5.6, *Effects on Covered Wildlife and Plant*
44 *Species*) estimates that the restoration and protection actions discussed above could result in the

1 protection of an estimated 46,566 acres of tricolored blackbird habitat (16,476 acres breeding
2 habitat and 31,090 acres nonbreeding habitat) and restoration of 31,001 acres of tricolored
3 blackbird habitat (2,190 acres breeding habitat and 28,811 acres nonbreeding habitat).

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
8 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
9 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
10 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
11 of the Final EIR/EIS.

12 Considering Alternative 1C's protection and restoration provisions, which would provide acreages
13 of new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to
14 construction and restoration activities, and implementation of AMM1–AMM7 and *AMM21 Tricolored*
15 *Blackbird*, the loss of habitat or direct mortality through the implementation of Alternative 1C as a
16 whole would not result in a substantial adverse effect through habitat modifications and would not
17 substantially reduce the number or restrict the range of the species. Therefore, the alternative
18 would have a less-than-significant impact on tricolored blackbird.

19 There are three other factors relevant to effects on tricolored blackbird.

- 20 ● Very little loss of nesting structure would occur (up to 81 acres of permanent loss and 93 acres
21 of temporary loss).
- 22 ● Most of the loss of breeding and nonbreeding habitat would be to cultivated lands that are
23 abundant throughout the Plan Area, so the loss is not expected to adversely affect the population
24 in the Plan Area.
- 25 ● Most temporary impacts would be to cultivated lands and grasslands that could be restored
26 relatively quickly to suitable foraging habitat after completion of construction activities.

27 Considering these protection and restoration provisions, which would provide acreages of new or
28 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction
29 and restoration activities, and with implementation of AMM1–AMM7 and *AMM21 Tricolored*
30 *Blackbird*, the loss of habitat or direct mortality through the implementation of Alternative 1C as a
31 whole would not result in a substantial adverse effect through habitat modifications and would not
32 substantially reduce the number or restrict the range of the species. Therefore, the alternative
33 would have a less-than-significant impact on tricolored blackbird.

34 **Impact BIO-88: Effects on Tricolored Blackbird Associated with Electrical Transmission** 35 **Facilities**

36 New transmission lines would increase the risk that tricolored blackbirds could be subject to power
37 line strikes, which could result in injury or mortality of individuals. Tricolored blackbirds would
38 have the potential to intersect the proposed transmission lines largely due to winter movements
39 throughout the study area, when individuals are migrating in large flocks and dense fog is common
40 in the area). Although migratory movements and daily flights between roosting and foraging habitat
41 make tricolored blackbird vulnerable to collision with transmission lines, daily flights associated
42 with winter foraging likely occurs in smaller flocks at heights that are lower than the transmission

1 lines (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP*
2 *Transmission Lines*). Marking transmission lines with flight diverters that make the lines more
3 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
4 1995). For example, Yee (2008) estimated that marking devices in the Central Valley could reduce
5 avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new project transmission
6 lines would be fitted with flight diverters, which would further reduce any potential for tricolored
7 blackbird collision with transmission lines.

8 Transmission line poles and towers provide perching substrate for raptors, which are predators on
9 tricolored blackbird. Although there is potential for transmission lines to result in increased
10 perching opportunities for raptors and result in increased predation pressure on tricolored
11 blackbirds, the existing network of transmission lines in the Plan Area currently poses these risks,
12 and any incremental risk associated with the new power line corridors would not be expected to
13 affect the study area population. Therefore, it is assumed that the increase in predation risk on
14 tricolored blackbird from an increase in raptor perching opportunities would be minimal.

15 **NEPA Effects:** New transmission lines would increase the risk for tricolored blackbird powerline
16 strikes, primarily during daily flights between roosting and foraging sites and during winter during
17 migration movements. *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike
18 diverters on all new powerlines, which would reduce the potential impact of the construction of new
19 transmission lines on tricolored blackbird. The increase in predation risk on tricolored blackbird
20 from an increase in raptor perching opportunities would be minimal. Therefore, the construction
21 and operation of new transmission lines under Alternative 1C would not result in an adverse effect
22 on tricolored blackbird.

23 **CEQA Conclusion:** New transmission lines would increase the risk for tricolored blackbird
24 powerline strikes, primarily during daily flights between roosting and foraging sites and during
25 winter during migration movements. *AMM20 Greater Sandhill Crane* contains the commitment to
26 place bird strike diverters on all new powerlines, which would reduce the potential impact of the
27 construction of new transmission lines on tricolored blackbird. The increase in predation risk on
28 tricolored blackbird from an increase in raptor perching opportunities would be minimal. The
29 construction and operation of new transmission lines under Alternative 1C would not substantially
30 reduce the number or restrict the range of the species and would therefore result in a less-than-
31 significant impact on tricolored blackbird.

32 **Impact BIO-89: Indirect Effects of Plan Implementation on Tricolored Blackbird**

33 **Indirect Construction- and Operation-Related Effects:** Tricolored blackbird nesting habitat
34 within the vicinity of proposed construction areas that could be indirectly affected by construction
35 activities. Construction noise above background noise levels (greater than 50 dBA) could extend
36 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D,
37 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),
38 although there are no available data to determine the extent to which these noise levels could affect
39 tricolored blackbird. Indirect effects associated with construction include noise, dust, and visual
40 disturbance caused by grading, filling, contouring, and other ground-disturbing operations outside
41 the project footprint but within 1,300 feet from the construction edge. Construction and subsequent
42 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting
43 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM21 Tricolored*
44 *Blackbird* would require preconstruction surveys, and if detected, covered activities would be

1 avoided within a minimum 250 feet of an active nesting colony and up to 1,300 feet where
2 practicable until breeding has ceased. Construction and restoration projects would also be designed,
3 in consultation with CDFW, to avoid construction activity within at least 300 feet from occupied
4 active tricolored blackbird roosting habitat. In addition, monitoring would be implemented to
5 ensure that construction does not adversely affect the nesting colony or roost site. The use of
6 mechanical equipment during water conveyance facilities construction could cause the accidental
7 release of petroleum or other contaminants that could affect tricolored blackbird in the surrounding
8 habitat. The inadvertent discharge of sediment or excessive dust adjacent to tricolored blackbird
9 habitat could also affect the species. AMM1–AMM7, including *AMM2 Construction Best Management*
10 *Practices and Monitoring*, would minimize the likelihood of such spills and ensure that measures are
11 in place to prevent runoff from the construction area and negative effects of dust on active nests.

12 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
13 mercury in avian species, including tricolored blackbird. Marsh (tidal and nontidal) and floodplain
14 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed
15 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to
16 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP
17 restoration activities that create newly inundated areas could increase bioavailability of mercury.

18 Breeding tricolored blackbirds are not thought to be highly susceptible to methylmercury exposure
19 because tidal wetlands are not expected to be a major foraging area for the species. Furthermore,
20 the Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
21 under the plan would generate less methylmercury than the existing managed wetlands, potentially
22 reducing the overall risk. However, species sensitivity to methylmercury differs widely and there is
23 a large amount of uncertainty with respect to species-specific effects and increased methylmercury
24 associated with natural community and floodplain restoration could indirectly affect tricolored
25 blackbird, via uptake in lower trophic levels (as described in Appendix 5.D, *Contaminants* of the
26 BDCP).

27 A detailed review of the methylmercury issues associated with implementation of the BDCP is
28 contained in Appendix 11F, *Substantive BDCP Revisions*. This review includes an overview of the
29 BDCP-related mechanisms that could result in increased mercury in the foodweb, and how exposure
30 of individual species to mercury may occur based on feeding habits and where species habitat
31 overlaps with the areas where mercury bioavailability could increase.

32 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
33 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
34 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
35 project-specific basis, where high potential for methylmercury production is identified that
36 restoration design and adaptive management cannot fully address while also meeting restoration
37 objectives, alternate restoration areas will be considered. CM12 would be implemented in
38 coordination with other similar efforts to address mercury in the Delta, and specifically with the
39 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
40 following actions.

- 41 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
42 mercury methylation and bioavailability
- 43 ● Define design elements that minimize conditions conducive to generation of methylmercury in
44 restored areas.

- 1 • Define adaptive management strategies that can be implemented to monitor and minimize
2 actual postrestoration creation and mobilization of methylmercury.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex
8 classes within a species. In addition, the effect of selenium on a species can be confounded by
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
10 2009).

11 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
12 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
13 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
14 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
15 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
16 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
17 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
18 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
19 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
20 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
21 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
22 levels of selenium have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
24 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
25 exacerbate bioaccumulation of selenium in avian species, including tricolored blackbird. Marsh
26 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
27 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
28 BDCP restoration activities that create newly inundated areas could increase bioavailability of
29 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
30 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
31 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
32 long-term increases in selenium concentrations in water in the Delta under any alternative.
33 However, it is difficult to determine whether the effects of potential increases in selenium
34 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
35 lead to adverse effects on tricolored blackbird.

36 Because of the uncertainty that exists at this programmatic level of review, there could be a
37 substantial effect on tricolored blackbird from increases in selenium associated with restoration
38 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
39 *Management* which would provide specific tidal habitat restoration design elements to reduce the
40 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
41 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
42 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
43 separately for each restoration effort as part of design and implementation. This avoidance and
44 minimization measure would be implemented as part of the tidal habitat restoration design
45 schedule.

1 **NEPA Effects:** The effects of noise, potential spills of hazardous material, increased dust and
2 sedimentation, and operations and maintenance of the water conveyance facilities would not be
3 adverse with the implementation of AMM1-AMM7 and AMM21 *Tricolored Blackbird*.

4 Tidal habitat restoration could result in increased exposure of tricolored blackbird to selenium. This
5 effect would be addressed through the implementation of AMM27 *Selenium Management*, which
6 would provide specific tidal habitat restoration design elements to reduce the potential for
7 bioaccumulation of selenium and its bioavailability in tidal habitats.

8 The implementation of tidal natural communities restoration or floodplain restoration could result
9 in increased exposure of tricolored blackbird to methylmercury. It is unlikely that breeding
10 tricolored blackbird would be highly susceptible to methylmercury exposure because tidal wetlands
11 are not expected to be a major foraging area for the species. However, it is unknown what
12 concentrations of methylmercury are harmful to this species and the potential for increased
13 exposure varies substantially within the study area. Implementation of CM12 which contains
14 measures to assess the amount of mercury before project development, followed by appropriate
15 design and adaptation management, would minimize the potential for increased methylmercury
16 exposure, and would result in no adverse effect on tricolored blackbird

17 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
18 sedimentation, and operations and maintenance of the water conveyance facilities would be less
19 than significant with the implementation of AMM21 *Tricolored Blackbird* and AMM1-AMM7.

20 Tidal habitat restoration could result in increased exposure of tricolored blackbird to selenium. This
21 impact would be addressed through the implementation of AMM27 *Selenium Management* which
22 would provide specific tidal habitat restoration design elements to reduce the potential for
23 bioaccumulation of selenium and its bioavailability in tidal habitats. The implementation of tidal
24 natural communities restoration or floodplain restoration could result in increased exposure of
25 tricolored blackbird to methylmercury. It is unlikely that breeding tricolored blackbird would be
26 highly susceptible to methylmercury exposure because tidal wetlands are not expected to be a major
27 foraging area for the species. However, it is unknown what concentrations of methylmercury are
28 harmful to this species. Implementation of CM12 which contains measures to assess the amount of
29 mercury before project development, followed by appropriate design and adaptation management,
30 would minimize the potential for increased methylmercury exposure, and would result in no
31 adverse effect on tricolored blackbird.

32 Therefore, with AMM1-AMM7, AMM21, AMM27, and CM12 in place, the indirect effects of
33 Alternative 1C implementation would not result in a substantial adverse effect through habitat
34 modification or potential mortality. Therefore, the indirect effects of Alternative 1C implementation
35 would have a less-than-significant impact on tricolored blackbird.

36 **Impact BIO-90: Periodic Effects of Inundation of Tricolored Blackbird Habitat as a Result of** 37 **Implementation of Conservation Components**

38 Flooding of the Yolo Bypass (CM2) would inundate 2,447-4,312 acres of breeding habitat and 263-
39 1,252 acres of nonbreeding habitat (Table 12-1C-37). Based on hypothetical floodplain restoration,
40 construction of setback levees for CM5 *Seasonally Inundated Floodplain Restoration* could result in
41 periodic inundation of approximately 2,509 acres of breeding habitat (30 acres of nesting, 2,124
42 acres of cultivated lands, 355 acres of noncultivated lands suitable for foraging) and 2,694 acres of
43 nonbreeding habitat(29 acres of roosting, 2,506 acres of cultivated lands, 158 acres of noncultivated

1 lands suitable for foraging, Table 12-1C-37) resulting in the temporary loss of these habitats.
2 Tricolored blackbirds are highly nomadic during the winter and would be expected to move to
3 adjacent suitable foraging habitat when the bypass is inundated, as they do under the current
4 flooding regime. However, this inundation could reduce the availability of nesting habitat during
5 years when flooding extends into the nesting season (past March). The periodic inundation of the
6 Yolo Bypass (CM2) and of other floodplains (CM5) is expected to restore a more natural flood
7 regime in support of wetland and riparian vegetation types that support nesting habitat. There
8 would be no expected adverse effect on tricolored blackbird.

9 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and
10 foraging habitat for tricolored blackbird. Periodic inundation would not result in an adverse effect
11 on tricolored blackbird because inundation is expected to take place outside of the breeding season.
12 Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly
13 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

14 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting
15 and foraging habitat for tricolored blackbird. Periodic inundation would have a less-than-significant
16 impact on tricolored blackbird because inundation is expected to take place outside of the breeding
17 season. Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly
18 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

19 **Western Burrowing Owl**

20 This section describes the effects of Alternative 1C, including water conveyance facilities
21 construction and implementation of other conservation components, on western burrowing owl.
22 Western burrowing owl modeled habitat consisted of high- and low-value habitat for nesting and
23 foraging. High-value habitat consists of plant alliances within the grassland and vernal pool natural
24 communities and pasture. Low-value habitat includes plant alliances and crop types from managed
25 wetland, alkali seasonal wetland, and cultivated lands. Value was determined through reported
26 species use patterns from the literature.

27 Construction and restoration associated with Alternative 1C conservation measures would result in
28 both temporary and permanent losses of western burrowing owl modeled habitat as indicated in
29 Table 12-1C-39. Full implementation of Alternative 1C also include the following conservation
30 actions over the term of the BDCP to benefit the western burrowing owl (BDCP Chapter 3, Section
31 3.3, *Biological Goals and Objectives*).

- 32 ● Protect at least 1,000 acres of cultivated lands in CZs 1 and 11 that support high-value
33 burrowing owl habitat and are within 0.5 mile of high-value grassland habitat or occupied low-
34 value habitat (Objective WBO1.1, associated with CM3).
- 35 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
36 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
37 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 38 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 39 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
40 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 41 ● Restore or create alkali seasonal wetlands and vernal pool complex in CZs 1, 8, and/or 11 to
42 achieve no net loss of wetted acres (Objectives ASWNC1.2 and VPNC1.2, associated with CM9)

- Increase burrow availability and prey abundance and accessibility (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, VPNC2.5, GNC2.3, and GNC2.4, associated with CM11)
- Protect at least 48,600 acres of cultivated lands that provide suitable habitat for covered and other native wildlife species and maintain and protect the small patches of important wildlife habitats associated with cultivated lands (Objectives CLNC1.1 and CLNC1.3, associated with CM3)

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance habitat for the species and the implementation of AMM1–AMM7, AMM23 *Western Burrowing Owl*, and Mitigation Measures BIO-91 and BIO-91a, impacts on western burrowing owl would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1C-39. Changes in Western Burrowing Owl Modeled Habitat Associated with Alternative 1C (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	1,052	1,052	1,447	1,447	NA	NA
	Low-value	3,067	3,067	3,492	3,492	NA	NA
Total Impacts CM1		4,119	4,119	4,939	4,939		
CM2–CM18	High-value	4,487	11,570	245	328	1,390–3,303	779
	Low-value	3,527	28,506	144	971	1,522–2,927	6,162
Total Impacts CM2–CM18		8,014	40,076	389	1,299	2,912–6,230	6,941
Total High-value		5,539	12,622	1,692	1,775	1,390–3,303	779
Total Low-value		6,594	31,573	3,636	4,463	1,522–2,927	6,162
TOTAL IMPACTS		12,133	44,195	5,328	6,238	2,912–6,230	6,941

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-91: Loss or Conversion of Habitat for and Direct Mortality of Western Burrowing Owl

Alternative 1C conservation measures would result in the combined permanent and temporary loss of up to 50,460 acres of modeled habitat for western burrowing owl (of which 14,397 acres is high-value habitat and 36,063 acres is low-value 14,397, Table 12-1C-39). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and

1 establishment and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries Enhancement*,
 2 *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7*
 3 *Riparian Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM10*
 4 *Nontidal Marsh Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18*
 5 *Conservation Hatcheries*. The majority of habitat loss (29,668 acres) would result from CM4. Habitat
 6 enhancement and management activities (CM11), which include ground disturbance or removal of
 7 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities
 8 associated with the long-term operation of the water conveyance facilities and other BDCP physical
 9 facilities could degrade or eliminate western burrowing owl habitat. Each of these individual
 10 activities is described below. A summary statement of the combined impacts and NEPA effects, and a
 11 CEQA conclusion follow the individual conservation measure discussions.

- 12 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would
 13 result in the combined permanent and temporary loss of up to 2,499 acres of acres of modeled
 14 high-value western burrowing owl habitat (1,052 acres of permanent loss, 1,447 acres of
 15 temporary loss) from CZs 3, 5, 6, and 8. In addition, 6,559 acres of low-value burrowing owl
 16 habitat would be removed (3,067 acres of permanent loss, 3,492 acres of temporary loss). The
 17 majority of high-value grassland that would be removed would be in CZ 8, west of the Clifton
 18 Court Forebay. There is a high concentration of CNDDDB and DHCCP survey records for western
 19 burrowing owls in CZ 8 to the west and the south of the Clifton Court Forebay. The loss of high-
 20 value habitat from construction could remove occupied habitat, displace nesting and wintering
 21 owls, and fragment occupied burrowing owl habitat.

22 The footprint of the canal overlaps with five burrowing owl occurrences to the southwest of
 23 Clifton Court Forebay and two occurrences east of the town of Knightsen. In addition, two
 24 occurrences east of Knightsen overlap with a RTM storage area adjacent to the canal. The
 25 footprint of a proposed temporary transmission line south of Dutch Slough also overlaps with
 26 one western burrowing owl occurrence and there are several occurrences west of the new
 27 forebay that could be indirectly affected by construction activities. The implementation of
 28 *AMM23 Western Burrowing Owl* would require breeding season and nonbreeding season
 29 surveys to be conducted where burrowing owl habitat (or sign) was encountered within and
 30 adjacent to (within 150 meters) a proposed project area. Prior to any ground disturbance
 31 related to covered activities, a qualified biologist would conduct preconstruction surveys in
 32 areas identified in the habitat surveys as having suitable burrowing owl burrows. If evidence of
 33 western burrowing owls was found during the breeding season (February 1–August 31), the
 34 project proponent would avoid all nest sites that could be disturbed by project construction
 35 during the remainder of the breeding season or while the nest is occupied by adults or young
 36 (occupation includes individuals or family groups foraging on or near the site following
 37 fledging). Avoidance would include establishment of a 50- to 500-meter nondisturbance buffer
 38 around nests. If evidence of western burrowing owl is detected during the nonbreeding season
 39 (September 1–January 31), the project proponent will establish a 50- to 500-meter
 40 nondisturbance buffer around occupied burrows as determined by a qualified biologist.

41 The implementation of *AMM6 Disposal and Reuse of Spoils* and *AMM23 Western Burrowing Owl*
 42 would require that, to the extent practicable, the reusable tunnel material storage area footprint
 43 avoid locations where active burrows are present. If avoidance is not possible, such as for those
 44 occurrences that overlap with the footprint of the canal, passive relocation would be considered
 45 in consultation with CDFW. If owls were to be excluded from existing burrows, artificial burrows
 46 would be used if it were possible for them to be installed within 100 meters of the existing

1 burrows on protected lands. However, if owls were present, relocation could still constitute an
2 adverse effect. A substantial portion of the high-value grassland protection and enhancement
3 under *CM8 Grassland Natural Community Restoration* would be expected to occur to the west
4 and to the south of these occurrences in CZ 8, which would provide high-value protected lands
5 in close proximity to the disturbed habitat. Refer to the Terrestrial Biology Map Book for a
6 detailed view of Alternative 1C construction locations.

- 7 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
8 would result in the combined permanent and temporary loss of up to 1,127 acres of high-value
9 western burrowing owl habitat (882 acres of permanent loss, 245 acres of temporary loss) in
10 the Yolo Bypass in CZ 2. In addition, 242 acres of low-value habitat would be removed (98 acres
11 of permanent loss, 144 acres of temporary loss). The loss is expected to occur during the first 10
12 years of Alternative 1C implementation.
- 13 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
14 inundation would permanently remove an estimated 29,668 acres of modeled western
15 burrowing owl habitat in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. The majority of removed or converted
16 acres (19,739 acres) is composed of low-value habitat. However, 9,929 acres of high-value
17 habitat would also be lost from tidal restoration actions. Tidal restoration would directly impact
18 and fragment remaining high-value grassland habitat just north of Rio Vista in and around
19 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Tidal
20 natural community restoration efforts would impact one extant record of burrowing owl just
21 northeast of Oakley along Dutch Slough and one possibly extirpated record in Suisun Marsh.
- 22 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
23 seasonally inundated floodplain would permanently and temporarily remove approximately
24 2,504 acres of modeled western burrowing owl in CZs 2, 4, and 7. This total is comprised of
25 2,279 acres of low-value habitat. Also, 225 acres of high-value grassland habitat would be
26 removed (142 permanent, 83 temporary) consisting of small patches of habitat along the San
27 Joaquin, Old, and Middle Rivers in CZ 7.
- 28 • *CM6 Channel Margin Enhancement*: Sites for channel margin enhancement would be located
29 along levees where western burrowing owl could be present. The species is known to use often
30 the grassland edges along canals and levees in agricultural areas. The implementation of *AMM23*
31 *Western Burrowing Owl* would reduce the potential for channel margin enhancement activities
32 to disturb owls or affect active nests.
- 33 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
34 approximately 11 acres of high-value burrowing owl habitat as part of tidal restoration. In
35 addition, 960 acres of low-value habitat would be removed as a part of tidal restoration and
36 3,991 acres would be removed as part of seasonal floodplain restoration through CM7.
- 37 • *CM8 Grassland Natural Community Restoration*: Grassland restoration would primarily be
38 implemented on agricultural lands and would result in the permanent loss of 1,676 acres (362
39 acres of high-value and 1,314 acres of low-value) of western burrowing owl habitat. The
40 conversion of 1,676 acres of low-value habitat to high-value grassland, would temporarily
41 remove available habitat but would ultimately have a beneficial effect on the western burrowing
42 owl.
- 43 • *CM10 Nontidal Marsh Restoration*: Implementation would result in the permanent removal of
44 159 acres of high-value and 952 acres of low-value western burrowing owl habitat.

1 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
2 actions that are designed to enhance wildlife values in restored or protected habitats could
3 result in localized ground disturbances that could temporarily remove small amounts of
4 western burrowing owl habitat. The burrowing owl's fossorial habits make the species more
5 sensitive to the effects of ground disturbance than other raptors. Ground-disturbing activities,
6 such as removal of nonnative vegetation and road and other infrastructure maintenance
7 activities, would be expected to have minor adverse effects on available western burrowing owl
8 habitat and would be expected to result in overall improvements to and maintenance of habitat
9 values over the term of the BDCP. CM11 would also include the construction of recreational-
10 related facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered*
11 *Activities and Associated Federal Actions*). The construction of trailhead facilities, signs, staging
12 areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when and
13 where possible. However, approximately 50 acres of grassland habitat would be lost from the
14 construction of trails and facilities.

15 Habitat management- and enhancement-related activities and equipment operation could
16 destroy nests burrows, and noise and visual disturbances could lead to their abandonment,
17 resulting in mortality of eggs and nestlings. The potential for these activities to result in nest
18 failure and mortality or other adverse effects on western burrowing owl would be avoided or
19 minimized with the incorporation of *AMM23 Western Burrowing Owl* into the BDCP which would
20 require surveys to determine presence or absence and the establishment of no-disturbance
21 buffers around active sites.

22 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
23 value western burrowing owl habitat for the development of a delta and longfin smelt
24 conservation hatchery in CZ 1.

25 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
26 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
27 disturbances that could affect western burrowing owl use of the surrounding habitat.
28 Maintenance activities would include vegetation management, levee and structure repair, and
29 re-grading of roads and permanent work areas. These effects, however, would be reduced by
30 AMMs and conservation actions as described below.

31 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
32 western burrowing owl. However, if nest burrows were occupied in the vicinity of construction
33 activities, equipment operation could destroy nests and noise and visual disturbances could lead
34 to abandonment. *AMM23 Western Burrowing Owl* would ensure that preconstruction surveys
35 detected any occupied burrows and no-disturbance buffers would be implemented.

36 The following paragraphs summarize the combined effects discussed above and describe other
37 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
38 included.

39 ***Near-Term Timeframe***

40 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
41 the near-term BDCP conservation strategy has been evaluated to determine whether it would
42 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
43 effects of construction would not be adverse under NEPA. Alternative 1C would remove 5,964 acres
44 (5,368 acres permanent, 596 acres temporary) of high-value habitat for western burrowing owl in

1 the study area in the near-term. These effects would result from the construction of the water
 2 conveyance facilities (CM1, 1,232 acres), and implementing other conservation measures (CM2 Yolo
 3 Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian Natural
 4 Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali
 5 Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management
 6 and CM18 Conservation Hatcheries—4,732 acres). In addition, 7,373 acres of low-value habitat
 7 would be removed or converted in the near-term (CM1, 3,702 acres; CM2 Yolo Bypass Fisheries
 8 Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian Natural Community
 9 Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal
 10 Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management and CM18
 11 Conservation Hatcheries—3,671 acres).

12 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
 13 CM1 and that are identified in the biological goals and objectives for western burrowing owl in
 14 Chapter 3 of the BDCP would be 2:1 protection for the loss of high-value habitat and 1:1 protection
 15 for the loss of low-value habitat. Using these typical ratios would indicate that 4,998 acres should be
 16 protected to mitigate the CM1 losses of high-value habitat, and 6,559 acres protected to compensate
 17 for loss of low-value western burrowing owl habitat. The near-term effects of other conservation
 18 actions would require the protection of 9,464 acres of high-value habitat 3,671 acres of low-value
 19 habitat using the same typical NEPA and CEQA ratios (2:1 protection for loss of high-value habitat
 20 and 1:1 protection for loss of low-value habitat).

21 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
 22 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
 23 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
 24 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,
 25 and CM9 and would occur in the same timeframe as the construction and early restoration losses.

26 The protection of high-value grasslands is essential in order to sustain existing western burrowing
 27 owl populations in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
 28 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
 29 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
 30 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
 31 pool natural communities which would provide habitat for western burrowing owl and reduce the
 32 effects of current levels of habitat fragmentation. This protection would not only expand the amount
 33 of protected high-value habitat in the study area, but also support existing western burrowing owl
 34 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
 35 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
 36 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
 37 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
 38 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*
 39 *Communities Enhancement and Management*, small mammal and insect prey populations would be
 40 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
 41 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected
 42 natural communities by encouraging ground squirrel occupancy and expansion through the creation
 43 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
 44 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance
 45 standards for considering the effectiveness of conservation actions.

1 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
2 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
3 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
4 CM1 and other near-term effects on western burrowing owl high-value habitat with the
5 consideration that some portion of the 15,400 acres of cultivated lands protected in the near-term
6 timeframe would be managed in suitable crop types to compensate for the loss of high-value
7 burrowing owl habitat at a ratio of 2:1. Mitigation Measure BIO-91, *Compensate for the Near-Term*
8 *Loss of High-Value Burrowing Owl Habitat*, would be available to address the adverse effect of high-
9 value habitat loss in the near-term.

10 The compensation for the loss of low-value burrowing owl habitat from the other near-term impacts
11 would be 5,632 acres less than the typical ratio of 1:1 protection. However, 3,636 acres of all near-
12 term impacts on low-value habitat would be temporary and would be restored within 1 year of the
13 completion of construction. In addition, a proportion of the loss of low-value habitat would be a
14 result of the conversion to high-value habitat. The near-term conservation acres would be 1,996
15 acres short of compensating for the permanent impacts on low-value habitat for the species.
16 Mitigation Measure BIO-91a, *Compensate for Permanent Loss of Low-Value Western Burrowing Owl*
17 *Habitat*, would compensate for the loss of permanent low-value habitat in the near-term. The
18 management and enhancement of cultivated lands and protected grasslands, including prey
19 enhancement, increasing burrow availability, and reducing existing fragmentation of high-value
20 habitat, would further compensate for any adverse effect from the near-term loss of low-value
21 foraging habitat on western-burrowing owl.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM23*
26 *Western Burrowing Owl*. All of these AMMs include elements that avoid or minimize the risk of
27 affecting habitats and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes
28 the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
29 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

30 **Late Long-Term Timeframe**

31 Based on the habitat model, the Plan Area supports approximately 128,781 acres of high-value and
32 234,903 acres of low-value habitat for western burrowing owl. Alternative 1C as a whole would
33 result in the permanent loss of and temporary effects on 14,397 acres of high-value habitat and
34 36,063 acres of low-value habitat for western burrowing owl during the term of the Plan (11% of
35 the total primary habitat in the Plan Area and 15% of the total low-value habitat in the study area).

36 The locations of these losses are described above in the analyses of individual conservation
37 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
38 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
39 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
40 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
41 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
42 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would
43 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,
44 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives

1 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal
 2 wetland, and vernal pool natural communities which would provide habitat for western burrowing
 3 owl and reduce the effects of current levels of habitat fragmentation. This protection would not only
 4 expand the amount of protected high-value habitat in the study area, but also support existing
 5 western burrowing owl populations that occur to the west of CZ 8 and in the areas surrounding CZs
 6 1 and 11, which would especially benefit declining populations in the vicinity of Suisun Marsh and
 7 San Pablo Bay. Certain types of cultivated lands such as irrigated pasture, alfalfa and other hay
 8 crops, and some row crops can provide foraging habitat for western burrowing owl. Under
 9 appropriate management regimes, cultivated lands can support breeding and wintering burrowing
 10 owls. To ensure that cultivated lands conservation benefits western burrowing owl, the Plan's
 11 biological goals and objectives further specify that, of the cultivated lands protected in the late long-
 12 term, at least 1,000 acres would be protected in CZs 1 and 11 that support high-value burrowing owl
 13 habitat and are within 0.5 miles of high-value grassland habitat or occupied low-value habitat
 14 (Objective WBO1.1). Under *CM11 Natural Communities Enhancement and Management*, small
 15 mammal and insect prey populations would be increased on protected lands, enhancing the foraging
 16 value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition,
 17 burrow availability would be increased on protected natural communities by encouraging ground
 18 squirrel occupancy and expansion through the creation of berms, mounds, edges, and through the
 19 prohibition of ground squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4,
 20 GNC2.3).

21 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
 22 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
 23 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-
 24 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl
 25 habitat (1,642 acres high-value and 3 acres low-value habitat).

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 30 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 31 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 32 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 33 of the Final EIR/EIS.

34 **NEPA Effects:** The loss of western burrowing owl habitat and potential for mortality of this special-
 35 status species under Alternative 1C would represent an adverse effect in the absence of other
 36 conservation actions. With habitat protection and restoration associated with CM3, CM8, and CM11,
 37 guided by biological goals and objectives and by AMM1-AMM7 and *AMM23 Western Burrowing Owl*,
 38 and with implementation of Mitigation Measures BIO-91 and BIO-91a, which would be available to
 39 guide the near-term protection and management of cultivated lands, the effects of habitat loss and
 40 potential mortality on western burrowing owl would not be adverse under Alternative 1C.

41 **CEQA Conclusion:**

42 **Near-Term Timeframe**

43 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 44 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 2 effects of construction would be less than significant under CEQA. Alternative 1C would remove
 3 5,964 acres (5,368 acres permanent, 596 acres temporary) of high-value habitat for western
 4 burrowing owl in the study area in the near-term. These effects would result from the construction
 5 of the water conveyance facilities (CM1, 1,232 acres), and implementing other conservation
 6 measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7*
 7 *Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal*
 8 *Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and*
 9 *Management and CM18 Conservation Hatcheries—4,732 acres). In addition, 7,373 acres of low-value*
 10 *habitat would be removed or converted in the near-term (CM1, 3,702 acres; CM2 Yolo Bypass*
 11 *Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian Natural*
 12 *Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali*
 13 *Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management*
 14 *and CM18 Conservation Hatcheries—3,671 acres).*

15 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
 16 CM1 and that are identified in the biological goals and objectives for western burrowing owl in
 17 Chapter 3 of the BDCP would be 2:1 protection for the loss of high-value habitat and 1:1 protection
 18 for the loss of low-value habitat. Using these typical ratios would indicate that 4,998 acres should be
 19 protected to mitigate the CM1 losses of high-value habitat, and 6,559 acres protected to compensate
 20 for loss of low-value western burrowing owl habitat. The near-term effects of other conservation
 21 actions would require the protection of 9,464 acres of high-value habitat 3,671 acres of low-value
 22 habitat using the same typical NEPA and CEQA ratios (2:1 protection for loss of high-value habitat
 23 and 1:1 protection for loss of low-value habitat).

24 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
 25 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
 26 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
 27 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,
 28 and CM9 and would occur in the same timeframe as the construction and early restoration losses.

29 The protection of high-value grasslands is essential in order to sustain existing western burrowing
 30 owl populations in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
 31 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
 32 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
 33 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
 34 pool natural communities which would provide habitat for western burrowing owl and reduce the
 35 effects of current levels of habitat fragmentation. This protection would not only expand the amount
 36 of protected high-value habitat in the study area, but also support existing western burrowing owl
 37 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
 38 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
 39 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
 40 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
 41 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*
 42 *Communities Enhancement and Management*, small mammal and insect prey populations would be
 43 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
 44 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected
 45 natural communities by encouraging ground squirrel occupancy and expansion through the creation
 46 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,

1 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance
2 standards for considering the effectiveness of conservation actions.

3 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
4 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
5 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
6 CM1 and other near-term effects on western burrowing owl high-value habitat with the
7 consideration that some portion of the 15,400 acres of cultivated lands protected in the near-term
8 timeframe would be managed in suitable crop types to compensate for the loss of high-value
9 burrowing owl habitat at a ratio of 2:1. Mitigation Measure BIO-91, *Compensate for Near-Term Loss*
10 *of High-Value Western Burrowing Owl Habitat*, would address the impact of high-value habitat loss in
11 the near-term.

12 The compensation for the loss of low-value burrowing owl habitat from the other near-term impacts
13 would be 5,632 acres less than the typical ratio of 1:1 protection. However, 3,636 acres of all near-
14 term impacts on low-value habitat would be temporary and would be restored within 1 year of the
15 completion of construction. In addition, a proportion of the loss of low-value habitat would be a
16 result of the conversion to high-value habitat. The near-term conservation acres would be 1,996
17 acres short of compensating for the permanent impacts on low-value habitat for the species.
18 Mitigation Measure BIO-91a, *Compensate for Permanent Loss of Low-Value Habitat for Western*
19 *Burrowing Owl* would compensate for the loss of permanent low-value habitat in the near-term. The
20 management and enhancement of cultivated lands and protected grasslands, including prey
21 enhancement, increasing burrow availability, and reducing existing fragmentation of high-value
22 habitat, would further compensate for any impact from the near-term loss of low-value foraging
23 habitat on western-burrowing owl.

24 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
25 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
26 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
27 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operation Plan*, and *AMM23*
28 *Western Burrowing Owl*. All of these AMMs include elements that avoid or minimize the risk of
29 affecting habitats and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes
30 the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
31 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

32 **Late Long-Term Timeframe**

33 Based on the habitat model, the Plan Area supports approximately 128,781 acres of high-value and
34 234,903 acres of low-value habitat for western burrowing owl. Alternative 1C as a whole would
35 result in the permanent loss of and temporary effects on 14,397 acres of high-value habitat and to
36 36,063 acres of low-value habitat for western burrowing owl during the term of the Plan (11% of
37 the total primary habitat in the Plan Area and 15% of the total low-value habitat in the study area).

38 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
39 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
40 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural
41 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
42 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
43 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
44 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be

1 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
 2 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
 3 pool natural communities which would provide habitat for western burrowing owl and reduce the
 4 effects of current levels of habitat fragmentation. This protection would not only expand the amount
 5 of protected high-value habitat in the study area, but also support existing western burrowing owl
 6 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
 7 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
 8 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
 9 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
 10 cultivated lands can support breeding and wintering burrowing owls. To ensure that cultivated
 11 lands conservation benefits western burrowing owl, the Plan's biological goals and objectives
 12 further specify that, of the cultivated lands protected in the late long-term, at least 1,000 acres
 13 would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are within
 14 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1). Under
 15 *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey
 16 populations would be increased on protected lands, enhancing the foraging value of these natural
 17 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would
 18 be increased on protected natural communities by encouraging ground squirrel occupancy and
 19 expansion through the creation of berms, mounds, edges, and through the prohibition of ground
 20 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

21 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
 22 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
 23 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-
 24 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl
 25 habitat (1,642 acres high-value and 3 acres low-value habitat).

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 30 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 31 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 32 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 33 of the Final EIR/EIS.

34 Considering Alternative 1C's protection and restoration provisions, which would provide acreages
 35 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
 36 construction and restoration activities, and implementation of AMM1–AMM7, *AMM23 Western*
 37 *Burrowing Owl*, and Mitigation Measures BIO-91 and BIO-91a, which would be available to guide the
 38 near-term protection and management of cultivated lands, the loss of habitat or direct mortality
 39 through implementation of Alternative 1C would not result in a substantial adverse effect through
 40 habitat modifications and would not substantially reduce the number or restrict the range of the
 41 species. Therefore, the loss of habitat or potential mortality under this alternative would have a less-
 42 than-significant impact on western burrowing owl.

1 **Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western**
2 **Burrowing Owl Habitat**

3 Because the BDCP lacks an acreage commitment for specific crop types that would be managed
4 within the 15,400 acres of cultivated lands protected in the near-term time period, DWR will
5 compensate for the loss of high-value burrowing owl habitat with high-value natural
6 communities or cultivated crop types a ratio of 2:1 in the near-term time period.

7 **Mitigation Measure BIO-91a: Compensate for Permanent Loss of Low-Value Western**
8 **Burrowing Owl Habitat**

9 DWR will compensate for the near-term permanent loss of low-value habitat at a ratio of 1:1.

10 **Impact BIO-92: Effects on Western Burrowing Owl Associated with Electrical Transmission**
11 **Facilities**

12 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,
13 which could result in injury or mortality of western burrowing owl. The species is large-bodied but
14 with relatively long and rounded wings, making it moderately maneuverable. While burrowing owls
15 may nest in loose colonies, they do not flock or congregate in roosts or foraging groups. Collectively,
16 the species' keen eyesight and largely ground-based hunting behavior make it a relatively low-risk
17 species for powerline collision. While the species is not widespread in the study area, it may become
18 more widely distributed as grassland enhancement improves habitat for the species. Even so, the
19 risk of effects on the population are low, given its physical and behavioral characteristics (BDCP
20 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission*
21 *Lines*). and new transmission lines would not be expected to have an adverse effect on the species.
22 Marking transmission lines with flight diverters that make the lines more visible to birds has been
23 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated
24 that marking devices in the Central Valley could reduce avian mortality by 60%. All new project
25 transmission lines would be fitted with flight diverters. Bird flight diverters would make
26 transmission lines highly visible to western burrowing owls and would further reduce any potential
27 for powerline collisions.

28 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
29 adverse effect on western burrowing owl because the risk of bird strike is considered to be minimal
30 based on the owl's physical and behavioral characteristics. All new transmission lines constructed
31 for the project would be fitted with bird diverters (*AMM20 Greater Sandhill Crane*), which have been
32 shown to reduce avian mortality by 60% and which would further reduce any potential for
33 powerline collisions.

34 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
35 significant impact on western burrowing owl because the risk of bird strike is considered to be
36 minimal based on the owl's physical and behavioral characteristics. All new transmission lines
37 constructed for the project would be fitted with bird diverters (*AMM20 Greater Sandhill Crane*),
38 which have been shown to reduce avian mortality by 60% and which would further reduce any
39 potential for powerline collisions.

1 **Impact BIO-93: Indirect Effects of Plan Implementation on Western Burrowing Owl**

2 Noise and visual disturbances associated with construction-related activities could result in
3 temporary disturbances that affect western burrowing owl use of up to 13,922 acres of modeled
4 burrowing owl habitat (6,113 acres of high-value habitat) within 500 feet of covered activities will
5 temporarily be made less suitable as a result of construction noise and visual disturbances adjacent
6 to proposed construction areas. Indirect effects associated with construction include noise, dust, and
7 visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations.
8 Any disturbance within 250 feet of a burrow occupied by burrowing owl during the breeding season
9 (February 1–August 31) and within 160 feet during the nonbreeding season (September 1–January
10 31) could potential displace winter owls or cause abandonment of active nests. These potential
11 effects would be minimized with incorporation of *AMM23 Western Burrowing Owl* into the BDCP,
12 which would require preconstruction surveys and establish no-disturbance buffers around active
13 burrows. Construction noise above background noise levels (greater than 50 dBA) could extend
14 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D,
15 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),
16 although there are no available data to determine the extent to which these noise levels could affect
17 western burrowing owl.

18 The use of mechanical equipment during water conveyance facilities construction could cause the
19 accidental release of petroleum or other contaminants that could affect western burrowing owl in
20 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
21 western burrowing owl habitat could also affect the species. AMM1–AMM7 in addition to *AMM23*
22 *Western Burrowing Owl* would minimize the likelihood of such spills from occurring and ensure that
23 measures were in place to prevent runoff from the construction area and any adverse effects of dust
24 on active nests.

25 **NEPA Effects:** Indirect effects on western burrowing owl as a result of Alternative 1C
26 implementation could have adverse effects on this species through the modification of habitat and
27 potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential to
28 disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton Court
29 Forebay and adjacent to work area. With the implementation of AMM1–AMM7, and *AMM23 Western*
30 *Burrowing Owl*, the indirect effects from Alternative 1C implementation would not be adverse under
31 NEPA.

32 **CEQA Conclusion:** Indirect effects on western burrowing owl as a result of Alternative 1C
33 implementation could have significant impacts on these species through the modification of habitat
34 and potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential
35 to disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton
36 Court Forebay and adjacent to work areas. With the implementation of AMM1–AMM7 and *AMM23*
37 *Western Burrowing Owl*, the indirect effects resulting from Alternative 1C implementation would
38 have a less-than-significant impact on western burrowing owl.

39 **Impact BIO-94: Periodic Effects of Inundation on Western Burrowing Owl Habitat as a Result**
40 **of Implementation of Conservation Components**

41 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
42 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,390–
43 3,303 acres of high-value habitat and 1,522–2,927 acres of low-value habitat (Table 12-1C-39).

1 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
2 *Restoration*, could result in the periodic inundation of up to approximately 6,941 acres of modeled
3 habitat (6,162 acres, of which would be low-value foraging habitat; Table 12-1C-39).

4 Burrowing owls cannot use inundated areas for foraging or nesting, and increased inundation
5 frequency and duration of cultivated lands and grassland habitats may affect prey populations that
6 have insufficient time to recover following inundation events. Depending on timing, seasonal
7 inundation of western burrowing owl habitat could result in displacement from nesting burrows or
8 drowning of individuals. The potential for this effect is considered low because suitable burrow sites
9 would most likely be located along setback levees, which are expected to be subject to inundation
10 less frequently than floodplain surfaces that would be less likely to support suitable nesting
11 burrows.

12 **NEPA Effects:** The periodically inundated habitat would not be expected to have an adverse effect on
13 the population. The potential for direct mortality of western burrowing owl caused by inundation
14 would be low because the locations of burrows would likely be above elevations consistently subject
15 to inundation; therefore, the potential impact would not be adverse.

16 **CEQA Conclusion:** The potential for direct mortality of western burrowing owl caused by inundation
17 would be low because the locations of burrows would likely be above elevations consistently subject
18 to inundation. Therefore, periodic inundation would be expected to have a less-than-significant
19 impact on the population.

20 **Western Yellow-Billed Cuckoo**

21 This section describes the effects of Alternative 1C, including water conveyance facilities
22 construction and implementation of other conservation components, on western yellow-billed
23 cuckoo. The habitat model for western yellow-billed cuckoo includes potential breeding habitat,
24 which includes plant alliances from the valley/foothill riparian modeled habitat that contain a dense
25 forest canopy for foraging with understory willow for nesting, and a minimum patch size of 50 acres.
26 Modeled habitat also includes migratory habitat, which contains the same plant alliances as
27 breeding habitat but without the minimum 50-acre patch size requirement.

28 The western yellow-billed cuckoo is uncommon in the Plan Area at present, and the likelihood that it
29 would be found using the modeled habitat is low relative to more abundant riparian species. Nesting
30 of the species in the plan area has not been confirmed for approximately 100 years. Western yellow-
31 billed cuckoo was detected in the study area during 2009 DHCCP surveys, but nesting was not
32 confirmed and the bird is suspected to have been a migrant (Appendix 12C, *2009 to 2011 Bay Delta*
33 *Conservation Plan EIR/EIS Environmental Data Report*). Construction and restoration associated
34 with Alternative 1C conservation measures would result in both temporary and permanent losses of
35 Western yellow-billed cuckoo modeled habitat as indicated in Table 12-1C-40. Full implementation
36 of Alternative 1C would also include the following conservation actions over the term of the BDCP
37 to benefit the western yellow-billed cuckoo (BDCP Chapter 3, Section 3.3, *Biological Goals and*
38 *Objectives*).

- 39 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
40 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
41 associated with CM7).
- 42 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
43 10 (Objective VFRNC1.2, associated with CM3).

- 1 • Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,
2 associated with CM3 and CM7).
- 3 • Maintain the at least 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion
4 of the early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a
5 minimum patch size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4,
6 associated with CM3 and CM7).

7 As explained below, with the restoration or protection of these amounts of habitat, in addition to
8 management activities that would enhance these natural communities for the species and the
9 implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least*
10 *Bell's Vireo, Western Yellow-Billed Cuckoo*, impacts on western yellow-billed cuckoo would not be
11 adverse for NEPA purposes and would be less than significant for CEQA purposes.

12 **Table 12-1C-40. Changes in Western Yellow-Billed Cuckoo Modeled Habitat Associated with**
13 **Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Breeding	0	0	0	0	NA	NA
	Migratory	13	13	35	35	NA	NA
Total Impacts CM1		13	13	35	35		
CM2–CM18	Breeding	29	142	5	10	11-20	17
	Migratory	278	383	83	94	37-64	125
Total Impacts CM2–CM18		307	525	88	104	48-84	142
Total Breeding		29	142	5	10	11-20	17
Total Migratory		291	396	118	129	37-64	125
TOTAL IMPACTS		320	538	123	139	48-84	142

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

14

15 **Impact BIO-95: Loss or Conversion of Habitat for and Direct Mortality of Western Yellow-**
16 **Billed Cuckoo**

17 Alternative 1C conservation measures would result in the combined permanent and temporary loss
18 of up to 677 acres of modeled habitat for western yellow-billed cuckoo (152 acres of breeding
19 habitat, 525 acres of migratory habitat, Table 12-1C-40). Conservation measures that would result
20 in these losses are conveyance facilities and transmission line construction, and establishment and

1 use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural*
 2 *Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. Habitat
 3 enhancement and management activities (CM11) which include ground disturbance or removal of
 4 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities
 5 associated with the long-term operation of the water conveyance facilities and other BDCP physical
 6 facilities could degrade or eliminate western yellow-billed cuckoo modeled habitat. Each of these
 7 individual activities is described below. A summary statement of the combined impacts and NEPA
 8 effects and a CEQA conclusion follow the individual conservation measure discussions.

- 9 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C water conveyance facilities
 10 would result in the combined permanent and temporary loss of up to 48 acres of modeled
 11 western yellow-billed cuckoo migratory habitat (Table 12-1C-40). Of the 48 acres of migratory
 12 habitat that would be removed for the construction of the conveyance facilities, 13 acres would
 13 be a permanent loss and 35 acres would be a temporary loss. There are no extant occurrences of
 14 yellow-billed cuckoo nests in the study area. However, this loss would have the potential to
 15 displace individuals, if present, and remove the functions and value of potentially suitable
 16 habitat for resting, protection, or foraging. Most of the permanent loss of nesting habitat would
 17 occur where Intakes 1–5 impact the Sacramento River’s west bank between just north of
 18 Clarksburg and Courtland. The riparian areas here are very small patches, dominated by valley
 19 oak, scrub vegetation, and nonnative trees. Temporary impacts would occur from the footprint
 20 of proposed temporary transmission lines, siphon work areas, a barge unloading facility east of
 21 Rio Vista, and a safe haven work area south of Piper Slough. Refer to the Terrestrial Biology Map
 22 Book for a detailed view of Alternative 1C construction locations.

23 There would be a 6 acre increase in the combined permanent and temporary loss of western
 24 yellow-billed cuckoo breeding habitat, and a 3 acre decrease in the loss of migratory habitat
 25 (resulting in a net 3 acre increase of modeled habitat) associated with the construction of the
 26 eastern transmission line for the Alternative 1C water conveyance facility rather than the north-
 27 south transmission line.

- 28 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 29 would result in the loss of approximately 31 acres of breeding habitat (26 acres of permanent
 30 loss and 5 acres of temporary loss) and 140 acres of migratory habitat (57 acres of permanent
 31 loss and 83 acres of temporary loss) for yellow-billed cuckoo in the Yolo Bypass in CZ 2. The loss
 32 is expected to occur during the first 10 years of Alternative 1C implementation. There are no
 33 extant occurrences of yellow-billed cuckoo nesting in the study area.
- 34 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 35 inundation would permanently remove an estimated 110 acres of modeled yellow-billed cuckoo
 36 breeding habitat and 310 acres of modeled migratory habitat in CZ 1, 2, 6, and 11. There are no
 37 extant nesting records of yellow-billed cuckoo in the study area. However, a yellow-billed
 38 cuckoo detection was recorded during DHCCP surveys in 2009 (Appendix 12C, *2009 to 2011 Bay*
 39 *Delta Conservation Plan EIR/EIS Environmental Data Report*) in CZ 5 between Twin Cities Road
 40 and Walnut Grove. These detections do not overlap with the hypothetical restoration areas for
 41 CM4.
- 42 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 43 seasonally inundated floodplain would permanently and temporarily remove approximately 11
 44 acres of modeled yellow-billed cuckoo breeding habitat (6 acres of permanent loss and 5 acres
 45 of temporary loss) and 27 acres of migratory habitat (16 acres of permanent loss and 11 acres of

1 temporary loss) in CZ 7. Based on the riparian habitat restoration assumptions, approximately
 2 3,000 acres of valley/foothill riparian habitat would be restored as a component of seasonally
 3 inundated floodplain restoration actions. The actual number of acres that would be restored
 4 may differ from these estimates, depending on how closely the outcome of seasonally inundated
 5 floodplain restoration approximates the assumed outcome. Once this restored riparian
 6 vegetation has developed habitat functions, a portion of it would be suitable to support western
 7 yellow-billed cuckoo habitat once the riparian vegetation has developed habitat functions for
 8 the cuckoo.

- 9 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
 10 activities that could be implemented in protected western yellow-billed cuckoo habitats would
 11 maintain and improve the functions of the habitat over the term of the BDCP. With conditions
 12 favorable for its future establishment in the study area, western yellow-billed cuckoo would be
 13 expected to benefit from the increase in protected habitat. However, habitat management- and
 14 enhancement-related activities could disturb western yellow-billed cuckoo nests if they were
 15 present near work sites. *CM11 Natural Communities Enhancement and Management* actions
 16 designed to enhance wildlife values in restored riparian habitats may result in localized ground
 17 disturbances that could temporarily remove small amounts of western yellow-billed cuckoo
 18 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and
 19 other infrastructure maintenance activities, would be expected to have minor adverse effects on
 20 available western yellow-billed cuckoo habitat and would be expected to result in overall
 21 improvements and maintenance of western yellow-billed cuckoo habitat values over the term of
 22 the BDCP.
- 23 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,
 24 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.
 25 Temporarily affected areas would be restored as riparian habitat within 1 year following
 26 completion of construction activities. Although the effects are considered temporary, the
 27 restored riparian habitat would require 5 years to several decades, for ecological succession to
 28 occur and for restored riparian habitat to functionally replace habitat that has been affected. The
 29 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;
 30 therefore, the replaced riparian vegetation would be expected to have structural components
 31 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial
 32 restoration activities are complete.
- 33 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
 34 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
 35 disturbances that could affect western yellow-billed cuckoo use of the surrounding habitat.
 36 Maintenance activities would include vegetation management, levee and structure repair, and
 37 re-grading of roads and permanent work areas. These effects, however, would be reduced by
 38 AMMs and conservation actions as described below.
- 39 ● Injury and Direct Mortality: Western yellow-billed cuckoo nesting has not been confirmed in the
 40 Delta for approximately 100 years. However, an unconfirmed breeding detection in 2009 in
 41 DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*
 42 *Data Report*) and the present of suitable habitat indicates that the species is potentially breeding
 43 in the study area, or may nest there in the future. Construction-related activities would not be
 44 expected to result in direct mortality of adult or fledged western yellow-billed cuckoo if they
 45 were present in the study area, because they would be expected to avoid contact with
 46 construction and other equipment. If western yellow-billed cuckoo were to nest in the

1 construction area, construction-related activities, including equipment operation, noise and
2 visual disturbances could destroy nests or lead to their abandonment, resulting in mortality of
3 eggs and nestlings. These effects would be avoided and minimized with the incorporation of
4 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
5 *Cuckoo* into the BDCP.

6 The following paragraphs summarize the combined effects discussed above and describe other
7 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
8 included.

9 ***Near-Term Timeframe***

10 Because the water conveyance facilities construction is being evaluated at the project level, the near-
11 term BDCP conservation strategy has been evaluated to determine whether it would provide
12 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
13 effects of construction would not be adverse under NEPA. Alternative 1C would remove 443 acres of
14 modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects would
15 result from the construction of the water conveyance facilities (CM1, 48 acres of modeled migratory
16 habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries Enhancement*,
17 CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain Restoration*—
18 395 acres of modeled nesting and migratory habitat). These habitat losses would primarily consist
19 of small, fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the
20 species.

21 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
22 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter
23 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
24 habitat. Using these ratios would indicate that 48 acres of valley/foothill riparian habitat should be
25 restored/created and 48 acres should be protected to compensate for the CM1 losses of yellow-
26 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres
27 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of
28 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
29 protection).

30 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
31 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*
32 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the
33 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
34 habitat loss on yellow-billed cuckoo. The majority of the riparian restoration acres would occur in
35 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill
36 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*
37 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,
38 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal
39 overlap among vegetation components and over adjacent riverine channels, freshwater emergent
40 wetlands, and grasslands (Objective VFRNC2.1). These natural community biological goals and
41 objectives would inform the near-term protection and restoration efforts and represent
42 performance standards for considering the effectiveness of conservation actions for the species.

43 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
44 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the

1 restored riparian habitat would require several years (early-mid successional) and several decades
2 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to
3 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not
4 known to be an established breeder in the Plan Area, the time lag in riparian restoration from BDCP
5 actions would not be expected to have an adverse population-level effect on the species. Overall,
6 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed
7 cuckoo by increasing opportunities for a breeding population to become reestablished in the study
8 area.

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
13 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
14 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
15 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
16 which have since been updated and which are provided in Appendix 3B, *Environmental*
17 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

18 **Late Long-Term Timeframe**

19 The habitat model indicates that the study area supports approximately 12,395 acres of modeled
20 breeding and migratory habitat for yellow-billed cuckoo. Alternative 1C as a whole would result in
21 the permanent loss of and temporary effects on 677 acres of modeled habitat (5% of the modeled
22 habitat in the Plan Area). These losses would occur from the construction of the water conveyance
23 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
24 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
25 would be in fragmented riparian habitat throughout the study area.

26 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
27 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
28 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
29 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
30 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
31 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least
32 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This
33 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian
34 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet
35 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.
36 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its
37 entirety the vegetative structure needed to support these species, because patch sizes may not be
38 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected
39 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11
40 would expand the patches of existing riparian forest in order to support the species should they
41 become established breeders in the study area.

42 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
43 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
44 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
5 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
6 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
7 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
8 which have since been updated and which are provided in Appendix 3B, *Environmental*
9 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

10 **NEPA Effects:** The loss of western yellow-billed cuckoo habitat associated with Alternative 1C would
11 represent an adverse effect in the absence of other conservation actions. However, the species is not
12 an established breeder in the study area and its current presence is limited to migrants. In addition,
13 the habitat lost would consist of small, fragmented riparian stands that would not provide high-
14 value habitat for the species. With habitat protection and restoration associated with CM3, CM7, and
15 CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM22 Suisun Song*
16 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be in
17 place throughout the construction phase, the effects of habitat loss and potential mortality under
18 Alternative 1C on western yellow-billed cuckoo would not be adverse.

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Because the water conveyance facilities construction is being evaluated at the project level, the near-
22 term BDCP conservation strategy has been evaluated to determine whether it would provide
23 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
24 effects of construction would be less than significant under CEQA. Alternative 1C would remove 443
25 acres of modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects
26 would result from the construction of the water conveyance facilities (CM1, 48 acres of modeled
27 migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
28 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
29 *Restoration*—395 acres of modeled nesting and migratory habitat). These habitat losses would
30 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value
31 habitat for the species.

32 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
33 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter
34 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
35 habitat. Using these ratios would indicate that 48 acres of valley/foothill riparian habitat should be
36 restored/created and 48 acres should be protected to compensate for the CM1 losses of yellow-
37 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres
38 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of
39 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
40 protection).

41 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
42 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*
43 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the
44 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of

1 habitat loss on yellow-billed cuckoo. The majority of the riparian restoration acres would occur in
2 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill
3 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*
4 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,
5 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal
6 overlap among vegetation components and over adjacent riverine channels, freshwater emergent
7 wetlands, and grasslands (Objective VFRNC2.1). These natural community biological goals and
8 objectives would inform the near-term protection and restoration efforts and represent
9 performance standards for considering the effectiveness of conservation actions for the species.

10 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
11 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the
12 restored riparian habitat would require several years (early-mid successional) and several decades
13 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to
14 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not
15 known to be an established breeder in the Plan Area, the time lag in riparian restoration from BDCP
16 actions would not be expected to have an adverse population-level effect on the species. Overall,
17 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed
18 cuckoo by increasing opportunities for a breeding population to become reestablished in the study
19 area.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
24 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
25 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
26 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
27 which have since been updated and which are provided in Appendix 3B, *Environmental*
28 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

29 **Late Long-Term Timeframe**

30 The habitat model indicates that the study area supports approximately 12,395 acres of modeled
31 breeding and migratory habitat for yellow-billed cuckoo. Alternative 1C as a whole would result in
32 the permanent loss of and temporary effects on 677 acres of modeled habitat (5% of the modeled
33 habitat in the Plan Area). These losses would occur from the construction of the water conveyance
34 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
35 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
36 would be in fragmented riparian habitat throughout the study area.

37 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
38 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
39 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
40 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
41 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
42 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least
43 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This
44 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian

1 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet
2 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.
3 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its
4 entirety the vegetative structure needed to support these species, because patch sizes may not be
5 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected
6 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11
7 would expand the patches of existing riparian forest in order to support the species should they
8 become established breeders in the study area.

9 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
10 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
11 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
13 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
14 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
16 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of
17 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
18 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
19 which have since been updated and which are provided in Appendix 3B, *Environmental*
20 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

21 In the absence of other conservation actions, effects on western yellow-billed cuckoo from
22 Alternative 1C would represent an adverse effect as a result of habitat modification and potential for
23 direct mortality of a special-status species; however, considering Alternative 1C's protection and
24 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
25 greater than necessary to compensate for the time lag of restoring habitats lost to construction and
26 restoration activities, and with implementation of AMM1–AMM7, AMM10, and AMM22 *Suisun Song*
27 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, the loss of habitat or
28 direct mortality through implementation of Alternative 1C would not result in a substantial adverse
29 effect through habitat modifications and would not substantially reduce the number or restrict the
30 range of the species. Therefore, the loss of habitat or potential mortality under this alternative
31 would have a less-than-significant impact on western yellow-billed cuckoo.

32 **Impact BIO-96: Fragmentation of Western Yellow-Billed Cuckoo Habitat as a Result of** 33 **Constructing the Water Conveyance Facilities**

34 Grading, filling, contouring, and other initial ground-disturbing operations for water conveyance
35 facilities construction may temporarily fragment modeled western yellow-billed cuckoo habitat.
36 This could temporarily reduce the extent and functions supported by the affected habitat. Because
37 western yellow-billed cuckoo is not currently known to breed in the study area, and the protection
38 and restoration of riparian habitat will expand contiguous habitat block requirements, habitat
39 fragmentation would have a minimal effect on the species.

40 **NEPA Effects:** Fragmentation of habitat would not have an adverse effect on western yellow-billed
41 cuckoo. The habitat functions in the study area for the species would be greatly improved through
42 the implementation of CM5, which would restore and protect large contiguous patches of riparian
43 habitat.

1 **CEQA Conclusion:** Fragmentation of habitat would have a less-than-significant impact on western
2 yellow-billed cuckoo. The habitat functions in the study area for the species would be greatly
3 improved through the implementation of CM5, which would restore and protect large contiguous
4 patches of riparian habitat.

5 **Impact BIO-97: Effects on Western Yellow-Billed Cuckoo Associated with Electrical**
6 **Transmission Facilities**

7 New transmission lines would increase the risk for bird-power line strikes, which could result in
8 injury or mortality of western yellow-billed cuckoo. Because the western yellow-billed cuckoo uses
9 riparian forests to meet all of its breeding and wintering life requisites, the species remains
10 primarily within the canopy of riparian forests and rarely ventures into open spaces except during
11 migration, limiting its opportunity to encounter the proposed transmission lines. As a summer
12 resident if the species were to occur in the study area, it would be during periods of relatively high
13 visibility and clear weather conditions, thus further reducing collision risk from daily use patterns
14 or seasonal migration flights. Finally, western yellow-billed cuckoo wing shape is characterized by
15 low wing loading and a moderate aspect ratio, making the species moderately maneuverable and
16 presumably able to avoid collisions, especially during high-visibility conditions (BDCP Appendix 5.J,
17 Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).

18 Transmission line poles and towers also provide perching substrate for raptors,

19 which are predators on western yellow-billed cuckoo. Although there is potential for transmission
20 lines to result in increased perching opportunities for raptors, the existing network of transmission
21 lines in the study area currently poses these risks and any incremental risk associated with the new
22 power line corridors would not be expected to affect the population. Because there is low
23 probability for the species to occur in the study area, any increase in predation risk on western
24 yellow-billed cuckoo from an increase in raptor perching opportunities would be minimal.

25 **NEPA Effects:** The risk of bird-strike is considered to be minimal based on the species' rarity in the
26 study area, its proclivity to remain in the riparian canopy, its presence in the study area during
27 periods of relative high visibility, and its overall ability to successfully negotiate around overhead
28 wires that it may encounter. Transmission line poles and towers also provide perching substrate for
29 raptors, which could result in increased predation pressure on western yellow-billed cuckoo.
30 However, because there is a low probability for the species to occur in the study area, any increase
31 in predation risk on western yellow-billed cuckoo from an increase in raptor perching opportunities
32 would be minimal. Therefore, the construction and operation of new transmission lines under
33 Alternative 1C would not result in an adverse effect on western yellow-billed cuckoo.

34 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
35 significant impact on western yellow-billed cuckoo because the risk of bird-strike is considered to
36 be minimal based on the species' rarity in the study area, its proclivity to remain in the riparian
37 canopy, its presence during periods of relative high visibility, and its overall ability to successfully
38 negotiate around overhead wires that it may encounter. Transmission line poles and towers also
39 provide perching substrate for raptors, which could result in increased predation pressure on
40 western yellow-billed cuckoo. However, because there is a low probability for the species to occur in
41 the study area, any increase in predation risk on western yellow-billed cuckoo from an increase in
42 raptor perching opportunities would be minimal. Therefore the construction and operation of new
43 transmission lines under Alternative 1C would result in a less-than-significant impact on western
44 yellow-billed cuckoo.

1 **Impact BIO-98: Indirect Effects of Plan Implementation on Western Yellow-Billed Cuckoo**

2 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
3 with construction-related activities could result in temporary disturbances that affect western
4 yellow-billed cuckoo use of modeled habitat adjacent to proposed construction areas. Construction
5 noise above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from
6 the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*
7 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no
8 available data to determine the extent to which these noise levels could affect western yellow-billed
9 cuckoo. Indirect effects associated with construction include noise, dust, and visual disturbance
10 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
11 footprint but within 1,300 feet from the construction edge. If western yellow-billed cuckoo were to
12 nest in or adjacent to work areas, construction and subsequent maintenance-related noise and
13 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
14 functions of suitable nesting habitat for these species. These potential effects would be minimized
15 with incorporation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
16 *Yellow-Billed Cuckoo* into the BDCP. The use of mechanical equipment during water conveyance
17 facilities construction could cause the accidental release of petroleum or other contaminants that
18 could affect western yellow-billed cuckoo in the surrounding habitat. The inadvertent discharge of
19 sediment or excessive dust adjacent to western yellow-billed cuckoo habitat could also affect the
20 species. AMM1–AMM7, including *AMM2 Construction BMPs and Monitoring*, in addition to *AMM22*
21 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would
22 minimize the likelihood of such spills from occurring and ensure that measures were in place to
23 prevent runoff from the construction area and any adverse effects of dust on active nests.

24 **Methylmercury Exposure:** Western yellow-billed cuckoo modeled habitat includes primarily
25 middle marsh habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is
26 also used if it is of high value, and low marsh provides foraging habitat for the species. Cuckoos are a
27 top predator in the benthic food chain; they forage by probing their beaks into the mud (Zembal and
28 Fancher 1988) and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects
29 (Eddleman and Conway 1998).

30 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
31 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
32 species would overestimate the effects on western yellow-billed cuckoo. Organisms feeding within
33 pelagic-based (algal) foodwebs have been found to have higher concentrations of methylmercury
34 than those in benthic or epibenthic foodwebs; this has been attributed to food chain length and
35 dietary segregation (Grimaldo et al. 2009).

36 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
37 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
38 Thus, Alternative 1C restoration activities that create newly inundated areas could increase
39 bioavailability of mercury. Concentrations of methylmercury known to be toxic to bird embryos
40 have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003);
41 however, currently, it is unknown how much of the sediment-derived methylmercury enters the
42 food chain in Suisun Marsh or what tissue concentrations are actually harmful to the western
43 yellow-billed cuckoo. In general, the highest methylation rates are associated with high tidal
44 marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers
45 et al. 2008). In Suisun Marsh, the conversion of managed wetlands to tidal wetlands is expected to

1 result in an overall reduction in mercury methylation. Because of the complex and very site-specific
2 factors that determine if mercury becomes mobilized into the foodweb, *CM12 Methylmercury*
3 *Management* is included to provide for site-specific evaluation for each restoration project. If a
4 project is identified where there is a high potential for methylmercury production that could not be
5 fully addressed through restoration design and adaptive management, alternate restoration areas
6 would be considered. CM12 would be implemented in coordination with other similar efforts to
7 address mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis
8 Section. This conservation measure would include the following actions.

- 9 • Assess pre-restoration conditions to determine the risk that the project could result in increased
10 mercury methylation and bioavailability
- 11 • Define design elements that minimize conditions conducive to generation of methylmercury in
12 restored areas.
- 13 • Define adaptive management strategies that can be implemented to monitor and minimize
14 actual postrestoration creation and mobilization of methylmercury.

15 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
16 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
17 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
18 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
19 2009). The effect of selenium toxicity differs widely between species and also between age and sex
20 classes within a species. In addition, the effect of selenium on a species can be confounded by
21 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
22 2009).

23 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
24 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
25 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
26 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
27 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
28 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
29 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
30 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
31 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
32 bivalves) have much higher levels than shorebirds that prey on aquatic invertebrates (Ackerman
33 and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium have a
34 higher risk of selenium toxicity.

35 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
36 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
37 exacerbate bioaccumulation of selenium in avian species, including western yellow-billed cuckoo.
38 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
39 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
40 Alternative 1C restoration activities that create newly inundated areas could increase bioavailability
41 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
42 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
43 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
44 increases in selenium concentrations in water in the Delta under any alternative. However, it is

1 difficult to determine whether the effects of potential increases in selenium bioavailability
2 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
3 effects on western yellow-billed cuckoo.

4 Because of the uncertainty that exists at this programmatic level of review, there could be a
5 substantial effect on western yellow-billed cuckoo from increases in selenium associated with
6 restoration activities. This effect would be addressed through the implementation of *AMM27*
7 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
8 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
9 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
10 selenium management to reduce selenium concentrations and/or bioaccumulation would be
11 evaluated separately for each restoration effort as part of design and implementation. This
12 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
13 design schedule.

14 **NEPA Effects:** Indirect effects on western yellow-billed cuckoo as a result of Plan implementation
15 could have adverse effects on the species through the modification of habitat and potential for direct
16 mortality.

17 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
18 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
19 the western yellow-billed cuckoo foodweb to methylmercury in these areas, with the level of
20 exposure dependent on the amounts of mercury available in the soils and the biogeochemical
21 conditions. However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would
22 be expected to reduce the overall production of methylmercury, resulting in a net benefit to the
23 species. Implementation of CM12, which contains measures to assess the amount of mercury before
24 project development, followed by appropriate design and adaptation management, would minimize
25 the potential for increased methylmercury exposure, and would result in no adverse effect on the
26 species.

27 Tidal habitat restoration could result in increased exposure of western yellow-billed cuckoo to
28 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
29 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
30 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

31 Because of the species' minimal presence in the study area, and with the incorporation of *AMM1-*
32 *AMM7, AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
33 *Cuckoo*, and *AMM27 Selenium Management* into the BDCP, indirect effects would not have an adverse
34 effect on western yellow-billed cuckoo.

35 **CEQA Conclusion:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 1C
36 implementation could have a significant impact on the species from modification of habitat.

37 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
38 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
39 the western yellow-billed cuckoo foodweb to methylmercury in these areas, with the level of
40 exposure dependent on the amounts of mercury available in the soils and the biogeochemical
41 conditions. However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would
42 be expected to reduce the overall production of methylmercury, resulting in a net benefit to the
43 species. Implementation of CM12, which contains measures to assess the amount of mercury before

1 project development, followed by appropriate design and adaptation management, would minimize
2 the potential for increased methylmercury exposure, and would result in no adverse effect on the
3 species.

4 Tidal habitat restoration could result in increased exposure of yellow-headed blackbird to selenium.
5 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
6 would provide specific tidal habitat restoration design elements to reduce the potential for
7 bioaccumulation of selenium and its bioavailability in tidal habitats.

8 With the incorporation of AMM1–AMM7, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least*
9 *Bell's Vireo*, *Western Yellow-Billed Cuckoo*, and *AMM27 Selenium Management* into the BDCP, indirect
10 effects as a result of Alternative 1C implementation would have a less-than-significant impact on
11 western yellow-billed cuckoo.

12 **Impact BIO-99: Periodic Effects of Inundation of Western Yellow-Billed Cuckoo Habitat as a** 13 **Result of Implementation of Conservation Components**

14 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
15 duration of inundation of approximately 11-20 acres of modeled western yellow-billed cuckoo
16 breeding habitat and 37–64 acres of modeled migratory habitat. No adverse effects of increased
17 inundation frequency on western yellow-billed cuckoo or its habitat are expected because the
18 cuckoo breeding period is outside the period the weir would be operated. In addition, riparian
19 vegetation supporting habitat has persisted under the existing Yolo Bypass flooding regime, and
20 changes to frequency and inundation would be within the tolerance of these vegetation types.

21 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
22 inundation of up to 142 acres of modeled western yellow-billed cuckoo habitat (17 acres of breeding
23 habitat, 125 acres of migratory habitat). Inundation of restored floodplains is not expected to affect
24 western yellow-billed cuckoo or its habitat adversely because the cuckoo breeding period is outside
25 the period the floodplains would likely be inundated, and periodic inundation of floodplains is
26 expected to restore a more natural flood regime in support of riparian vegetation types that provide
27 nesting and migratory habitat for western yellow-billed cuckoo. The overall effect of seasonal
28 inundation in existing riparian natural communities is likely to be beneficial for western yellow-
29 billed cuckoo, because, historically, flooding was the main natural disturbance regulating ecological
30 processes in riparian areas, and flooding promotes the germination and establishment of many
31 native riparian plants.

32 **NEPA Effects:** Periodic inundation would not have an adverse on yellow-billed cuckoos if they were
33 to establish as breeders in the study area, because flooding is expected to occur outside of the
34 breeding season.

35 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on
36 yellow-billed cuckoos if they were to establish as breeders in the study area, because flooding is
37 expected to occur outside of the breeding season.

38 **White-Tailed Kite**

39 This section describes the effects of Alternative 1C, including water conveyance facilities
40 construction and implementation of other conservation components, on white-tailed kite. The
41 habitat model used to assess impacts on white-tailed kite includes nesting habitat and foraging
42 habitat. Most white-tailed kites in the Sacramento Valley are found in oak and cottonwood riparian

1 forests, valley oak woodlands, or other groups of trees and are usually associated with compatible
2 foraging habitat for the species in patches greater than 1,500 square meters (Erichsen et al. 1996).
3 Modeled foraging habitat for white-tailed kite consists of pasture and hay crops, compatible row and
4 grain crops and natural vegetation such as seasonal wetlands and annual grasslands (Erichsen
5 1995).

6 Construction and restoration associated with Alternative 1C conservation measures would result in
7 both temporary and permanent losses of white-tailed kite modeled habitat as indicated in Table 12-
8 1C-41. The majority of the losses would take place over an extended period of time as tidal marsh is
9 restored in the study area. Although restoration for the loss of nesting and foraging habitat would be
10 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)
11 for restored habitats to replace the functions of habitat lost. This time lag between impacts and
12 restoration of habitat function would be minimized by specific requirements of *AMM18 Swainson's*
13 *Hawk*, including the planting of mature trees in the near-term time period. Full implementation of
14 Alternative 1C would also include the following biological objectives over the term of the BDCP to
15 benefit the white-tailed kite (BDCP Chapter 3, *Conservation Strategy*).

- 16 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
17 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
18 associated with CM7).
- 19 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
20 10 (Objective VFRNC1.2, associated with CM3).
- 21 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
22 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
23 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 24 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 25 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
26 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 27 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
28 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 29 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
30 VPNC2.5, and GNC2.4, associated with CM11).
- 31 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
32 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 33 ● Plant and maintain native trees along roadsides and field borders within protected cultivated
34 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM3 and CM11).
- 35 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
36 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
37 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
38 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 39 ● Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey
40 populations throughout protected cultivated lands (Objective SH2.2, associated with CM3 and
41 CM11)

1 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 2 management activities that would enhance these natural communities for the species and the
 3 implementation of AMM1–AMM7 and *AMM39 White-Tailed Kite*, impacts on white-tailed kite would
 4 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

5 **Table 12-1C-41. Changes in White-Tailed Kite Modeled Habitat Associated with Alternative 1C**
 6 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	33	33	71	71	NA	NA
	Foraging	4,787	4,787	6,603	6,603	NA	NA
Total Impacts CM1		4,820	4,820	6,674	6,674	NA	NA
CM2–CM18	Nesting	312	507	88	121	48–82	230
	Foraging	8,723	52,675	516	1,484	3,030–6,651	7,402
Total Impacts CM2–CM18		9,035	53,182	604	1,605	3,078–6,733	7,632
Total Nesting		345	540	159	192	48–82	230
Total Foraging		13,510	57,462	7,119	8,087	3,030–6,651	7,402
TOTAL IMPACTS		13,855	58,002	7,278	8,279	3,078–6,733	7,632

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

7

8 **Impact BIO-100: Loss or Conversion of Habitat for and Direct Mortality of White-Tailed Kite**

9 Alternative 1C conservation measures would result in the combined permanent and temporary loss
 10 of up to 66,281 acres of modeled habitat for white-tailed kite (732 acres of nesting habitat, 65,549
 11 acres of foraging habitat; Table 12-1C-41). Conservation measures that would result in these losses
 12 are conveyance facilities and transmission line construction, and establishment and use of borrow
 13 and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4),
 14 floodplain restoration (CM5), riparian habitat restoration, (CM7), grassland restoration (CM8),
 15 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of
 16 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which
 17 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.
 18 In addition, maintenance activities associated with the long-term operation of the water conveyance
 19 facilities and other BDCP physical facilities could affect white-tailed kite modeled habitat. Each of
 20 these individual activities is described below. A summary statement of the combined impacts and
 21 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C water conveyance facilities
2 would result in the combined permanent and temporary loss of up to 104 acres of white-tailed
3 kite nesting habitat (33 acres of permanent loss and 71 acres of temporary loss). Most of the
4 permanent loss of nesting habitat would occur where Intakes 1–5 impact the Sacramento River’s
5 west bank between just north of Clarksburg and Courtland. The riparian areas here are very
6 small patches, dominated by valley oak, scrub vegetation, and nonnative trees. Temporary
7 impacts would occur from the footprint of proposed temporary transmission lines, siphon work
8 areas, a barge unloading facility east of Rio Vista, and a safe haven work area south of Piper
9 Slough. In addition, 11,390 acres of foraging habitat would be removed (4,787 acres of
10 permanent loss, 6,603 acres of temporary loss, Table 12-1C-41). The permanent losses of
11 foraging habitat would occur at various locations along the western canal route, at the intake
12 sites along the Sacramento River, construction of the new forebay, and associated RTM storage
13 areas. Both temporary and permanent losses of foraging habitat would occur from the
14 transmission line corridors west of the study area and along the tunnel alignment in the west
15 Delta. Temporary losses would occur from siphon construction areas, safe haven work areas,
16 railroad work areas, and potential borrow and spoil sites along the canal alignment. There are
17 no occurrences of nesting white-tailed kite that overlap with the construction footprint of CM1.
18 However, the implementation of *AMM39 White-Tailed Kite* would minimize effects on white-
19 tailed kites if they were to nest within or adjacent to the construction footprint. Refer to the
20 Terrestrial Biology Map Book for a detailed view of Alternative 1C construction locations.
- 21 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
22 would result in the combined permanent and temporary loss of up to 170 acres of nesting
23 habitat (82 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2. In
24 addition, 1,525 acres of foraging habitat would be removed (1,008 acres of permanent loss, 516
25 acres of temporary loss). Activities through CM2 could involve excavation and grading in
26 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
27 riparian losses would occur at the north end of Yolo Bypass where major fish passage
28 improvements are planned. Excavation to improve water movement in the Toe Drain and in the
29 Sacramento Weir would also remove white-tailed kite habitat. The loss is expected to occur
30 during the first 10 years of Alternative 1C implementation.
- 31 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
32 inundation would permanently remove an estimated 383 acres of white-tailed kite nesting
33 habitat and 41,625 acres of foraging habitat. The majority of the acres lost would consist of
34 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity
35 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,
36 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
37 directly impact and fragment grassland just north of Rio Vista in and around French and
38 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
39 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
40 the northern fringes of Suisun Marsh. The conversion of cultivated lands to tidal wetlands over
41 fairly broad areas within the tidal restoration footprints could result in the removal or
42 abandonment of nesting territories that occur within or adjacent to the restoration areas. Trees
43 would not be actively removed but tree mortality would be expected over time as areas became
44 tidally inundated. Depending on the extent and value of remaining habitat, this could reduce the
45 local nesting population.

- 1 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
2 seasonally inundated floodplain and riparian restoration actions would remove approximately
3 75 acres of white-tailed kite nesting habitat (42 acres of permanent loss, 33 acres of temporary
4 loss) and 2,675 acres of foraging habitat (1,706 acres of permanent loss, 968 acres of temporary
5 loss). These losses would be expected after the first 10 years of Alternative 1C implementation
6 along the San Joaquin River and other major waterways in CZ 7.
- 7 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
8 approximately 971 acres of white-tailed kite foraging habitat as part of tidal restoration and
9 3,991 acres as part of seasonal floodplain restoration through CM7.
- 10 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
11 implemented on agricultural lands and would result in the conversion of 1,849 acres of white-
12 tailed kite agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8, and 11.
13 If agricultural lands supporting higher value foraging habitat than the restored grassland were
14 removed, there would be a loss of white-tailed kite foraging habitat value.
- 15 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh
16 (CM10) would result in the permanent conversion of 1,440 acres of cultivated lands to nontidal
17 marsh in CZ 2 and CZ 4. This would not result in a loss of foraging habitat as both natural
18 communities are foraging habitat for white-tailed kite. Small patches of riparian vegetation that
19 support White-tailed kite nesting habitat may develop along the margins of restored nontidal
20 marsh restoration would also provide foraging habitat for the species.
- 21 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
22 enhancement-related activities could disturb white-tailed kite nests if they were present near
23 work sites. A variety of habitat management actions that are designed to enhance wildlife values
24 in BDCP-protected habitats may result in localized ground disturbances that could temporarily
25 remove small amounts of white-tailed kite habitat and reduce the functions of habitat until
26 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
27 and road and other infrastructure maintenance, are expected to have minor effects on available
28 white-tailed kite habitat and are expected to result in overall improvements to and maintenance
29 of habitat values over the term of the BDCP. These effects cannot be quantified, but are expected
30 to be minimal and would be avoided and minimized by the AMMs listed below. CM11 would also
31 include the construction of recreational-related facilities including trails, interpretive signs, and
32 picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The
33 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be
34 placed on existing, disturbed areas when and where possible. However, approximately 50 acres
35 of white-tailed kite grassland foraging habitat would be lost from the construction of trails and
36 facilities.
- 37 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
38 white-tailed kite foraging habitat for the development of a delta and longfin smelt conservation
39 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Alternative 1C
40 implementation.

41 Permanent and temporary white-tailed kite nesting habitat losses from the above conservation
42 measures, would primarily consist of small, fragmented riparian stands. Temporarily affected
43 nesting habitat would be restored as riparian habitat within 1 year following completion of
44 construction activities. The restored riparian habitat would require 1 to several decades to
45 functionally replace habitat that has been affected and for trees to attain sufficient size and

1 structure suitable for nesting by white-tailed kite. *AMM39 White-Tailed Kite* contains actions
2 described below to reduce the effect of temporal loss of nesting habitat, including the
3 transplanting of mature trees and planting of trees near high-value foraging habitat. The
4 functions of agricultural and grassland communities that provide foraging habitat for white-
5 tailed kite are expected to be restored relatively quickly.

- 6 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
7 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
8 disturbances that could affect white-tailed kite use of the surrounding habitat. Maintenance
9 activities would include vegetation management, levee and structure repair, and re-grading of
10 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7
11 and *AMM39 White-Tailed Kite* in addition to conservation actions as described below.
- 12 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in
13 direct mortality of adult or fledged white-tailed kite if they were present in the study area,
14 because they would be expected to avoid contact with construction and other equipment.
15 However, if white-tailed kite were to nest in the construction area, construction-related
16 activities, including equipment operation, noise and visual disturbances could affect nests or
17 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects
18 would be avoided and minimized with the incorporation of *AMM39 White-Tailed Kite* into the
19 BDCP.

20 The following paragraphs summarize the combined effects discussed above and describe other
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
22 included.

23 ***Near-Term Timeframe***

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would
26 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
27 the effect of construction would not be adverse under NEPA. Alternative 1C would remove 504 acres
28 (345 acres of permanent loss, 159 acres of temporary loss) of white-tailed kite nesting habitat in the
29 study area in the near-term. These effects would result from the construction of the water
30 conveyance facilities (CM1, 104 acres), and implementing other conservation measures (*CM2 Yolo*
31 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
32 *Inundated Floodplain Restoration*—400 acres). In addition, 21,229 acres of white-tailed kite foraging
33 habitat would be removed or converted in the near-term (CM1, 11,390 acres; *CM2 Yolo Bypass*
34 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5, Seasonally Inundated*
35 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*
36 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*
37 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—9,239
38 acres).

39 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
40 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of
41 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
42 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that
43 104 acres of nesting habitat should be restored/created and 104 acres should be protected to
44 mitigate the CM1 losses of white-tailed kite nesting habitat. In addition, 11,390 acres of foraging

1 habitat should be protected to compensate for the CM1 losses of white-tailed kite foraging habitat.
2 The near-term effects of other conservation actions would remove 400 acres of modeled nesting
3 habitat, and therefore require 400 acres of restoration and 400 acres of protection of nesting
4 habitat. Similarly, the near-term effects of other conservation actions would result in the loss or
5 conversion of 9,239 acres of modeled foraging habitat, and therefore require 9,239 acres of
6 protection of foraging habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and
7 1:1 for protection of nesting habitat; 1:1 for protection of foraging habitat).

8 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
9 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
10 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
11 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
12 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
13 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of*
14 *Alternatives*). These conservation actions are associated with CM3, CM4, CM7, and CM8 and would
15 occur in the same timeframe as the construction and early restoration losses.

16 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
17 system with extensive wide bands or large patches of valley/foothill riparian natural community
18 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
19 restoration would expand the patches of existing riparian forest in order to support nesting habitat
20 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
21 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
22 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
23 would be increased by planting and maintaining native trees along roadsides and field borders
24 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
25 small but essential nesting habitat associated with cultivated lands would also be maintained and
26 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
27 farmyards or at rural residences (Objective CLNC1.3).

28 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
29 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
30 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
31 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
32 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
33 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
34 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
35 Foraging opportunities would also be improved by enhancing prey populations through the
36 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
37 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
38 would also be protected and maintained as part of the cultivated lands reserve system which would
39 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
40 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
41 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
42 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres
43 of tidal natural communities, including transitional uplands would provide high-value foraging
44 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for
45 covered and other native wildlife species would be protected in the near-term time period
46 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection

1 and restoration efforts and represent performance standards for considering the effectiveness of
2 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
3 and the additional detail in the biological objectives satisfy the typical mitigation that would be
4 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate
5 the near-term effects of the other conservation measures.

6 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
7 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
8 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian
9 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
10 require one to several decades to functionally replace habitat that has been affected and for trees to
11 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between
12 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite
13 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting
14 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
15 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat
16 would further reduce this limited resource and could reduce or restrict the number of active white-
17 tailed kite nests within the Plan Area until restored riparian habitat is sufficiently developed.

18 *AMM39 White-Tailed Kite* would implement a program to plant large mature trees, including
19 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson's hawk
20 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
21 within the 125-acre block are removed. These mature trees would be supplemented with additional
22 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
23 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
24 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
25 system for every tree 20 feet or taller removed by construction during the near-term period. A
26 variety of native tree species would be planted to provide trees with differing growth rates,
27 maturation, and life span. Trees would be planted within the BDCP reserve system in areas that
28 support high-value foraging habitat to increase nest sites, or within riparian plantings as a
29 component of the riparian restoration (CM5, CM7) where they are in close proximity to suitable
30 foraging habitat. Replacement trees that were incorporated into the riparian restoration would not
31 be clustered in a single region of the Plan Area, but would be distributed throughout the lands
32 protected as foraging habitat for white-tailed kite. With this program in place, Alternative 1C would
33 not have a substantial adverse effect on white-tailed kite in the near-term timeframe, either through
34 direct mortality or through habitat modifications. Further details of AMM39 are provided in
35 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
37 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
38 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
39 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
40 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
41 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
42 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
43 of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres
3 of modeled foraging habitat for white-tailed kite. Alternative 1C as a whole would result in the
4 permanent loss of and temporary effects on 732 acres of potential nesting habitat (5% of the
5 potential nesting habitat in the study area) and the loss or conversion of 65,549 acres of foraging
6 habitat (13% of the foraging habitat in the study area). The locations of these losses are described
7 above in the analyses of individual conservation measures.

8 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
9 *Restoration, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*
10 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Community*
11 *Restoration*, to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
12 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
13 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
14 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that
15 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal
16 wetlands (Table 3-4 in Chapter 3, *Description of Alternatives*).

17 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
18 system with extensive wide bands or large patches of valley/foothill riparian natural community
19 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
20 restoration would expand the patches of existing riparian forest in order to support nesting habitat
21 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
22 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
23 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
24 would be increased by planting and maintaining native trees along roadsides and field borders
25 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
26 small but essential nesting habitat associated with cultivated lands would also be maintained and
27 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
28 farmyards or at rural residences (Objective CLNC1.3).

29 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
30 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
31 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
32 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
33 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
34 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
35 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
36 Foraging opportunities would also be improved by enhancing prey populations through the
37 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
38 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
39 would also be protected and maintained as part of the cultivated lands reserve system which would
40 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
41 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
42 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
43 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least
44 65,000 acres of tidal natural communities, including transitional uplands would provide high-value
45 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide

1 foraging habitat for white-tailed kite would be protected by the late long-term time period
2 (Objective CLNC1.1).

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
4 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
5 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration
6 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
11 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
12 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
13 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
14 of the Final EIR/EIS.

15 **NEPA Effects:** The loss of white-tailed kite habitat and potential for direct mortality of this special-
16 status species under Alternative 1C would represent an adverse effect in the absence of other
17 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,
18 CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM39 White-*
19 *Tailed Kite*, which would be in place throughout the construction period, the effects of habitat loss
20 and potential mortality on white-tailed kite would not be adverse under Alternative 1C.

21 **CEQA Conclusion:**

22 ***Near-Term Timeframe***

23 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
24 the near-term BDCP conservation strategy has been evaluated to determine whether it would
25 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
26 the effect of construction would be less than significant under CEQA. Alternative 1C would remove
27 504 acres (345 acres of permanent loss, 159 acres of temporary loss) of white-tailed kite nesting
28 habitat in the study area in the near-term. These effects would result from the construction of the
29 water conveyance facilities (CM1, 104 acres), and implementing other conservation measures (*CM2*
30 *Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
31 *Inundated Floodplain Restoration*—400 acres). In addition, 21,229 acres of white-tailed kite foraging
32 habitat would be removed or converted in the near-term (CM1, 11,390 acres; *CM2 Yolo Bypass*
33 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5, Seasonally Inundated*
34 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*
35 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*
36 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—9,239
37 acres).

38 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
39 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of
40 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
41 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that
42 104 acres of nesting habitat should be restored/created and 104 acres should be protected to
43 mitigate the CM1 losses of white-tailed kite nesting habitat. In addition, 11,390 acres of foraging

1 habitat should be protected to compensate for the CM1 losses of white-tailed kite foraging habitat.
2 The near-term effects of other conservation actions would remove 400 acres of modeled nesting
3 habitat, and therefore require 400 acres of restoration and 400 acres of protection of nesting
4 habitat. Similarly, the near-term effects of other conservation actions would result in the loss or
5 conversion of 9,239 acres of modeled foraging habitat, and therefore require 9,239 acres of
6 protection of foraging habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and
7 1:1 for protection of nesting habitat; 1:1 for protection of foraging habitat).

8 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
9 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
10 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
11 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
12 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
13 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of*
14 *Alternatives*). These conservation actions are associated with CM3, CM4, CM7, and CM8 and would
15 occur in the same timeframe as the construction and early restoration losses.

16 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
17 system with extensive wide bands or large patches of valley/foothill riparian natural community
18 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
19 restoration would expand the patches of existing riparian forest in order to support nesting habitat
20 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
21 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
22 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
23 would be increased by planting and maintaining native trees along roadsides and field borders
24 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
25 small but essential nesting habitat associated with cultivated lands would also be maintained and
26 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
27 farmyards or at rural residences (Objective CLNC1.3).

28 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
29 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
30 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
31 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
32 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
33 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
34 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
35 Foraging opportunities would also be improved by enhancing prey populations through the
36 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
37 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
38 would also be protected and maintained as part of the cultivated lands reserve system which would
39 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
40 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
41 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
42 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres
43 of tidal natural communities, including transitional uplands would provide high-value foraging
44 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for
45 covered and other native wildlife species would be protected in the near-term time period
46 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection

1 and restoration efforts and represent performance standards for considering the effectiveness of
2 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
3 and the additional detail in the biological objectives satisfy the typical mitigation that would be
4 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate
5 the near-term effects of the other conservation measures.

6 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
7 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
8 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian
9 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
10 require one to several decades to functionally replace habitat that has been affected and for trees to
11 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between
12 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite
13 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting
14 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
15 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat
16 would further reduce this limited resource and could reduce or restrict the number of active white-
17 tailed kite nests within the Plan Area until restored riparian habitat is sufficiently developed.

18 *AMM39 White-Tailed Kite* would implement a program to plant large mature trees, including
19 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson's hawk
20 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
21 within the 125-acre block are removed. These mature trees would be supplemented with additional
22 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
23 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
24 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
25 system for every tree 20 feet or taller removed by construction during the near-term period. A
26 variety of native tree species would be planted to provide trees with differing growth rates,
27 maturation, and life span. Trees would be planted within the BDCP reserve system in areas that
28 support high-value foraging habitat to increase nest sites, or within riparian plantings as a
29 component of the riparian restoration (CM5, CM7) where they are in close proximity to suitable
30 foraging habitat. Replacement trees that were incorporated into the riparian restoration would not
31 be clustered in a single region of the Plan Area, but would be distributed throughout the lands
32 protected as foraging habitat for white-tailed kite. Further details of AMM39 are provided in
33 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. With this program
34 in place, Alternative 1C would not have a substantial adverse effect on white-tailed kite in the near-
35 term timeframe, either through direct mortality or through habitat modifications.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
37 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
38 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
39 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
40 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
41 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
42 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
43 of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres
3 of modeled foraging habitat for white-tailed kite. Alternative 1C as a whole would result in the
4 permanent loss of and temporary effects on 732 acres of potential nesting habitat (5% of the
5 potential nesting habitat in the study area) and the loss or conversion of 65,549 acres of foraging
6 habitat (13% of the foraging habitat in the study area).

7 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
8 *Restoration, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*
9 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Community*
10 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
11 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
12 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
13 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that
14 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal
15 wetlands (Table 3-4 in Chapter 3, *Description of Alternatives*).

16 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
17 system with extensive wide bands or large patches of valley/foothill riparian natural community
18 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
19 restoration would expand the patches of existing riparian forest in order to support nesting habitat
20 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
21 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
22 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
23 would be increased by planting and maintaining native trees along roadsides and field borders
24 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
25 small but essential nesting habitat associated with cultivated lands would also be maintained and
26 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
27 farmyards or at rural residences (Objective CLNC1.3).

28 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
29 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
30 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
31 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
32 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
33 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
34 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
35 Foraging opportunities would also be improved by enhancing prey populations through the
36 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
37 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
38 would also be protected and maintained as part of the cultivated lands reserve system which would
39 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
40 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
41 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
42 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least
43 65,000 acres of tidal natural communities, including transitional uplands would provide high-value
44 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide

1 foraging habitat for white-tailed kite would be protected by the late long-term time period
2 (Objective CLNC1.1).

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
4 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
5 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration
6 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
11 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
12 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
13 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
14 of the Final EIR/EIS.

15 In the absence of other conservation actions, the effects on white-tailed kite habitat from Alternative
16 1C would represent an adverse effect as a result of habitat modification and potential for direct
17 mortality of a special status species; however, considering Alternative 1C's protection and
18 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
19 greater than necessary to compensate for the time lag of restoring riparian and foraging habitats
20 lost to construction and restoration activities, and with implementation of AMM1-AMM7 and
21 *AMM39 White-Tailed Kite*, the loss of habitat or direct mortality through implementation of
22 Alternative 1C would not result in a substantial adverse effect through habitat modifications and
23 would not substantially reduce the number or restrict the range of the species. In particular, 95% of
24 the loss of foraging habitat effects involve the conversion from one habitat type to another form of
25 suitable foraging habitat. Therefore, the loss of habitat or potential mortality under this alternative
26 would have a less-than-significant impact on white-tailed kite.

27 **Impact BIO-101: Effects on White-Tailed Kite Associated with Electrical Transmission** 28 **Facilities**

29 There are several known occurrences of nesting white-tailed kite within 5 miles of the proposed
30 transmission line alignment. While white-tailed kite flight behavior puts them regularly within the
31 range of heights proposed for the new transmission lines (50 to 110 feet), their keen vision and high
32 maneuverability substantially reduce powerline collision risk for the species. Like other diurnal
33 raptors, white-tailed kites have highly developed eyesight (Jones et al. 2007), allowing them to
34 detect small prey while hunting from relatively high altitudes. Keen eyesight also allows for
35 detection and avoidance of other aerial objects, including above-ground utility lines. Like many
36 other falcons, the white-tailed kite has long, narrow, tapered wings and body size that allow for
37 efficient soaring flight and highly developed aerial maneuverability. White-tailed kite are at low risk
38 of bird strike mortality from the construction of new transmission lines based on its general
39 maneuverability, its keen eyesight, and lack of flocking behavior (BDCP Appendix 5.J, Attachment
40 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).
41 Marking transmission lines with flight diverters that make the lines more visible to birds has been
42 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated
43 that marking devices in the Central Valley could reduce avian mortality by 60%. With the

1 implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines would be fitted with
2 flight diverters, which would substantially reduce any risk of collision with lines.

3 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
4 adverse effect because the risk of bird strike is considered to be minimal based on the species'
5 general maneuverability, keen eyesight, and lack of flocking behavior. In addition, *AMM20 Greater*
6 *Sandhill Crane* contains the commitment to place bird strike diverters on all new powerlines, which
7 would eliminate or nearly eliminate the risk of mortality from bird strike for white-tailed kite as a
8 result of the project. Therefore, the construction and operation of new transmission lines under
9 Alternative 1C would not result in an adverse effect on white-tailed kite.

10 **CEQA Conclusion:** The construction and presence of new transmission lines would not represent a
11 significant impact because the risk of bird strike is considered to be minimal based on the species'
12 general maneuverability, keen eyesight, and lack of flocking behavior. In addition, *AMM20 Greater*
13 *Sandhill Crane* contains the commitment to place bird strike diverters on all new powerlines, which
14 would eliminate or nearly eliminate the risk of mortality from bird strike for white-tailed kite as a
15 result of the project. Therefore, the construction and operation of new transmission lines under
16 Alternative 1C would result in a less-than-significant impact on white-tailed kite.

17 **Impact BIO-102: Indirect Effects of Plan Implementation on White-Tailed Kite**

18 White-tailed kite nesting habitat within the vicinity of proposed construction areas could be
19 indirectly affected by construction activities. Construction noise above background noise levels
20 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
21 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
22 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
23 which these noise levels could affect white-tailed kite. Indirect effects associated with construction
24 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
25 disturbing operations outside the project footprint but within 1,300 feet from the construction edge.
26 If white-tailed kite were to nest in or adjacent to work areas, construction and subsequent
27 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting
28 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM39 White-*
29 *Tailed Kite* would require preconstruction surveys, and if detected, 200 yard no disturbance buffers
30 would be established around active nests. The use of mechanical equipment during water
31 conveyance facilities construction could cause the accidental release of petroleum or other
32 contaminants that could affect white-tailed kite in the surrounding habitat. The inadvertent
33 discharge of sediment or excessive dust adjacent to white-tailed kite habitat could also affect the
34 species. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
35 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff
36 from the construction area and negative effects of dust on active nests.

37 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
38 mercury in avian species, including white-tailed kite. Marsh (tidal and nontidal) and floodplain
39 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed
40 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to
41 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP
42 restoration activities that create newly inundated areas could increase bioavailability of mercury
43 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Increased methylmercury
44 associated with natural community and floodplain restoration may indirectly affect white-tailed kite

1 (see BDCP Appendix 5.D, *Contaminants*). However, the potential mobilization or creation of
 2 methylmercury within the study area varies with site-specific conditions and would need to be
 3 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-
 4 specific Mercury Management Plans. Site-specific restoration plans that address the creation and
 5 mobilization of mercury, as well as monitoring and adaptive management as described in CM12
 6 would be available to address the uncertainty of methylmercury levels in restored tidal marsh and
 7 potential impacts on white-tailed kite.

8 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 9 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 10 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 11 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 12 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 13 classes within a species. In addition, the effect of selenium on a species can be confounded by
 14 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 15 2009).

16 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 17 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 18 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 19 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 20 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 21 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 22 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 23 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 24 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 25 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
 26 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 27 levels of selenium have a higher risk of selenium toxicity.

28 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 29 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 30 exacerbate bioaccumulation of selenium in avian species, including white-tailed kite. Marsh (tidal
 31 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
 32 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP
 33 restoration activities that create newly inundated areas could increase bioavailability of selenium
 34 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
 35 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
 36 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
 37 increases in selenium concentrations in water in the Delta under any alternative. However, it is
 38 difficult to determine whether the effects of potential increases in selenium bioavailability
 39 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
 40 effects on white-tailed kite.

41 Because of the uncertainty that exists at this programmatic level of review, there could be a
 42 substantial effect on white-tailed kite from increases in selenium associated with restoration
 43 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
 44 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
 45 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,

1 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
 2 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
 3 separately for each restoration effort as part of design and implementation. This avoidance and
 4 minimization measure would be implemented as part of the tidal habitat restoration design
 5 schedule.

6 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
 7 could reduce white-tailed kite use of modeled habitat adjacent to work areas. Moreover, operation
 8 and maintenance of the water conveyance facilities, including the transmission facilities, could result
 9 in ongoing but periodic postconstruction disturbances that could affect white-tailed kite use of the
 10 surrounding habitat. Noise, potential spills of hazardous materials, increased dust and
 11 sedimentation, and operations and maintenance of the water conveyance facilities under Alternative
 12 1C would not have an adverse effect on white-tailed kite with the implementation of AMM1–AMM7
 13 and *AMM39 White-Tailed Kite*. Tidal habitat restoration could result in increased exposure of white-
 14 tailed kite to selenium. This effect would be addressed through the implementation of *AMM27*
 15 *Selenium Management* which would provide specific tidal habitat restoration design elements to
 16 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
 17 indirect effects associated with noise and visual disturbances, potential spills of hazardous material,
 18 and increased exposure to selenium from Alternative 1C implementation would not have an adverse
 19 effect on white-tailed kite. Tidal habitat restoration is unlikely to have an adverse effect on white-
 20 tailed kite through increased exposure to methylmercury, as kites currently forage in tidal marshes
 21 where elevated methylmercury levels exist. However, it is unknown what concentrations of
 22 methylmercury are harmful to the species and the potential for increased exposure varies
 23 substantially within the study area. Site-specific restoration plans in addition to monitoring and
 24 adaptive management, described in *CM12 Methylmercury Management*, would address the
 25 uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning phase of
 26 marsh restoration would be the appropriate place to assess the potential for risk of methylmercury
 27 exposure for white-tailed kite, once site specific sampling and other information could be developed.

28 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
 29 operations and maintenance of the water conveyance facilities under Alternative 1C would have a
 30 less-than-significant impact on white-tailed kite with the implementation of *AMM39 White-Tailed*
 31 *Kite*, and AMM1–AMM7. Tidal habitat restoration could result in increased exposure of white-tailed
 32 kite to selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
 33 *Management* which would provide specific tidal habitat restoration design elements to reduce the
 34 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
 35 implementation of tidal natural communities restoration or floodplain restoration could result in
 36 increased exposure of white-tailed kite to methylmercury. However, it is unknown what
 37 concentrations of methylmercury are harmful to this species. *CM12 Methylmercury Management*
 38 includes provisions for project-specific Mercury Management Plans. Site-specific restoration plans
 39 that address the creation and mobilization of mercury, as well as monitoring and adaptive
 40 management as described in *CM12*, would better inform potential impacts and address the
 41 uncertainty of methylmercury levels in restored tidal marsh in the study area on white-tailed kite.
 42 With these measures in place, the indirect effects associated with noise and visual disturbances,
 43 potential spills of hazardous material, and increased exposure to selenium from Alternative 1C
 44 implementation would have a less-than-significant impact on white-tailed kite.

1 **Impact BIO-103: Periodic Effects of Inundation of White-Tailed Kite Habitat as a Result of**
2 **Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations related to *CM2 Yolo Bypass Fisheries*
4 *Enhancement* would increase the frequency and duration of inundation on approximately 48–82
5 acres of modeled white-tailed kite nesting habitat and 3,030–6,651 acres of modeled white-tailed
6 kite foraging habitat (Table 12-1C-41). During inundation years, affected cultivated lands and
7 grassland would not be available as foraging habitat until prey populations have re-inhabited
8 inundated areas. This would result in temporary periodic reduction in availability of foraging
9 habitat. If late-season Fremont Weir operations were to preclude the planting of some crop types,
10 there could be a further loss of foraging habitat value if the crop type that would have been planted
11 would provide greater foraging habitat value than the fallowed fields. No known white-tailed kite
12 nest sites would be affected, and increased periodic flooding is not expected to cause any adverse
13 effect on nest sites that may be within the inundation area because existing trees already withstand
14 floods in the area, the increase in inundation frequency and duration is expected to remain within
15 the range of tolerance of riparian trees, and any nest sites would be located above floodwaters.

16 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
17 inundation of up to approximately 230 acres of modeled white-tailed kite nesting habitat and 7,402
18 acres of modeled white-tailed kite foraging habitat (Table 12-1C-41). Inundation of foraging habitat
19 could result in a periodic reduction of available foraging habitat due to the reduction in available
20 prey. Following draw-down, inundated habitats are expected to recover and provide suitable
21 foraging conditions until the following inundation period. Thus, this is considered a periodic impact
22 that is unlikely to affect white-tailed kite distribution and abundance, or foraging use of the Plan
23 Area.

24 Periodic inundation of floodplains (through CM2 and CM5) would be expected to restore a more
25 natural flood regime in support of riparian vegetation types that support white-tailed kite nesting
26 habitat. No adverse effects of inundation on white-tailed kite riparian habitat are expected because
27 valley/foothill riparian vegetation is expected to benefit from seasonal inundation.

28 **NEPA Effects:** Although foraging habitat would be periodically unavailable to white-tailed kite
29 because of CM2 and CM5 implementation, inundated habitats are expected to recover following
30 draw-down. Any effects are considered short-term and would not result in an adverse effect.

31 **CEQA Conclusion:** Although foraging habitat would be periodically unavailable to white-tailed kite
32 because of CM2 and CM5 implementation, inundated habitats are expected to recover following
33 draw-down. Any effects are considered short-term and would be expected to have a less-than-
34 significant impact on white-tailed kite.

35 **Yellow-Breasted Chat**

36 This section describes the effects of Alternative 1C, including water conveyance facilities
37 construction and implementation of other conservation components, on yellow-breasted chat.
38 Yellow-breasted chat modeled habitat includes suitable nesting and migratory habitat as those plant
39 alliances from the valley/foothill riparian modeled habitat that contain a shrub component and an
40 overstory component. Primary nesting and migratory habitat is qualitatively distinguished from
41 secondary habitat in Delta areas as those plant associations that support a greater percentage of a
42 suitable shrub cover, particularly blackberry, and California wild rose, and have an open to
43 moderately dense overstory canopy, using data from Hickson and Keeler-Wolf (2007). No

1 distinction is made between primary and secondary habitat for Suisun Marsh/Yolo Basin habitats
2 because supporting information is lacking. For this reason, the effects analysis only provides the
3 breakdown between primary and secondary habitat in the habitat loss totals and associated tables,
4 and does not provide this breakdown in the text by activity or effect type.

5 Construction and restoration associated with Alternative 1C conservation measures would result in
6 both temporary and permanent losses of yellow-breasted chat modeled habitat as indicated in Table
7 12-1C-42. Full implementation of Alternative 1C would also include the following conservation
8 actions over the term of the BDCP to benefit the yellow-breasted chat (BDCP Chapter 3, Section 3.3,
9 *Biological Goals and Objectives*).

- 10 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
11 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
12 associated with CM7).
- 13 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
14 10 (Objective VFRNC1.2, associated with CM3).
- 15 ● Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal
16 overlap among vegetation components and over adjacent riverine channels, freshwater
17 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM7).
- 18 ● Maintain at least 1,000 acres of early- to mid-successional vegetation with a well-developed
19 understory of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2,
20 associated with CM7).

21 As explained below, with the restoration or protection of these amounts of habitat, in addition to
22 management activities that would enhance these natural communities for the species and the
23 implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least*
24 *Bell's Vireo, Western Yellow-Billed Cuckoo*, impacts on yellow-breasted chat would not be adverse for
25 NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-1C-42. Changes in Yellow-Breasted Chat Modeled Habitat Associated with Alternative 1C (acres)^a

Conservation Measure ^b	Nesting and Migratory Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	8	8	32	32	NA	NA
	Secondary	6	6	12	12	NA	NA
	Suisun Marsh/ Upper Yolo Bypass	0	0	0	0	NA	NA
Total Impacts CM1		14	14	44	44	NA	NA
CM2-CM18	Primary	96	214	58	73	19-38	92
	Secondary	209	357	0	6	6-18	56
	Suisun Marsh/ Upper Yolo Bypass	76	85	29	29	23-32	0
Total Impacts CM2-CM18		381	656	87	108	48-88	148
Total Primary		104	222	90	105	19-38	92
Total Secondary		215	363	12	18	6-18	56
Total Suisun Marsh/Upper Yolo Bypass		76	85	29	29	23-32	0
TOTAL IMPACTS		395	670	131	152	48-88	148

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-104: Loss or Conversion of Habitat for and Direct Mortality of Yellow-Breasted**
5 **Chat**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss
7 of up to 822 acres of modeled nesting and migratory habitat for yellow-breasted chat (670 acres of
8 permanent loss, 152 acres of temporary loss, Table 12-1C-42). Conservation measures that would
9 result in these losses are conveyance facilities and transmission line construction, and establishment
10 and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural*
11 *Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. Habitat
12 enhancement and management activities (CM11) which include ground disturbance or removal of
13 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities
14 associated with the long-term operation of the water conveyance facilities and other BDCP physical
15 facilities could degrade or eliminate yellow-breasted chat habitat. Each of these individual activities

1 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA
2 conclusion follow the individual conservation measure discussions.

3 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would
4 result in the combined permanent and temporary loss of up to 40 acres of primary habitat (8
5 acres of permanent loss, 32 acres of temporary loss). In addition, 18 acres of secondary habitat
6 would be removed (6 acres of permanent loss, 12 acres of temporary loss, Table 12-1C-42).
7 There are no occurrences of yellow-breasted chat that overlap with the CM1 construction
8 footprint. However, this loss would have the potential to displace individuals, if present, and
9 remove the functions and value of modeled habitat for resting, protection, or foraging. Most of
10 the permanent loss of nesting habitat would occur where Intakes 1–5 impact the Sacramento
11 River’s west bank between just north of Clarksburg and Courtland. The riparian areas here are
12 very small patches, dominated by valley oak, scrub vegetation, and nonnative trees. Temporary
13 impacts would occur from the footprint of proposed temporary transmission lines, siphon work
14 areas, a barge unloading facility east of Rio Vista, and a safe haven work area south of Piper
15 Slough. The implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell’s*
16 *Vireo, Western Yellow-Billed Cuckoo* would minimize effects on yellow-breasted chat if they were
17 to nest within or adjacent to the construction footprint. Refer to the Terrestrial Biology Map
18 Book for a detailed view of Alternative 1C construction locations.

19 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
20 would permanently remove approximately 83 acres and temporarily remove 88 acres of yellow-
21 breasted chat habitat in the Yolo Bypass in CZ 2. The loss is expected to occur during the first 10
22 years of Alternative 1C implementation.

23 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
24 inundation would permanently remove an estimated 545 acres of modeled yellow-breasted chat
25 habitat in CZ 1, 2, 6, and 11. This total is composed of an estimated 182 acres of primary nesting
26 and migratory habitat, 349 acres of secondary nesting and migratory habitat, and 14 acres of
27 nesting and migratory habitat in the Suisun Marsh and upper Yolo Bypass areas.

28 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
29 seasonally inundated floodplain would permanently and temporarily remove approximately 49
30 acres of modeled yellow-breasted chat habitat in CZ 7. This total is comprised of 28 acres of
31 primary nesting and migratory habitat and 21 acres of secondary nesting and migratory habitat.
32 Based on the riparian habitat restoration assumptions, approximately 3,000 acres of
33 valley/foothill riparian habitat would be restored as a component of seasonally inundated
34 floodplain restoration actions. The actual number of acres that would be restored may differ
35 from these estimates, depending on how closely the outcome of seasonally inundated floodplain
36 restoration approximates the assumed outcome. Once this restored riparian vegetation has
37 developed habitat functions, a portion of it would be suitable to support yellow-breasted chat
38 habitat.

39 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
40 activities that could be implemented in protected yellow-breasted chat habitats would be
41 expected to maintain and improve the functions of the habitat over the term of the BDCP.
42 Yellow-breasted chat would be expected to benefit from the increase in protected habitat, which
43 would maintain conditions favorable for the chat’s use of the study area.

44 Habitat management- and enhancement-related activities could disturb yellow-breasted chat
45 nests if they are present near work sites. Equipment operation could destroy nests, and noise

1 and visual disturbances could lead to their abandonment, resulting in mortality of eggs and
2 nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*
3 *Billed Cuckoo* would ensure that these activities do not result in direct mortality of yellow-
4 breasted chat or other adverse effects.

5 Occupied habitat would be monitored to determine if there is a need to implement controls on
6 brood parasites (brown-headed cowbird) or nest predators. If implemented, these actions
7 would be expected to benefit the yellow-breasted chat by removing a potential stressor that
8 could, if not addressed, adversely affect the stability of newly established populations.

9 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*
10 *and Management* that are designed to enhance wildlife values in restored riparian habitats may
11 result in localized ground disturbances that could temporarily remove small amounts of yellow-
12 breasted chat habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
13 road and other infrastructure maintenance activities, are expected to have minor adverse effects
14 on available yellow-breasted chat habitat and are expected to result in overall improvements to
15 and maintenance of yellow-breasted chat habitat values over the term of the BDCP.

- 16 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
17 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
18 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding
19 habitat. Maintenance activities would include vegetation management, levee and structure
20 repair, and re-grading of roads and permanent work areas. These effects, however, would be
21 reduced by AMMs and conservation actions as described below.
- 22 ● Injury and Direct Mortality: Construction is not expected to result in direct mortality of yellow-
23 breasted chat because adults and fledged young are expected to occur only in very small
24 numbers and, if present, would avoid contact with construction and other equipment. If yellow-
25 breasted chat were to nest in the vicinity of construction activities, equipment operation could
26 destroy nests and noise and visual disturbances could lead to nest abandonment. *AMM22 Suisun*
27 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would avoid
28 and minimize this effect.
- 29 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,
30 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.
31 Temporarily affected areas would be restored as riparian habitat within 1 year following
32 completion of construction activities. Although the effects are considered temporary, the
33 restored riparian habitat would require 5 years to several decades, for ecological succession to
34 occur and for restored riparian habitat to functionally replace habitat that has been affected. The
35 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;
36 therefore, the replaced riparian vegetation would be expected to have structural components
37 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial
38 restoration activities are complete.

39 The following paragraphs summarize the combined effects discussed above and describe other
40 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
41 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-
3 term BDCP conservation strategy has been evaluated to determine whether it would provide
4 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
5 effects of construction would not be adverse under NEPA. Alternative 1C would remove 526 acres of
6 modeled habitat for yellow-breasted chat in the study area in the near-term. These effects would
7 result from the construction of the water conveyance facilities (CM1, 58 acres of modeled nesting
8 and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
9 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
10 *Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses would
11 primarily consist of small, fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value
12 habitat for the species.

13 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
14 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter
15 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
16 habitat. Using these ratios would indicate that 58 acres of valley/foothill riparian habitat should be
17 restored/created and 58 acres should be protected to compensate for the CM1 losses of yellow-
18 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres
19 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of
20 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
21 protection).

22 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
23 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*
24 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the
25 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
26 habitat loss on yellow-breasted chat. The majority of the riparian restoration acres would occur in
27 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill
28 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*
29 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,
30 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal
31 overlap among vegetation components and over adjacent riverine channels, freshwater emergent
32 wetlands, and grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural
33 habitat requirements, so only the early- to mid-successional portions of the restored and protected
34 riparian natural would be expected to provide suitable habitat characteristics for the species. These
35 natural community biological goals and objectives would inform the near-term protection and
36 restoration efforts and represent performance standards for considering the effectiveness of
37 conservation actions for the species.

38 The acres of protection contained in the near-term Plan goals and the additional detail in the
39 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be
40 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other
41 conservation measures. The restored riparian habitat could require 5 years to several decades, for
42 ecological succession to occur and for restored riparian habitat to functionally replace habitat that
43 has been affected. However, because the modeled habitat impacted largely consists of small patches
44 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have an adverse
45 population-level effect on the species in the near-term time period.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
5 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of
6 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
7 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
8 which have since been updated and which are provided in Appendix 3B, *Environmental*
9 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

10 **Late Long-Term Timeframe**

11 The habitat model indicates that the study area supports approximately 14,547 acres of modeled
12 nesting and migratory habitat for yellow-breasted chat. Alternative 1C as a whole would result in
13 the permanent loss of and temporary effects on 822 acres of modeled habitat (6% of the modeled
14 habitat in the study area). These losses would occur from the construction of the water conveyance
15 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
16 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The locations of these losses
17 would be in fragmented riparian habitat throughout the study area.

18 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
19 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
20 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
21 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
22 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
23 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted
24 chat has specific structural habitat requirements, so only the early- to mid-successional portions of
25 the restored and protected riparian natural would be expected to provide suitable habitat
26 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to
27 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to
28 natural erosion and deposition, which would provide conditions conducive to the establishment of
29 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if
30 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted
31 population in the Plan Area, a cowbird control program would be implemented through *CM11*
32 *Natural Communities Enhancement and Management.* Goals and objectives in the Plan for riparian
33 restoration also include the maintenance and enhancement of structural heterogeneity (Objective
34 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

35 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
36 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
37 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted
38 chat.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
40 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
41 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
42 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
43 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of
44 these AMMs include elements that would avoid or minimize the risk of affecting individuals and

1 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
2 which have since been updated and which are provided in Appendix 3B, *Environmental*
3 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

4 **NEPA Effects:** The loss of yellow-breasted chat habitat and potential direct mortality of this special-
5 status species would represent an adverse effect in the absence of other conservation actions.
6 However, the habitat that would be lost consists of small, fragmented riparian stands that do not
7 provide high-value habitat for the species. The restored riparian habitat would require 5 years to
8 several decades for ecological succession to occur and for restored riparian habitat to functionally
9 replace habitat that has been affected. Because the nesting and migratory habitat that would be lost
10 is small relative to the species range throughout California and North America, Alternative 1C would
11 not be expected to have an adverse population-level effect on the species. With habitat protection
12 and restoration associated with CM3, CM7, and CM11, guided by biological goals and objectives and
13 by *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and*
14 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan,*
15 *AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils,*
16 *AMM7 Barge Operations Plan, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
17 *Vireo, Western Yellow-Billed Cuckoo*, which would be in place throughout the construction period,
18 the effects of habitat loss and potential mortality on yellow-breasted chat under Alternative 1C
19 would not be adverse.

20 **CEQA Conclusion:**

21 **Near-Term Timeframe**

22 Because the water conveyance facilities construction is being evaluated at the project level, the near-
23 term BDCP conservation strategy has been evaluated to determine whether it would provide
24 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
25 impact of construction would be less than significant under CEQA. Alternative 1C would remove 526
26 acres of modeled habitat for yellow-breasted chat in the study area in the near-term. These effects
27 would result from the construction of the water conveyance facilities (CM1, 58 acres of modeled
28 nesting and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass*
29 *Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated*
30 *Floodplain Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses
31 would primarily consist of small, fragmented riparian stands in CZ 2–CZ 8 that do not provide high-
32 value habitat for the species.

33 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
34 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter
35 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
36 habitat. Using these ratios would indicate that 58 acres of valley/foothill riparian habitat should be
37 restored/created and 58 acres should be protected to compensate for the CM1 losses of yellow-
38 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres
39 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of
40 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
41 protection).

42 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
43 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*
44 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the

1 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
 2 habitat loss on yellow-breasted chat. The majority of the riparian restoration acres would occur in
 3 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill
 4 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*
 5 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,
 6 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal
 7 overlap among vegetation components and over adjacent riverine channels, freshwater emergent
 8 wetlands, and grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural
 9 habitat requirements, so only the early- to mid-successional portions of the restored and protected
 10 riparian natural would be expected to provide suitable habitat characteristics for the species. These
 11 natural community biological goals and objectives would inform the near-term protection and
 12 restoration efforts and represent performance standards for considering the effectiveness of
 13 conservation actions for the species.

14 The acres of protection contained in the near-term Plan goals and the additional detail in the
 15 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be
 16 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other
 17 conservation measures. The restored riparian habitat could require 5 years to several decades, for
 18 ecological succession to occur and for restored riparian habitat to functionally replace habitat that
 19 has been affected. However, because the modeled habitat impacted largely consists of small patches
 20 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have a significant
 21 population-level impact on the species in the near-term time period.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
 26 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
 27 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 28 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
 29 which have since been updated and which are provided in Appendix 3B, *Environmental*
 30 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

31 ***Late Long-Term Timeframe***

32 The habitat model indicates that the study area supports approximately 14,547 acres of modeled
 33 nesting and migratory habitat for yellow-breasted chat. Alternative 1C as a whole would result in
 34 the permanent loss of and temporary effects on 822 acres of modeled habitat (6% of the modeled
 35 habitat in the study area). These losses would occur from the construction of the water conveyance
 36 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
 37 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
 38 would be in fragmented riparian habitat throughout the study area.

39 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
 40 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
 41 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
 42 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
 43 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
 44 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted

1 chat has specific structural habitat requirements, so only the early- to mid-successional portions of
2 the restored and protected riparian natural would be expected to provide suitable habitat
3 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to
4 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to
5 natural erosion and deposition, which would provide conditions conducive to the establishment of
6 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if
7 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted
8 population in the Plan Area, a cowbird control program would be implemented through *CM11*
9 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian
10 restoration also include the maintenance and enhancement of structural heterogeneity (Objective
11 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

12 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
13 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
14 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted
15 chat.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
20 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
21 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
22 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
23 which have since been updated and which are provided in Appendix 3B, *Environmental*
24 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

25 In the absence of other conservation actions, the effects on yellow breasted chat habitat from
26 Alternative 1C would represent an adverse effect as a result of habitat modification and potential for
27 direct mortality of special-status species. Considering Alternative 1C's protection and restoration
28 provisions, which would provide acreages of new or enhanced habitat in amounts suitable to
29 compensate for habitats lost to construction and restoration activities, and with implementation of
30 *AMM1-AMM7* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
31 *Yellow-Billed Cuckoo*, the loss of habitat or direct mortality through implementation of Alternative
32 1C would not result in a substantial adverse effect through habitat modifications and would not
33 substantially reduce the number or restrict the range of the species. Therefore, the loss of habitat or
34 potential mortality under this alternative would have a less-than-significant impact on yellow-
35 breasted chat.

36 **Impact BIO-105: Fragmentation of Yellow-Breasted Chat Habitat as a Result of Constructing** 37 **the Water Conveyance Facilities**

38 Grading, filling, contouring, and other initial ground-disturbing activities for water conveyance
39 facilities construction may temporarily fragment modeled yellow-breasted chat habitat. This could
40 temporarily reduce the extent of and functions supported by the affected habitat. Because of the
41 current infrequent occurrence and small numbers of yellow-breasted chat in the Plan Area, and
42 because *CM5* would restore and protect contiguous high-value riparian habitat in CZ 7, any such
43 habitat fragmentation is expected to have no or minimal effect on the species.

1 **NEPA Effects:** Temporary fragmentation of habitat would not result in an adverse effect on yellow-
2 breasted chat. The habitat functions for the species would be significantly improved through the
3 implementation of CM5, which would restore and protect large contiguous patches of riparian
4 habitat.

5 **CEQA Conclusion:** Temporary fragmentation of habitat would have a less-than-significant impact on
6 yellow-breasted chat. The habitat functions for the species would be significantly improved through
7 the implementation of CM5, which would restore and protect large contiguous patches of riparian
8 habitat.

9 **Impact BIO-106: Effects on Yellow-Breasted Chat Associated with Electrical Transmission** 10 **Facilities**

11 Yellow-breasted chats are migratory and usually arrive at California breeding grounds in April from
12 their wintering grounds in Mexico and Guatemala. Departure for wintering grounds occurs from
13 August to September. These are periods of relative high visibility when the risk of powerline
14 collisions would be low. The species' small, relatively maneuverable body; its foraging behavior; and
15 its presence in the Plan Area during the summer contribute to a low risk of collision with the
16 proposed transmission lines (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird*
17 *Collisions at Proposed BDCP Transmission Lines*). Marking transmission lines with flight diverters
18 that make the lines more visible to birds has been shown to reduce the incidence of bird mortality
19 (Brown and Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could
20 reduce avian mortality by 60%. All new project transmission lines would be fitted with flight
21 diverters. Bird flight diverters would further reduce any potential for powerline collisions.

22 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
23 adverse effect on yellow-breasted chat because the risk of bird strike is considered to be minimal
24 based on the species' small, relatively maneuverable body; its foraging behavior; and its presence in
25 the Plan Area during the summer when visibility is high. Under *AMM20 Greater Sandhill Crane*, all
26 new project transmission lines would be fitted with bird diverters, which would further reduce any
27 potential for powerline collisions.

28 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
29 significant impact on yellow-breasted chat because the risk of bird-strike is considered to be
30 minimal based on the species' small, relatively maneuverable body, its foraging behavior, and its
31 presence in the Plan Area during the summer when visibility is high. Under *AMM20 Greater Sandhill*
32 *Crane*, all new project transmission lines would be fitted with bird diverters, which would further
33 reduce any potential for powerline collisions.

34 **Impact BIO-107: Indirect Effects of Plan Implementation on Yellow-Breasted Chat**

35 Noise and visual disturbances associated with construction-related activities could result in
36 temporary disturbances that affect yellow-breasted chat use of modeled habitat adjacent to
37 proposed construction areas. Construction noise above background noise levels (greater than 50
38 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,
39 *Attachment 5J.D, Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
40 *Crane*, Table 4), although there are no available data to determine the extent to which these noise
41 levels could affect yellow-breasted chat. Indirect effects associated with construction include noise,
42 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
43 operations outside the project footprint but within 1,300 feet of the construction edge. If yellow-

1 breasted chat were to nest in or adjacent to work areas, construction and subsequent maintenance-
 2 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and
 3 reduce the functions of suitable nesting habitat for these species. These potential effects would be
 4 minimized with incorporation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
 5 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP, which would ensure 250-foot no-disturbance
 6 buffers were established around active nests. The use of mechanical equipment during water
 7 conveyance facilities construction could cause the accidental release of petroleum or other
 8 contaminants that could affect yellow-breasted chat in the surrounding habitat. The inadvertent
 9 discharge of sediment or excessive dust adjacent to yellow-breasted chat habitat could also affect
 10 the species. *AMM1-AMM7*, including *AMM2 Construction BMPs and Monitoring*, in addition to
 11 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*,
 12 would minimize the likelihood of such spills and ensure that measures were in place to prevent
 13 runoff from the construction area and any adverse effects of dust on active nests. If present, yellow-
 14 breasted chat individuals could be temporarily affected by noise and visual disturbances adjacent to
 15 water conveyance construction sites, *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
 16 *Vireo, Western Yellow-Billed Cuckoo* would minimize this effect on the species.

17 **Methylmercury Exposure:** Yellow-breasted chat modeled habitat includes primarily middle marsh
 18 habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is also used if it is
 19 of high value, and low marsh provides foraging habitat for the species. Chats are a top predator in
 20 the benthic food chain; they forage by probing their beaks into the mud (Zembal and Fancher 1988)
 21 and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects (Eddleman and
 22 Conway 1998).

23 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
 24 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
 25 species would overestimate the effects on yellow-breasted chat. Organisms feeding within pelagic-
 26 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
 27 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
 28 segregation (Grimaldo et al. 2009).

29 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
 30 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
 31 Thus, Alternative 1C restoration activities that create newly inundated areas could increase
 32 bioavailability of mercury. Concentrations of methylmercury known to be toxic to bird embryos
 33 have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003);
 34 however, currently, it is unknown how much of the sediment-derived methylmercury enters the
 35 food chain in Suisun Marsh or what tissue concentrations are actually harmful to the yellow-
 36 breasted chat. In general, the highest methylation rates are associated with high tidal marshes that
 37 experience intermittent wetting and drying and associated anoxic conditions (Alpers et al. 2008). In
 38 Suisun Marsh, the conversion of managed wetlands to tidal wetlands is expected to result in an
 39 overall reduction in mercury methylation. Because of the complex and very site-specific factors that
 40 determine if mercury becomes mobilized into the foodweb, *CM12 Methylmercury Management* is
 41 included to provide for site-specific evaluation for each restoration project. If a project is identified
 42 where there is a high potential for methylmercury production that could not be fully addressed
 43 through restoration design and adaptive management, alternate restoration areas would be
 44 considered. *CM12* would be implemented in coordination with other similar efforts to address
 45 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
 46 conservation measure would include the following actions.

- 1 • Assess pre-restoration conditions to determine the risk that the project could result in increased
2 mercury methylation and bioavailability
- 3 • Define design elements that minimize conditions conducive to generation of methylmercury in
4 restored areas.
- 5 • Define adaptive management strategies that can be implemented to monitor and minimize
6 actual postrestoration creation and mobilization of methylmercury.

7 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
8 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
9 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
10 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
11 2009). The effect of selenium toxicity differs widely between species and also between age and sex
12 classes within a species. In addition, the effect of selenium on a species can be confounded by
13 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
14 2009).

15 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
16 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
17 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
18 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
19 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
20 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
21 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
22 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
23 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
24 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
25 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
26 have a higher risk of selenium toxicity.

27 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
28 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
29 exacerbate bioaccumulation of selenium in avian species, including yellow-breasted chat. Marsh
30 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
31 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
32 Alternative 1C restoration activities that create newly inundated areas could increase bioavailability
33 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
34 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
35 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
36 increases in selenium concentrations in water in the Delta under any alternative. However, it is
37 difficult to determine whether the effects of potential increases in selenium bioavailability
38 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
39 effects on yellow-breasted chat.

40 Because of the uncertainty that exists at this programmatic level of review, there could be a
41 substantial effect on yellow-breasted chat from increases in selenium associated with restoration
42 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
43 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
44 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,

1 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
2 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
3 separately for each restoration effort as part of design and implementation. This avoidance and
4 minimization measure would be implemented as part of the tidal habitat restoration design
5 schedule.

6 **NEPA Effects:** The potential for noise and visual disturbance, hazardous spills, increased dust and
7 sedimentation, and the potential impacts of operations and maintenance of the water conveyance
8 facilities would not result in an adverse effect on yellow-breasted chat with the incorporation of
9 AMM1–AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
10 *Yellow-Billed Cuckoo* into the BDCP.

11 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
12 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
13 the yellow-breasted chat foodweb to methylmercury in these areas, with the level of exposure
14 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
15 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
16 to reduce the overall production of methylmercury, resulting in a net benefit to the species.
17 Implementation of CM12, which contains measures to assess the amount of mercury before project
18 development, followed by appropriate design and adaptation management, would minimize the
19 potential for increased methylmercury exposure, and would result in no adverse effect on the
20 species.

21 Tidal habitat restoration could result in increased exposure of yellow-breasted chat to selenium.
22 This effect would be addressed through the implementation of AMM27 *Selenium Management*, which
23 would provide specific tidal habitat restoration design elements to reduce the potential for
24 bioaccumulation of selenium and its bioavailability in tidal habitats.

25 **CEQA Conclusion:** The potential for noise and visual disturbance, hazardous spills, increased dust
26 and sedimentation, and the potential impacts of operations and maintenance of the water
27 conveyance facilities would have a less-than-significant impact on yellow-breasted chat with the
28 incorporation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
29 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP.

30 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
31 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
32 the yellow-breasted chat foodweb to methylmercury in these areas, with the level of exposure
33 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
34 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
35 to reduce the overall production of methylmercury, resulting in a net benefit to the species.
36 Implementation of CM12, which contains measures to assess the amount of mercury before project
37 development, followed by appropriate design and adaptation management, would minimize the
38 potential for increased methylmercury exposure, and would result in no adverse effect on the
39 species.

40 Tidal habitat restoration could result in increased exposure of yellow-breasted chat to selenium.
41 With the implementation of AMM27 *Selenium Management*, which would provide specific tidal
42 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its
43 bioavailability in tidal habitats, the impact of potential increased exposure to selenium would be less
44 than significant.

1 **Impact BIO-108: Periodic Effects of Inundation of Yellow-Breasted Chat Habitat as a Result of**
2 **Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
4 duration of inundation of approximately 48–88 acres of modeled yellow-breasted chat nesting and
5 migratory habitat. No adverse effects of increased inundation frequency on yellow-breasted chat or
6 its habitat are expected because the chat breeding period is outside the period the weir would be
7 operated. Moreover, riparian vegetation supporting habitat has persisted under the existing Yolo
8 Bypass flooding regime, and changes to frequency and inundation would be within the tolerance of
9 these vegetation types.

10 Based on hypothetical floodplain restoration, CM5 could result in periodic inundation of up to 148
11 acres of modeled yellow-breasted chat habitat. Inundation of restored floodplains is not expected to
12 affect yellow-breasted chat or its habitat because the chat breeding period is outside the period the
13 floodplains would likely be inundated. In addition, providing for periodic inundation of floodplains
14 is expected to restore a more natural flood regime in support of riparian vegetation types that
15 provide nesting and migratory habitat for yellow-breasted chat. The overall effect of seasonal
16 inundation in existing riparian natural communities is likely to be beneficial because, historically,
17 flooding was the main natural disturbance regulating ecological processes in riparian areas, and
18 flooding promotes the germination and establishment of many native riparian plants.

19 **NEPA Effects:** Increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain
20 restoration would be expected to create more natural flood regimes that would support riparian
21 habitat, which would not result in an adverse effect on yellow breasted chat.

22 **CEQA Conclusion:** Periodic inundation would have a less-than-significant impact on yellow-breasted
23 chat because inundation would occur outside of the breeding season and would not be expected to
24 adversely modify habitat or result in direct mortality of the species. Flooding promotes the
25 germination and establishment of many native riparian plants. Therefore, the overall impact of
26 seasonal inundation would be beneficial for yellow-breasted chat.

27 **Cooper's Hawk and Osprey**

28 This section describes the effects of Alternative 1C, including water conveyance facilities
29 construction and implementation of other conservation components, on Cooper's hawk and osprey.
30 Although osprey often nest on manmade structures such as telephone poles, and Cooper's hawk will
31 nest in more developed landscapes, modeled breeding habitat for these species is restricted to
32 valley/foothill riparian forest.

33 Construction and restoration associated with Alternative 1C conservation measures would result in
34 both temporary and permanent losses of Cooper's hawk and osprey modeled habitat as indicated in
35 Table 12-1C-43. The majority of the losses would take place over an extended period of time as tidal
36 marsh is restored in the study area. Although restoration for the loss of nesting habitat would be
37 initiated in the same timeframe as the losses, it could take one or more decades for restored habitats
38 to replace the functions of habitat lost. This time lag between impacts and restoration of habitat
39 function would be minimized by specific requirements of *AMM39 White-Tailed Kite*, including the
40 planting of mature trees in the near-term time period. Full implementation of Alternative 1C would
41 include the following conservation actions over the term of the BDCP which would also benefit
42 Cooper's hawk and osprey (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 1 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
2 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
3 associated with CM7)
- 4 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
5 10 (Objective VFRNC1.2, associated with CM3).
- 6 • Plant and maintain native trees along roadsides and field borders within protected cultivated
7 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 8 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
9 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
10 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
11 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

12 As explained below, with the acres of restoration or protection included in the Plan, in addition to
13 management activities to enhance natural communities for species and the implementation of
14 AMM1-AMM7, AMM18 Swainson's Hawk, and Mitigation Measure BIO-75, impacts on Cooper's hawk
15 and osprey would not be adverse for NEPA purposes and would be less than significant for CEQA
16 purposes.

17 **Table 12-1C-43. Changes in Cooper's Hawk and Osprey Modeled Habitat Associated with**
18 **Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	33	33	71	71	NA	NA
Total Impacts CM1		33	33	71	71	NA	NA
CM2-CM18	Nesting	312	507	88	121	48-82	230
Total Impacts CM2-CM18		312	507	88	121	48-82	230
TOTAL IMPACTS		345	540	159	192	48-82	230

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

19

20 **Impact BIO-109: Loss or Conversion of Habitat for and Direct Mortality of Cooper's Hawk and**
21 **Osprey**

22 Alternative 1C conservation measures would result in the combined permanent and temporary loss
23 of up to 911 acres of modeled habitat for Cooper's hawk and osprey (Table 12-1C-43). Conservation
24 measures that would result in these losses are *CM1 Water Facilities and Operation* (which would

1 involve conveyance facilities and transmission line construction, and establishment and use of
 2 borrow and spoil areas), *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
 3 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. Habitat enhancement and
 4 management activities (CM11) which include ground disturbance or removal of nonnative
 5 vegetation, could result in local adverse habitat effects. In addition, maintenance activities
 6 associated with the long-term operation of the water conveyance facilities and other BDCP physical
 7 facilities could affect Cooper's hawk and osprey modeled habitat. Each of these individual activities
 8 is described below. A summary statement of the combined impacts and NEPA and CEQA conclusions
 9 follows the individual conservation measure discussions.

- 10 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C water conveyance facilities
 11 would result in the combined permanent and temporary loss of up to 104 acres of white-tailed
 12 kite nesting habitat (33 acres of permanent loss and 71 acres of temporary loss, Table 12-1C-
 13 43). Most of the permanent loss of nesting habitat would occur where Intakes 1–5 impact the
 14 Sacramento River's west bank between just north of Clarksburg and Courtland. The riparian
 15 areas here are very small patches, dominated by valley oak, scrub vegetation, and nonnative
 16 trees. Temporary impacts would occur from the footprint of proposed temporary transmission
 17 lines, siphon work areas, a barge unloading facility east of Rio Vista, and a safe haven work area
 18 south of Piper Slough. These losses would have the potential to displace individuals, if present,
 19 and remove the functions and value of potentially suitable habitat. There are no occurrences of
 20 Cooper's hawk or osprey that overlap with the construction footprint for CM1. Mitigation
 21 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
 22 *Birds*, (described below) would require preconstruction surveys and the establishment of no-
 23 disturbance buffers and would be available to address potential effects on Cooper's hawk and
 24 osprey if either species were to nest in or adjacent to the construction footprint. Refer to the
 25 Terrestrial Biology Map Book for a detailed view of Alternative 1C construction locations.
 26 Impacts from CM1 would occur within the first 10 years of Alternative 1C implementation.
- 27 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 28 would result in the combined permanent and temporary loss of up to 170 acres of Cooper's
 29 hawk and osprey nesting habitat (82 acres of permanent loss, 88 acres of temporary loss) in the
 30 Yolo Bypass in CZ 2. Activities through CM2 could involve excavation and grading in
 31 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
 32 riparian losses would occur at the north end of Yolo Bypass where major fish passage
 33 improvements are planned. Excavation to improve water movement in the Toe Drain and in the
 34 Sacramento Weir would also remove potential Cooper's hawk and osprey habitat. Mitigation
 35 Measure BIO-75 would require preconstruction surveys and the establishment of no-
 36 disturbance buffers and would be available to address potential effects on cooper's hawk and
 37 osprey if either species were to nest in or adjacent to the construction footprint. The loss is
 38 expected to occur during the first 10 years of Alternative 1C implementation.
- 39 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration could permanently
 40 remove up to 383 acres of potential Cooper's hawk and osprey nesting habitat. Trees would not
 41 be actively removed but tree mortality would be expected over time as areas became tidally
 42 inundated.
- 43 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 44 seasonally inundated floodplain and riparian restoration actions (CM5) would remove
 45 approximately 75 acres of Cooper's hawk and osprey nesting habitat (42 acres of permanent

1 loss, 33 acres of temporary loss). These losses would be expected after the first 10 years of
2 Alternative 1C implementation along the San Joaquin River and other major waterways in CZ 7.

- 3 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and
4 enhancement-related activities could disturb Cooper's hawk and osprey nests if they were
5 present near work sites. A variety of habitat management actions included in CM11 that are
6 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground
7 disturbances that could temporarily remove small amounts of Cooper's hawk and osprey habitat
8 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,
9 such as removal of nonnative vegetation and road and other infrastructure maintenance, are
10 expected to have minor effects on available Cooper's hawk and osprey habitat and are expected
11 to result in overall improvements to and maintenance of habitat values over the term of the
12 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
13 and minimized by the AMMs listed below.

14 Permanent and temporary habitat losses from the above conservation measures would
15 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored
16 as riparian habitat within 1 year following completion of construction activities. Although the
17 effects are considered temporary, the restored riparian habitat would require 1 to several
18 decades to functionally replace habitat that has been affected and for trees to attain sufficient
19 size and structure suitable for nesting by Cooper's hawk or osprey. *AMM18 Swainson's Hawk*
20 contains actions described below to reduce the effect of temporal loss of nesting habitat,
21 including the transplanting of mature trees.

- 22 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
23 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
24 disturbances that could affect Cooper's hawk or osprey use of the surrounding habitat.
25 Maintenance activities would include vegetation management, levee and structure repair, and
26 re-grading of roads and permanent work areas. These effects, however, would be reduced by
27 AMM1-AMM7 and conservation actions as described below.
- 28 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
29 direct mortality of adult or fledged Cooper's hawk or osprey if they were present in the Plan
30 Area, because they would be expected to avoid contact with construction and other equipment.
31 If Cooper's hawk or osprey were to nest in the construction area, construction-related activities,
32 including equipment operation, noise and visual disturbances could affect nests or lead to their
33 abandonment, potentially resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
34 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
35 be available to address these adverse effects on Cooper's hawk and osprey.

36 The following paragraphs summarize the combined effects discussed above and describe other
37 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
38 included.

39 ***Near-Term Timeframe***

40 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
41 the near-term BDCP conservation strategy has been evaluated to determine whether it would
42 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
43 effect of construction would not be adverse under NEPA. Alternative 1C would remove 504 acres
44 (345 acres of permanent loss, 159 acres of temporary loss) of Cooper's hawk and osprey nesting

1 habitat in the study area in the near-term. These effects would result from the construction of the
2 water conveyance facilities (CM1, 104 acres), and implementing other conservation measures (CM2
3 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*
4 *Inundated Floodplain Restoration*—400 acres of habitat).

5 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
6 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.
7 Using these ratios would indicate that 104 acres of nesting habitat should be restored/created and
8 104 acres should be protected to compensate for the CM1 losses of modeled Cooper's hawk and
9 osprey habitat. In addition, the near-term effects of other conservation actions would remove 400
10 acres of modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of
11 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios.

12 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
13 valley/foothill riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*).
14 These conservation actions are associated with CM3, and CM7 and would occur in the same
15 timeframe as the construction and early restoration losses. The majority of riparian protection and
16 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
17 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP
18 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing
19 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would
20 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within
21 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in
22 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of
23 potential nest trees would be increased by planting and maintaining native trees along roadsides
24 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective
25 SWHA2.1).

26 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
27 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
28 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored
29 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but
30 would require one to several decades to functionally replace habitat that has been affected and for
31 trees to attain sufficient size and structure suitable for nesting by these species. This time lag
32 between the removal and restoration of nesting habitat could have a substantial impact on nesting
33 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,
34 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
35 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
36 habitat would further reduce this limited resource and could reduce or restrict the number of active
37 nests within the study area until restored riparian habitat is sufficiently developed.

38 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
39 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson's hawk
40 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
41 within the 125-acre block are removed. These mature trees would be supplemented with additional
42 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
43 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
44 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
45 system for every tree 20 feet or taller removed by construction during the near-term period. A

1 variety of native tree species would be planted to provide trees with differing growth rates,
2 maturation, and life span. Trees would be planted within the BDCP reserve system in areas that
3 support high-value Swainson’s hawk foraging habitat to increase nest sites, or within riparian
4 plantings as a component of the riparian restoration (CM5, CM7). Replacement trees that were
5 incorporated into the riparian restoration would not be clustered in a single region of the study
6 area, but would be distributed throughout the conserved lands. Further details of AMM18 are
7 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
9 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
10 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
11 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
12 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
13 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
14 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
15 of the Final EIR/EIS. Cooper’s hawk and osprey are not species that are covered under the BDCP. In
16 order for the BDCP not to have an adverse effect on individuals, preconstruction surveys for
17 noncovered avian species would be required to ensure that active nests are detected and avoided.
18 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
19 *Nesting Birds*, would be available to address this adverse effect.

20 ***Late Long-Term Timeframe***

21 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper’s hawk
22 and osprey. Alternative 1C as a whole would result in the permanent loss of and temporary effects
23 on 732 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

24 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
25 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*
26 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
27 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of
28 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with
29 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives
30 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would
31 expand the patches of existing riparian forest in order to support nesting habitat for riparian
32 species. The Plan’s objectives would also benefit Cooper’s hawk and osprey by protecting small but
33 essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,
34 and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition, the
35 distribution and abundance of potential nest trees would be increased by planting and maintaining
36 native trees along roadsides and field borders within protected cultivated lands at a rate of one tree
37 per 10 acres (Objective SWHA2.1).

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
39 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
40 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
41 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
42 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
43 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
44 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,

1 of the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. For
2 the BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
3 species would be required to ensure that active nests are detected and avoided. Mitigation Measure
4 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
5 be available to address this adverse effect.

6 **NEPA Effects:** The loss of Cooper's hawk and osprey habitat and potential for direct mortality of
7 these special-status species under Alternative 1C would represent an adverse effect in the absence
8 of other conservation actions. However, with habitat protection and restoration associated with
9 CM3, CM5, CM7, guided by biological goals and objectives and by AMM1–AMM7 and *AMM18*
10 *Swainson's Hawk*, which would be in place throughout the construction period, the effects of habitat
11 loss on Cooper's hawk and osprey under Alternative 1C would not be adverse. Cooper's hawk and
12 osprey are not covered species under the BDCP. For the BDCP to avoid an adverse effect on
13 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
14 nests are detected and avoided. Mitigation Measure BIO-75 would be available to address this effect.

15 **CEQA Conclusion:**

16 **Near-Term Timeframe**

17 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
18 the near-term BDCP conservation strategy has been evaluated to determine whether it would
19 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
20 effect of construction would not be adverse under NEPA. Alternative 1C would remove 504 acres
21 (345 acres of permanent loss, 159 acres of temporary loss) of Cooper's hawk and osprey nesting
22 habitat in the study area in the near-term. These effects would result from the construction of the
23 water conveyance facilities (CM1, 104 acres), and implementing other conservation measures (*CM2*
24 *Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
25 *Inundated Floodplain Restoration—400 acres of habitat*).

26 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
27 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.
28 Using these ratios would indicate that 104 acres of nesting habitat should be restored/created and
29 104 acres should be protected to compensate for the CM1 losses of modeled Cooper's hawk and
30 osprey habitat. In addition, the near-term effects of other conservation actions would remove 400
31 acres of modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of
32 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios.

33 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
34 valley/foothill riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*).
35 These conservation actions are associated with CM3, and CM7 and would occur in the same
36 timeframe as the construction and early restoration losses. The majority of riparian protection and
37 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
38 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP
39 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing
40 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would
41 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within
42 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in
43 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of
44 potential nest trees would be increased by planting and maintaining native trees along roadsides

1 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective
2 SWHA2.1).

3 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
4 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
5 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored
6 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but
7 would require one to several decades to functionally replace habitat that has been affected and for
8 trees to attain sufficient size and structure suitable for nesting by these species. This time lag
9 between the removal and restoration of nesting habitat could have a substantial impact on nesting
10 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,
11 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
12 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
13 habitat would further reduce this limited resource and could reduce or restrict the number of active
14 nests within the study area until restored riparian habitat is sufficiently developed.

15 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
16 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson's hawk
17 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
18 within the 125-acre block are removed. These would be supplemented with additional saplings and
19 would be expected to reduce the temporal effects of loss of nesting habitat. The plantings would
20 occur prior to or concurrent with (in the case of transplanting) the loss of trees. In addition, at least
21 five trees (5-gallon container size) would be planted within the BDCP reserve system for every tree
22 20 feet or taller removed by construction during the near-term period. A variety of native tree
23 species would be planted to provide trees with differing growth rates, maturation, and life span.
24 Trees would be planted within the BDCP reserve system in areas that support high-value Swainson's
25 hawk foraging habitat to increase nest sites, or within riparian plantings as a component of the
26 riparian restoration (CM5, CM7). Replacement trees that were incorporated into the riparian
27 restoration would not be clustered in a single region of the study area, but would be distributed
28 throughout the conserved lands. Further details of AMM18 are provided in Appendix 3B,
29 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
34 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
35 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
36 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
37 of the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. For
38 the BDCP to avoid a significant impact on individuals, preconstruction surveys for noncovered avian
39 species would be required to ensure that active nests are detected and avoided. Implementation of
40 Mitigation Measure BIO-75 would reduce the potential impact on nesting Cooper's hawk and osprey
41 to a less-than-significant level.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk
3 and osprey. Alternative 1C as a whole would result in the permanent loss of and temporary effects
4 on 732 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

5 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
6 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*
7 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
8 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of
9 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with
10 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives
11 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would
12 expand the patches of existing riparian forest in order to support nesting habitat for riparian
13 species. The Plan's objectives would also benefit Cooper's hawk and osprey by protecting small but
14 essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,
15 and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition, the
16 distribution and abundance of potential nest trees would be increased by planting and maintaining
17 native trees along roadsides and field borders within protected cultivated lands at a rate of one tree
18 per 10 acres (Objective SWHA2.1).

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
23 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
24 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
25 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
26 of the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. For
27 the BDCP to have a less-than-significant impact on individuals, preconstruction surveys for
28 noncovered avian species would be required to ensure that active nests are detected and avoided.
29 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
30 *Nesting Birds*, would be reduce this impact to a less-than-significant level.

31 Considering Alternative 1C's protection and restoration provisions, which would provide acreages
32 of new or enhanced habitat in amounts greater than necessary to compensate for the time lag of
33 restoring riparian habitats lost to construction and restoration activities, and with implementation
34 of AMM1-AMM7, *AMM18 Swainson's Hawk*, and Mitigation Measure BIO-75, the loss of habitat or
35 direct mortality through implementation of Alternative 1C would not result in a substantial adverse
36 effect through habitat modifications and would not substantially reduce the number or restrict the
37 range of either species. Therefore, the loss of habitat or potential mortality under this alternative
38 would have a less-than-significant impact on Cooper's hawk and osprey.

39 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
40 **Disturbance of Nesting Birds**

41 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-110: Effects on Cooper's Hawk and Osprey Associated with Electrical**
2 **Transmission Facilities**

3 New transmission lines would increase the risk for bird-power line strikes, which could result in
4 injury or mortality of Cooper's hawk and osprey. However, the flight behavior of these species, their
5 keen vision, and high maneuverability substantially reduce the risk of powerline collisions. The
6 existing network of transmission lines in the project area currently poses the same small risk for
7 Cooper's hawk and osprey, and any incremental risk associated with the new power line corridors
8 would also be expected to be low. Marking transmission lines with flight diverters that make the
9 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
10 Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian
11 mortality by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission
12 lines would be fitted with flight diverters, which would further reduce any risk of collision with
13 lines.

14 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
15 adverse effect because the risk of bird strike is considered to be minimal based on the flight
16 behavior, the general maneuverability, and keen eyesight of Cooper's hawk and osprey. In addition,
17 *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters on all new
18 powerlines, which would further reduce any risk of mortality from bird strike for Cooper's hawk
19 and osprey as a result of the project. Therefore, the construction and operation of new transmission
20 lines under Alternative 1C would not result in an adverse effect on Cooper's hawk and osprey.

21 **CEQA Conclusion:** The construction and presence of new transmission lines would not represent an
22 adverse effect because the risk of bird strike is considered to be minimal based on the flight
23 behavior, the general maneuverability and keen eyesight of Cooper's hawk and osprey. In addition,
24 *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters on all new
25 powerlines, which would further reduce any risk of mortality from bird strike for Cooper's hawk
26 and osprey as a result of the project. Therefore, the construction and operation of new transmission
27 lines under Alternative 1C would result in a less-than-significant impact on Cooper's hawk and
28 osprey.

29 **Impact BIO-111: Indirect Effects of Plan Implementation on Cooper's Hawk and Osprey**

30 **Indirect Construction- and Operation-Related Effects:** Construction noise above background
31 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
32 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
33 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
34 the extent to which these noise levels could affect Cooper's hawk or osprey. If Cooper's hawk or
35 osprey were to nest in or adjacent to work areas, construction and subsequent maintenance-related
36 noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce
37 the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct*
38 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid the
39 potential for adverse effects of construction-related activities on survival and productivity of nesting
40 Cooper's hawk and osprey. The use of mechanical equipment during water conveyance facilities
41 construction could cause the accidental release of petroleum or other contaminants that could affect
42 Cooper's hawk and osprey in the surrounding habitat. The inadvertent discharge of sediment or
43 excessive dust adjacent to suitable habitat could also have an adverse effect on these species.
44 *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*, would

1 minimize the likelihood of such spills and ensure that measures are in place to prevent runoff from
2 the construction area and negative effects of dust on active nests.

3 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
4 mercury in avian species, including Cooper's hawk and osprey. Future operational impacts under
5 CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury concentration
6 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to
7 estimate fish-tissue concentrations under these future operational conditions (evaluated starting
8 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues
9 due to ESO were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

10 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to
11 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
12 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
13 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas
14 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of
15 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of
16 uncertainty with respect to species-specific effects. Increased methylmercury associated with
17 natural community and floodplain restoration could indirectly affect cooper's hawk and osprey, via
18 uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

19 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
20 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
21 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
22 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
23 adaptive management as described in CM12 would be available to address the uncertainty of
24 methylmercury levels in restored tidal marsh and potential impacts on cooper's hawk and osprey.

25 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
26 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
27 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
28 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
29 2009). The effect of selenium toxicity differs widely between species and also between age and sex
30 classes within a species. In addition, the effect of selenium on a species can be confounded by
31 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
32 2009).

33 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
34 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
35 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
36 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
37 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
38 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
39 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
40 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
41 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
42 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
43 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
44 have a higher risk of selenium toxicity.

1 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 2 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 3 exacerbate bioaccumulation of selenium in avian species, including Cooper’s hawk and osprey.
 4 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
 5 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
 6 Alternative 1C restoration activities that create newly inundated areas could increase bioavailability
 7 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
 8 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
 9 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
 10 increases in selenium concentrations in water in the Delta under any alternative. However, it is
 11 difficult to determine whether the effects of potential increases in selenium bioavailability
 12 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
 13 effects on Cooper’s hawk and osprey.

14 Because of the uncertainty that exists at this programmatic level of review, there could be a
 15 substantial effect on Cooper’s hawk and osprey from increases in selenium associated with
 16 restoration activities. This effect would be addressed through the implementation of *AMM27*
 17 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 18 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
 19 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
 20 selenium management to reduce selenium concentrations and/or bioaccumulation would be
 21 evaluated separately for each restoration effort as part of design and implementation. This
 22 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
 23 design schedule.

24 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
 25 could reduce Cooper’s hawk and osprey use of modeled habitat adjacent to work areas. Moreover,
 26 operation and maintenance of the water conveyance facilities, including the transmission facilities,
 27 could result in ongoing but periodic postconstruction disturbances that could affect Cooper’s hawk
 28 and osprey use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
 29 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse
 30 effects on nesting individuals in addition to AMM1–AMM7.

31 The implementation of tidal natural communities restoration or floodplain restoration could result
 32 in increased exposure of Cooper’s hawk or osprey to methylmercury, through the ingestion of fish or
 33 small mammals in tidally restored areas. However, it is currently unknown what concentrations of
 34 methylmercury are harmful to these species and the potential for increased exposure varies
 35 substantially within the study area. Site-specific restoration plans that address the creation and
 36 mobilization of mercury, as well as monitoring and adaptive management as described in CM12
 37 would better inform potential impacts and address the uncertainty of methylmercury levels in
 38 restored tidal marsh in the study area on cooper’s hawk and osprey. The site-specific planning phase
 39 of marsh restoration would be the appropriate place to assess the potential for risk of
 40 methylmercury exposure for Cooper’s hawk and osprey, once site specific sampling and other
 41 information could be developed.

42 Tidal habitat restoration could result in increased exposure of Cooper’s hawk and osprey to
 43 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
 44 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
 45 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

1 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
2 facilities could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas.
3 Moreover, operation and maintenance of the water conveyance facilities, including the transmission
4 facilities, could result in ongoing but periodic postconstruction disturbances that could affect
5 Cooper's hawk and osprey use of the surrounding habitat. Noise, the potential for hazardous spills,
6 increased dust and sedimentation, and operations and maintenance of the water conveyance
7 facilities under Alternative 1C would have a less-than-significant impact on Cooper's hawk and
8 osprey with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
9 *Surveys and Avoid Disturbance of Nesting Birds*, and AMM1-AMM7.

10 The implementation of tidal natural communities restoration or floodplain restoration could result
11 in increased exposure of Cooper's hawk or osprey to methylmercury through the ingestion of fish or
12 small mammals in restored tidal areas. However, it is currently unknown what concentrations of
13 methylmercury are harmful to these species. Site-specific restoration plans that address the creation
14 and mobilization of mercury, as well as monitoring and adaptive management as described in CM12,
15 would address the uncertainty of methylmercury levels in restored tidal marsh in the study area and
16 better inform potential impacts on Cooper's hawk and osprey.

17 Tidal habitat restoration could result in increased exposure of Cooper's hawk and osprey to
18 selenium. With the implementation of *AMM27 Selenium Management*, which would provide specific
19 tidal habitat restoration design elements to reduce the potential for bioaccumulation of selenium
20 and its bioavailability in tidal habitats, the impact of increased exposure to selenium would be less
21 than significant.

22 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
23 **Disturbance of Nesting Birds**

24 See Mitigation Measure BIO-75 under Impact BIO-75.

25 **Impact BIO-112: Periodic Effects of Inundation of Cooper's Hawk and Osprey Nesting Habitat**
26 **as a Result of Implementation of Conservation Components**

27 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
28 duration of inundation of approximately 48-82 acres of modeled Cooper's hawk and osprey
29 breeding habitat. However, increased periodic flooding is not expected to cause any adverse effect on
30 breeding habitat because trees in which nest sites are situated already withstand floods, the
31 increase in inundation frequency and duration is expected to remain within the range of tolerance of
32 riparian trees, and nest sites are located above floodwaters.

33 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
34 inundation of up to 230 acres of breeding habitat for Cooper's hawk and osprey. The overall effect of
35 seasonal inundation in existing riparian natural communities is likely to be beneficial for these
36 species, because, historically, flooding was the main natural disturbance regulating ecological
37 processes in riparian areas, and flooding promotes the germination and establishment of many
38 native riparian plants.

39 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
40 sites because trees in which nest sites are situated already withstand floods, the increase in
41 inundation frequency and duration is expected to remain within the range of tolerance of riparian

1 trees, and nest sites are located above floodwaters. Therefore, increased duration of inundation
2 resulting from CM2 and CM5 would not have an adverse effect on Cooper's hawk and osprey.

3 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
4 nest sites because trees in which nest sites are situated already withstand floods, the increase in
5 inundation frequency and duration is expected to remain within the range of tolerance of riparian
6 trees, and nest sites are located above floodwaters. Therefore, increased duration of inundation
7 resulting from CM2 and CM5 would have a less-than-significant impact on Cooper's hawk and
8 osprey.

9 **Golden Eagle and Ferruginous Hawk**

10 This section describes the effects of Alternative 1C, including water conveyance facilities
11 construction and implementation of other conservation components, on golden eagle and
12 ferruginous hawk. Modeled foraging habitat for these species consists of grassland, alkali seasonal
13 wetland, vernal pool complex, alfalfa, grain and hay, pasture, and idle cropland throughout the study
14 area.

15 Construction and restoration associated with Alternative 1C conservation measures would result in
16 both temporary and permanent losses of golden eagle and ferruginous hawk modeled foraging
17 habitat as indicated in Table 12-1C-44. Full implementation of Alternative 1C would include the
18 following conservation actions over the term of the BDCP that would also benefit golden eagles or
19 ferruginous hawk (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 20 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
21 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
22 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 23 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 24 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
25 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 26 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
27 VPNC2.5, and GNC2.4, associated with CM11).
- 28 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
29 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 30 • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
31 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value
32 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

33 As explained below, with the restoration or protection of these amounts of habitat, in addition to
34 management activities to enhance natural communities for species and implementation of AMM1–
35 AMM7, impacts on golden eagle and ferruginous hawk would not be adverse for NEPA purposes and
36 would be less than significant for CEQA purposes.

1 **Table 12-1C-44. Changes in Golden Eagle and Ferruginous Hawk Habitat Associated with**
2 **Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Foraging	2,796	2,796	3,750	3,750	NA	NA
Total Impacts CM1		2,796	2,796	3,750	3,750	NA	NA
CM2–CM18	Foraging	5,450	26,198	376	893	1,158–3,650	3,823
Total Impacts CM2–CM18		5,450	26,198	376	893	1,158–3,650	3,823
TOTAL IMPACTS		8,246	28,994	4,126	4,643	1,158–3,650	3,823

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-113: Loss or Conversion of Habitat for and Direct Mortality of Golden Eagle and**
5 **Ferruginous Hawk**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss
7 of up to 33,688 acres of modeled foraging habitat for golden eagle and ferruginous hawk (of which
8 28,994 acres would be a permanent loss and 4,643 acres would be a temporary loss of habitat, Table
9 12-1C-44). Conservation measures that would result in these losses are conveyance facilities and
10 transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo
11 Bypass fisheries improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5),
12 riparian habitat restoration (CM7), grassland restoration (CM8), vernal pool and wetland
13 restoration (CM9), nontidal marsh restoration (CM10), and construction of conservation hatcheries
14 (CM18). The majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement
15 and management activities (CM11), which include ground disturbance or removal of nonnative
16 vegetation, and the construction of recreational trails, signs, and facilities, could result in local
17 adverse habitat effects. In addition, maintenance activities associated with the long-term operation
18 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate
19 foraging habitat for both species. Each of these individual activities is described below. A summary
20 statement of the combined impacts and NEPA effects, and a CEQA conclusion follows the individual
21 conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would
23 result in the combined permanent and temporary loss of up to 6,546 acres of modeled golden
24 eagle and ferruginous hawk foraging habitat (2,796 acres of permanent loss, 3,750 acres of
25 temporary loss) from CZs 3, 5, 6, 8, and 9. The permanent losses would occur at various
26 locations along the western canal route and at the intake sites along the Sacramento River. The

1 majority of grassland that would be removed would be in CZ 8, west of the Clifton Court Forebay
 2 from the construction of the new forebay and the associated borrow and spoil areas. Larger
 3 areas of annual grassland would be permanently removed by canal construction south of Rock
 4 Slough, south of Discovery Bay and immediately west of Clifton Court Forebay. Both temporary
 5 and permanent losses of grassland would be created by constructing transmission corridors
 6 west of the Plan Area and along the tunnel alignment in the west Delta. Other temporary losses
 7 occur from siphon construction areas, at safe haven work areas, and at railroad work areas just
 8 southwest of Clifton Court Forebay. There are no occurrences of golden eagle or ferruginous
 9 hawk that intersect with the CM1 footprint. Refer to the Terrestrial Biology Map Book for a
 10 detailed view of Alternative 1C construction locations. Impacts resulting from CM1 would occur
 11 within the first 10 years of Alternative 1C implementation.

- 12 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 13 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
 14 golden eagle and ferruginous hawk foraging habitat (898 acres of permanent loss, 376 acres of
 15 temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of
 16 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass
 17 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.
 18 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland
 19 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10
 20 years of Alternative 1C implementation.
- 21 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 22 inundation would permanently remove an estimated 20,880 acres of modeled golden eagle and
 23 ferruginous hawk habitat. The majority of the acres lost would consist of cultivated lands in CZs
 24 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache Slough, on
 25 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
 26 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact
 27 and fragment grassland just north of Rio Vista in and around French and Prospect Islands, and in
 28 an area south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex
 29 habitat would likely occur in the south end of the Yolo Bypass and on the northern fringes of
 30 Suisun Marsh.
- 31 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 32 seasonally inundated floodplain would permanently and temporarily remove approximately
 33 1,450 acres of modeled golden eagle and ferruginous hawk foraging habitat (933 permanent,
 34 517 temporary). These losses would be expected after the first 10 years of Alternative 1C
 35 implementation along the San Joaquin River and other major waterways in CZ 7.
- 36 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
 37 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
 38 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
 39 would be restored after the construction periods. Grassland restoration would be implemented
 40 on agricultural lands that also provide foraging habitat for golden eagle and ferruginous hawk
 41 and would result in the conversion of 837 acres of cultivated lands to grassland.
- 42 ● *CM10 Nontidal Marsh Restoration*: Implementation of *CM10 Nontidal Marsh Restoration* would
 43 result in the permanent removal of 705 acres of golden eagle and ferruginous hawk foraging
 44 habitat.

- 1 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
2 actions included in CM11 that are designed to enhance wildlife values in restored or protected
3 habitats could result in localized ground disturbances that could temporarily remove small
4 amounts of golden eagle and ferruginous hawk foraging habitat. Ground-disturbing activities,
5 such as removal of nonnative vegetation and road and other infrastructure maintenance
6 activities, would be expected to have minor adverse effects on available habitat for these
7 species. CM11 would also include the construction of recreational-related facilities including
8 trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated*
9 *Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas,
10 bathrooms, etc. would be placed on existing, disturbed areas when and where possible.
11 However, approximately 50 acres of grassland habitat would be lost from the construction of
12 trails and facilities.
- 13 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
14 modeled golden eagle and ferruginous hawk foraging habitat for the development of a delta and
15 longfin smelt conservation hatchery in CZ 1.
- 16 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
17 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
18 disturbances that could affect golden eagle and ferruginous hawk use of the surrounding habitat.
19 Maintenance activities would include vegetation management, levee and structure repair, and
20 re-grading of roads and permanent work areas. These effects, however, would be reduced by
21 AMM1–AMM7 and conservation actions as described below.
- 22 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
23 golden eagle and ferruginous hawk because foraging individuals would be expected to
24 temporarily avoid the increased noise and activity associated with construction areas.

25 The following paragraphs summarize the combined effects discussed above and describe other
26 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
27 included.

28 ***Near-Term Timeframe***

29 Because the water conveyance facility construction is being evaluated at the project level, the near-
30 term BDCP conservation strategy has been evaluated to determine whether it would provide
31 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
32 such conveyance facility construction would not be adverse under NEPA. Alternative 1C would
33 remove 12,372 acres (8,246 acres permanent, 4,126 acres temporary) of modeled golden eagle and
34 ferruginous hawk foraging habitat in the study area in the near-term. These effects would result
35 from the construction of the water conveyance facilities (CM1, 6,546 acres), and implementing other
36 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
37 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*
38 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*
39 *Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—5,826 acres).

40 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
41 would be 2:1 for protection of habitat. Using this ratio would indicate that 13,092 acres should be
42 protected to compensate for the CM1 losses of 6,546 acres of golden eagle and ferruginous hawk
43 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of

1 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous
2 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

3 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
4 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
5 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
6 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
7 in the same timeframe as the construction and early restoration losses thereby avoiding adverse
8 effects of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland
9 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2)
10 Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal
11 wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
12 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand golden
13 eagle and ferruginous hawk foraging habitat and reduce the effects of current levels of habitat
14 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect and
15 mammal prey populations would be increased on protected lands, enhancing the foraging value of
16 these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would
17 be increased on protected natural communities by encouraging ground squirrel occupancy and
18 expansion through the creation of berms, mounds, edges, and through the prohibition of ground
19 squirrel control programs (i.e., poisoning).

20 Cultivated lands that provide habitat for covered and other native wildlife species would provide
21 approximately 15,400 acres of potential foraging habitat for golden eagle and ferruginous hawk
22 (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time
23 period would be in alfalfa and pasture crop types (very high- and high-value crop types) for
24 Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.
25 This biological objective provides an estimate for the high proportion of cultivated lands protected
26 in the near-term time period which would be suitable for golden eagle and ferruginous hawk.

27 The acres of restoration and protection contained in the near-term Plan goals and the additional
28 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
29 level effects of CM1 on golden eagle and ferruginous hawk. However, the conservation commitment
30 is 5,684 acres short of meeting the compensation for other near-term effects on golden eagle and
31 ferruginous hawk habitat. Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden
32 Eagle and Ferruginous Hawk Foraging Habitat*, would be available to address the adverse effect of
33 near-term habitat loss.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2
35 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention
36 Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and
37 Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
38 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
39 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
40 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
41 of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 Based on modeled habitat, the study area supports approximately 269,411 acres of modeled
3 foraging habitat for golden eagle and ferruginous hawk. Alternative 1C as a whole would result in
4 the permanent loss of and temporary effects on 33,688 acres of modeled foraging habitat during the
5 term of the Plan (13% of the modeled habitat in the study area). The locations of these losses are
6 described above in the analyses of individual conservation measures.

7 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
8 *Restoration*, *CM8 Grassland Natural Communities Restoration*, and *CM9 Vernal Pool and Alkali*
9 *Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland
10 natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal
11 wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native
12 wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland restoration and
13 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland
14 protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland
15 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
16 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand
17 foraging habitat for golden eagle and ferruginous hawk and reduce the effects of current levels of
18 habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect and
19 small mammal prey populations would be increased on protected lands, enhancing the foraging
20 value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow
21 availability would be increased on protected natural communities by encouraging ground squirrel
22 occupancy and expansion through the creation of berms, mounds, edges, and through the
23 prohibition of ground squirrel control programs (i.e., poisoning). Cultivated lands that provide
24 habitat for covered and other native wildlife species would provide approximately 15,400 acres of
25 potential habitat for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 42,275
26 acres of cultivated lands protected would be in alfalfa and pasture crop types (very high- and high-
27 value crop types) for Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle
28 and ferruginous hawk.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
33 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
34 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
35 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
36 of the Final EIR/EIS.

37 **NEPA Effects:** The loss of golden eagle and ferruginous hawk habitat and potential for mortality of
38 these special-status species under Alternative 1C would represent an adverse effect in the absence
39 of other conservation actions. However, with habitat protection and restoration associated with
40 CM3, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which
41 would be in place throughout the construction period, and with implementation of Mitigation
42 Measure BIO-113, *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous Hawk*
43 *Foraging Habitat*, the effects of habitat loss and potential for direct mortality on golden eagle and
44 ferruginous hawk under Alternative 1C would not be adverse under NEPA.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
6 effects of construction would be less than significant under CEQA. Alternative 1C would remove
7 12,372 acres (8,246 acres permanent, 4,126 acres temporary) of modeled golden eagle and
8 ferruginous hawk foraging habitat in the study area in the near-term. These effects would result
9 from the construction of the water conveyance facilities (CM1, 6,546 acres), and implementing other
10 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
11 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*
12 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*
13 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

14 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
15 would be 2:1 for protection of habitat. Using this ratio would indicate that 13,092 acres should be
16 protected to compensate for the CM1 losses of 6,546 acres of golden eagle and ferruginous hawk
17 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of
18 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous
19 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

20 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
21 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
22 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
23 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
24 in the same timeframe as the construction and early restoration losses thereby avoiding significant
25 impacts of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland
26 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and
27 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali
28 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
29 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
30 expand golden eagle and ferruginous hawk foraging habitat and reduce the effects of current levels
31 of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect
32 and mammal prey populations would be increased on protected lands, enhancing the foraging value
33 of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability
34 would be increased on protected natural communities by encouraging ground squirrel occupancy
35 and expansion through the creation of berms, mounds, edges, and through the prohibition of ground
36 squirrel control programs (i.e., poisoning). Cultivated lands that provide habitat for covered and
37 other native wildlife species would provide approximately 15,400 acres of potential foraging habitat
38 for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 87% of cultivated lands
39 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-
40 and high-value crop types) for Swainson's hawk (Objective SH1.2) which are also suitable for golden
41 eagle and ferruginous hawk. This biological objective provides an estimate for the high proportion of
42 cultivated lands protected in the near-term time period which would be suitable for golden eagle
43 and ferruginous hawk.

1 The acres of restoration and protection contained in the near-term Plan goals and the additional
2 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
3 level effects of CM1 on golden eagle and ferruginous hawk. However, the conservation commitment
4 is 5,684 acres short of meeting the compensation for other near-term effects on golden eagle and
5 ferruginous hawk habitat. The implementation of Mitigation Measure BIO-113, *Compensate for the*
6 *Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, would reduce the near-
7 term impact of habitat loss to less than significant.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
12 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
13 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
14 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
15 of the Final EIR/EIS.

16 ***Late Long-Term Timeframe***

17 Based on modeled habitat, the study area supports approximately 269,411 acres of modeled
18 foraging habitat for golden eagle and ferruginous hawk. Alternative 1C as a whole would result in
19 the permanent loss of and temporary effects on 33,688 acres of modeled foraging habitat during the
20 term of the Plan (13% of the modeled habitat in the study area). The locations of these losses are
21 described above in the analyses of individual conservation measures.

22 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
23 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
24 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural
25 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
26 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
27 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
28 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
29 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
30 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
31 pool natural communities that would expand foraging habitat for golden eagle and ferruginous
32 hawk and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*
33 *Communities Enhancement and Management*, insect and small mammal prey populations would be
34 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
35 ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would be increased on protected natural
36 communities by encouraging ground squirrel occupancy and expansion through the creation of
37 berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
38 poisoning). Cultivated lands that provide habitat for covered and other native wildlife species would
39 provide approximately 15,400 acres of potential habitat for golden eagle and ferruginous hawk
40 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa
41 and pasture crop types. These are very high- and high-value crop types for Swainson's hawk
42 (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
44 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
3 *these AMMs include elements that would avoid or minimize the risk of affecting individuals and*
4 *species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since*
5 *been updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs,*
6 *of the Final EIR/EIS.*

7 Considering Alternative 1C's protection and restoration provisions, which would provide acreages
8 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
9 construction and restoration activities, and with the implementation of AMM1-AMM7 and
10 Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous*
11 *Hawk Foraging Habitat*, the loss of habitat or direct mortality through implementation of Alternative
12 1C would not result in a substantial adverse effect through habitat modifications and would not
13 substantially reduce the number or restrict the range of either species. Therefore, the loss of habitat
14 or potential mortality under this alternative would have a less-than-significant impact on golden
15 eagle and ferruginous hawk.

16 **Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and** 17 **Ferruginous Hawk Foraging Habitat**

18 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
19 crops, or alfalfa to provide golden eagle and ferruginous hawk foraging habitat such that the
20 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of
21 2:1. Additional grassland protection, enhancement, and management may be substituted for the
22 protection of high-value cultivated lands.

23 **Impact BIO-114: Effects on Golden Eagle and Ferruginous Hawk Associated with Electrical** 24 **Transmission Facilities**

25 Golden eagle and ferruginous hawk would be at low risk of bird strike mortality from the
26 construction of new transmission lines based on their maneuverability, their keen eyesight, their
27 lack of flocking behavior, and other factors assessed in the bird strike vulnerability analysis (BDCP
28 Appendix 5.J, Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP*
29 *Transmission Lines*). Marking transmission lines with flight diverters that make the lines more
30 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
31 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
32 by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines
33 would be fitted with flight diverters, which would substantially reduce any potential for powerline
34 collisions.

35 **NEPA Effects:** Golden eagle and ferruginous hawk are already at a low risk of bird strike mortality
36 based on their general maneuverability, keen eyesight and lack of flocking behavior. All new
37 transmission lines constructed for the project would be fitted with bird diverters, which have been
38 shown to reduce avian mortality by 60%. With implementation of *AMM20 Greater Sandhill Crane*,
39 the construction and operation of transmission lines would not result in an adverse effect on golden
40 eagle and ferruginous hawk.

41 **CEQA Conclusion:** Golden eagle and ferruginous hawk are already at a low risk of bird strike
42 mortality based on their general maneuverability, keen eyesight and lack of flocking behavior. All
43 new transmission lines constructed for the project would be fitted with bird diverters, which have

1 been shown to reduce avian mortality by 60%. With implementation of *AMM20 Greater Sandhill*
2 *Crane*, the construction and operation of transmission lines would result in a less-than-significant
3 impact on golden eagle and ferruginous hawk.

4 **Impact BIO-115: Indirect Effects of Plan Implementation on Golden Eagle and Ferruginous** 5 **Hawk**

6 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt
7 foraging, and reduce the functions of suitable foraging habitat for golden eagle and ferruginous
8 hawk. Construction noise above background noise levels (greater than 50 dBA) could extend 1,900
9 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*
10 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there
11 are no available data to determine the extent to which these noise levels could affect golden eagle or
12 ferruginous hawk. Indirect effects associated with construction include noise, dust, and visual
13 disturbance caused by grading, filling, contouring, and other ground-disturbing operations. The use
14 of mechanical equipment during water conveyance facilities construction could cause the accidental
15 release of petroleum or other contaminants that could affect these species or their prey in the
16 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
17 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge
18 of sediment or excessive dust adjacent to golden eagle and ferruginous hawk grassland habitat could
19 also have a negative effect on the species. However, AMM1–AMM7 would also ensure that measures
20 would be in place to prevent runoff from the construction area and the negative effects of dust on
21 wildlife adjacent to work areas.

22 **NEPA Effects:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative 1C
23 implementation could have adverse effects on these species through the modification of habitat.
24 With the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 1C
25 implementation would not have an adverse effect on golden eagle and ferruginous hawk.

26 **CEQA Conclusion:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative
27 1C implementation could have a significant impact on the species from modification of habitat. With
28 the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 1C
29 implementation would have a less-than-significant impact on golden eagle and ferruginous hawk.

30 **Impact BIO-116: Periodic Effects of Inundation on Golden Eagle and Ferruginous Hawk** 31 **Habitat as a Result of Implementation of Conservation Components**

32 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
33 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–
34 3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat (Table 12-1C-44).

35 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
36 *Restoration*, could result in the periodic inundation of up to approximately 3,823 acres of modeled
37 habitat (Table 12-1C-44).

38 Golden eagles and ferruginous hawks would not likely use inundated areas for foraging, and
39 increased inundation frequency and duration of inundation of grassland habitats may affect prey
40 populations that have insufficient time to recover following inundation events. nesting burrows.
41 Periodic inundation would at a maximum, remove 2% of the available foraging habitat in the Plan

1 Area. Thus, periodically inundated habitat would not be expected to have an adverse effect on local
2 or migratory golden eagles or the wintering ferruginous hawk population in the area.

3 **NEPA Effects:** Implementation of CM2 and CM5 would increase the frequency and duration of
4 inundation of modeled golden eagle and ferruginous hawk foraging habitat. However, periodic
5 inundation would not be expected to have an adverse effect on the wintering golden eagle or
6 ferruginous hawk populations in the study area.

7 **CEQA Conclusion:** Implementation of CM2 and CM5 would increase the frequency and duration of
8 inundation of modeled golden eagle and ferruginous hawk foraging habitat. Periodic inundation
9 would be expected to have a less-than-significant impact on the population.

10 **Cormorants, Herons and Egrets**

11 This section describes the effects of Alternative 1C, including water conveyance facilities
12 construction and implementation of other conservation components, on double-crested cormorant,
13 great blue heron, great egret, snowy egret, and black-crowned night heron. Modeled breeding
14 habitat for these species consists of valley/foothill riparian forest.

15 Construction and restoration associated with Alternative 1C conservation measures would result in
16 both temporary and permanent losses of cormorant, heron, and egret modeled habitat as indicated
17 in Table 12-1C-45. The majority of the losses would take place over an extended period of time as
18 tidal marsh is restored in the study area. Although restoration for the loss of nesting habitat would
19 be initiated in the same timeframe as the losses, it could take one or more decades for restored
20 habitats to replace the functions of habitat lost. This time lag between impacts and restoration of
21 habitat function would be minimized by specific requirements of *AMM18 Swainson's Hawk*, including
22 the planting of mature trees in the near-term time period. Full implementation of Alternative 1C
23 would include the following conservation actions over the term of the BDCP which would also
24 benefit cormorants, herons, and egrets (BDCP Chapter 3, Section 3.3, *Biological Goals and*
25 *Objectives*).

- 26 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
27 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
28 associated with CM7).
- 29 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
30 10 (Objective VFRNC1.2, associated with CM3).
- 31 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
32 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
33 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
34 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

35 As explained below, with the restoration or protection of these amounts of habitat, in addition to
36 management activities to enhance natural communities for species and the implementation of
37 AMM1-AMM7, *AMM18 Swainson's Hawk*, and Mitigation Measures BIO-75 and BIO-117, impacts on
38 cormorants, herons, and egrets would not be adverse for NEPA purposes and would be less than
39 significant for CEQA purposes.

1 **Table 12-1C-45. Changes in Cormorant, Heron and Egret Modeled Habitat Associated with**
 2 **Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting (Rookeries)	40	40	86	86	NA	NA
Total Impacts CM1		40	40	86	86	NA	NA
CM2-CM18	Nesting (Rookeries)	387	684	88	123	51-92	266
Total Impacts CM2-CM18		387	684	88	123	51-92	266
TOTAL IMPACTS		427	724	174	209	51-92	266

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-117: Loss or Conversion of Nesting Habitat for and Direct Mortality of**
 5 **Cormorants, Herons and Egrets**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss
 7 of up to 1,133 acres of modeled nesting habitat for double-crested cormorant, great blue heron,
 8 great egret, snowy egret, and black-crowned night heron (724 acres of permanent loss, 209 acres of
 9 temporary loss, Table 12-1C-45). Conservation measures that would result in these losses are *CM1*
 10 *Water Facilities and Operation* (which would involve conveyance facilities and transmission line
 11 construction, and establishment and use of borrow and spoil areas), *CM2 Yolo Bypass Fisheries*
 12 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
 13 *Restoration*. Habitat enhancement and management activities (CM11), which include ground
 14 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In
 15 addition, maintenance activities associated with the long-term operation of the water conveyance
 16 facilities and other BDCP physical facilities could degrade or eliminate cormorant, heron, and egret
 17 modeled habitat. Each of these individual activities is described below. A summary statement of the
 18 combined impacts, NEPA effects, and a CEQA conclusion follow the individual conservation measure
 19 discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C water conveyance facilities
 21 would result in the combined permanent and temporary loss of up to 126 acres of modeled
 22 habitat for cormorants, herons, and egrets (Table 12-1C-45). Of the 126 acres of modeled
 23 habitat that would be removed for the construction of the conveyance facilities, 40 acres would
 24 be a permanent loss and 86 acres would be a temporary loss of habitat. This loss would have the

1 potential to displace individuals, if present, and remove the functions and value of potentially
 2 suitable habitat. Most of the permanent loss of nesting habitat would occur where Intakes 1–5
 3 impact the Sacramento River’s west bank between just north of Clarksburg and Courtland. The
 4 riparian areas here are very small patches, dominated by valley oak, scrub vegetation, and
 5 nonnative trees. Temporary impacts would occur from the footprint of proposed temporary
 6 transmission lines, siphon work areas, a barge unloading facility east of Rio Vista, and a safe
 7 haven work area south of Piper Slough. The construction footprint for a potential borrow and
 8 spoil area south of Clifton Court road overlaps with a rookery that includes great blue heron,
 9 double-crested cormorant, and great egret nests. The primary impact of concern regarding
 10 double-crested cormorant, great blue heron, great egret, snowy egret, and black-crowned night
 11 heron is the loss of existing known nest trees, and other large trees associated with known nest
 12 sites. Because these species are highly traditional in their use of rookeries, the establishment of
 13 new nest sites is unpredictable. Therefore, to avoid adverse effects on great blue herons,
 14 cormorants, and great egrets, existing rookeries must be avoided. Mitigation Measure BIO-75,
 15 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and
 16 Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to address this
 17 adverse effect on cormorants, herons, and egrets. Refer to the Terrestrial Biology Map Book for a
 18 detailed view of Alternative 1C construction locations.

- 19 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 20 would result in the combined permanent and temporary loss of up to 177 acres of nesting
 21 habitat (89 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2.
 22 Activities through CM2 could involve excavation and grading in valley/foothill riparian areas to
 23 improve passage of fish through the bypasses. Most of the riparian losses would occur at the
 24 north end of Yolo Bypass where major fish passage improvements are planned. Excavation to
 25 improve water movement in the Toe Drain and in the Sacramento Weir would also remove
 26 potential nesting habitat. The loss is expected to occur during the first 10 years of Alternative 1C
 27 implementation.
- 28 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 29 inundation would permanently remove an estimated 552 acres of nesting habitat for
 30 cormorants, herons and egrets. Trees would not be actively removed but tree mortality would
 31 be expected over time as areas became tidally inundated. Depending on the extent and value of
 32 remaining habitat, this could reduce use of these habitats by these species. There is one CNDDDB
 33 occurrence of a great blue heron rookery that overlaps with the hypothetical restoration
 34 footprint for tidal restoration. The occurrence is on Decker Island and tidal restoration could
 35 potentially impact the nest trees from inundation. This potential effect would need to be
 36 addressed within the project specific analysis for tidal restoration projects.
- 37 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 38 seasonally inundated floodplain would permanently remove approximately 43 acres and
 39 temporarily remove approximately 35 acres of potential cormorants, heron, and egret nesting
 40 habitat. These losses would be expected after the first 10 years of Alternative 1C
 41 implementation along the San Joaquin River and other major waterways in CZ 7.
- 42 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
 43 enhancement-related activities could disturb cormorant, heron, and egret nests if they were
 44 present near work sites. A variety of habitat management actions included in CM11 that are
 45 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground
 46 disturbances that could temporarily remove small amounts of cormorant, heron, and egret

1 habitat and reduce the functions of habitat until restoration is complete. Ground-disturbing
2 activities, such as removal of nonnative vegetation and road and other infrastructure
3 maintenance, are expected to have minor effects on available habitat for these species and are
4 expected to result in overall improvements to and maintenance of habitat values over the term
5 of the BDCP. These effects cannot be quantified, but are expected to be minimal and would be
6 avoided and minimized by the AMMs listed below.

- 7 • Permanent and temporary habitat losses from the above conservation measures would
8 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored
9 as riparian habitat within 1 year following completion of construction activities. Although the
10 effects are considered temporary, the restored riparian habitat would require years to several
11 decades to functionally replace habitat that has been affected and for trees to attain sufficient
12 size and structure for established rookeries. *AMM18 Swainson's Hawk* contains actions described
13 below to reduce the effect of temporal loss of mature riparian habitat, including the
14 transplanting of mature trees.
- 15 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
16 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
17 disturbances that could affect use of the surrounding habitat by cormorants, herons or egrets.
18 Maintenance activities would include vegetation management, levee and structure repair, and
19 re-grading of roads and permanent work areas. These effects, however, would be reduced by
20 AMMs and conservation actions as described below.
- 21 • The primary impact of concern regarding double-crested cormorant, great blue heron, great
22 egret, snowy egret, and black-crowned night heron is the loss of existing known nest trees, and
23 other large trees associated with known nest sites. Because these species are highly traditional
24 in their use of rookeries, the establishment of new nest sites is unpredictable. To avoid adverse
25 effects on these species, existing known nest sites would have to be avoided. Mitigation Measure
26 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and
27 Mitigation Measure *BIO-117, Avoid Impacts on Rookeries*, would be available to address these
28 adverse effects on cormorants, herons, and egrets.
- 29 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
30 direct mortality of adult or fledged double-crested cormorant, great blue heron, great egret,
31 snowy egret, and black-crowned night heron if they were present in the Plan Area, because they
32 would be expected to avoid contact with construction and other equipment. If birds were to nest
33 in the construction area, construction-related activities, including equipment operation, noise
34 and visual disturbances could affect nests including any nests that are built on the ground (e.g.
35 Cormorant nests that have been built on the ground after nest trees fall over or die from stress
36 and guano produced by a rookery) or lead to their abandonment, potentially resulting in
37 mortality of eggs and nestlings. Mitigation Measures *BIO-75* and *BIO-117* would be available to
38 address these adverse effects on cormorants, herons, and egrets.

39 The following paragraphs summarize the combined effects discussed above and describe other
40 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
41 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
5 effects of construction would not be adverse under NEPA. Alternative 1C would remove 601 acres of
6 nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These effects
7 would result from the construction of the water conveyance facilities (CM1, 126 acres of nesting
8 habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,
9 *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*—
10 475 acres of nesting habitat).

11 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
12 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for
13 breeding habitat. Using these ratios would indicate that 126 acres of breeding habitat should be
14 restored/created and 126 acres should be protected to compensate for the CM1 losses of modeled
15 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions
16 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of
17 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the
18 same typical NEPA and CEQA ratios.

19 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
20 system with extensive wide bands or large patches of valley/foothill riparian natural community
21 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
22 restoration would expand the patches of existing riparian forest in order to support nesting habitat
23 for these species. In addition, small but essential nesting habitat associated with cultivated lands
24 would also be maintained and protected such as isolated trees, tree rows along field borders or
25 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

26 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
27 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
28 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored
29 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but
30 would require years to several decades to functionally replace habitat that has been affected and for
31 trees to attain sufficient size and structure suitable for established rookeries. This time lag between
32 the removal and restoration of nesting habitat could have a substantial impact on cormorants,
33 herons and egrets in the near-term time period.

34 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
35 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson's hawk
36 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
37 within the 125-acre block are removed. These mature trees would be supplemented with additional
38 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
39 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
40 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
41 system for every tree 20 feet or taller removed by construction during the near-term period. A
42 variety of native tree species would be planted to provide trees with differing growth rates,
43 maturation, and life span. Replacement trees that were incorporated into the riparian restoration
44 would not be clustered in a single region of the study area, but would be distributed throughout

1 protected lands. Further details of AMM18 are provided in Appendix 3B, *Environmental*
2 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
7 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
8 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
9 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
10 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
11 black-crowned night heron are not species that are covered under the BDCP. To avoid adverse
12 effects on individuals, existing nests and rookeries would have to be avoided. Mitigation Measure
13 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and
14 Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to address effects on
15 nesting cormorants, herons, and egrets.

16 ***Late Long-Term Timeframe***

17 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting
18 habitat for cormorants, herons, and egrets. Alternative 1C as a whole would result in the permanent
19 loss of and temporary effects on 933 acres of potential breeding habitat (5% of the potential
20 breeding habitat in the study area).

21 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
22 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural*
23 *Communities Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of
24 valley/foothill riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The
25 majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve system
26 with extensive wide bands or large patches of valley/foothill riparian natural community
27 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
28 restoration would expand the patches of existing riparian forest in order to support nesting habitat
29 for riparian species. The Plan's objectives would also benefit cormorants, herons, and egrets by
30 protecting small but essential habitats that occur within cultivated lands, such as tree rows along
31 field borders or roads, and small clusters of trees in farmyards or rural residences (Objective
32 CLNC1.3). In addition, the distribution and abundance of potential nest trees would be increased by
33 planting and maintaining native trees along roadsides and field borders within protected cultivated
34 lands at a rate of one tree per 10 acres (Objective SWHA2.1).

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
36 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
37 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
38 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
39 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
40 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
41 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
42 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
43 black-crowned night heron are not species that are covered under the BDCP. These species are
44 highly traditional in their use of nest sites and, for the BDCP to avoid an adverse effect on

1 individuals, preconstruction surveys would be required to ensure that nests are detected and any
2 direct and indirect impacts on rookeries are avoided. Mitigation Measure BIO-75, *Conduct*
3 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure
4 BIO-117, *Avoid Impacts on Rookeries*, would be available to address adverse effects on nesting
5 cormorants, herons, and egrets.

6 **NEPA Effects:** The loss of cormorant, heron, and egret habitat and potential for direct mortality of
7 these special-status species under Alternative 1C would represent an adverse effect in the absence
8 of other conservation actions. However, with habitat protection and restoration associated with
9 CM3, CM5, CM7, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–
10 AMM7 and AMM18 *Swainson's Hawk*, which would be in place throughout the construction period,
11 the effects of habitat loss on cormorants, herons, and egrets under Alternative 1C would not be
12 adverse. Double-crested cormorant, great blue heron, great egret, snowy egret, and black-crowned
13 night heron are not species that are covered under the BDCP. Mitigation Measure BIO-75, *Conduct*
14 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure
15 BIO-117, *Avoid Impacts on Rookeries*, would be available to address adverse effects on nesting
16 cormorants, herons, and egrets.

17 **CEQA Conclusion:**

18 **Near-Term Timeframe**

19 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
20 the near-term BDCP conservation strategy has been evaluated to determine whether it would
21 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
22 effects of construction would be less than significant under NEPA. Alternative 1C would remove 601
23 acres of nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These
24 effects would result from the construction of the water conveyance facilities (CM1, 126 acres of
25 nesting habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
26 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
27 *Restoration*—475 acres of nesting habitat).

28 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
29 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for
30 breeding habitat. Using these ratios would indicate that 126 acres of breeding habitat should be
31 restored/created and 126 acres should be protected to compensate for the CM1 losses of modeled
32 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions
33 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of
34 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the
35 same typical NEPA and CEQA ratios.

36 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
37 system with extensive wide bands or large patches of valley/foothill riparian natural community
38 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
39 restoration would expand the patches of existing riparian forest in order to support nesting habitat
40 for these species. In addition, small but essential nesting habitat associated with cultivated lands
41 would also be maintained and protected such as isolated trees, tree rows along field borders or
42 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

1 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
 2 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
 3 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored
 4 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but
 5 would require years to several decades to functionally replace habitat that has been affected and for
 6 trees to attain sufficient size and structure suitable for established rookeries. This time lag between
 7 the removal and restoration of nesting habitat could have a substantial impact on cormorants,
 8 herons and egrets in the near-term time period.

9 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
 10 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson's hawk
 11 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
 12 within the 125-acre block are removed. These mature trees would be supplemented with additional
 13 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
 14 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
 15 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
 16 system for every tree 20 feet or taller removed by construction during the near-term period. A
 17 variety of native tree species would be planted to provide trees with differing growth rates,
 18 maturation, and life span. Replacement trees that were incorporated into the riparian restoration
 19 would not be clustered in a single region of the study area, but would be distributed throughout
 20 protected lands. Further details of AMM18 are provided in Appendix 3B, *Environmental*
 21 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 26 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 27 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 28 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 29 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
 30 black-crowned night heron are not species that are covered under the BDCP. For the BDCP to avoid a
 31 significant impact on individuals, preconstruction surveys for noncovered avian species would be
 32 required to ensure that nests are detected and avoided. Implementation of Mitigation Measure BIO-
 33 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and
 34 Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would reduce this potential impact to a
 35 less-than-significant level.

36 **Late Long-Term Timeframe**

37 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting
 38 habitat for cormorants, herons, and egrets. Alternative 1C as a whole would result in the permanent
 39 loss of and temporary effects on 933 acres of potential breeding habitat (5% of the potential
 40 breeding habitat in the study area).

41 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 42 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*
 43 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
 44 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of

1 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with
2 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives
3 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would
4 expand the patches of existing riparian forest in order to support nesting habitat for riparian
5 species. The Plan's objectives would also benefit cormorants, herons, and egrets by protecting small
6 but essential habitats that occur within cultivated lands, such as tree rows along field borders or
7 roads, and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition,
8 the distribution and abundance of potential nest trees would be increased by planting and
9 maintaining native trees along roadsides and field borders within protected cultivated lands at a
10 rate of one tree per 10 acres (Objective SWHA2.1).

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
15 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
16 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
17 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
18 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
19 black-crowned night heron are not species that are covered under the BDCP. These species are
20 highly traditional in their use of nest sites, and, for the BDCP to avoid a significant impact on
21 individuals, preconstruction surveys would be required to ensure that nests are detected and any
22 direct and indirect impacts on rookeries are avoided. Implementation of Mitigation Measure BIO-75,
23 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation
24 Measure BIO-117, *Avoid Impacts on Rookeries*, would reduce this potential impact to a less-than-
25 significant level.

26 In the absence of other conservation actions, effects on nesting cormorants, herons, and egrets
27 would represent an adverse effect as a result of habitat modification and potential for direct
28 mortality of special-status species. This impact would be significant. Considering Alternative 1C's
29 protection and restoration provisions, which would provide acreages of new or enhanced habitat in
30 amounts sufficient to compensate for the loss of riparian habitats lost to construction and
31 restoration activities, and with implementation of AMM1–AMM7, *AMM18 Swainson's Hawk*, and
32 Mitigation Measures BIO-75 and BIO-117, the loss of habitat or direct mortality through
33 implementation of Alternative 1C would not result in a substantial adverse effect through habitat
34 modifications and would not substantially reduce the number or restrict the range of these species.
35 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-
36 significant impact on cormorants, herons, and egrets.

37 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
38 **Disturbance of Nesting Birds**

39 See Mitigation Measure BIO-75 under Impact BIO-75.

40 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

41 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);
42 therefore, DWR will avoid all direct and indirect impacts on rookeries.

1 **Impact BIO-118: Effects Associated with Electrical Transmission Facilities on Cormorants,**
2 **Hérons and Egrets**

3 New transmission lines would increase the risk for bird-power line strikes, which could result in
4 injury or mortality of cormorants, herons and egrets. New transmission lines would increase the
5 risk for bird-power line strikes. Waterbirds have a higher susceptibility to collisions than passerines,
6 raptors, and other birds. Marking transmission lines with flight diverters that make the lines more
7 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
8 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
9 by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines
10 constructed for the project would be fitted with flight diverters, which would reduce bird strike risk
11 of cormorants, herons, and egrets.

12 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
13 could result in injury or mortality of cormorants, herons, and egrets. The implementation of *AMM20*
14 *Greater Sandhill Crane* would require the installation of bird flight diverters on all new transmission
15 lines, which could reduce bird strike risk of cormorants, herons, and egrets by 60%. With the
16 installation of bird flight diverters, the construction and operation of new transmission lines under
17 Alternative 1C would not result in an adverse effect on cormorants, herons, and egrets.

18 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
19 could result in injury or mortality of cormorants, herons, and egrets. The implementation of *AMM20*
20 *Greater Sandhill Crane* would require the installation of bird flight diverters on all new transmission
21 lines, which could reduce bird strike risk of cormorants, herons, and egrets by 60%. With the
22 installation of bird flight diverters, the construction and operation of new transmission lines under
23 Alternative 1C would result in a less-than-significant impact on cormorants, herons, and egrets.

24 **Impact BIO-119: Indirect Effects of Plan Implementation on Cormorants, Herons and Egrets**

25 **Indirect Construction- and Operation-Related Effects:** Construction noise above background
26 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
27 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
28 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
29 the extent to which these noise levels could affect cormorants, herons, or egrets. If cormorants,
30 herons or egrets were to nest in or adjacent to work areas, construction and subsequent
31 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting
32 behaviors, and reduce the functions of suitable nesting habitat for these species. Mitigation Measure
33 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
34 avoid the potential for adverse effects of construction-related activities on survival and productivity
35 of nesting cormorants, herons or egrets. The use of mechanical equipment during water conveyance
36 facilities construction could cause the accidental release of petroleum or other contaminants that
37 could affect cormorants, herons or egrets in the surrounding habitat. The inadvertent discharge of
38 sediment or excessive dust adjacent to suitable habitat could also have an adverse effect on these
39 species. *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*,
40 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff
41 from the construction area and negative effects of dust on active nests.

1 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
2 mercury in avian species, including cormorants, herons or egrets.

3 A detailed review of the methylmercury issues associated with implementation of the BDCP is
4 contained in Appendix 11F, *Substantive BDCP Revisions*. This review includes an overview of the
5 BDCP-related mechanisms that could result in increased mercury in the foodweb, and how exposure
6 of individual species to mercury may occur based on feeding habits and where species habitat
7 overlaps with the areas where mercury bioavailability could increase. Mercury is transformed into
8 the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to
9 regular wetting and drying such as tidal marshes and flood plains (Alpers et al.
10 2008). Bioaccumulation of methylmercury varies by species as there are taxonomic differences in
11 rates of detoxification within the liver (Eagles-Smith et al. 2009). Organisms feeding within pelagic-
12 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
13 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
14 segregation (Grimaldo et al. 2009). That is, the pelagic food chain tends to be longer than the benthic
15 food chain, which allows for greater biomagnification of methylmercury in top predators. Also, there
16 is less prey diversity at the top of the pelagic food chain than in the benthic food chain; pelagic top
17 predators eat smaller fish and little else, while benthic top predators consume a variety of
18 organisms, many of which are lower in the food chain than fishes and thus have less potential for
19 methylmercury biomagnification.

20 Largemouth bass was used as a surrogate species for analysis (Appendix 11F, *Substantive BDCP*
21 *Revisions*) and the modeled effects of mercury concentrations from changes in water operations
22 under CM1 on largemouth bass did not differ substantially from existing conditions; therefore,
23 results also indicate that cormorant, heron, and egret tissue concentrations would not measurably
24 increase as a result of CM1 implementation.

25 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to
26 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
27 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
28 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas
29 could increase bioavailability of mercury. Species sensitivity to methylmercury differs widely and
30 there is a large amount of uncertainty with respect to species-specific effects. Increased
31 methylmercury associated with natural community and floodplain restoration could indirectly effect
32 on cormorants, herons or egrets, via uptake in lower trophic levels (as described in BDCP Appendix
33 5.D, *Contaminants*). Mercury is generally elevated throughout the Delta, and restoration of the lower
34 potential areas in total may result in generalized, very low level increases of mercury. Given that
35 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in
36 some level of effects. Restoration in Suisun Marsh would convert managed wetlands to tidal
37 wetlands, which would be expected to result in an overall reduction in mercury methylation.

38 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
39 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
40 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
41 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
42 adaptive management as described in CM12 would be available to address the uncertainty of
43 methylmercury levels in restored tidal marsh and potential impacts on cormorants, herons or
44 egrets.

1 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
2 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
3 each restoration project. On a project-specific basis, where high potential for methylmercury
4 production is identified that restoration design and adaptive management cannot fully address
5 while also meeting restoration objectives, alternate restoration areas would be considered. CM12
6 would be implemented in coordination with other similar efforts to address mercury in the Delta,
7 and specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
8 would include the following actions.

- 9 • Assess pre-restoration conditions to determine the risk that the project could result in increased
10 mercury methylation and bioavailability
- 11 • Define design elements that minimize conditions conducive to generation of methylmercury in
12 restored areas.
- 13 • Define adaptive management strategies that can be implemented to monitor and minimize
14 actual postrestoration creation and mobilization of methylmercury.

15 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
16 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
17 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
18 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
19 2009). The effect of selenium toxicity differs widely between species and also between age and sex
20 classes within a species. In addition, the effect of selenium on a species can be confounded by
21 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
22 2009).

23 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
24 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
25 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
26 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
27 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
28 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
29 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
30 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
31 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
32 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
33 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
34 levels of selenium have a higher risk of selenium toxicity.

35 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
36 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
37 exacerbate bioaccumulation of selenium in avian species, including cormorants, herons, and egrets.
38 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
39 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
40 BDCP restoration activities that create newly inundated areas could increase bioavailability of
41 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
42 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
43 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
44 long-term increases in selenium concentrations in water in the Delta under any alternative.

1 However, it is difficult to determine whether the effects of potential increases in selenium
2 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
3 lead to adverse effects on cormorants, herons, and egrets.

4 Because of the uncertainty that exists at this programmatic level of review, there could be a
5 substantial effect on cormorants, herons, and egrets from increases in selenium associated with
6 restoration activities. This effect would be addressed through the implementation of *AMM27*
7 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
8 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
9 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
10 selenium management to reduce selenium concentrations and/or bioaccumulation would be
11 evaluated separately for each restoration effort as part of design and implementation. This
12 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
13 design schedule.

14 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
15 could reduce cormorant, heron, and egret use of modeled habitat adjacent to work areas. Moreover,
16 operation and maintenance of the water conveyance facilities, including the transmission facilities,
17 could result in ongoing but periodic postconstruction disturbances that could affect cormorant,
18 heron, and egret use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
19 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*
20 *Impacts on Rookeries*, would be available to address adverse effects on nesting individuals in
21 addition to AMM1–AMM7. Tidal habitat restoration could result in increased exposure of
22 cormorants, herons, and egrets to selenium. This effect would be addressed through the
23 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
24 restoration design elements to reduce the potential for bioaccumulation of selenium and its
25 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or
26 floodplain restoration could result in increased exposure of cormorants, herons or egrets to
27 methylmercury through the ingestion of fish in restored tidal areas. However, it is unknown what
28 concentrations of methylmercury are harmful to these species and the potential for increased
29 exposure varies substantially within the study area. Implementation of CM12 which contains
30 measures to assess the amount of mercury before project development, followed by appropriate
31 design and adaptation management, would minimize the potential for increased methylmercury
32 exposure, and would result in no adverse effect on cormorants, herons, and egrets.

33 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
34 sedimentation, and operations and maintenance of the water conveyance facilities would represent
35 an adverse effect in the absence of other conservation actions. This impact would be significant.
36 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
37 *Nesting Birds*, Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, and AMM1–AMM7, would
38 reduce this impact to a less-than-significant level.

39 Tidal habitat restoration could result in increased exposure of cormorants, herons, and egrets to
40 selenium which could result in mortality of special-status species. This effect would be addressed
41 through the implementation of *AMM27 Selenium Management*, which would provide specific tidal
42 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its
43 bioavailability in tidal habitats. With implementation of AMM27, potential for increased selenium
44 exposure would result in no adverse effect on the species.

1 The implementation of tidal natural communities restoration or floodplain restoration could result
2 in increased exposure of cormorants, herons or egrets to methylmercury, through the ingestion of
3 fish in tidally restored areas. However, it is unknown what concentrations of methylmercury are
4 harmful to these species. Implementation of CM12 which contains measures to assess the amount of
5 mercury before project development, followed by appropriate design and adaptation management,
6 would minimize the potential for increased methylmercury exposure, and would result in no
7 adverse effect on the species. With AMM1-AMM7, AMM27, and CM12 in place, in addition to the
8 implementation of Mitigation Measure BIO-75 and BIO-117 measures, indirect effects of plan
9 implementation would not result in a substantial adverse effect on cormorants, herons, and egrets
10 through habitat modification or potential mortality. Therefore, the indirect effects of Alternative 1C
11 implementation would have a less-than-significant impact on cormorants, herons, and egrets.

12 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
13 **Disturbance of Nesting Birds**

14 See Mitigation Measure BIO-75 under Impact BIO-75.

15 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

16 See Mitigation Measure BIO-117 under Impact BIO-117.

17 **Impact BIO-120: Periodic Effects of Inundation on Cormorants, Herons and Egrets as a Result**
18 **of Implementation of Conservation Components**

19 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
20 duration of inundation of approximately 51–92 acres of modeled breeding habitat for cormorants,
21 herons and egrets. However, increased periodic flooding is not expected to cause any adverse effect
22 on breeding habitat because trees in which nest sites are situated already withstand floods, the
23 increase in inundation frequency and duration is expected to remain within the range of tolerance of
24 riparian trees, and nest sites are located above floodwaters.

25 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
26 inundation of up to 266 acres of breeding habitat for cormorants, herons and egrets. The overall
27 effect of seasonal inundation in existing riparian natural communities is likely to be beneficial for
28 these species, because, historically, flooding was the main natural disturbance regulating ecological
29 processes in riparian areas, and flooding promotes the germination and establishment of many
30 native riparian plants.

31 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
32 sites because trees in which nest sites are situated already withstand floods, the increase in
33 inundation frequency and duration is expected to remain within the range of tolerance of riparian
34 trees, and nest sites are located above floodwaters. Therefore, increased duration of inundation
35 from CM2 and CM5 would not result in an adverse effect on cormorants, herons and egrets.

36 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
37 nest sites because trees in which nest sites are situated already withstand floods, the increase in
38 inundation frequency and duration is expected to remain within the range of tolerance of riparian
39 trees, and nest sites are located above floodwaters. Therefore, increased duration of inundation
40 from CM2 and CM5 would have a less-than-significant impact on cormorants, herons and egrets.

1 **Short-Eared Owl and Northern Harrier**

2 This section describes the effects of Alternative 1C, including water conveyance facilities
3 construction and implementation of other conservation components, on short-eared owl and
4 northern harrier. Modeled habitat for short-eared owl and northern harrier include tidal brackish
5 and freshwater emergent wetland, nontidal freshwater perennial emergent wetland, managed
6 wetland, other natural seasonal wetland, grassland, alkali seasonal wetland, vernal pool complex,
7 and selected cultivated lands (grain and hay crops, pasture [including alfalfa], rice, truck, nursery,
8 and berry crops [including tomatoes and melons], beets, and idle lands).

9 Construction and restoration associated with Alternative 1C conservation measures would result in
10 both temporary and permanent losses of modeled habitat for short-eared owl and northern harrier
11 as indicated in Table 12-1C-46. Full implementation of Alternative 1C would include the following
12 conservation actions over the term of the BDCP which would benefit short-eared owl and northern
13 harrier (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 14 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at
15 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
16 with CM4).
- 17 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,
18 and/or 7 (Objective TFEWNC1.2, associated with CM4).
- 19 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
20 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
21 associated with CM10).
- 22 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
23 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
24 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 25 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 26 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
27 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 28 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
29 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 30 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
31 VPNC2.5, and GNC2.4, associated with CM11).

32 As explained below, with the restoration or protection of these amounts of habitat, in addition to
33 management activities that would enhance habitat for these species and the implementation of
34 AMM1–AMM7, *AMM27 Selenium Management*, and Mitigation Measures BIO-75 and BIO-121,
35 impacts on short-eared owl and northern harrier would not be adverse for NEPA purposes and
36 would be less than significant for CEQA purposes.

1 **Table 12-1C-46. Changes in Short-Eared Owl and Northern Harrier Modeled Habitat Associated**
2 **with Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting and foraging	3,166	3,166	4,779	4,779	NA	NA
Total Impacts CM1		3,166	3,166	4,779	4,779	NA	NA
CM2–CM18	Nesting and foraging	12,281	46,700	471	1,224	2,926–8,060	5,978
Total Impacts CM2–CM18		12,281	46,700	471	1,224	2,926–8,060	5,978
TOTAL IMPACTS		15,447	49,866	5,250	6,003	2,926–8,060	5,978

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-121: Loss or Conversion of Habitat for and Direct Mortality of Short-Eared Owl**
5 **and Northern Harrier**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss
7 of up to 55,869 acres of modeled habitat for short-eared owl and northern harrier (of which 49,866
8 acres would be a permanent loss and 6,003 acres would be a temporary loss of habitat, Table 12-1C-
9 46). Conservation measures that would result in these losses are conveyance facilities and
10 transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo
11 Bypass Fisheries Enhancement (CM2), Tidal Natural Communities Restoration (CM4), Seasonally
12 Inundated Floodplain Restoration (CM5), Grassland Natural Community Restoration (CM8), Vernal
13 Pool Natural Community and Alkali Seasonal Wetland Complex Restoration (CM9), Nontidal Marsh
14 Restoration (CM10) and Conservation Hatcheries (CM18). The majority of habitat loss would result
15 from CM4. Habitat enhancement and management activities (CM11), which include ground
16 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In
17 addition, maintenance activities associated with the long-term operation of the water conveyance
18 facilities and other BDCP physical facilities could degrade or eliminate short-eared owl and northern
19 harrier modeled habitat. Each of these individual activities is described below. A summary
20 statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the individual
21 conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would
23 result in the combined permanent and temporary loss of up to 7,945 acres of modeled short-
24 eared owl and northern harrier habitat (3,166 acres of permanent loss, 4,779 acres of

1 temporary loss) from CZs 3, 5, 6, 8, and 9. The majority of habitat removed would be grassland
 2 and cultivated lands. The permanent losses would occur at various locations along the western
 3 canal route, at the intake sites along the Sacramento River, construction of the new forebay, and
 4 associated RTM storage areas. Both temporary and permanent losses of habitat would occur
 5 from the transmission line corridors west of the study area and along the tunnel alignment in
 6 the west Delta. The CM1 footprint overlaps with two northern harrier occurrences in the study
 7 area (one temporary control structure work area and one potential borrow area in CZ 8 east of
 8 the new forebay). Mitigation Measure BIO-75 would be available to reduce adverse effects on
 9 harriers or short-eared owls nesting in the vicinity of work areas. Refer to the Terrestrial
 10 Biology Map Book for a detailed view of Alternative 1C construction locations.

- 11 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 12 would permanently remove 1,021 acres of modeled short-eared owl and northern harrier
 13 habitat in the Yolo Bypass in CZ 2. In addition, 471 acres of habitat would be temporarily
 14 removed. The impact would primarily consist of loss of acreages of pastures. The conversion is
 15 expected to occur during the first 10 years of Alternative 1C implementation.
- 16 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 17 inundation would permanently remove an estimated 39,017 acres of modeled short-eared owl
 18 and northern harrier habitat. The majority of the losses would be managed wetlands and
 19 cultivated lands in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. Tidal restoration actions through CM4 would
 20 restore an estimated 55,000 acres of tidal natural communities. These restored wetland areas
 21 could provide suitable nesting habitat for short-eared owl and northern harrier. Consequently,
 22 although existing nesting habitat for short-eared owl and northern harrier would be removed,
 23 restoration of wetland habitats is expected to benefit marsh associated ground nesting birds by
 24 increasing the extent and value of their nesting habitat. Grizzley Island supports the only known
 25 resident population of short-eared owls in the Suisun Marsh and Sacramento-San Joaquin River
 26 Delta (Roberson 2008). Grizzley Island does not overlap with the hypothetical footprint for CM4.
 27 However, this is an important breeding area for short-eared owl and if restoration footprints
 28 were changed during the implementation process of BDCP to overlap with this area, the effects
 29 on breeding short-eared owls could likely be adverse. Future NEPA and CEQA analysis would be
 30 conducted for restoration projects under BDCP and if restoration was proposed to occur outside
 31 of the hypothetical footprints used for this programmatic analysis, potential impacts on these
 32 species would be captured in the project-level analysis (Appendix 3B, *Environmental*
 33 *Commitments, AMMs, and CMs*).
- 34 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 35 seasonally inundated floodplain would permanently and temporarily remove approximately
 36 2,086 acres of modeled short-eared owl and northern harrier habitat (1,332 permanent, 754
 37 temporary). These losses would be expected to occur along the San Joaquin River and other
 38 major waterways in CZ 7.
- 39 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
 40 approximately 623 acres of short-eared owl and northern harrier habitat as part of tidal
 41 restoration and 2,479 acres of habitat as part of seasonal floodplain restoration.
- 42 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
 43 implemented on agricultural lands and would result in the conversion of 1,066 acres of
 44 cultivated lands to grassland in CZs 1, 2, 4, 5, 7, 8, and 11. The resulting 2,000 acres of grassland
 45 would provide habitat for short-eared owl and northern harrier.

- 1 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
2 actions included in *CM11 Natural Communities Enhancement and Management* that are designed
3 to enhance wildlife values in restored or protected habitats could result in localized ground
4 disturbances that could temporarily remove small amounts of modeled habitat. Ground-
5 disturbing activities, such as removal of nonnative vegetation and road and other infrastructure
6 maintenance activities, would be expected to have minor adverse effects on available habitat
7 and would be expected to result in overall improvements to and maintenance of habitat values
8 over the term of the BDCP. Habitat management- and enhancement-related activities could
9 short-eared owl and northern harrier nests. If either species were to nest in the vicinity of a
10 worksite, equipment operation could destroy nests, and noise and visual disturbances could
11 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
12 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
13 be available to minimize these adverse effects.
- 14 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of short-
15 eared owl and northern harrier habitat for the development of a delta and longfin smelt
16 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan
17 implementation.
- 18 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
19 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
20 disturbances that could affect short-eared owl and northern harrier use of the surrounding
21 habitat. Maintenance activities would include vegetation management, levee and structure
22 repair, and re-grading of roads and permanent work areas. These effects, however, would be
23 reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as described
24 below.
- 25 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
26 direct mortality of adult or fledged short-eared owl and northern harrier if they were present in
27 the Plan Area, because they would be expected to avoid contact with construction and other
28 equipment. If either species were to nest in the construction area, construction-related
29 activities, including equipment operation, noise and visual disturbances could destroy nests or
30 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
31 75 would be available to minimize these adverse effects.

32 The following paragraphs summarize the combined effects discussed above and describe other
33 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
34 included.

35 ***Near-Term Timeframe***

36 Because the water conveyance facilities construction is being evaluated at the project level, the near-
37 term BDCP conservation strategy has been evaluated to determine whether it would provide
38 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
39 construction would not be adverse under NEPA. Alternative 1C would remove 20,697 acres of
40 modeled habitat (15,447 permanent, 5,250 temporary) for short-eared owl and northern harrier in
41 the study area in the near-term. These effects would result from the construction of the water
42 conveyance facilities (CM1, 7,945 acres), and implementing other conservation measures (*CM2 Yolo*
43 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally*
44 *Inundated Floodplain Restoration*, *CM7, Riparian Natural Community Restoration*, *CM8 Grassland*

1 *Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation*
2 *Hatcheries—12,752 acres).*

3 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
4 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios
5 would indicate that 7,945 acres of habitat should be restored and 7,945 acres should be protected to
6 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term
7 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore
8 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern
9 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
10 protection).

11 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
12 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
13 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
14 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
15 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of*
16 *Alternatives*). These conservation actions are associated with CM3, CM4, and CM8 and would occur
17 in the same timeframe as the construction and early restoration losses.

18 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
19 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
20 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
21 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
22 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
23 of current levels of habitat fragmentation. Small mammal populations would also be increased on
24 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
25 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
26 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
27 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
28 other uncultivated areas would also be protected and maintained as part of the cultivated lands
29 reserve system which would provide additional foraging habitat and a source of rodent prey that
30 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
31 (including upland grassland components) would preserve habitat for short-eared owl and northern
32 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
33 objective would focus on highly degraded areas in order to provide the greatest possible level of
34 enhancement benefit to the managed wetland natural community and associated species. Managed
35 wetland protection and enhancement would be concentrated in Suisun Marsh, which currently
36 supports a high concentration of nesting short-eared owls on Grizzley Island.

37 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would
38 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and
39 northern harrier nest in tidal brackish and freshwater emergent wetland, nontidal freshwater
40 perennial emergent wetland, managed wetland, other natural seasonal wetland, grassland, alkali
41 seasonal wetland, vernal pool complex, and selected cultivated lands, which includes alfalfa,
42 irrigated pasture, and other grain fields. At least 15,400 acres of cultivated lands that provide
43 habitat for covered and other native wildlife species would be protected in the near-term time
44 period (Objective CLNC1.1). A minimum of 87% of cultivated lands protected by the late long-term
45 time period would be in alfalfa, irrigated pasture, and other hay crops (Objective SH1.2). This

1 biological objective provides an estimate for the proportion of cultivated lands protected in the
2 near-term time period which would provide suitable nesting and foraging habitat for short-eared
3 owl and northern harrier.

4 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
5 that would be applied to the project-level effects of CM1 and the effects from other near-term
6 restoration actions. The acres of restoration in the near-term satisfy the project-level effects of CM1,
7 but are 392 acres short of satisfying the compensation required for other near-term impacts.
8 Mitigation Measure BIO-121 *Compensate for Loss of Short-Eared Owl and Northern Harrier Nesting*
9 *Habitat*, would be available to address the adverse effect of near-term habitat loss.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
14 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
15 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
16 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
17 of the Final EIR/EIS.

18 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP
19 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would
20 be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
21 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
22 address this adverse effect.

23 **Late Long-Term Timeframe**

24 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting
25 and foraging habitat for short-eared owl and northern harrier. Alternative 1C as a whole would
26 result in the permanent loss of and temporary effects on 55,869 acres of modeled short-eared owl
27 and northern harrier habitat during the term of the Plan (14% of the modeled habitat in the study
28 area). The locations of these losses are described above in the analyses of individual conservation
29 measures.

30 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
31 *Restoration*, *CM4 Tidal Natural Communities Restoration*, and *CM8 Grassland Natural Community*
32 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
33 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect
34 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable
35 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in
36 Chapter 3).

37 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
38 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
39 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
40 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
41 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
42 of current levels of habitat fragmentation. Small mammal populations would also be increased on
43 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,

1 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
 2 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
 3 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
 4 other uncultivated areas would also be protected and maintained as part of the cultivated lands
 5 reserve system which would provide additional foraging habitat and a source of rodent prey that
 6 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
 7 (including upland grassland components) would preserve habitat for short-eared owl and northern
 8 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
 9 objective would focus on highly degraded areas in order to provide the greatest possible level of
 10 enhancement benefit to the managed wetland natural community and associated species. Managed
 11 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
 12 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the
 13 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time
 14 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands
 15 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared
 16 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated
 17 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected
 18 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated
 19 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*. All of these
 24 AMMs include elements that would avoid or minimize the risk of affecting individuals and species
 25 habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since been
 26 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
 27 the Final EIR/EIS. Short-eared owl and northern harrier are not species that are covered under the
 28 BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
 29 noncovered avian species would be required to ensure that active nests are detected and avoided.
 30 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
 31 *Nesting Birds*, would be available to address this adverse effect.

32 **NEPA Effects:** The loss of short-eared owl and northern harrier habitat and potential for direct
 33 mortality of these special-status species under Alternative 1C would represent an adverse effect in
 34 the absence of other conservation actions. With habitat protection and restoration associated with
 35 CM3, CM8, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would
 36 be in place throughout the construction period, the effects of habitat loss from Alternative 1C would
 37 not be adverse under NEPA. Short-eared owl and northern harrier are not covered species under the
 38 BDCP, and preconstruction surveys for noncovered avian species would be required to ensure that
 39 nests are detected and avoided. Mitigation Measure BIO-75 would be available to address the
 40 adverse effect of direct mortality on short-eared owl and northern harrier.

41 **CEQA Conclusion:**

42 **Near-Term Timeframe**

43 Because the water conveyance facilities construction is being evaluated at the project level, the near-
 44 term BDCP conservation strategy has been evaluated to determine whether it would provide

1 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
2 construction would be less than significant under CEQA. Alternative 1C would remove 20,697 acres
3 of modeled habitat (15,447 permanent, 5,250 temporary) for short-eared owl and northern harrier
4 in the study area in the near-term. These effects would result from the construction of the water
5 conveyance facilities (CM1, 7,945 acres), and implementing other conservation measures (*CM2 Yolo*
6 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally*
7 *Inundated Floodplain Restoration*, *CM7, Riparian Natural Community Restoration*, *CM8 Grassland*
8 *Natural Community Restoration*, *CM10 Nontidal Marsh Restoration*, and *CM18 Conservation*
9 *Hatcheries*—12,752 acres).

10 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
11 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios
12 would indicate that 7,945 acres of habitat should be restored and 7,945 acres should be protected to
13 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term
14 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore
15 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern
16 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
17 protection).

18 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
19 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
20 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
21 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
22 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation
23 actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the
24 construction and early restoration losses.

25 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
26 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
27 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
28 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
29 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
30 of current levels of habitat fragmentation. Small mammal populations would also be increased on
31 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
32 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
33 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
34 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
35 other uncultivated areas would also be protected and maintained as part of the cultivated lands
36 reserve system which would provide additional foraging habitat and a source of rodent prey that
37 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
38 (including upland grassland components) would preserve habitat for short-eared owl and northern
39 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
40 objective would focus on highly degraded areas in order to provide the greatest possible level of
41 enhancement benefit to the managed wetland natural community and associated species. Managed
42 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
43 high concentration of nesting short-eared owls on Grizzley Island.

44 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would
45 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and

1 northern harrier nest in tidal brackish and freshwater emergent wetland, nontidal freshwater
2 perennial emergent wetland, managed wetland, other natural seasonal wetland, grassland, alkali
3 seasonal wetland, vernal pool complex, and selected cultivated lands, which includes alfalfa,
4 irrigated pasture, and other grain fields. At least 15,400 acres of cultivated lands that provide
5 habitat for covered and other native wildlife species would be protected in the near-term time
6 period (Objective CLNC1.1). A minimum of 87% of cultivated lands protected by the late long-term
7 time period would be in alfalfa, irrigated pasture, and other hay crops (Objective SH1.2). This
8 biological objective provides an estimate for the proportion of cultivated lands protected in the
9 near-term time period which would provide suitable nesting and foraging habitat for short-eared
10 owl and northern harrier. These biological goals and objectives would inform the near-term
11 protection and restoration efforts and represent performance standards for considering the
12 effectiveness of restoration actions.

13 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
14 that would be applied to the project-level effects of CM1 and the effects from other near-term
15 restoration actions. The acres of restoration in the near-term satisfy the project-level effects of CM1,
16 but are 392 acres short of satisfying the compensation required for other near-term impacts. The
17 implementation of Mitigation Measure BIO-121 *Compensate for Loss of Short-Eared Owl and*
18 *Northern Harrier Nesting Habitat*, would reduce the impact of near-term habitat loss to a less-than-
19 significant level.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
24 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
25 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
26 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
27 of the Final EIR/EIS.

28 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP
29 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would
30 be required to ensure that nests are detected and avoided. The implementation of Mitigation
31 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
32 *Birds*, would reduce this potential impact to a less-than-significant level.

33 **Late Long-Term Timeframe**

34 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting
35 and foraging habitat for short-eared owl and northern harrier. Alternative 1C as a whole would
36 result in the permanent loss of and temporary effects on 55,869 acres of modeled short-eared owl
37 and northern harrier habitat during the term of the Plan (14% of the modeled habitat in the study
38 area). The locations of these losses are described above in the analyses of individual conservation
39 measures.

40 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
41 *Restoration*, *CM4 Tidal Natural Communities Restoration*, and *CM8 Grassland Natural Community*
42 *Restoration*, to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
43 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect
44 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable

1 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in
2 Chapter 3).

3 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
4 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
5 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
6 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
7 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
8 of current levels of habitat fragmentation. Small mammal populations would also be increased on
9 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
10 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
11 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
12 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
13 other uncultivated areas would also be protected and maintained as part of the cultivated lands
14 reserve system which would provide additional foraging habitat and a source of rodent prey that
15 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
16 (including upland grassland components) would preserve habitat for short-eared owl and northern
17 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
18 objective would focus on highly degraded areas in order to provide the greatest possible level of
19 enhancement benefit to the managed wetland natural community and associated species. Managed
20 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
21 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the
22 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time
23 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands
24 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared
25 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated
26 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected
27 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated
28 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
33 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
34 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
35 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
36 of the Final EIR/EIS. Short-eared owl and northern harrier are not species that are covered under
37 the BDCP. For the BDCP to have a less-than-significant impact on individuals, preconstruction
38 surveys for noncovered avian species would be required to ensure that active nests are detected and
39 avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
40 *Disturbance of Nesting Birds*, would be reduce the impact to a less-than-significant level.

41 In the absence of other conservation actions, effects on short-eared owl and northern harrier would
42 represent an adverse effect as a result of habitat modification and potential for direct mortality of
43 special-status species. This impact would be significant. Considering Alternative 1C's protection and
44 restoration provisions, which would provide acreages of new high-value or enhanced habitat in
45 amounts suitable to compensate for habitats lost to construction and restoration activities, and with
46 the implementation of AMM1-AMM7 and Mitigation Measures BIO-75 and BIO-121, the loss of

1 habitat or direct mortality through implementation of Alternative 1C would not result in a
2 substantial adverse effect through habitat modifications and would not substantially reduce the
3 number or restrict the range of either species. Therefore, the loss of habitat or potential mortality
4 under this alternative would have a less-than-significant impact on short-eared owl and northern
5 harrier.

6 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
7 **Disturbance of Nesting Birds**

8 See discussion of Mitigation Measure BIO-75 under Impact BIO-75.

9 **Mitigation Measure BIO-121: Compensate for Loss of Short-Eared Owl and Northern**
10 **Harrier Nesting Habitat**

11 DWR will restore and protect sufficient acres of suitable nesting habitat for short-eared owl and
12 northern harrier such that the total acres of habitat impacted in the near-term timeframe are
13 mitigated at a ratio of 1:1. Restored habitat could consist of grassland or managed wetlands.

14 **Impact BIO-122: Effects on Short-Eared Owl and Northern Harrier Associated with Electrical**
15 **Transmission Facilities**

16 New transmission lines would increase the risk that short-eared owl and northern harrier could be
17 subject to power line strikes, which could result in injury or mortality of these species. Short-eared
18 owl and northern harrier would be at low risk of bird strike mortality based on their keen eyesight
19 and largely ground-based foraging behavior (BDCP Appendix 5.J, Attachment 5.J-2, *Memorandum:*
20 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). The existing network of
21 transmission lines in the project area currently poses the same small risk for these species, and any
22 incremental risk associated with the new power line corridors would also be expected to be low.
23 Marking transmission lines with flight diverters that make the lines more visible to birds has been
24 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated
25 that marking devices in the Central Valley could reduce avian mortality by 60%. With the
26 implementation of *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted
27 with flight diverters, which would further reduce any bird strike risk of short-eared owl and
28 northern harrier.

29 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
30 adverse effect on short-eared owl or northern harrier because the risk of bird strike is considered to
31 be low for both species based on their keen eyesight and behavioral characteristics. New
32 transmission lines would minimally increase the risk for short-eared owl and northern harrier
33 power line strikes. All new transmission lines constructed for the project would be fitted with bird
34 diverters (*AMM20 Greater Sandhill Crane*), which have been shown to reduce avian mortality by
35 60% and which would further reduce any potential for powerline collisions. Therefore, the
36 construction and operation of transmission lines under Alternative 1C would not result in an
37 adverse effect on short-eared owl or northern harrier.

38 **CEQA Conclusion:** The construction and presence of new transmission lines would not result in a
39 significant impact on short-eared owl or northern harrier because the risk of bird strike is
40 considered to be low for both species based on their keen eyesight and behavioral characteristics.
41 New transmission lines would minimally increase the risk for short-eared owl and northern harrier
42 power line strikes. All new transmission lines constructed for the project would be fitted with bird

1 diverters (*AMM20 Greater Sandhill Crane*), which have been shown to reduce avian mortality by
2 60% and which would further reduce any potential for powerline collisions. Therefore, the
3 construction and operation of transmission lines under Alternative 1C would result in a less-than-
4 significant impact on short-eared owl or northern harrier.

5 **Impact BIO-123: Indirect Effects of Plan Implementation on Short-Eared Owl and Northern** 6 **Harrier**

7 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
8 with construction-related activities could result in temporary disturbances that affect short-eared
9 owl and northern harrier use of modeled habitat. Construction noise above background noise levels
10 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
11 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
12 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
13 which these noise levels could affect short-eared owl or northern harrier. Indirect effects associated
14 with construction include noise, dust, and visual disturbance caused by grading, filling, contouring,
15 and other ground-disturbing operations. Construction-related noise and visual disturbances could
16 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could
17 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*
18 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse
19 effects on active nests. The use of mechanical equipment during water conveyance construction
20 could cause the accidental release of petroleum or other contaminants that could affect these
21 species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best*
22 *Management Practices and Monitoring*, would minimize the likelihood of such spills from occurring.
23 The inadvertent discharge of sediment or excessive dust adjacent to short-eared owl and northern
24 harrier could also have a negative effect on these species. AMM1–AMM7 would ensure that
25 measures are in place to prevent runoff from the construction area and the negative effects of dust
26 on wildlife adjacent to work areas.

27 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
28 mercury in avian species, including short-eared owl and northern harrier. Marsh (tidal and nontidal)
29 and floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
30 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
31 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
32 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
33 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity
34 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-
35 specific effects. Increased methylmercury associated with natural community and floodplain
36 restoration could indirectly affect short-eared owl and northern harrier, via uptake in lower trophic
37 levels (as described in BDCP Appendix 5.D, *Contaminants*).

38 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
39 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
40 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
41 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
42 adaptive management as described in CM12 would be available to address the uncertainty of
43 methylmercury levels in restored tidal marsh and potential impacts on short-eared owl and
44 northern harrier.

1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 5 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 6 classes within a species. In addition, the effect of selenium on a species can be confounded by
 7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 8 2009).

9 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 10 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 11 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 12 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 13 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 14 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 15 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 16 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 17 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 18 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
 19 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 20 levels of selenium have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 22 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 23 exacerbate bioaccumulation of selenium in avian species, including short-eared owl and northern
 24 harrier. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
 25 selenium, and therefore increase avian exposure from ingestion of prey items with elevated
 26 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase
 27 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).
 28 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was
 29 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
 30 in substantial, long-term increases in selenium concentrations in water in the Delta under any
 31 alternative. However, it is difficult to determine whether the effects of potential increases in
 32 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)
 33 would lead to adverse effects on short-eared owl and northern harrier.

34 Because of the uncertainty that exists at this programmatic level of review, there could be a
 35 substantial effect on short-eared owl and northern harrier from increases in selenium associated
 36 with restoration activities. This effect would be addressed through the implementation of *AMM27*
 37 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 38 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
 39 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
 40 selenium management to reduce selenium concentrations and/or bioaccumulation would be
 41 evaluated separately for each restoration effort as part of design and implementation. This
 42 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
 43 design schedule.

1 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
2 could reduce short-eared owl and northern harrier use of modeled habitat adjacent to work areas.
3 Moreover, operation and maintenance of the water conveyance facilities, including the transmission
4 facilities, could result in ongoing but periodic postconstruction disturbances that could affect short-
5 eared owl and northern harrier use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*
6 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
7 address adverse effects on nesting individuals in addition to AMM1–AMM7. Tidal habitat restoration
8 could result in increased exposure of short-eared owl and northern harrier to selenium. This effect
9 would be addressed through the implementation of *AMM27 Selenium Management*, which would
10 provide specific tidal habitat restoration design elements to reduce the potential for
11 bioaccumulation of selenium and its bioavailability in tidal habitats.

12 Tidal habitat restoration is unlikely to have an adverse effect on short-eared owl and northern
13 harrier through increased exposure to methylmercury, as these species currently nest and forage in
14 tidal marshes where elevated methylmercury levels exist. However, it is unknown what
15 concentrations of methylmercury are harmful to the species and the potential for increased
16 exposure varies substantially within the study area. Site-specific restoration plans in addition to
17 monitoring and adaptive management, described in CM12 *Methylmercury Management*, would
18 address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning
19 phase of marsh restoration would be the appropriate place to assess the potential for risk of
20 methylmercury exposure for short-eared owl and northern harrier, once site specific sampling and
21 other information could be developed.

22 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
23 operations and maintenance of the water conveyance facilities would have a less-than-significant
24 impact on short-eared owl and northern harrier with the implementation of Mitigation Measure
25 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and
26 AMM1–AMM7. Tidal habitat restoration is unlikely to have a significant impact on short-eared owl
27 and northern harrier through increased exposure to methylmercury, as these species currently nest
28 and forage in tidal marshes where elevated methylmercury levels exist. However, it is unknown
29 what concentrations of methylmercury are harmful to these species. Site-specific restoration plans
30 that address the creation and mobilization of mercury, as well as monitoring and adaptive
31 management as described in CM12 would better inform potential impacts and address the
32 uncertainty of methylmercury levels in restored tidal marsh in the study area. Tidal habitat
33 restoration could result in increased exposure of short-eared owl and northern harrier to selenium.
34 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
35 would provide specific tidal habitat restoration design elements to reduce the potential for
36 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of
37 Alternative 1C implementation would result in a less-than-significant impact on short-eared
38 owl and northern harrier.

39 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
40 **Disturbance of Nesting Birds**

41 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-124: Periodic Effects of Inundation on Short-Eared Owl and Northern Harrier as a**
2 **Result of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
4 *Enhancement*) would increase the frequency and duration of inundation on approximately 2,926–
5 8,060 acres of modeled short-eared owl and northern harrier habitat (Table 12-1C-46).

6 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
7 *Restoration* could result in the periodic inundation of up to approximately 5,978 acres of modeled
8 habitat (Table 12-1C-46), the majority of which would be pasture and other cultivated lands.

9 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
10 season due to periodic inundation. However, inundation would occur during the nonbreeding
11 season and would not be expected to have an adverse effect on either species.

12 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on short-
13 eared owl and northern harrier because inundation is expected to occur prior to the breeding
14 season.

15 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on short-
16 eared owl and northern harrier because inundation is expected to occur prior to the breeding
17 season.

18 **Redhead and Tule Greater White-Fronted Goose**

19 Impacts, relevant protection and restoration actions, and mitigation requirements under CEQA are
20 discussed for these species in the *General Terrestrial Biology Effects* section under Impacts BIO-178
21 through BIO-183. Further details of the methods of analysis for waterfowl and shorebirds can be
22 found in the *BDCP Waterfowl and Shorebird Effects Analysis* (Ducks Unlimited 2013).

23 **Mountain Plover**

24 This section describes the effects of Alternative 1C, including water conveyance facilities
25 construction and implementation of other conservation components, on mountain plover. Modeled
26 habitat for mountain plover consists of grassland, alkali seasonal wetland, vernal pool complex,
27 alfalfa, grain and hay, pasture, and idle cropland throughout the study area.

28 Construction and restoration associated with Alternative 1C conservation measures would result in
29 both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table
30 12-1C-47. Full implementation of Alternative 1C would include the following biological objectives
31 over the term of the BDCP which would also benefit the mountain plover (BDCP Chapter 3,
32 *Conservation Strategy*).

- 33 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
34 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
35 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 36 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 37 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
38 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).

- 1 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
2 VPNC2.5, GNC2.4, associated with CM11).
- 3 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
4 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 5 • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
6 cultivated lands as Swainson’s hawk foraging habitat with at least 50% in very high-value
7 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

8 As explained below, with the restoration or protection of these amounts of habitat, in addition to
9 management activities that would enhance these natural communities for the species, impacts on
10 mountain plover would not be adverse for NEPA purposes and would be less than significant for
11 CEQA purposes.

12 **Table 12-1C-47. Changes in Mountain Plover Modeled Habitat Associated with Alternative 1C**
13 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Wintering	2,796	2,796	3,750	3,750	NA	NA
Total Impacts CM1		2,796	2,796	3,750	3,750	NA	NA
CM2–CM18	Wintering	5,450	26,198	376	893	1,158–3,650	3,823
Total Impacts CM2–CM18		5,450	26,198	376	893	1,158–3,650	3,823
TOTAL IMPACTS		8,246	28,994	4,126	4,643	1,158–3,650	3,823

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

14

15 **Impact BIO-125: Loss or Conversion of Habitat for and Direct Mortality of Mountain Plover**

16 Alternative 1C conservation measures would result in the combined permanent and temporary loss
17 of up to 33,668 acres of modeled habitat for mountain plover (28,994 acres of permanent loss and
18 4,643 of temporary loss, Table 12-1C-47). Conservation measures that would result in these losses
19 are conveyance facilities and transmission line construction, and establishment and use of borrow
20 and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4),
21 floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), vernal pool
22 and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of
23 conservation hatcheries (CM18). The majority of habitat loss (20,880 acres) would result from CM4.
24 Habitat enhancement and management activities (CM11), which include ground disturbance or

1 removal of nonnative vegetation, and the construction of recreational trails, signs, and facilities,
2 could result in local adverse habitat effects. In addition, maintenance activities associated with the
3 long-term operation of the water conveyance facilities and other BDCP physical facilities could
4 degrade or eliminate mountain plover modeled wintering habitat. Each of these individual activities
5 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA
6 conclusion follow the individual conservation measure discussions.

- 7 ● *CM1 Water Facilities and Operation:* Construction of Alternative 1C conveyance facilities would
8 result in the combined permanent and temporary loss of up to 6,546 acres of modeled mountain
9 plover habitat (2,796 acres of permanent loss, 3,750 acres of temporary loss) from CZs 1, 3, 5, 6,
10 8, and 9. The majority of habitat that would be removed would be in CZ 8, west of the Clifton
11 Court Forebay from the construction of the new forebay and the associated borrow and spoil
12 areas. Larger areas of annual grassland would be permanently removed by canal construction
13 south of Rock Slough, south of Discovery Bay and immediately west of Clifton Court Forebay.
14 Both temporary and permanent losses of grassland would be created by constructing the
15 transmission corridor west of the Plan Area and along the tunnel alignment in the west Delta.
16 The transmission corridor in the western tail of the study area as it is currently designed, would
17 consist of a permanent 230 kV transmission line parallel to Flannery Road, which is an
18 important wintering area for mountain plover. Mountain plovers use the grasslands, pastures,
19 and recently plowed fields in this area for foraging during winter months. Existing transmission
20 lines in the western tail include two 500 kV lines that intersect Canright Road, in addition to a
21 500 kV line and a 230 kV line that intersect Lambie Road at the western end of the study area.
22 The construction of the new transmission line along Flannery Road would be expected to cause
23 temporary disturbance to mountain plovers if construction were to occur during the winter
24 months. However, mountain plovers tend to forage in open areas and are more likely to use
25 areas of pastures and fields that are not in close proximity to roads. Foraging individuals would
26 be expected to move to adjacent suitable habitat north of Flannery Road during construction.
27 Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1C construction
28 locations.
- 29 ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
30 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
31 mountain plover wintering habitat (898 acres of permanent loss, 376 acres of temporary loss) in
32 the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of grassland and pasture.
33 Most of the grassland losses would occur at the north end of the bypass below Fremont Weir,
34 along the Toe Drain/Tule Canal, and along the west side channels. Realignment of Putah Creek
35 could also involve excavation and grading in alkali seasonal wetland complex habitat as a new
36 channel is constructed. The loss is expected to occur during the first 10 years of Alternative 1C
37 implementation.
- 38 ● *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and
39 inundation would permanently remove an estimated 20,880 acres of modeled mountain plover
40 habitat. The majority of the acres lost would consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or
41 7. Grassland losses would likely occur in the vicinity of Cache Slough, on Decker Island in the
42 West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow bands adjacent to
43 waterways in the South Delta ROA. Tidal restoration would directly impact and fragment
44 grassland just north of Rio Vista in and around French and Prospect Islands, and in an area
45 south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex habitat

- 1 would likely occur in the south end of the Yolo Bypass and on the northern fringes of Suisun
2 Marsh.
- 3 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
4 seasonally inundated floodplain would permanently and temporarily remove approximately
5 1,450 acres of modeled mountain plover habitat (933 permanent, 517 temporary). These losses
6 would be expected after the first 10 years of Alternative 1C implementation along the San
7 Joaquin River and other major waterways in CZ 7.
 - 8 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
9 approximately 370 acres of mountain plover wintering habitat as part of tidal restoration and
10 1,489 acres of habitat as part of seasonal floodplain restoration.
 - 11 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
12 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
13 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
14 would be restored after the construction periods. Grassland restoration would be implemented
15 on agricultural lands that also provide wintering habitat for mountain plover and would result
16 in the conversion of 837 acres of cultivated lands to grassland.
 - 17 • *CM10 Nontidal Marsh Restoration*: Implementation of *CM10 Nontidal Marsh Restoration* would
18 result in the permanent removal of 705 acres of mountain plover habitat.
 - 19 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
20 actions included in CM11 that are designed to enhance wildlife values in restored or protected
21 habitats could result in localized ground disturbances that could temporarily remove small
22 amounts of mountain plover habitat. Ground-disturbing activities, such as removal of nonnative
23 vegetation and road and other infrastructure maintenance activities, would be expected to have
24 minor adverse effects on available mountain plover habitat. CM11 would also include the
25 construction of recreational-related facilities including trails, interpretive signs, and picnic
26 tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of
27 trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
28 disturbed areas when and where possible. However, approximately 50 acres of grassland
29 habitat would be lost from the construction of trails and facilities.
 - 30 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
31 modeled mountain plover habitat for the development of a delta and longfin smelt conservation
32 hatchery in CZ 1.
 - 33 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
34 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
35 disturbances that could affect mountain plover use of the surrounding habitat. Maintenance
36 activities would include vegetation management, levee and structure repair, and re-grading of
37 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7
38 and conservation actions as described below.
 - 39 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
40 mountain plover because foraging individuals would be expected to temporarily avoid the
41 increased noise and activity associated with construction areas.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
3 included.

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
8 effects of construction would not be adverse under NEPA. Alternative 1C would remove 12,372
9 acres (8,246 acres permanent, 4,126 acres temporary) of modeled mountain plover wintering
10 habitat in the study area in the near-term. These effects would result from the construction of the
11 water conveyance facilities (CM1, 6,546 acres), and implementing other conservation measures
12 (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian*
13 *Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and*
14 *Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and*
15 *Management and CM18 Conservation Hatcheries—5,826 acres).*

16 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
17 would be 2:1 for protection of habitat. Using this ratio would indicate that 13,092 acres should be
18 protected to compensate for the CM1 losses of 6,546 acres of mountain plover wintering habitat.
19 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,
20 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical
21 NEPA and CEQA ratio (2:1 for protection).

22 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
23 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
24 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
25 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,
26 and CM9 and would occur in the same timeframe as the construction and early restoration losses
27 thereby avoiding adverse effects of habitat loss on mountain plover wintering in the study area.
28 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
29 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
30 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
31 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
32 would expand mountain plover wintering habitat and reduce the effects of current levels of habitat
33 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
34 populations would be increased on protected lands, enhancing the foraging value of these natural
35 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat
36 for covered and other native wildlife species would provide approximately 15,400 acres of potential
37 wintering habitat for mountain plover (Objective CLNC1.1). Approximately 87% of cultivated lands
38 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-
39 and high-value crop types) for Swainson's hawk (Objective SH1.2) which are also modeled habitat
40 for wintering mountain plover. This biological objective provides an estimate for the high
41 proportion of cultivated lands protected in the near-term time period which would be suitable for
42 mountain plover.

1 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
 2 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
 3 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
 4 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term
 5 timeframe would need to include suitable crop types for these species in order to avoid the adverse
 6 effect of habitat loss resulting from CM1. The conservation commitment is 7,572 acres short of
 7 meeting the compensation for other near-term effects on mountain plover habitat. Mitigation
 8 Measure BIO-125, *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, would
 9 be available to address the adverse effect of near-term high-value habitat loss by providing crop
 10 management requirements for CM1 compensation and requiring acreage compensation for the
 11 other near-term effects.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 16 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 17 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 18 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 19 of the Final EIR/EIS.

20 ***Late Long-Term Timeframe***

21 Based on the habitat model, the study area supports approximately 269,411 acres of potential
 22 habitat for mountain plover. Alternative 1C as a whole would result in the permanent loss of and
 23 temporary effects on 33,688 acres of modeled mountain plover wintering habitat during the term of
 24 the Plan (13% of the total habitat in the study area). The locations of these losses are described
 25 above in the analyses of individual conservation measures. The Plan includes conservation
 26 commitments through *CM3 Natural Communities Protection and Restoration*, *CM8 Grassland Natural*
 27 *Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to
 28 protect 8,000 acres and restore 2,000 acres of grassland natural community, protect 600 acres of
 29 vernal pool complex, protect 150 acres of alkali seasonal wetland complex and protect 48,625 acres
 30 of cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3).
 31 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 32 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
 33 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
 34 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
 35 would expand habitat for mountain plover and reduce the effects of current levels of habitat
 36 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
 37 populations would be increased on protected lands, enhancing the foraging value of these natural
 38 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat
 39 for covered and other native wildlife species would provide approximately 15,400 acres of potential
 40 wintering habitat for mountain plover (Objective CLNC1.1). Approximately 42,275 acres of
 41 cultivated lands protected would be in alfalfa and pasture crop types (very high- and high-value crop
 42 types) for Swainson's hawk (Objective SH1.2) which would also provide potential wintering habitat
 43 for mountain plover.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
8 of the Final EIR/EIS.

9 **NEPA Effects:** The loss of mountain plover habitat and potential for mortality of this special-status
10 species under Alternative 1C would represent an adverse effect in the absence of other conservation
11 actions. With habitat protection and restoration associated with CM3, CM8, CM9, and CM11, guided
12 by biological goals and objectives and by AMM1–AMM7, which would be in place throughout the
13 construction period, and with implementation of Mitigation Measure BIO-125, *Compensate for the*
14 *Near-Term Loss of Mountain Plover Wintering Habitat*, the effects of habitat loss and potential for
15 direct mortality on mountain plover under Alternative 1C would not be adverse.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
19 the near-term BDCP conservation strategy has been evaluated to determine whether it would
20 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
21 effects of construction would be less than significant under CEQA. Alternative 1C would remove
22 12,372 acres (8,246 acres permanent, 4,126 acres temporary) of modeled mountain plover
23 wintering habitat in the study area in the near-term. These effects would result from the
24 construction of the water conveyance facilities (CM1, 6,546 acres), and implementing other
25 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
26 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*
27 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*
28 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

29 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
30 would be 2:1 for protection of habitat. Using this ratio would indicate that 13,092 acres should be
31 protected to compensate for the CM1 losses of 6,546 acres of mountain plover wintering habitat.
32 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,
33 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical
34 NEPA and CEQA ratio (2:1 for protection).

35 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
36 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
37 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
38 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
39 in the same timeframe as the construction and early restoration losses thereby avoiding significant
40 impacts of habitat loss on mountain plover. Grassland restoration and protection would occur in CZs
41 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11
42 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1
43 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and
44 vernal pool natural communities which would expand wintering habitat for mountain plover and

1 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
2 *Enhancement and Management*, insect prey populations would be increased on protected lands,
3 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
4 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would
5 provide approximately 15,400 acres of potential wintering habitat for mountain plover (Objective
6 CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time period would
7 be in alfalfa and pasture crop types (very high- and high-value crop types) for Swainson's hawk
8 (Objective SH1.2) which would also provide potential habitat for mountain plover wintering in the
9 study area. This biological objective provides an estimate for the high proportion of cultivated lands
10 protected in the near-term time period which would provide habitat for mountain plover.

11 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
12 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
13 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
14 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term
15 timeframe would need to include suitable crop types for these species in order to avoid the
16 significant impact of habitat loss resulting from CM1. The conservation commitment is 7,572 acres
17 short of meeting the compensation for other near-term effects on mountain plover habitat.
18 Implementation of Mitigation Measure BIO-125, *Compensate for the Near-Term Loss of Mountain*
19 *Plover Wintering Habitat*, would reduce the impacts of near-term habitat loss to a less-than-
20 significant level.

21 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
22 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
23 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
24 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
25 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
26 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
27 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
28 of the Final EIR/EIS.

29 ***Late Long-Term Timeframe***

30 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 33,688
31 acres of mountain plover habitat during the term of the Plan (13% of the total habitat in the study
32 area). The locations of these losses are described above in the analyses of individual conservation
33 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
34 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
35 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
36 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
37 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
38 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would
39 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,
40 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives
41 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal
42 wetland, and vernal pool natural communities which would expand wintering habitat for mountain
43 plover and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*
44 *Communities Enhancement and Management*, insect prey populations would be increased on
45 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,

1 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife
2 species would provide approximately 15,400 acres of potential habitat for mountain plover
3 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa
4 and pasture crop types (very high- and high-value crop types for Swainson's hawk under Objective
5 SH1.2) which would also provide habitat for mountain plover.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
10 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
11 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
12 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
13 of the Final EIR/EIS.

14 In the absence of other conservation actions, effects on mountain plover would represent an adverse
15 effect as a result of habitat modification and potential for direct mortality of special-status species.
16 This impact would be significant. Considering Alternative 1C's protection and restoration
17 provisions, which would provide acreages of new high-value or enhanced habitat in amounts
18 suitable to compensate for habitats lost to construction and restoration activities, and with the
19 implementation of AMM1-AMM7, and Mitigation Measure BIO-125, *Compensate for the Near-Term*
20 *Loss of Mountain Plover Wintering Habitat*, the loss of habitat or direct mortality through
21 implementation of Alternative 1C would not result in a substantial adverse effect through habitat
22 modifications and would not substantially reduce the number or restrict the range of mountain
23 plover. Therefore, the loss of habitat or potential mortality under this alternative would have a less-
24 than-significant impact on mountain plover.

25 **Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover** 26 **Wintering Habitat**

27 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
28 crops, or alfalfa to provide habitat for mountain plover such that the total acres of high-value
29 habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1. Additional grassland
30 protection, enhancement, and management may be substituted for the protection of high-value
31 cultivated lands.

32 **Impact BIO-126: Effects on Mountain Plover Associated with Electrical Transmission** 33 **Facilities**

34 The transmission corridor in the western tail of the study area as it is currently designed, would
35 consist of a permanent 230 kV transmission line parallel to Flannery Road, which is an important
36 wintering area for mountain plover. Mountain plovers use the grasslands, pastures, and recently
37 plowed fields in this area for foraging during winter months. Existing transmission lines in the
38 western tail include two 500 kV lines that intersect Canright Road, in addition to a 500 kV line and a
39 230 kV line that intersect Lambie Road at the western end of the study area. Mountain plovers
40 congregate in flocks during the winter and travel between grasslands and cultivated lands that
41 provide foraging habitat for the species. This flocking behavior puts them at risk of collisions with
42 powerlines. However, plovers exhibit low wing loading and high aspect-ratio wings and as a result
43 can maneuver relatively quickly around an obstacle such as a transmission line. Their wing

1 structure and design allows for rapid flight and quick, evasive actions. Marking transmission lines
2 with flight diverters that make the lines more visible to birds has been shown to reduce the
3 incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that marking devices
4 in the Central Valley could reduce avian mortality by 60%. Plovers are primarily visual foragers and,
5 therefore, the risk for collision would be further reduced by *AMM20 Greater Sandhill Crane*, which
6 would require the installation of bird flight diverters on all new transmission lines in the study area.

7 **NEPA Effects:** New transmission lines are not expected to have an adverse effect on mountain plover
8 because the probability of bird-powerline strikes is highly unlikely due to their flight behaviors. The
9 implementation of *AMM20 Greater Sandhill Crane* would require the installation of bird flight
10 diverters on all new transmission lines, which would further reduce any potential for mortality.
11 Therefore, the construction and operation of new transmission lines under Alternative 1C would not
12 result in an adverse effect on mountain plover.

13 **CEQA Conclusion:** New transmission lines would have a less-than-significant impact on mountain
14 plover because the probability of bird-powerline strikes is highly unlikely due to their flight
15 behaviors. The implementation of *AMM20 Greater Sandhill Crane* would require the installation of
16 bird flight diverters on all new transmission lines, which would further reduce any potential for
17 mortality. Therefore, the construction and operation of new transmission lines under Alternative 1C
18 would result in a less-than-significant impact on mountain plover.

19 **Impact BIO-127: Indirect Effects of Plan Implementation on Mountain Plover**

20 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt
21 foraging, and reduce the functions of suitable foraging habitat for mountain plover. Construction
22 noise above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from
23 the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*
24 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no
25 available data to determine the extent to which these noise levels could affect mountain plover.
26 Indirect effects associated with construction include noise, dust, and visual disturbance caused by
27 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical
28 equipment during water conveyance facilities construction could cause the accidental release of
29 petroleum or other contaminants that could affect these species or their prey in the surrounding
30 habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
31 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment
32 or excessive dust adjacent to mountain plover grassland habitat could also have a negative effect on
33 the species. However, AMM1–AMM7 would also ensure that measures would be in place to prevent
34 runoff from the construction area and the negative effects of dust on wildlife adjacent to work areas.

35 **NEPA Effects:** Indirect effects on mountain plover as a result of Alternative 1C implementation could
36 have adverse effects on the species through the modification of habitat. With the implementation of
37 AMM1–AMM7, indirect effects as a result of Alternative 1C implementation would not have an
38 adverse effect mountain plover.

39 **CEQA Conclusion:** Indirect effects on mountain plover as a result of Alternative 1C implementation
40 could have a significant impact on the species from modification of habitat. With the implementation
41 of AMM1–AMM7, indirect effects as a result of Alternative 1C implementation would have a less-
42 than-significant impact on mountain plover.

1 **Impact BIO-128: Periodic Effects of Inundation on Mountain Plover as a Result of**
2 **Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
4 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,884-
5 3,813 acres of modeled mountain plover foraging habitat (Table 12-1C-47).

6 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
7 *Restoration* could result in the periodic inundation of up to approximately 7,082 acres of modeled
8 habitat (Table 12-1C-47). Periodic inundation from CM2 and CM5 would not have an adverse effect
9 on mountain plover because birds would be expected to move to adjacent foraging habitat.

10 **NEPA Effects:** Implementation of CM2 and CM5 would periodically inundate suitable mountain
11 plover foraging habitat. However, periodic inundation would not have an adverse effect on
12 mountain plover because birds would be expected to move to adjacent foraging habitat.

13 **CEQA Conclusion:** Implementation of CM2 and CM5 would periodically inundate suitable mountain
14 plover foraging habitat. However, periodic inundation would have a less-than-significant impact on
15 mountain plover because birds would be expected to move to adjacent foraging habitat.

16 **Black Tern**

17 This section describes the effects of Alternative 1C, including water conveyance facilities
18 construction and implementation of other conservation components, on black tern. Modeled nesting
19 habitat for black tern in the study area is currently limited to rice in CZ 2.

20 Construction and restoration associated with Alternative 1C conservation measures would result in
21 both temporary and permanent losses of modeled habitat for black tern as indicated in Table 12-1C-
22 48. Full implementation of Alternative 1C would include the following biological objectives over the
23 term of the BDCP which would also benefit the black tern (BDCP Chapter 3, *Conservation Strategy*).

- 24 ● Protect 700 acres of cultivated lands, with at least 500 acres consisting of rice land, to expand
25 upon and buffer newly restored/created nontidal perennial habitat in CZ 2, (Objective GGS2.3,
26 associated with CM3).
- 27 ● Protect up to 1,700 acres of rice land or equivalent habitat (e.g., perennial wetland) in the Yolo
28 Bypass if this portion meets the criteria specified in CM3, *Reserve Design Requirements by Species*
29 for giant garter snake. Any remaining acreage (from a total 2,740 acre commitment) will consist
30 of rice land or equivalent-value habitat outside the Yolo Bypass in CZs 1, 2, 4, or 5 (Objective
31 GGS3.1, associated with CM3).
- 32 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
33 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 34 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
35 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
36 associated with CM10).

37 As explained below, with the restoration and protection of these amounts of habitat, in addition to
38 management activities that would enhance this habitat for the species, implementation of AMM1-
39 AMM7, and Mitigation Measure BIO-75, impacts on black tern would not be adverse for NEPA
40 purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-48. Changes in Black Tern Modeled Habitat Associated with Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2–CM18	Nesting	306	490	1	1	791–1,582	0
Total Impacts CM2–CM18		306	490	1	1	791–1,582	0
TOTAL IMPACTS		306	490	1	1	791–1,582	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-129a: Loss or Conversion of Habitat for and Direct Mortality of Black Tern**

4 Alternative 1C conservation measures would result in the permanent loss of up to 491 acres of
 5 modeled nesting habitat for black tern, consisting of rice and freshwater wetlands in CZ 2 (Table 12-
 6 1C-48). Conservation measures that would result in these losses are Yolo Bypass fisheries
 7 improvements (CM2), tidal habitat restoration (CM4), grassland restoration (CM8) and nontidal
 8 marsh restoration (CM10). Each of these individual activities is described below. A summary
 9 statement of the combined impacts and NEPA effects, and a CEQA conclusion follows the individual
 10 conservation measure discussions.

- 11 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
 12 would permanently remove 31 acres of modeled black tern habitat in the Yolo Bypass in CZ 2. In
 13 addition, 1 acre of habitat would be temporarily removed. The loss is expected to occur during
 14 the first 10 years of Alternative 1C implementation.
- 15 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and
 16 inundation would permanently remove an estimated 199 acres of modeled black tern habitat in
 17 CZ 2.
- 18 • *CM8 Grassland Natural Community Restoration:* Restoration of grassland is expected to be
 19 implemented on agricultural lands and would result in the conversion of 52 acres of rice lands
 20 to grassland in CZ 2 by the late-long time period. An estimated 30 acres of impact would occur in
 21 the first 10 years.
- 22 • *CM10 Nontidal Marsh Restoration:* Implementation of CM10 would result in the permanent
 23 removal of 208 acres of black tern nesting habitat in in CZ 2. An estimated 46 acres would be
 24 removed in the first 10 years.

- 1 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
2 actions that are designed to enhance wildlife values in restored or protected habitats could
3 result in localized ground disturbances that could temporarily remove small amounts of
4 modeled habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road
5 and other infrastructure maintenance activities, would be expected to have minor adverse
6 effects on available habitat and would be expected to result in overall improvements to and
7 maintenance of habitat values over the term of the BDCP. Habitat management- and
8 enhancement-related activities could disturb nesting black terns if they were to nest in the
9 vicinity of a worksite. Equipment operation could destroy nests, and noise and visual
10 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings. The
11 potential for these activities to result in direct mortality of black tern would be minimized with
12 the implementation of and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
13 *Surveys and Avoid Disturbance of Nesting Birds*.
- 14 • *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration
15 infrastructure could result in ongoing but periodic disturbances that could affect black tern
16 nesting adjacent to maintenance areas. Maintenance activities would include vegetation
17 management, levee and structure repair, and re-grading of roads and permanent work areas.
18 These effects, however, would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and
19 conservation actions as described below.
- 20 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
21 direct mortality of adult or fledged black tern individuals if they were present in the study area,
22 because they would be expected to avoid contact with construction and other equipment. If
23 black tern were to nest in the construction area, construction-related activities, including
24 equipment operation, noise and visual disturbances could destroy nests or lead to their
25 abandonment, resulting in mortality of eggs and nestlings. These effects would be avoided and
26 minimized with the implementation of Mitigation Measure BIO-75.
- 27 • *Late season flooding in the Yolo Bypass* could result in the loss of rice (nesting habitat for black
28 tern) by precluding the preparation and planting of rice fields. The methods for estimating loss
29 of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation*
30 *of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo Bypass*. This analysis
31 concludes that the estimated loss of rice could be up to 1,662 acres by the late long-term
32 timeframe. This potential impact is further described under Impact BIO-129c below.

33 The following paragraphs summarize the combined effects discussed above and describe other
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
35 included.

36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would
39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
40 effects of construction would not be adverse under NEPA. There would be no impacts on black tern
41 nesting habitat resulting from the construction of the water conveyance facilities (CM1). However,
42 there would be a loss of 307 acres of modeled nesting habitat for black tern in the study area in the
43 near-term. These effects would result from implementing *CM2 Yolo Bypass Fisheries Enhancements*,

1 *CM4 Tidal Natural Communities Restoration, CM8 Grassland Restoration and CM10 Nontidal Marsh*
2 *Restoration.*

3 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection and 1:1
4 restoration for the loss of black tern nesting habitat. Using this ratio would indicate that 307 acres of
5 rice lands and/or freshwater wetlands should be protected and 307 acres should be restored in CZ 2
6 to compensate for the losses of black tern nesting habitat.

7 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or
8 equivalent habitat and restoring 8,850 acres of tidal freshwater emergent wetland (see Table 3-4 in
9 Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3 and CM4
10 and would occur in the same timeframe as the early restoration losses. The BDCP also contains
11 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to
12 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria
13 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3
14 and GGS3.1) by the late long-term time period. The tidal freshwater emergent wetland would be
15 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*
16 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that
17 increase connectivity among protected lands (Objective TFEWNC2.2).

18 These objectives would inform the near-term protection actions, and therefore some portion of the
19 200 acres of rice and 700 acres of rice or equivalent habitat and the 8,850 acres of tidal freshwater
20 emergent wetland would be expected to be restored in CZ 2. However, there is no near-term acreage
21 commitment in the plan that is specific to CZ 2. In order to avoid an adverse effect on black tern from
22 habitat loss, protection and restoration of 307 acres of rice and/or freshwater wetlands would need
23 to occur in CZ 2 in the near-term timeframe. Mitigation Measure BIO-129a, *Compensate for Loss of*
24 *Black Tern Nesting Habitat*, would be available to address this adverse effect.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
26 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
27 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
28 *Countermeasure Plan, and AMM6 Disposal and Reuse of Spoils*. All of these AMMs include elements
29 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
30 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
31 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. Black
32 tern is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
33 preconstruction surveys for noncovered avian species would be required to ensure that nests are
34 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
35 *Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

36 **Late Long-Term Timeframe**

37 Alternative 1C as a whole would result in the permanent loss of 491 acres of modeled black tern
38 nesting habitat during the term of the Plan. This impact would result from the removal or
39 conversion of rice and freshwater wetlands in CZ 2. The Plan includes conservation commitments
40 through *CM3 Natural Communities Protection and Restoration* to protect 500 acres of rice lands (see
41 Table 3-4 in Chapter 3, *Description of Alternatives*) and up to 1,700 acres of rice lands or equivalent
42 habitat for the giant garter snake (Objective GGS3.1) in CZ 2. The nesting habitat for black tern in the
43 northern part of the study area has largely been reduced to rice lands, and these acres would
44 provide protected nesting habitat for the species. The Plan also includes conservation commitments

1 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
2 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1).

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils*. All of these AMMs include elements
7 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
8 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
9 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. Black
10 tern is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
11 preconstruction surveys for noncovered avian species would be required to ensure that nests are
12 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
13 *Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

14 **NEPA Effects:** The loss of black tern nesting habitat and potential for mortality of this special-status
15 species under Alternative 1C would represent an adverse effect in the absence of other conservation
16 actions. With habitat protection associated with CM3, guided by biological goals and objectives and
17 AMM1–AMM6, which would be in place throughout the construction period, the effects of habitat
18 loss on black tern under Alternative 1C would not be adverse. Black tern is not a covered species
19 under the BDCP, and the potential for mortality would be an adverse effect without preconstruction
20 surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
21 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
22 address this adverse effect.

23 **CEQA Conclusion:**

24 **Near-Term Timeframe**

25 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
26 the near-term BDCP conservation strategy has been evaluated to determine whether it would
27 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
28 effects of construction would be less than significant under CEQA. There would be no impacts on
29 black tern nesting habitat resulting from the construction of the water conveyance facilities (CM1).
30 However, there would be a loss of 307 acres of modeled nesting habitat for black tern in the study
31 area in the near-term. These effects would result from implementing *CM2 Yolo Bypass Fisheries*
32 *Enhancements*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Restoration*, and *CM10*
33 *Nontidal Marsh Restoration*.

34 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection and 1:1
35 restoration for the loss of black tern nesting habitat. Using this ratio would indicate that 307 acres of
36 rice lands and/or freshwater wetlands should be protected and restored in CZ 2 to mitigate the
37 losses of black tern nesting habitat.

38 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or
39 equivalent habitat and restoring 8,850 acres of tidal freshwater emergent wetland (see Table 3-4 in
40 Chapter 3 *Description of Alternatives*). These conservation actions are associated with CM3 and CM4
41 and would occur in the same timeframe as the early restoration losses. The BDCP also contains
42 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to
43 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria

1 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3
2 and GGS 3.1) by the late long-term time period. The tidal freshwater emergent wetland would be
3 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*
4 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that
5 increase connectivity among protected lands (Objective TFEWNC2.2).

6 These objectives would inform the near-term protection actions, and therefore some portion of the
7 200 acres of rice and 700 acres of rice or equivalent habitat and the 8,850 acres of tidal freshwater
8 emergent wetland would be expected to be restored and protected in CZ 2. However, there is no
9 near-term acreage commitment in the plan that is specific to CZ 2. In order to compensate for black
10 tern habitat loss, the protection and restoration of 307 acres of rice or freshwater wetlands would
11 need to occur in CZ 2 in the near-term timeframe. Mitigation Measure BIO-129a, *Compensate for Loss*
12 *of Black Tern Nesting Habitat*, would reduce this potential impact to a less-than-significant level.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
16 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils*. All of these AMMs include elements
17 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
18 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
19 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. Black
20 tern is not a covered species under the BDCP. For the BDCP to have a less-than-significant impact on
21 individuals, preconstruction would be required to ensure that nests are detected and avoided.

22 In the absence of other conservation actions, effects on black tern would represent an adverse effect
23 as a result of habitat modification and potential for direct mortality of a special-status species. This
24 impact would be significant. However, the BDCP has committed to habitat protection, restoration,
25 management and enhancement activities described above. As outlined in BDCP Chapter 3, Section
26 3.4, *Conservation Measures*, natural community restoration and protection are planned so that they
27 keep pace with project impacts. Thus, there would be minimal lag time between impacts and those
28 measures designed to offset those impacts on natural communities and the species that use them. In
29 addition, implementation of AMM1-AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction*
30 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-129a,
31 *Compensate for Loss of Black Tern Nesting Habitat*, which would require 1:1 protection of habitat in
32 CZ 2 in the near-term time frame, would reduce this potential impact to a less-than-significant level.

33 **Late Long-Term Timeframe**

34 Alternative 1C as a whole would result in the permanent loss of 491 acres of modeled black tern
35 nesting habitat during the term of the Plan. This impact would result from the removal or
36 conversion of rice and freshwater wetlands in CZ 2. The Plan includes conservation commitments
37 through *CM3 Natural Communities Protection and Restoration* to protect 500 acres of rice lands (see
38 Table 3-4 in Chapter 3, *Description of Alternatives*) and up to 1,700 acres of rice lands or equivalent
39 habitat for the giant garter snake (Objective GGS3.1) in CZ 2. The nesting habitat for black tern in the
40 northern part of the study area has largely been reduced to rice lands, and these acres would
41 provide protected nesting habitat for the species. The Plan also includes conservation commitments
42 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
43 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1).

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, and AMM6 Disposal and Reuse of Spoils*. All of these AMMs include elements
5 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
6 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
7 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. Black
8 tern is not a covered species under the BDCP. For the BDCP to avoid a significant impact on
9 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
10 nests are detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct*
11 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, reduce the potential
12 impact on nesting black tern to a less-than-significant level.

13 Considering Alternative 1C's protection provisions, which would provide acreages of new or
14 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction
15 and restoration activities, loss of habitat or direct mortality through implementation of Alternative
16 1C would not result in a substantial adverse effect through habitat modifications and would not
17 substantially reduce the number or restrict the range of the species. Therefore, the alternative
18 would have a less-than-significant impact on black tern.

19 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
20 **Disturbance of Nesting Birds**

21 See Mitigation Measure BIO-75 under Impact BIO-75.

22 **Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat**

23 Because there is no near-term acreage commitment associated with the protection of rice and
24 the restoration of freshwater wetlands in CZ 2, BDCP proponents must protect and restore rice
25 and/or freshwater wetlands at a 1:1 ratio for each acre of habitat impacted in CZ 2.

26 **Impact BIO-129b: Indirect Effects of Plan Implementation on Black Tern**

27 If black terns were to nest in or adjacent to work areas, construction and subsequent maintenance-
28 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and
29 reduce the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75,
30 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid
31 the potential for adverse effects of construction-related activities on survival and productivity of
32 nesting black terns. The use of mechanical equipment during restoration activities could cause the
33 accidental release of petroleum or other contaminants that could affect black terns in the
34 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable
35 habitat could also have an adverse effect on these species. AMM1–AMM7, including *AMM2*
36 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such
37 spills and ensure that measures are in place to prevent runoff from the construction area and
38 negative effects of dust on active nests.

39 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
40 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
41 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
42 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz

1 2009). The effect of selenium toxicity differs widely between species and also between age and sex
2 classes within a species. In addition, the effect of selenium on a species can be confounded by
3 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
4 2009).

5 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
6 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
7 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
8 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
9 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
10 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
11 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
12 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
13 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
14 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
15 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
16 levels of selenium have a higher risk of selenium toxicity.

17 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
18 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
19 exacerbate bioaccumulation of selenium in avian species, including black tern. Marsh (tidal and
20 nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore increase
21 avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP restoration
22 activities that create newly inundated areas could increase bioavailability of selenium (see BDCP
23 Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium concentrations
24 were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to Existing
25 Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases
26 in selenium concentrations in water in the Delta under any alternative. However, it is difficult to
27 determine whether the effects of potential increases in selenium bioavailability associated with
28 restoration-related conservation measures (CM4 and CM5) would lead to adverse effects on black
29 tern.

30 Because of the uncertainty that exists at this programmatic level of review, there could be an effect
31 on black tern from increases in selenium associated with restoration activities. This effect would be
32 addressed through the implementation of *AMM27 Selenium Management*, which would provide
33 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
34 selenium and its bioavailability in tidal habitats (see Appendix 3B, *Environmental Commitments*,
35 *AMMs, and CMs*). Furthermore, the effectiveness of selenium management to reduce selenium
36 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as
37 part of design and implementation. This avoidance and minimization measure would be
38 implemented as part of the tidal habitat restoration design schedule.

39 **NEPA Effects:** Noise and visual disturbances from the construction of conservation components
40 could affect black tern use of modeled habitat adjacent to work areas. Moreover, the use of
41 mechanical equipment for the construction of conservation components could cause the accidental
42 release of petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust
43 adjacent to suitable habitat. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct Preconstruction*
44 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse
45 effects on nesting individuals. Tidal habitat restoration could result in increased exposure of black

1 tern to selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
2 *Management* which would provide specific tidal habitat restoration design elements to reduce the
3 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

4 **CEQA Conclusion:** Noise and visual disturbances from the construction of conservation components
5 could affect black tern use of modeled habitat adjacent to work areas. Moreover, the use of
6 mechanical equipment for the construction of conservation components could cause the accidental
7 release of petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust
8 adjacent to suitable habitat which could result in potential mortality of a special-status species.
9 These impacts would be significant. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct*
10 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce these
11 impacts to a less-than-significant level.

12 Tidal habitat restoration could result in increased exposure of black tern to selenium, which could
13 result in the mortality of a special-status species. This impact would be significant. This impact
14 would be addressed through the implementation of *AMM27 Selenium Management* which would
15 provide specific tidal habitat restoration design elements to reduce the potential for
16 bioaccumulation of selenium and its bioavailability in tidal habitats. With AMM27 in place, potential
17 effects of increased exposure of black tern to selenium would be reduced to a less-than-significant
18 impact.

19 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
20 **Disturbance of Nesting Birds**

21 See Mitigation Measure BIO-75 under Impact BIO-75

22 **Impact BIO-129c: Periodic Effects of Inundation on Black Tern Nesting Habitat as a Result of**
23 **Construction Implementation of Conservation Components**

24 Flooding of the Yolo Bypass would inundate 791–1,582 acres of suitable black tern nesting habitat
25 (land currently managed as rice in CZ 2). Inundation would occur during the nonbreeding season
26 but could reduce the availability of nesting habitat during years that flooding extends into the
27 nesting season (past March). Extended inundation of the Yolo Bypass would not be expected to
28 affect black tern nesting habitat. However, if periodic inundation took land out of rice production,
29 this could have an adverse effect on black tern nesting habitat. Late season flooding in the Yolo
30 Bypass could result in the loss of rice (nesting habitat for black tern) by precluding the preparation
31 and planting of rice fields. The methods for estimating loss of rice in the bypass and results are
32 provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter Snake*
33 *Summer Foraging Habitat in the Yolo Bypass*. This analysis concludes that the estimated loss of rice
34 could be up to 1,662 acres by the late long-term timeframe. The BDCP has committed to protect,
35 restore and/or create up to 1,700 acres of rice in the Yolo Bypass (Objective GGS3.1). These acres of
36 rice would be protected in areas that are less susceptible to inundation, which would benefit the
37 black tern during years in which the magnitude and duration of inundation were increased.

38 **NEPA Effects:** Flooding of the Yolo Bypass is not expected to adversely affect nesting habitat for
39 black tern. However, if flooding were to extend into the nesting season or were to significantly
40 reduce rice production it could also reduce suitable black tern nesting habitat. This potential effect
41 would not be adverse with the creation and/or protection of 1,700 acres of rice in CZ 2 under
42 Objective GGS3.1.

1 **CEQA Conclusion:** Flooding of the Yolo Bypass is not expected to have a significant impact on
2 nesting habitat for black tern. However, if flooding were to extend into the nesting season or were to
3 significantly reduce rice production it could also reduce suitable black tern nesting habitat. This
4 potential impact would be reduced to a less-than-significant level by the creation and/or protection
5 of 1,700 acres of rice in CZ 2 under Objective GGS3.1.

6 **California Horned Lark and Grasshopper Sparrow**

7 This section describes the effects of Alternative 1C, including water conveyance facilities
8 construction and implementation of other conservation components, on California horned lark and
9 grasshopper sparrow. The primary impact of concern for grasshopper sparrow and California
10 horned lark would be the loss of nesting habitat in the Plan Area, which includes grassland, vernal
11 pool complex, and alkali seasonal wetland natural communities and selected cultivated lands
12 including grain and hay crops and pasture. Construction and restoration associated with Alternative
13 1C conservation measures would result in both temporary and permanent losses of modeled
14 breeding habitat for California horned lark and grasshopper sparrow as indicated in Table 12-1C-49.

15 would include the following biological objectives over the term of the BDCP which would also
16 benefit the California horned lark and the grasshopper sparrow (BDCP Chapter 3, *Conservation*
17 *Strategy*).

- 18 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
19 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
20 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 21 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 22 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
23 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 24 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
25 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 26 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
27 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value
28 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 29 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
30 VPNC2.5, and GNC2.4, associated with CM11).

31 As explained below, with the restoration or protection of these amounts of habitat, in addition to
32 management activities that would enhance habitat for these species and the implementation of
33 AMM1–AMM7 and Mitigation Measure BIO-75, impacts on California horned lark and grasshopper
34 sparrow would not be adverse for NEPA purposes and would be less than significant for CEQA
35 purposes.

1 **Table 12-1C-49. Changes in California Horned Lark and Grasshopper Sparrow Modeled Habitat**
 2 **Associated with Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Breeding	2,796	2,796	3,750	3,750	NA	NA
Total Impacts CM1		2,796	2,796	3,750	3,750	NA	NA
CM2–CM18	Breeding	5,450	26,198	376	893	1,158–3,650	3,823
Total Impacts CM2–CM18		5,450	26,198	376	893	1,158–3,650	3,823
TOTAL IMPACTS		8,246	28,994	4,126	4,643	1,158–3,650	3,823

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3
 4 **Impact BIO-130: Loss or Conversion of Habitat for and Direct Mortality of California Horned**
 5 **Lark and Grasshopper Sparrow**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss
 7 of up to 33,688 acres of modeled nesting habitat for California horned lark and grasshopper sparrow
 8 (of which 28,994 acres would be a permanent loss and 4,643 acres would be a temporary loss of
 9 habitat, Table 12-1C-49). Conservation measures that would result in these losses are conveyance
 10 facilities and transmission line construction, and establishment and use of borrow and spoil areas
 11 (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4), floodplain
 12 restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), vernal pool and wetland
 13 restoration (CM9), nontidal marsh restoration (CM10), and construction of conservation hatcheries
 14 (CM18). The majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement
 15 and management activities (CM11), which include ground disturbance or removal of nonnative
 16 vegetation, and the construction of recreational trails, signs, and facilities, could result in local
 17 adverse habitat effects. In addition, maintenance activities associated with the long-term operation
 18 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate
 19 California horned lark and grasshopper sparrow modeled habitat. Each of these individual activities
 20 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA
 21 conclusion follow the individual conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation:* Construction of Alternative 1C conveyance facilities would
 23 result in the combined permanent and temporary loss of up to 6,546 acres of modeled California
 24 horned lark and grasshopper sparrow habitat (2,796 acres of permanent loss, 3,750 acres of
 25 temporary loss) from CZs 1, 3, 5, 6, 8, and 9. The permanent losses would occur at various
 26 locations along the western canal route, at the intake sites along the Sacramento River,

1 construction of the new forebay, and associated RTM storage areas. Both temporary and
 2 permanent losses of foraging habitat would occur from the transmission line corridors west of
 3 the study area and along the tunnel alignment in the west Delta. Grasshopper sparrows were
 4 detected in DHCCP surveys south of Byron Highway in CZ 8 (1 occurrence) and east of Intakes 2
 5 and 3 (6 occurrences), in the Stone Lakes NWR. However, the CM1 footprint does not overlap
 6 with any grasshopper sparrow or California horned lark occurrences. However, Mitigation
 7 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
 8 *Birds*, would require preconstruction surveys and the establishment of no-disturbance buffers
 9 and would be available to address potential effects on California horned larks and grasshopper
 10 sparrows if they were to nest in or adjacent to construction areas. Refer to the Terrestrial
 11 Biology Map Book for a detailed view of Alternative 1C construction locations. Impacts resulting
 12 from CM1 would occur within the first 10 years of Alternative 1C implementation.

- 13 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 14 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
 15 California horned lark and grasshopper sparrow habitat (898 acres of permanent loss, 376 acres
 16 of temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of
 17 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass
 18 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.
 19 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland
 20 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10
 21 years of Alternative 1C implementation.
- 22 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 23 inundation would permanently remove an estimated 20,880 acres of modeled California horned
 24 lark and grasshopper sparrow habitat. The majority of the acres lost would consist of cultivated
 25 lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache
 26 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and
 27 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
 28 directly impact and fragment grassland just north of Rio Vista in and around French and
 29 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
 30 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
 31 the northern fringes of Suisun Marsh.
- 32 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 33 seasonally inundated floodplain would permanently and temporarily remove approximately
 34 1,450 acres of modeled California horned lark and grasshopper sparrow nesting habitat (933
 35 permanent, 517 temporary). These losses would be expected after the first 10 years of
 36 Alternative 1C implementation along the San Joaquin River and other major waterways in CZ 7.
- 37 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
 38 approximately 370 acres of California horned lark and grasshopper sparrow nesting habitat as
 39 part of tidal restoration and 1,489 acres as part of seasonal floodplain restoration.
- 40 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
 41 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
 42 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
 43 would be restored after the construction periods. Grassland restoration would be implemented
 44 on agricultural lands that also provide nesting habitat for California horned lark and

1 grasshopper sparrow and would result in the conversion of 837 acres of cultivated lands to
2 grassland.

- 3 • *CM10 Nontidal Marsh Restoration*: Implementation of *CM10 Nontidal Marsh Restoration* would
4 result in the permanent removal of 705 acres of California horned lark and grasshopper
5 sparrow nesting habitat.
- 6 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
7 actions included in CM11 that are designed to enhance wildlife values in restored or protected
8 habitats could result in localized ground disturbances that could temporarily remove small
9 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
10 vegetation and road and other infrastructure maintenance activities, would be expected to have
11 minor adverse effects on available habitat and would be expected to result in overall
12 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would
13 also include the construction of recreational-related facilities including trails, interpretive signs,
14 and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The
15 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be
16 placed on existing, disturbed areas when and where possible. However, approximately 50 acres
17 of grassland habitat would be lost from the construction of trails and facilities.

18 Habitat management- and enhancement-related activities could disturb California horned lark
19 and grasshopper sparrow nests. If either species were to nest in the vicinity of a worksite,
20 equipment operation could destroy nests, and noise and visual disturbances could lead to their
21 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct*
22 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available
23 to address these adverse effects.

- 24 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
25 modeled California horned lark and grasshopper sparrow habitat for the development of a delta
26 and longfin smelt conservation hatchery in CZ 1.
- 27 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
28 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
29 disturbances that could affect California horned lark and grasshopper sparrow use of the
30 surrounding habitat. Maintenance activities would include vegetation management, levee and
31 structure repair, and re-grading of roads and permanent work areas. These effects, however,
32 would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as
33 described below.
- 34 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
35 direct mortality of adult or fledged California horned lark and grasshopper sparrow if they were
36 present in the Plan Area, because they would be expected to avoid contact with construction and
37 other equipment. If either species were to nest in the construction area, construction-related
38 activities, including equipment operation, noise and visual disturbances could destroy nests or
39 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
40 75 would be available to address these adverse effects.

41 The following paragraphs summarize the combined effects discussed above and describe other
42 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
43 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
5 effects of construction would not be adverse under NEPA. Alternative 1C would remove 12,372
6 acres (8,246 acres permanent, 4,126 acres temporary) of modeled breeding habitat for California
7 horned lark and grasshopper sparrow in the study area in the near-term. These effects would result
8 from the construction of the water conveyance facilities (CM1, 6,546 acres), and implementing other
9 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
10 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*
11 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*
12 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

13 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
14 would be 2:1 for protection of habitat. Using this ratio would indicate that 13,092 acres should be
15 protected to compensate for the CM1 losses of 6,546 acres of California horned lark and
16 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove
17 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California
18 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio
19 (2:1 for protection).

20 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
21 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
22 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
23 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,
24 and CM9 and would occur in the same timeframe as the construction and early restoration losses
25 thereby avoiding adverse effects of habitat loss on California horned lark and grasshopper sparrow.
26 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
27 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
28 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
29 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
30 would expand breeding habitat for California horned lark and grasshopper sparrow and reduce the
31 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*
32 *and Management*, insect prey populations would be increased on protected lands, enhancing the
33 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
34 Cultivated lands that provide habitat for covered and other native wildlife species would provide
35 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper
36 sparrow (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-
37 term time period would be in alfalfa and pasture crop types (very high- and high-value crop types)
38 for Swainson’s hawk (Objective SH1.2) which would also provide potential nesting habitat for
39 California horned lark and grasshopper sparrow. This biological objective provides an estimate for
40 the high proportion of cultivated lands protected in the near-term time period which would provide
41 nesting habitat for California horned lark and grasshopper sparrow.

42 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
43 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
44 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
45 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term

1 timeframe would need to include suitable crop types for these species in order to avoid the adverse
 2 effect of habitat loss resulting from CM1. The conservation commitment is 5,684 acres short of
 3 meeting the compensation for other near-term effects on California horned lark and grasshopper
 4 sparrow habitat. Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California*
 5 *Horned Lark and Grasshopper Sparrow Habitat*, would be available to address the adverse effect of
 6 near-term high-value habitat loss by providing crop management requirements for CM1
 7 compensation and requiring additional acreage compensation for the other near-term effects.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 12 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 13 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 14 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 15 of the Final EIR/EIS.

16 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the
 17 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
 18 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-
 19 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
 20 available to address this adverse effect.

21 ***Late Long-Term Timeframe***

22 Based on the habitat model, the study area supports approximately 269,411 acres of potential
 23 habitat for California horned lark and grasshopper sparrow. Alternative 1C as a whole would result
 24 in the permanent loss of and temporary effects on 33,688 acres of modeled California horned lark
 25 and grasshopper sparrow habitat during the term of the Plan (13% of the total habitat in the study
 26 area). The locations of these losses are described above in the analyses of individual conservation
 27 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
 28 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
 29 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
 30 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
 31 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
 32 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would
 33 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,
 34 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives
 35 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal
 36 wetland, and vernal pool natural communities which would expand breeding habitat for California
 37 horned lark and grasshopper sparrow and reduce the effects of current levels of habitat
 38 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
 39 populations would be increased on protected lands, enhancing the foraging value of these natural
 40 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat
 41 for covered and other native wildlife species would provide approximately 15,400 acres of potential
 42 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).
 43 Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture crop types.
 44 These are very high- and high-value crop types for Swainson's hawk (Objective SH1.2) and would
 45 provide potential nesting habitat for California horned lark and grasshopper sparrow.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
8 of the Final EIR/EIS. California horned lark and grasshopper sparrow are not covered species under
9 the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
10 noncovered avian species would be required to ensure that nests are detected and avoided.
11 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
12 *Nesting Birds*, would be available to address this adverse effect.

13 **NEPA Effects:** The loss of California horned lark and grasshopper sparrow habitat and potential for
14 mortality of these special-status species under Alternative 1C would represent an adverse effect in
15 the absence of other conservation actions. With habitat protection and restoration associated with
16 CM3, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which
17 would be in place throughout the construction period, and with implementation of Mitigation
18 Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper*
19 *Sparrow Habitat*, the effects of habitat loss under Alternative 1C on California horned lark and
20 grasshopper sparrow would not be adverse under NEPA. California horned lark and grasshopper
21 sparrow are not covered species under the BDCP, and the potential for mortality would be an
22 adverse effect without preconstruction surveys to ensure that nests are detected and avoided.
23 Mitigation Measure BIO-75 would be available to address this adverse effect.

24 **CEQA Conclusion:**

25 **Near-Term Timeframe**

26 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
27 the near-term BDCP conservation strategy has been evaluated to determine whether it would
28 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
29 effects of construction would be less than significant under CEQA. Alternative 1C would remove
30 13,316 acres (8,412 permanent, 4,904 temporary) of modeled breeding habitat for California
31 horned lark and grasshopper sparrow in the study area in the near-term. These effects would result
32 from the construction of the water conveyance facilities (CM1, 7,490 acres), and implementing other
33 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
34 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*
35 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*
36 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

37 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
38 would be 2:1 for protection of habitat. Using this ratio would indicate that 14,980 acres should be
39 protected to compensate for the CM1 losses of 7,490 acres of California horned lark and
40 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove
41 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California
42 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio
43 (2:1 for protection).

1 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
 2 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
 3 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
 4 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
 5 in the same timeframe as the construction and early restoration losses thereby avoiding significant
 6 impacts on California horned lark and grasshopper sparrow. Grassland restoration and protection
 7 would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in
 8 CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes
 9 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali
 10 seasonal wetland, and vernal pool natural communities which would expand breeding habitat for
 11 California horned lark and grasshopper sparrow and reduce the effects of current levels of habitat
 12 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
 13 populations would be increased on protected lands, enhancing the foraging value of these natural
 14 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat
 15 for covered and other native wildlife species would provide approximately 15,400 acres of potential
 16 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).
 17 Approximately 87% of cultivated lands protected by the late long-term time period would be in
 18 alfalfa and pasture crop types (very high- and high-value crop types) for Swainson's hawk (Objective
 19 SH1.2) which would also provide potential nesting habitat for California horned lark and
 20 grasshopper sparrow. This biological objective provides an estimate for the high proportion of
 21 cultivated lands protected in the near-term time period which would provide nesting habitat for
 22 California horned lark and grasshopper sparrow.

23 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
 24 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
 25 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
 26 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term
 27 timeframe would need to include suitable crop types for these species in order to avoid the
 28 significant impact of habitat loss resulting from CM1. The conservation commitment is 5,684 acres
 29 short of meeting the compensation for other near-term effects on California horned lark and
 30 grasshopper sparrow habitat. Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of*
 31 *California Horned Lark and Grasshopper Sparrow Habitat*, would address the impact of near-term
 32 high-value habitat loss by providing crop management requirements for CM1 compensation and
 33 requiring additional acreage compensation for the other near-term effects.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 38 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 39 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 40 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 41 of the Final EIR/EIS.

42 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the
 43 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
 44 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-
 45 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
 46 reduce this potential impact to a less-than-significant level.

1 **Late Long-Term Timeframe**

2 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 33,688
 3 acres of California horned lark and grasshopper sparrow habitat during the term of the Plan (13% of
 4 the total habitat in the study area). The locations of these losses are described above in the analyses
 5 of individual conservation measures. The locations of these losses are described above in the
 6 analyses of individual conservation measures. The Plan includes conservation commitments
 7 through *CM3 Natural Communities Protection and Restoration*, *CM8 Grassland Natural Community*
 8 *Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000
 9 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool
 10 complex, protect 150 acres of alkali seasonal wetland complex and protect 48,625 acres of
 11 cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3).
 12 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 13 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
 14 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
 15 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
 16 would expand breeding habitat for California horned lark and grasshopper sparrow and reduce the
 17 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*
 18 *and Management*, insect prey populations would be increased on protected lands, enhancing the
 19 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
 20 Cultivated lands that provide habitat for covered and other native wildlife species would provide
 21 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper
 22 sparrow (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in
 23 alfalfa and pasture crop types (very high- and high-value crop types for Swainson's hawk under
 24 Objective SH1.2) which would also provide potential nesting habitat for California horned lark and
 25 grasshopper sparrow.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 30 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 31 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 32 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 33 of the Final EIR/EIS. California horned lark and grasshopper sparrow are not covered species under
 34 the BDCP. For the BDCP to avoid significant impacts on individuals, preconstruction surveys for
 35 noncovered avian species would be required to ensure that nests are detected and avoided.
 36 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
 37 *Nesting Birds*, would reduce this impact to a less-than-significant level.

38 Considering Alternative 1C's protection and restoration provisions, which would provide acreages
 39 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
 40 construction and restoration activities, and with the implementation of AMM1-AMM7, Mitigation
 41 Measure BIO-75, and Mitigation Measure BIO-130, the loss of habitat or direct mortality through
 42 implementation of Alternative 1C would not result in a substantial adverse effect through habitat
 43 modifications and would not substantially reduce the number or restrict the range of either species.
 44 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-
 45 significant impact on California horned lark and grasshopper sparrow.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 See Mitigation Measure BIO-75 under Impact BIO-75.

4 **Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned**
5 **Lark and Grasshopper Sparrow Habitat**

6 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
7 crops, or alfalfa to provide California horned lark and grasshopper sparrow habitat such that the
8 total acres of habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1
9 protection. Additional grassland protection, enhancement, and management may be substituted
10 for the protection of cultivated lands.

11 **Impact BIO-131: Effects on California Horned Lark and Grasshopper Sparrow and Associated**
12 **with Electrical Transmission Facilities**

13 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,
14 which could result in injury or mortality of grasshopper sparrow and California horned lark. The
15 potential for this risk, is considered minimal based on the flight behaviors of each species.
16 Transmission line poles and towers also provide perching substrate for raptors, which could result
17 in increased predation pressure. However, this would be expected to have few adverse effects on the
18 grasshopper sparrow and California horned lark local populations.

19 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
20 could result in injury or mortality of grasshopper sparrow and California horned lark. With the
21 implementation of *AMM20 Greater Sandhill Crane*, the effect of new transmission lines on California
22 horned lark and grasshopper sparrow would not be adverse.

23 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes
24 and/or electrocution, which could result in injury or mortality of grasshopper sparrow and
25 California horned lark. However, new transmission lines would have a less-than-significant impact
26 on grasshopper sparrow and California horned lark based on the species' flight behaviors.

27 **Impact BIO-132: Indirect Effects of Plan Implementation on Grasshopper Sparrow and**
28 **California Horned Lark**

29 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
30 with construction-related activities could result in temporary disturbances that affect California
31 horned lark and grasshopper sparrow use of modeled habitat. Construction noise above background
32 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
33 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
34 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
35 the extent to which these noise levels could affect California horned lark or grasshopper sparrow.
36 Indirect effects associated with construction include noise, dust, and visual disturbance caused by
37 grading, filling, contouring, and other ground-disturbing operations. Construction-related noise and
38 visual disturbances could disrupt nesting and foraging behaviors, and reduce the functions of
39 suitable habitat which could result in an adverse effect on these species. Mitigation Measure BIO-75,
40 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
41 available to minimize adverse effects on active nests. The use of mechanical equipment during water

1 conveyance construction could cause the accidental release of petroleum or other contaminants that
2 could affect these species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2*
3 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such
4 spills from occurring. The inadvertent discharge of sediment or excessive dust adjacent to
5 grasshopper sparrow and California horned lark habitat could also have a negative effect on these
6 species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the
7 construction area and the negative effects of dust on wildlife adjacent to work areas.

8 **NEPA Effects:** Indirect effects on California horned lark and grasshopper sparrow as a result of
9 Alternative 1C implementation could have adverse effects on these species through the modification
10 of habitat and potential for direct mortality. California horned lark and grasshopper sparrow are not
11 covered species under the BDCP, and potential mortality would be an adverse effect without
12 preconstruction surveys to ensure that nests are detected and avoided. In conjunction with AMM1–
13 AMM7, Mitigation Measure BIO-75 *Conduct Preconstruction Nesting Bird Surveys and Avoid*
14 *Disturbance of Nesting Birds*, would be available to address this effect.

15 **CEQA Conclusion:** Indirect effects on grasshopper sparrow and California horned lark as a result of
16 constructing the water conveyance facilities could have a significant impact on these species. The
17 incorporation of AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-
18 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
19 reduce this impact to a less-than-significant level.

20 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
21 **Disturbance of Nesting Birds**

22 See discussion of Mitigation Measure BIO-75 under Impact BIO-75.

23 **Impact BIO-133: Periodic Effects of Inundation on Grasshopper Sparrow and California**
24 **Horned Lark as a Result of Implementation of Conservation Components**

25 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
26 *Enhancement*) would increase the frequency and duration of inundation on approximately 777–
27 2,423 acres of modeled California horned lark and grasshopper sparrow habitat (Table 12-1C-49).

28 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
29 *Restoration* could result in the periodic inundation of up to approximately 656 acres of modeled
30 habitat (Table 12-1C-49).

31 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
32 season due to periodic inundation. However, inundation would occur during the nonbreeding
33 season and would not be expected to have an adverse effect on either species.

34 **NEPA Effects:** Periodic inundation of floodplains would not have adverse effects on grasshopper
35 sparrow or California horned lark because inundation is expected to occur prior to the breeding
36 season.

37 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on
38 grasshopper sparrow or California horned lark because inundation is expected to occur prior to the
39 breeding season.

1 **Least Bittern and White-Faced Ibis**

2 This section describes the effects of Alternative 1C, including water conveyance facilities
3 construction and implementation of other conservation components, on least bittern and white-
4 faced ibis. Modeled breeding habitat for least bittern and white-faced ibis consists of tidal
5 freshwater and tidal brackish emergent wetlands, nontidal freshwater emergent wetlands, managed
6 wetlands, and other natural seasonal wetlands in CZ 2, 4, and 11.

7 Construction and restoration associated with Alternative 1C conservation measures would result in
8 both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table
9 12-1C-50. Full implementation of Alternative 1C would include the following biological objectives
10 over the term of the BDCP which would also benefit least bittern and white-faced ibis (BDCP Chapter
11 3, Section 3.3, *Biological Goals and Objectives*).

- 12 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
13 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 14 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
15 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
16 associated with CM10).
- 17 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
18 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).

19 As explained below, with the restoration or protection of these amounts of habitat, in addition to
20 management activities that would enhance habitat for these species and the implementation of
21 AMM1–AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on least
22 bittern and white-faced ibis would not be adverse for NEPA purposes and would be less than
23 significant for CEQA purposes.

24 **Table 12-1C-50. Changes in Least Bittern and White-Faced Ibis Modeled Habitat Associated with**
25 **Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2–CM18	Nesting	5,134	13,063	45	45	961–2,672	NA
Total Impacts CM2–CM18		5,134	13,063	45	45	961–2,672	NA
TOTAL IMPACTS		5,134	13,063	45	45	961–2,672	NA

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-134: Loss or Conversion of Habitat for and Direct Mortality of Least Bittern and**
2 **White-Faced Ibis**

3 Alternative 1C conservation measures would result in the combined permanent and temporary loss
4 and conversion of up to 13,108 acres of modeled habitat for least bittern and white-faced ibis
5 (13,063 acres of permanent loss and conversion and 45 of temporary loss, Table 12-1C-50).
6 Conservation measures that would result in these losses are *CM2 Yolo Bypass Fisheries Enhancement*,
7 and *CM4 Tidal Natural Communities Restoration*. Habitat enhancement and management activities
8 (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local
9 adverse habitat effects. In addition, maintenance activities associated with the long-term operation
10 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate least
11 bittern and white-faced ibis habitat. Each of these individual activities is described below. A
12 summary statement of the combined impacts, NEPA effects, and a CEQA conclusion follow the
13 individual conservation measure discussions.

- 14 • *CM1 Water Facilities and Operation*: There would be no permanent or temporary loss of least
15 bittern and white-faced ibis habitat from the construction of the Alternative 1C conveyance
16 facilities (Table 12-1C-50).
- 17 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
18 would permanently remove 55 acres of modeled least bittern and white-faced ibis habitat in the
19 Yolo Bypass in CZ 2. In addition, 45 acres of habitat would be temporarily removed. The loss is
20 expected to occur during the first 10 years of Alternative 1C implementation.
- 21 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
22 inundation would permanently remove an estimated 13,008 acres of modeled least bittern and
23 white-faced ibis habitat in CZ 2, 4, and 11 by the late long-term time period.
- 24 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
25 actions included in CM11 that are designed to enhance wildlife values in restored or protected
26 habitats could result in localized ground disturbances that could temporarily remove small
27 amounts of least bittern and white-faced ibis habitat. Ground-disturbing activities, such as
28 removal of nonnative vegetation and road and other infrastructure maintenance activities,
29 would be expected to have minor adverse effects on available least bittern and white-faced ibis
30 habitat.
- 31 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
32 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
33 disturbances that could affect least bittern and white-faced ibis use of the surrounding habitat.
34 Maintenance activities would include vegetation management, levee and structure repair, and
35 re-grading of roads and permanent work areas. These effects, however, would be reduced by
36 AMM1–AMM7 described below and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
37 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to further reduce
38 adverse effects.
- 39 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
40 direct mortality of least bittern and white-faced ibis because adults and fledged young would be
41 expected to avoid contact with construction and other equipment. However, if either species
42 were to nest in the construction area, equipment operation, noise and visual disturbances could
43 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings.
44 Mitigation Measure BIO-75 would be available to address these adverse effects.

1 The following paragraphs summarize the combined effects discussed above and describe other
 2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
 3 included.

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 8 effects of construction would not be adverse under NEPA. There would be no impacts resulting from
 9 the construction of the water conveyance facilities (CM1). However, there would be a loss of 5,179
 10 acres (5,134 acres of permanent loss, 45 acres of temporary loss) of modeled habitat for these
 11 species in the near-term. These effects would result from the implementation of *CM2 Yolo Bypass*
 12 *Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration*.

13 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
 14 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using
 15 these ratios would indicate that 5,179 acres of restoration and 5,179 acres of protection of least
 16 bittern and white-faced ibis habitat would be required to compensate for the loss of habitat using
 17 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

18 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
 19 wetland and protecting and enhancing 4,800 acres of managed wetland in the Plan Area (Table 3-4
 20 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM4 and
 21 CM3 and would occur in the same timeframe as the construction and early restoration losses,
 22 thereby avoiding adverse effects of habitat loss on least bittern and white-faced ibis. The tidal
 23 freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1
 24 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates topographic
 25 heterogeneity and in areas that increase connectivity among protected lands (Objective
 26 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and
 27 would benefit these species through the enhancement of degraded areas (such as areas of bare
 28 ground or marsh where the predominant vegetation consists of invasive species such as perennial
 29 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
 30 (Objective MWNC1.1). In addition, at least 400 acres of nontidal marsh would be created, some of
 31 which would provide nesting habitat for least bittern and white-faced ibis. These Plan objectives
 32 represent performance standards for considering the effectiveness of restoration and protection
 33 actions. The acres of restoration and protection contained in the near-term Plan goals satisfy the
 34 typical mitigation that would be applied to the project-level effects of CM1, as well as mitigate the
 35 near-term effects of the other conservation measures.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 40 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
 41 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
 42 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
 43 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species

1 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
2 noncovered avian species would be required to ensure that nests are detected and avoided.

3 **Late Long-Term Timeframe**

4 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 13,108
5 acres (13,063 acres of permanent loss, 45 acres of temporary loss) of least bittern and white-faced
6 ibis habitat during the term of the Plan. The locations of these losses are described above in the
7 analyses of individual conservation measures. The Plan includes conservation commitments
8 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
9 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200
10 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres
11 of managed wetland would be protected and enhanced in CZ 11.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
16 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
17 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
18 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
19 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
20 under the BDCP and in order to have a less than adverse effect on individuals, preconstruction
21 surveys for noncovered avian species would be required to ensure that nests are detected and
22 avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
23 *Disturbance of Nesting Birds*, would be available to address this potential effect.

24 **NEPA Effects:** The loss of least bittern and white-faced ibis habitat and potential mortality of these
25 special-status species under Alternative 1C would represent an adverse effect in the absence of
26 other conservation actions. However, with the habitat protection and restoration associated with
27 CM3, CM4, CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7,
28 which would be in place throughout the construction period, the effects of habitat loss on least
29 bittern and white-faced ibis would not be adverse under Alternative 1C. Least bittern and white-
30 faced ibis are not covered species under the BDCP, and the potential for mortality would be an
31 adverse effect without preconstruction surveys to ensure that nests are detected and avoided.
32 Mitigation Measure BIO-75 would be available to address this effect.

33 **CEQA Conclusion:**

34 **Near-Term Timeframe**

35 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
36 the near-term BDCP conservation strategy has been evaluated to determine whether it would
37 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
38 impacts of construction would be less than significant under CEQA. There would be no impacts
39 resulting from the construction of the water conveyance facilities (CM1). However, there would be a
40 loss of 5,179 acres of modeled habitat (5,134 acres of permanent loss, 45 acres of temporary loss)
41 for these species in the near-term. These effects would result from the implementation of *CM2 Yolo*
42 *Bypass Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration*.

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
 2 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using
 3 these ratios would indicate that 5,179 acres of restoration and 5,179 acres of protection of least
 4 bittern and white-faced ibis habitat would be required to compensate for the loss of habitat using
 5 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

6 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal freshwater emergent
 7 wetland and 4,800 acres of managed wetland in the Plan Area (Table 3-4 in Chapter 3, *Description of*
 8 *Alternatives*). These conservation actions are associated with CM4 and CM3 and would occur in the
 9 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
 10 habitat loss on least bittern and white-faced ibis. The tidal freshwater emergent wetland would be
 11 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*
 12 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that
 13 increase connectivity among protected lands (Objective TFEWNC2.2). The 4,800 acres of managed
 14 wetland would be protected and enhanced in CZ 11 and would benefit these species through the
 15 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
 16 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
 17 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). In addition, at
 18 least 400 acres of nontidal marsh would be created, some of which would provide nesting habitat
 19 for least bittern and white-faced ibis. These Plan objectives represent performance standards for
 20 considering the effectiveness of restoration and protection actions. The acres of restoration and
 21 protection contained in the near-term Plan goals satisfy the typical mitigation that would be applied
 22 to the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation
 23 measures.

24 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 25 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 26 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 27 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 28 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
 29 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
 30 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
 31 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
 32 under the BDCP. For the BDCP to have a less-than-significant impact on individuals, preconstruction
 33 surveys would be required to ensure that nests were detected and avoided. Implementation of
 34 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
 35 *Nesting Birds*, would reduce the potential impact on nesting least bittern and white-faced ibis to a
 36 less-than-significant level.

37 **Late Long-Term Timeframe**

38 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 13,108
 39 acres (13,063 acres of permanent loss, 45 acres of temporary loss) of least bittern and white-faced
 40 ibis habitat during the term of the Plan. The locations of these losses are described above in the
 41 analyses of individual conservation measures. The Plan includes conservation commitments
 42 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
 43 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200
 44 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres
 45 of managed wetland would be protected and enhanced in CZ 11.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
6 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
7 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
8 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
9 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
10 noncovered avian species would be required to ensure that nests were detected and avoided.
11 Implementation of Mitigation Measure BIO-75 would reduce the potential impact on nesting least
12 bittern and white-faced ibis and to a less-than-significant level.

13 Considering Alternative 1C's protection and restoration provisions, which would provide acreages
14 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
15 construction and restoration activities, and with the implementation of AMM1-AMM7 and
16 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
17 *Nesting Birds*, the loss of habitat or direct mortality through implementation of Alternative 1C would
18 not result in a substantial adverse effect through habitat modifications and would not substantially
19 reduce the number or restrict the range of the species. Therefore, the loss of habitat or potential
20 mortality under this alternative would have a less-than-significant impact on least bittern and
21 white-faced ibis.

22 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 23 **Disturbance of Nesting Birds**

24 See Mitigation Measure BIO-75 under Impact BIO-75.

25 **Impact BIO-135: Effects on Least Bittern and White-Faced Ibis Associated with Electrical** 26 **Transmission Facilities**

27 New transmission lines would increase the risk for bird-power line strikes, which could result in
28 injury or mortality of least bittern and white-faced ibis. Waterbirds have a higher susceptibility to
29 collisions than passerines, raptors, and other birds. Bitterns and ibises have a high wing loading/low
30 aspect ratio which limits their maneuverability and make them more vulnerable to collisions rather
31 than more agile species (see BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions*
32 *at Proposed BDCP Powerlines*). Marking transmission lines with flight diverters that make the lines
33 more visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
34 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
35 by 60%. All new project transmission lines would be fitted with flight diverters which would reduce
36 bird strike risk of least bittern and white-faced ibis.

37 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
38 could result in injury or mortality of least bittern and white-faced ibis. Bitterns and ibises have a
39 high wing loading/low aspect ratio which limits their maneuverability and make them more
40 vulnerable to collisions rather than more agile species. The implementation of *AMM20 Greater*
41 *Sandhill Crane* would require the installation of bird flight diverters on all new transmission lines,
42 which could reduce bird strike risk of least bittern and white-faced ibis by 60%. With the installation

1 of bird flight diverters, the construction and operation of new transmission lines under Alternative
2 1C would not result in an adverse effect on least bittern and white-faced ibis.

3 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
4 could result in injury or mortality of least bittern and white-faced ibis. Bitterns and ibises have a
5 high wing loading/low aspect ratio which limits their maneuverability and make them more
6 vulnerable to collisions rather than more agile species. The implementation of *AMM20 Greater*
7 *Sandhill Crane* would require the installation of bird flight diverters on all new transmission lines,
8 which could reduce bird strike risk of least bittern and white-faced ibis by 60%. With the installation
9 of bird flight diverters, the construction and operation of new transmission lines under Alternative
10 1C would result in a less-than-significant impact on least bittern and white-faced ibis.

11 **Impact BIO-136: Indirect Effects of Plan Implementation on Least Bittern and White-Faced**
12 **Ibis**

13 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
14 with construction-related activities could result in temporary disturbances that affect least bittern
15 and white-faced ibis use of modeled habitat. Construction noise above background noise levels
16 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
17 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
18 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
19 which these noise levels could affect least bittern or white-faced ibis. Indirect effects associated with
20 construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and
21 other ground-disturbing operations. Construction-related noise and visual disturbances could
22 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could
23 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*
24 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse
25 effects on active nests. The use of mechanical equipment during water conveyance construction
26 could cause the accidental release of petroleum or other contaminants that could affect these
27 species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best*
28 *Management Practices and Monitoring*, would minimize the likelihood of such spills from occurring.
29 The inadvertent discharge of sediment or excessive dust adjacent to least bittern and white-faced
30 ibis could also have a negative effect on these species. AMM1–AMM7 would ensure that measures
31 are in place to prevent runoff from the construction area and the negative effects of dust on wildlife
32 adjacent to work areas.

33 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
34 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
35 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
36 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
37 newly inundated areas could increase bioavailability of mercury (see Chapter 3, *Conservation*
38 *Strategy*, of the BDCP for details of restoration). Species sensitivity to methylmercury differs widely
39 and there is a large amount of uncertainty with respect to species-specific effects. A detailed review
40 of the methylmercury issues associated with implementation of the BDCP is contained in Appendix
41 11F, *Substantive BDCP Revisions*. The review includes an overview of the BDCP-related mechanisms
42 that could result in increased mercury in the foodweb, and how exposure of individual species to
43 mercury may occur based on feeding habits and where species habitat overlaps with the areas
44 where mercury bioavailability could increase. Increased methylmercury associated with natural

1 community and floodplain restoration could indirectly affect least bittern and white-faced ibis, via
2 uptake in lower trophic levels (as described in Appendix 11F, *Substantive BDCP Revisions*).

3 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
4 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
5 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
6 project-specific basis, where high potential for methylmercury production is identified that
7 restoration design and adaptive management cannot fully address while also meeting restoration
8 objectives, alternate restoration areas would be considered. CM12 would be implemented in
9 coordination with other similar efforts to address mercury in the Delta, and specifically with the
10 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
11 following actions.

- 12 • Assess pre-restoration conditions to determine the risk that the project could result in increased
13 mercury methylation and bioavailability
- 14 • Define design elements that minimize conditions conducive to generation of methylmercury in
15 restored areas.
- 16 • Define adaptive management strategies that can be implemented to monitor and minimize
17 actual postrestoration creation and mobilization of methylmercury.

18 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
19 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
20 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
21 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
22 2009). The effect of selenium toxicity differs widely between species and also between age and sex
23 classes within a species. In addition, the effect of selenium on a species can be confounded by
24 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
25 2009).

26 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
27 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
28 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
29 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
30 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
31 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
32 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
33 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
34 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
35 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
36 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
37 levels of selenium have a higher risk of selenium toxicity.

38 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
39 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
40 exacerbate bioaccumulation of selenium in avian species, including least bittern and white-faced
41 ibis. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium,
42 and therefore increase avian exposure from ingestion of prey items with elevated selenium levels.
43 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
44 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in

1 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
2 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
3 long-term increases in selenium concentrations in water in the Delta under any alternative.
4 However, it is difficult to determine whether the effects of potential increases in selenium
5 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
6 lead to adverse effects on least bittern and white-faced ibis.

7 Because of the uncertainty that exists at this programmatic level of review, there could be a
8 substantial effect on least bittern and white-faced ibis from increases in selenium associated with
9 restoration activities. This effect would be addressed through the implementation of *AMM27*
10 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
11 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
12 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
13 selenium management to reduce selenium concentrations and/or bioaccumulation would be
14 evaluated separately for each restoration effort as part of design and implementation. This
15 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
16 design schedule.

17 **NEPA Effects:** Indirect effects on least bittern and white-faced ibis as a result of constructing the
18 water conveyance facilities could have adverse effects on these species in the absence of other
19 conservation actions. However, the implementation of AMM1–AMM7 would help to reduce this
20 effect. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
21 *Disturbance of Nesting Birds*, would also be available to address the adverse indirect effects of
22 construction on active nests. Tidal habitat restoration could result in increased exposure of least
23 bittern and white-faced ibis to selenium. This effect would be addressed through the
24 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
25 restoration design elements to reduce the potential for bioaccumulation of selenium and its
26 bioavailability in tidal habitats.

27 Increased methylmercury associated with natural community and floodplain restoration could
28 indirectly affect least bittern and white-faced ibis, via uptake in lower trophic levels (as described in
29 Appendix 5.D, *Contaminants*, of the BDCP). However, it is unknown what concentrations of
30 methylmercury are harmful to the species, and the potential for increased exposure varies
31 substantially within the study area. Implementation of CM12 which contains measures to assess the
32 amount of mercury before project development, followed by appropriate design and adaptation
33 management, would minimize the potential for increased methylmercury exposure, and would
34 result in no adverse effect on least bittern and white-faced ibis.

35 **CEQA Conclusion:** Indirect effects of noise and visual disturbance, in addition to the potential for
36 hazardous spills or increased dust on least bittern and white-faced ibis and their habitat as a result
37 of plan implementation would represent a substantial adverse effect in the absence of other
38 conservation actions. This impact would be significant. The incorporation of AMM1–AMM7 into the
39 BDCP and the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
40 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant
41 level.

42 Tidal habitat restoration could result in increased exposure of least bittern and white-faced ibis to
43 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
44 *Management*, which would provide specific tidal habitat restoration design elements to reduce the

1 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
2 implementation of tidal natural communities restoration or floodplain restoration could result in
3 increased exposure of least bittern and white-faced ibis to methylmercury in restored tidal areas.
4 However, it is unknown what concentrations of methylmercury are harmful to these species and the
5 potential for increased exposure varies substantially within the study area. Implementation of CM12
6 which contains measures to assess the amount of mercury before project development, followed by
7 appropriate design and adaptation management, would minimize the potential for increased
8 methylmercury exposure, and would result in no adverse effect on least bittern and white-faced ibis.

9 Indirect effects of plan implementation would represent an adverse effect on least bittern and
10 white-faced ibis in the absence of other conservation measures. This would be a significant impact.
11 With AMM1-AMM7, *AMM27 Selenium Management*, and CM12 in place, and with the implementation
12 of Mitigation Measure BIO-75, indirect effects of plan implementation would not result in a
13 substantial adverse effect through habitat modifications and would not substantially reduce the
14 number or restrict the range of either species. Therefore, the indirect effects of Alternative 1C
15 implementation would have a less-than-significant impact on least bittern and white-faced ibis.

16 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
17 **Disturbance of Nesting Birds**

18 See Mitigation Measure BIO-75 under Impact BIO-75.

19 **Impact BIO-137: Periodic Effects of Inundation on Least Bittern and White-Faced Ibis as a**
20 **Result of Implementation of Conservation Components**

21 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
22 *Enhancement*) would increase the frequency and duration of inundation on approximately 961-
23 2,672 acres of modeled least bittern and white-faced ibis habitat (Table 12-1C-50). However, no
24 adverse effects of increased inundation frequency on nesting habitat would be expected because
25 wetland vegetation has persisted under the existing Yolo Bypass flooding regime, and changes to
26 frequency and inundation are within the tolerance of these vegetation types. Inundation would
27 occur in the nonbreeding season and wetlands supporting habitat would not be expected to be
28 affected by flood flows.

29 **NEPA Effects:** Periodic inundation of Yolo Bypass would not be expected to have adverse effects on
30 least bittern or white-faced ibis because wetland vegetation has persisted under the existing Yolo
31 Bypass flooding regime, and changes to frequency and inundation are within the tolerance of these
32 vegetation types.

33 **CEQA Conclusion:** Periodic inundation of Yolo Bypass would not be expected to have a significant
34 impact on least bittern or white-faced ibis because wetland vegetation has persisted under the
35 existing Yolo Bypass flooding regime, and changes to frequency and inundation are within the
36 tolerance of these vegetation types.

37 **Loggerhead Shrike**

38 This section describes the effects of Alternative 1C, including water conveyance facilities
39 construction and implementation of other conservation components, on loggerhead shrike. Modeled
40 habitat for loggerhead shrike includes both high-value and low-value modeled habitat. High-value
41 habitat includes grassland and alkali seasonal wetland natural communities in addition to cultivated

1 lands, including irrigated pasture and grain and hay crops. Breeding shrikes require shrubs and tall
2 trees for perching and nest placement, and are generally associated with riparian edge grasslands
3 (Humble 2008) or cultivated lands with associated trees and shrubs. Loggerhead shrike modeled
4 habitat is overestimated as it does not differentiate between lands with or without associated
5 nesting vegetation. Low-value habitat includes row crops such as truck and berry crops and field
6 crops which are not considered to be valuable habitat for the species but were included in the model
7 as they may provide foraging opportunities.

8 Construction and restoration associated with Alternative 1C conservation measures would result in
9 both temporary and permanent losses of modeled habitat for loggerhead shrike as indicated in
10 Table 12-1C-51. Full implementation of Alternative 1C would result in both temporary and
11 permanent losses of modeled habitat for loggerhead shrike as indicated in Table 12-1C-51. Full
12 implementation of Alternative 1C would include the following biological objectives over the term of
13 the BDCP which would also benefit loggerhead shrike (BDCP Chapter 3, Section, 3.3, *Biological Goals*
14 *and Objective*).

- 15 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
16 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
17 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 18 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 19 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
20 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 21 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
22 VPNC2.5, and GNC2.4, associated with CM11).
- 23 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
24 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 25 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
26 lands that occur in cultivated lands within the reserve system, including isolated valley oak
27 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
28 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
29 with CM3 and CM11).
- 30 • Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
31 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated
32 with CM11).

33 As explained below, with the restoration or protection of these amounts of habitat, in addition to
34 management activities that would enhance habitat for the species and the implementation of
35 AMM1–AMM7, and Mitigation Measure BIO-75, impacts on loggerhead shrike would not be adverse
36 for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-51. Changes in Loggerhead Shrike Modeled Habitat Associated with Alternative 1C**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	2,796	2,796	3,750	3,750	NA	NA
	Low-value	2,120	2,120	2,925	2,925	NA	NA
Total Impacts CM1		4,916	4,916	6,675	6,675	NA	NA
CM2-CM18	High-value	5,450	26,198	376	893	777-2,423	3,823
	Low-value	1,801	17,575	97	624	672-1,996	4,315
Total Impacts CM2-CM18		7,251	43,773	473	1,517	1,830-5,646	8,138
Total High-value		8,246	28,994	4,126	4,643		
Total Low-value		3,921	19,695	3,022	3,549		
TOTAL IMPACTS		12,167	48,689	7,149	8,192	1,830-5,646	8,138

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-138: Loss or Conversion of Modeled Habitat for and Direct Mortality of**
5 **Loggerhead Shrike**

6 Alternative 1C conservation measures would result in the combined permanent loss or conversion
7 and temporary loss of up to 56,912 acres of modeled habitat for loggerhead shrike (of which 33,688
8 acres is of high-value and 23,224 acres is of low value, Table 12-1C-51). Conservation measures that
9 would result in these losses are conveyance facilities and transmission line construction, and
10 establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2),
11 tidal habitat restoration (CM4), floodplain restoration (CM5), channel margin enhancement (CM6),
12 riparian restoration, (CM7), grassland restoration (CM8), vernal pool and wetland restoration
13 (CM9), nontidal marsh restoration (CM10), natural communities enhancement and management
14 (CM11) and construction of conservation hatcheries (CM18). The majority of habitat loss (33,244
15 acres) would result from CM4. Habitat enhancement and management activities (CM11), which
16 include ground disturbance or removal of nonnative vegetation, and the construction of recreational
17 trails, signs, and facilities, could result in local adverse habitat effects. In addition, maintenance
18 activities associated with the long-term operation of the water conveyance facilities and other BDCP
19 physical facilities could degrade or eliminate loggerhead shrike modeled habitat. Each of these
20 individual activities is described below. A summary statement of the combined impacts and NEPA
21 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would
2 result in the combined permanent and temporary loss of up to 6,546 acres of high-value
3 loggerhead shrike habitat (2,796 acres of permanent loss, 3,750 acres of temporary loss). In
4 addition, 5,045 acres of low-value habitat would be removed (2,120 acres of permanent loss or
5 conversion, 2,925 acres of temporary loss or conversion) from CZ 1, 3, 5, 6, 8, and 9. The
6 permanent losses would occur at various locations along the western canal route and at the
7 intake sites along the Sacramento River. The majority of grassland that would be removed
8 would be in CZ 8, west of the Clifton Court Forebay from the construction of the new forebay and
9 the associated borrow and spoil areas. Larger areas of annual grassland would be permanently
10 removed by canal construction south of Rock Slough, south of Discovery Bay and immediately
11 west of Clifton Court Forebay. Both temporary and permanent losses of grassland would be
12 created by constructing transmission corridors west of the Plan Area and along the tunnel
13 alignment in the west Delta. Other temporary losses occur from siphon construction areas, at
14 safe haven work areas, and at railroad work areas just southwest of Clifton Court Forebay.
15 Temporarily affected areas (grassland, cultivated lands, and associated shrubs or trees) would
16 be restored within 1 year following completion of construction activities as described in *AMM10*
17 *Restoration of Temporarily Affected Natural Communities*.

18 Loggerhead shrikes nest in high abundance in shrubs associated with the grasslands to the
19 south and to the west of Clifton Court Forebay. Shrikes were detected using this area at a much
20 higher rate than other grasslands and areas in the Delta during DHCCP surveys (Appendix 12C,
21 *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). Permanent
22 impacts from CM1 that overlap with recorded loggerhead shrike nest occurrences include the
23 construction footprint of the canal (4 occurrences), a bridge associated with Byron Highway (1
24 occurrence), and a siphon just south of Highway 4 (1 occurrence). The temporary impacts of
25 potential borrow and spoil sites (4 occurrences), siphon work areas (3 occurrences), and the
26 footprint for a temporary transmission line east of Clifton Court Forebay (1 occurrence) also
27 intersects with loggerhead shrike occurrences. Mitigation Measure BIO-75 would be available to
28 address adverse effects on nesting loggerhead shrikes adjacent to work areas. Refer to the
29 Terrestrial Biology Map Book for a detailed view of Alternative 1C construction locations.
30 Construction of the water conveyance facilities would occur in the near-term timeframe.

- 31 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
32 would result in the combined permanent and temporary loss of up to 1,274 acres of high-value
33 loggerhead shrike habitat (898 acres of permanent loss, 376 acres of temporary loss) in the Yolo
34 Bypass in CZ 2. In addition, 182 acres of low-value habitat would be removed (85 acres of
35 permanent loss, 97 acres of temporary loss). The loss is expected to occur during the first 10
36 years of Alternative 1C implementation.

- 37 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
38 inundation would permanently remove an estimated 20,880 acres of high-value loggerhead
39 shrike habitat and 12,364 acres of low-value habitat. The majority of the acres lost would
40 consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the
41 vicinity of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of
42 Suisun Marsh, and along narrow bands adjacent to waterways in the South Delta ROA. Tidal
43 restoration would directly impact and fragment grassland just north of Rio Vista in and around
44 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses
45 of alkali seasonal wetland complex habitat would likely occur in the south end of the Yolo
46 Bypass and on the northern fringes of Suisun Marsh.

- 1 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
2 seasonally inundated floodplain would permanently and temporarily remove approximately
3 1,450 acres of high-value loggerhead shrike habitat (933 permanent, 517 temporary). These
4 losses would be expected after the first 10 years of Alternative 1C implementation along the San
5 Joaquin River and other major waterways in CZ 7.
- 6 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
7 approximately 370 acres of high-value loggerhead shrike habitat as part of tidal restoration and
8 1,489 acres as part of seasonal floodplain restoration. In addition, 503 acres of low-value habitat
9 would be removed as a part of tidal restoration and 1,971 acres would be removed as part of
10 seasonal floodplain restoration through CM7.
- 11 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
12 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
13 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
14 would be restored after the construction periods. Grassland restoration would be implemented
15 on agricultural lands that also provide habitat for loggerhead shrike and would result in the
16 conversion of 1,849 acres of cultivated lands to high-value grassland.
- 17 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
18 removal of 705 acres of high-value loggerhead shrike habitat and 735 acres of low-value
19 loggerhead shrike habitat.
- 20 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
21 actions included in CM11 that are designed to enhance wildlife values in restored or protected
22 habitats could result in localized ground disturbances that could temporarily remove small
23 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
24 vegetation and road and other infrastructure maintenance activities, would be expected to have
25 minor adverse effects on available habitat and would be expected to result in overall
26 improvements to and maintenance of habitat values over the term of the BDCP. Fences (e.g.
27 barbed wire) installed as part of CM11 in or adjacent to protected grasslands and cultivated
28 lands could benefit loggerhead shrike by providing hunting perches and impalement
29 opportunities. CM11 would also include the construction of recreational-related facilities
30 including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and*
31 *Associated Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic
32 areas, bathrooms, etc. would be placed on existing, disturbed areas when and where possible.
33 However, approximately 50 acres of grassland habitat would be lost from the construction of
34 trails and facilities.
- 35 Habitat management- and enhancement-related activities could disturb loggerhead shrike nests.
36 If either species were to nest in the vicinity of a worksite, equipment operation could destroy
37 nests if shrubs and trees in grasslands or cultivated lands were removed, and noise and visual
38 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings.
39 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
40 *of Nesting Birds*, would be available to address these adverse effects.
- 41 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
42 value loggerhead shrike habitat for the development of a delta and longfin smelt conservation
43 hatchery in CZ 1. Hatchery construction is expected to occur within the first 10 years of Plan
44 implementation.

- 1 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
2 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
3 disturbances that could affect loggerhead shrike use of the surrounding habitat. Maintenance
4 activities would include vegetation management, levee and structure repair, and re-grading of
5 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7,
6 Mitigation Measure BIO-75, and conservation actions as described below.
- 7 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
8 direct mortality of adult or fledged loggerhead shrike if they were present in the Plan Area,
9 because they would be expected to avoid contact with construction and other equipment. If
10 either species were to nest in the construction area, construction-related activities, including
11 equipment operation, noise and visual disturbances could destroy nests or lead to their
12 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be
13 available to address these adverse effects.

14 The following paragraphs summarize the combined effects discussed above and describe other
15 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
16 included.

17 ***Near-Term Timeframe***

18 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
19 the near-term BDCP conservation strategy has been evaluated to determine whether it would
20 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
21 effects of construction would not be adverse under NEPA. Alternative 1C would remove 12,372
22 acres (8,246 permanent, 4,126 temporary) of high-value habitat for loggerhead shrike in the study
23 area in the near-term. These effects would result from the construction of the water conveyance
24 facilities (CM1, 6,546 acres), and implementing other conservation measures (*CM2 Yolo Bypass
25 Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated
26 Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural
27 Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11
28 Natural Communities Enhancement and Management and CM18 Conservation Hatcheries*—5,826
29 acres). In addition, 6,943 acres (3,921 permanent, 3,022 temporary) of low-value habitat would be
30 removed or converted in the near-term (CM1, 5,045 acres; *CM2 Yolo Bypass Fisheries Enhancement,
31 CM4 Tidal Natural Communities Restoration, CM7 Riparian Natural Community Restoration, CM8
32 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex
33 Restoration, CM11 Natural Communities Enhancement and Management and CM18 Conservation
34 Hatcheries*—1,898 acres).

35 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
36 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 13,092 acres
37 should be protected to compensate for the loss of high-value habitat from CM1. The near-term
38 effects of other conservation actions would require 11,652 acres of protection to compensate for the
39 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the
40 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a
41 large proportion of the low-value habitat would result from the conversion and enhancement to
42 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively
43 quickly after completion of construction.

1 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
2 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
3 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,
5 and CM9 and would occur in the same timeframe as the construction and early restoration losses.

6 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
7 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
8 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
9 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
10 create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce the
11 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement
12 and Management*, insect prey populations would be increased on protected lands, enhancing the
13 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
14 Cultivated lands that provide habitat for covered and other native wildlife species would provide
15 approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective
16 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and
17 protect small patches of trees and shrubs within cultivated lands that would maintain foraging
18 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows
19 along field borders and roadsides within protected cultivated lands would also provide high-value
20 nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to near-term goals
21 of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural community.
22 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
23 late-successional habitat types with a well-developed understory of dense shrubs. *AMM18
24 Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
25 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
26 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
27 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
28 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
29 nesting habitat for loggerhead shrike. These Plan objectives represent performance standards for
30 considering the effectiveness of conservation actions.

31 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
32 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
33 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
34 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term
35 timeframe would need to include suitable high-value crop types for loggerhead shrike to avoid the
36 adverse effect of habitat loss resulting from CM1. The conservation commitment is 5,684 acres short
37 of meeting the compensation for other near-term effects on loggerhead shrike high-value habitat.
38 Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike
39 Habitat*, would be available to address the adverse effect of near-term high-value habitat loss by
40 providing crop management requirements for CM1 compensation and requiring additional acreage
41 compensation for the other near-term effects. With the management and enhancement of cultivated
42 lands including insect prey enhancement through CM3 and CM11, the protection of shrubs and
43 establishment of hedgerows within protected cultivated lands would compensate for any effect from
44 the loss of low-value loggerhead shrike foraging habitat.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 8 of the Final EIR/EIS.

9 The loggerhead shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse
 10 effect on individuals, preconstruction surveys for noncovered avian species would be required to
 11 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*
 12 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this effect.

13 **Late Long-Term Timeframe**

14 Alternative 1C as a whole would result in the combined permanent of and temporary effects on
 15 33,688 acres of high-value habitat and 23,244 acres of low-value loggerhead shrike habitat over the
 16 term of the Plan. The locations of these losses are described above in the analyses of individual
 17 conservation measures. The Plan includes conservation commitments through *CM3 Natural*
 18 *Communities Protection and Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8*
 19 *Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*
 20 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
 21 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex and protect
 22 48,625 acres of cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in
 23 Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11
 24 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, 8, and 11 would be associated with
 25 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would
 26 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural
 27 communities which would create larger, more expansive patches of high-value habitat for
 28 loggerhead shrike and reduce the effects of current levels of habitat fragmentation. Under *CM11*
 29 *Natural Communities Enhancement and Management*, insect prey populations would be increased on
 30 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
 31 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife
 32 species would provide approximately 48,625 acres of potential high-value habitat for loggerhead
 33 shrike (Objective CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to
 34 maintain and protect small patches of trees and shrubs within cultivated lands that would maintain
 35 foraging perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide
 36 hedgerows along field borders and roadsides within protected cultivated lands would also provide
 37 high-value nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to
 38 near-term goals of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural
 39 community. Riparian areas would be restored, maintained, and enhanced to provide a mix of early-,
 40 mid- and late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
 41 *Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
 42 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
 43 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
 44 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
 45 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
 46 nesting habitat for loggerhead shrike.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
 5 *Affected Natural Communities*. All of these AMMs include elements that would avoid or minimize the
 6 risk of affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C
 7 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
 8 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. The loggerhead shrike is not a
 9 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
 10 preconstruction surveys for noncovered avian species would be required to ensure that nests are
 11 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
 12 *Avoid Disturbance of Nesting Birds*, would be available to address this effect.

13 **NEPA Effects:** The loss of loggerhead shrike habitat and potential for mortality of this special-status
 14 species under Alternative 1C would represent an adverse effect in the absence of other conservation
 15 actions. With habitat protection and restoration associated with CM3, CM8, CM9, and CM11, guided
 16 by biological goals and objectives and by AMM1–AMM6, *AMM10 Restoration of Temporarily Affected*
 17 *Natural Communities*, and *AMM18 Swainson’s Hawk*, and with implementation of Mitigation Measure
 18 BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*, the effects of
 19 habitat loss on loggerhead shrike under Alternative 1C would not be adverse. Loggerhead shrike is
 20 not a covered species under the BDCP, and potential mortality would be an adverse effect without
 21 preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75,
 22 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
 23 available to address this effect.

24 **CEQA Conclusion:**

25 **Near-Term Timeframe**

26 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 27 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 28 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 29 effects of construction would be less than significant under CEQA. Alternative 1C would remove
 30 12,372 acres (8,246 permanent, 4,126 temporary) of high-value habitat for loggerhead shrike in the
 31 study area in the near-term. These effects would result from the construction of the water
 32 conveyance facilities (CM1, 6,546 acres), and implementing other conservation measures (*CM2 Yolo*
 33 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally*
 34 *Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland*
 35 *Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*,
 36 *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries—*
 37 *5,826 acres*). In addition, 6,943 acres (3,921 permanent, 3,022 temporary) of low-value habitat
 38 would be removed or converted in the near-term (CM1, 5,045 acres; *CM2 Yolo Bypass Fisheries*
 39 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community*
 40 *Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*
 41 *Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18*
 42 *Conservation Hatcheries—1,898 acres*).

1 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
2 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 13,092 acres
3 should be protected to compensate for the loss of high-value habitat from CM1. The near-term
4 effects of other conservation actions would require 11,652 acres of protection to compensate for the
5 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the
6 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a
7 large proportion of the low-value habitat would result from the conversion and enhancement to
8 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively
9 quickly after completion of construction.

10 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
11 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
12 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
13 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
14 in the same timeframe as the construction and early restoration losses.

15 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
16 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
17 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
18 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
19 would create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce
20 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
21 *Enhancement and Management*, insect prey populations would be increased on protected lands,
22 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
23 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would
24 provide approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective
25 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and
26 protect small patches of trees and shrubs within cultivated lands that would maintain foraging
27 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows
28 along field borders and roadsides within protected cultivated lands would also provide high-value
29 nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to near-term goals
30 of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural community.
31 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
32 late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
33 *Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
34 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
35 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
36 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
37 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
38 nesting habitat for loggerhead shrike. These Plan objectives represent performance standards for
39 considering the effectiveness of conservation actions.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
41 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
42 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
43 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
44 *Affected Natural Communities*. All of these AMMs include elements that would avoid or minimize the
45 risk of affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C

1 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
2 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

3 In the absence of other conservation actions, the effects on loggerhead shrike habitat would
4 represent an adverse effect as a result of habitat modification and potential direct mortality of a
5 special-status species. This impact would be significant. Loggerhead shrike is not a covered species
6 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
7 noncovered avian species would be required to ensure that nests are detected and avoided. The
8 combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex, and
9 alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
10 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
11 CM1. However, some portion of the 15,400 acres of cultivated lands protected in the near-term
12 timeframe would need to include suitable high-value crop types for loggerhead shrike to avoid the
13 significant impact of habitat loss resulting from CM1. The conservation commitment is 5,684 acres
14 short of meeting the mitigation needed to compensate for other near-term effects on loggerhead
15 shrike high-value habitat. Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-
16 Value Loggerhead Shrike Habitat* would address the significant impact of near-term high-value
17 habitat loss by providing crop management requirements for CM1 compensation and requiring
18 additional acreage compensation for the other near-term effects.

19 With the acres of habitat protection and restoration described above, in addition to Mitigation
20 Measure BIO-138, *Compensate for the Near-term Loss of High-Value Loggerhead Shrike Habitat*,
21 Alternative 1C would not result in a substantial adverse effect through loss of high-value habitat.
22 The management and enhancement of cultivated lands including insect prey enhancement through
23 CM3 and CM11, the protection of shrubs and establishment of hedgerows within protected
24 cultivated lands would compensate for any potential substantial impact from the loss of low-value
25 loggerhead shrike foraging habitat. In addition, AMM1–AMM7, and implementation of Mitigation
26 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting
27 Birds*, would avoid potentially significant impacts on nesting individuals. With these measures in
28 place, Alternative 1C would not result in a substantial adverse effect through habitat modification
29 and would not substantially reduce the number or restrict the range of the species. Therefore,
30 Alternative 1C would have a less-than-significant impact on loggerhead shrike.

31 ***Late Long-Term Timeframe***

32 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 33,688
33 acres of high-value loggerhead shrike habitat during the term of the Plan. In addition, 23,244 acres
34 of low-value loggerhead shrike habitat would be impacted. The locations of these losses are
35 described above in the analyses of individual conservation measures. The Plan includes
36 conservation commitments through *CM3 Natural Communities Protection and Restoration*, *CM7,
37 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9
38 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore
39 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex, protect 150
40 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands that provide
41 suitable habitat for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and
42 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland
43 protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland
44 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
45 grassland, alkali seasonal wetland, and vernal pool natural communities which would create larger,

1 more expansive patches of high-value habitat for loggerhead shrike and reduce the effects of current
 2 levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*,
 3 insect prey populations would be increased on protected lands, enhancing the foraging value of
 4 these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that
 5 provide habitat for covered and other native wildlife species would provide approximately 48,625
 6 acres of potential high-value habitat for loggerhead shrike (Objective CLNC1.1). In addition, there is
 7 a commitment in the plan (Objective CLNC1.3) to maintain and protect small patches of trees and
 8 shrubs within cultivated lands that would maintain foraging perches and nesting habitat for the
 9 species. The establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides
 10 within protected cultivated lands would also provide high-value nesting habitat for loggerhead
 11 shrike (Objective SH2.2). The BDCP has committed to near-term goals of protecting 750 acres and
 12 restoring 800 acres of valley/foothill riparian natural community. Riparian areas would be restored,
 13 maintained, and enhanced to provide a mix of early-, mid- and late-successional habitat types with a
 14 well-developed understory of dense shrubs. *AMM18 Swainson's Hawk* includes a measure to plant
 15 large mature trees, including transplanting trees scheduled for removal. Trees would be planted in
 16 areas that support high-value Swainson's hawk foraging habitat within or adjacent to conserved
 17 cultivated lands, or as a component of the riparian restoration where they are in close proximity to
 18 suitable foraging habitat. Locating tree plantings and riparian restoration adjacent to Swainson's
 19 hawk foraging habitat would also provide suitable nesting habitat for loggerhead shrike.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
 24 *Affected Natural Communities*. All of these AMMs include elements that would avoid or minimize the
 25 risk of affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C
 26 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
 27 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. The loggerhead shrike is not a
 28 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
 29 preconstruction surveys for noncovered avian species would be required to ensure that nests are
 30 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
 31 *Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a less-than-significant
 32 level.

33 In the absence of other conservation actions, the effects on loggerhead shrike habitat would
 34 represent an adverse effect as a result of habitat modification and potential direct mortality of a
 35 special-status species. This impact would be significant. Considering Alternative 1C's protection and
 36 restoration provisions, which would provide acreages of new high-value or enhanced habitat in
 37 amounts suitable to compensate for habitats lost to construction and restoration activities, and with
 38 the implementation of AMM1-AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
 39 *Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-138, *Compensate*
 40 *for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*, the loss of habitat or direct
 41 mortality through implementation of Alternative 1C would not result in a substantial adverse effect
 42 through habitat modifications and would not substantially reduce the number or restrict the range
 43 of the species. Therefore, the loss of habitat or potential mortality under this alternative would have
 44 a less-than-significant impact on loggerhead shrike.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 See Mitigation Measure BIO-75 under Impact BIO-75.

4 **Mitigation Measure BIO-138: Compensate for the Near-term Loss of High-Value**
5 **Loggerhead Shrike Habitat**

6 Because the BDCP does not include acreage commitments for the protection of crop types in the
7 near-term time period, DWR will manage and protect sufficient acres of cultivated lands such as
8 pasture, grain and hay crops, or alfalfa as high-value loggerhead shrike habitat such that the
9 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of
10 2:1. Additional grassland protection, enhancement, and management may be substituted for the
11 protection of high-value cultivated lands.

12 **Impact BIO-139: Effects on Loggerhead Shrike Associated with Electrical Transmission**
13 **Facilities**

14 Loggerhead shrike's small, relatively maneuverable body, its lack of flocking behavior, and its
15 diurnal foraging behavior contribute to a low risk of collision with the proposed transmission lines.
16 Marking transmission lines with flight diverters that make the lines more visible to birds has been
17 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). For example, Yee
18 (2008) estimated that marking devices in the Central Valley could reduce avian mortality by 60%.
19 As described in *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted
20 with flight diverters, which would substantially reduce any potential for mortality of loggerhead
21 shrike individuals from powerline collisions.

22 **NEPA Effects:** Loggerhead shrike's small, relatively maneuverable body, its lack of flocking behavior,
23 and its diurnal foraging behavior contribute to a low risk of collision with the proposed
24 transmission lines In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird
25 strike diverters on all new transmission lines, which would substantially reduce the risk of bird
26 strike for loggerhead shrike from the project. Therefore, the construction and operation of new
27 transmission lines under Alternative 1C would not result in an adverse effect on loggerhead shrike.

28 **CEQA Conclusion:** Loggerhead shrike's small, relatively maneuverable body, its lack of flocking
29 behavior, and its diurnal foraging behavior contribute to a low risk of collision with the proposed
30 transmission lines In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird
31 strike diverters on all new transmission lines, which would substantially reduce the risk of bird
32 strike for loggerhead shrike from the project. Therefore, the construction and operation of new
33 transmission lines under Alternative 1C would result in a less-than-significant impact on loggerhead
34 shrike.

35 **Impact BIO-140: Indirect Effects of Plan Implementation on Loggerhead Shrike**

36 Noise and visual disturbances associated with construction-related activities could result in
37 temporary disturbances that affect loggerhead shrike use of modeled habitat. Construction noise
38 above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge
39 of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*
40 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to
41 determine the extent to which these noise levels could affect loggerhead shrike. Indirect effects

1 associated with construction include noise, dust, and visual disturbance caused by grading, filling,
2 contouring, and other ground-disturbing operations. If loggerhead shrike were to nest in or adjacent
3 to work areas, construction and subsequent maintenance-related noise and visual disturbances
4 could mask calls, disrupt foraging and nesting behaviors, and reduce the functions of suitable
5 nesting habitat for these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
6 *Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse effects of
7 construction-related activities on survival and productivity of nesting loggerhead shrike. The use of
8 mechanical equipment during water conveyance facilities construction could cause the accidental
9 release of petroleum or other contaminants that could affect loggerhead shrike in the surrounding
10 habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could
11 also have an adverse effect on the species. AMM1–AMM7, including *AMM2 Construction Best*
12 *Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that
13 measures are in place to prevent runoff from the construction area and negative effects of dust on
14 active nests.

15 **NEPA Effects:** Indirect effects on loggerhead shrike as a result of Plan implementation could have
16 adverse effects on these species through the modification of habitat and potential for direct
17 mortality. The loggerhead shrike is not a covered species under the BDCP and potential mortality
18 would be an adverse effect without preconstruction surveys to ensure that nests are detected and
19 avoided. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting
20 loggerhead shrikes in the highly suitable habitat surrounding Clifton Court Forebay and adjacent to
21 work areas. In conjunction with AMM1–AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction*
22 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this effect.

23 **CEQA Conclusion:** Indirect effects as a result of Alternative 1C implementation could have a
24 significant impact on loggerhead shrike. The incorporation of AMM1–AMM7 into the BDCP and the
25 implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
26 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

27 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
28 **Disturbance of Nesting Birds**

29 See discussion of Mitigation Measure BIO-75 under Impact 75.

30 **Impact BIO-141: Periodic Effects of Inundation on Loggerhead Shrike as a Result of**
31 **Implementation of Conservation Components**

32 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
33 *Enhancement*) would increase the frequency and duration of inundation on approximately 2,121–
34 4,318 acres of modeled loggerhead shrike habitat (consisting of approximately 894–2,460 acres of
35 high-value habitat; Table 12-1C-51).

36 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
37 *Restoration* could result in the periodic inundation of up to approximately 7,845 acres of modeled
38 habitat (Table 12-1C-51), the majority of which would be pasture and other cultivated lands.

39 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
40 season due to periodic inundation. However, inundation would occur during the nonbreeding
41 season and would not be expected to have an adverse effect on the species.

1 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on loggerhead
2 shrike from the modification of habitat. Reduced foraging habitat availability may be expected
3 during the fledgling period of the nesting season due to periodic inundation. However, increased
4 frequency and duration of inundation would occur during the nonbreeding season.

5 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on
6 loggerhead shrike because inundation is expected to occur prior to the breeding season.

7 **Song Sparrow “Modesto” Population**

8 This section describes the effects of Alternative 1C, including water conveyance facilities
9 construction and implementation of other conservation components, on Modesto song sparrow. The
10 Modesto song sparrow is common and ubiquitous throughout the study area, excluding CZ 11, and
11 modeled habitat for the species includes managed wetlands, tidal freshwater emergent, nontidal
12 freshwater emergent, and valley/foothill riparian vegetation communities.

13 Construction and restoration associated with Alternative 1C conservation measures would result in
14 both temporary and permanent removal of Modesto song sparrow habitat in the quantities
15 indicated in Table 12-1C-52. Full implementation of Alternative 1C would include the following
16 biological objectives over the term of the BDCP which would also benefit Modesto song sparrow
17 (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 18 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
19 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
20 associated with CM7).
- 21 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
22 10 (Objective VFRNC1.2, associated with CM3).
- 23 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,
24 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 25 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
26 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
27 associated with CM10)
- 28 • Create 500 acres of managed wetlands in CZ 3, 4, 5, or 6 (Objectives GSHC1.3 and GSHC1.4,
29 associated with CM10).
- 30 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
31 VPNC2.5, and GNC2.4, associated with CM11).
- 32 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
33 lands that occur in cultivated lands within the reserve system, including isolated valley oak
34 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
35 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
36 with CM3).
- 37 • Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
38 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated
39 with CM3).

40 As explained below, with the restoration or protection of these amounts of habitat, in addition to
41 implementation of AMM1–AMM7 and Mitigation Measure BIO-75, impacts on Modesto song

1 sparrow would not be adverse for NEPA purposes and would be less than significant for CEQA
2 purposes.

3 **Table 12-1C-52. Changes in Modesto Song Sparrow Modeled Habitat Associated with Alternative 1C**
4 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	43	43	239	239	NA	NA
Total Impacts CM1		43	43	239	239	NA	NA
CM2–CM18	Nesting	1,980	2,816	133	169	81–158	284
Total Impacts CM2–CM18		1,980	2,816	133	169	81–158	284
TOTAL IMPACTS		2,023	2,859	372	408	81–158	284

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

5

6 **Impact BIO-142: Loss or Conversion of Habitat for and Direct Mortality of Modesto Song**
7 **Sparrow**

8 Alternative 1C conservation measures would result in the combined permanent and temporary loss
9 of up to 3,267 acres of modeled habitat for Modesto song sparrow (2,859 acres of permanent loss
10 and 408 acres of temporary loss, Table 12-1C-52). Conservation measures that would result in these
11 losses are conveyance facilities and transmission line construction, and establishment and use of
12 borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration
13 (CM4), and floodplain restoration (CM5). Habitat enhancement and management activities (CM11),
14 which include ground disturbance or removal of nonnative vegetation, could result in local adverse
15 habitat effects. In addition, maintenance activities associated with the long-term operation of the
16 water conveyance facilities and other BDCP physical facilities could degrade or eliminate Modesto
17 song sparrow modeled habitat. Each of these individual activities is described below. A summary
18 statement of the combined impacts and NEPA effects, and a CEQA conclusion follows the individual
19 conservation measure discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would
21 result in the combined permanent and temporary loss of up to 282 acres of modeled Modesto
22 song sparrow habitat (43 acres of permanent loss, 239 acres of temporary loss) from CZ 1, 3, 5,
23 6, 8, and 9. Impacts would occur from the construction of Intakes 1-5, the construction of the
24 canal and associated borrow and spoil areas, and temporary work areas throughout the central
25 Delta. Permanent and temporary impacts on modeled habitat would also occur as a result of the

1 proposed transmission lines. The CM1 construction footprint overlaps with two Modesto song
 2 sparrow occurrences (one with a temporary barge facility and one with the permanent tunnel
 3 impact) and the species is ubiquitous throughout the Delta. Mitigation Measure BIO-75, *Conduct*
 4 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would require
 5 preconstruction surveys and the establishment of no-disturbance buffers and would be
 6 available to address potential effects on nesting song sparrows. Refer to the Terrestrial Biology
 7 Map Book for a detailed view of Alternative 1C construction locations. Construction of the water
 8 conveyance facilities would occur in the near-term timeframe.

- 9 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 10 would permanently remove 143 acres of modeled Modesto song sparrow habitat in the Yolo
 11 Bypass in CZ 2. In addition, 133 acres of habitat would be temporarily removed. These losses
 12 would occur in the near-term timeframe and primarily consist of valley/foothill riparian natural
 13 community and managed wetland. The loss is expected to occur during the first 10 years of
 14 Alternative 1C implementation.
- 15 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 16 inundation would result in the conversion of an estimated loss of 2,629 acres of modeled
 17 Modesto song sparrow habitat.
- 18 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 19 seasonally inundated floodplain would permanently and temporarily remove approximately 80
 20 acres of modeled Modesto song sparrow habitat (44 permanent, 36 temporary). These losses
 21 would be expected to occur along the San Joaquin River and other major waterways in CZ 7. The
 22 BDCP is expected to restore approximately 5,000 acres of valley/foothill riparian natural
 23 community. These lands would be managed as a mosaic of seral stages, age classes, and plant
 24 heights, some of which would provide suitable nesting habitat for Modesto song sparrow.
- 25 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
 26 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
 27 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
 28 activity would occur along waterway margins where riparian habitat stringers exist, including
 29 levees and channel banks. The improvements would occur within the study area on sections of
 30 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
 31 Some of the restored riparian habitat in the channel margin would be expected to support
 32 nesting habitat for Modesto song sparrow.
- 33 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
 34 actions included in CM11 that are designed to enhance wildlife values in restored or protected
 35 habitats could result in localized ground disturbances that could temporarily remove small
 36 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
 37 vegetation and road and other infrastructure maintenance activities, would be expected to have
 38 minor adverse effects on available habitat and would be expected to result in overall
 39 improvements to and maintenance of habitat values over the term of the BDCP.

40 Habitat management- and enhancement-related activities could affect Modesto song sparrow
 41 nests. If the individuals were to nest in the vicinity of a worksite, equipment operation could
 42 destroy nests, and noise and visual disturbances could lead to their abandonment, resulting in
 43 mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
 44 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address these adverse
 45 effects.

- 1 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
2 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
3 disturbances that could affect Modesto song sparrow use of the surrounding habitat.
4 Maintenance activities would include vegetation management, levee and structure repair, and
5 re-grading of roads and permanent work areas. These effects, however, would be reduced by
6 AMMs, and conservation actions as described below.
- 7 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
8 direct mortality of adult or fledged Modesto song sparrow if they were present in the Plan Area,
9 because they would be expected to avoid contact with construction and other equipment. If
10 either species were to nest in the construction area, construction-related activities, including
11 equipment operation, noise and visual disturbances could destroy nests or lead to their
12 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be
13 available to address these adverse effects.

14 The following paragraphs summarize the combined effects discussed above and describe other
15 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
16 included.

17 ***Near-Term Timeframe***

18 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
19 the near-term BDCP conservation strategy has been evaluated to determine whether it would
20 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
21 effects of construction would not be adverse under NEPA. Alternative 1C would remove 2,395 acres
22 of modeled habitat (2,023 permanent, 372 temporary) for Modesto song sparrow in the study area
23 in the near-term. These effects would result from the construction of the water conveyance facilities
24 (CM1, 282 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
25 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
26 *Restoration*—2,113 acres).

27 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
28 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios
29 would indicate that 282 acres of suitable habitat should be restored/created and 282 acres should
30 be protected to compensate for the CM1 losses of Modesto song sparrow habitat. The near-term
31 effects of other conservation actions would remove 2,113 acres of modeled habitat, and therefore
32 require 2,113 acres of restoration/creation and 2,113 acres of protection of Modesto song sparrow
33 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1 for
34 protection).

35 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
36 valley/foothill riparian natural community, restoring 2,000 acres of tidal freshwater emergent
37 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the
38 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are
39 associated with CM3, CM4, CM7, and CM10 and would occur in the same timeframe as the
40 construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
41 Modesto song sparrow. The majority of the riparian restoration acres would occur in CZ 7 as part of
42 a reserve system with extensive wide bands or large patches of valley/foothill riparian natural
43 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and
44 would provide suitable Modesto song sparrow nesting habitat. The tidal freshwater emergent

1 wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be
 2 restored in a way that creates topographic heterogeneity and in areas that increase connectivity
 3 among protected lands (Objective TFEWNC2.2). The nontidal marsh restoration would occur in
 4 CZs 2, 4, and/or 5, and the managed wetland restoration would occur in CZs 3, 4, 5, or 6. Both the
 5 nontidal marsh and managed wetland restoration are associated with CM10 and would provide
 6 nesting habitat for Modesto song sparrow.

7 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated
 8 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands
 9 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field
 10 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).
 11 The management of protected grasslands to increase insect prey through techniques such as the
 12 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
 13 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
 14 standards for considering the effectiveness of conservation actions. The acres of restoration and
 15 protection contained in the near-term Plan goals and the additional detail in the biological objectives
 16 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
 17 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 22 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 23 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 24 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 25 of the Final EIR/EIS.

26 Modesto song sparrow is not a covered species under the BDCP. For the BDCP to avoid an adverse
 27 effect on individuals, preconstruction surveys for noncovered avian species would be required to
 28 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*
 29 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this
 30 adverse effect.

31 ***Late Long-Term Timeframe***

32 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 3,267
 33 acres (2,859 acres of permanent loss, 408 acres of temporary loss) of modeled Modesto song
 34 sparrow habitat during the term of the Plan. The locations of these losses are described above in the
 35 analyses of individual conservation measures. The Plan includes conservation commitments
 36 through *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities*
 37 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of
 38 the valley/foothill riparian natural community, restore 24,000 acres of tidal freshwater emergent
 39 wetland, restore 500 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the
 40 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). Additional acres of valley/foothill
 41 riparian habitat would be restored as a component of channel margin enhancement actions (CM6)
 42 along 20 miles of river and slough channels in the Delta, some of which would be expected to
 43 support nesting habitat for Modesto song sparrow. Of the 5,000 acres of restored riparian natural
 44 communities, a minimum of 3,000 acres of valley/foothill riparian would be restored within the

1 seasonally inundated floodplain, and 1,000 acres would be managed as dense early to mid-
2 successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan
3 for riparian restoration also include the maintenance and enhancement of structural heterogeneity
4 (Objective VFRNC2.1) which would provide suitable nesting habitat for Modesto song sparrow.

5 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
6 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas
7 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh
8 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in
9 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with
10 CM10 and would provide nesting habitat for Modesto song sparrow.

11 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands
12 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective
13 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and
14 roadsides, which would provide additional habitat for the species (Objective SH2.2). The
15 management of protected grasslands to increase insect prey through techniques such as the
16 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
17 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
18 standards for considering the effectiveness of conservation actions. The acres of restoration and
19 protection contained in the near-term Plan goals and the additional detail in the biological objectives
20 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
21 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
26 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
27 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
28 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
29 of the Final EIR/EIS. Modesto song sparrow is not a covered species under the BDCP. For the BDCP
30 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species
31 would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75,
32 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
33 available to address this adverse effect.

34 **NEPA Effects:** The loss of Modesto song sparrow habitat and potential for mortality of this special-
35 status species under Alternative 1C would represent an adverse effect in the absence of other
36 conservation actions. With habitat protection and restoration associated with CM3, CM4, CM6, CM7,
37 and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in place
38 throughout the construction period, the effects of habitat loss on Modesto song sparrow under
39 Alternative 1C would not be adverse. The Modesto song sparrow is not a covered species under the
40 BDCP, and potential mortality would be an adverse effect without preconstruction surveys to ensure
41 that nests are detected and avoided. Mitigation Measure BIO-75 would be available to address this
42 effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
6 effects of construction would be less than significant under CEQA. Alternative 1C would remove
7 2,395 acres of modeled habitat (2,023 acres permanently, 372 acres temporarily) for Modesto song
8 sparrow in the study area in the near-term. These effects would result from the construction of the
9 water conveyance facilities (CM1, 282 acres), and implementing other conservation measures (CM2
10 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*
11 *Inundated Floodplain Restoration*—2,113 acres).

12 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
13 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios
14 would indicate that 282 acres of suitable habitat should be restored/created and 282 acres should
15 be protected to compensate for the CM1 losses of Modesto song sparrow habitat. The near-term
16 effects of other conservation actions would remove 2,113 acres of modeled habitat, and therefore
17 require 2,113 acres of restoration/creation and 2,113 acres of protection of Modesto song sparrow
18 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1 for
19 protection).

20 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
21 valley/foothill riparian natural community, restoring 2,000 acres of tidal freshwater emergent
22 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the
23 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are
24 associated with CM3, CM4, CM7, and CM10 and would occur in the same timeframe as the
25 construction and early restoration losses, thereby avoiding a significant impact of habitat loss on
26 Modesto song sparrow. The majority of the riparian restoration acres would occur in CZ 7 as part of
27 a reserve system with extensive wide bands or large patches of valley/foothill riparian natural
28 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and
29 would provide suitable Modesto song sparrow nesting habitat. The tidal freshwater emergent
30 wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be
31 restored in a way that creates topographic heterogeneity and in areas that increase connectivity
32 among protected lands (Objective TFEWNC2.2). The nontidal marsh restoration would occur in
33 CZs 2, 4, and/or 5, and the managed wetland restoration would occur in CZs 3, 4, 5, or 6. Both the
34 nontidal marsh and managed wetland restoration are associated with CM10 and would provide
35 nesting habitat for Modesto song sparrow.

36 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated
37 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands
38 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field
39 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).
40 The management of protected grasslands to increase insect prey through techniques such as the
41 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
42 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
43 standards for considering the effectiveness of conservation actions. The acres of restoration and
44 protection contained in the near-term Plan goals and the additional detail in the biological objectives

1 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
2 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
7 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
8 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
9 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
10 of the Final EIR/EIS. Modesto song sparrow is not a covered species under the BDCP. For the BDCP
11 to have a less-than-significant impact on individuals, preconstruction surveys for noncovered avian
12 species would be required to ensure that nests were detected and avoided. Implementation of
13 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
14 *Nesting Birds*, would reduce this impact to a less-than-significant level.

15 **Late Long-Term Timeframe**

16 Alternative 1C as a whole would result in the permanent loss of and temporary effects on 3,267
17 acres (2,859 acres of permanent loss, 408 acres of temporary loss) of modeled Modesto song
18 sparrow habitat during the term of the Plan. The locations of these losses are described above in the
19 analyses of individual conservation measures. The Plan includes conservation commitments
20 through *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities*
21 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of
22 the valley/foothill riparian natural community, restore 24,000 acres of tidal freshwater emergent
23 wetland, restore 500 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the
24 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). Additional acres of valley/foothill
25 riparian habitat would be restored as a component of channel margin enhancement actions (CM6)
26 along 20 miles of river and slough channels in the Delta, some of which would be expected to
27 support nesting habitat for Modesto song sparrow. Of the 5,000 acres of restored riparian natural
28 communities, a minimum of 3,000 acres of valley/foothill riparian would be restored within the
29 seasonally inundated floodplain, and 1,000 acres would be managed as dense early to mid-
30 successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan
31 for riparian restoration also include the maintenance and enhancement of structural heterogeneity
32 (Objective VFRNC2.1) which would provide suitable nesting habitat for Modesto song sparrow.

33 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
34 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas
35 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh
36 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in
37 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with
38 CM10 and would provide nesting habitat for Modesto song sparrow.

39 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands
40 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective
41 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and
42 roadsides, which would provide additional habitat for the species (Objective SH2.2). The
43 management of protected grasslands to increase insect prey through techniques such as the
44 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further

1 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
2 standards for considering the effectiveness of conservation actions. The acres of restoration and
3 protection contained in the near-term Plan goals and the additional detail in the biological objectives
4 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
5 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
10 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
11 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
12 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
13 of the Final EIR/EIS. Modesto song sparrow is not a covered species under the BDCP. For the BDCP
14 to minimize direct mortality of individuals, preconstruction surveys for noncovered avian species
15 would be required to ensure that nests are detected and avoided. Implementation of Mitigation
16 Measure BIO-75 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
17 *Birds*, would reduce this impact to a less-than-significant level.

18 Considering Alternative 1C's protection and restoration provisions, which would provide acreages
19 of new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
20 construction and restoration activities, and with the implementation of AMM1-AMM7 and
21 Mitigation Measure BIO-75, the loss of habitat or direct mortality through implementation of
22 Alternative 1C would not result in a substantial adverse effect through habitat modifications and
23 would not substantially reduce the number or restrict the range of either species. Therefore, the loss
24 of habitat or potential mortality under this alternative would have a less-than-significant impact on
25 Modesto song sparrow.

26 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
27 **Disturbance of Nesting Birds**

28 See Mitigation Measure BIO-75 under Impact BIO-75.

29 **Impact BIO-143: Effects on Modesto Song Sparrow Associated with Electrical Transmission**
30 **Facilities**

31 New transmission lines would increase the risk for bird-power line strikes, which could result in
32 injury or mortality of Modesto song sparrow. Existing lines currently pose this risk for Modesto song
33 sparrow and the incremental increased risk from the construction of new transmission lines is not
34 expected to adversely affect the population.

35 **NEPA Effects:** The incremental increased risk of bird-powerline strikes from the construction of new
36 transmission lines would not adversely affect the Modesto song sparrow population.

37 **CEQA Conclusion:** The incremental increased risk of bird-powerline strikes from the construction of
38 new transmission lines would have a less-than-significant impact on the Modesto song sparrow
39 population.

1 **Impact BIO-144: Indirect Effects of Plan Implementation on Modesto Song Sparrow**

2 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
3 with construction-related activities could result in temporary disturbances that affect Modesto song
4 sparrow use of modeled habitat. Construction noise above background noise levels (greater than 50
5 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,
6 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
7 *Crane*, Table 4), although there are no available data to determine the extent to which these noise
8 levels could affect Modesto song sparrow. Indirect effects associated with construction include
9 noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
10 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and
11 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse
12 effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
13 *Avoid Disturbance of Nesting Birds*, would be available to minimize effects on active nests. The use of
14 mechanical equipment during water conveyance construction could cause the accidental release of
15 petroleum or other contaminants that could affect these species or their prey in the surrounding
16 habitat. AMM1–AMM7 including *AMM2 Construction Best Management Practices and Monitoring*
17 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment
18 or excessive dust adjacent to Modesto song sparrow could also have a negative effect on these
19 species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the
20 construction area and the negative effects of dust on wildlife adjacent to work areas.

21 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
22 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
23 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
24 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
25 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*
26 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is
27 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury
28 associated with natural community and floodplain restoration could indirectly affect Modesto song
29 sparrow, via uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

30 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
31 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
32 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
33 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
34 adaptive management as described in CM12 would be available to address the uncertainty of
35 methylmercury levels in restored tidal marsh and potential impacts on Modesto song sparrow.

36 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
37 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
38 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
39 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
40 2009). The effect of selenium toxicity differs widely between species and also between age and sex
41 classes within a species. In addition, the effect of selenium on a species can be confounded by
42 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
43 2009).

1 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
2 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
3 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
4 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
5 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
6 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
7 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
8 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
9 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
10 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
11 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
12 have a higher risk of selenium toxicity.

13 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
14 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
15 exacerbate bioaccumulation of selenium in avian species, including Modesto song sparrow. Marsh
16 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
17 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
18 Alternative 1C restoration activities that create newly inundated areas could increase bioavailability
19 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
20 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
21 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
22 increases in selenium concentrations in water in the Delta under any alternative. However, it is
23 difficult to determine whether the effects of potential increases in selenium bioavailability
24 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
25 effects on Modesto song sparrow.

26 Because of the uncertainty that exists at this programmatic level of review, there could be a
27 substantial effect on Modesto song sparrow from increases in selenium associated with restoration
28 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
29 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
30 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
31 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
32 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
33 separately for each restoration effort as part of design and implementation. This avoidance and
34 minimization measure would be implemented as part of the tidal habitat restoration design
35 schedule.

36 **NEPA Effects:** Indirect effects on Modesto song sparrow as a result of constructing the Alternative
37 1C water conveyance facilities could adversely affect individuals in the absence of other
38 conservation actions. The incorporation of AMM1–AMM7 into the BDCP and the implementation of
39 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
40 *Nesting Birds*, would minimize this adverse effect.

41 The implementation of tidal natural communities restoration or floodplain restoration could result
42 in increased exposure of Modesto song sparrow to methylmercury. However, it is unknown what
43 concentrations of methylmercury are harmful to the species and the potential for increased
44 exposure varies substantially within the study area. Site-specific restoration plans that address the
45 creation and mobilization of mercury, as well as monitoring and adaptive management as described

1 in *CM12 Methylmercury Management* would address the potential impacts of methylmercury levels
2 in restored tidal marsh in the study area. The site-specific planning phase of marsh restoration
3 would be the appropriate place to assess the potential for risk of methylmercury exposure for
4 Modesto song sparrow, once site specific sampling and other information could be developed.

5 Tidal habitat restoration could result in increased exposure of Modesto song sparrow to selenium.
6 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
7 would provide specific tidal habitat restoration design elements to reduce the potential for
8 bioaccumulation of selenium and its bioavailability in tidal habitats.

9 **CEQA Conclusion:** Indirect effects on Modesto song sparrow as a result of constructing the water
10 conveyance facilities could have a significant impact on these species. The incorporation of AMM1-
11 AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*
12 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this
13 impact to a less-than-significant level. The implementation of tidal natural communities restoration
14 or floodplain restoration could result in increased exposure of Modesto song sparrow to
15 methylmercury. However, it is unknown what concentrations of methylmercury are harmful to the
16 species. Site-specific restoration plans that address the creation and mobilization of mercury, as well
17 as monitoring and adaptive management as described in *CM12 Methylmercury Management* would
18 address the potential impacts of methylmercury levels in restored tidal marsh in the study area.

19 Tidal habitat restoration could result in increased exposure of Modesto song sparrow to selenium.
20 With implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
21 restoration design elements to reduce the potential for bioaccumulation of selenium and its
22 bioavailability in tidal habitats, the impact of potential increased exposure to selenium would be less
23 than significant.

24 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
25 **Disturbance of Nesting Birds**

26 See Mitigation Measure BIO-75 under Impact BIO-75.

27 **Impact BIO-145: Periodic Effects of Inundation on Modesto Song Sparrow as a Result of**
28 **Implementation of Conservation Components**

29 Flooding of the Yolo Bypass (CM2) would inundate 81-158 acres of modeled Modesto song sparrow
30 habitat. However, inundation would occur during the nonbreeding season. Reduced foraging habitat
31 availability would be expected during the fledgling period of the nesting season due to periodic
32 inundation.

33 Based on hypothetical floodplain restoration, construction of setback levees from seasonally
34 inundated floodplain restoration (CM5) could result in periodic inundation of up to approximately
35 284 acres of Modesto song sparrow modeled habitat (Table 12-1C-52).

36 The periodic inundation of the Yolo Bypass (CM2) and of seasonal floodplains (CM5) is expected to
37 restore a more natural flood regime in support of wetland and riparian vegetation types that
38 support Modesto song sparrow habitat, but may reduce the availability of nesting habitat during
39 years when flooding extends into the nesting season (past March).

1 **NEPA Effects:** Periodic inundation would not result in an adverse effect on Modesto song sparrow
2 because increased frequency and duration of inundation would be expected to restore a more
3 natural flood regime in support of wetland and riparian vegetation types that support Modesto song
4 sparrow habitat.

5 **CEQA Conclusion:** Periodic inundation would have a less-than-significant impact on Modesto song
6 sparrow because increased frequency and duration of inundation would be expected to restore a
7 more natural flood regime in support of wetland and riparian vegetation types that support Modesto
8 song sparrow habitat.

9 **Bank Swallow**

10 This section describes the effects of Alternative 1C, including construction and implementation of
11 other conservation components, on bank swallow. Bank swallows nest in colonies along rivers,
12 streams, or other water and require fine textured sandy soils in vertical banks to create their
13 burrows. There is little suitable habitat for bank swallow in the study area because most of the
14 erodible banks have been stabilized with of levee revetment. The placement of rock revetment
15 prevents the lateral migration of rivers, removing the natural river process that creates vertical
16 banks through erosion (Bank Swallow Technical Advisory Committee 2013, Stillwater Sciences
17 2007). An estimated 70-90% of the bank swallow population in California nests along the
18 Sacramento and Feather Rivers (Bank Swallow Technical Advisory Committee 2013) upstream of
19 the study area. However, there are three CNDDDB records of bank swallow colonies in the study area:
20 two in CZ 2 north of Fremont Weir, and one in CZ 5 on Brannan Island, just west of Twitchell Island.

21 The closest natural community to represent modeled habitat for bank swallow is valley foothill
22 riparian. Although there are impacts to the valley foothill riparian natural community along the
23 northeast corner of Clifton Court Forebay, at the intermediate forebay, and on Bouldin Island, it is
24 highly unlikely that the habitat in these locations is suitable for bank swallow (alluvial soils that
25 form steep, eroded banks that have not been stabilized with levee revetment). Reusable tunnel
26 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that the
27 substrate would provide suitable nesting habitat for the species. However, if reusable tunnel
28 material areas were to become suitable for swallows over time, Mitigation Measure BIO-146 *Active*
29 *Bank Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*,
30 would avoid impacts on nesting bank swallows by requiring surveys to be conducted prior to the
31 removal of reusable tunnel material. Construction and restoration associated with Alternative 1C
32 conservation measures would not result in the direct loss of modeled habitat for bank swallow
33 (Table 12-1C-53). However, indirect effects of noise and visual disturbance from *CM2 Yolo Bypass*
34 *Fisheries Enhancements* and *CM4 Tidal Natural Communities Restoration* could impact bank swallow
35 colonies if they were present near work areas. In addition, there is uncertainty with respect to how
36 water flows upstream of the study area would affect bank swallow habitat. As explained below,
37 impacts on bank swallow would not be adverse for NEPA purposes and would be less than
38 significant for CEQA purposes with the implementation of mitigation measures to monitor colonies
39 and address the uncertainty of upstream operations on the species.

1 **Table 12-1C-53. Changes in Bank Swallow Modeled Habitat Associated with Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Breeding	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2–CM18	Breeding	0	0	0	0	0	0
Total Impacts CM2–CM18		0	0	0	0	0	0
TOTAL IMPACTS		0	0	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-146: Indirect Effects of Implementation of Conservation Components on Bank**
4 **Swallow**

5 Noise and visual disturbances during restoration activities from *CM2 Yolo Bypass Fisheries*
6 *Enhancement*, and *CM4 Tidal Natural Communities Restoration* including operation of earthmoving
7 equipment and human activities at work sites, could result in temporary disturbances that cause
8 bank swallow to abandon active nest burrows adjacent to construction areas. Bank swallow colonies
9 with occupied burrows have been recorded in in CZ 2 and CZ 5 and construction-related
10 disturbances could result in an adverse effect on individuals. Various activities related to *CM11*
11 *Natural Communities Enhancement and Management* could also have indirect impacts on bank
12 swallow.

13 **NEPA Effects:** Construction activities associated with habitat restoration could adversely affect bank
14 swallow colonies. Noise and visual disturbances could result in adverse effects on bank swallows if
15 active colonies were present within 500 feet of work areas. Mitigation Measure BIO-146, *Active Bank*
16 *Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would be
17 available to address this adverse effect.

18 **CEQA Conclusion:** Construction activities associated with habitat restoration could result in a
19 significant impact on bank swallow colonies. Noise and visual disturbances could result in
20 significant impacts on bank swallows if active colonies were present within 500 feet of work areas.
21 Implementation of Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and*
22 *Indirect Effects on Bank Swallow Will Be Minimized*, would reduce this impact to a less-than-
23 significant level.

1 **Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect**
2 **Effects on Bank Swallow Will Be Minimized**

3 To the extent practicable, BDCP proponents will not construct conservation components during
4 the bank swallow nesting season (April 1 through August 31). If restoration activities cannot be
5 avoided during nesting season, a qualified biologist will conduct preconstruction surveys to
6 determine if active bank swallow nesting colonies are present within 500 feet of work areas. If
7 no active nesting colonies are present, no further mitigation is required. Reusable tunnel
8 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that
9 the substrate would provide suitable nesting habitat for the species. However, reusable tunnel
10 material sites could become suitable for swallows over time. Surveys of reusable tunnel material
11 areas that have been present for at least 1 year, allowing the substrate to stabilize, will be
12 conducted prior to the removal of reusable tunnel material.

13 If active colonies are detected, DWR will establish a nondisturbance buffer (determined by DWR
14 in consultation with CDFW and the Bank Swallow Technical Advisory Committee) around the
15 colony during the breeding season. In addition, a qualified biologist will monitor any active
16 colony within 500 feet of construction to ensure that construction activities do not affect nest
17 success.

18 **Impact BIO-147: Effects of Upstream Reservoir and Water Conveyance Facilities Operations**
19 **on Bank Swallow**

20 Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes
21 with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the
22 species is loss of nesting habitat from the placement of rock revetment for levee stabilization.

23 Because of this limited available habitat, and the reduction of natural river process, the species is
24 highly sensitive to 1) reductions in winter flows that are necessary to erode banks for habitat
25 creation, and 2) high flows during the breeding season. The potential impacts of changes in
26 upstream flows during the breeding season on bank swallows are the flooding of active burrows and
27 destruction of burrows from increased bank sloughing. Bank swallows arrive in California and begin
28 to excavate their burrows in March, and the peak egg-laying occurs during April and May (Bank
29 Swallow Technical Advisory Committee 2013). Therefore, increases in flows after March when the
30 swallows have nested and laid eggs in the burrows could result in the loss of nests. On the
31 Sacramento River, breeding season flows between 14,000 and 30,000 cfs have been associated with
32 localized bank collapses, which resulted in partial or complete colony failure (Stillwater Sciences
33 2007).

34 The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations
35 on the Sacramento River (Sacramento River at Keswick, Sacramento River upstream of Red Bluff,
36 Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-
37 flow channel at Thermalito Dam, and Feather River at the confluence with the Sacramento River).
38 Flows were estimated for wet years, above normal years, below normal years, dry years, and critical
39 years. An average also was estimated (see Chapter 5, Section 5.3.1, *Methods for Analysis*, for a
40 description of the model). Alternative 1C would implement Operational Scenario A, which is the
41 same operational scenario as Alternative 1A described below.

42 On the Sacramento River, mean monthly flows under Alternative 1A could increase between April
43 and August in all but wet years at the Keswick flow gauge based on modeling assumptions (Table 1

1 in Section 11C.1.1 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*) and in dry
 2 and critical years at the gauge upstream of Red Bluff (Table 3 in Section 11C.1.1 of Appendix 11C,
 3 *CALSIM II Model Results Utilized in the Fish Analysis*) which could lead to inundation of active
 4 colonies. However, model outputs indicate that the flows under Existing Conditions and the
 5 predicted flows in the late long-term without the project (NAA) also show increases in flows during
 6 the breeding season (April through August) in these water year types. Similar trends are shown for
 7 the Feather River (Table 15 in Section 11C.1.1 and Table 17 in Section 11C.1.1 of Appendix 11C,
 8 *CALSIM II Model Results Utilized in the Fish Analysis*). In addition, on the Sacramento River at the
 9 Verona gauge in average, above normal, and wet water years, flows are predicted to be greater than
 10 14,000 cfs during some months of the breeding season, which could lead to bank collapse events
 11 (Tables 1, 3, and 7 in Section 11C.1.1 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish*
 12 *Analysis*). However, flows of this height are recorded under Existing Conditions at this flow gauge
 13 and are also predicted for the late long-term time without the project (NAA).

14 **NEPA Effects:** High spring flows on the Sacramento and Feather Rivers may already be impacting
 15 bank swallow colonies during the breeding season, and predicted flows under Alternative 1C would
 16 not differ substantially from those under the No Action Alternative. However, because of the
 17 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding
 18 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.
 19 Soil type, high winter flows, and low spring flows all contribute to successful nesting of bank
 20 swallow and even moderate changes in seasonal flows could have an adverse effect on breeding
 21 success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate*
 22 *Winter and Spring Flows Upstream of the Study Area*, would be available to address the uncertainty of
 23 potential adverse effects of upstream operations on bank swallow.

24 **CEQA Conclusion:** High spring flows on the Sacramento and Feather Rivers may already be
 25 impacting bank swallow colonies during the breeding season, and predicted flows under Alternative
 26 1C would not differ substantially from those under the Existing Conditions. However, because of the
 27 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding
 28 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.
 29 There are many variables that dictate suitable habitat for the species that cannot be clearly
 30 quantified, and seasonal changes in flow could increase or decrease suitable habitat for bank
 31 swallow depending on soil type and location of current colonies. Implementation of Mitigation
 32 Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of*
 33 *the Study Area*, would address this potential significant impact and determine if additional
 34 mitigation is required for bank swallow.

35 **Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and**
 36 **Spring Flows Upstream of the Study Area**

37 To address the uncertainty of the impact of upstream spring flows on existing bank swallow
 38 habitat, DWR will continue to support annual monitoring¹ of existing colonies upstream of the
 39 study area. DWR will collect data to be used for quantifying the magnitude of flows that would
 40 result in loss of active nest sites or degradation of available nesting habitat, and the extent to

¹ Bank swallow colonies have historically been and are currently monitored by DWR, USFWS, and CDFW in association with the Bank Swallow Technical Advisory Committee, which is a diverse coalition of state and federal agency and nongovernmental organization personnel, created in response to the continued decline of bank swallow populations on the Sacramento River.

1 which changes in SWP operations attributable solely to the California WaterFix are the cause of
2 such impacts. If DWR determines that changes in SWP operations attributable solely to the
3 California WaterFix have caused loss of active nest sites or degradation of available nesting
4 habitat, replacement habitat will be established at a minimum of 2:1 for the length of bank
5 habitat affected. Replacement habitat will consist of removing bank revetment to create habitat
6 for bank swallow at a location subject to CDFW approval (Bank Swallow Technical Advisory
7 Committee 2013).

8 **Yellow-Headed Blackbird**

9 This section describes the effects of Alternative 1C, including water conveyance facilities
10 construction and implementation of other conservation components, on yellow-headed blackbird.
11 The habitat model used to assess impacts on yellow-headed blackbird includes nesting habitat and
12 foraging habitat. Modeled nesting habitat includes tidal freshwater emergent wetland, other natural
13 seasonal wetland, nontidal freshwater perennial emergent wetland, and managed wetland. Modeled
14 foraging habitat for yellow-headed blackbird consists of cultivated lands and noncultivated land
15 cover types known to support abundant insect populations, including corn, pasture, and feedlots.

16 Construction and restoration associated with Alternative 1C conservation measures would result in
17 both temporary and permanent losses of yellow-headed blackbird modeled habitat as indicated in
18 Table 12-1C-54. Full implementation of Alternative 1C would include the following biological
19 objectives over the term of the BDCP which would also benefit yellow-headed blackbird (BDCP
20 Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 21 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
22 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 23 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
24 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
25 associated with CM10).
- 26 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
27 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 28 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
29 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
30 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 31 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 32 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
33 complex in CZs 1, 8, and/or 11 (Objective ASWNC1.1, Objective VPNC1.1, associated with CM3).
- 34 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
35 lands that occur in cultivated lands within the reserve system, including isolated valley oak
36 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
37 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
38 with CM3).
- 39 ● Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat (Table 12-1C-
40 38) in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.3, associated with CM3).

- Maintain and protect the small patches of important wildlife habitats associated with cultivated lands that occur in cultivated lands within the reserve system, including isolated valley oak trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- Increase prey abundance and accessibility for grassland-foraging species (Objective GNC2.4, associated with CM11).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities to enhance habitats for the species and the implementation of AMM1–AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on yellow-headed blackbird would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1C-54. Changes in Yellow-Headed Blackbird Modeled Habitat Associated with Alternative 1C

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	3	3	152	152	NA	NA
	Foraging	2,756	2,756	3,634	3,634	NA	NA
Total Impacts CM1		2,759	2,759	3,786	3,786	NA	NA
CM2–CM18	Nesting	5,814	13,902	45	46	961–2,678	18
	Foraging	5,612	26,673	376	905	368–1,476	2,701
Total Impacts CM2–CM18		11,426	40,575	421	951	1,495–4,394	2,719
Total Nesting		5,817	13,905	197	198	961–2,678	18
Total Foraging		8,368	29,429	4,010	4,539	368–1,476	2,701
TOTAL IMPACTS		4,185	43,334	4,207	4,737	1,495–4,394	2,719

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-148: Loss of Habitat for and Direct Mortality of Yellow-Headed Blackbird

Alternative 1C conservation measures would result in the combined permanent and temporary loss of up to 48,071 acres of modeled habitat (14,103 acres of nesting habitat and 33,968 acres of foraging habitat) for yellow-headed blackbird (Table 12-1C-54). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat

1 restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration
 2 (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat
 3 enhancement and management activities (CM11) which include ground disturbance or removal of
 4 nonnative vegetation could result in local adverse habitat effects. In addition, maintenance activities
 5 associated with the long-term operation of the water conveyance facilities and other BDCP physical
 6 facilities could degrade or eliminate yellow-headed blackbird suitable habitat. Each of these
 7 individual activities is described below. A summary statement of the combined impacts and NEPA
 8 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 9 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C water conveyance facilities
 10 would result in the combined permanent and temporary loss of up to 155 acres of yellow-
 11 headed blackbird nesting habitat (3 acres of permanent loss and 152 acres of temporary loss). In
 12 addition, 6,390 acres of foraging habitat would be removed (2,756 acres of permanent loss,
 13 3,634 acres of temporary loss, Table 12-1C-54). Activities that would impact suitable yellow-
 14 headed blackbird habitat consist of the western channel, tunnel, forebay, and intake
 15 construction, temporary access roads, and construction of transmission lines in CZ 1, 3, 5, 6, 8,
 16 and 9. The largest losses of foraging habitat would occur from loss of corn. There are no
 17 occurrences of yellow-headed blackbird that overlap with the construction footprint for CM1.
 18 Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 1C construction
 19 locations.
- 20 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 21 would result in the permanent removal of 29 acres of breeding habitat and 113 acres of
 22 nonbreeding habitat for yellow-headed blackbird. In addition, CM2 would result in the
 23 temporary loss of 43 acres of breeding habitat for the species. Impacts from CM2 would
 24 primarily occur in the near-term timeframe.
- 25 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation from CM4 would
 26 permanently remove or convert an estimated 4,801 acres of breeding habitat. In addition, 3,282
 27 acres of non-breeding habitat would be lost or converted as a result of tidal restoration.
 28 However, the resulting 65,000 acres of tidal natural communities would also provide habitat for
 29 the species, 24,000 acres of which would be tidal freshwater natural communities providing
 30 breeding habitat for yellow-headed blackbird.
- 31 • *CM5 Seasonally Inundated Floodplain Restoration and CM7 Riparian Natural Community*
 32 *Restoration*: Construction of setback levees to restore seasonally inundated floodplain and
 33 riparian restoration actions would permanently and temporarily remove approximately 2,477
 34 acres of suitable yellow-headed blackbird habitat consisting of 2 acres of breeding habitat and
 35 2,475 acres of nonbreeding habitat.
- 36 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
 37 implemented on agricultural lands and would result in the conversion of 230 acres of yellow-
 38 headed blackbird agricultural foraging habitat to grassland foraging habitat in CZs 1, 8, and/or
 39 11. If agricultural lands supporting higher value foraging habitat than the restored grassland
 40 were removed, there would be a loss of yellow-headed blackbird foraging habitat value. CM8
 41 would result in the restoration of 2,000 acres of grassland foraging habitat in the Plan Area.
- 42 • *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would
 43 result in the permanent conversion of 133 acres of cultivated lands foraging habitat to nontidal
 44 marsh in CZ 2 and CZ 4. Yellow-headed blackbird nesting habitat may develop along the margins
 45 of restored nontidal marsh and restoration would also provide foraging habitat for the species.

- 1 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and
2 enhancement-related activities could disturb yellow-headed blackbird nests if they were
3 present near work sites. A variety of habitat management actions included in *CM11 Natural*
4 *Communities Enhancement and Management* that are designed to enhance wildlife values in
5 BDCP-protected habitats may result in localized ground disturbances that could temporarily
6 remove small amounts of yellow-headed blackbird habitat and reduce the functions of habitat
7 until restoration is complete. Ground-disturbing activities, such as removal of nonnative
8 vegetation and road and other infrastructure maintenance, would be expected to have minor
9 effects on available yellow-headed blackbird habitat. These effects cannot be quantified, but are
10 expected to be minimal and would be avoided and minimized by the AMMs listed below.
- 11 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
12 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
13 disturbances that could affect yellow-headed blackbird use of the surrounding habitat.
14 Maintenance activities would include vegetation management, levee and structure repair, and
15 re-grading of roads and permanent work areas. These effects, however, would be reduced by
16 AMMs and conservation actions as described below.
- 17 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
18 direct mortality of adult or fledged yellow-headed blackbird if they were present in the Plan
19 Area, because they would be expected to avoid contact with construction and other equipment.
20 If yellow-headed blackbird were to nest in the construction area, construction-related activities,
21 including equipment operation, noise and visual disturbances could destroy nests or lead to
22 their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75,
23 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
24 available to address these adverse effects on yellow-headed blackbird.

25 The following paragraphs summarize the combined effects discussed above and describe other
26 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
27 included.

28 ***Near-Term Timeframe***

29 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
30 the near-term BDCP conservation strategy has been evaluated to determine whether it would
31 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
32 effects of construction would not be adverse under NEPA. Alternative 1C would remove 6,014 acres
33 (5,817 acres of permanent loss, 197 acres of temporary loss) of yellow-headed blackbird nesting
34 habitat in the study area in the near-term. These effects would result from the construction of the
35 water conveyance facilities (CM1, 155 acres), and implementing other conservation measures (CM2
36 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*
37 *Inundated Floodplain Restoration*—5,859 acres). In addition, 12,378 acres of yellow-headed
38 blackbird foraging habitat would be removed or converted in the near-term (CM1, 6,390 acres; CM2
39 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5 *Seasonally*
40 *Inundated Floodplain Restoration*, CM7 *Riparian Natural Community Restoration*, CM8 *Grassland*
41 *Natural Community Restoration*, CM10 *Nontidal Marsh Restoration*, and CM18 *Conservation*
42 *Hatcheries*—5,988 acres).

43 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
44 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection

1 of foraging habitat. Using these ratios would indicate that 155 acres of nesting habitat should be
2 restored/created and 155 acres should be protected to compensate for the CM1 losses of yellow-
3 headed blackbird nesting habitat. In addition, 6,390 acres of foraging habitat should be protected to
4 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of
5 other conservation actions would require 5,859 acres each of restoration and protection of breeding
6 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA
7 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

8 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
9 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of
10 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,
11 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland
12 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3,
13 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM8, and
14 CM10 and would occur in the same timeframe as the construction and early restoration losses.

15 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
16 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
17 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
18 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and
19 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas
20 of bare ground or marsh where the predominant vegetation consists of invasive species such as
21 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant
22 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be
23 created, some of which would provide nesting habitat for the species.

24 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
25 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
26 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
27 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
28 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
29 abundance would also be increased on protected lands, enhancing the foraging value of these
30 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
31 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
32 hedgerows along field borders and roadsides within protected cultivated lands (Objective
33 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
34 wetlands would also be protected and maintained as part of the cultivated lands reserve system
35 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

36 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
37 species would be protected in the near-term time period (Objective CLNC1.1), much of which would
38 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection
39 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the
40 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed
41 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
43 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
44 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
2 *these AMMs include elements that would avoid or minimize the risk of affecting individuals and*
3 *species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since*
4 *been updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs,*
5 *of the Final EIR/EIS.*

6 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
7 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
8 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
9 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
10 address this adverse effect.

11 **Late Long-Term Timeframe**

12 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres
13 of modeled foraging habitat for yellow-headed blackbird. Alternative 1C as a whole would result in
14 the permanent loss of and temporary effects on 14,103 acres of potential nesting habitat (17% of the
15 potential nesting habitat in the study area) and the loss or conversion of 33,968 acres of foraging
16 habitat (10% of the foraging habitat in the study area). The locations of these losses are described
17 above in the analyses of individual conservation measures.

18 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
19 *Restoration, CM4 Tidal Natural Communities Restoration, CM8 Grassland Natural Community*
20 *Restoration, and CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of
21 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,
22 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres
23 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of
24 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable
25 habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*).

26 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
27 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
28 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
29 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit
30 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground
31 or marsh where the predominant vegetation consists of invasive species such as perennial
32 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
33 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of
34 which would provide nesting habitat for the species.

35 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
36 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
37 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
38 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
39 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
40 abundance would also be increased on protected lands, enhancing the foraging value of these
41 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
42 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
43 hedgerows along field borders and roadsides within protected cultivated lands (Objective
44 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and

1 wetlands would also be protected and maintained as part of the cultivated lands reserve system
2 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the
3 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time
4 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types
5 for tricolored blackbird (BDCP Chapter 3, Table 3.3-6). These crop types include pasture, sunflower,
6 alfalfa, and other crop types that would provide high-value foraging habitat for yellow-headed
7 blackbird.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
12 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
13 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
14 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
15 of the Final EIR/EIS.

16 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
17 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
18 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
19 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
20 address this adverse effect.

21 **NEPA Effects:** The loss of yellow-headed blackbird habitat and potential for direct mortality of this
22 special-status species associated with Alternative 1C would represent an adverse effect in the
23 absence of other conservation actions. With habitat protection and restoration associated with CM3,
24 CM4, CM8, CM10, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which
25 would be in place throughout the construction phase, the effects of habitat loss on yellow-headed
26 blackbird would not be adverse under Alternative 1C. The yellow-headed blackbird is not a covered
27 species under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction
28 surveys for noncovered avian species would be required to ensure that nests are detected and
29 avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
30 *Disturbance of Nesting Birds*, would be available to address this adverse effect.

31 **CEQA Conclusion:**

32 ***Near-Term Timeframe***

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
36 effects of construction would be less than significant under CEQA. Alternative 1C would remove
37 6,014 acres (5,817 acres of permanent loss, 197 acres of temporary loss) of yellow-headed blackbird
38 nesting habitat in the study area in the near-term. These effects would result from the construction
39 of the water conveyance facilities (CM1, 155 acres), and implementing other conservation measures
40 (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5*
41 *Seasonally Inundated Floodplain Restoration*—5,859 acres). In addition, 12,378 acres of yellow-
42 headed blackbird foraging habitat would be removed or converted in the near-term (CM1, 6,390
43 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5*
44 *Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8*

1 *Grassland Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation*
2 *Hatcheries—5,988 acres).*

3 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
4 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection
5 of foraging habitat. Using these ratios would indicate that 155 acres of nesting habitat should be
6 restored/created and 155 acres should be protected to compensate for the CM1 losses of yellow-
7 headed blackbird nesting habitat. In addition, 6,390 acres of foraging habitat should be protected to
8 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of
9 other conservation actions would require 5,859 acres each of restoration and protection of breeding
10 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA
11 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

12 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
13 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of
14 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,
15 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland
16 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3,
17 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM8, and
18 CM10 and would occur in the same timeframe as the construction and early restoration losses.

19 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
20 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
21 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
22 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and
23 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas
24 of bare ground or marsh where the predominant vegetation consists of invasive species such as
25 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant
26 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be
27 created, some of which would provide nesting habitat for the species.

28 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
29 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
30 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
31 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
32 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
33 abundance would also be increased on protected lands, enhancing the foraging value of these
34 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
35 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
36 hedgerows along field borders and roadsides within protected cultivated lands (Objective
37 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
38 wetlands would also be protected and maintained as part of the cultivated lands reserve system
39 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

40 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife
41 species would be protected in the near-term time period (Objective CLNC1.1), much of which would
42 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection
43 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the
44 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed
45 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
8 of the Final EIR/EIS.

9 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
10 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
11 required to ensure that nests are detected and avoided. The implementation of Mitigation Measure
12 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
13 reduce potential impacts on nesting yellow-headed blackbird to a less-than-significant level.

14 **Late Long-Term Timeframe**

15 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres
16 of modeled foraging habitat for yellow-headed blackbird. Alternative 1C as a whole would result in
17 the permanent loss of and temporary effects on 14,103 acres of potential nesting habitat (17% of the
18 potential nesting habitat in the study area) and the loss or conversion of 33,968 acres of foraging
19 habitat (10% of the foraging habitat in the study area). The locations of these losses are described
20 above in the analyses of individual conservation measures.

21 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
22 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*
23 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of
24 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,
25 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres
26 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of
27 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable
28 habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*).

29 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
30 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
31 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
32 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit
33 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground
34 or marsh where the predominant vegetation consists of invasive species such as perennial
35 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
36 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of
37 which would provide nesting habitat for the species.

38 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
39 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
40 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
41 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
42 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
43 abundance would also be increased on protected lands, enhancing the foraging value of these
44 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would

1 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
2 hedgerows along field borders and roadsides within protected cultivated lands (Objective
3 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
4 wetlands would also be protected and maintained as part of the cultivated lands reserve system
5 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the
6 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time
7 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types
8 for tricolored blackbird (BDCP Chapter 3, Table 3.3-6). These crop types include pasture, sunflower,
9 alfalfa, and other crop types that would provide high-value foraging habitat for yellow-headed
10 blackbird.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
15 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
16 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
17 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
18 of the Final EIR/EIS.

19 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
20 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
21 required to ensure that nests are detected and avoided. Implementation of Mitigation Measure BIO-
22 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
23 reduce this potential impact to a less-than-significant level.

24 In the absence of other conservation actions, the effects on yellow-headed blackbird habitat would
25 represent an adverse effect as a result of habitat modification and potential direct mortality of a
26 special-status species. This impact would be significant. Considering Alternative 1C's protection and
27 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
28 necessary to compensate for habitat lost to construction and restoration activities, and with the
29 implementation of AMM1-AMM7 and Mitigation Measure BIO-75, the loss of habitat or direct
30 mortality through implementation of Alternative 1C would not result in a substantial adverse effect
31 through habitat modifications and would not substantially reduce the number or restrict the range
32 of either species. Therefore, the loss of habitat or potential mortality under this alternative would
33 have a less-than-significant impact on yellow-headed blackbird.

34 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
35 **Disturbance of Nesting Birds**

36 See Mitigation Measure BIO-75 under Impact BIO-75.

37 **Impact BIO-149: Effects on Yellow-Headed Blackbird Associated with Electrical Transmission**
38 **Facilities**

39 Yellow-headed blackbirds are colonial and have the potential to collide with the proposed
40 transmission lines when migrating in large flocks. However, similar to tricolored blackbird behavior,
41 daily flights associated with foraging likely occur in smaller flocks at heights that are lower than the
42 transmission lines (BDCP Appendix 5.J, Attachment 5.J-2, *Memorandum: Analysis of Potential Bird*
43 *Collisions at Proposed BDCP Transmission Lines*). Marking transmission lines with flight diverters

1 that make the lines more visible to birds has been shown to reduce the incidence of bird mortality
 2 (Brown and Drewien 1995). For example, Yee (2008) estimated that marking devices in the Central
 3 Valley could reduce avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new
 4 project transmission lines would be fitted with flight diverters, which would reduce the potential for
 5 yellow-headed blackbird collision with transmission lines. Transmission line poles and towers also
 6 provide perching substrate for raptors, which are predators on yellow-headed blackbird. Although
 7 there is potential for transmission lines to result in increased perching opportunities for raptors and
 8 result in increased predation pressure on yellow-headed blackbirds, the existing network of
 9 transmission lines in the study area currently poses this risk for yellow-headed blackbirds, and any
 10 incremental risk associated with the new transmission line corridors would not be expected to
 11 affect the study area population. Therefore, it is assumed that the increase in predation risk on
 12 yellow-headed blackbird from an increase in raptor perching opportunities would be minimal.

13 **NEPA Effects:** *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters
 14 on all new powerlines, which would reduce the potential impact of the construction of new
 15 transmission lines on yellow-headed blackbird. The increase in predation risk on yellow-headed
 16 blackbird from an increase in raptor perching opportunities would be minimal. Therefore, the
 17 construction and operation of new transmission lines under Alternative 1C would not result in an
 18 adverse effect on yellow-headed blackbird.

19 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
 20 could result in injury or mortality of yellow-headed blackbird. *AMM20 Greater Sandhill Crane*
 21 contains the commitment to place bird strike diverters on all new powerlines, which would reduce
 22 the potential impact of the construction of new transmission lines on yellow-headed blackbird. The
 23 increase in predation risk on yellow-headed blackbird from an increase in raptor perching
 24 opportunities would be minimal. The construction and operation of new transmission lines under
 25 Alternative 1C would not substantially reduce the number or restrict the range of the species and
 26 would therefore result in a less-than-significant impact on yellow-headed blackbird.

27 **Impact BIO-150: Indirect Effects of Plan Implementation on Yellow-Headed Blackbird**

28 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
 29 with construction-related activities could result in temporary disturbances that affect yellow-
 30 headed blackbird use of suitable habitat. Construction noise above background noise levels (greater
 31 than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP
 32 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*
 33 *Sandhill Crane*, Table 4), although there are no available data to determine the extent to which these
 34 noise levels could affect yellow-headed blackbird. Indirect effects associated with construction
 35 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
 36 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and
 37 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse
 38 effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
 39 *Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests.
 40 The use of mechanical equipment during water conveyance construction could cause the accidental
 41 release of petroleum or other contaminants that could affect the species in the surrounding habitat.
 42 The inadvertent discharge of sediment or excessive dust adjacent to yellow-headed blackbird
 43 habitat could also have a negative effect on the species. Where nests are located above open water,
 44 impacts of contamination, dust, and sediment in water could impact fledglings directly, or affect
 45 aquatic insect prey, which is important for feeding young. AMM1-AMM7 would minimize the

1 likelihood of spills from occurring and ensure that measures are in place to prevent runoff from the
2 construction area and the negative effects of dust on wildlife adjacent to work areas.

3 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
4 mercury in avian species, including yellow-headed blackbird. Marsh (tidal and nontidal) and
5 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
6 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
7 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
8 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
9 mercury (see Chapter 3, *Conservation Strategy*, of the BDCP for details of restoration). Species
10 sensitivity to methylmercury differs widely and there is a large amount of uncertainty with respect
11 to species-specific effects. A detailed review of the methylmercury issues associated with
12 implementation of the BDCP is contained in Appendix 11F, *Substantive BDCP Revisions*. The review
13 includes an overview of the BDCP-related mechanisms that could result in increased mercury in the
14 foodweb, and how exposure of individual species to mercury may occur based on feeding habits and
15 where species habitat overlaps with the areas where mercury bioavailability could increase.
16 Increased methylmercury associated with natural community and floodplain restoration could
17 indirectly affect yellow-headed blackbird, via uptake in lower trophic levels (as described in
18 Appendix 5.D, *Contaminants*, of the BDCP).

19 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
20 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
21 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
22 project-specific basis, where high potential for methylmercury production is identified that
23 restoration design and adaptive management cannot fully address while also meeting restoration
24 objectives, alternate restoration areas would be considered. CM12 would be implemented in
25 coordination with other similar efforts to address mercury in the Delta, and specifically with the
26 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
27 following actions.

- 28 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
29 mercury methylation and bioavailability
- 30 ● Define design elements that minimize conditions conducive to generation of methylmercury in
31 restored areas.
- 32 ● Define adaptive management strategies that can be implemented to monitor and minimize
33 actual postrestoration creation and mobilization of methylmercury.

34 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
35 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
36 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
37 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
38 2009). The effect of selenium toxicity differs widely between species and also between age and sex
39 classes within a species. In addition, the effect of selenium on a species can be confounded by
40 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
41 2009).

42 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
43 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
44 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir

1 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
2 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
3 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
4 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
5 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
6 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
7 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
8 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
9 have a higher risk of selenium toxicity.

10 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
11 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
12 exacerbate bioaccumulation of selenium in avian species, including yellow-headed blackbird. Marsh
13 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
14 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
15 Alternative 1C restoration activities that create newly inundated areas could increase bioavailability
16 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
17 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
18 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
19 increases in selenium concentrations in water in the Delta under any alternative. However, it is
20 difficult to determine whether the effects of potential increases in selenium bioavailability
21 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
22 effects on yellow-headed blackbird.

23 Because of the uncertainty that exists at this programmatic level of review, there could be a
24 substantial effect on yellow-headed blackbird from increases in selenium associated with
25 restoration activities. This effect would be addressed through the implementation of *AMM27*
26 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
27 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
28 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
29 selenium management to reduce selenium concentrations and/or bioaccumulation would be
30 evaluated separately for each restoration effort as part of design and implementation. This
31 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
32 design schedule.

33 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
34 could reduce yellow-headed blackbird use of modeled habitat adjacent to work areas. Moreover,
35 operation and maintenance of the water conveyance facilities, including the transmission facilities,
36 could result in ongoing but periodic postconstruction disturbances that could affect yellow-headed
37 blackbird use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
38 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse
39 effects on nesting individuals in addition to AMM1–AMM7.

40 The implementation of tidal natural communities restoration or floodplain restoration could result
41 in increased exposure of yellow-headed blackbird to methylmercury, in restored tidal areas.
42 However, it is unknown what concentrations of methylmercury are harmful to these species and the
43 potential for increased exposure varies substantially within the study area.

1 Implementation of CM12 which contains measures to assess the amount of mercury before project
2 development, followed by appropriate design and adaptation management, would minimize the
3 potential for increased methylmercury exposure, and would result in no adverse effect on yellow-
4 headed blackbird.

5 Tidal habitat restoration could result in increased exposure of yellow-headed blackbird to selenium.
6 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
7 would provide specific tidal habitat restoration design elements to reduce the potential for
8 bioaccumulation of selenium and its bioavailability in tidal habitats.

9 **CEQA Conclusion:** In the absence of other conservation actions, noise and visual disturbance, the
10 potential for hazardous spills, increased dust and sedimentation, and operations and maintenance of
11 the water conveyance facilities under Alternative 1C would represent an adverse effect. This impact
12 would be significant. The implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*
13 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and AMM1–AMM7, would reduce this
14 impact to a less-than-significant level.

15 The implementation of tidal natural communities restoration or floodplain restoration could result
16 in increased exposure of yellow-headed blackbird to methylmercury in restored tidal areas.
17 However, it is unknown what concentrations of methylmercury are harmful to these species and the
18 potential for increased exposure varies substantially within the study area. Implementation of CM12
19 which contains measures to assess the amount of mercury before project development, followed by
20 appropriate design and adaptation management, would minimize the potential for increased
21 methylmercury exposure, and would result in no adverse effect on yellow-headed blackbird.

22 Tidal habitat restoration could result in increased exposure of yellow-headed blackbird to selenium.
23 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
24 would provide specific tidal habitat restoration design elements to reduce the potential for
25 bioaccumulation of selenium and its bioavailability in tidal habitats.

26 Indirect effects of plan implementation would represent an adverse effect on yellow-headed
27 blackbird in the absence of other conservation measures. This would be a significant impact. With
28 AMM1-AMM7, AMM27, and CM12 in place, and with the implementation of Mitigation Measure BIO-
29 75, indirect effects of plan implementation would not result in a substantial adverse effect through
30 habitat modifications and would not substantially reduce the number or restrict the range of the
31 species. Therefore, indirect effects of plan implementation would have a less-than-significant impact
32 on yellow-headed blackbird.

33 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
34 **Disturbance of Nesting Birds**

35 See Mitigation Measure BIO-75 under Impact BIO-75.

36 **Impact BIO-151: Periodic Effects of Inundation of Yellow-Headed Blackbird Nesting Habitat**
37 **as a Result of Implementation of Conservation Components**

38 Flooding of the Yolo Bypass (CM2) would inundate 961–2,678 acres of nesting habitat and 368–
39 2,678 acres of foraging habitat (Table 12-1C-54). Based on hypothetical floodplain restoration,
40 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in
41 periodic inundation of approximately 18 acres of nesting habitat and 2,701 acres of nonbreeding
42 habitat (Table 12-1C-54) resulting in the temporary loss of these habitats. Foraging yellow-headed

1 blackbirds would be expected to move to adjacent suitable foraging habitat when the bypass is
2 inundated, as they do under the current flooding regime. However, this inundation could reduce the
3 availability of nesting habitat during years when flooding extends into the nesting season (past
4 March). The periodic inundation of the Yolo Bypass (CM2) and of other floodplains (CM5) is
5 expected to restore a more natural flood regime in support of wetland and riparian vegetation types
6 that support nesting habitat.

7 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and
8 foraging habitat for yellow-headed blackbird. Periodic inundation would not have an adverse effect
9 on yellow-headed blackbird because inundation is expected to take place outside of the breeding
10 season, and, although foraging habitat may be temporarily unavailable, birds would be expected to
11 move to adjacent foraging habitat.

12 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting
13 and foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-
14 significant impact on yellow-headed blackbird because inundation is expected to take place outside
15 of the breeding season, and, although foraging habitat would be temporarily unavailable, birds
16 would be expected to move to adjacent foraging habitat.

17 **Riparian Brush Rabbit**

18 The habitat model used to assess effects on the riparian brush rabbit consists of 38 vegetation
19 associations within the valley/foothill riparian natural community and adjacent grasslands. The
20 vegetation associations were selected based on a review of understory and overstory composition
21 from Hickson and Keeler-Wolf (2007) and species habitat requirements.

22 Just until recently, the only known naturally occurring populations of riparian brush rabbits were
23 confined to Caswell Memorial State Park (MSP), a 258-acre park supporting riparian oak woodland
24 on the Stanislaus River immediately southeast of the study area, and in the south Delta southwest of
25 Lathrop, which is within the study area (Williams and Basey 1986; Williams et al. 2002) (Figure 12-
26 46). On October 11, 2012 a single female riparian brush rabbit was captured near Durham Ferry
27 Road in riparian habitat along the San Joaquin River between Caswell MSP and Lathrop (Bradbury
28 pers. comm.). This is only the second naturally occurring population documented outside of Caswell
29 MSP. Factors considered in assessing the value of adversely affected habitat for riparian brush
30 rabbit, to the extent information was available, included size and degree of isolation of habitat
31 patches, proximity to recorded species occurrences, and adjacency to conserved lands.

32 Construction and restoration associated with Alternative 1C conservation measures would result in
33 both temporary and permanent losses of riparian brush rabbit modeled habitat as indicated in Table
34 12-1C-55. Full implementation of Alternative 1C would also include biological objectives over the
35 term of the BDCP to benefit the riparian brush rabbit (BDCP Chapter 3, *Conservation Strategy*). The
36 conservation strategy for the riparian brush rabbit, with conservation principles involves
37 protecting, restoring or creating, and maintaining habitat and corridors near the largest remaining
38 fragments of habitat and extant populations; providing high-water refugia from flooding; and
39 managing feral predators (dogs and cats) in areas occupied by the species. The conservation
40 measures that will be implemented to achieve the biological goals and objectives are summarized
41 below.

- 42 • Provide a range of elevations in restored floodplains that transition from frequently flooded
43 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a

- 1 range of habitat conditions, upland habitat values, and refugia from flooding during most flood
2 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 3 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
4 between existing conservation lands (Objective L1.6, associated with CM3).
 - 5 ● Allow floods to promote fluvial processes, such that bare mineral soils are available for natural
6 recolonization of vegetation, desirable natural community vegetation is regenerated, and
7 structural diversity is promoted, or implement management actions that mimic those natural
8 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
 - 9 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to
10 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
11 associated with CM3–CM8, and CM11).
 - 12 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000
13 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated
14 with CM3 and CM7).
 - 15 ● Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
16 (Objective VFRNC1.2, associated with CM3).
 - 17 ● Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory
18 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated
19 with CM5, CM7, and CM11).
 - 20 ● Of the 750 acres of protected valley/foothill riparian natural community protected under
21 Objective VFRNC1.2, protect at least 200 acres of suitable riparian brush rabbit habitat (defined
22 in CM7 Riparian Natural Community Restoration) that is occupied by the species or contiguous
23 with occupied habitat (Objective RBR1.1, associated with 3).
 - 24 ● Of the 1,000 acres of early- to midsuccessional riparian habitat maintained under VFRNC2.2,
25 maintain at least 800 acres within the range of the riparian brush rabbit (CZ 7), in areas that are
26 adjacent to or that facilitate connectivity with occupied or potentially occupied habitat
27 (Objective RBR1.2, associated with CM3, CM7, and CM11).
 - 28 ● Of the 5,000 acres of valley/foothill riparian natural community restored under Objective
29 VFRNC1.1, restore/create and maintain at least 300 acres of early- to mid-successional riparian
30 habitat that meets the ecological requirements of the riparian brush rabbit and that is within or
31 adjacent to or that facilitates connectivity with existing occupied or potentially occupied habitat
32 (Objective 1.3, associated with CM3, CM7, and CM11).
 - 33 ● Create and maintain high-water refugia in the 300 acres of restored riparian brush rabbit
34 habitat and the 200 acres of protected riparian brush rabbit habitat, through the retention,
35 construction and/or restoration of high-ground habitat on mounds, berms, or levees, so that
36 refugia are no further apart than 66 feet (Objective RBR1.4, associated with CM7 and CM11).
 - 37 ● In protected riparian areas that are occupied by riparian brush rabbit, monitor for and control
38 nonnative predators that are known to prey on riparian brush rabbit (Objective RBR1.5,
39 associated with CM11).
 - 40 ● Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres of
41 grasslands restored under Objective GNC1.2, protect or restore grasslands on the landward side

1 of levees adjacent to restored floodplain to provide flood refugia and foraging habitat for
2 riparian brush rabbit (Objective RBR1.6m associated with CM3 and CM8).

3 As explained below, with the restoration and protection of these amounts of habitat, in addition to
4 implementation of the AMMs to reduce potential effects, impacts on riparian brush rabbit would not
5 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

6 **Table 12-1C-55. Changes in Riparian Brush Rabbit Modeled Habitat Associated with Alternative 1C**
7 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	0	0	4	4	NA	NA
	Grassland	41	41	39	39	NA	NA
Total Impacts CM1		41	41	43	43	NA	NA
CM2-CM18	Riparian	0	62	0	35	0	264
	Grassland	0	44	0	20	0	423
Total Impacts CM2-CM18		0	106	0	55	0	687
TOTAL IMPACTS		41	147	43	98	0	687

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

8

9 **Impact BIO-152: Loss or Conversion of Habitat for and Direct Mortality of Riparian Brush**
10 **Rabbit**

11 Alternative 1C conservation measures would result in the permanent and temporary losses
12 combined of up to 101 acres of riparian habitat and 144 acres of associated grassland habitat for the
13 riparian brush rabbit in the study area (Table 12-1C-55). The hypothetical footprint for levee
14 construction under CM5, overlaps with one occurrence record for riparian brush rabbit, south of the
15 Interstate 5/Interstate 205 interchange. Conservation measures resulting in permanent habitat loss
16 include conveyance facilities construction (CM1), tidal natural communities restoration (CM4), and
17 floodplain restoration (CM5). Each of these individual activities is described below. A summary
18 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual
19 conservation measure discussions.

- 20 • *CM1 Water Facilities and Operation*: Development of Alternative 1C water conveyance facilities
21 would result in the permanent removal of approximately 13,741 acres of associated grassland
22 habitat and in the temporary removal of 4 acres of riparian habitat and 39 acres of grassland
23 habitat for riparian brush rabbit in CZ 8 (Table 12-1C-55). The riparian habitat that would be

1 removed is of low value for the riparian brush rabbit as it consists of several small, isolated
 2 patches surrounded by agricultural lands northeast of Clifton Court Forebay. The associated
 3 grasslands are also of low value for the species: They consist of long, linear strips that abut
 4 riparian habitat, but extend several miles from the riparian habitat and, therefore, provide few if
 5 any opportunities for adjacent cover. Trapping efforts conducted for the riparian brush rabbit in
 6 this area were negative (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush*
 7 *Rabbit and Riparian Woodrat*). Refer to the Terrestrial Biology Map Book for a detailed view of
 8 Alternative 1C construction locations.

- 9 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 10 inundation would permanently remove approximately 19 acres of riparian habitat and 18 acres
 11 of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late long-term. The
 12 riparian habitat that would be removed consists of relatively small and isolated patches along
 13 canals and irrigation ditches surrounded by agricultural lands in the Union Island and Roberts
 14 Island areas, and several small patches along the San Joaquin River. The habitat that would be
 15 removed is not adjacent to any existing conserved lands, and is several miles north and
 16 northeast of the northernmost riparian brush rabbit record located northeast of Paradise Cut
 17 (Williams et al. 2002). Although the final footprint for tidal natural communities restoration
 18 would differ from the hypothetical footprint, compliance monitoring would be implemented to
 19 ensure that acreage limits are not exceeded and the measures described in AMM25 *Riparian*
 20 *Woodrat and Riparian Brush Rabbit* require that tidal natural communities restoration avoid
 21 removal of any habitat occupied by the riparian brush rabbit.

- 22 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
 23 restoration would result in the permanent removal of approximately 43 acres of riparian habitat
 24 and 26 acres of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late
 25 long-term. Levee construction would also result in the temporary removal of 35 acre riparian
 26 habitat and 20 acres of grassland habitat for the riparian brush rabbit. Although the effects are
 27 considered temporary, five years to several decades may be required for ecological succession
 28 to occur and for restored riparian habitat to replace the function of habitat that has been
 29 affected. The value of this habitat for riparian brush rabbit is high: although it consists of small
 30 patches and narrow bands of riparian vegetation, these areas are in proximity to, or contiguous
 31 with, habitat with recorded occurrences of riparian brush rabbit. The hypothetical footprint for
 32 levee construction overlaps with one occurrence record for riparian brush rabbit, south of the
 33 Interstate 5/Interstate 205 interchange.

34 Although the final floodplain restoration design would differ from the hypothetical footprint
 35 used for this effects analysis, restoration of the river floodplain in CZ 7 would be targeted in the
 36 general area of the riparian brush rabbit population. Implementation of adaptive management
 37 described in AMM25 would ensure that riparian brush rabbit habitat permanently removed
 38 does not exceed maximum allowable habitat loss for this species.

- 39 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
 40 actions included in CM11 that are designed to enhance wildlife values in BDCP protected
 41 habitats may result in localized ground disturbances that could temporarily remove small
 42 amounts of riparian brush rabbit habitat. Passive recreation in the reserve system could result
 43 in disturbance of individual riparian brush rabbits foraging in the ecotone between riparian and
 44 adjacent open habitats. However, *AMM37 Recreation* limits trail development adjacent to
 45 riparian corridors within the range of the riparian brush rabbit. With this minimization measure
 46 in place, recreation related effects on the riparian brush rabbit are expected to be minimal.

1 Enhancement and management actions in riparian brush rabbit habitat within the reserve
2 system may include invasive plant removal, planting and maintaining vegetation to improve and
3 sustain habitat characteristics for the species, and creating and maintaining flood refugia. These
4 activities are expected to have minor adverse effects on available riparian brush rabbit habitat
5 and are expected to result in overall improvements to and maintenance of riparian brush rabbit
6 habitat values over the term of the BDCP. These effects cannot be quantified, but are expected to
7 be minimal and would be avoided and minimized through the AMMs listed below.

- 8 ● Operations and maintenance: Ongoing maintenance of BDCP facilities are not expected to
9 adversely affect the riparian brush rabbit because the species is not expected to occur in the
10 vicinity of proposed facilities.
- 11 ● Recreation: Passive recreation in the reserve system could result in disturbance of individual
12 riparian brush rabbits foraging in the ecotone between riparian and adjacent open habitats.
13 However, AMM37, described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
14 limits trail development adjacent to riparian corridors within the range of the riparian brush
15 rabbit. With this minimization measure in place, recreation related effects on the riparian brush
16 rabbit are expected to be minimal.
- 17 ● Injury and direct mortality: Water conveyance facility construction is not is not likely to result in
18 injury or mortality of individual riparian brush rabbits because the species is not likely to be
19 present in the areas that would be affected by this activity, based on live trapping results (BDCP
20 Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal
21 natural communities restoration would not result in injury or mortality of the riparian brush
22 rabbit because tidal natural communities restoration projects would be designed to avoid
23 occupied riparian brush rabbit habitat and, if that is not possible, rabbits would be trapped and
24 relocated as described in AMM25 (see Appendix 3B, *Environmental Commitments, AMMs, and*
25 *CMs*). Activities associated with construction of setback levees for floodplain restoration could
26 result in injury or mortality of riparian brush rabbits: however, preconstruction surveys,
27 construction monitoring, and other measures would be implemented to avoid and minimize
28 injury or mortality of this species during construction (AMM25).

29 The following paragraphs summarize the combined effects discussed above and describe other
30 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
31 also included.

32 ***Near-Term Timeframe***

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
36 effects of construction would not be adverse under NEPA.

37 Alternative 1C would result in permanent and temporary effects combined on 4 acres of riparian
38 habitat and 41 acres of grassland habitat for riparian brush rabbit in the near-term as a result of
39 construction of the water conveyance facilities (CM1). The habitat would be lost in the
40 valley/foothill riparian and grassland natural communities. All the near-term loss of riparian brush
41 rabbit habitat would be in an area not likely to be occupied by the species. Habitat loss in CZ 7, in
42 areas known or likely to be occupied, would occur during the early long-term and late long-term

1 implementation periods. Riparian restoration would be phased to minimize temporal habitat loss.
2 There would be no near-term losses resulting from CM2–CM18.

3 Typical NEPA project-level mitigation ratios for these natural communities that would be affected
4 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of
5 the BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural
6 community, and 2:1 for protection of grassland. Using these ratios would indicate that 4 acres of
7 riparian habitat should be restored, 4 acres of riparian habitat should be protected, and 82 acres of
8 grassland should be protected for riparian brush rabbit for near-term losses.

9 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1 and
10 an unknown number of associated acres of grassland and protection of 750 acres of riparian
11 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in
12 Chapter 3). In addition, the species-specific biological goals and objectives (RBR1.1-RBR1.6) would
13 inform the near-term protection and restoration efforts. The natural community restoration and
14 protection activities are expected to be concluded during the first 10 years of plan implementation,
15 which is close enough in time to the occurrence of impacts to constitute adequate mitigation for
16 NEPA purposes. These commitments are more than sufficient to support the conclusion that the
17 near-term effects of Alternative 1C would be not be adverse under NEPA, because the number of
18 acres required to meet the typical ratios described above would be only 4 acres of riparian habitat
19 restored and protected, and 82 acres of grassland protected.

20 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
24 *Restoration of Temporarily Affected Natural Communities*, *AMM25 Riparian Woodrat and Riparian*
25 *Brush Rabbit*, and *AMM37 Recreation*. These AMMs contain elements that avoid or minimize the risk
26 of BDCP activities affecting habitats and species adjacent to work areas and storage sites. BDCP
27 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
28 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

29 **Late Long-Term Timeframe**

30 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of
31 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 1C as a
32 whole would result in permanent and temporary effects combined on 101 acres of modeled riparian
33 habitat and 144 acres of modeled grassland habitat for riparian brush rabbit in CZ 6, CZ 7, and CZ 8.
34 Habitat lost in CZ 6 and CZ 8 is fragmented, isolated, and unlikely to support the species. Habitat
35 would also be lost in areas in CZ 7 that provide high-value habitat for the species.

36 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
37 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
38 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to
39 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or
40 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist
41 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800
42 acres to be conserved would consist of early successional riparian vegetation suitable for riparian
43 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy
44 area of protected and restored riparian natural community than what currently exists in CZ 7 and

1 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific
2 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at
3 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological
4 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal
5 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines
6 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from
7 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators
8 that are known to prey on riparian brush rabbit would be monitored and controlled (RBR1.5).

9 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, Alternative
10 1C would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian
11 vegetation in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected
12 to provide additional foraging opportunities for the riparian brush rabbit and upland refugia during
13 flood events. The actual acreage of grassland to be restored or protected for riparian brush rabbit
14 would depend on site-specific needs adjacent to restored and protected riparian habitat (CM3).
15 Grasslands on the landward side of levees adjacent to restored floodplain will be restored or
16 protected as needed to provide flood refugia and foraging habitat for riparian brush rabbit
17 (Objective RBR1.6).

18 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as
19 needed, the floodplains will transition from areas that flood frequently (e.g., every 1 to 2 years) to
20 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently
21 flooded areas will provide refuge for the riparian brush rabbit during most years. Alternative 1C
22 would also create and maintain mounds, levee sections, or other high areas in restored and
23 protected riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia
24 for the riparian brush rabbit (BDCP Appendix 3.F, *Conservation Principles for the Riparian Brush
25 Rabbit and Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian
26 brush rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas
27 that are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and
29 Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
30 restoration of valley/foothill riparian and grassland that could overlap with the species model,
31 would result in the restoration of 800 acres of riparian and 79 acres of grassland modeled habitat
32 for riparian brush rabbit. In addition, protection of valley/foothill riparian and grassland could
33 overlap with the species model and would result in the protection of 200 acres of riparian and 317
34 acres of grassland riparian brush rabbit modeled habitat.

35 **NEPA Effects:** In the near-term, the loss of riparian brush rabbit habitat under Alternative 1C would
36 not be an adverse effect because there is little likelihood of riparian brush rabbits being present and
37 because the BDCP has committed to protecting and restoring the acreage required to meet the
38 typical mitigation ratios described above. In the late long-term, the losses of riparian brush rabbit
39 riparian and grassland habitat associated with Alternative 1C, in the absence of other conservation
40 actions, would represent an adverse effect as a result of habitat modification and potential direct
41 mortality of a special-status species. However, with habitat protection and restoration associated
42 with the conservation components, guided by landscape-scale goals and objectives and by AMM1-
43 AMM7, AMM10, AMM25, and AMM37, the effects of Alternative 1C as a whole on riparian brush
44 rabbit would not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction is being evaluated at the project level, the near-
4 term BDCP conservation strategy has been evaluated to determine whether it would provide
5 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
6 construction would be less than significant under CEQA.

7 Alternative 1C would result in permanent and temporary effects combined on 4 acres of riparian
8 habitat and 41 acres of grassland habitat for riparian brush rabbit in the near-term as a result of
9 construction of the water conveyance facilities (CM1). The habitat would be lost in the
10 valley/foothill riparian and grassland natural communities. All the near-term loss of riparian brush
11 rabbit habitat would be in an area not likely to be occupied by the species. Habitat loss in CZ 7, in
12 areas known or likely to be occupied, would occur during the early long-term and late long-term
13 implementation periods. Riparian restoration would be phased to minimize temporal habitat loss.
14 There would be no near-term losses resulting from CM2–CM18.

15 Typical CEQA project-level mitigation ratios for these natural communities that would be affected
16 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of
17 the BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural
18 community, and 2:1 for protection of grassland. Using these ratios would indicate that 4 acres of
19 riparian habitat should be restored, 4 acres of riparian habitat should be protected, and 82 acres of
20 grassland should be protected for riparian brush rabbit for near-term losses.

21 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
22 and an unknown number of associated acres of grassland and protection of 750 acres of riparian
23 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in
24 Chapter 3). In addition, the species-specific biological goals and objectives (RBR1.1-RBR1.6) would
25 inform the near-term protection and restoration efforts. The natural community restoration and
26 protection activities are expected to be concluded during the first 10 years of plan implementation,
27 which is close enough in time to the occurrence of impacts to constitute adequate mitigation for
28 CEQA purposes. These commitments are more than sufficient to support the conclusion that the
29 near-term impacts of Alternative 1C would be less than significant under CEQA, because the number
30 of acres required to meet the typical ratios described above would be only 8 acres of riparian
31 habitat protected, 8 acres of riparian habitat restored, and 360 acres of grassland habitat

32 The plan also contains commitments to implement AMM1–AMM7, AMM10, AMM25, and AMM37.
33 These AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats
34 and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
35 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
36 *AMMs, and CMs*, of the Final EIR/EIS.

37 **Late Long-Term Timeframe**

38 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of
39 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 1C would
40 result in permanent and temporary effects combined on 101 acres of modeled riparian habitat and
41 144 acres of modeled grassland habitat for riparian brush rabbit in CZ 6, CZ 7, and CZ 8. Habitat lost
42 in CZ 6 and CZ 8 is fragmented, isolated, and unlikely to support the species. Habitat would also be
43 lost in areas in CZ 7 that provide high-value habitat for the species.

1 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
2 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
3 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to
4 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or
5 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist
6 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800
7 acres to be conserved would consist of early successional riparian vegetation suitable for riparian
8 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy
9 area of protected and restored riparian natural community than what currently exists in CZ 7 and
10 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific
11 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at
12 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological
13 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal
14 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines
15 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from
16 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators
17 that are known to prey on riparian brush rabbit would be monitored and controlled (RBR1.5).

18 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the BDCP
19 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation
20 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide
21 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood
22 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would
23 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands
24 on the landward side of levees adjacent to restored floodplain will be restored or protected as
25 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

26 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as
27 needed, the floodplains will transition from areas that flood frequently (e.g., every 1 to 2 years) to
28 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently
29 flooded areas will provide refuge for the riparian brush rabbit during most years. The Plan would
30 also create and maintain mounds, levee sections, or other high areas in restored and protected
31 riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia for the
32 riparian brush rabbit (BDCP Appendix 3.F, *Conservation Principles for the Riparian Brush Rabbit and*
33 *Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian brush
34 rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas that
35 are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

36 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
37 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
38 restoration of valley/foothill riparian and grassland that could overlap with the species model,
39 would result in the restoration of 800 acres of riparian and 79 acres of grassland modeled habitat
40 for riparian brush rabbit. In addition, protection of valley/foothill riparian and grassland could
41 overlap with the species model and would result in the protection of 200 acres of riparian and 317
42 acres of grassland riparian brush rabbit modeled habitat.

43 Only a small proportion of the habitat losses would be considered occupied and of high value.
44 Alternative 1C conservation measures provide for large acreages of riparian brush rabbit riparian
45 and grassland habitat to be protected and restored, and the BDCP includes AMM1–AMM7, AMM10,

1 AMM25, and AMM37 directed at minimizing or avoiding potential impacts during construction and
2 operation of the conservation measures. Overall, Alternative 1C would provide a substantial net
3 benefit to the riparian brush rabbit through the increase in available habitat and habitat in protected
4 status.

5 Considering the habitat restoration and protection associated with CM3, CM7, CM8 and CM11,
6 guided by species-specific goals and objectives and by AMM1–AMM7, AMM10, AMM25, and AMM37,
7 the temporary and permanent losses of riparian and grassland habitat and potential direct mortality
8 of riparian brush rabbit as a result of implementing Alternative 1C would not represent a substantial
9 adverse effect through habitat modifications and would not substantially reduce the number or
10 restrict the range of the species. The loss of habitat and potential mortality of riparian brush rabbits
11 would be a less-than-significant impact under CEQA.

12 **Impact BIO-153: Indirect Effects of Plan Implementation on Riparian Brush Rabbit**

13 Noise, lighting, and visual disturbances adjacent to construction activities could indirectly affect the
14 use of modeled riparian brush rabbit riparian habitat and of associated grassland habitat in the
15 study area. These construction activities would include water conveyance (including transmission
16 line) construction in CZ 8, tidal natural community restoration construction, and construction of
17 setback levees. Water conveyance construction would potentially affect acres of adjacent riparian
18 habitat and of associated grassland habitat: this construction would occur in CZ 8 where there is
19 suitable habitat for the species but surveys by ESRP did not indicate the species is present in this
20 area; therefore, the potential for adverse noise and visual effects from conveyance facility
21 construction would be minimal. Tidal natural communities restoration construction would also
22 potentially affect adjacent riparian habitat and associated grassland habitat for this species:
23 however, adverse effects on the species are unlikely because tidal natural communities restoration
24 projects would be sited to avoid areas occupied by riparian brush rabbit. The activity most likely to
25 result in noise, lighting, and visual disturbances to riparian brush rabbit is the construction of
26 setback levees for floodplain restoration, which would take place in CZ 7, where the species is
27 known to occur. The use of mechanical equipment during construction might cause the accidental
28 release of petroleum or other contaminants that would affect the riparian brush rabbit in adjacent
29 habitat, if the species is present.

30 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1C
31 would avoid the potential for substantial adverse effects on riparian brush rabbits, either indirectly
32 or through habitat modifications or result in a substantial reduction in numbers or a restriction in
33 the range of riparian brush rabbits. Therefore, indirect effects of Alternative 1C would not have an
34 adverse effect on riparian brush rabbit.

35 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
36 as construction-related noise, lighting, and visual disturbances could affect riparian brush rabbit in
37 riparian and grassland habitats. The use of mechanical equipment during construction could cause
38 the accidental release of petroleum or other contaminants that could affect riparian brush rabbit.
39 The inadvertent discharge of sediment or excessive dust adjacent to riparian brush rabbit habitat
40 could also have a negative effect on the species. With implementation of AMM1–AMM7, AMM10,
41 AMM25, and AMM37 as part of Alternative 1C, the BDCP would avoid the potential for substantial
42 adverse effects on riparian brush rabbits, either indirectly or through habitat modifications and
43 would not result in a substantial reduction in numbers or a restriction in the range of riparian brush

1 rabbits. Indirect effects of Alternative 1C would have a less-than-significant impact on riparian
2 brush rabbit.

3 **Impact BIO-154: Periodic Effects of Inundation of Riparian Brush Rabbit Habitat as a Result of**
4 **Implementation of Conservation Components**

5 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in
6 periodic inundation of riparian brush rabbit habitat. This activity would periodically inundate
7 approximately 264 acres of riparian habitat (9% of riparian habitat in the Plan Area) and 423 acres
8 of associated grassland habitat (14% of associated grassland habitat in the Plan Area) for the
9 riparian brush rabbit. The area between existing levees that would be breached and the newly
10 constructed setback levees would be inundated through seasonal flooding. The potentially
11 inundated areas consist of high-value habitat for the species: although they consist of small patches
12 and narrow bands of riparian vegetation, many of these areas are in proximity to, or contiguous
13 with, habitat with recorded occurrences of riparian brush rabbit. The restored floodplain would
14 include a range of elevations from lower lying areas that flood frequently (e.g., every 1 to 2 years) to
15 higher elevation areas that flood infrequently (e.g., every 10 years or more).

16 Seasonal flooding in restored floodplains can result in injury or mortality of individuals if riparian
17 brush rabbits occupy these areas and cannot escape flood waters. One recorded occurrence of
18 riparian brush rabbit (Williams et al. 2002), just west of Stewart Road in Mossdale, is in the area that
19 would be seasonally flooded based on the hypothetical restoration footprint.

20 **NEPA Effects:** Floodplain restoration under CM5 would periodically affect only a small proportion of
21 the modeled riparian brush rabbit habitat in the study area. The adverse effects of periodic
22 inundation on the riparian brush rabbit would be minimized through construction and maintenance
23 of flood refugia to allow riparian brush rabbits to escape inundation. Therefore, implementing
24 Alternative 1C, including AMM1–AMM7, AMM10, AMM25, and AMM37, would not expected to result
25 in substantial adverse effects on riparian brush rabbit, either directly or through habitat
26 modifications and would not result in a substantial reduction in numbers or a restriction in the
27 range of riparian brush rabbits. Therefore, Alternative 1C would not adversely affect the species.

28 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect only a small
29 proportion of the modeled riparian brush rabbit habitat in the study area. The overall effect of
30 seasonal inundation on existing riparian natural communities may instead be beneficial. Historically,
31 flooding was the main natural disturbance regulating ecological processes in riparian areas, and
32 flooding promotes the germination and establishment of many native riparian plants. In the late
33 long-term, seasonal inundation in areas currently occupied by riparian vegetation may contribute to
34 the establishment of high-value habitat for covered riparian species, such as the riparian brush
35 rabbit. Long-term management of riparian areas would ensure that refugia also exist along the
36 edges of seasonally inundated habitat.

37 The adverse effects of periodic inundation on the riparian brush rabbit would be minimized through
38 construction and maintenance of flood refugia to allow riparian brush rabbits to escape inundation.
39 Therefore, implementing Alternative 1C, including AMM1–AMM7, AMM10, AMM25, and AMM37,
40 would not be expected to result in substantial adverse effects on riparian brush rabbit, either
41 directly or through habitat modifications and would not result in a substantial reduction in numbers
42 or a restriction in the range of riparian brush rabbits. Periodic inundation of riparian and grassland
43 habitat for riparian brush rabbit under Alternative 1C would have a less-than-significant impact on
44 the species.

1 **Riparian Woodrat**

2 The habitat model used to assess effects for the riparian woodrat consists of selected plant alliances
3 from the valley/foothill riparian natural community, geographically constrained to the south Delta
4 portion of the BDCP area in CZ 7, south of SR 4 and Old River Pipeline along the Stanislaus, San
5 Joaquin, Old, and Middle Rivers. Valley/foothill riparian areas along smaller drainages (Paradise Cut,
6 Tom Paine Slough), and some larger streams in the northern portion of CZ 7 were excluded from the
7 riparian woodrat habitat model due to a lack of trees or riparian corridors that were too narrow.
8 Factors considered in assessing the value of affected habitat for the riparian woodrat, to the extent
9 that information is available, include habitat patch size and connectivity.

10 The riparian woodrat is not known to occur in the study area. The only verified extant population of
11 riparian woodrats rangewide is 2 miles east of the southern end of the study area in Caswell
12 Memorial State Park along the Stanislaus River (Williams 1986:1–112; 1993). Riparian woodrat may
13 occur in small patches of valley oak riparian forest along the San Joaquin River from the southern tip
14 of the study area north to approximately the Interstate 5 overcrossing near Lathrop (Figure 12-47).

15 Construction and restoration associated with Alternative 1C conservation measures would result in
16 both temporary and permanent losses of riparian woodrat modeled habitat as indicated in Table 12-
17 1C-56. Tidal habitat restoration, floodplain restoration, and protection and management of natural
18 communities could affect modeled riparian woodrat habitat. However, because the species is not
19 known to occur in the study area it is not expected to be affected by BDCP actions unless the species
20 were to establish in the study area over the term of the BDCP. Full implementation of Alternative 1C
21 would also include biological objectives over the term of the BDCP to benefit the riparian woodrat
22 (BDCP Chapter 3, *Conservation Strategy*). The conservation strategy for the riparian woodrat
23 involves providing opportunities for population expansion into the Plan Area from adjacent lands to
24 the south and southeast. The strategy focuses on restoring and maintaining suitable habitat at the
25 southernmost end of CZ 7, providing connectivity with existing populations to the south and
26 southeast, and creating and maintaining flood refugia. This conservation approach is consistent with
27 the recovery plan (U.S. Fish and Wildlife Service 1998) and conservation principles (BDCP Appendix
28 3.E). The conservation measures that will be implemented to achieve the biological goals and
29 objectives are summarized below.

- 30 ● Provide a range of elevations in restored floodplains that transition from frequently flooded
31 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a
32 range of habitat conditions, upland habitat values, and refugia from flooding during most flood
33 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 34 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
35 between existing conservation lands (Objective L1.6, associated with CM3).
- 36 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to
37 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
38 associated with CM3-CM8, and CM11).
- 39 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with 3,000 acres
40 occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated with
41 CM3 and CM7).
- 42 ● Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
43 (Objective VFRNC1.2, associated with CM3).

- 1 • Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal
2 overlap among vegetation components and over adjacent riverine channels, freshwater
3 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM5, CM7, and CM11).
- 4 • Of the 5,000 acres of valley/foothill riparian natural community restored under Objective
5 VFRNC1.1, restore/create and maintain 300 acres riparian habitat in CZ 7 that meets the
6 ecological requirements of the riparian woodrat (i.e., dense willow understory and oak
7 overstory) and that is adjacent to or facilitates connectivity with existing occupied or potentially
8 occupied habitat (Objective RW1.1, associated with CM3, CM7, CM11).
- 9 • Provide and maintain high-water refugia in the 300 acres of riparian woodrat habitat restored
10 under Objective RW1.1 through the retention, construction, and/or restoration of high-ground
11 habitat on mounds, berms, or levees, so that refugia are no further apart than 67 feet (Objective
12 RW1.2, associated with CM7 and CM11).

13 As explained below, with the restoration and protection of these amounts of habitat, in addition to
14 implementation of the AMMs to reduce potential effects, impacts on riparian woodrat would not be
15 adverse for NEPA purposes and would be less than significant for CEQA purposes.

16 **Table 12-1C-56. Changes in Riparian Woodrat Modeled Habitat Associated with Alternative 1C**
17 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	0	0	1	1	NA	NA
Total Impacts CM1		0	0	1	1	NA	NA
CM2–CM18	Riparian	0	51	0	33	0	203
Total Impacts CM2–CM18		0	51	0	33	0	203
TOTAL IMPACTS		0	51	1	34	0	203

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

18

19 **Impact BIO-155: Loss or Conversion of Habitat for and Direct Mortality of Riparian Woodrat**

20 Alternative 1C conservation measures would result in the permanent loss of up to 51 acres of
21 habitat and temporary loss of up to 34 acres of habitat for riparian woodrat (Table 12-1C-56).
22 Construction of Alternative 1C water conveyance facilities (CM1), tidal natural communities
23 restoration and seasonally inundated floodplain restoration would remove habitat. Each of these
24 individual activities is described below. A summary statement of the combined impacts and NEPA
25 effects and a CEQA conclusion follow the individual conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Development of Alternative 1C water conveyance facilities
2 would result in the temporary removal of 1 acre of modeled habitat for the riparian woodrat in
3 CZ 9 (Table 12-1C-56). The modeled habitat that would be removed is of low value for the
4 riparian woodrat as is consists of several small, isolated patches surrounded by agricultural
5 lands northeast of Clifton Court Forebay. Trapping efforts conducted for the riparian woodrat in
6 this area were negative (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush*
7 *Rabbit and Riparian Woodrat*). Refer to the Terrestrial Biology Map Book for a detailed view of
8 Alternative 1C construction locations.
- 9 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
10 inundation would permanently remove approximately 10 acres of modeled habitat for the
11 riparian woodrat in CZ 7. This habitat is of low value, consisting of a small, isolated patch
12 surrounded by agricultural lands, and the species has a relatively low likelihood of being present
13 in these areas. The measures described in *AMM25 Riparian Woodrat and Riparian Brush Rabbit*,
14 require that tidal natural communities restoration avoid removal of any habitat occupied by the
15 riparian woodrat. Because the estimates of habitat loss due to tidal inundation are based on
16 projections of where restoration may occur, actual habitat loss is expected to be lower because
17 sites would be selected to minimize effects on riparian woodrat.
- 18 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
19 restoration would result in the permanent removal of approximately 41 acres of modeled
20 habitat for the riparian woodrat in CZ 7. The value of this habitat for riparian woodrat is
21 moderate. Although the habitat consists of small patches and narrow bands of riparian
22 vegetation and no riparian woodrats have detected in CZ 7, the riparian patches are in proximity
23 to each other along the San Joaquin River. There are two species occurrences immediately south
24 of CZ 7, one of which is less than 1.5 mile from the southernmost patch of riparian habitat
25 potentially affected by levee construction.

26 The final floodplain restoration design would differ from the hypothetical footprint used for this
27 effects analysis. However, monitoring and adaptive management described in *CM11 Natural*
28 *Communities Enhancement and Management* and *AMM25* would ensure that modeled habitat
29 permanently removed as a result of floodplain restoration does not exceed the amount
30 estimated based on the hypothetical footprint. Habitat loss is expected to be lower than 41 acres
31 because sites would be selected and restoration designed to minimize effects on the riparian
32 woodrat. If natural flooding is insufficient to maintain appropriate riparian woodrat vegetation
33 structure, the vegetation would be actively managed to provide suitable habitat structure as
34 described in *CM11 Natural Communities Enhancement and Management*.

35 Levee construction would also result in the temporary removal of 33 acres of modeled habitat
36 for the riparian woodrat. Although the effects are considered temporary, 5 years to several
37 decades may be required for ecological succession to occur and for restored riparian habitat to
38 replace the function of habitat that has been affected.

- 39 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
40 actions included in *CM11* that are designed to enhance wildlife values in BDCP protected
41 habitats may result in localized ground disturbances that could temporarily remove small
42 amounts of riparian woodrat habitat. Enhancement and management actions in riparian
43 woodrat habitat within the reserve system may include invasive plant removal, planting and
44 maintaining vegetation to improve and sustain habitat characteristics for the species, and
45 creating and maintaining flood refugia. These activities are expected to have minor adverse

1 effects on available riparian woodrat habitat and are expected to result in overall improvements
2 to and maintenance of riparian woodrat habitat values over the term of the BDCP. These effects
3 cannot be quantified, but are expected to be minimal and would be avoided and minimized
4 through the AMMs listed below.

- 5 ● Operations and maintenance: The only ongoing effects on the riparian woodrat are those
6 potentially resulting from habitat enhancement and management activities. Enhancement and
7 management actions in riparian woodrat habitat within the reserve system may include invasive
8 plant removal, planting and maintaining vegetation to improve and sustain habitat
9 characteristics for the species, and creating and maintaining flood refugia. These activities may
10 result in harassment of riparian woodrats through noise and visual disturbance which would be
11 minimized with implementation of AMM1–AMM7, AMM10, and AMM25.
- 12 ● Injury and direct mortality: Water conveyance facility construction is not likely to result in
13 injury or mortality of individual riparian woodrats because the species is not likely to be present
14 in the areas that would be affected by this activity, based on live trapping results (BDCP
15 Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal
16 natural communities restoration would not result in injury or mortality of the riparian woodrats
17 because tidal natural communities restoration projects would be designed to avoid occupied
18 riparian woodrat habitat and if that is not possible to trap and relocate the species (AMM25).
19 Activities associated with construction of setback levees for floodplain restoration could result
20 in injury or mortality of riparian woodrats: however, preconstruction surveys, construction
21 monitoring, and other measures would be implemented under AMM25 to avoid and minimize
22 injury or mortality of this species during construction, as described in Appendix 3B,
23 *Environmental Commitments, AMMs, and CMs*. If occupied riparian woodrat habitat cannot be
24 avoided, mortality would be avoided through implementation of a trapping and relocation
25 program. The program will be developed in coordination with USFWS, and relocation will be to
26 a site approved by USFWS prior to construction activities.

27 The following paragraphs summarize the combined effects discussed above and describe other
28 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
29 also included.

30 ***Near-Term Timeframe***

31 Because water conveyance facilities construction is being evaluated at the project level, the near-
32 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
33 protection or restoration in an appropriate timeframe to ensure that the construction effects would
34 not be adverse under NEPA.

35 Alternative 1C would result in temporary effects on 1 acre of modeled habitat for riparian woodrat
36 in the near-term as a result of construction of the water conveyance facilities (CM1). The habitat
37 would be lost in the valley/foothill riparian. All the near-term loss of riparian woodrat habitat would
38 result from CM1 conveyance facility construction in CZ 9, and would occur in an area not likely to be
39 occupied by the species. Habitat loss in CZ 7, in areas known or likely to be occupied, would occur
40 during the early long-term and late long-term implementation periods. Riparian restoration would
41 be phased to minimize temporal habitat loss. There would be no near-term losses from CM2–CM18.

42 Typical NEPA project-level mitigation ratios for these natural communities that would be affected
43 and that are identified in the biological goals and objectives for riparian woodrat in Chapter 3 of the

1 BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural
2 community. Using these ratios would indicate that 1 acre of riparian habitat should be restored and
3 1 acre of riparian habitat should be protected for riparian woodrat for near-term losses.

4 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
5 and protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3). In addition,
6 the species-specific biological goals and objectives (RW1.1 and RW1.2) would inform the near-term
7 protection and restoration efforts. The natural community restoration and protection activities are
8 expected to be concluded during the first 10 years of plan implementation, which is close enough in
9 time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes. These
10 commitments are more than sufficient to support the conclusion that the near-term effects of
11 Alternative 1C would not be adverse under NEPA, because only 1 acre of modeled habitat would be
12 temporarily affected and there is only limited potential for minor adverse effects on woodrats or its
13 habitat from implementation of CM11.

14 These effects cannot be quantified, but are expected to be minimal and would be avoided and
15 minimized through the BDCP's commitment to *AMM1 Worker Awareness Training*, *AMM2*
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
19 *Restoration of Temporarily Affected Natural Communities*, and *AMM25 Riparian Woodrat and*
20 *Riparian Brush Rabbit*. BDCP Appendix 3.C describes the AMMs, which have since been updated and
21 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
22 EIR/EIS.

23 **Late Long-Term Timeframe**

24 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.
25 Alternative 1C as a whole would result in the permanent loss of and temporary removal of 85 acres
26 of modeled habitat for riparian woodrat habitat during the late long-term. None of this habitat is
27 considered occupied.

28 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
29 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
30 (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of riparian
31 habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow
32 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing
33 occupied or potentially occupied habitat to be restored in CZ 7. The conserved habitat would also be
34 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural
35 community than what currently exists in CZ 7 and would be contiguous with existing modeled
36 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of
37 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,
38 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural
39 community would provide riparian woodrat habitat proportional to the amount of modeled habitat
40 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area
41 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community
42 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is
43 comparable to or of higher value than existing modeled grassland habitat. All riparian protection
44 would occur during the near-term period, to offset early riparian losses.

1 The Plan would also create and maintain mounds, levee sections, or other high areas in restored and
2 protected riparian areas (Objective RW1.2) that are designed specifically to provide flood refugia for
3 the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and*
4 *Riparian Woodrat*). In addition, the restored floodplains would transition from areas that flood
5 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more)
6 (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian woodrat
7 during most years.

8 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
9 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
10 restoration of valley/foothill riparian that could overlap with the species model, would result in the
11 restoration of 300 acres of modeled habitat for riparian woodrat. In addition, protection of
12 valley/foothill riparian could overlap with the species model and would result in the protection of
13 90 acres riparian woodrat modeled habitat.

14 Although there are no records of occurrences of the riparian woodrat in the study area, habitat
15 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase
16 opportunities for northward expansion of the species into the study area. Implementation of
17 Alternative 1C conservation measures is not expected to adversely affect the riparian woodrat for
18 the following reasons.

- 19 ● There are no riparian woodrat occurrences in the Plan Area.
- 20 ● The habitat that would be removed consists of small patches that are of moderate value for the
21 species.
- 22 ● The habitat that would be removed permanently is a small proportion of the total habitat in the
23 Plan Area (2%).
- 24 ● Avoidance and minimization measures would be implemented to avoid injury or mortality of
25 riparian woodrats, and to minimize loss of occupied habitat.
- 26 ● Floodplain restoration would be designed to provide flood refugia so that flooding would not
27 adversely affect any riparian woodrats that occupy restored floodplains.

28 **NEPA Effects:** Alternative 1C would provide a substantial benefit to the riparian woodrat through
29 the net increase in available habitat and a net increase of habitat in protected status. These
30 protected areas would be managed and monitored to support the species. The affected habitat is
31 currently unoccupied and habitat removal is not expected to result in a discernible change in the
32 abundance or distribution of riparian woodrats if they occupy study area habitats. Should the
33 species be detected in the study area, AMM1-AMM7, AMM10, and AMM25 would avoid and
34 minimize the effects of conservation component construction and implementation. Therefore, the
35 loss of habitat and potential mortality of individuals would not have an adverse effect on riparian
36 woodrat under Alternative 1C.

37 **CEQA Conclusion:**

38 **Near-Term Timeframe**

39 Because the water conveyance facilities construction is being evaluated at the project level, the near-
40 term BDCP conservation strategy has been evaluated to determine whether it would provide
41 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
42 construction would be less than significant under CEQA.

1 Alternative 1C would result in temporary effects on 1 acre of modeled habitat for riparian woodrat
2 in the near-term as a result of construction of the water conveyance facilities (CM1). The habitat
3 would be lost in the valley/foothill riparian. All the near-term loss of riparian woodrat habitat would
4 result from CM1 conveyance facility construction in CZ 9, and would occur in an area not likely to be
5 occupied by the species. Habitat loss in CZ 7, in areas known or likely to be occupied, would occur
6 during the early long-term and late long-term implementation periods. Riparian restoration would
7 be phased to minimize temporal habitat loss. There would be no near-term losses from CM2–CM18.

8 Typical CEQA project-level mitigation ratios for these natural communities that would be affected
9 and that are identified in the biological goals and objectives for riparian woodrat in Chapter 3 of the
10 BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural
11 community. Using these ratios would indicate that 1 acre of riparian habitat should be restored and
12 1 acre of riparian habitat should be protected for riparian woodrat for near-term losses.

13 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
14 and protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3). In addition,
15 the species-specific biological goals and objectives (RW1.1 and RW1.2) would inform the near-term
16 protection and restoration efforts.

17 The natural community restoration and protection activities are expected to be concluded during
18 the first 10 years of plan implementation, which is close enough in time to the occurrence of impacts
19 to constitute adequate mitigation for CEQA purposes. These commitments are more than sufficient
20 to support the conclusion that the near-term impacts of Alternative 1C would be less than significant
21 under CEQA, because the number of acres required to meet the typical ratios described above would
22 be only 1 acre of riparian habitat protected and 1 acre of riparian habitat restored.

23 These commitments are more than sufficient to support the conclusion that the near-term effects of
24 Alternative 1C would not be significant under CEQA, because only 1 acre of modeled habitat would
25 be temporarily affected and there is only limited potential for minor adverse effects on woodrats or
26 its habitat from implementation of CM11.

27 These effects cannot be quantified, but are expected to be minimal and would be avoided and
28 minimized through the BDCP's commitment to AMM1–AMM7, AMM10, and AMM25. BDCP Appendix
29 3.C describes the AMMs, which have since been updated and which are provided in Appendix 3B,
30 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

31 ***Late Long-Term Timeframe***

32 Based on modeled habitat, the study area supports approximately 2,166 acres of modeled riparian
33 woodrat habitat. Alternative 1C as a whole would result in the permanent loss of and temporary
34 removal of 85 acres of modeled habitat for riparian woodrat habitat during the late long-term. None
35 of this habitat is considered occupied.

36 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
37 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
38 (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of riparian
39 habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow
40 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing
41 occupied or potentially occupied habitat to be restored in CZ 7. The conserved habitat would also be
42 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural
43 community than what currently exists in CZ 7 and would be contiguous with existing modeled

1 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of
2 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,
3 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural
4 community would provide riparian woodrat habitat proportional to the amount of modeled habitat
5 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area
6 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community
7 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is
8 comparable to or of higher value than existing modeled grassland habitat. All riparian protection
9 would occur during the near-term period, to offset early riparian losses.

10 The Plan would also create and maintain mounds, levee sections, or other high areas in restored and
11 protected riparian areas (Objective RW1.2) that are designed specifically to provide flood refugia for
12 the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and*
13 *Riparian Woodrat*). In addition, the restored floodplains would transition from areas that flood
14 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more)
15 (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian woodrat
16 during most years.

17 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
18 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
19 restoration of valley/foothill riparian that could overlap with the species model, would result in the
20 restoration of 300 acres of modeled habitat for riparian woodrat. In addition, protection of
21 valley/foothill riparian could overlap with the species model and would result in the protection of
22 90 acres riparian woodrat modeled habitat.

23 Although there are no records of occurrences of the riparian woodrat in the study area, habitat
24 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase
25 opportunities for northward expansion of the species into the study area. Implementation of
26 Alternative 1C conservation measures is not expected to adversely affect the riparian woodrat for
27 the following reasons.

- 28 ● There are no riparian woodrat occurrences in the Plan Area.
- 29 ● The habitat that would be removed consists of small patches that are of moderate value for the
30 species.
- 31 ● The habitat that would be removed permanently is a small proportion of the total habitat in the
32 Plan Area (2%).
- 33 ● Avoidance and minimization measures would be implemented to avoid injury or mortality of
34 riparian woodrats, and to minimize loss of occupied habitat.
- 35 ● Floodplain restoration would be designed to provide flood refugia so that flooding would not
36 adversely affect any riparian woodrats that occupy restored floodplains.

37 Alternative 1C would provide a substantial benefit to the riparian woodrat through the net increase
38 in available habitat and a net increase of habitat in protected status. These protected areas would be
39 managed and monitored to support the species. The affected habitat is currently unoccupied and
40 habitat removal is not expected to result in a discernible change in the abundance or distribution of
41 riparian woodrats if they occupy study area habitats. Should the species be detected in the study
42 area, AMM1–AMM7, AMM10, and AMM25 would avoid and minimize the effects of conservation

1 component construction and implementation. Therefore, the loss of habitat and potential mortality
2 of individuals would not have a significant impact on riparian woodrat.

3 **Impact BIO-156: Indirect Effects of Plan Implementation on Riparian Woodrat**

4 Noise, lighting, and visual disturbances adjacent to construction activities could indirectly affect the
5 use of modeled habitat for riparian woodrat. These effects are related construction activities
6 associated with water conveyance construction, tidal natural communities restoration construction,
7 and construction of setback levees. Indirect effects on the species from construction associated with
8 tidal natural communities restoration are unlikely because tidal natural communities restoration
9 projects would be sited to avoid areas occupied by riparian woodrat. The activity most likely to
10 result in noise, lighting, and visual disturbance to riparian woodrat is the construction of setback
11 levees.

12 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1C
13 would avoid the potential for substantial adverse effects on riparian woodrats, either indirectly or
14 through habitat modifications or result in a substantial reduction in numbers or a restriction in the
15 range of riparian woodrats. Therefore, indirect effects of Alternative 1C would not have an adverse
16 effect on riparian woodrat

17 **CEQA Conclusion:** Should the species be detected in the study area, indirect effects of conservation
18 measure construction and implementation could impact riparian woodrat and its habitat. AMM1–
19 AMM7, AMM10, and AMM25 would avoid and minimize the impact.

20 **Impact BIO-157: Periodic Effects of Inundation of Riparian Woodrat Habitat as a Result of** 21 **Implementation of Conservation Components**

22 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in
23 periodic inundation of riparian woodrat habitat. Floodplain restoration would result in periodic
24 inundation of up to 203 acres of riparian woodrat habitat (9% of the riparian woodrat habitat in the
25 Plan Area). The area between existing levees that would be breached and the newly constructed
26 setback levees would be inundated through seasonal flooding. The potentially inundated areas
27 consist of moderate-value habitat for the species. Although the habitat consists of small patches and
28 narrow bands of riparian vegetation and no riparian woodrats have detected in CZ 7, the riparian
29 patches are in proximity to each other along the San Joaquin River and there are two species
30 occurrences immediately south of CZ 7, one of which is less than 1 mile from the southernmost
31 patch of riparian habitat potentially affected by levee construction. The restored floodplains would
32 transition from areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently
33 (e.g., every 10 years or more).

34 **NEPA Effects:** Alternative 1C's periodic inundation of 203 acres of riparian habitat for riparian
35 woodrat is not expected to result in substantial adverse effects on riparian woodrat, either directly
36 or through habitat modifications and would not result in a substantial reduction in numbers or a
37 restriction in the range of riparian woodrat. The effects of periodic inundation on the riparian
38 woodrat would be minimized through construction and maintenance of flood refugia to allow
39 riparian woodrats to escape inundation. Therefore, the periodic inundation of riparian woodrat
40 habitat would not adversely affect the species.

1 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect a total of 203 acres of
2 riparian habitat for riparian woodrat, representing 9% of the 2,166 acres of modeled riparian
3 woodrat habitat in the study area. The impact of periodic inundation on the riparian woodrat would
4 be minimized through construction and maintenance of flood refugia to allow riparian woodrats to
5 escape inundation, as described in AMM25. Implementation of CM5 would not be expected to result
6 in significant impacts on riparian woodrat, either directly or through habitat modifications, and
7 would not result in a substantial reduction in numbers or a restriction in the range of riparian
8 woodrats. Periodic inundation of riparian woodrat habitat under Alternative 1C would have a less-
9 than-significant impact.

10 **Salt Marsh Harvest Mouse**

11 The habitat model used to assess effects on the salt marsh harvest mouse includes six habitat types:
12 primary tidal marsh habitat, secondary tidal marsh habitat (low marsh), secondary upland habitat
13 adjacent to tidal marsh habitat, primary habitat within managed wetlands, secondary habitat within
14 managed wetlands (dominated by plants characteristic of low marsh), and upland habitats within
15 managed wetland boundaries. The tidal and managed wetland habitats were discriminated
16 recognizing that regardless of habitat value, managed wetlands are at high risk of catastrophic
17 flooding and have lower long-term conservation value than tidal wetlands.

18 Construction and restoration associated with Alternative 1C conservation measures would result in
19 effects on modeled salt marsh harvest mouse habitat, which would include permanent losses and
20 habitat conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species
21 post-restoration) as indicated in Table 12-1C-57. All of the effects on the species would take place
22 over an extended period of time as tidal marsh is restored in the Plan Area. Full implementation of
23 Alternative 1C would also include the following conservation actions over the term of the BDCP to
24 benefit salt marsh harvest mouse (BDCP Chapter 3, *Conservation Strategy*).

- 25 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with
26 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California
27 (Objective TBEWNC1.1, associated with CM4)
- 28 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500
29 acres of middle and high marsh (primary salt marsh harvest mouse habitat) to contribute to
30 total (existing and restored) acreage targets for each complex as specified in the final Recovery
31 Plan for Tidal Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2,
32 associated with CM4).
- 33 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
34 natural community within the reserve system (Objective TBEWNC2.1).
- 35 ● Protect and enhance at least 1,500 acres of managed wetland in Grizzly Island Marsh Complex
36 for the benefit of salt marsh harvest mouse (Objective MWNC1.1, associated with CM3).
- 37 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide
38 at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective
39 GNC1.4, associated with CM3 and CM8).
- 40 ● Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of restored or
41 created middle and high marsh as defined in the final Recovery Plan for Tidal Marsh Ecosystems
42 of Northern and Central California (Objective SMHM1.1).

- Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of managed wetland protected and enhanced in the Grizzly Island Marsh Complex as defined in the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California, and increase population levels above the current baseline (Objective SMHM1.2).

As explained below, with the restoration and protection of these amounts of habitat, in addition to AMMs to minimize potential effects, impacts on the salt marsh harvest mouse would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-1C-57. Changes in Salt Marsh Harvest Mouse Modeled Habitat Associated with Alternative 1C (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2–CM18	TBEW Primary	64	67	0	0	0	0
	TBEW Secondary	0	0	0	0	0	0
	Upland Secondary	8	9	0	0	0	0
	MW Wetland Primary	1,913	5,323	0	0	0	0
	MW Wetland Secondary	315	807	0	0	0	0
	MW Upland	165	762	0	0	0	0
Total Impacts CM2–CM18		2,465	6,968	0	0	0	0
TOTAL IMPACTS		2,645	6,968	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

TBEW = tidal brackish emergent wetland

MW = managed wetland

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-158: Loss or Conversion of Habitat for and Direct Mortality of Salt Marsh Harvest Mouse

Alternative 1C tidal restoration (CM4) would be the only conservation measure resulting in effects on salt marsh harvest mouse habitat. Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. Each of these activities is described in detail below. A summary statement of the combined impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- *CM4 Tidal Natural Communities Restoration* would result in effects on 6,968 acres of salt marsh harvest mouse modeled habitat, which would include 5,376 acres of permanent losses and 1,592

1 acres of habitat conversions. Salt marsh harvest mouse may be displaced temporarily from areas
2 of converted habitat but these areas would ultimately provide suitable habitat for the species.
3 However, 1,058 of these acres would be downgraded from primary habitat (67 acres of primary
4 tidal brackish emergent wetland and 991 acres of primary managed wetland) to secondary tidal
5 brackish emergent wetland. The hypothetical restoration footprints in Suisun Marsh overlap
6 with 13 CNDDDB records for salt marsh harvest mouse (California Department of Fish and
7 Wildlife 2013); however, the BDCP's conservation actions assume that all suitable habitat in
8 Suisun Marsh is occupied by the species.

- 9 • *CM11 Natural Communities Enhancement and Management:* As described in the BDCP, the
10 restoration of at least 1,500 acres of tidal brackish emergent wetland would be managed to
11 provide viable habitat for salt marsh harvest mouse and the protection of 1,500 acres of
12 managed wetland specifically to be managed for salt marsh harvest mouse. A variety of habitat
13 management actions included in CM11 that are designed to enhance and manage these areas for
14 salt marsh harvest mouse and may result in localized ground disturbances that could
15 temporarily remove small amounts of salt marsh harvest mouse habitat. The restoration of tidal
16 brackish emergent wetlands, the protection managed wetlands, and the protection and/or
17 restoration of grasslands within 200 feet of restored salt marsh harvest mouse habitat would
18 also have enhancement and management actions that would include invasive species control,
19 nonnative wildlife control, and vegetation management. Ground-disturbing activities, such as
20 removal of nonnative vegetation are expected to have minor effects on habitat and are expected
21 to result in overall improvements to and maintenance of salt marsh harvest mouse habitat
22 values over the term of the BDCP. These effects cannot be quantified, but are expected to be
23 minimal and would be avoided and minimized by the AMMs listed below.
- 24 • *Injury and Direct Mortality:* The use of heavy equipment and handtools may result in injury or
25 mortality to salt marsh harvest mouse during restoration, enhancement, and management
26 activities. However, preconstruction surveys, construction monitoring, and other measures
27 would be implemented to avoid and minimize injury or mortality of this species during these
28 activities, as required by the AMMs listed below.

29 The following paragraphs summarize the combined effects discussed above and describe other
30 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
31 also included.

32 ***Near-Term Timeframe***

33 The near-term BDCP conservation strategy has been evaluated to determine whether it would
34 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
35 the effects of near-term covered activities would not be adverse under NEPA and would be less than
36 significant under CEQA. Alternative 1C would effect 2,465 acres of salt marsh harvest mouse
37 modeled habitat in the study area in the near-term. These effects include 1,517 acres of permanent
38 loss and 948 acres of converted habitat. Most of the habitat converted would be from primary
39 habitats (599 acres consisting of 64 acres of tidal brackish emergent wetland and 534 acres of
40 managed wetland) to secondary tidal brackish emergent wetland.

41 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
42 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,
43 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest
44 mouse. Though there would be a net loss of modeled habitat, all of these losses (97%) are to

1 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of
2 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation
3 value than tidal wetlands. The species-specific biological goals and objectives would inform the
4 near-term protection and restoration efforts. These Plan goals represent performance standards for
5 considering the effectiveness of restoration actions. The acres of protection and restoration
6 contained in the near-term Plan goals would keep pace with the loss of habitat and effects on salt
7 marsh harvest mouse habitat.

8 Other factors relevant to effects on salt marsh harvest mouse are listed below.

- 9 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
10 wetlands as noted in the specie's draft recovery plan because the conversion of managed
11 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by
12 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest
13 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided
14 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a
15 prolonged period (sometimes a decade or more) in which resident mice populations are
16 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these
17 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for
18 restoration of tidal wetlands through the conversion of managed wetlands. These plans are
19 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse
20 habitat from a variety of factors, including flooding from levee failure and cessation of active
21 management (which is often necessary to maintain habitat values in managed wetlands).
22 Therefore, the temporary effects under Alternative 1C would be consistent with those deemed
23 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 24 • Restoration in Suisun Marsh would be carefully phased over time to offset adverse effects of
25 restoration as it occurs. This phasing would ensure that temporal loss as a result of tidal natural
26 communities restoration does not adversely affect the salt marsh harvest mouse population,
27 ensure that short-term population loss is relatively small and incremental, and maintain local
28 source populations to recolonize newly restored areas. The tidal restoration projects in Suisun
29 Marsh would be implemented in 150-acre or greater patches that provide viable habitat areas
30 for the salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan
31 (U.S. Fish and Wildlife Service 2010).
- 32 • The salt marsh harvest mouse population would be monitored during the phasing process (see
33 BDCP Chapter 3, Section 3.4.4.3.4), and adaptive management would be applied to ensure
34 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
35 Section 3.6).
- 36 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
37 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
38 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
39 forage and cover.

40 Because there would be no project-level effects on salt marsh harvest mouse resulting from CM1,
41 the analysis of the effects of conservation actions does not include a comparison with standard
42 ratios used for project level NEPA analyses.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
44 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment and*
2 *Countermeasure Plan, and AMM26 Salt Marsh Harvest Mouse and Suisun Shrew. All of these AMMs*
3 *include elements that avoid or minimize the risk of affecting habitats and species adjacent to work*
4 *areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are*
5 *provided in Appendix 3B, Environmental Commitments, AMMs, and CMs, of the Final EIR/EIS.*

6 **Late Long-Term Timeframe**

7 The study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat.
8 Alternative 1C as a whole would result in effects on 6,968 acres of saltmarsh harvest mouse
9 modeled habitat over the term of the Plan, which would include 5,376 acres of permanent losses and
10 1,592 acres of habitat conversions. These effects (loss and conversion) would be to 20% of the
11 modeled habitat in the study area. Most of these effects (99%) would be to managed wetlands,
12 which though are known to be occupied by salt marsh harvest mouse are at high risk of catastrophic
13 flooding and have a lower long-term conservation value than tidal wetlands (U.S. Fish and Wildlife
14 Service 2010). Effects on up to 20% of the species' habitat in the Plan Area may diminish the salt
15 marsh harvest mouse population in the Plan Area and result in reduced genetic diversity, thereby
16 putting the local population at risk of local extirpation due to random environmental fluctuations or
17 catastrophic events. This effect is expected to be greatest if large amounts of habitat are removed at
18 one time in Suisun Marsh and are not effectively restored for many years, and if there are no
19 adjacent lands with salt marsh harvest mouse populations to recolonize restored areas.

20 The Plan includes a commitment to restore or create 6,000 acres to tidal brackish emergent wetland,
21 1,500 acres of which would target middle and high marsh habitat (primary habitat for salt marsh
22 harvest mouse) (Objectives TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4), the
23 protection of 6,500 acres of managed wetlands, 1,500 acres of which would be specifically managed
24 for salt marsh harvest mouse (Objectives SMHM1.2 and MWNC1.1, associated with CM3), and the
25 protection and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of
26 tidal restoration) to provide upland refugia for salt marsh harvest mouse (Objectives GNC1.4,
27 associated with CM3 and CM8). Other factors relevant to effects on salt marsh harvest are listed
28 below.

- 29 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
30 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the
31 conversion of managed wetland to tidal marsh occurs gradually. Tidal marsh restoration is often
32 accomplished by breaching levees and converting diked nontidal marsh currently occupied by
33 salt marsh harvest mouse populations to tidal wetlands, their historic condition. Conversion of
34 these subsided areas requires sedimentation and accretion over time to restore marsh plains,
35 resulting in a prolonged period (sometimes a decade or more) in which resident mice
36 populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010).
37 Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan
38 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.
39 These plans are based on the premise that managed wetlands are at high risk of loss of salt
40 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and
41 cessation of active management (which is often necessary to maintain habitat values in managed
42 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed
43 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 44 ● In order to ensure that temporal loss as a result of tidal natural communities restoration does
45 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh

1 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure
2 that short-term population loss is relatively small and incremental, and maintain local source
3 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh
4 would be implemented in 150-acre or greater patches that provide viable habitat areas for the
5 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish
6 and Wildlife Service 2010).

- 7 ● The salt marsh harvest mouse population would be monitored during the phasing process (see
8 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure
9 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
10 Section 3.6).
- 11 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
12 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
13 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
14 forage and cover.
- 15 ● The habitat that would be restored and protected would consist of large blocks of contiguous
16 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
17 vegetation suitable for the species. This would provide greater habitat connectivity and greater
18 habitat value, which is expected to accommodate larger populations and to therefore increase
19 population resilience to random environmental events and climate change.

20 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
21 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
22 the restoration of 6,046 acres and the protection of 1,550 acres of modeled habitat for salt marsh
23 harvest mouse.

24 **NEPA Effects:** In the absence of other conservation actions, the effects on salt marsh harvest mouse
25 habitat from Alternative 1C in the would represent an adverse effect as a result of habitat
26 modification and potential direct mortality of a special-status species. However, the BDCP has
27 committed to habitat protection, restoration, management, and enhancement associated with CM3,
28 CM4, CM8 and CM11. This habitat protection, restoration, management, and enhancement would be
29 guided by species-specific goals and objectives and by AMM1–AMM5 and AMM26, which would be
30 in place throughout the construction period. Considering these commitments, losses and
31 conversions of salt marsh harvest mouse habitat and potential mortality of individuals under
32 Alternative 1C would not be adverse.

33 **CEQA Conclusion:**

34 **Near-Term Timeframe**

35 The near-term BDCP conservation strategy has been evaluated to determine whether it would
36 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
37 impacts of near-term covered activities would be less than significant. Alternative 1C would impact
38 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the near-term. These
39 effects include 1,517 acres of permanent loss and 948 acres of converted habitat. Most of the habitat
40 converted would be to primary habitats (599 acres consisting of 64 acres of tidal brackish emergent
41 wetland and 534 acres of managed wetland) to secondary tidal brackish emergent wetland.

1 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
2 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,
3 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest
4 mouse. Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to
5 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of
6 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation
7 value than tidal wetlands. The species-specific biological goals and objectives would inform the
8 near-term protection and restoration efforts. These Plan goals represent performance standards for
9 considering the effectiveness of restoration actions. The acres of protection and restoration
10 contained in the near-term Plan goals would keep pace with the loss of habitat and effects on salt
11 marsh harvest mouse habitat.

12 Other factors relevant to effects on salt marsh harvest mouse are listed below.

- 13 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
14 wetlands as noted in the specie's draft recovery plan because the conversion of managed
15 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by
16 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest
17 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided
18 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a
19 prolonged period (sometimes a decade or more) in which resident mice populations are
20 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these
21 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for
22 restoration of tidal wetlands through the conversion of managed wetlands. These plans are
23 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse
24 habitat from a variety of factors, including flooding from levee failure and cessation of active
25 management (which is often necessary to maintain habitat values in managed wetlands).
26 Therefore, the temporary effects under Alternative 1C would be consistent with those deemed
27 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 28 ● To ensure that temporal loss as a result of tidal natural communities restoration does not
29 adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh would be
30 carefully phased over time to offset adverse effects of restoration as it occurs, ensure that short-
31 term population loss is relatively small and incremental, and maintain local source populations
32 to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh would be
33 implemented in 150-acre or greater patches that provide viable habitat areas for the salt marsh
34 harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish and Wildlife
35 Service 2010).
- 36 ● The salt marsh harvest mouse population would be monitored during the phasing process (see
37 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure
38 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
39 Section 3.6).
- 40 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
41 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
42 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
43 forage and cover.

1 Because there would be no project-level impacts on salt marsh harvest mouse from CM1, the
2 analysis of the impacts of conservation actions does not include a comparison with standard ratios
3 used for project level CEQA analyses.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
7 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
8 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
9 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
10 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

11 These commitments are more than sufficient to support the conclusion that the near-term effects of
12 Alternative 1C would be less than significant under CEQA.

13 **Late Long-Term Timeframe**

14 Based on modeled habitat, the study area supports approximately 35,588 acres of salt marsh
15 harvest mouse modeled habitat. Alternative 1C as a whole would result in effects on 6,968 acres of
16 saltmarsh harvest mouse modeled habitat over the term of the Plan, which would include 5,376
17 acres of permanent losses and 1,592 acres of habitat conversions. The Plan includes a commitment
18 to restore or create 6,000 acres of tidal brackish emergent wetland, 1,500 acres of which would
19 target middle and high marsh habitat (primary habitat for salt marsh harvest mouse) (Objectives
20 TBEWNC1.1, TBEWNC1.2, and SMHM1.1, associate with CM4); the protection of 6,500 acres of
21 managed wetlands, 1,500 acres of which would be specifically managed for salt marsh harvest
22 mouse (Objectives SMHM1.2 and MWNC1.1, associated with CM3), and the protection and/or
23 restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration) to
24 provide upland refugia for salt marsh harvest mouse (Objectives GNC1.4, associated with CM3 and
25 CM8). Other factors relevant to effects on salt marsh harvest mouse include:

- 26 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
27 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the
28 conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is
29 often accomplished by breaching levees and converting diked nontidal marsh currently
30 occupied by salt marsh harvest mouse populations to tidal wetlands, their historic condition.
31 Conversion of these subsided areas requires sedimentation and accretion over time to restore
32 marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident
33 mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service
34 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan
35 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.
36 These plans are based on the premise that managed wetlands are at high risk of loss of salt
37 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and
38 cessation of active management (which is often necessary to maintain habitat values in managed
39 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed
40 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 41 ● In order to ensure that temporal loss as a result of tidal natural communities restoration does
42 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh
43 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure
44 that short-term population loss is relatively small and incremental, and maintain local source

1 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh
2 would be implemented in 150-acre or greater patches that provide viable habitat areas for the
3 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish
4 and Wildlife Service 2010).

- 5 ● The salt marsh harvest mouse population would be monitored during the phasing process (see
6 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure
7 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
8 Section 3.6).
- 9 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
10 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
11 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
12 forage and cover.
- 13 ● The habitat that would be restored and protected would consist of large blocks of contiguous
14 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
15 vegetation suitable for the species. This would provide greater habitat connectivity and greater
16 habitat value, which is expected to accommodate larger populations and to therefore increase
17 population resilience to random environmental events and climate change.

18 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
19 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
20 the restoration of 6,046 acres and the protection of 1,550 acres of modeled habitat for salt marsh
21 harvest mouse.

22 Alternative 1C would result in substantial modifications to salt marsh harvest mouse habitat in the
23 absence of other conservation actions. However, with habitat protection, restoration, management,
24 and enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and
25 objectives and by AMM1–AMM5, and AMM26, which would be in place throughout the construction
26 phase, Alternative 1C over the term of the BDCP would not result in a substantial adverse effect
27 through habitat modifications and would not substantially reduce the number or restrict the range
28 of the species. Therefore, the alternative would have a less-than-significant impact on salt marsh
29 harvest mouse.

30 **Impact BIO-159: Indirect Effects of Plan Implementation on Salt Marsh Harvest Mouse**

31 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),
32 and management and enhancement activities (CM11) could result in temporary noise and visual
33 disturbances to salt marsh harvest mouse occurring within 100 feet of these areas over the term of
34 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM6 and
35 AMM26, which would be in effect throughout the term of the Plan.

36 The use of mechanical equipment during the implementation of the conservation measures could
37 cause the accidental release of petroleum or other contaminants that could affect salt marsh harvest
38 mouse and its habitat. The inadvertent discharge of sediment could also have a negative effect on
39 the species and its habitat. AMM1–AMM6 would minimize the likelihood of such spills and would
40 ensure measures are in place to prevent runoff from the construction area and potential effects of
41 sediment on salt marsh harvest mouse.

1 Tidal marsh restoration has the potential to increase salt marsh harvest mouse's exposure to
2 mercury. Mercury is transformed into the more bioavailable form of methylmercury under
3 anaerobic conditions, which in the environment typically occurs in sediments subjected to regular
4 wetting and drying such as tidal marshes and flood plains. Thus, BDCP restoration activities that
5 create newly inundated areas could increase bioavailability of mercury. In general, the highest
6 methylation rates are associated with high tidal marshes that experience intermittent wetting and
7 drying and associated anoxic conditions (Alpers et al. 2008). High tidal marsh is considered to be
8 primary habitat for salt marsh harvest mouse and thus the species could be exposed to methyl
9 mercury in tidal restoration areas. Salt marsh harvest mouse may be exposed to elemental mercury
10 by feeding on pickleweed, which is found concentrated in the distal tips of pickleweed leaves (Yee et
11 al., 2008). Though elemental mercury is less bioavailable than methylmercury, studies have shown
12 that mercury can become methylated in the anaerobic portions of the intestinal tract (Rudd et al.
13 1980, Rieder et al. 2013) and could thus become a pathway for salt marsh harvest exposure to
14 methylmercury. A study of small mammals residing in pickleweed around the San Francisco Bay
15 showed an absence of salt marsh harvest mouse where mercury concentrations measured in house
16 mice (*Mus musculus*) livers were ≥ 0.19 $\mu\text{g/g}$ (dry weight) (Clark et al. 1992). Clark et al (1992) also
17 report that the lack of salt marsh harvest mouse at these locations are not the result of undetected
18 habitat differences or are by chance. Clarke et al (1992) suggest that the absence of salt marsh
19 harvest mouse at certain locations may be associated with higher amounts of mercury and
20 polychlorinated biphenyls (PCBs); however, because their study didn't analyze contaminants in salt
21 marsh harvest mouse and because (at that time) there was no data in the literature on contaminants
22 in harvest mice, they could not make conclusions on these associations. Currently, it is unknown
23 what the exact exposure pathways are or what tissue concentrations are harmful to the salt marsh
24 harvest mouse.

25 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
26 under the plan would generate less methylmercury than the existing managed wetlands. The
27 potential for salt marsh harvest mouse exposure to methyl mercury in Suisun Marsh may decrease
28 in the long term because the creation of tidal brackish emergent wetland would predominantly
29 result from the conversion of managed wetlands. *CM12 Methylmercury Management* includes
30 provisions for project-specific Mercury Management Plans. Along with avoidance and minimization
31 measures and adaptive management and monitoring, CM12 could reduce the effects of
32 methylmercury on salt marsh harvest mouse resulting from BDCP tidal restoration.

33 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1C
34 would avoid and minimize indirect effects on salt marsh harvest mouse. These AMMs would also
35 avoid and minimize effects that could substantially reduce the number of salt marsh harvest mouse,
36 or restrict the species' range. Therefore, the indirect effects of Alternative 1C would not have an
37 adverse effect on salt marsh harvest mouse.

38 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could
39 impact salt marsh harvest mouse within 100 feet of these disturbances. The use of mechanical
40 equipment during construction could cause the accidental release of petroleum or other
41 contaminants that could impact salt marsh harvest mouse and its habitat. The inadvertent discharge
42 of sediment adjacent to salt marsh harvest mouse habitat could also impact the species. With
43 implementation of AMM1-AMM5, and AMM26 as part of Alternative 1C construction, operation and
44 maintenance, the BDCP would avoid the potential for substantial adverse effects on salt marsh
45 harvest mouse, either indirectly or through habitat modifications, in that the BDCP would not result
46 in a substantial reduction in numbers or a restriction in the range of salt marsh harvest mouse. The

1 indirect effects of Alternative 1C would have a less-than-significant impact on salt marsh harvest
2 mouse.

3 Salt marsh harvest mouse could experience indirect effects from increased exposure to
4 methylmercury as a result of tidal habitat restoration (CM4). With implementation of CM12, the
5 potential indirect effects of methylmercury would not result in a substantial reduction in numbers
6 or a restriction in the range of salt marsh harvest mouse, and, therefore, would have a less-than-
7 significant impact on the species.

8 **Suisun Shrew**

9 Primary Suisun shrew habitat consists of all *Salicornia*-dominated natural seasonal wetlands and
10 certain *Scirpus* and *Typha* communities found within Suisun Marsh only. Low marsh dominated by
11 *Schoenoplectus acutus* and *S. californicus* and upland transitional zones within 150 feet of the tidal
12 wetland edge were classified separately as secondary habitat because they are used seasonally
13 (Hays and Lidicker 2000). All managed wetlands were excluded from the habitat model.
14 Construction and restoration associated with Alternative 1C conservation measures would result in
15 effects on modeled Suisun shrew habitat, which would include permanent losses and habitat
16 conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species post-
17 restoration) as indicated in Table 12-1C-58. All of the effects on the species would take place over an
18 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of
19 Alternative 1C would also include the following conservation actions over the term of the BDCP to
20 benefit Suisun shrew (BDCP Chapter 3, *Conservation Strategy*).

- 21 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with
22 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California
23 (Objective TBEWNC1.1, associated with CM4)
- 24 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500
25 acres of middle and high marsh (primary Suisun shrew habitat) to contribute to total (existing
26 and restored) acreage targets for each complex as specified in the final Recovery Plan for Tidal
27 Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2, associated with
28 CM4).
- 29 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
30 natural community within the reserve system (Objective TBEWNC2.1).

31 Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide at
32 least 200 feet of adjacent grasslands beyond the sea level rise accommodation area, which provides
33 refugia during high tides (Objective GNC1.4, associated with CM3 and CM8). As explained below,
34 with the restoration and protection of these amounts of habitat, impacts on the Suisun shrew would
35 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-1C-58. Changes in Suisun Shrew Modeled Habitat Associated with Alternative 1C (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2-CM18	Primary	58	60	0	0	0	0
	Secondary	47	342	0	0	0	0
Total Impacts CM2-CM18		105	401	0	0	0	0
TOTAL IMPACTS		105	401	0	0	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-160: Loss or Conversion of Habitat for and Direct Mortality of Suisun Shrew**

4 BDCP tidal restoration (CM4) would be the only conservation measure resulting in loss of habitat to
5 Suisun shrew. Habitat enhancement and management activities (CM11), which include ground
6 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. Each of
7 these activities is described in detail below. A summary statement of the combined impacts and
8 NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 9 • *CM4 Tidal Natural Communities Restoration* would result in effects on 401 acres of Suisun shrew
10 modeled habitat, which would include 377 acres of permanent losses and 24 acres of habitat
11 conversions. Suisun shrew may be displaced temporarily from areas of converted habitat but
12 would ultimately provide suitable habitat for the species. However, all 24 acres would be
13 converted from secondary to primary habitat and therefore over would be a net benefit to the
14 species. The hypothetical restoration footprints overlap with two CNDDDB records for Suisun
15 shrew (California Department of Fish and Wildlife 2013).
- 16 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the
17 restoration of at least 6,000 acres of tidal brackish emergent wetland would be managed to
18 provide habitat for covered species, including Suisun shrew. A variety of habitat management
19 actions included in *CM11 Natural Communities Enhancement and Management* that are designed
20 to enhance and manage these areas may result in localized ground disturbances that could
21 temporarily remove small amounts of Suisun shrew habitat. The areas of grasslands that would
22 be protected and/or restored within 200 feet of restored tidal marsh would also have
23 enhancement and management actions that would include invasive species control, nonnative
24 wildlife control, and vegetation management. Ground-disturbing activities, such as removal of

1 nonnative vegetation are expected to have minor effects on habitat and are expected to result in
2 overall improvements to and maintenance of Suisun shrew habitat values over the term of the
3 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
4 and minimized by the AMMs listed below.

- 5 • Injury and Direct Mortality: The use of heavy equipment and handtools may result in injury or
6 mortality to Suisun shrew during restoration, enhancement, and management activities.
7 However, preconstruction surveys, construction monitoring, and other measures would be
8 implemented to avoid and minimize injury or mortality of this species during these activities, as
9 required by the AMM described below.

10 The following paragraphs summarize the combined effects discussed above and describe other
11 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
12 also included.

13 ***Near-Term Timeframe***

14 The near-term BDCP conservation strategy has been evaluated to determine whether it would
15 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
16 effects of near-term covered activities would not be adverse under NEPA. Alternative 1C would
17 effect 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These effects
18 include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary habitat
19 being converted to primary habitat.

20 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
21 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal
22 wetlands, of which approximately 150 feet of this area will benefit the species. These Plan goals
23 represent performance standards for considering the effectiveness of restoration actions. The acres
24 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-
25 term Plan goals would keep pace with the loss of habitat and effects on Suisun shrew.

26 Other factors relevant to effects on Suisun shrew are listed below.

- 27 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
28 loss of habitat and habitat fragmentation
- 29 • The habitat that would be restored and protected would consist of large blocks of contiguous
30 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
31 vegetation suitable for the species. This would provide greater habitat connectivity and greater
32 habitat value and quantity, with is expected to accommodate larger populations and to therefore
33 increase population resilience to random environmental events and climate change.
- 34 • The amount of tidal habitat restored in the near term (2,000 acres) would greatly exceeds the
35 amount permanently lost (105 acres).

36 Because there would be no project-level effects on Suisun shrew resulting from CM1, the analysis of
37 the effects of conservation actions does not include a comparison with standard ratios used for
38 project-level NEPA analyses.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*

1 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
2 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
3 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
4 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

5 **Late Long-Term Timeframe**

6 The study area supports approximately 7,515 acres of Suisun shrew modeled habitat. Alternative 1C
7 as a whole would result in effects on 401 acres of Suisun shrew modeled habitat over the term of the
8 Plan, which would include 377 acres of permanent losses and 24 acres of habitat conversions
9 (roughly 5% of the habitat in the study area).

10 The Plan contains a commitment to restore or create 6,000 acres of tidal brackish emergent
11 wetland, 1,500 acres of which would target middle and high marsh habitat (primary habitat for
12 Suisun shrew) (Objectives TBEWNC1.1, TBEWNC1.2, and SMHM1.1, associated with CM4) and the
13 protection and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of
14 tidal restoration, of which approximately 150 feet would likely benefit the species) to provide
15 upland refugia for Suisun shrew (Objective GNC1.4, associated with CM3 and CM8). Other factors
16 relevant to effects on Suisun shrew are listed below.

- 17 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
18 loss of habitat and habitat fragmentation
- 19 ● The habitat that would be restored and protected would consist of large blocks of contiguous
20 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
21 vegetation suitable for the species. This would provide greater habitat connectivity and greater
22 habitat value and quantity, with is expected to accommodate larger populations and to therefore
23 increase population resilience to random environmental events and climate change.
- 24 ● The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost
25 and converted (401 acres).

26 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
27 and protection actions discussed above could result in the restoration of 6,006 acres and the
28 protection of 232 acres of modeled habitat for Suisun shrew.

29 **NEPA Effects:** In the absence of other conservation actions, the effects on Suisun shrew habitat from
30 Alternative 1C would represent an adverse effect as a result of habitat modification and potential
31 direct mortality of a special-status species. However, the BDCP has committed to habitat protection,
32 restoration, management, and enhancement with CM3, CM4, CM8, and CM11. This habitat
33 protection, restoration, management, and enhancement would be guided by goals and objectives
34 and by AMM1–AMM5 and AMM26, which would be in place throughout the construction period.
35 Considering these commitments, the effects of losses and conversions of Suisun shrew habitat and
36 potential mortality of individuals on Suisun shrew would not be adverse under Alternative 1C.

37 **CEQA Conclusion:**

38 **Near-Term Timeframe**

39 The near-term BDCP conservation strategy has been evaluated to determine whether it would
40 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
41 the effects of near-term covered activities would be less than significant. Alternative 1C would

1 impact 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These impacts
2 include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary habitat
3 being converted to primary habitat.

4 The BDCP has committed to near-term goals of restoring 1,000 acres of tidal brackish emergent
5 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal
6 wetlands, of which approximately 150 feet of this area will benefit the species. These Plan goals
7 represent performance standards for considering the effectiveness of restoration actions. The acres
8 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-
9 term Plan goals would keep pace with the loss of habitat and impacts on Suisun shrew.

10 Other factors relevant to effects on Suisun shrew include:

- 11 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
12 loss of habitat and habitat fragmentation
- 13 • The habitat that would be restored and protected would consist of large blocks of contiguous
14 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
15 vegetation suitable for the species. This would provide greater habitat connectivity and greater
16 habitat value and quantity, with is expected to accommodate larger populations and to therefore
17 increase population resilience to random environmental events and climate change.
- 18 • The amount of tidal habitat restored in the near term (2,000 acres) greatly exceeds the amount
19 permanently lost (105 acres).

20 Because there would be no project level impacts on Suisun shrew resulting from CM1, the analysis of
21 the impacts of conservation actions does not include a comparison with standard ratios used for
22 project-level CEQA analyses.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
26 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
27 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
28 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
29 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

30 These commitments are more than sufficient to support the conclusion that the near-term effects of
31 Alternative 1C would be less than significant under CEQA.

32 **Late Long-Term Timeframe**

33 Based on modeled habitat, the study area supports approximately 7,515 acres of Suisun shrew
34 modeled habitat. Alternative 1C as a whole would result in effects to 401 acres of Suisun shrew
35 modeled habitat over the term of the Plan, which would include 377 acres of permanent losses and
36 24 acres of habitat conversions (roughly 5% of the habitat in the study area). The Plan includes a
37 commitment to restore or create 6,000 acres of tidal brackish emergent wetland, 1,500 acres of
38 which would target middle and high marsh habitat (primary habitat for Suisun shrew) (Objectives
39 TBEWNC1.1, TBEWNC1.2, and SMHM1.1, associated with CM4) and the protection and/or
40 restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration, of
41 which approximately 150 feet would likely benefit the species) to provide upland refugia for Suisun

1 shrew (Objective GNC1.4, associated with CM3 and CM8). Other factors relevant to effects on Suisun
2 shrew are listed below.

- 3 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
4 loss of habitat and habitat fragmentation
- 5 ● The habitat that would be restored and protected would consist of large blocks of contiguous
6 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
7 vegetation suitable for the species. This would provide greater habitat connectivity and greater
8 habitat value and quantity, with is expected to accommodate larger populations and to therefore
9 increase population resilience to random environmental events and climate change.
- 10 ● The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost
11 (401 acres).

12 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
13 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
14 the restoration of 6,006 acres and the protection of 232 acres of modeled habitat for Suisun shrew.

15 Alternative 1C would result in substantial modifications to Suisun shrew habitat in the absence of
16 other conservation actions. However, with habitat protection, restoration, management, and
17 enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and
18 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the construction
19 phase, Alternative 1C over the term of the BDCP would not result in a substantial adverse effect
20 through habitat modifications and would not substantially reduce the number or restrict the range
21 of the species. Therefore, the alternative would have a less-than-significant impact on Suisun shrew.

22 **Impact BIO-161: Indirect Effects of Plan Implementation on Suisun Shrew**

23 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),
24 and management and enhancement activities (CM11) could result in temporary noise and visual
25 disturbances to Suisun shrew occurring within 100 feet of these areas over the term of the BDCP.
26 These potential effects would be minimized or avoided through AMM1–AMM7, and AMM26, which
27 would be in effect throughout the term of the Plan.

28 The use of mechanical equipment during the implementation of the conservation measures could
29 cause the accidental release of petroleum or other contaminants that could affect Suisun shrew and
30 its habitat. The inadvertent discharge of sediment could also have a negative effect on the species
31 and its habitat. AMM1–AMM6 would minimize the likelihood of such spills and would ensure
32 measures are in place to prevent runoff from the construction area and potential effects of sediment
33 on Suisun shrew.

34 Tidal marsh restoration has the potential to increase Suisun shrew's exposure to mercury. Mercury
35 is transformed into the more bioavailable form of methylmercury under anaerobic conditions,
36 which in the environment typically occurs in sediments subjected to regular wetting and drying
37 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly
38 inundated areas could increase bioavailability of mercury. In general, the highest methylation rates
39 are associated with high tidal marshes that experience intermittent wetting and drying and
40 associated anoxic conditions (Alpers et al. 2008). High and mid tidal marsh is considered to be
41 primary habitat for Suisun shrew and thus the species could be exposed to methylmercury in tidal
42 restoration areas. Suisun shrew could be exposed to methylmercury by feeding on marsh

1 invertebrates that may bioaccumulate methylmercury from marsh sediments. Toxic concentrations
2 of methylmercury have been found in the kidneys of shrews that inhabit contaminated sites and
3 forage on earthworms and other prey that live within contaminated sediments (Talmage and
4 Walton 1993; Hinton and Veiga 2002).

5 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
6 under the plan would generate less methylmercury than the existing managed wetlands. The
7 potential for Suisun shrew exposure to methylmercury in Suisun Marsh may decrease in the long
8 term because the creation of tidal brackish emergent wetland would predominantly result from the
9 conversion of managed wetlands. *CM12 Methylmercury Management* includes provisions for project-
10 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive
11 management and monitoring, CM12 could reduce the effects of methylmercury on Suisun shrew
12 resulting from BDCP tidal restoration.

13 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 1C
14 would avoid and minimize the potential for substantial adverse effects on Suisun shrew, either
15 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that
16 could substantially reduce the number of Suisun shrew, or restrict the species' range. Therefore, the
17 indirect effects of Alternative 1C would not have an adverse effect on Suisun shrew.

18 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could
19 impact Suisun shrew within 100 feet of these disturbances. The use of mechanical equipment during
20 construction could cause the accidental release of petroleum or other contaminants that could
21 impact Suisun shrew and its habitat. The inadvertent discharge of sediment adjacent to Suisun
22 shrew habitat could also impact the species. With implementation of AMM1-AMM5, and AMM26 as
23 part of Alternative 1C construction, operation, and maintenance, the BDCP would avoid the potential
24 for substantial adverse effects on Suisun shrew, either indirectly or through habitat modifications, in
25 that the BDCP would not result in a substantial reduction in numbers or a restriction in the range of
26 Suisun shrew. The indirect effects of Alternative 1C would have a less-than-significant impact on
27 Suisun shrew.

28 Suisun shrew could experience indirect effects from increased exposure to methylmercury as a
29 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects
30 of methylmercury would not result in a substantial reduction in numbers or a restriction in the
31 range of Suisun shrew, and, therefore, would have a less-than-significant impact on the species.

32 **San Joaquin Kit Fox and American Badger**

33 Within the study area, the modeled habitat for the San Joaquin kit fox and potential habitat for the
34 American badger is restricted to 5,327 acres of grassland habitat west of Clifton Court Forebay along
35 the study area's southwestern edge, in CZ 7-CZ 10.

36 The study area represents the extreme northeastern corner of the San Joaquin kit fox's range in
37 California, which extends westward and southward from the study area border. The northern range
38 of the San Joaquin kit fox (including the study area) was most likely marginal habitat historically and
39 has been further degraded due to development pressures, habitat loss, and fragmentation (Clark et
40 al. 2007). CNDDDB (California Department of Fish and Wildlife 2013.) reports eight occurrences of
41 San Joaquin kit foxes along the extreme western edge of the study area within CZ 8, south of
42 Brentwood (Figure 12-49). However, Clark et al. (2007) provide evidence that a number of CNDDDB
43 occurrences in the northern portion of the species' range may be coyote pups misidentified as San

1 Joaquin kit foxes. Smith et al. (2006) suggest that the northern range may possibly be a population
2 sink for the San Joaquin kit fox. There are five American badger records in the study area (California
3 Department of Fish and Wildlife 2013). Two are from 1938 and no longer extant. The remaining
4 three are all located in CZ 8, west of Clifton Court Forebay.

5 Construction and restoration associated with Alternative 1C conservation measures would result in
6 both temporary and permanent losses of San Joaquin kit and American badger habitat (Table 12-1C-
7 59). Grassland restoration, and protection and management of natural communities could affect
8 modeled San Joaquin kit fox habitat and potential American badger habitat. Full implementation of
9 Alternative 1C would also include biological objectives over the term of the BDCP to benefit the San
10 Joaquin kit fox which would also benefit American badger which uses similar habitat (BDCP Chapter
11 3, *Conservation Strategy*). The conservation strategy for the San Joaquin kit fox involves protecting
12 and enhancing habitat in the northern extent of the species' range to increase the likelihood that San
13 Joaquin kit fox may reside and breed in the Plan Area; and providing connectivity to habitat outside
14 the Plan Area. The conservation measures that will be implemented to achieve the biological goals
15 and objectives are summarized below.

- 16 • Protect and improve habitat linkages that allow terrestrial covered and other native species to
17 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
18 associated with CM3-CM8, and CM11).
- 19 • Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
20 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 21 • Restore or create alkali seasonal wetlands in CZs 1, CZ 8, and/or CZ 11 (up to 72 acres of alkali
22 seasonal wetland complex restoration) (Objective ASWNC1.2, associated with CM3 and CM9).
- 23 • Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and CZ 11, primarily in core
24 vernal pool recovery areas identified in the Recovery Plan for Vernal Pool Ecosystems of
25 California and Southern Oregon (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,
26 associated with CM3).
- 27 • Restore vernal pool complex in C Z 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool
28 acreage (up to 67 acres of vernal pool complex restoration) (Objective VPNC1.2, associated with
29 CM3 and CM9).
- 30 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 31 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland
32 (Objective GNC1.2, associated with CM3 and CM8).
- 33 • Increase burrow availability for burrow-dependent species in grasslands surrounding alkali
34 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective
35 ASWNC2.3, associated with CM11).
- 36 • Increase prey, especially small mammals and insects, for grassland-foraging species in
37 grasslands surrounding alkali seasonal wetlands within restored and protected alkali seasonal
38 wetland complex (Objective ASWNC2.4, associated with CM11).
- 39 • Increase burrow availability for burrow-dependent species in grasslands surrounding vernal
40 pools within restored and protected vernal pool complex (Objective VPNC2.4, associated with
41 CM11).

- 1 • Increase prey, especially small mammals and insects, for grassland-foraging species in
2 grasslands surrounding vernal pools within restored and protected vernal pool complex
3 (Objective VPNC2.5, associated with CM11).
- 4 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
5 CM11).
- 6 • Increase prey abundance and accessibility, especially small mammals and insects, for grassland-
7 foraging species (Objective GNC2.4, associated with CM11).

8 As explained below, with the restoration and protection of these amounts of habitat, in addition to
9 the AMMs to reduce potential effects, impacts on San Joaquin kit fox and American badger would not
10 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

11 **Table 12-1C-59. Changes in San Joaquin Kit Fox Modeled Habitat Associated with Alternative 1C**
12 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Grassland	193	193	160	160	NA	NA
Total Impacts CM1		193	193	160	160	NA	NA
CM2–CM18	Grassland	3	8	0	0	0	0
Total Impacts CM2–CM18		3	8	0	0	0	0
TOTAL IMPACTS		196	201	160	160	0	0

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

13

14 **Impact BIO-162: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Kit Fox**
15 **and American Badger**

16 Alternative 1C conservation measures would result in the permanent and temporary loss combined
17 of up to 353 acres of modeled habitat for the San Joaquin kit fox (Table 12-1C-59). Because
18 American badger uses grasslands for denning and foraging and may occupy the same range as the
19 San Joaquin kit fox in the project area, effects on are anticipated to be the same as those described
20 for San Joaquin kit fox. There are two San Joaquin kit fox and no American badger occurrences that
21 overlap with the Plan footprint.

22 Habitat enhancement and management activities (CM11) could result in local adverse effects on
23 species. In addition, construction vehicle activity could cause injury or mortality of San Joaquin kit
24 foxes and badgers. Each of these individual activities is described below. A summary statement of

1 the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation
2 measure discussions.

- 3 • *CM1 Water Facilities and Operation*: Construction of the conveyance facilities would result in the
4 permanent loss of approximately 193 acres and the temporary loss of 160 acres of modeled San
5 Joaquin kit fox habitat and American badger habitat. This habitat is located in areas of
6 naturalized grassland in a highly disturbed or modified setting on lands immediately adjacent to
7 Clifton Court Forebay, in CZ 8.
- 8 • *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails
9 and recreational staging areas would result in the permanent removal of 8 acres of San Joaquin
10 kit fox modeled habitat and American badger potential habitat. *AMM24 San Joaquin Kit Fox*
11 would be implemented to ensure that San Joaquin kit fox dens are avoided, as described in BDCP
12 Appendix 3B, *Environmental Commitments, AMMs, and CMs*. Mitigation Measure BIO-162:
13 *Conduct Preconstruction Survey for American Badger* would be implemented to ensure that
14 American badger dens are avoided.

15 Passive recreation in the reserve system could result in disturbance of San Joaquin kit foxes and
16 American badgers at their den site. Natal and pupping dens would be particularly vulnerable to
17 human disturbance. Additionally, disease could be transmitted from domestic dogs that enter
18 the reserve system with recreational users. However, *AMM37 Recreation* and Mitigation
19 Measure BIO-162 would prohibit construction of new trails within 250 feet of active San Joaquin
20 kit fox and American badger dens. Existing trails would be closed within 250 feet of active
21 natal/pupping dens until young have vacated, and within 50 feet of other active dens. No dogs
22 would be allowed on reserve units with active San Joaquin kit fox and American badger
23 populations. Rodent control would be prohibited even on grazed or equestrian access areas with
24 San Joaquin kit fox or American badger populations. *AMM37* measures to protect San Joaquin kit
25 fox would also benefit American badger if present. With these restrictions, recreation-related
26 effects on San Joaquin kit fox and American badger are expected to be minimal.

27 The BDCP would require the enhancement and management of these protected existing
28 grasslands and restored grasslands to improve their function as a natural community of plants
29 and wildlife and for associated covered species, including San Joaquin kit fox and American
30 badger. The BDCP also includes actions to improve rodent prey availability.

31 However, management activities could result in injury or mortality of San Joaquin kit fox or
32 American badger if individuals were present in work sites or if dens were located in the vicinity
33 of habitat management work sites. A variety of habitat management actions included in *CM11*
34 that are designed to enhance wildlife values on protected lands may result in localized ground
35 disturbances that could temporarily remove small amounts of San Joaquin kit fox and American
36 badger habitat near Clifton Court Forebay, in CZ 8. Ground-disturbing activities, such as removal
37 of nonnative vegetation and road and other infrastructure maintenance activities, are expected
38 to have minor effects on available habitat and are expected to result in overall improvements to
39 and maintenance of San Joaquin kit fox and badger habitat values over the term of the BDCP.
40 These effects cannot be quantified, but are expected to be minimal and would be avoided and
41 minimized through the AMMs and Mitigation Measures listed below. These AMMs and
42 Mitigation Measures would remain in effect throughout the BDCP's construction phase.

- 43 • *Operations and maintenance*: Ongoing maintenance of BDCP facilities would be expected to have
44 little if any adverse effect on San Joaquin kit fox or American badger. Postconstruction
45 operations and maintenance of the above-ground water conveyance facilities and restoration

1 infrastructure could result in ongoing but periodic disturbances that could affect either species'
2 use of the surrounding habitat near Clifton Court Forebay, in CZ 8. Maintenance activities would
3 include vegetation management, levee and structure repair, and regrading of roads and
4 permanent work areas. These effects, however, would be minimized with implementation of
5 AMM1–AMM6, AMM10, and AMM24 and with preconstruction surveys for the American badger,
6 as required by Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American*
7 *Badger*.

- 8 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
9 either species. If San Joaquin kit fox or American badger reside where activities take place (most
10 likely in the vicinity of Clifton Court Forebay, in CZ 8), the operation of equipment for land
11 clearing, construction, operations and maintenance, and restoration, enhancement, and
12 management activities could result in injury to or mortality of either species. Measures would be
13 implemented to avoid and minimize injury to or mortality of these species as described in
14 AMM1–AMM6, AMM10, and AMM24 (see Appendix 3B, *Environmental Commitments, AMMs, and*
15 *CMs*) and Mitigation Measure BIO-162.

16 The following paragraphs summarize the combined effects discussed above and describe other
17 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
18 also included.

19 ***Near-Term Timeframe***

20 Because water conveyance facilities construction is being evaluated at the project level, the near-
21 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
22 protection or restoration in an appropriate timeframe to ensure that the construction effects would
23 not be adverse under NEPA.

24 Under Alternative 1C there would be a loss of 356 acres of San Joaquin kit fox modeled habitat and
25 American badger habitat from CM1 (353 acres) and CM11 (3 acres).

26 Typical NEPA project-level mitigation ratio for the natural community that would be affected and
27 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3 of the
28 BDCP would be 2:1 for protection of grassland. Using this ratio would indicate that 712 acres of
29 grassland should be protected for San Joaquin kit fox to mitigate near-term losses.

30 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective
31 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland
32 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal
33 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000
34 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities
35 are expected to be concluded during the first 10 years of plan implementation, which is close enough
36 in time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes. These
37 commitments are more than sufficient to support the conclusion that the near-term effects of
38 Alternative 1C would be not be adverse under NEPA, because the number of acres required to meet
39 the typical ratios described above would be only 712 acres of grassland protected.

40 The effects on San Joaquin kit fox and American badger habitat from Alternative 1C as a whole
41 would represent an adverse effect as a result of habitat modification of a special-status species and
42 potential for direct mortality in the absence of other conservation actions. However, the effects of
43 Alternative 1C would be not be adverse with habitat protection, restoration, and management and

1 enhancement in addition to implementation of *AMM1 Worker Training Awareness*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
5 *Natural Communities*, *AMM24 San Joaquin Kit Fox*, and *AMM37 Recreation*. These AMMs include
6 elements that avoid or minimize the risk of construction activity affecting habitat and species
7 adjacent to work areas and storage sites. Remaining effects would be addressed by implementation
8 of Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American Badger*. BDCP
9 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
10 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

11 **Late Long-Term Timeframe**

12 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 1C as a
13 whole would result in the permanent loss of and temporary effects on 361 acres of modeled habitat
14 for San Joaquin kit fox and potential habitat for American badger representing 7% of the modeled
15 habitat (Table 12-1C-59).

16 With full implementation of Alternative 1C, at least 1,000 acres of grassland would be protected in
17 CZ 8, where the San Joaquin kit fox and American badger is most likely to occur if present in the Plan
18 Area. Additionally, a portion of the 2,000 acres of grassland restoration will likely occur in CZ 8.
19 Assuming the restored grasslands would provide suitable San Joaquin kit fox habitat proportional to
20 the amount of modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in
21 the Plan Area consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored
22 grasslands would be suitable for both species (6.6% of 2,000 acres).

23 Because San Joaquin kit fox home ranges are large (ranging from around 1 to 12 square miles; see
24 BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the conservation of the
25 species. Grasslands would be acquired for protection in locations that provide connectivity to
26 existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining San Joaquin kit
27 fox habitat within and adjacent to the Plan Area. Connectivity to occupied habitat adjacent to the
28 Plan Area would help ensure the movement of San Joaquin kit foxes and American badgers, if
29 present, to larger habitat patches outside of the Plan Area in Contra Costa County. Grassland
30 protection would focus in particular on acquiring the largest remaining contiguous patches of
31 unprotected grassland habitat, which are located south of SR 4 in CZ 8 (see BDCP Appendix 2.A).
32 This area connects to more than 620 acres of existing habitat that was protected under the East
33 Contra Costa County HCP/NCCP.

34 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to
35 increase mammal burrows, which could benefit the San Joaquin kit fox and American badger by
36 increasing potential den sites, which are a limiting factor for the San Joaquin kit fox in the northern
37 portion of its range (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective
38 GNC2.3, and Objective GNC2.4). These management and enhancement actions are expected to
39 benefit the San Joaquin kit fox as well as the American badger by increasing the habitat value of the
40 protected and restoration grasslands.

41 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the
42 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this
43 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches
44 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool

1 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in
2 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities
3 construction.

4 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
5 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
6 restoration of grassland and vernal pool that could overlap with the species model, would result in
7 the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In addition, protection of
8 grassland and vernal pool complex could overlap with the species model and would result in the
9 protection of 1,011 acres of modeled habitat for San Joaquin kit fox. These restoration and
10 protection actions would also benefit the American badger.

11 **NEPA Effects:** In the absence of other conservation actions, the effects on San Joaquin kit fox and
12 American badger habitat from Alternative 1C would represent an adverse effect as a result of habitat
13 modification and potential direct mortality of a special-status species. However, with habitat
14 protection, restoration, management, and enhancement associated with CM3, CM8, and CM11, and
15 guided by AMM1–AMM6, AMM10, AMM24, and AMM37, which would be in place throughout the
16 time period of construction, and with implementation of Mitigation Measure BIO-162, the effects of
17 Alternative 1C as a whole on San Joaquin kit fox and American badger would not be adverse.

18 **CEQA Conclusion:**

19 **Near-Term Timeframe**

20 Because water conveyance facilities construction (CM1) is being evaluated at the project level, the
21 near-term BDCP strategy has been analyzed to determine whether it would provide sufficient
22 habitat protection or restoration in an appropriate timeframe to ensure that the construction effects
23 would be less than significant under CEQA.

24 Under Alternative 1C there would be a loss of 356 acres of San Joaquin kit fox modeled habitat and
25 American badger habitat from CM1 (353 acres) and CM11 (3 acres).

26 Typical CEQA project-level mitigation ratio for the natural community that would be affected and
27 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3 of the
28 BDCP would be 2:1 for protection of grassland. Using this ratio would indicate that 712 acres of
29 grassland should be protected for San Joaquin kit fox and American badger to mitigate near-term
30 losses.

31 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective
32 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland
33 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal
34 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000
35 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities
36 are expected to be concluded during the first 10 years of plan implementation, which is close enough
37 in time to the occurrence of impacts to constitute adequate mitigation for CEQA purposes.

38 These commitments are more than sufficient to support the conclusion that the near-term effects of
39 Alternative 1C would be less than significant under CEQA, because the number of acres required to
40 meet the typical ratios described above would be only 712 acres of grassland protected.

1 The BDCP also contains commitments to implement AMM1–AMM6, AMM10, AMM24, and AMM37
2 which include elements that avoid or minimize the risk of construction activity impacting habitat
3 and species adjacent to work areas and storage sites. Remaining effects would be addressed by
4 implementation of Mitigation Measure BIO-162. BDCP Appendix 3.C describes the AMMs, which
5 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
6 *AMMs, and CMs*, of the Final EIR/EIS.

7 These commitments are more than sufficient to support the conclusion that the near-term impacts
8 of Alternative 1C on San Joaquin kit fox and American badger would be less than significant under
9 CEQA, because the number of acres required to meet the typical rations described above would be
10 only 712 acres of grassland protected.

11 **Late Long-Term Timeframe**

12 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 1C as a
13 whole would result in the permanent loss of and temporary effects on 361 acres of modeled habitat
14 for San Joaquin kit fox and potential habitat for American badger representing 7% of the modeled
15 habitat (Table 12-1C-59).

16 With full implementation of Alternative 1C, at least 1,000 acres of grassland would be protected in
17 CZ 8, where the San Joaquin kit fox and American badger are most likely to occur if present in the
18 Plan Area. Additionally, a portion of the 2,000 acres of grassland restoration will likely occur in CZ 8.
19 Assuming the restored grasslands would provide suitable San Joaquin kit fox habitat proportional to
20 the amount of modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in
21 the Plan Area consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored
22 grasslands would be suitable for the species (6.6% of 2,000 acres).

23 Because San Joaquin kit fox home ranges are large (ranging from around 1 to 12 square miles; see
24 BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the conservation of the
25 species. Grasslands would be acquired for protection in locations that provide connectivity to
26 existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining San Joaquin kit
27 fox and American badger habitat within and adjacent to the Plan Area. Connectivity to occupied
28 habitat adjacent to the Plan Area would help ensure the movement of San Joaquin kit foxes and
29 American badgers, if present, to larger habitat patches outside of the Plan Area in Contra Costa
30 County. Grassland protection would focus in particular on acquiring the largest remaining
31 contiguous patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (see
32 BDCP Appendix 2.A). This area connects to more than 620 acres of existing habitat that was
33 protected under the East Contra Costa County HCP/NCCP.

34 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to
35 increase mammal burrows, which could benefit the San Joaquin kit fox and American badger by
36 increasing potential den sites, which are a limiting factor for the San Joaquin kit fox in the northern
37 portion of its range (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective
38 GNC2.3, and Objective GNC2.4). These management and enhancement actions are expected to
39 benefit the San Joaquin kit fox as well as the American badger by increasing the habitat value of the
40 protected and restoration grasslands.

41 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the
42 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this
43 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches

1 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool
2 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in
3 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities
4 construction.

5 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
6 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
7 restoration of grassland and vernal pool that could overlap with the species model, would result in
8 the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In addition, protection of
9 grassland and vernal pool complex could overlap with the species model and would result in the
10 protection of 1,011 acres of modeled habitat for San Joaquin kit fox. These restoration and
11 protection actions would also benefit the American badger.

12 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger
13 habitat from Alternative 1C would represent a significant impact as a result of habitat modification
14 and potential direct mortality of a special-status species. However, with habitat protection,
15 restoration, management, and enhancement associated with CM3, CM8, and CM11, and guided by
16 AMM1-AMM6, AMM10, AMM24, and AMM37, which would be in place throughout the time period
17 of construction, and with implementation of Mitigation Measure BIO-162, the impact of Alternative
18 1C as a whole on San Joaquin kit fox and American badger would be less than significant.

19 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

20 A qualified biologist provided by DWR will survey for American badger concurrent with the
21 preconstruction survey for San Joaquin kit fox and burrowing owl. If badgers are detected, the
22 biologist will passively relocate badgers out of the work area prior to construction if feasible. If
23 an active den is detected within the work area, DWR will establish a suitable buffer distance and
24 avoid the den until the qualified biologist determines the den is no longer active. Dens that are
25 determined to be inactive by the qualified biologist will be collapsed by hand to prevent
26 occupation of the den between the time of the survey and construction activities. In addition,
27 ground disturbance within project-related conservation areas within 50 feet of active American
28 badger dens would be prohibited. Existing trails would be closed within 250 feet of active
29 natal/pupping dens until young have vacated, and within 50 feet of other active dens. No dogs
30 would be allowed on conservation areas with active American badger populations. Rodent
31 control would be prohibited on areas with American badger populations to ensure rodent prey
32 availability. Mitigation Measure BIO-162 is applicable to all ground-disturbing activities related
33 to construction, restoration, and operations and maintenance.

34 **Impact BIO-163: Indirect Effects of Plan Implementation on San Joaquin Kit Fox and** 35 **American Badger**

36 Noise and visual disturbances outside the project footprint but within 250 feet of construction
37 activities could temporarily affect modeled San Joaquin kit fox habitat and potential American
38 badger. Water conveyance facilities operations and maintenance activities would include vegetation
39 and weed control, rodent control, canal maintenance, infrastructure and road maintenance, levee
40 maintenance, and maintenance and upgrade of electrical systems. Because operations and
41 maintenance are covered activities rodent control would be prohibited in areas with San Joaquin kit
42 fox or American badger populations to ensure rodent prey availability. While maintenance activities
43 are not expected to remove San Joaquin kit fox and badger habitat, operation of equipment could

1 disturb small areas of vegetation around maintained structures and could result in injury or
2 mortality of individual foxes and badgers, if present. Given the remote likelihood of active San
3 Joaquin kit fox or badger dens in the vicinity of the conveyance facility, the potential for this effect is
4 small and would further be minimized with the implementation of seasonal no-disturbance buffers
5 around occupied dens, if any, and other measures as described in AMM24 and MM BIO-62.

6 **NEPA Effects:** Implementation of the AMMs listed above and Mitigation Measure BIO-162, *Conduct*
7 *Preconstruction Survey for American Badger*, would avoid the potential for substantial adverse
8 effects on San Joaquin kit fox or American badger, either indirectly or through habitat modifications.
9 These measures would also avoid and minimize effects that could substantially reduce the number
10 of San Joaquin kit fox or American badger, or restrict either species' range. Therefore, the indirect
11 effects of Alternative 1C would not have an adverse effect on San Joaquin kit fox or American badger.

12 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
13 as construction-related noise and visual disturbances could impact San Joaquin kit fox and American
14 badger. With implementation of AMM1–AMM6, AMM10, AMM24, and AMM37 as part of Alternative
15 1C construction, operation, and maintenance, the BDCP would avoid the potential for significant
16 adverse effects on either species, either indirectly or through habitat modifications, and would not
17 result in a substantial reduction in numbers or a restriction in the range of either species. In
18 addition, Mitigation Measure BIO-162 would reduce the impact of indirect effects of Alternative 1C
19 on American badger to a less-than-significant level.

20 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

21 Please see Mitigation Measure BIO-162 under Impact BIO-162.

22 **San Joaquin Pocket Mouse**

23 Habitat for San Joaquin pocket mouse consists of the grassland natural community throughout the
24 Plan Area. The species requires friable soils for burrowing. Construction and restoration associated
25 with Alternative 1C conservation measures would result in both temporary and permanent losses of
26 San Joaquin pocket mouse habitat as indicated in Table 12-1C-60. Full implementation of Alternative
27 1C would also include the following conservation actions over the term of the BDCP that would
28 likely benefit San Joaquin pocket mouse.

- 29 ● Protect 8,000 acres of grasslands (Objective GNC1.1, associated with CM3).
- 30 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grasslands
31 (Objective GNC1.2, associated with CM8).
- 32 ● Restore and sustain a mosaic of grassland vegetation alliances, reflecting localized water
33 availability, soil chemistry, soil texture, topography, and disturbance regimes, with
34 consideration of historical states (Objective GNC2.1).

35 As explained below, with the restoration or protection of these amounts of habitat, impacts on San
36 Joaquin pocket mouse would not be adverse for NEPA purposes and would be less than significant
37 for CEQA purposes.

1 **Table 12-1C-60. Changes in San Joaquin Pocket Mouse Habitat Associated with Alternative 1C**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Grassland	358	358	320	320	NA	NA
Total Impacts CM1		358	358	320	320	NA	NA
CM2-CM18	Grassland	889	2,056	239	274	385-1277	514
Total Impacts CM2-CM18		889	2,056	239	274	385-1277	514
TOTAL IMPACTS		1,247	2,414	559	594	385-1277	514

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3
4 **Impact BIO-164: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Pocket**
5 **Mouse**

6 Alternative 1C conservation measures would result in the combined permanent and temporary loss
7 of up to 3,008 acres of habitat for San Joaquin pocket mouse (of which 2,414 acres would be a
8 permanent loss and 594 acres would be a temporary loss of habitat, Table 12-1C-60). Conservation
9 measures that would result in these losses are conveyance facilities and transmission line
10 construction, and establishment and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries*
11 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
12 *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM9 Vernal Pool Natural Community and*
13 *Alkali Seasonal Wetland Complex Restoration*, *CM10 Nontidal Marsh Restoration*, *CM11 Natural*
14 *Community Enhancement and Management*, and *CM18 Conservation Hatcheries*. The majority of
15 habitat loss would result from CM4. Habitat enhancement and management activities (CM11), which
16 include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat
17 effects. In addition, maintenance activities associated with the long-term operation of the water
18 conveyance facilities and other BDCP physical facilities could degrade or eliminate San Joaquin
19 pocket mouse habitat. Each of these individual activities is described below. A summary statement
20 of the combined impacts and NEPA and CEQA conclusions follows the individual conservation
21 measure discussions.

- 22 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would
23 result in the combined permanent and temporary loss of up to 678 acres of potential San
24 Joaquin pocket mouse habitat (358 acres of permanent loss, 320 acres of temporary loss) in CZ
25 3-CZ 6, CZ 8, and CZ 9. The majority of grassland that would be removed would be in CZ 8 and CZ
26 9, from the construction of the new canals. Refer to the Terrestrial Biology Map Book for a

1 detailed view of Alternative 1C construction locations. Construction of the canal south of Clifton
2 Court Forebay would affect the area where there is a record of San Joaquin pocket mouse
3 (California Department of Fish and Game 2012).

- 4 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
5 would permanently remove 388 acres of potential San Joaquin pocket mouse habitat in the Yolo
6 Bypass in CZ 2. In addition, 239 acres would be temporarily removed. Most of the grassland
7 losses would occur at the north end of the bypass below Fremont Weir, along the Toe
8 Drain/Tule Canal, and along the west side channels.
- 9 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
10 inundation would permanently remove an estimated 1,122 acres of potential San Joaquin pocket
11 mouse habitat. The majority of the losses would likely occur in the vicinity of Cache Slough, on
12 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
13 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact
14 and fragment remaining grassland just north of Rio Vista in and around French and Prospect
15 Islands, and in an area south of Rio Vista around Threemile Slough.
- 16 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
17 seasonally inundated floodplain would permanently and temporarily remove approximately 85
18 acres of San Joaquin pocket mouse habitat (51 permanent, 34 temporary). These losses would
19 be expected to occur along the San Joaquin River and other major waterways in CZ 7.
- 20 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration will impact 410 acres of
21 grasslands, primarily in CZ 7, as part of tidal natural communities restoration (11 acres) and
22 seasonal floodplain restoration (399 acres).
- 23 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Up to 10 acres of grassland
24 will be permanently converted to vernal pool complex. The vernal pool and alkali seasonal
25 wetland restoration will leave intact the grasslands surrounding the vernal pools. Temporary
26 construction-related disturbance of grassland habitat would result from implementation of *CM9*
27 in CZ 1, CZ 8, and CZ 11. However, all areas would be restored to their original or higher value
28 habitat after the construction periods.
- 29 ● *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails
30 and recreational staging areas will result in the permanent removal of 50 acres of grassland. The
31 protection of 8,000 acres of grassland for covered species is also expected to benefit San Joaquin
32 pocket mouse by protecting existing habitats from potential loss or degradation that otherwise
33 could occur with future changes in existing land use. Habitat management and enhancement-
34 related activities could cause disturbance or direct mortality to San Joaquin pocket mouse if they
35 are present near work areas.

36 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*
37 *and Management* that are designed to enhance wildlife values in restored or protected habitats
38 could result in localized ground disturbances that could temporarily remove small amounts of
39 San Joaquin pocket mouse habitat. Ground-disturbing activities, such as removal of nonnative
40 vegetation and road and other infrastructure maintenance activities, would be expected to have
41 minor adverse effects on habitat and would be expected to result in overall improvements to
42 and maintenance of habitat values over the term of the BDCP. Noise and visual disturbance from
43 management-related equipment operation could temporarily displace individuals or alter the
44 behavior of the species if adjacent to work areas. With full implementation of the BDCP,

1 enhancement and management actions designed for western burrowing owl would also be
2 expected to benefit these species. San Joaquin pocket mouse would benefit particularly from
3 protection of grassland habitat against potential loss or degradation that otherwise could occur
4 with future changes in existing land use.

- 5 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of San
6 Joaquin pocket mouse habitat.
- 7 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
8 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
9 disturbances that could affect San Joaquin pocket mouse use of the surrounding habitat.
10 Maintenance activities would include vegetation management, levee and structure repair, and
11 re-grading of roads and permanent work areas. These effects, however, would be reduced by
12 AMMs and conservation actions as described below.
- 13 • *Injury and Direct Mortality*: Construction could result in direct mortality of San Joaquin pocket
14 mouse if present in construction areas.

15 The following paragraphs summarize the combined effects discussed above and describe other
16 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
17 also included.

18 ***Near-Term Timeframe***

19 Because the water conveyance facilities construction is being evaluated at the project level, the near-
20 term BDCP conservation strategy has been evaluated to determine whether it would provide
21 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
22 construction would not be adverse under NEPA. Alternative 1C would remove 1,806 acres of San
23 Joaquin pocket mouse habitat (1,247 permanent, 559 temporary) in the study area in the near-term.
24 One record of San Joaquin pocket mouse near Clifton Court forebay could be affected by the
25 construction of the new canal south of the forebay. These effects would result from the construction
26 of the water conveyance facilities (CM1, 678 acres), and implementing other conservation measures
27 (Yolo Bypass Fisheries Enhancement [CM2] Tidal Natural Communities Restoration [CM4],
28 Seasonally Inundated Floodplain Restoration [CM5], Grassland Natural Community Restoration
29 [CM8], Vernal Pool and Alkali Seasonal Wetland Complex Restoration [CM9], and Conservation
30 Hatcheries [CM18] 1,128 acres).

31 The typical NEPA project-level mitigation ratio for those natural communities affected by CM1
32 would be 2:1 protection of grassland habitat. Using this ratio would indicate that 1,356 acres of
33 grassland natural communities should be protected to mitigate the CM1 losses of 678 acres of San
34 Joaquin pocket mouse habitat. The near-term effects of other conservation actions would remove
35 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of golden eagle and
36 ferruginous hawk habitat using the same typical NEPA ratio (2:1 for protection).

37 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
38 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and
39 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,
40 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and
41 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
42 *Enhancement and Management*, San Joaquin pocket mouse would likely benefit from the
43 management of the grasslands for general wildlife benefit.

1 These natural community biological goals and objectives would inform the near-term protection and
2 restoration efforts and represent performance standards for considering the effectiveness of
3 restoration actions for the species. The acres of protection and restoration contained in the near-
4 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level
5 effects of CM1, especially considering that a large portion of the affected grasslands consists of thin
6 strips of grassland along levees and that areas of grassland protection and restoration would be in
7 large contiguous blocks.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
12 *Affected Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of
13 affecting habitats and species adjacent to work areas and RTM storage sites. BDCP Appendix 3.C
14 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
15 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

16 **Late Long-Term Timeframe**

17 Based on the habitat model, the study area supports approximately 78,047 acres of potential habitat
18 for San Joaquin pocket mouse. Alternative 1C as a whole would result in the permanent loss of and
19 temporary effects on 3,008 acres of grasslands that could be suitable for San Joaquin pocket mouse
20 (4% of the habitat in the study area). The locations of these losses are described above in the
21 analyses of individual conservation measures. The Plan includes a commitment to restore or create
22 at least 2,000 acres of grassland in CZ 1, CZ 8 and CZ 11 (GNC1.2) and to protect 8,000 acres of
23 grassland (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000
24 acres protected in CZ 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8,
25 and CZ 11 in the study area)(GNC1.1). The Plan's commitment to restore grasslands such that they
26 connect fragmented patches of already protected grasslands (GNC1.2) will improve habitat
27 connectivity and dispersal abilities of San Joaquin pocket mouse within and outside of the plan area.
28 All protected habitat would be managed under *CM11 Natural Communities Enhancement and*
29 *Management*.

30 **NEPA Effects:** In the near-term, the loss of San Joaquin pocket mouse habitat and potential direct
31 mortality would not be an adverse effect because the BDCP has committed to protecting and
32 restoring an acreage that would meet the typical mitigation ratios described above. In the absence of
33 other conservation actions, the effects on San Joaquin pocket mouse habitat and potential mortality
34 of a special-status species resulting from Alternative 1C would represent an adverse effect.
35 However, the BDCP has committed to habitat protection and restoration associated with CM3, CM8,
36 and CM11. This habitat protection and restoration would be guided by biological goals and
37 objectives and by AMM1-AMM6, and AMM10, which would be in place throughout the construction
38 period. Considering these commitments, losses of San Joaquin pocket mouse habitat and potential
39 mortality under Alternative 1C would not be an adverse effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction is being evaluated at the project level, the near-
4 term BDCP conservation strategy has been evaluated to determine whether it would provide
5 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
6 construction would be less than significant. Alternative 1C would remove 1,806 acres of modeled
7 (1,247 permanent, 559 temporary) habitat for San Joaquin pocket mouse in the study area in the
8 near-term. One record of San Joaquin pocket mouse near Clifton Court forebay could be affected by
9 the construction of the new canal south of the forebay. These impacts would result from the
10 construction of the water conveyance facilities (CM1, 678 acres), and implementing other
11 conservation measures (Yolo Bypass Fisheries Enhancement [CM2] Tidal Natural Communities
12 Restoration [CM4], Seasonally Inundated Floodplain Restoration [CM5], Grassland Natural
13 Community Restoration [CM8], Vernal Pool and Alkali Seasonal Wetland Complex Restoration
14 [CM9], and Conservation Hatcheries [CM18] 1,128 acres).

15 Typical CEQA project-level mitigation ratios for those natural communities affected by CM1 would
16 be 2:1 protection of grassland habitat. Using these typical ratios would indicate that 1,356 acres of
17 grassland natural communities should be protected to mitigate the CM1 losses of 678 acres of San
18 Joaquin pocket mouse habitat. The near-term impacts of other conservation actions would remove
19 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of golden eagle and
20 ferruginous hawk habitat using the same typical NEPA and CEQA ratios (2:1 for protection).

21 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
22 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and
23 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,
24 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and
25 reduce the effects of current levels of habitat fragmentation. Under CM11 Natural Communities
26 Enhancement and Management, San Joaquin pocket mouse would likely benefit from the
27 management of the grasslands for general wildlife benefit.

28 These natural community biological goals and objectives would inform the near-term protection and
29 restoration efforts and represent performance standards for considering the effectiveness of
30 restoration actions for the species. The acres of protection and restoration contained in the near-
31 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level
32 effects of CM1, especially considering that a large portion of the impacted grasslands consists of thin
33 strips of grassland along levees and that areas of grassland protection and restoration would be in
34 large contiguous blocks.

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
36 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
37 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
38 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
39 *Affected Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of
40 affecting habitats and species adjacent to work areas and RTM storage sites. BDCP Appendix 3.C
41 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
42 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 These commitments are more than sufficient to support the conclusion that the near-term effects of
2 Alternative 1C would be less than significant under CEQA.

3 **Late Long-Term Timeframe**

4 Based on the habitat model, the study area supports approximately 78,047 acres of potential habitat
5 for San Joaquin pocket mouse. Alternative 1C as a whole would result in the permanent loss of and
6 temporary impacts on 3,008 acres of grasslands that could be suitable for San Joaquin pocket mouse
7 (4% of the habitat in the study area). The locations of these losses are described above in the
8 analyses of individual conservation measures. The Plan includes a commitment to restore or create
9 at least 2,000 acres of grassland in CZ 1, CZ 8 and CZ 11(GNC1.2) and to protect 8,000 acres of
10 grassland (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000
11 acres protected in CZ 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8,
12 and CZ 11 in the study area)(GNC1.1). The Plan's commitment to restore grasslands such that they
13 connect fragmented patches of already protected grasslands (GNC1.2) will improve habitat
14 connectivity and dispersal abilities of San Joaquin pocket mouse within and outside of the plan area.
15 All protected habitat would be managed under CM11.

16 Considering these protection and restoration provisions, which would provide acreages of new
17 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction
18 and restoration activities, and with implementation of AMM1-AMM6, and AMM10, the loss of
19 habitat and direct mortality through implementation of Alternative 1C would not result in a
20 substantial adverse effect through habitat modifications and would not substantially reduce the
21 number or restrict the range of the species. Therefore, the loss of habitat and potential mortality
22 under this alternative would have a less-than-significant impact on San Joaquin pocket mouse.

23 **Impact BIO-165: Indirect Effects of Plan Implementation on San Joaquin Pocket Mouse**

24 Construction activities associated with water conveyance facilities, conservation components and
25 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
26 conveyance facilities, including the transmission facilities, could result in ongoing periodic
27 postconstruction disturbances and noise with localized effects on San Joaquin kit pocket mouse and
28 its habitat over the term of the BDCP. These potential effects would be minimized and avoided
29 through AMM1-AMM6 and AMM10, which would be in effect throughout the plan's construction
30 phase.

31 Water conveyance facilities operations and maintenance activities would include vegetation and
32 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
33 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance
34 activities are not expected to remove pocket mouse habitat, operation of equipment could disturb
35 small areas of vegetation around maintained structures and could result in injury or mortality of
36 individual pocket mice, if present.

37 **NEPA Effects:** Implementation of the AMMs listed above would avoid the potential for substantial
38 adverse effects on San Joaquin pocket mouse, either indirectly or through habitat modifications.
39 These measures would also avoid and minimize effects that could substantially reduce the number
40 of San Joaquin pocket mouse, or restrict the species' range. Therefore, the indirect effects of
41 Alternative 1C would not have an adverse effect on San Joaquin pocket mouse.

1 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
2 as construction-related noise and visual disturbances could impact San Joaquin pocket mouse. With
3 implementation of AMM1–AMM6 and AMM10 as part of Alternative 1C construction, operation, and
4 maintenance, the BDCP would avoid the potential for significant adverse effects on either species,
5 either indirectly or through habitat modifications, and would not result in a substantial reduction in
6 numbers or a restriction in the range of the species. Therefore, the indirect effects under this
7 alternative would have a less-than-significant impact on San Joaquin pocket mouse.

8 **Special-Status Bat Species**

9 Special-status bat species with potential to occur in the study area employ varied roost strategies,
10 from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as
11 tunnels, buildings, and bridges. Various roost strategies could include night roosts, maternity roosts,
12 migration stopover, or hibernation. The habitat types used to assess effects for special-status bats
13 roosting habitat includes valley/foothill riparian natural community, developed lands and
14 landscaped trees, including eucalyptus, palms and orchards. Potential foraging habitat includes all
15 riparian habitat types, cultivated lands, developed lands, grasslands, and wetlands.

16 There is potential for at least thirteen different bat species to be present in the study area (Figure
17 12-51), including four California species of special concern and nine species ranked from low to
18 moderate priority by the Western Bat Working Group (Table 12A-2 in Appendix 12A, *Special-Status*
19 *Species with Potential to Occur in the Study Area*). In 2009, DHCCP conducted a large-scale effort that
20 involved habitat assessments, bridge surveys, and passive acoustic monitoring surveys for bats (see
21 Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*, for
22 details on methods and results).

23 There is potential for at least thirteen different bat species to be present in the study area (Figure
24 12-51), including four California species of special concern and nine species ranked from low to
25 moderate priority by the Western Bat Working Group (Table 12A-2 in Appendix 12A). In 2009,
26 DHCCP conducted a large-scale effort that involved habitat assessments, bridge surveys, and passive
27 acoustic monitoring surveys for bats (see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
28 *EIR/EIS Environmental Data Report*, for details on methods and results).

29 The majority of the parcels assessed during field surveys contained bat foraging and roosting
30 features and were considered highly suitable habitat, at the time of the 2009 field surveys, DWR
31 biologists initially identified 145 bridges in their survey area. Eleven of the 145 bridges were not
32 accessible and thirteen were determined to not be suitable for bats. Evidence of bat presence was
33 observed at six of the bridges and bat sign (guano, urine staining, odor, or vocalizations) was
34 observed at 26 of the bridges. biologists observed Mexican free-tailed bats at four of the bridges and
35 unidentified species at the remaining two bridges. One of these bridges, over the Yolo Causeway,
36 was used by approximately 10,000 Mexican free-tailed bats, indicating a maternity roost. A second
37 roost site of about 50 individuals was observed under a bridge in eastern Solano County.

38 The remaining 89 bridges contained structural features that were considered conducive to
39 maternity, solitary, day and/or night roosting. Night roosts may have crevices and cracks but more
40 often have box beams or other less protected roosting spots where bats rest temporarily while
41 feeding. Day roosts are commonly found in bridges with expansion joints, crevices, or cracks where
42 bats are protected from predators and weather. Seventeen bridges in the survey area had no

1 potential for roosting because they lacked surface features from which bats could hang and offered
2 no protection from weather or predators.

3 Construction and restoration associated with Alternative 1C conservation measures would result in
4 both temporary and permanent losses of foraging and roosting habitat for special-status bats as
5 indicated in Table 12-1C-61. Protection and restoration for special-status bat species focuses on
6 habitats and does not include manmade structures such as bridges. The conservation measures that
7 would be implemented to achieve the biological goals and objectives that would also benefit special-
8 status bats are summarized below.

- 9 ● Protect or restore 142,200 acres of high-value natural communities (Objective L1.1, associated
10 with CM3). This objective includes restoring and protecting a variety of habitat types described
11 below (BDCP Chapter 3, Table 3.3-4).
 - 12 ○ Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
13 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
 - 14 ○ Protect 600 acres of existing vernal pool complex (Objective VPNC1.1, associated with CM3).
 - 15 ○ Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
 - 16 ○ Protect 8,100 acres of managed wetland (Objective MWNC1.1, associated with CM3 and
17 CM11).
 - 18 ○ Protect 48,625 acres of cultivated lands (Objective CLNC1.1, associated with CM3 and
19 CM11).
 - 20 ○ Protect, restore, or create 2,740 acres of rice land or equivalent habitat type for the giant
21 garter snake (Objective GGS3.1, associated with CM3, CM4, and CM10).
 - 22 ○ Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective
23 GNC1.2, associated with CM3 and 8).
 - 24 ○ Restore 67 acres of vernal pool complex (Objective VPNC1.2, associated with CM3 and 9).
 - 25 ○ Restore and protect 65,000 acres of tidal natural communities (Objective L1.2, associated
26 with CM2, 3, and 4).
 - 27 ○ Restore or create 5,000 acres of valley/foothill riparian natural community (Objective
28 VFRNC1.1, associated with CM3 and CM7).
 - 29 ○ Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
30 (Objective VFRNC1.2, associated with CM3).

31 As explained below, with the restoration and protection of these amounts of habitat, in addition to
32 mitigation measures to reduce potential effects, impacts on special-status bats would not be adverse
33 for NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-1C-61. Changes in Special-Status Bat Roosting and Foraging Habitat Associated with Alternative 1C^a

Conservation Measure ^b	Habitat Type ^c	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT ^d	CM2	CM5
CM1	Roosting	135	135	333	333	NA	NA
	Foraging	6,832	6,832	10,451	10,451	NA	NA
Total Impacts CM1		6,967	6,967	10,784	10,784	NA	NA
CM2-CM18	Roosting	524	1,570	167	212	324	411
	Foraging	14,497	60,399	773	2,126	21,265	10,137
Total Impacts CM2-CM18		15,021	61,969	940	2,338	21,589	10,548
TOTAL IMPACTS		21,988	68,937	11,724	13,122	21,589	10,548

^a See Appendix 12E for detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c Affected roosting habitat acreages include valley/foothill riparian habitat, developed lands, and orchards. An unknown number of buildings, bridges, tunnels, and individual trees could also be affected but were not included in this analysis. Foraging habitat includes all natural communities, cultivated lands, and developed lands in the study area. Foraging habitat effects for CM2-CM18 were not considered adverse as they reflect a conversion from one foraging habitat type (mostly cultivated lands) to another foraging habitat (wetlands).

^d LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^e Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as the maximum possible based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-166: Loss or Conversion of Habitat for and Direct Mortality of Special-Status Bats**

5 Alternative 1C conservation measure CM1 would result in the permanent and temporary loss
6 combined of up to 468 acres of roosting habitat and 16,833 acres of foraging habitat for special-
7 status bats in the study area. DWR identified two bridges, one with positive bat sign that provided
8 both day and night roosting habitat and the other a potential night roost, that could be affected by
9 construction in CM1. Conservation measures Fremont Weir/Yolo Bypass improvements (CM2), tidal
10 habitat restoration (CM4), and floodplain restoration (CM5) and would result in the permanent and
11 temporary loss of 1,782 acres of roosting habitat and the conversion of approximately 65,525 acres
12 of foraging habitat from mostly cultivated lands and managed wetlands to tidal and nontidal
13 wetlands. Habitat enhancement and management activities (CM11) could result in local adverse
14 effects. In addition, maintenance activities associated with the long-term operation of the water
15 conveyance facilities and other BDCP physical facilities could affect special-status bat habitat. A
16 summary of combined impacts and NEPA effects and a CEQA conclusion follows the individual
17 conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of Alternative 1C conveyance facilities would
2 result in the permanent loss of approximately 135 acres of roosting habitat and 6,832 acres of
3 foraging habitat in the study area. Development of the water conveyance facilities would also
4 result in the temporary removal of up to 333 acres of roosting habitat and up to 10,451 acres of
5 foraging habitat for special-status bats in the study area (Table 12-1C-61). DWR identified two
6 bridges within the CM1 footprint. One bridge had positive bat sign and provided both day and
7 night roosting habitat and was located in a new bridge construction area. The second bridge
8 provided potential night roosting habitat and is located in a borrow area.
- 9 • *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the
10 conversion of approximately 2,025 acres of foraging habitat into wetlands that could still be
11 used by bats for foraging. CM2 would also result in the permanent removal of 89 acres and
12 temporary removal of 167 acres of roosting habitat for special-status bats. The maternity colony
13 of Mexican free-tailed bats located at both ends of the Yolo Causeway bridge could also be
14 affected during construction for CM2. Implementation of Mitigation Measure BIO-166 *Conduct*
15 *Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, would ensure that
16 improvements in the Yolo Bypass avoid effects on roosting special-status bats.
- 17 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
18 inundation would result in the conversion of approximately 56,810 acres of foraging habitat into
19 wetlands that could still be used by bats for foraging. Approximately 1,425 acres of roosting
20 habitat for special-status bats would permanently affected. This habitat is of low value,
21 consisting of a small, isolated patch surrounded by cultivated lands, and the species have a
22 relatively low likelihood of being present in these areas. The roosting habitat that would be
23 removed consists of relatively small and isolated patches along canals and irrigation ditches
24 surrounded by cultivated lands in the Union Island and Roberts Island areas, and several small
25 patches along the San Joaquin River. Mitigation Measure BIO-166, *Conduct Preconstruction*
26 *Surveys for Roosting Bats and Implement Protective Measures*, requires that tidal natural
27 communities restoration avoid effects on roosting special-status bats.
- 28 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
29 restoration would result in the conversion of an estimated 3,690 acres of foraging habitat into
30 wetlands that could still be used by bats for foraging. CM5 would also result in the permanent
31 removal of 57 acres and temporary removal of 45 acres of roosting habitat for special-status
32 bats in the study area.
- 33 • *CM11 Natural Communities Enhancement and Management*: Implementation of Alternative 1C
34 would result in an overall benefit to special-status bats within the study area through protection
35 and restoration of their foraging and roosting habitats. The majority of affected acres would
36 convert agricultural land to natural communities with higher potential foraging and roosting
37 value, such as riparian, tidal and nontidal wetlands, and periodically inundated lands. Restored
38 foraging habitats primarily would replace agricultural lands. Restored habitats are expected to
39 be of higher function because the production of flying insect prey species is expected to be
40 greater in restored wetlands and uplands on which application of pesticides would be reduced
41 relative to affected agricultural habitats. Noise and visual disturbances during implementation
42 of riparian habitat management actions could result in temporary disturbances that, if bat roost
43 sites are present, could cause temporary abandonment of roosts. This effect would be
44 minimized with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction*
45 *Surveys for Roosting Bats and Implement Protective Measures*.

- 1 • Operations and maintenance: Ongoing facilities operation and maintenance is expected to have
2 little if any adverse effect on special-status bats. Postconstruction operation and maintenance of
3 the above-ground water conveyance facilities and restoration infrastructure could result in
4 ongoing but periodic disturbances that could affect special-status bat use of the surrounding
5 habitat in the Yolo Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ
6 4, CZ 5, CZ 6, CZ 7, and CZ 8). Maintenance activities would include vegetation management,
7 levee and structure repair, and regrading of roads and permanent work areas. These effects,
8 however, would be minimized with implementation of the mitigation measures described
9 below.
- 10 • Injury and direct mortality: In addition, to habitat loss and conversion, construction activities,
11 such as grading, the movement of construction vehicles or heavy equipment, and the installation
12 of water conveyance facilities components and new transmission lines, may result in the direct
13 mortality, injury, or harassment of roosting special-status bats. Construction activities related to
14 conservation components could have similar affects. Preconstruction surveys would be
15 conducted and if roosting or maternity sites are detected, seasonal restrictions would be placed
16 while bats are present, as described below in the mitigation measures.

17 The following paragraphs summarize the combined effects discussed above and describe other
18 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are
19 also included.

20 ***Near-Term Timeframe***

21 Because water conveyance facilities construction is being evaluated at the project level, the near-
22 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
23 protection or restoration in an appropriate timeframe to ensure that the construction effects would
24 not be adverse under NEPA. Because the majority of affected acres would convert agricultural land
25 to natural communities with higher potential foraging and roosting value, such as riparian, tidal and
26 nontidal wetlands, and periodically inundated lands this analysis focuses only on losses to roosting
27 habitat for CM1, CM2, and CM4 in the near-term.

28 Alternative 1C would permanently or temporarily affect 1,159 acres of roosting for special-status
29 bats in the near-term as a result of implementing (468 acres roosting habitat), CM2 (256 acres
30 roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in the late
31 long-term. Only 601 acres of the 1,159 acres of roosting habitat losses would be in valley/foothill
32 riparian habitat. Typical NEPA project-level mitigation ratios for those natural communities that
33 would be affected for roosting habitat would be 1:1 for restoration and protection of the
34 valley/foothill riparian natural community. Using these ratios would indicate that 601 acres of
35 riparian habitat should be restored and 601 acres of riparian habitat should be protected.

36 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status
37 bats within the study area through protection and restoration of their foraging and roosting habitats
38 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and
39 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities
40 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and
41 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging
42 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective
43 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and
44 Objective GNC1.1). Restored foraging habitats would replace primarily cultivated lands. Restored

1 habitats are expected to be of higher function because the production of flying insect prey species is
2 expected to be greater in restored wetlands and uplands on which application of pesticides would
3 be reduced relative to affected agricultural habitats. Conservation components in the near-term
4 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 1C.

5 In addition, activities associated with natural communities enhancement and protection and with
6 ongoing facilities operations and maintenance could affect special-status bat use of surrounding
7 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,
8 described below, requires preconstruction surveys to reduce these effects.

9 The BDCP also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
13 *Affected Natural Communities*. These AMMs include elements that avoid or minimize the risk of
14 construction activity affecting habitat and species adjacent to work areas and storage sites. BDCP
15 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
16 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

17 **Late Long-Term Timeframe**

18 Alternative 1C as a whole would affect 2,250 acres of roosting habitat (Table 12-1C-61). Because the
19 majority of affected acres would convert agricultural land to natural communities with higher
20 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically
21 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5
22 in the late long-term.

23 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-
24 status bats within the study area through protection and restoration of approximately 142,200 acres
25 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to
26 protect the highest quality natural communities and covered species habitat in the Plan Area to
27 optimize the ecological value of the reserve system for conserving covered species and native
28 biodiversity. The target for total protected and restored acreage is based on the sum of all natural
29 community acreage targets. Achieving this objective is intended to protect and restore natural
30 communities, species-specific habitat elements, and species diversity on a landscape-scale.,
31 Achieving this objective is also intended to conserve representative natural and seminatural
32 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired
33 ecosystem function, and biological diversity.

34 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and
35 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging
36 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,
37 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,
38 Objective GGS3.1, and Objective GNC1.1) in natural communities and developed lands. Restored
39 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of
40 higher function because the production of flying insect prey species is expected to be greater in
41 restored wetlands and uplands on which application of pesticides would be reduced relative to
42 affected agricultural habitats.

1 Should any of the special-status bat species be detected roosting in the study area, construction of
2 water conveyance facilities and restoration activities would have an adverse effect on roosting
3 special-status bats. Noise and visual disturbances and the potential for injury or mortality of
4 individuals associated within implementation of the restoration activities on active roosts would be
5 minimized with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for*
6 *Roosting Bats and Implement Protective Measures*. Conservation components would sufficiently
7 offset the adverse effects resulting from late long-term effects from CM1, CM2, CM4, and CM5.

8 **NEPA Effects:** In the near-term, the losses of roosting and foraging habitat for special-status bats
9 associated with implementing Alternative 1C are not expected to result in substantial adverse
10 effects on special-status bats, either directly or through habitat modifications and would not result
11 in a substantial reduction in numbers or a restriction in the range of special-status bats because the
12 BDCP has committed to protecting the acreage required to meet the typical mitigation ratios
13 described above. In the late long-term, the losses of foraging and roosting habitat for special-status
14 bats associated with Alternative 1C, in the absence of other conservation actions, would represent
15 an adverse effect as a result of habitat modification and potential direct mortality of a special-status
16 species. However, with habitat protection and restoration associated with the conservation
17 components, guided by landscape-scale goals and objectives and by AMM1–AMM6 and AMM10, and
18 with implementation of Mitigation Measure BIO-166, the effects of Alternative 1C as a whole on
19 special-status bats would not be adverse.

20 **CEQA Conclusion:**

21 **Near-Term Timeframe**

22 Because water conveyance facilities construction is being evaluated at the project level, the near-
23 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
24 protection or restoration in an appropriate timeframe to ensure that the construction effects would
25 be less than significant for CEQA purposes. Because the majority of affected acres would convert
26 agricultural land to natural communities with higher potential foraging and roosting value, such as
27 riparian, tidal and nontidal wetlands, and periodically inundated lands this analysis focuses only on
28 losses to roosting habitat for CM1, CM2, and CM4 in the near-term.

29 Alternative 1C would permanently or temporarily affect 1,159 acres of roosting for special-status
30 bats in the near-term as a result of implementing (468 acres roosting habitat), CM2 (256 acres
31 roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in the late
32 long-term. Only 601 acres of the 1,159 acres of roosting habitat losses would be in valley/foothill
33 riparian habitat. Typical CEQA project-level mitigation ratios for those natural communities that
34 would be affected for roosting habitat would be 1:1 for restoration and protection of the
35 valley/foothill riparian natural community. Using these ratios would indicate that 601 acres of
36 riparian habitat should be restored and 601 acres of riparian habitat should be protected.

37 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status
38 bats within the study area through protection and restoration of their foraging and roosting habitats
39 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and
40 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities
41 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and
42 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging
43 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective
44 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and

1 Objective GNC1.1). Restored foraging habitats would replace primarily cultivated lands. Restored
2 habitats are expected to be of higher function because the production of flying insect prey species is
3 expected to be greater in restored wetlands and uplands on which application of pesticides would
4 be reduced relative to affected agricultural habitats. Conservation components in the near-term
5 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 1C.

6 In addition, activities associated with natural communities enhancement and protection and with
7 ongoing facilities operations and maintenance could affect special-status bat use of surrounding
8 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,
9 described below, requires preconstruction surveys to reduce these impacts to a less-than-significant
10 level.

11 The permanent loss of roosting habitat from Alternative 1C would be mitigated through
12 implementation of Mitigation Measure BIO-166, which would ensure there is no significant impact
13 under CEQA on roosting special-status bats, either directly or through habitat modifications and no
14 substantial reduction in numbers or a restriction in the range of special-status bats. The BDCP also
15 contains commitments to implement AMM1–AMM6 and AMM10. These AMMs include elements that
16 avoid or minimize the risk of construction activity affecting habitat and species adjacent to work
17 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
18 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
19 EIR/EIS.

20 **Late Long-Term Timeframe**

21 Alternative 1C as a whole would affect 2,250 acres of roosting habitat (Table 12-1C-61). Because the
22 majority of affected acres would convert agricultural land to natural communities with higher
23 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically
24 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5
25 in the late long-term.

26 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-
27 status bats within the study area through protection and restoration of approximately 142,200 acres
28 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to
29 protect the highest quality natural communities and covered species habitat in the Plan Area to
30 optimize the ecological value of the reserve system for conserving covered species and native
31 biodiversity. The target for total protected and restored acreage is based on the sum of all natural
32 community acreage targets. Achieving this objective is intended to protect and restore natural
33 communities, species-specific habitat elements, and species diversity on a landscape-scale.,
34 Achieving this objective is also intended to conserve representative natural and seminatural
35 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired
36 ecosystem function, and biological diversity.

37 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and
38 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging
39 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,
40 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,
41 Objective GGS3.1, and Objective GNC1.1) in natural communities and developed lands. Restored
42 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of
43 higher function because the production of flying insect prey species is expected to be greater in

1 restored wetlands and uplands on which application of pesticides would be reduced relative to
2 affected agricultural habitats.

3 Should any of the special-status bat species roost in the study area, construction of water
4 conveyance facilities and restoration activities would have an adverse effect on roosting special-
5 status bats. Noise and visual disturbances and the potential for injury or mortality of individuals
6 associated within implementation of the restoration activities on active roosts would be minimized
7 with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting*
8 *Bats and Implement Protective Measures*. Conservation components would sufficiently offset late
9 long-term effects resulting from CM1, CM2, CM4, and CM5.

10 The permanent loss of roosting habitat from Alternative 1C would be mitigated through
11 implementation of Mitigation Measure BIO-166, which would ensure there is no significant impact
12 under CEQA on roosting special-status bats, either directly or through habitat modifications and no
13 substantial reduction in numbers or a restriction in the range of special-status bats. Therefore,
14 Alternative 1C would not result in a significant impact on special-status bats under CEQA.

15 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
16 **Implement Protective Measures**

17 The following measure was designed to avoid and minimize adverse direct and indirect effects
18 on special-status bats. However, baseline data are not available or are limited on how bats use
19 the study area, and on individual numbers of bats and how they vary seasonally. Therefore, it is
20 difficult to determine if there would be a substantial reduction in species numbers. Bat species
21 with potential to occur in the study area employ varied roost strategies, from solitary roosting in
22 foliage of trees to colonial roosting in trees and artificial structures, such as buildings and
23 bridges. Daily and seasonal variations in habitat use are common. To obtain the highest
24 likelihood of detection, preconstruction bat surveys will be conducted by DWR and will include
25 these components.

- 26 • Identification of potential roosting habitat within project footprint.
- 27 • Daytime search for bats and bat sign in and around identified habitat.
- 28 • Evening emergence surveys at potential day-roost sites, using night-vision goggles and/or
29 active full-spectrum acoustic monitoring where species identification is sought.
- 30 • Passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from
31 dusk to dawn over multiple nights.
- 32 • Additional on-site night surveys as needed following passive acoustic detection of special
33 status bats to determine nature of bat use of the structure in question (e.g., use of structure
34 as night roost between foraging bouts).
- 35 • Qualified biologists would have knowledge of the natural history of the species that could
36 occur in the study area and experience using full-spectrum acoustic equipment. During
37 surveys, biologists would avoid unnecessary disturbance of occupied roosts.

38 ***Preconstruction Bridges and Other Structure Surveys***

39 Before work begins on the bridge/structure, qualified biologists would conduct a daytime
40 search for bat sign and evening emergence surveys to determine if the bridge/structure is being
41 used as a roost. Biologists conducting daytime surveys would listen for audible bat calls and

1 would use naked eye, binoculars, and a high-powered spotlight to inspect expansion joints,
2 weep holes, and other bridge features that could house bats. Bridge surfaces and the ground
3 around the bridge/structure would be surveyed for bat sign, such as guano, staining, and prey
4 remains.

5 Evening emergence surveys would consist of at least one biologist stationed on each side of the
6 bridge/structure watching for emerging bats from a half hour before sunset to 1–2 hours after
7 sunset for a minimum of two nights within the season that construction would be taking place.
8 Night-vision goggles and/or full-spectrum acoustic detectors shall be used during emergence
9 surveys to assist in species identification. All emergence surveys would be conducted during
10 favorable weather conditions (calm nights with temperatures conducive to bat activity and no
11 precipitation predicted).

12 Additionally, passive monitoring with full-spectrum bat detectors would be used to assist in
13 determining species present. A minimum of four nights of acoustic monitoring surveys would be
14 conducted within the season that the construction would be taking place. If site security allows,
15 detectors should be set to record bat calls for the duration of each night. To the extent possible,
16 all monitoring would be conducted during favorable weather conditions (calm nights with
17 temperatures conducive to bat activity and no precipitation predicted). The biologists would
18 analyze the bat call data using appropriate software and prepare a report with the results of the
19 surveys. If acoustic data suggest that bats may be using the bridge/structure as a night roost,
20 biologists would conduct a night survey from 1–2 hours past sunset up to 6 hours past sunset to
21 determine if the bridge is serving as a colonial night roost.

22 If suitable roost structures would be removed, additional surveys may be required to determine
23 how the structure is used by bats, whether it is as a night roost, maternity roosts, migration
24 stopover, or for hibernation.

25 ***Preconstruction Tree Surveys***

26 If tree removal or trimming is necessary, qualified biologists would examine trees to be
27 removed or trimmed for suitable bat roosting habitat. High-value habitat features (large tree
28 cavities, basal hollows, loose or peeling bark, larger snags, palm trees with intact thatch, etc.)
29 would be identified and the area around these features searched for bats and bat sign (guano,
30 culled insect parts, staining, etc.). Riparian woodland, orchards, and stands of mature broadleaf
31 trees should be considered potential habitat for solitary foliage roosting bat species.

32 If bat sign is detected, biologists would conduct evening visual emergence survey of the source
33 habitat feature, from a half hour before sunset to 1–2 hours after sunset for a minimum of two
34 nights within the season that construction would be taking place. Methodology should follow
35 that described above for the bridge emergence survey.

36 Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector
37 would be used to assist in determining species present. These surveys would be conducted in
38 coordination with the acoustic monitoring conducted for the bridge/structure.

1 ***Protective Measures for Bats using Bridges/Structures and Trees***

2 Avoidance and minimization measures shall be necessary if it is determined that bats are using
3 the bridge/structure or trees as roost sites and/or sensitive bats species are detected during
4 acoustic monitoring. Appropriate measures would be determined by DWR in consultation with
5 CDFW and shall include, as applicable, the measures listed below.

- 6 • Ensure that bats are protected from noise, vibrations, and light that result from construction
7 activities associated with water conveyance facilities, conservation components and ongoing
8 habitat enhancement, as well as operations and maintenance of above-ground water
9 conveyance facilities, including the transmission facilities. This would be accomplished by
10 either directing noise barriers and lights inward from the disturbance or ensuring that the
11 disturbances do not extend more than 300 feet from the point source.
- 12 • Disturbance of the bridge would be avoided between March 1 and October 31 (the maternity
13 period) to avoid impacts on reproductively active females and dependent young.
- 14 • Installation of exclusion devices from March 1 through October 31 to preclude bats from
15 occupying the bridge during construction. Exclusionary devices would only be installed by
16 or under the supervision of an experienced bat biologist.
- 17 • Tree removal would be avoided between April 15 and September 15 (the maternity period
18 for bats that use trees) to avoid impacts on pregnant females and active maternity roosts
19 (whether colonial or solitary).
- 20 • Tree removal would be conducted between September 15 and October 31 to the maximum
21 extent feasible, which corresponds to a time period when bats would not likely have entered
22 winter hibernation and would not be caring for flightless young. If weather conditions
23 remain conducive to regular bat activity beyond October 31, later tree removal may be
24 considered in consultation with CDFW.
- 25 • Trees would be removed in pieces, rather than felling the entire tree.
- 26 • If a maternity roost is located, whether solitary or colonial, that roost would remain
27 undisturbed with a buffer as determined in consultation with CDFW until September 15 or
28 until a qualified biologist has determined the roost is no longer active.
- 29 • If a non-maternity roost is found, that roost would be avoided to the maximum extent
30 feasible and an appropriate buffer established in consultation with CDFW. Every effort
31 would be made to avoid the roost to the maximum extent feasible, as methods to evict bats
32 from trees are largely untested. However, if the roost cannot be avoided, eviction would be
33 attempted and procedures designed in consultation with CDFW to reduce the likelihood of
34 mortality of evicted bats. In all cases:
 - 35 ○ Eviction would not occur before September 15th and would match the timeframe for
36 tree removal approved by CDFW.
 - 37 ○ Qualified biologists would carry out or oversee the eviction tasks and would monitor the
38 tree trimming/removal.
 - 39 ○ Eviction would take place late in the day or in the evening to reduce the likelihood of
40 evicted bats falling prey to diurnal predators.
 - 41 ○ Eviction would take place during weather and temperature conditions conducive to bat
42 activity.

- 1 ○ Special-status bat roosts would not be disturbed.
- 2 Eviction procedures shall include but are not limited to:
- 3 ○ Pre-eviction surveys to obtain data to inform the eviction approach and subsequent
4 mitigation requirements. Relevant data may include the species, sex, reproductive status
5 and/or number of bats using the roost, and roost conditions themselves such as
6 temperature and dimensions. Surveys may include visual emergence, night vision,
7 acoustic, and/or capture.
- 8 ○ Structural changes may be made to the roost, performed without harming bats, such
9 that the conditions in the roost are undesirable to roosting bats and the bats leave on
10 their own (e.g., open additional portals so that temperature, wind, light and
11 precipitation regime in the roost change).
- 12 ○ Noninjurious harassment at the roost site to encourage bats to leave on their own, such
13 as ultrasound deterrents or other sensory irritants.
- 14 ● Prior to removal/trimming, after other eviction efforts have been attempted, any confirmed
15 roost tree would be shaken, repeatedly struck with a heavy implement such as an axe and
16 several minutes should pass before felling trees or trimming limbs to allow bats time to
17 arouse and leave the tree. The biologists should search downed vegetation for dead and
18 injured bats. The presence of dead or injured bats would be reported to CDFW.

19 Compensatory mitigation for the loss of roosting habitat would also be determined through
20 consultation with CDFW and may include the construction and installation of suitable replacement
21 habitat onsite. Depending on the species and type of roost lost, various roost replacement habitats
22 have met with some success (e.g., bat houses, “bat bark,” planting cottonwood trees, leaving palm
23 thatch in place rather than trimming). The creation of natural habitat onsite is generally preferable
24 to artificial.

25 Artificial roosts are often unsuccessful, and care must be taken to determine as closely as possible
26 the conditions in the natural roost to be replaced. Even with such care, artificial habitat may fail.
27 Several artificial roosts have been highly successful in replacing bridge roost habitat when
28 incorporated into new bridge designs. “Bat bark” has been successfully used by Arizona Department
29 of Game and Fish to create artificial crevice-roosting bat habitat mounted on pine trees (Mering and
30 Chambers 2012: 765). Bat houses have at best an inconsistent track record but information is
31 mounting on how to create successful houses. There is no single protocol or recipe for bat-house
32 success. Careful study of the roost requirements of the species in question; the particular conditions
33 at the lost roost site including temperature, orientation of the openings, airflow, internal dimensions
34 and structures (cavity vs. crevice, etc.) should increase the chances of designing a successful
35 replacement.

36 Restoring riparian woodland with plantings shows signs of success in Colorado. Western red bat
37 activity has been positively correlated with increased vegetation and tree growth, canopy
38 complexity and restoration acreage at cottonwood-willow restoration sites along the Lower
39 Colorado River (Broderick 2012: 39). These complex woodland areas would ultimately provide a
40 wider range of bat species with preferred roost types, including both foliage-roosting and crevice-
41 /cavity-roosting bats.

1 **Impact BIO-167: Indirect Effects of Plan Implementation on Special-Status Bats**

2 Construction activities associated with water conveyance facilities, conservation components and
3 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
4 conveyance facilities, including the transmission facilities, could result in ongoing periodic
5 disturbances from light, vibrations, and noise with localized effects on special-status bats and their
6 roosting habitat over the term of the BDCP.

7 Water conveyance facilities operations and maintenance activities would include vegetation and
8 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
9 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance
10 activities are not expected to remove special-status bat habitat, operation of equipment could
11 disturb small areas of vegetation around maintained structures and could result in disturbances to
12 roosting bats, if present. Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting*
13 *Bats and Implement Protective Measures*, is available to address these adverse effects.

14 Increased exposure to methylmercury associated with tidal natural communities restoration would
15 potentially indirectly affect special-status bat species. *CM12 Methylmercury Management* describes
16 the process by which tidal natural communities restoration may increase methyl mercury levels in
17 wetlands in the study area. Mercury has been found in high concentrations in some bat species, such
18 as the Indiana bat. Many bat species forage heavily on aquatic insects, which might result in rapid
19 bioaccumulation (Evers et al. 2012). Measures described in *CM12 Methylmercury Management* are
20 expected to reduce the effects of methylmercury on special-status bat species resulting from BDCP
21 tidal natural communities restoration.

22 **NEPA Effects:** Implementation of the Mitigation Measure BIO-166 for special-status bats would
23 avoid the potential for substantial adverse effects on roosting special-status bats, either indirectly or
24 through habitat modifications. This mitigation measure would also avoid and minimize effects that
25 could substantially reduce the number of special-status bats, or restrict species' range. Therefore,
26 the indirect effects of Alternative 1C would not have an adverse effect on special-status bats.

27 **CEQA Conclusion:** Indirect effects from conservation components operations and maintenance as
28 well as construction-related noise and visual disturbances could have a significant impact on
29 special-status bat species, either indirectly or through habitat modifications. Mitigation Measure
30 BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*,
31 would reduce these potential impacts to a less-than-significant level and ensure that Alternative 1C
32 would not result in a substantial reduction in numbers or a restriction in the range of species.

33 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
34 **Implement Protective Measures**

35 See Mitigation Measure BIO-166 under Impact BIO-166.

36 **Impact BIO-168: Periodic Effects of Inundation of Special-Status Bat Habitat as a Result of**
37 **Implementation of Conservation Components**

38 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
39 324 acres of roosting habitat and 21,265 acres of foraging habitat for special-status bats in the study
40 area (Table 12-1C-61).

1 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate up to 411 acres of
2 roosting habitat and 10,137 acres of foraging habitat for special-status bats (Table 12-1C-61).
3 Potential roosting trees are likely to be retained within seasonally flooded areas, although high
4 velocity flooding could uproot some trees. Seasonal flooding would not adversely affect foraging
5 habitat for the species. The overall effect of seasonal inundation in existing riparian natural
6 communities may instead be beneficial. Historically, flooding was the main natural disturbance
7 regulating ecological processes in riparian areas, and flooding promotes the germination and
8 establishment of many native riparian plants. In the late long-term, seasonal inundation in areas
9 currently occupied by riparian vegetation may contribute to the establishment of high-value habitat
10 for special-status bats that use riparian habitats.

11 **NEPA Effects:** Periodic effects on roosting and foraging habitat for special-status bats associated
12 with implementing Alternative 1C are not expected to result in substantial adverse effects on
13 special-status bats, either directly or through habitat modifications and would not result in a
14 substantial reduction in numbers or a restriction in the range of special-status bats. Mitigation
15 Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective*
16 *Measures*, is available to address any effects of periodic inundation on special-status bats and
17 roosting habitat. Therefore, Alternative 1C would not adversely affect the species.

18 **CEQA Conclusion:** Periodic inundation under CM2 and floodplain restoration under CM5 would
19 periodically affect foraging and roosting habitat for special-status bats in the study area. Any impact
20 of periodic inundation on special-status bats would be mitigated through implementation of
21 Mitigation Measure BIO-166, which would ensure there is no significant impact on roosting special-
22 status bats, either directly or through habitat modifications and no substantial reduction in numbers
23 or a restriction in the range of special-status bats.

24 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
25 **Implement Protective Measures**

26 See discussion of Mitigation Measure BIO-166 under Impact BIO-166.

27 **Plant Species**

28 **Vernal Pool Plants**

29 Five covered plant species and 12 noncovered special-status plant species occur in vernal pools in
30 the study area (Tables 12-2, 12-3, summarized in Table 12-1C-62). The vernal pool habitat model
31 used for the impact analysis was based on vegetation types and associations from various data sets
32 which were used to create maps showing the distribution of vernal pool habitat in the study area
33 according to three habitat types in which the species are known to occur, including vernal pool
34 complex and degraded vernal pool complex, and alkali seasonal wetland habitat. Vernal pool
35 complex habitat consists of vernal pools and uplands that display characteristic vernal pool and
36 swale visual signatures that have not been significantly impacted by agricultural or development
37 practices. Degraded vernal pool complex habitat consists of habitat that ranges from areas with
38 vernal pool and swale visual signatures that display clear evidence of significant disturbance due to
39 plowing, discing, or leveling to areas with clearly artificial basins such as shallow agricultural
40 ditches, depressions in fallow fields, and areas of compacted soils in pastures. Because wetlands in
41 the degraded vernal pool complex are inundated during the wet season and may have historically
42 been located in or near areas with natural vernal pool complex, they may support individuals or

1 small populations of species that are found in vernal pools and swales. However, they do not possess
2 the full complement of ecosystem and community characteristics of natural vernal pools, swales and
3 their associated uplands and they are generally ephemeral features that are eliminated during the
4 course of normal agricultural practices. A small amount of alkali seasonal wetland habitat was
5 included in the model because alkaline vernal pools are also present in some areas mapped as alkali
6 seasonal wetland.

7 Because each of the vernal pool species addressed in this EIR/EIS have specific microhabitat
8 affinities, and because vernal pool habitat within the study area is highly heterogeneous with
9 respect to habitat parameters such as soil type and pool depth, the vernal pool habitat model greatly
10 overestimates the extent of habitat in the study area occupied by each species. However, the vernal
11 pool habitat model is likely to encompass all or most of the potential area within which special-
12 status vernal pool plant species would occur. Therefore, it is not likely to underestimate the extent
13 of occupied habitat or to underestimate the effects of Alternative 1C.

14 Full implementation of Alternative 1C would include the following conservation actions over the
15 term of the BDCP to benefit covered vernal pool plants (BDCP Chapter 3, Section 3.3, *Biological Goals*
16 *and Objectives*).

- 17 • Protect two currently unprotected occurrences of alkali milk-vetch in the Altamont Hills or
18 Jepson Prairie core recovery areas (Objective VPP1.1, associated with CM3).
- 19 • Maintain no net loss of Heckard's peppergrass in Conservation Zones 1, 8, or 11 within
20 restoration sites or within the area of affected tidal range of restoration projects (Objective
21 VPP1.2, associated with CM3 and CM9).

22 The construction and restoration activities covered under Alternative 1C could have impacts on
23 special-status vernal pool plants. Modeled habitat is within the proposed footprint for the
24 Alternative 1C water conveyance facilities and within the hypothetical footprints for restoration
25 activities. In addition, three known occurrence of a covered plant species and two known
26 occurrences of a noncovered plant species are within the proposed footprint for the Alternative 1C
27 water conveyance facilities. Table 12-1C-62 summarizes the acreage of modeled vernal pool habitat
28 in the study area, the number of occurrences of each special-status vernal pool plant in the study
29 area, and potential effects.

1 **Table 12-1C-62. Summary of Impacts on Vernal Pool Plants under Alternative 1C**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Modeled Habitat					
Vernal pool complex	9,557	61	0	0	Habitat loss from construction of water conveyance facilities and tidal restoration
Degraded vernal pool complex	2,493	376	0	0	Habitat loss from construction of water conveyance facilities and tidal restoration
Alkali Seasonal Wetland	188	15	0	0	Habitat loss from construction of water conveyance facilities
Total	12,238	452	0	0	
Covered Species					
Alkali milk-vetch	0	0	16	1	Occurrences affected by construction of water conveyance facilities
Dwarf downingia	0	0	12	0	None
Boggs Lake hedge-hyssop	0	0	1	0	None
Legenere	0	0	8	0	None
Heckard's peppergrass	0	0	4 ^a	0	None
Noncovered Species					
Ferris' milk-vetch	0	0	6	2	Occurrences affected by construction of water conveyance facilities
Vernal pool smallscale	0	0	2	0	None
Hogwallow starfish	0	0	0	0	None
Ferris' goldfields	0	0	4	2	Occurrences affected by construction of water conveyance facilities
Contra Costa goldfields	0	0	7	0	None
Cotula-leaf navarretia	0	0	5	0	None
Baker's navarretia	0	0	3	0	None
Colusa grass	0	0	1	0	None
Bearded popcorn-flower	0	0	4	0	None
Delta woolly marbles	0	0	3	0	None
Saline clover	0	0	9	0	None
Solano grass	0	0	1	0	None

^a One additional occurrence is in alkali seasonal wetlands.

2

1 **Impact BIO-169: Effects on Habitat and Populations of Vernal Pool Plants**

2 Alternative 1C could affect habitat for special-status vernal pool plants and occurrences of two
3 vernal pool plant species. The individual effects of each relevant conservation measure are
4 addressed below. A summary statement of the combined impacts and NEPA and CEQA conclusions
5 follows the individual conservation measure discussions.

- 6 • *CM1 Water Facilities and Operations*: Eighty acres of modeled habitat in CZ 8 are within the
7 proposed footprint for the Alternative 1C water conveyance facilities, including 5.5 acres of
8 critical habitat for Contra Costa goldfields, one known occurrence of alkali milk-vetch, two
9 known occurrences of Ferris' milk-vetch, and two known occurrences of Ferris' goldfields.
10 Construction and operation of the water conveyance facilities would not affect known
11 occurrences of the other four covered vernal pool plants or the other 11 noncovered special-
12 status plants. Under Alternative 1C, construction and operation of the water conveyance
13 facilities could affect undiscovered occurrences of the five covered vernal pool plants or the 12
14 noncovered special-status plants. In addition, construction of the west transmission line option
15 could affect potential habitat and undocumented occurrences of special-status vernal pool
16 plants, including Ferris' milkvetch, Baker's meadowfoam, bearded popcornflower, Delta woolly
17 marbles, and saline clover.
- 18 • *CM2 Yolo Bypass Fisheries Enhancement*: No modeled vernal pool habitat and no known
19 occurrences of special-status vernal pool plant species are within the hypothetical footprint for
20 construction or operation of the Yolo Bypass fisheries enhancements. Construction and
21 operation of the Yolo Bypass fisheries enhancements would not affect the 17 covered or
22 noncovered vernal pool plants.
- 23 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit covered
24 vernal pool plants by protecting 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective
25 VPNC1.1). The protected vernal pool habitat would be managed and enhanced to sustain
26 populations of native vernal pool species. These benefits also would accrue to any noncovered
27 vernal pool plants occurring in the protected vernal pool complex.
- 28 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would result in the
29 inundation of an estimated acres of vernal pool complex and would, therefore, potentially affect
30 special-status vernal pool plants. However, most of this habitat (370 acres) consists of degraded
31 vernal pool habitat that is unlikely to contain special-status plants. In addition, 257.8 acres of
32 critical habitat for Contra Costa goldfields could be affected. No known occurrences of covered
33 and noncovered vernal pool plants would be affected by tidal restoration.
- 34 • *CM5 Seasonally Inundated Floodplain Restoration*: No vernal pool habitat or occurrences of
35 special-status vernal pool plants are present within areas proposed for floodplain restoration.
36 Therefore, floodplain restoration and construction of new floodplain levees would have no
37 impacts on covered and noncovered vernal pool plants.
- 38 • *CM6 Channel Margin Enhancement*: No vernal pool habitat or occurrences of special-status
39 vernal pool plants are present within areas proposed for channel margin habitat enhancement.
40 Therefore, channel margin habitat enhancement would have no impacts on covered and
41 noncovered vernal pool plants.

- 1 ● *CM7 Riparian Natural Community Restoration*: No vernal pool habitat or occurrences of special-
2 status vernal pool plants are present within areas proposed for riparian habitat enhancement.
3 Therefore, riparian habitat enhancement would have no impacts on covered and noncovered
4 vernal pool plants.
- 5 ● *CM8 Grassland Natural Community Restoration*: Although the vernal pool complex habitat
6 includes grassland matrix within which the vernal pools occur, grassland restoration activities
7 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands
8 that are not included within vernal pool complex habitat. Therefore, grassland communities
9 restoration would have no impacts on covered and noncovered vernal pool plants.
- 10 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: If, through unforeseen
11 circumstances, BDCP activities result in the net loss of vernal pool habitat, CM9 would be
12 implemented to compensate for that loss. Because vernal pool complex restoration would focus
13 on habitat that had been cleared and leveled but maintained an intact duripan or claypan, the
14 likelihood of affecting any special-status vernal pool plants would be low. However, vernal pool
15 restoration could adversely affect remnant populations of special-status vernal pool plants or
16 potentially affect vernal pool habitat adjacent to the restoration areas.
- 17 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
18 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid vernal pool
19 habitat and would have no impacts on covered and noncovered vernal pool plants.
- 20 ● *CM22 Avoidance and Minimization Measures*: Effects on covered vernal pool plants potentially
21 resulting from implementation of CM4 would be avoided or minimized through *AMM11 Covered*
22 *Plant Species*, *AMM12 Vernal Pool Crustaceans*, *AMM30 Transmission Line Design and Alignment*
23 *Guidelines*, and *AMM37 Recreation*. *AMM2 Construction Best Management Practices and*
24 *Monitoring*. AMM11 prohibits ground disturbance or hydrologic disturbance within 250 feet of
25 existing vernal pools. In addition, AMM11 specifies that individual projects be designed to avoid
26 critical habitat for listed plant and wildlife vernal pool species. *AMM12 Vernal Pool Crustaceans*
27 also requires that that tidal natural communities restoration or other ground-disturbing
28 covered activities in Conservation Zones 1 and 11 will not result in the adverse modification of
29 primary constituent elements of critical habitat for vernal pool fairy shrimp, conservancy fairy
30 shrimp, and vernal pool tadpole shrimp. These protections would also apply to critical habitat
31 for Contra Costa goldfields, where it overlaps with critical habitat for these vernal pool
32 crustaceans. AMM12 limits the direct removal of vernal pool crustacean habitat to no more than
33 10 wetted acres and the indirect effect to no more than 20 wetted acres through the life of the
34 Plan. AMM30 specifies that the alignment of proposed transmission lines will be designed to
35 avoid sensitive terrestrial and aquatic habitats when siting poles and towers, to the maximum
36 extent feasible. Effects on alkali milk-vetch would be avoided or minimized through
37 implementation of AMM11 and AMM30. AMM37 requires that new recreation trails avoid
38 populations of covered vernal pool plants. BDCP Appendix 3.C describes the AMMs, which have
39 since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
40 *AMMs, and CMs*, of the Final EIR/EIS.

41 In addition, the BDCP includes species-specific goals to benefit covered vernal pool plants. This
42 includes protecting two occurrences of alkali milkvetch (Objective VPP1.1) and requiring no net loss
43 of Heckard's peppergrass (Objective VPP1.2).

1 In summary, adverse effects on covered vernal pool plants could occur from implementing
2 Alternative 1C. One known occurrence of alkali milk-vetch that could be affected under the current
3 project design would be surveyed to establish the occurrence limits and to redesign the project to
4 avoid affecting the occurrences, but only to the extent feasible. Beneficial effects on special-status
5 vernal pool plants could occur by protecting 600 acres of vernal pool complex in CZs 1, 8, and 11 and
6 by protecting occurrences of alkali milk-vetch. However, conservation measures that benefit or
7 protect covered species do not apply to noncovered species, and two occurrences of Ferris' milk-
8 vetch and two occurrences of Ferris' goldfields at Byron Tract Forebay would be adversely affected.

9 The GIS analysis estimated that up to 437 acres of vernal pool complex could be adversely affected
10 by covered activities under Alternative 1C. However, the actual effect on habitat for special-status
11 vernal pool plants is expected to be much less than the estimated impact because the BDCP limits
12 the total loss of wetted vernal pool habitat resulting from specific projects to 10 acres
13 (approximately 67 acres of vernal pool complex) over the permit term (AMM12). At the proposed
14 restoration ratios of 1:1 (prior to impact) and 1.5:1 (concurrent with impact), between 67 and 100.5
15 acres of vernal pool complex restoration would be required to compensate for the loss of modeled
16 habitat for special-status vernal pool plants (Objective VPNC1.2, associated with CM9). This would
17 be consistent with typical NEPA and CEQA project-level mitigation ratios for vernal pool impacts.
18 Because most of the vernal pool habitat restoration would be applied to compensating for impacts of
19 CM1, the limitation on the loss of wetted vernal pool habitat would prevent implementation of tidal
20 restoration projects that are adjacent to vernal pool complex, which could affect the feasibility of
21 restoring 65,000 acres of tidal habitat (Objective TPANC1.1, associated with CM4).

22 **NEPA Effects:** The loss of modeled habitat for vernal pool plant species would be minimized by
23 AMM12 and offset through CM9. Impacts on one occurrence of a covered vernal pool plant, alkali
24 milk-vetch, could be avoided by project design. The loss of two occurrences of Ferris' milk-vetch and
25 two occurrences of Ferris' goldfields, both noncovered species, would result in a reduction in the
26 range and numbers of this species and would be an adverse effect. Implementation of Mitigation
27 Measure BIO-170 for Ferris' milk-vetch and Ferris' goldfields could offset or avoid this effect. With
28 avoidance and minimization, Alternative 1C would not result in adverse effects on covered and
29 noncovered vernal pool plant species. If the impacts could only be mitigated through project design,
30 and project design changes are infeasible, then the effects would be adverse.

31 **CEQA Conclusion:** Because loss of modeled habitat for vernal pool plant species would be offset
32 through restoration, and because impacts on occurrences of covered vernal pool plants would be
33 avoided, the impacts of Alternative 1C on 15 covered and noncovered special-status vernal pool
34 plants in the study area would be less than significant. However, construction of the water
35 conveyance facilities could result in the reduction in numbers and range of Ferris' milk-vetch and
36 Ferris' goldfields, which would be significant impacts. Mitigation Measure BIO-32, *Restore and*
37 *Protect Vernal Pool Crustacean Habitat*, and Mitigation Measure BIO-170, *Avoid, Minimize, or*
38 *Compensate for Impacts on Noncovered Special-Status Plant Species*, would reduce these impacts to a
39 less-than-significant level. If the impacts could only be mitigated through project design, and project
40 design changes are infeasible, then the impacts would be significant.

1 **Mitigation Measure BIO-32: Restore and Protect Vernal Pool Crustacean Habitat**

2 See discussion of Mitigation Measure BIO-32 under Impact BIO-32.

3 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**
4 **Special-Status Plant Species**

5 DWR will evaluate all projects for their impacts on special-status plants, avoid or minimize
6 impacts on species that occur on project sites, and compensate for impacts on species. All
7 impacts on diamond-petaled California poppy and caper-fruited tropidocarpum shall be
8 avoided. Impacts on other special-status plant species shall be avoided to the extent feasible,
9 and any unavoidable impacts shall be compensated for.

- 10 ● DWR shall conduct surveys for the special-status plant species within and adjacent to all
11 project sites. Special-status plant surveys required for project-specific permit compliance
12 will be conducted during the planning phase to allow design of the individual restoration
13 projects to avoid adverse modification of habitat for specified covered plants if feasible. The
14 purpose of these surveys will be to verify that the locations of special-status plants
15 identified in previous record searches or surveys are extant, identify any new special-status
16 plant occurrences, and cover any portions of the project area not previously surveyed. The
17 extent of mitigation of direct loss of or indirect effects on special-status plants will be based
18 on these survey results.
- 19 ● All surveys shall be conducted by qualified biologists using the using *Guidelines for*
20 *Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate*
21 *Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating*
22 *Impacts to Special Status Native Plant Populations and Natural Communities* (California
23 Department of Fish and Game 2009) during the season that special-status plant species
24 would be evident and identifiable, i.e., during their blooming season. Locations of special-
25 status plants in proposed construction areas will be recorded using a GPS unit and flagged.
- 26 ● The construction monitoring plan for the protection of covered fish, wildlife, and plant
27 species, prepared by DWR before implementing an approved project, will provide for
28 construction activity monitoring in areas identified during the planning stages and
29 species/habitat surveys as having noncovered special-status plant species.
- 30 ● Where surveys determine that a special-status plant species is present in or adjacent to a
31 project site, direct and indirect impacts of the project on the species shall be avoided if
32 feasible through the establishment of 250-foot activity exclusion zones surrounding the
33 periphery of occurrences, within which no ground-disturbing activities shall take place,
34 including construction of new facilities, construction staging, or other temporary work
35 areas. Activity exclusion zones for special-status plant species shall be established according
36 to a 250-foot buffer surrounding the periphery of each plant species occurrence, the
37 boundaries of which shall be clearly marked with standard orange plastic construction
38 exclusion fencing or its equivalent. The establishment of activity exclusion zones shall not be
39 required if no construction-related disturbances will occur within 250 feet of the occurrence
40 periphery. The size of activity exclusion zones may be reduced through consultation with a
41 qualified biologist and with concurrence from USFWS or CDFW based on project site-
42 specific conditions.

- Where avoidance of impacts on a special-status plant species is infeasible, DWR will compensate for loss of individuals or occupied habitat of a special-status plant species through the acquisition, protection, and subsequent management in perpetuity of other existing occurrences at a 2:1 ratio (preservation: impact). DWR will provide detailed information to USFWS and CDFW on the location of the preserved occurrences, quality of the preserved habitat, feasibility of protecting and managing the areas in-perpetuity, responsible parties, and other pertinent information. If suitable occurrences of a special-status plant species are not available for preservation, then the project shall be redesigned to remove features that would result in impacts on that species.

10 Alkali Seasonal Wetland Plants

11 Five covered species and three noncovered plants occur in alkali seasonal wetlands in the study area
12 (Tables 12-2, 12-3, summarized in Table 12-1C-63). Alkali seasonal wetland habitat was modeled
13 separately for four covered plant species occurring in seasonal alkali wetlands.

14 The San Joaquin spearscale habitat model approximated the distribution of suitable San Joaquin
15 spearscale habitat in the study area according to the species' preferred habitat types, intersected
16 with soil series and slope position. Historical and current records of San Joaquin spearscale in the
17 study area indicate that its current distribution is limited to alkaline soil areas with shallow basin or
18 swale microtopography along the western border. The vegetation cover of the alkaline soils is
19 typically a combination of alkaline soil-adapted species and annual grasses, including annual
20 ryegrass and Mediterranean barley. Habitat types used for the model included alkali seasonal
21 wetlands, vernal pool complex, and grasslands. Soil series used in the model consisted of either clays
22 or clay loams with alkaline horizons. San Joaquin spearscale typically occurs in swales or in level
23 terrain but occasionally occurs on the lower slopes adjacent to streams or swales or where seeps are
24 present. Because some of the soil series with which San Joaquin spearscale is associated can occur
25 on hillsides, slope was used to limit the extent of the model to the toe of the slope where these soils
26 occur by excluding areas with slope greater than 1%. Land uses that are incompatible with the
27 species' habitat requirements, such as modeled habitat polygons falling on leveled or developed
28 lands, were removed from the model.

29 Modeled habitat for brittlescale was mapped as hydrologic features such as stream corridors and
30 playa pools located on alluvium associated with the Montezuma Block along the western boundary
31 of the study area or on alluvium associated with tertiary formations located along the southwest
32 boundary of the study area. Stream corridors (intermittent and perennial) that intersected these
33 geologic units were selected and truncated at the point at which they encountered the upper
34 elevation of intertidal marsh. The corridors were buffered 50 feet (15.2 meters) on either side of
35 their centerlines to capture the estimated maximum extent of alluvium deposits in proximity to the
36 streams. Mapped habitat that was occupied by urban or intensive agricultural uses was removed
37 from the model.

38 The habitat model for heartscale was based on the species distribution in the study area (Solano and
39 Yolo Counties) and on the soil types and plant communities within which it occurs. Potential habitat
40 was determined by intersecting the GIS coverage for three parameters: 1) Yolo and Solano County
41 boundaries; 2) Solano, Pescadero, and Willows soils; and 3) grassland, alkali seasonal wetland, and
42 vernal pool complex natural communities. The model excluded areas that have been developed or
43 cultivated, i.e., where the topography, soils, and hydrology have been substantially altered.

1 Delta button-celery habitat was modeled as alkali seasonal wetland complex, vernal pool complex,
2 other natural seasonal wetland, and grassland occurring on Brentwood, Grangerville, Marcuse,
3 Solano, and Vernalis soil map units within the San Joaquin Basin (i.e., south of the mainstem San
4 Joaquin River). For this species, land cover north of the Discovery Bay area where intensive
5 agriculture was classified as annual grassland were manually deleted from the area of predicted
6 habitat. Additionally, other areas of potential habitat that have been developed were also manually
7 deleted.

8 Full implementation of Alternative 1C would include the following conservation actions over the
9 term of the BDCP to benefit covered alkali seasonal wetland plants (BDCP Chapter 3, Section 3.3,
10 *Biological Goals and Objectives*).

- 11 • Of the 150 acres of alkali seasonal wetland complex protected under Objective ASWNC1.1, 600
12 acres of vernal pool complex protected under Objective VPNC1.1, and 8,000 acres of grassland
13 natural community protected under Objective GNC1.1, protect 75 acres of suitable brittlescale
14 habitat and 75 acres of suitable heartscale habitat in Conservation Zones 1, 8, or 11 (Objective
15 BRIT/HART/SJSC1.1, associated with CM3).
- 16 • Protect two currently unprotected occurrences of San Joaquin spearscale in Conservation Zones
17 1, 8, or 11 (Objective BRIT/HART/SJSC1.2, associated with CM3).

18 Alternative 1C would have adverse effects on modeled habitat for San Joaquin spearscale,
19 brittlescale, heartscale, and Delta button-celery. It would also have adverse effects on occurrences of
20 heartscale, Heckard's peppergrass, crownscale and recurved larkspur. Table 12-1C-63 summarizes
21 the acreage of modeled alkali seasonal wetland habitat in the study area, the number of occurrences
22 of each special-status alkali seasonal wetland plant in the study area, and potential impacts.

1 **Table 12-1C-63. Summary of Impacts on Seasonal Alkali Wetland Plants under Alternative 1C**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
San Joaquin spearscale	14,933	823	0	0	Habitat loss from construction of water conveyance facilities, construction of Yolo Bypass fisheries enhancements, tidal habitat restoration, and floodplain restoration levee construction
Brittlescale modeled habitat	451	5	0	0	Habitat loss from construction of water conveyance facilities and tidal habitat restoration
Heartscale modeled habitat	6,528	307	0	0	Habitat loss from tidal habitat restoration
Delta button celery modeled habitat	3,361 ^a	130	0	0	Habitat loss from construction of water conveyance facilities
Alkali seasonal wetlands	3,723	94	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration and Yolo Bypass fisheries enhancements
Covered Species					
San Joaquin spearscale	0	0	19	3	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Brittlescale	0	0	8	0	None
Heartscale	0	0	3	1	Population loss from transmission line construction
Delta button celery	0	0	1 ^b	0	None
Heckard's peppergrass	0	0	1 ^c	1	Occurrence affected by tidal habitat restoration
Noncovered Species					
Crownscale	0	0	17	2	Occurrences affected by construction of water conveyance facilities
Palmate-bracted bird's-beak	0	0	1	0	None
Recurved larkspur	0	0	4	1	Occurrence affected by construction of water conveyance facilities

^a A portion of this acreage consists of riparian habitat.

^b A second occurrence in study area is in riparian habitat.

^c Four additional occurrences of Heckard's peppergrass are associated with vernal pools.

2

1 **Impact BIO-170: Effects on Habitat and Populations of Alkali Seasonal Wetland Plants**

2 Modeled habitat for San Joaquin spearscale, Delta button-celery and brittlescale would be adversely
3 affected by construction of the Alternative 1C water conveyance facilities. Two populations of San
4 Joaquin spearscale, one population of crownscale, and one population of recurved larkspur also
5 would be adversely affected by construction of the water conveyance facilities. Modeled habitat for
6 brittlescale and heartscale could be adversely affected by tidal habitat restoration. One occurrence
7 each of heartscale and Heckard's peppergrass could be affected by tidal habitat restoration. No
8 adverse effects on palmate-bracted bird's-beak would be expected.

9 The individual effects of each relevant conservation measure are addressed below. A summary
10 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
11 conservation measure discussions.

- 12 • *CM1 Water Facilities and Operation:* Under Alternative 1C, construction of the canal and
13 associated facilities would permanently remove 144 acres of modeled habitat for San Joaquin
14 spearscale, 130 acres of modeled habitat for Delta button-celery, and 1 acre of modeled habitat
15 for brittlescale. This could be an adverse effect, depending on whether the affected modeled
16 habitat is actually occupied by the species. Modeled habitat is assumed to encompass all
17 potential habitat for a species and may therefore overestimate the area actually occupied. Two
18 occurrences of San Joaquin spearscale, two occurrences of crownscale, and one occurrence of
19 recurved larkspur would be affected near the Clifton Court Forebay by construction of the canal.
20 Delta button-celery is not known to occur in CZ 8; the nearest known occurrence, in CZ 9, would
21 not be affected.

22 Construction of the water conveyance facilities would permanently remove 0.2 acre of habitat
23 occupied by crownscale at the Byron Tract Forebay. Part of the occurrence would be removed,
24 but most of the occurrence would not be directly affected. However, a reduction of the
25 population size, both in area and number of individuals present, would be an adverse impact.

26 Construction of the west transmission line option could affect one occurrence of heartscale
27 along Goose Haven Road.

28 Construction of the water conveyance facilities would not affect Heckard's peppergrass, or
29 palmate-bracted bird's-beak.

- 30 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo Bypass improvements would
31 permanently remove 56 acres of modeled habitat for San Joaquin spearscale. No known
32 occurrences of San Joaquin spearscale would be affected. No modeled habitat and no known
33 occurrences of the seven other alkali seasonal wetland plants are within the hypothetical
34 footprint for construction or operation of the Yolo Bypass fisheries enhancements.
- 35 • *CM3 Natural Communities Protection and Restoration:* The BDCP proposes to benefit alkali
36 seasonal wetland plants by protecting 150 acres of alkali seasonal wetland in Conservation
37 Zones 1, 8, and/or 11. The protected alkali seasonal wetland habitat would be managed and
38 enhanced to sustain populations of native plant species.
- 39 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration is expected to convert
40 alkali seasonal wetlands on the margins of tidal wetlands to freshwater or brackish tidal marsh.
41 Tidal habitat restoration would convert 622 acres of modeled habitat for San Joaquin spearscale
42 to tidal marsh. Tidal habitat restoration would permanently remove 4 acres of modeled habitat
43 for brittlescale in CZ 1 near Lindsey Slough and in CZ 11 near Nurse Slough; however, the BDCP

1 would allow up to 50 acres of modeled habitat to be converted to tidal wetlands. Tidal habitat
 2 restoration would remove 306 acres of modeled habitat for heartscale in CZ 1 in the vicinity of
 3 Jepson Prairie and in CZ 11 adjacent to Suisun Marsh. The extent to which the modeled habitat is
 4 actually occupied by these species is not known; modeled habitat is assumed to encompass all
 5 potential habitat for a species and may therefore overestimate the area actually occupied. Tidal
 6 habitat restoration could adversely affect one occurrence of Heckard's peppergrass at Hass
 7 Slough and one occurrence of San Joaquin spearscale at Main Prairie, both in CZ 1. These
 8 occurrences are based on historic records, and the whether the populations still exist is not
 9 known. In each case, the loss of modeled habitat and occurrences for covered species would be
 10 adverse effects. Delta button celery, crownscale, palmate-bracted bird's-beak, and recurved
 11 larkspur would not be affected by tidal habitat restoration.

- 12 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
 13 would result in the removal of 2 acres of modeled habitat for San Joaquin spearscale. No known
 14 occurrences of San Joaquin spearscale would be affected. No other alkali seasonal wetland
 15 habitat or occurrences of special-status alkali seasonal wetland plants are present within areas
 16 proposed for floodplain restoration. Therefore, floodplain restoration and construction of new
 17 floodplain levees would have no impacts on covered and noncovered alkali seasonal wetland
 18 plants.
- 19 ● *CM6 Channel Margin Enhancement*: No alkali seasonal wetland habitat or occurrences of special-
 20 status alkali seasonal wetland plants are present within areas proposed for channel margin
 21 habitat enhancement. Therefore, channel margin habitat enhancement would have no impacts
 22 on covered and noncovered alkali seasonal wetland plants.
- 23 ● *CM7 Riparian Natural Community Restoration*: No alkali seasonal wetland habitat or occurrences
 24 of special-status alkali seasonal wetland plants are present within areas proposed for riparian
 25 habitat enhancement. Therefore, riparian habitat enhancement would have no impacts on
 26 covered and noncovered alkali seasonal wetland plants.
- 27 ● *CM8 Grassland Natural Community Restoration*: Although the alkali seasonal wetland habitat
 28 includes the grassland matrix within which the wetlands occur, grassland restoration activities
 29 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands
 30 that are not included within alkali seasonal wetland habitat. Therefore, grassland communities
 31 restoration would have no impacts on covered and noncovered alkali seasonal wetland plants.
- 32 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Although some vernal pools
 33 are alkaline, alkali seasonal wetlands in the study area consist of alkali grassland, alkali meadow,
 34 or iodine bush scrub. Therefore, vernal pool restoration would avoid alkali seasonal wetland
 35 habitat and would have no impacts on covered and noncovered alkali seasonal wetland plants.
 36 In addition, the BDCP would compensate for the loss of alkali seasonal wetlands from other
 37 conservation measures by restoring or creating 72 acres of alkali seasonal wetlands in
 38 Conservation Zones 1, 8, or 11 to achieve no net loss of this habitat.
- 39 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
 40 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid alkali
 41 seasonal wetland habitat and would have no impacts on covered and noncovered alkali seasonal
 42 wetland plants.
- 43 ● *Avoidance and Minimization Measures*: Effects on special-status alkali seasonal wetland plants
 44 potentially resulting from implementation of CM1 and CM4 would be avoided or minimized

1 though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*
2 *Monitoring*, *AMM12 Vernal Pool Crustaceans*, *AMM30 Transmission Line Design and Alignment*
3 *Guidelines*, and *AMM37 Recreation*. Under AMM11, surveys for covered plant species would be
4 performed during the planning phase of projects, and any impacts on populations of covered
5 species would be avoided through project design or subsequently minimized through AMM2. In
6 addition, AMM11 prohibits ground disturbance or hydrologic disturbance within 250 feet of
7 existing vernal pools, which would protect those species with modeled habitat that includes
8 vernal pool complex. Occurrences of covered species in vernal pools near tidal wetlands would
9 not be affected by tidal habitat restoration where critical habitat for vernal pool species is
10 present and would be avoided under AMM11. AMM30, which specifies that the alignment of
11 proposed transmission lines will be designed to avoid sensitive terrestrial and aquatic habitats
12 when siting poles and towers, to the maximum extent feasible, would avoid some impacts on
13 San Joaquin spearscale. AMM37 requires that new recreation trails avoid populations of covered
14 alkali seasonal wetland plants. BDCP Appendix 3.C describes the AMMs, which have since been
15 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
16 of the Final EIR/EIS.

17 In summary, two known occurrences of a special-status alkali seasonal wetland species
18 (crownscale) would be affected under Alternative 1C, although one historic occurrence of Heckard's
19 peppergrass and one historic occurrence of San Joaquin spearscale could be affected by tidal
20 restoration activities, if those occurrences still exist. AMM11 would be implemented to avoid an
21 adverse effect on the Heckard's peppergrass and San Joaquin spearscale occurrences.

22 The primary effect of Alternative 1C on special-status alkali seasonal wetland plants would be the
23 loss of potential (i.e., modeled) habitat for San Joaquin spearscale, brittlescale, heartscale, and Delta
24 button-celery. Approximately 72 acres of this habitat loss would be alkali seasonal wetlands. The
25 actual effect on modeled habitat for alkali seasonal wetland plants is expected to be somewhat less
26 than the estimated impact because some of this habitat is composed of vernal pool complex, and the
27 BDCP limits the total loss of wetted vernal pool habitat to 10 acres (approximately 67 acres of vernal
28 pool complex) over the permit term (AMM12). Loss of modeled habitat would be compensated for
29 by restoring or creating vernal pool complex, alkali seasonal wetlands, and grasslands, in proportion
30 to the amount of each habitat removed. At the proposed restoration ratios of 1:1 (prior to impact)
31 and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal pool complex restoration
32 would be required to compensate for the loss of modeled habitat composed of vernal pool complex
33 (Objective VPNC1.2, associated with CM9). Approximately 72 acres of alkali seasonal wetlands
34 would be restored (Objective ASWC1.2, associated with CM9). Loss of modeled habitat composed of
35 grasslands would be compensated for by restoring grassland habitat on a 1:1 basis (Objective
36 GNC1.1, associated with CM8). These compensation levels would be consistent with typical NEPA
37 and CEQA project-level mitigation ratios for impacts on vernal pools, alkali seasonal wetlands, and
38 grasslands.

39 The BDCP would have a small beneficial effect on special-status alkali seasonal wetland plants by
40 protecting 150 acres of alkali seasonal wetland habitat. The BDCP also includes the species-specific
41 goal that 75 acres would be modeled habitat for brittlescale and heartscale (Objective
42 BRIT/HART/SJSC1.1) and another goal that would protect 2 occurrences of San Joaquin spearscale
43 (Objective BRIT/HART/SJSC1.2). The benefits of habitat protection and management also would
44 accrue to any noncovered alkali seasonal wetland plants occurring in the protected habitat. Because
45 conservation measures that protect covered species do not apply to noncovered species, the loss of

1 portions of the crownscale and recurved larkspur populations at Byron Tract Forebay would be an
2 adverse effect.

3 **NEPA Effects:** Under Alternative 1C, loss of modeled habitat for alkali seasonal wetland plant species
4 would be offset through restoration of grassland, vernal pool, and alkali seasonal wetland habitat
5 (CM8, CM9). Impacts on one occurrence of San Joaquin spearscale and one occurrence of Heckard's
6 peppergrass would be avoided through AMM11, and one occurrence of heartscale would be avoided
7 through AMM30. Impacts on two occurrences of San Joaquin spearscale could be avoided by project
8 design. With avoidance and habitat restoration, these effects would not be adverse. The loss of two
9 occurrences of crownscale and one occurrence of recurved larkspur, both noncovered species,
10 would result in a reduction in the range and numbers of these species and would be an adverse
11 effect. Adverse effects on crownscale and recurved larkspur could be avoided or offset through
12 implementation of Mitigation Measure BIO-170. Because avoidance of these occurrences would
13 require redesign of the main conveyance canal, project design changes to avoid this impact may be
14 infeasible. Under those circumstances, the impacts would be adverse.

15 **CEQA Conclusion:** Because loss of modeled habitat for alkali seasonal wetland plant species would
16 be offset through restoration, and because impacts on occurrences of covered alkali seasonal
17 wetland plants would be avoided, impacts on covered and one noncovered alkali seasonal wetland
18 plants as a result of implementing Alternative 1C would be less than significant. However, the loss of
19 all or portions of two crownscale populations and a recurved larkspur population at Byron Tract
20 Forebay would be a significant impact. Mitigation Measure BIO-170 would reduce this impact to a
21 less-than-significant level. Because avoidance of these occurrences would require redesign of the
22 main conveyance canal, project design changes to avoid this impact may be infeasible. Under those
23 circumstances, the impacts would be significant and unavoidable.

24 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**
25 **Special-Status Plant Species.**

26 See discussion of Mitigation Measure BIO-170 under Impact BIO-169.

27 **Grassland Plants**

28 One covered plant and 11 noncovered special-status plants occur in grasslands in the study area
29 (Tables 12-2, 12-3, summarized in Table 12-1C-64). The only covered plant species occurring in
30 grassland is Carquinez goldenbush. Carquinez goldenbush modeled habitat included hydrological
31 features such as stream corridors on alluvium derived from the Montezuma Formation. Stream
32 corridors (intermittent and perennial) that intersected these geologic units were selected and
33 truncated at the point at which they encountered the upper elevation of intertidal marsh. The
34 corridors were buffered 50 feet (15 meters) on either side in an effort to capture the estimated
35 maximum extent of alluvium deposits in close proximity to the actual rivers/streams.

36 Full implementation of Alternative 1C would include the following conservation actions over the
37 term of the BDCP to benefit covered grassland plants (BDCP Chapter 3, Section 3.3, *Biological Goals*
38 *and Objectives*).

- 39 ● Protect three unprotected occurrences of the Carquinez goldenbush in Conservation Zones 1
40 and/or 11 (Objective CGB1.1, associated with CM3).
- 41 ● Maintain and enhance occupied Carquinez goldenbush habitat to slow erosion and reverse
42 degradation from livestock grazing (Objective CGB1.2, associated with CM11).

1 Of 78,047 acres of grasslands in the study area, Alternative 1C would adversely affect 2,957 acres
 2 under Alternative 1C, including 4 acres that are modeled habitat for Carquinez goldenbush. For 10 of
 3 the plants, no known occurrences would be affected. One of eight Carquinez goldenbush occurrences
 4 and one of five Parry's rough tarplant occurrences in the study area could be adversely affected by
 5 Alternative 1C. Table 12-1C-64 summarizes the acreage of grassland habitat in the study area, the
 6 number of occurrences of each special-status grassland plant in the study area, and potential effects.

7 **Table 12-1C-64. Summary of Impacts on Grassland Plants under Alternative 1C**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Carquinez goldenbush modeled habitat	1,346	4	0	0	Habitat loss from tidal habitat restoration
Grassland	78,047	2,957	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, floodplain restoration, and construction of conservation hatcheries
Covered Species					
Carquinez goldenbush	0	0	10	1	Occurrence affected by tidal restoration
Noncovered Species					
Big tarplant	0	0	5	0	None
Round-leaved filaree	0	0	2	0	None
Pappose tarplant	0	0	7	0	None
Parry's rough tarplant	0	0	5	1	Periodic inundation of one occurrence as a result of Yolo Bypass operations
Small-flowered morning-glory	0	0	0	0	None
Diamond-petaled poppy	0	0	1	0	None
Stinkbells	0	0	1	0	None
Fragrant fritillary	0	0	4	0	None
Keck's checkerbloom	0	0	2	1	Population loss from transmission line construction
Gairdner's yampah	0	0	0	0	None
Streamside daisy ^a	0	0	1	0	None
Caper-fruited tropidocarpum	0	0	8	0	None

^a This species actually occurs in upland woodland, a habitat that has not been mapped or quantified in the BDCP.

8

1 **Impact BIO-171: Effects on Habitat and Populations of Grassland Plant Species**

2 Alternative 1C could have adverse effects on modeled habitat for Carquinez goldenbush. It could
3 also affect one occurrence of Carquinez goldenbush, one occurrence of Parry's rough tarplant, and
4 one occurrence of Keck's checkerbloom. Although Alternative 1C would have no expected effects on
5 known occurrences of the other special-status plant species that occur in grasslands, the loss of
6 2,957 acres of grassland would have the potential to adversely affected undocumented populations
7 of special-status grassland species.

8 The individual effects of each relevant conservation measure are addressed below. A summary
9 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
10 conservation measure discussions.

- 11 • *CM1 Water Facilities and Operation:* No modeled habitat for Carquinez goldenbush and no
12 known occurrences of 12 of the 13 special-status grassland plants are within the proposed
13 footprint for the Alternative 1C water conveyance facilities. The west transmission line
14 alternative would cross one historic occurrence of Keck's checkerbloom, which could have an
15 adverse effect on the population, if it is still present. About 664 acres of grassland habitat would
16 be affected by construction of the water conveyance facilities. However, this grassland habitat
17 primarily consists of small patches of herbaceous ruderal vegetation along levees that do not
18 provide habitat for special-status grassland species.
- 19 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo Bypass fisheries
20 enhancements would remove 627 acres of grassland habitat. Yolo Bypass operations would
21 result in more frequent and longer inundation of 1,597 acres of grasslands in the Yolo Causeway
22 (CZ 2) that include habitat for one occurrence of Parry's rough tarplant. Parry's rough tarplant is
23 a summer-blooming plant that occurs in areas subject to occasional inundation during the wet
24 season, such as swales and seasonal wetlands. Increasing the frequency or duration of
25 inundation may decrease the distribution in some areas by making some conditions too wet but
26 would also expand the distribution into areas that may currently be too dry. Overall, changing
27 the frequency and duration of inundation in the area of this occurrence should not result in a
28 substantial change in the range of numbers of Parry's rough tarplant. Construction and
29 operation of the Yolo Bypass fisheries enhancements would not affect modeled habitat for
30 Carquinez goldenbush or known occurrences of other special-status grassland plants.
- 31 • *CM3 Natural Communities Protection and Restoration:* Alternative 1C would preserve 8,000 acres
32 of grassland habitat, some of which may contain modeled habitat for Carquinez goldenbush.
33 Protection of grassland habitat may also protect undiscovered occurrences of special-status
34 plant species.
- 35 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration would permanently
36 remove 1,122 acres of grassland habitat, including 4 acres of modeled habitat for Carquinez
37 goldenbush along the eastern side of Suisun Marsh. Part of one Carquinez goldenbush
38 occurrence within the hypothetical footprint of tidal restoration could be affected. Tidal
39 restoration would have no impacts on other known occurrences of special-status grassland
40 plants.
- 41 • *CM5 Seasonally Inundated Floodplain Restoration:* Construction of new floodplain levees would
42 result in the loss of 85 acres of grassland habitat, periodic inundation of the floodplain would
43 affect 513 acres of grassland habitat, and another 399 acres of grassland habitat would be
44 converted to riparian habitat. However, no modeled habitat for Carquinez goldenbush or known

1 occurrences of special-status grassland plants are present within areas proposed for floodplain
2 restoration, and the affected grassland habitat consists of herbaceous ruderal vegetation that
3 does not support special-status grassland plants. Therefore, floodplain restoration and
4 construction of new floodplain levees would have no impacts on covered and noncovered
5 grassland plants.

- 6 • *CM6 Channel Margin Enhancement*: No known occurrences of special-status grassland plants are
7 present within areas proposed for channel margin habitat enhancement. Areas mapped as
8 grassland along levees that would be affected by channel margin habitat enhancement are small
9 patches of ruderal vegetation along levees that do not provide habitat for special-status
10 grassland species and are not modeled habitat for Carquinez goldenbush. Therefore, channel
11 margin habitat enhancement would have no impacts on covered and noncovered grassland
12 plants.
- 13 • *CM7 Riparian Natural Community Restoration*: No modeled habitat for Carquinez goldenbush or
14 known occurrences of special-status grassland plants are present within areas proposed for
15 riparian habitat enhancement. Therefore, riparian habitat enhancement would have no impacts
16 on covered and noncovered grassland plants.
- 17 • *CM8 Grassland Natural Community Restoration*: Grassland restoration would restore 2,000 acres
18 of grassland habitat. Restoration activities would take place in non-grasslands (ruderal habitat,
19 cultivated land) or degraded grasslands. These areas do not currently provide habitat for
20 special-status grassland plants. Therefore, grassland communities restoration would have no
21 impacts on covered and noncovered grassland plants.
- 22 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Vernal pool complex includes
23 vernal pools as well as the surrounding grassland matrix. Because the habitat to be restored
24 would consist of areas of former vernal pool complex that have been leveled for cultivation,
25 special-status grassland plants would not be present. Therefore, vernal pool complex
26 restoration would not affect special-status grassland plants.
- 27 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
28 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid grassland
29 habitat and would have no impacts on covered and noncovered grassland plants.
- 30 • *CM18 Conservation Hatcheries*: Construction of the conservation hatcheries would remove 35
31 acres of grassland habitat. The removed habitat would consist of ruderal herbaceous vegetation
32 that would not be likely to provide habitat for special-status grassland plants. Therefore,
33 construction of the conservation hatcheries would not be expected to affect special-status
34 grassland plants.
- 35 • *Avoidance and Minimization Measures*: Effects on Carquinez goldenbush potentially resulting
36 from implementation of CM4 and potential effects on undiscovered populations of special-status
37 grassland plants would be avoided or minimized through *AMM11 Covered Plant Species*, *AMM2*
38 *Construction Best Management Practices and Monitoring*, and *AMM37 Recreation*. Under AMM11,
39 surveys for covered plant species would be performed during the planning phase of projects,
40 and any impacts on populations of covered species would be avoided through project design or
41 subsequently minimized through AMM2. AMM37 requires that new recreation trails would avoid
42 populations of Carquinez goldenbush. BDCP Appendix 3.C describes the AMMs, which have since
43 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and*
44 *CMs*, of the Final EIR/EIS.

1 The primary effect of Alternative 1C on special-status grassland plants is the loss of potential (i.e.,
2 modeled) habitat for Carquinez goldenbush, including part of one known occurrence. Adverse
3 effects on Carquinez goldenbush would be avoided through implementation of AMMs, which include
4 surveys to establish the population limits and redesigning the project to avoid affecting the
5 population, to the extent feasible. Protecting three unprotected occurrences of Carquinez
6 goldenbush (Objective CGB1.1, associated with CM3) and maintaining and enhancing occupied
7 Carquinez goldenbush (Objective CGB1.2, associated with CM11) would compensate for any residual
8 effects. One occurrence of Parry's rough tarplant would be affected by CM2, but the effect is not
9 expected to be adverse. One occurrence of Keck's checkerbloom could be adversely affected, but no
10 other special-status grassland plants would be affected.

11 The BDCP would have a potential beneficial effect on special-status grassland plants by protecting
12 8,000 acres of grassland habitat. To ensure that this habitat preservation would specifically benefit
13 Carquinez goldenbush, the plan proposes to protect at least three Carquinez goldenbush
14 occurrences in CZs 1 and 11 that are currently not protected and to maintain and enhance occupied
15 Carquinez goldenbush habitat. The preservation of modeled or potential habitat, together with
16 avoidance and minimization of impacts on species occurrences, would reduce any effects of
17 Alternative 1C implementation on covered grassland plants to a level that is no longer adverse.

18 **NEPA Effects:** The loss of modeled and occupied habitat for Carquinez goldenbush would be offset
19 through CM3, CM8, and CM11. Adverse effects on Keck's checkerbloom could be avoided or offset
20 through implementation of Mitigation Measure BIO-170. With avoidance and habitat enhancement,
21 these effects would not be adverse.

22 **CEQA Conclusion:** Because adverse effects on special-status grassland plant species would be
23 avoided or compensated for, Alternative 1C would not result in substantially reducing the numbers
24 or restricting the range of one covered or 11 noncovered special-status grassland plants. However,
25 conservation measures that benefit or protect covered species do not apply to noncovered species,
26 and portions of one Keck's checkerbloom population could be adversely affected, which would be a
27 significant impact. Implementation of Mitigation Measure BIO-170 would reduce this impact to a
28 less-than-significant level.

29 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**
30 **Special-Status Plant Species**

31 See discussion of Mitigation Measure BIO-170 under Impact BIO-169.

32 **Valley/Foothill Riparian Plants**

33 Two covered plants and two noncovered special-status plants occur in valley/foothill riparian
34 habitat in the study area (Tables 12-2, 12-3, summarized in Table 12-1C-65). The valley/foothill
35 riparian habitat model for Delta button-celery and slough thistle was mapped as all of the study area
36 along the flood plain of the San Joaquin River between the levees from the Mossdale Bridge to
37 Vernalis. Whether or not this modeled habitat is actually occupied by Delta button-celery and slough
38 thistle is unknown; all known occurrences of these species within the area of modeled habitat are
39 believed to be extirpated.

40 Full implementation of Alternative 1C would include the following conservation actions over the
41 term of the BDCP to benefit covered valley/foothill riparian plants (BDCP Chapter 3, Section 3.3,
42 *Biological Goals and Objectives*).

- 1 • Protect and enhance two occurrences of delta button celery. If occurrences are not found in the
2 Plan Area, establish self-sustaining occurrences of delta button celery for a total of two
3 occurrences within the restored floodplain habitat on the mainstem of the San Joaquin River in
4 Conservation Zone 7 between Mossdale and Vernalis. (Objective DBC1.1, associated with CM3
5 and CM11).
- 6 • Protect and enhance two occurrences of slough thistle. If occurrences are not found in the Plan
7 Area, establish self-sustaining occurrences of slough thistle for a total of two occurrences within
8 the 10,000 acres of restored floodplain on the mainstem of the San Joaquin River in
9 Conservation Zone 7 between Mossdale and Vernalis (Objective ST1.1: associated with CM3 and
10 CM11).

11 Of 17,966 acres of valley/foothill riparian habitat in the study area, Alternative 1C would adversely
12 affect 932 acres, including 15 acres that are modeled habitat for Delta button-celery and 11 acres
13 that are modeled habitat for slough thistle. Table 12-1C-65 summarizes the acreage of modeled
14 habitat for Delta button-celery and slough thistle and the number of occurrences of each special-
15 status grassland plant in the study area.

16 **Table 12-1C-65. Summary of Impacts on Valley/Foothill Riparian Plants under Alternative 1C**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Delta button celery modeled habitat	3,361 ^a	15	0	0	Habitat loss from floodplain restoration
Slough thistle modeled habitat	1,834	11	0	0	Habitat loss from floodplain restoration
Valley/foothill riparian habitat	17,966	932	0	0	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Covered Species					
Delta button celery	0	0	1 ^b	1	Occurrence potentially affected by floodplain restoration
Slough thistle	0	0	2	2	Occurrences potentially affected by floodplain restoration
Noncovered Species					
Northern California black walnut	0	0	1	0	None
Wright's trichocoronis	0	0	1	0	None

^a A portion of this acreage consists of alkali seasonal wetland
^b A second occurrence is in alkali seasonal wetland

17

1 **Impact BIO-172: Effects on Habitat and Populations of Valley/Foothill Riparian Plants**

2 No extant occurrences of Delta button-celery, slough thistle, Northern California black walnut, or
3 Wright's trichocoronis are present in the study area. Therefore, no impacts on special-status
4 valley/foothill riparian plants are expected. Modeled habitat for Delta button-celery and slough
5 thistle, which may support undocumented occurrences of these species, would be affected by
6 restoration of seasonally inundated floodplain.

7 The individual effects of each relevant conservation measure are addressed below. A summary
8 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
9 conservation measure discussions.

- 10 • *CM1 Water Facilities and Operation*: Construction of the water conveyance facilities would
11 remove 126 acres of valley-foothill riparian habitat under Alternative 1C. However, no modeled
12 habitat and no known occurrences of the four special-status valley/foothill riparian plants are
13 within the proposed footprint for the Alternative 1C water conveyance facilities. Therefore,
14 under Alternative 1C, construction and operation of the water conveyance facilities would not
15 affect covered or noncovered special-status valley/foothill riparian plants.
- 16 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction and operation of the Yolo Bypass fisheries
17 enhancements would adversely affect 378 acres of valley/foothill riparian habitat. However, no
18 modeled habitat and no known occurrences of the four special-status valley/foothill riparian
19 plants are within the hypothetical footprint for construction or operation of the Yolo Bypass
20 fisheries enhancements. Therefore, construction and operation of the Yolo Bypass Fisheries
21 enhancements would not affect the covered or noncovered valley/foothill riparian plants.
- 22 • *CM3 Natural Communities Protection*: Alternative 1C would protect 552 acres of existing
23 valley/foothill riparian forest in CZ 7. This action would have no substantial effects on special-
24 status valley/foothill plants because no extant occurrences of special-status valley/foothill
25 plants are present in the study area.
- 26 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would inundate 552 acres
27 of valley/foothill riparian habitat. However, no modeled habitat and no known occurrences of
28 the four special-status valley/foothill riparian plants are within the hypothetical footprint for
29 tidal restoration. Therefore, tidal restoration would not affect the covered or noncovered
30 valley/foothill riparian plants.
- 31 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
32 would remove 15 acres of modeled habitat for Delta button-celery along the San Joaquin River
33 in CZ 7. In addition, floodplain restoration would result in more frequent and longer inundation
34 of 18 acres of modeled habitat for Delta button-celery in this area. The area affected contains
35 one historic occurrence of Delta button celery. This occurrence is considered to be extirpated,
36 because all habitat for Delta button-celery at his location has been converted to agriculture
37 (California Department of Fish and Wildlife 2013). Therefore, Alternative 1C would not have an
38 adverse effect on Delta button celery in CZ 7.

39 The BDCP proposes to benefit Delta button-celery at this location by restoring 5,000 acres of
40 valley/foothill riparian habitat and re-introducing two occurrences of Delta button-celery.
41 Although Delta button celery occurs in riparian habitat, it is not associated with woodland or
42 scrub habitats; rather, it occurs in alkali seasonal wetlands in floodplains, which may or may not
43 also contain adjacent woody riparian habitat. Restoring habitat for Delta button-celery may not
44 be compatible with restoring woody riparian habitat. In addition, establishing new populations

1 of Delta button-celery is an untried, unproven procedure and may not be feasible. Therefore, any
2 beneficial effects on Delta button-celery would be speculative.

3 Floodplain restoration levee construction would remove 11 acres of modeled habitat for slough
4 thistle and would result in more frequent and longer inundation of 6 acres of modeled habitat
5 for slough thistle along the San Joaquin River in CZ 7. However, the BDCP would allow up to 50
6 acres of modeled habitat to be converted to riparian habitat. Whether the affected modeled
7 habitat is actually occupied by slough thistle is not known; however, of two historic occurrences
8 of slough thistle present in the study area, only one is considered to be extirpated (California
9 Department of Fish and Wildlife 2013). The BDCP would protect and enhance two occurrences
10 of slough thistle. If occurrences are not found in the study area, then two self-sustaining
11 occurrences of slough thistle would be established using locally-sourced genetic material for a
12 total of two occurrences within the restored floodplain habitat on the main stem of the San
13 Joaquin River in Conservation Zone 7 between Mossdale and Vernalis. Establishing new
14 populations of slough thistle is an untried, unproven procedure and may not be feasible.
15 Therefore, any beneficial effects on slough thistle would be speculative.

16 One historic occurrence of Wright's trichocoronis in the study area near Lathrop (CZ 7) could
17 also be affected by floodplain restoration. The occurrence is presumed to be extant because the
18 presence or absence of suitable habitat has not been verified by field surveys (California
19 Department of Fish and Wildlife 2013). However, the species has not been observed at this
20 location for nearly a century, and habitat for Wright's trichocoronis, which would have been
21 similar to that for Delta button celery and slough thistle, no longer appears to be present in
22 aerial photographs of the area. Therefore, Alternative 1C would not be expected to have an
23 adverse effect on Wright's trichocoronis.

- 24 ● *CM6 Channel Margin Enhancement*: No modeled habitat or occurrences of special-status
25 valley/foothill riparian plants are present within areas proposed for channel margin habitat
26 enhancement. Therefore, channel margin habitat enhancement would have no impacts on
27 covered and noncovered valley/foothill riparian plants.
- 28 ● *CM7 Riparian Natural Community Restoration*: No extant occurrences of special-status
29 valley/foothill riparian plants are present within areas proposed for riparian habitat
30 restoration. Therefore, riparian habitat restoration would have no impacts on covered and
31 noncovered valley/foothill riparian plants.
- 32 ● *CM8 Grassland Natural Community Restoration*: No occurrences of special-status valley/foothill
33 riparian plants are present within areas proposed for grassland communities restoration.
34 Therefore, grassland communities restoration would have no impacts on covered and
35 noncovered valley/foothill riparian plants.
- 36 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No occurrences of special-
37 status valley/foothill riparian plants are present within areas proposed for vernal pool and
38 alkali seasonal wetland complex restoration. Therefore, vernal pool and alkali seasonal wetland
39 complex restoration would have no impacts on covered and noncovered valley/foothill riparian
40 plants.
- 41 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
42 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid
43 valley/foothill riparian habitat and would have no impacts on covered and noncovered
44 valley/foothill riparian plants.

- *Avoidance and Minimization Measures:* Effects on Delta button-celery and slough thistle potentially resulting from implementation of CM5 would be avoided or minimized through *AMM11 Covered Plant Species* and *AMM2 Construction Best Management Practices and Monitoring*. Under AMM11, surveys for covered plant species would be performed during the planning phase of projects, and any impacts on populations of covered species would be avoided through project design or subsequently minimized through AMM2. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

Because no extant occurrences of special-status valley/foothill riparian plants are known to occur in the study area, Alternative 1C is not expected to adversely affect any special-status valley/foothill riparian plants. Modeled habitat for both Delta button-celery and slough thistle would be affected. Under AMM11, surveys for covered plants would be performed during the planning phase for floodplain restoration. If Delta button-celery or slough thistle were found to be present in the floodplain restoration area, then the project would be designed to avoid impacts on the populations. Therefore, Alternative 1C would not have an adverse effect on these species.

The BDCP proposes to benefit Delta button-celery and slough thistle by restoring 5,000 acres of valley/foothill riparian habitat and re-introducing two occurrences of both species. Establishing new populations of Delta-button-celery or slough thistle would be a beneficial effect. However, establishing new populations is an untried, unproven procedure and may not be feasible.

NEPA Effects: Implementing the BDCP under Alternative 1C would not have an adverse effect on special-status valley/foothill riparian plant species.

CEQA Conclusion: Because Alternative 1C would not result in a reduction in the range and numbers of covered and noncovered valley/foothill riparian plants, this impact would be less than significant. No mitigation is required.

Tidal Wetland Plants

Seven covered plants and one noncovered special-status plant occur in tidal wetlands in the study area (Tables 12-2, 12-3, summarized in Table 12-1C-66). Five tidal wetland habitat models were developed for the seven covered plant species occurring in tidal wetland habitat.

Modeled habitat for Mason's lilaepsis and Delta mudwort was mapped as areas within 10 feet (3 meters) on either side of the landward boundary of tidal perennial aquatic land cover type, which was obtained from the BDCP GIS vegetation data layer.

The side-flowering skullcap model mapped the distribution of suitable habitat in the study area according to the species' habitat association with woody riparian habitat. The model selected Delta riparian vegetation types providing the habitat characteristics that side-flowering skullcap seems to require, namely, woody substrate in freshwater tidal areas. The model included vegetation subunits of the BDCP Valley Riparian natural community characterized by California dogwood, white alder, and arroyo willow.

The modeled habitat for soft bird's-beak consisted of pickleweed- and saltgrass-dominated vegetation units located west of the Antioch Bridge. Modeled habitat for these two plant species was mapped as areas within 10 feet (3 meters) on either side of the landward boundary of tidal perennial aquatic land cover types. The model used all Tidal Brackish Emergent Wetland polygons

1 that were limited by specific vegetation units that are known to be closely associated with soft
2 bird's-beak habitat.

3 Habitat for Delta tule pea and Suisun Marsh aster was modeled separately based on the salinity of
4 the water. For the tidal freshwater emergent wetland BDCP land cover type, modeled habitat was
5 mapped as the area within 10 feet (3 meters) of the landward side of the landward boundary,
6 exclusively where this land cover type is adjacent to grassland, vernal pool complex, valley/foothill
7 riparian, or cultivated land habitat cover types. For brackish water areas in and near Suisun Marsh,
8 the model used all tidal brackish emergent wetland polygons within an elevation range of 7 to 10
9 feet (2 to 3 meters) to capture elevations 1 foot (30 centimeters) below intertidal to 2 feet (60
10 centimeters) above intertidal.

11 The modeled habitat for Suisun thistle in and near Suisun Marsh consists of all tidal brackish
12 emergent wetland polygons with the appropriate vegetation. This included vegetation units
13 dominated by saltscare, saltgrass, pickleweed, and broad-leaved peppergrass.

14 Full implementation of Alternative 1C would include the following conservation actions over the
15 term of the BDCP to benefit covered tidal wetland plants (BDCP Chapter 3, Section 3.3, *Biological*
16 *Goals and Objectives*).

- 17 ● No net loss of Mason's lilaepsis and delta mudwort occurrences within restoration sites, or
18 within the area of affected tidal range of restoration projects (Objective DMW/ML1.1, associated
19 with CM4 and CM11).
- 20 ● No net loss of Delta tule pea and Suisun Marsh aster occurrences within restoration sites
21 (Objective DTP/SMA1.1, associated with CM4 and CM11).
- 22 ● Restore tidal inundation to wetlands in the Hill Slough Ecological Reserve and to the ponded
23 area at Rush Ranch (Objective SBB/SuT1.1, associated with CM4).
- 24 ● Complete seed banking of all existing Suisun Marsh populations and the representative genetic
25 diversity using accepted seed banking protocols (Objective SBB/SuT1.2, associated with CM11).
- 26 ● Establish a cultivated population of Suisun thistle from wild seed using accepted seed collection
27 protocols (Objective SBB/SuT1.3, associated with CM11).
- 28 ● Establish two occurrences of Suisun thistle in Conservation Zone 11 (Objective SBB/SuT1.4,
29 associated with CM11).

30 Of 17,357 acres of tidal wetlands in the study area, Alternative 1C would affect 10 acres, including
31 areas that are modeled habitat for Mason's lilaepsis, Delta mudwort, side-flowering skullcap, Delta
32 tule pea, Suisun Marsh aster, soft bird's-beak, and Suisun thistle. Known occurrences of these
33 species would be affected. In addition, three occurrences of Bolander's water-hemlock, a noncovered
34 special-status plant, could be affected by tidal habitat restoration. Table 12-1C-66 summarizes the
35 acreage of modeled habitat for covered tidal wetland species and the number of occurrences of each
36 special-status tidal wetland plants in the study area.

1 **Table 12-1C-66. Summary of Impacts on Tidal Wetland Plants under Alternative 1C**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Delta mudwort/Mason's lilaepsis modeled habitat	6,081	41	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Side-flowering skullcap modeled habitat	2,497	22	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Soft bird's-beak modeled habitat	1,228	73	0	0	Habitat loss from tidal habitat restoration
Delta tule pea/Suisun Marsh aster modeled habitat	5,853	1	0	0	Habitat loss from tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Suisun thistle modeled habitat	1,281	73	0	0	Habitat loss from tidal habitat restoration
Tidal brackish emergent wetland	8,501	0	0	0	Habitat loss from tidal habitat restoration
Tidal freshwater emergent wetland	8,856	10	0	0	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Covered Species					
Delta mudwort	0	0	58	3	Occurrences affected by tidal habitat restoration
Delta tule pea	0	0	106	26	Occurrences affected by tidal habitat restoration
Mason's lilaepsis	0	0	181	17	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Side-flowering skullcap	0	0	12	0	None
Soft bird's-beak	0	0	13	7	Occurrences affected by tidal habitat restoration
Suisun Marsh aster	0	0	164	27	Occurrences affected by construction of water conveyance facilities, Yolo Bypass fisheries enhancements, and tidal habitat restoration
Suisun thistle	0	0	4	0	Occurrences affected by tidal habitat restoration
Noncovered Species					
Bolander's water hemlock	0	0	8	3	Occurrences affected by tidal habitat restoration

1 **Impact BIO-173: Effects on Habitat and Populations of Tidal Wetland Plants**

2 Alternative 1C would have adverse effects on tidal marsh special-status plants through
3 implementation of CM1, CM2, CM4, and CM5. No adverse effects are expected from implementation
4 of CM3, CM6, CM7, CM8, and CM9.

5 The individual effects of each relevant conservation measure are addressed below. A summary
6 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
7 conservation measure discussions.

- 8 • *CM1 Water Facilities and Operation:* Construction of the Alternative 1C water conveyance
9 facilities would remove 27 acres of modeled habitat for delta mudwort and Mason's lilaepsis
10 and 17 acres of modeled habitat for side-flowering skullcap. The extent to which modeled
11 habitat is actually occupied by these species is not known; however, 2 occurrences of Mason's
12 lilaepsis and one occurrence of Suisun Marsh aster in the study area could be affected by
13 construction impacts. No known occurrences of the other covered and noncovered tidal wetland
14 species would be affected by construction of the water conveyance facilities.
- 15 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo Bypass fisheries
16 enhancements would remove 5 acres of modeled habitat for Mason's lilaepsis and delta
17 mudwort. The extent to which modeled habitat is actually occupied by these species is not
18 known; however, no known occurrences in the study area would be affected. Yolo Bypass
19 operations would result in more frequent and longer inundation of 8 acres of modeled habitat
20 Delta tule peas and Suisun Marsh aster. Two occurrences of Suisun Marsh aster would be
21 affected by Yolo Bypass operations. Habitat for these species is normally periodically inundated
22 or saturated; therefore, a small increase in the frequency and duration of periodic inundation of
23 the habitat would not be expected to have a substantial effect.
- 24 • *CM3 Natural Communities Protection and Restoration:* The BDCP proposes restoring or creating
25 20 linear miles of transitional tidal areas within other natural communities that would be
26 created or restored, including 6,000 acres of tidal brackish emergent wetland and 24,000 acres
27 of tidal freshwater emergent wetland. In addition, the habitat and ecosystem functions of these
28 areas would be maintained and enhanced. The BDCP does not specifically propose to protect
29 any occurrences of tidal wetland plants nor does it propose active restoration of affected habitat
30 or occurrences. Instead, the BDCP assumes that the 20 linear miles of restored transitional tidal
31 areas would be passively colonized by the covered tidal wetland plants.
- 32 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration would permanently
33 remove 6 acres of modeled habitat for Mason's lilaepsis and Delta mudwort. Habitat loss would
34 occur through conversion of the species habitat (at and immediately above the tidal zone in
35 marshes and along rivers and streams) to inundated tidal habitat. The extent to which modeled
36 habitat is actually occupied by the species is not known; however, 14 of 181 known occurrences
37 of Mason's lilaepsis and 3 of 58 known occurrences of delta mudwort in the study area could be
38 affected by tidal habitat restoration.

39 Tidal habitat restoration would remove 4 acres of modeled habitat for side-flowering skullcap.
40 Whether the affected modeled habitat is actually occupied by side-flowering skullcap is not
41 known; however, none of the 12 known occurrences in the study area would be affected.

42 Tidal habitat restoration would remove 2 acres of modeled habitat for Delta tule pea and Suisun
43 Marsh aster. However, the BDCP would allow up to 50 acres of modeled habitat to be removed.
44 Habitat loss would result from conversion of the species habitat (at and immediately above the

1 tidal zone in marshes and along rivers and streams) to inundated tidal habitat. The extent to
2 which modeled habitat is actually occupied by the species is not known; however, 26 of 106
3 known occurrences of Delta tule pea and 24 of 164 occurrences of Suisun Marsh aster in the
4 study area would be affected.

5 Tidal habitat restoration could affect 73 acres of modeled habitat for soft bird's-beak and Suisun
6 thistle, including 1.3 acres of critical habitat. The extent to which modeled habitat is actually
7 occupied by the species is not known; however, seven of 13 known occurrences of soft bird's-
8 beak in the study area could be affected. None of the four known occurrences of Suisun thistle in
9 the study area would be affected.

10 Tidal habitat restoration could affect three of eight known occurrences of Bolander's water-
11 hemlock, a noncovered special-status species in the study area. Because Bolander's water-
12 hemlock occurs in tidal marsh, it may benefit from tidal marsh restoration. However, site
13 preparation, earthwork, and other site activities could adversely affect Bolander's water-
14 hemlock through direct habitat removal.

- 15 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
16 would remove 3 acres of modeled habitat for Mason's lilaepsis and delta mudwort and 2 acres
17 of modeled habitat for side-flowering skullcap. No known occurrences of these species in the
18 study area would be affected by floodplain restoration.

19 Floodplain restoration would result in more frequent and longer inundation of 2 acres of
20 modeled habitat for Mason's lilaepsis and delta mudwort, 18 acres of modeled habitat for side-
21 flowering skullcap, and 1 acre of modeled habitat for Delta tule peas and Suisun Marsh aster. No
22 known occurrences of these species in the study area would be affected by periodic inundation
23 of restored floodplain habitat. Habitat for these species is normally periodically inundated or
24 saturated; therefore, a small increase in the frequency and duration of periodic inundation of the
25 habitat would not be expected to have a substantial effect.

- 26 • *CM6 Channel Margin Enhancement*: Effects of channel margin enhancement were not analyzed
27 separately from the effects of tidal habitat restoration. Channel margin enhancement would
28 have adverse effects on tidal wetland plants through direct removal and habitat modification.
29 However, it would have beneficial effects on these species by improving the habitat functions for
30 these species as a result of riprap removal and creation of floodplain benches. Side-flowering
31 skullcap would benefit from installation of large woody material, which it appears to colonize.
- 32 • *CM7 Riparian Natural Community Restoration*: Riparian habitat restoration is not expected to
33 adversely affect special-status tidal wetland plants. Preparatory work that involves habitat
34 disturbance would occur during implementation of CM4 and CM5. Riparian plantings carried out
35 for CM7 would be placed in floodplain areas, not in tidal wetlands.
- 36 • *CM8 Grassland Natural Community Restoration*: No tidal wetlands or occurrences of special-
37 status tidal wetland plants are present within areas proposed for grassland communities
38 restoration. Therefore, grassland communities restoration would have no impacts on covered
39 and noncovered tidal wetland plants.
- 40 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No tidal wetlands or
41 occurrences of special-status tidal wetland plants are present within areas proposed for vernal
42 pool complex restoration. Therefore, vernal pool complex restoration would have no impacts on
43 covered and noncovered tidal wetland plants.

- 1 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
2 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid tidal wetland
3 habitat and would have no impacts on covered and noncovered tidal wetland plants.
- 4 • *Avoidance and Minimization Measures*: Effects on covered tidal wetland plants potentially
5 resulting from implementation of CM1, CM2, CM4, and CM5 would be avoided or minimized
6 though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*
7 *Monitoring*, *AMM30 Transmission line Design and Alignment Guidelines*, and *AMM37*. Under
8 *AMM11*, surveys for covered plant species would be performed during the planning phase of
9 projects, and any impacts on populations of covered species would be avoided through project
10 design or subsequently minimized through *AMM2*. In addition, *AMM11* contains specific
11 guidance to avoid adverse modification of any of the primary constituent elements for Suisun
12 thistle or soft bird's-beak critical habitat. *AMM30*, which specifies that the alignment of
13 proposed transmission lines will be designed to avoid sensitive terrestrial and aquatic habitats
14 when siting poles and towers, to the maximum extent feasible, would avoid some impacts on
15 Mason's lilaepsis and Suisun Marsh aster. *AMM37* requires that new recreation trails avoid
16 populations of covered tidal wetland plants. BDCP Appendix 3.C describes the AMMs, which
17 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
18 *AMMs, and CMs*, of the Final EIR/EIS.

19 In summary, the GIS analysis indicates that Alternative 1C would result in the loss of modeled
20 habitat for all of the covered species and result in adverse effects on known occurrences of most of
21 the special-status plants occurring in tidal wetlands. However, the BDCP predicts that habitat
22 restoration activities would greatly expand the amount of habitat available to each of these species,
23 offsetting any potential loss of habitat or occurrences resulting from covered activities.

24 Delta mudwort could lose 41 acres of modeled habitat (0.7%), including all or part of three
25 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
26 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
27 colonization by Delta mudwort, which could offset this habitat loss. Channel margin enhancement
28 (CM6) and riparian natural community restoration (CM7) will also consider the potential for
29 creating habitat for Delta mudwort; creation of suitable habitat under these measures could also
30 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP
31 predicts that natural expansion of populations into the restored habitat would take place and result
32 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation
33 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that
34 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

35 Mason's lilaepsis could lose 41 acres of modeled habitat (0.7%), including all or part of 17
36 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
37 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
38 colonization by Mason's lilaepsis, which could offset this habitat loss. Channel margin enhancement
39 (CM6) and riparian natural community restoration (CM7) will also consider the potential for
40 creating habitat for Mason's lilaepsis; creation of suitable habitat under these measures could also
41 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP
42 predicts that natural expansion of populations into the restored habitat would take place and result
43 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation
44 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that
45 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

1 Delta tule pea could lose 1 acre of modeled habitat (0.02%), including all or part of 26 occurrences.
2 The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives
3 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by
4 Delta tule pea, which could offset this habitat loss. Channel margin enhancement (CM6) and riparian
5 natural community restoration (CM7) will also consider the potential for creating habitat for Delta
6 tule pea; creation of suitable habitat under these measures could also help offset this habitat loss.
7 Although active restoration of this species is not proposed, the BDCP predicts that natural expansion
8 of populations into the restored habitat would take place and result in no net loss of occurrences
9 (Objective DTP/SMA1.1, associated with CM11). Post-implementation monitoring of affected
10 occurrences and occurrences in reserve lands would be done to confirm that no net loss of
11 occurrences has been achieved (Monitoring Action CM11-22, associated with CM11).

12 Suisun Marsh aster could lose 1 acre of modeled habitat (0.02%), including all or part of 27
13 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
14 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
15 colonization by Suisun Marsh aster, which could offset this habitat loss. Channel margin
16 enhancement (CM6) and riparian natural community restoration (CM7) will also consider the
17 potential for creating habitat for Suisun marsh aster; creation of suitable habitat under these
18 measures could also help offset this habitat loss. Although active restoration of this species is not
19 proposed, the BDCP predicts that natural expansion of populations into the restored habitat would
20 occur and result in no net loss of occurrences (Objective DTP/SMA1.1, associated with CM11). Post-
21 implementation monitoring of affected occurrences and occurrences in reserve lands would be done
22 to confirm that no net loss of occurrences has been achieved (Monitoring Action CM11-22,
23 associated with CM11).

24 All four of these species (Delta mudwort, Mason's lilaeopsis, Delta tule pea, and Suisun Marsh aster)
25 are widespread in the study area with many occurrences. Habitat modification and loss are the
26 primary stressors that are responsible for their decline and that currently limit their distribution
27 and abundance. Therefore, restoring large areas of habitat and improving habitat functions for these
28 species would provide a reasonable expectation that the distribution and abundance of these
29 species would also improve. Because a relatively small amount of modeled habitat would be
30 adversely affected (less than 1% of the total), it is likely that the initial adverse effects of covered
31 activities on these species would be offset and that the overall effect of Alternative 1C on these
32 species would not be adverse.

33 Side-flowering skullcap could lose 22 acres of modeled habitat (0.9%), although no occurrences
34 would be affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4
35 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
36 colonization by side-flowering skullcap, which could offset this habitat loss. Channel margin
37 enhancement (CM6) and riparian natural community restoration (CM7) will also consider the
38 potential for creating habitat for side-flowering skullcap; creation of suitable habitat under these
39 measures could also help offset this habitat loss. No active restoration of this species is proposed,
40 and no post-implementation monitoring of affected occurrences and occurrences in reserve lands
41 would be done. Because impacts on occurrences of side-flowering skullcap would be avoided, and
42 because loss of modeled habitat for the species would be offset through restoration, the overall
43 effect of Alternative 1C on this species would not be adverse.

44 Soft bird's-beak could lose 73 acres of modeled habitat (6%), including all or part of seven
45 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4

1 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
 2 colonization by soft bird's-beak, which could offset this habitat loss. Tidal restoration in the Hill
 3 Slough Ecological Reserve would be done to increase potential habitat there for soft bird's-beak
 4 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and
 5 manage livestock in tidal marsh habitat under CM11 could enhance habitat for soft bird's-beak.
 6 Although no active restoration of this species is proposed, post-implementation monitoring of soft
 7 bird's-beak occurrences in proximity to tidal restoration sites would be done to confirm that
 8 occurrences are stable or increasing (Monitoring Action CM11-22, associated with CM11). Soft
 9 bird's-beak has a restricted distribution in the study area with highly localized occurrences, and
 10 habitat modification is the primary factor responsible for the species' decline and limiting the
 11 species' distribution and abundance. Improving habitat functions for this species would provide a
 12 reasonable expectation that the distribution and abundance of soft bird's-beak would also improve.
 13 Although a substantial amount of modeled habitat could be affected, the primary habitat for soft
 14 bird's-beak is high tidal brackish marsh, and the affected habitat is low tidal brackish marsh.
 15 Therefore, it is likely that the overall effect of Alternative 1C on this species would not be adverse.

16 Suisun thistle could lose 73 acres of modeled habitat (6%), although no occurrences would be
 17 affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives
 18 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by
 19 Suisun thistle, which could offset this habitat loss. Tidal restoration in the Hill Slough Ecological
 20 Reserve and at Rush Ranch would be done to increase potential habitat there for Suisun thistle
 21 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and
 22 manage livestock in tidal marsh habitat under CM11 could enhance habitat for Suisun thistle. In
 23 addition, two new occurrences of Suisun thistle would be established in CZ 11 (Objective
 24 SBB/SuT1.4, associated with CM11). Post-implementation monitoring of Suisun thistle occurrences
 25 in proximity to tidal restoration sites would be done to confirm that occurrences are stable or
 26 increasing (Monitoring Action CM11-22, associated with CM11). Habitat restoration, enhancement
 27 of habitat functions, and establishment of new occurrences would offset any potential loss of
 28 modeled habitat for Suisun Marsh thistle.

29 Three occurrences of Bolander's water-hemlock could be affected. Although the extent of potential
 30 habitat affected was not determined, it would be comparable to that for Delta tule pea and Suisun
 31 Marsh aster (5 acres). Tidal habitat restoration activities proposed under CM4 (Objectives
 32 TBEWNC1.1 and TFEWNC1.1) could increase the extent of habitat available for colonization by
 33 Bolander's water-hemlock, which could offset this habitat loss. Because only a few scattered
 34 occurrences of Bolander's water-hemlock are present in the study area, there is no reasonable
 35 expectation that habitat restoration without active species-specific restoration activities would
 36 result in the establishment of new occurrences to offset the losses. Also, because Bolander's water-
 37 hemlock is a noncovered species, the species protections and occurrence monitoring afforded to
 38 covered species under the BDCP would not apply to this species. Therefore, the effects of Alternative
 39 1C on Bolander's water hemlock could be adverse.

40 **NEPA Effects:** The loss of modeled and occupied habitat for special-status tidal wetland plants
 41 would be offset through tidal habitat restoration (CM4). Therefore, implementation of Alternative
 42 1C would result in no adverse effects on seven of eight special-status grassland plants in the study
 43 area. Alternative 1C would result in a reduction in the range and numbers of Bolander's water-
 44 hemlock, which would be an adverse effect. Adverse effects on Bolander's water-hemlock could be
 45 avoided or offset through implementation of Mitigation Measure BIO-170.

CEQA Conclusion: Because loss of occurrences and modeled habitat for covered tidal habitat plant species would be offset through habitat restoration, impacts on covered tidal wetland plants resulting from implementation of Alternative 1C would be less than significant. However, the loss of Bolander’s water-hemlock populations in CZ 11 would be a reduction in the species’ numbers and range, which would be a significant impact. Implementation of Mitigation Measure BIO-170 would reduce this impact to a less-than-significant level.

Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered Special-Status Plant Species

Please see Mitigation Measure BIO-170 under Impact BIO-169.

Inland Dune Plants

Impact BIO-174: Effects on Habitat and Populations of Inland Dune Plants

Alternative 1C would have no adverse effects on inland dune plants (Table 12-1C-67). No construction activities or habitat restoration would take place where the species occur. No specific actions to benefit inland dune species are proposed.

Table 12-1C-67. Summary of Impacts on Inland Dune Plants under Alternative 1C

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Modeled Habitat					
Inland Dunes	19	0	0	0	None
Noncovered Species					
Hoover’s cryptantha	0	0	1	0	None
Antioch Dunes buckwheat	0	0	1	0	None
Mt. Diablo buckwheat	0	0	1	0	None
Contra Costa wallflower	0	0	3	0	None
Antioch Dunes evening-primrose	0	0	9	0	None

NEPA Effects: Implementing the BDCP under Alternative 1C would not affect special-status inland dune plant species.

CEQA Conclusion: Alternative 1C would have no impacts on inland dune plant species. No mitigation is required.

Nontidal Wetland Plants

No covered plant species occur in nontidal wetlands in the study area; however, six noncovered special-status plant species occur in nontidal wetlands in the study area. Table 12-1C-68 summarizes the acreage of nontidal wetland habitat in the study area and the number of occurrences of each special-status nontidal wetland plant in the study area.

1 **Table 12-1C-68. Summary of Impacts on Nontidal Wetland Plants under Alternative 1C**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Nontidal freshwater aquatic	5,567	311	0	0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Nontidal freshwater perennial emergent wetland	1,509	131	0	0	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Noncovered Species					
Watershield	0	0	3	0	None
Bristly sedge	0	0	18	0	Loss of habitat from construction of water conveyance facilities
Woolly rose-mallow ^a	0	0	121	4	Loss of habitat from construction of water conveyance facilities and tidal habitat restoration
Eel-grass pondweed	0	0	1	1	Loss of habitat from construction of water conveyance facilities
Sanford's arrowhead	0	0	23	1	Loss of habitat from tidal habitat restoration
Marsh skullcap ^a	0	0	3	0	None

^a Also occurs in valley/foothill riparian habitat.

2

3 **Impact BIO-175: Effects on Habitat and Populations of Nontidal Wetland Plants**

4 Under Alternative 1C, known occurrences of woolly rose-mallow, eel-grass pondweed, and Sanford's
5 arrowhead are within the proposed footprint for the water conveyance facilities or within the
6 hypothetical footprint for restoration activities and could be adversely affected. Alternative 1C
7 would have no adverse effects on watershield, bristly sedge, or marsh skullcap.

8 The individual effects of each relevant conservation measure are addressed below. A summary
9 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
10 conservation measure discussions.

- 11 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1C water conveyance
12 facilities would adversely affect two noncovered special-status plants occurring in nontidal
13 wetlands. One occurrence of woolly rose-mallow in CZ 3 and two occurrences in CZ 8 would be
14 affected by construction activities. One occurrence of eel-grass pondweed could be affected by

- 1 construction activities on the Webb Tract in CZ 6. Four other noncovered nontidal wetland
2 plants would not be affected by construction of the water conveyance facilities.
- 3 • *CM2 Yolo Bypass Fisheries Enhancement*: No known occurrences of special-status nontidal
4 wetland plants are present in the hypothetical footprint for construction or operation of the
5 Yolo Bypass fisheries enhancements. Therefore, construction and operation of the Yolo Bypass
6 Fisheries enhancements would not affect special-status nontidal marsh plants.
 - 7 • *CM3 Natural Communities Protection and Restoration*: No specific natural communities
8 protection is proposed for nontidal wetlands under the BDCP. Therefore, no occurrences of
9 special-status nontidal plants are proposed for protection.
 - 10 • *CM4 Tidal Natural Communities Restoration*: One known occurrence of Sanford's arrowhead is
11 present within areas proposed for tidal habitat restoration in CZ 2, and one occurrence of woolly
12 rose-mallow is present in areas proposed for tidal habitat restoration in CZ 7. Therefore, tidal
13 habitat restoration would have an adverse effect on these species. No other special-status tidal
14 wetland plants would be affected.
 - 15 • *CM5 Seasonally Inundated Floodplain Restoration*: No known occurrences of special-status
16 nontidal wetland plants are present within areas proposed for floodplain restoration. Therefore,
17 floodplain restoration and construction of new floodplain levees would have no impacts on
18 special-status nontidal wetland plants.
 - 19 • *CM6 Channel Margin Enhancement*: No known occurrences of special-status nontidal wetland
20 plants are present within areas proposed for channel margin habitat enhancement. Therefore,
21 channel margin habitat enhancement would have no impacts on special-status nontidal wetland
22 plants.
 - 23 • *CM7 Riparian Natural Community Restoration*: No known occurrences of special-status nontidal
24 wetland plants are present within areas proposed for riparian habitat restoration. Therefore,
25 riparian habitat restoration would have no impacts on special-status nontidal wetland plants.
 - 26 • *CM8 Grassland Natural Community Restoration*: No known occurrences of special-status nontidal
27 wetland plants are present within areas proposed for grassland communities restoration.
28 Therefore, grassland communities restoration would have no impacts on special-status nontidal
29 wetland plants.
 - 30 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No known occurrences of
31 special-status nontidal wetland plants are present within areas proposed for vernal pool and
32 alkali seasonal wetland complex restoration. Therefore, vernal pool and alkali seasonal wetland
33 complex restoration would have no impacts on special-status nontidal wetland plants.
 - 34 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
35 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid existing
36 nontidal marsh and would have no adverse effects on special-status nontidal wetland plants.
37 The BDCP may benefit nontidal wetland species by creating 400 acres of nontidal freshwater
38 marsh, including components of nontidal perennial aquatic and nontidal freshwater perennial
39 emergent wetland communities, and by maintaining and enhancing the habitat functions of
40 protected and created nontidal wetland habitats for covered and other native species. However,
41 no specific actions to benefit noncovered species are proposed.

1 Under Alternative 1C, 1,500 acres of nontidal marsh would be restored (Objective NFEW/NPANC1.1,
2 addressed under CM10). However, these wetlands would be restored primarily as habitat for giant
3 garter snake. These habitat restoration activities would be unlikely to expand the amount of habitat
4 available to woolly rose-mallow, eel-grass pondweed, and Sanford's arrowhead, potential loss of
5 habitat or occurrences resulting from covered activities would not be compensated for. Moreover,
6 because special-status nontidal wetland plant species are not covered under the BDCP, the species
7 protections afforded to covered species under the AMMs do not apply to these species, and the
8 effects of Alternative 1C on these species would be adverse.

9 **NEPA Effects:** Implementation of the BDCP under Alternative 1C could result in a reduction in the
10 range and numbers of woolly rose-mallow, eel-grass pondweed, and Sanford's arrowhead, three
11 noncovered nontidal wetland species, which would be an adverse effect. Adverse effects on these
12 species could be avoided or offset through implementation of Mitigation Measure BIO-170.

13 **CEQA Conclusion:** Under Alternative 1C, tidal habitat restoration could result in a reduction in the
14 range and numbers of woolly rose-mallow and eel-grass pondweed. Tidal habitat restoration could
15 result in a reduction in the range and numbers of Sanford's arrowhead and woolly rose-mallow.
16 These impacts would be significant. Implementation of Mitigation Measure BIO-170 would reduce
17 these impacts to a less-than-significant level.

18 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered** 19 **Special-Status Plant Species**

20 Please see Mitigation Measure BIO-170 under Impact BIO-169.

21 **General Terrestrial Biology**

22 **Wetlands and Other Waters of the United States**

23 Alternative 1C actions would both permanently and temporarily remove or convert wetlands and
24 open water that are regulated by USACE under Section 404 of the CWA. The Section 404 regulations
25 and relevant information on mitigating impacts on wetlands and waters of the United States are
26 described in Section 12.2.1.1. The following two impacts address the project-level effects of CM1 on
27 these potential wetlands and waters, and the programmatic-level effects of other relevant
28 conservation actions (CM2–CM10). CM11–CM21 would not directly result in loss or conversion of
29 wetlands or other waters of the United States. The methods used to conduct these analyses are
30 described in Section 12.3.2.4, *Methods Used to Assess Wetlands and Other Waters of the United States*.
31 The waters of the United States data used for this analysis is based on a verified wetland delineation
32 from the USACE that was completed in early 2015. These waters of the United States were mapped
33 at finer scale than that which was done for the natural community mapping for the BDCP; therefore,
34 the acreages of these two datasets differ. The waters of the United States mapping identified
35 numerous agricultural ditches and seasonal wetlands occurring within and associated with
36 cultivated lands, which explains the majority of the difference.

37 **Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and** 38 **Other Waters of the United States**

39 Alternative 1C proposes the construction, maintenance, and operation of water conveyance facilities
40 within, or requiring the unavoidable fill of, waters of the United States. The estimated fill of
41 jurisdictional waters associated with this alternative is described in Table 12-1C-69. Based on the

1 methodology used to conduct this analysis, these losses would occur at pipeline, canal and intake
 2 areas, RTM and borrow/spoil storage sites, transmission corridors, forebay site, and multiple
 3 temporary work areas associated with the construction activity. The permanent open water and
 4 wetland losses would occur at various locations along the water conveyance facility alignment, but
 5 the majority of the loss would occur due to construction of Alternative 1C's five intake structures
 6 along the western bank of the Sacramento River from just north of Clarksburg to Courtland in the
 7 north Delta (including associated spoil/borrow areas), along the entire canal route in the west and
 8 south Delta, and at the southern forebay site in the south Delta. The temporary open water and
 9 wetland effects would also occur mainly at the five intake construction sites along the western bank
 10 of the Sacramento River, at temporary siphon work areas where the canal crosses under north and
 11 west Delta sloughs and waterways, and at barge offloading sites in the west Delta.

12 **Table 12-1C-69. Estimated Fill of Waters of the United States Associated with the Construction of**
 13 **Water Conveyance Facilities under Alternative 1C (acres)**

Wetland/Water Type	Permanent Impact	Temporary Impacts Treated as Permanent ^a	Temporary Impact	Total Impact
Agricultural Ditch	242.4	57.1	0	299.5
Alkaline Wetland	55.6	9.4	0	65.0
Clifton Court Forebay	0	0	0	0
Conveyance Channel	15.2	14.3	0	29.5
Depression	3.7	1.3	0	5.0
Emergent Wetland	116.9	24.3	0	141.2
Forest	1.6	14.4	0	16.0
Lake	0.2	3.7	0	3.9
Natural Channel	0.1	0.1	0	0.2
Scrub-Shrub	3.0	4.5	0	7.5
Seasonal Wetland	67.0	20.8	0	87.7
Tidal Channel	27.1	116.5	0	143.6
Vernal Pool	0.1	0	0	0.1
Total	533	266	0	799

^a Temporary impacts treated as permanent are temporary impacts expected to last over one year. These impact sites will eventually be restored to pre-project conditions; however, due to the duration of effect, compensatory mitigation will be included for these areas.

14
 15 The majority of the impacts on wetlands and waters of U.S. are on wetlands and waters found within
 16 cultivated lands (agricultural ditches and seasonal wetlands), emergent wetlands, and tidal
 17 channels. These impacts mostly result from reusable tunnel material storage area, the construction
 18 of the canal, siphon work areas, and intake work areas. The impacted seasonal wetlands mapped
 19 within the Conveyance Planning Area, as described in Section 12.3.2.4, *Methods Used to Assess*
 20 *Wetlands and Other Waters of the United States*, all occur in the central Delta within plowed
 21 agricultural fields.

22 Unavoidable impacts on waters of the United States would be offset such that the loss of acreage and
 23 functions due to construction activities are fully compensated. Wetland functions are defined as a
 24 process or series of processes that take place within a wetland. These include the storage of water,
 25 transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have

1 value for the wetland itself, for surrounding ecosystems, and for people. Functions can be grouped
 2 broadly as habitat, hydrologic/hydraulic, or water quality. Not all wetlands perform all functions nor
 3 do they perform all functions equally well. The location and size of a wetland may determine what
 4 functions it will perform. For example, the geographic location may determine its habitat functions,
 5 and the location of a wetland within a watershed may determine its hydrologic/hydraulic or water-
 6 quality functions. Many factors determine how well a wetland will perform these functions: climatic
 7 conditions, quantity and quality of water entering the wetland, and disturbances or alteration within
 8 the wetland or the surrounding ecosystem. Wetland disturbances may be the result of natural
 9 conditions, such as an extended drought, or human activities, such as land clearing, dredging, or the
 10 introduction of nonnative species. Wetlands are among the most productive habitats in the world,
 11 providing food, water, and shelter for fish, shellfish, birds, and mammals, and serving as a breeding
 12 ground and nursery for numerous species. Many endangered plant and animal species are
 13 dependent on wetland habitats for their survival. Hydrologic and hydraulic functions are those
 14 related to the quantity of water that enters, is stored in, or leaves a wetland. These functions include
 15 such factors as the reduction of flow velocity, the role of wetlands as ground-water recharge or
 16 discharge areas, and the influence of wetlands on atmospheric processes. Water-quality functions
 17 include the trapping of sediment, pollution control, and the biochemical processes that take place as
 18 water enters, is stored in, or leaves a wetland.

19 The functions of the waters of the United States that would be temporarily or permanently impacted
 20 by this alternative vary greatly depending primarily on existing land uses and historical levels of
 21 disturbance. Generally, agricultural ditches and conveyance channels, which are regularly
 22 maintained and often devoid of vegetation, support only minimal hydraulic function (water
 23 conveyance), with virtually no water quality or habitat function. With respect to Clifton Court
 24 Forebay, the facility is regularly maintained, but supports some hydrologic, hydraulic, and water
 25 quality functions (e.g. reduction of velocity, groundwater recharge, and trapping of sediment). Tidal
 26 channels affected by this alternative support functions in all three categories, but the level at which
 27 these functions perform vary depending on setting, size, and level of disturbance. The alkaline
 28 wetlands and vernal pools exist in non-native grasslands and have been subjected to some
 29 disturbance due to past land uses. Although these features likely support habitat, water quality, and
 30 hydrologic/hydraulic functions, the capacity of these features to perform such functions vary
 31 depending on the overall ecological setting and level of disturbance. Functions associated with
 32 emergent wetland, forest, and scrub-shrub, depend primarily on the location of these habitat types.
 33 Where they exist as in-stream (in-channel islands) or as the thick band of habitat adjacent to a
 34 waterway, these features are expected to function at a high level. However, where these habitats
 35 exist as thin bands, or where they are situated in agricultural fields, their habitat functions will be
 36 considerably lower. All of the wetlands classified as seasonal wetlands occur in agricultural fields. As
 37 such, their habitat functions have been greatly compromised, but they retain some water quality and
 38 hydrologic/hydraulic function. Like seasonal wetlands, most depressions occur within agricultural
 39 areas; however the depressions may support wetland vegetation at their edges. The areas mapped
 40 as lake are the dredged borrow ponds created during the construction of Interstate 5. Although
 41 relatively small, each lake is likely performing functions from all three categories.

42 A functional assessment of wetlands proposed for fill will be conducted during the development of
 43 the Conceptual Mitigation Plan as part of the Clean Water Act permitting process. The results of this
 44 assessment will be compared to the expected functions at the proposed mitigation site(s) such that
 45 it can be confirmed that the compensatory mitigation will in fact accomplish full functional
 46 replacement of impacted wetlands. All impacted wetlands would be replaced with fully functional

1 compensatory wetland habitat demonstrating high levels of habitat, water quality, and
2 hydrologic/hydraulic function. Because many impacted wetlands are significantly less than high
3 function, the compensatory mitigation would result in a net increase in wetland function.

4 Alternative 1C was designed to avoid waters of the United States to the maximum extent practicable.
5 Each of the conveyance components has been located in upland areas where it was feasible to do so.
6 Once construction begins, specific measures would be implemented, as described in the AMMs set
7 out in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to further avoid and minimize
8 effects on waters of the United States as well as on special-status species. The AMMs would be
9 implemented at all phases of a project, from siting through design, construction, and on to
10 operations and maintenance. The AMMs that pertain specifically to waters of the United States are
11 *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and Monitoring,*
12 *AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill*
13 *Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge*
14 *Operations Plan, AMM10 Restoration of Temporarily Affected Natural Communities, AMM12 Vernal*
15 *Pool Crustaceans, AMM30 Transmission Line Design and Alignment Guidelines, AMM34 Construction*
16 *Site Security, and AMM36 Notification of Activities in Waterways.*

17 The implementation of measures to avoid and minimize impacts on habitat for aquatic species and
18 species which utilize aquatic habitats, such as California tiger salamander, giant garter snake,
19 California red legged frog, western pond turtle, riparian woodrat, and riparian brush rabbit, would
20 also result in further avoidance and minimization of effects to waters of the United States.

21 Aside from wetland habitats that would be created as a result of implementing CM4–CM10, some of
22 which could serve the dual purpose of offsetting effects to species and mitigating impacts on waters
23 of the United States, more specific mitigation is required to ensure that there is no net loss of
24 wetland functions and values as a result of implementing Alternative 1C pursuant to USACE's and
25 EPA's Mitigation Rule (see Section 12.2.1.1). Mitigation Measure BIO-176, *Compensatory Mitigation*
26 *for Fill of Waters of the United States*, would be available to address adverse impacts on waters of the
27 United States.

28 **NEPA Effects:** The permanent and temporary loss of these jurisdictional wetlands and waters as a
29 result of constructing Alternative 1C water conveyance facilities would be a substantial effect if not
30 compensated by wetland protection and/or restoration. This loss would represent a removal of
31 federally protected wetlands as defined by Section 404 of the CWA. Impacts on wetlands from CM1
32 construction would occur in the first 10 years after BDCP approval. Approximately 19,550 acres of
33 this wetland restoration would occur during this time period. Project proponents under Alternative
34 1C would implement AMM1AMM7, AMM10, AMM12, AMM30, AMM34, and AMM36, which would
35 avoid and minimize fill of wetlands and waters and any indirect effects to wetlands and waters.
36 Specific mitigation would be required to ensure that Alternative 1C does not result in a loss of
37 functions and values of waters of the United States and thus that the affect is not adverse. Mitigation
38 Measure BIO-176, *Compensatory Mitigation for Fill of Waters of the United States*, would be available
39 to reduce these effects such that they are not adverse.

40 **CEQA Conclusion:** The permanent and temporary loss of jurisdictional wetlands and waters as a
41 result of constructing Alternative 1C water conveyance facilities would be substantial effect if not
42 compensated for by wetland protection and/or restoration. This loss would represent either
43 temporary or permanent removal of federally protected wetlands or other waters of the United
44 States as defined by Section 404 of the CWA. Specific mitigation would be required to ensure that

1 Alternative 1C does not result in a loss of functions and values of waters of the United States.
2 Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters of the United States*, would
3 be available to reduce the impact to a less-than-significant level. Alternative 1C does propose to
4 restore up to 76,721 acres of wetland natural communities under the Plan, which would include
5 65,000 acres of tidal marsh restoration (CM4), 10,000 acres of seasonally inundated floodplain
6 restoration (CM5), 21 acres of vernal pool/alkali seasonal wetlands (CM9; 67 acres of vernal pool
7 complex and 72 acres of alkali seasonal wetland complex assuming a wetland density of 15%), and
8 1,700 acres of nontidal marsh restoration (CM10). In addition, Alternative 1C would restore 5,000
9 acres of riparian habitat (CM7), some portion of which may also qualify as forested or scrub-shrub
10 wetland. In addition, 20 miles of levees will have channel margin enhancement conducted on them
11 (CM6), which would include improving channel geometry and restoring riparian, marsh, and
12 mudflat habitats on the water side of levees.

13 The success in implementing these Conservation Measures would be assured through effectiveness
14 monitoring, which includes success criteria, and adaptive management as outlined in the *Adaptive*
15 *Management and Monitoring* sections of the BDCP Chapter 3, *Conservation Strategy*, for tidal marsh
16 restoration (BDCP Section 3.4.4), seasonal floodplain restoration (BDCP Section 3.4.5.4), channel
17 margin enhancement (BDCP Section 3.4.6.4), valley/foothill riparian restoration (BDCP Section
18 3.4.7.4), vernal pool and alkali seasonal wetland complex restoration (BDCP Section 3.4.9.4), and
19 nontidal marsh restoration (BDCP Section 3.4.10.3). All restored areas will be secured in fee-title or
20 through conservation easements.

21 Alternative 1C would also result in the protection and management of the following natural
22 communities that contain wetlands: 750 acres of valley/foothill riparian, 600 acres of vernal pool
23 complex, 150 acres of alkali seasonal wetland complex, 8,100 acres of managed wetlands, and 50
24 acres of nontidal marsh. In addition, 8,000 acres of grasslands and 51,625 acres of cultivated lands
25 will be protected and managed, which would likely include areas of seasonal wetlands, ponds, and
26 agricultural ditches.

27 Project proponents under Alternative 1C would also implement AMM1–AMM7, AMM10, AMM12,
28 AMM30, AMM34, and AMM36, which would avoid and minimize fill of wetlands and waters and any
29 indirect effects to wetlands and waters. As stated above, specific mitigation would be required to
30 ensure that Alternative 1C does not result in a loss of functions and values of waters of the United
31 States. Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters of the United States*,
32 would be available to reduce the impact to a less-than-significant level.

33 **Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United** 34 **States**

35 All mitigation proposed as compensatory mitigation would be subject to specific success criteria,
36 success monitoring, long-term preservation, and long-term maintenance and monitoring
37 pursuant to the requirements of the Mitigation Rule. All compensatory mitigation shall fully
38 replace lost function through the mechanisms discussed below which will result in restoration
39 and/or creation of habitat with at least as much function and value as those of the impacted
40 habitat. In some cases, the mitigation habitat will afford significantly higher function and value
41 than that of impacted habitat.

42 Compensation ratios are driven by type, condition, and location of replacement habitat as
43 compared to type, condition and location of impacted habitat. Compensatory mitigation usually
44 includes restoration, creation, or rehabilitation of aquatic habitat. The USACE does not typically

1 accept preservation as the only form of mitigation; use of preservation as mitigation typically
2 requires a very high ratio of replacement to impact. It is anticipated that ratios will be a
3 minimum of 1:1, depending on the factors listed above.

4 Compensatory mitigation will consist of restoration, creation, and/or rehabilitation of aquatic
5 habitat. Typically, impacted habitat will be replaced in-kind, although impacts on some habitat
6 types such as agricultural ditches, conveyance channels, and Clifton Court Forebay, will be
7 mitigated out-of-kind with higher functioning habitat types such as riparian wetland, marsh,
8 and/or seasonal wetland. Compensatory mitigation shall be accomplished by one, or a
9 combination of the following methods:

- 10 ● Purchase credits for restored/created/rehabilitated habitat at an approved wetland
11 mitigation bank;
- 12 ● On-site (adjacent to the project footprint) restoration or rehabilitation of wetlands
13 converted to uplands due to past land use activities (such as agriculture) or functionally
14 degraded by such activities;
- 15 ● On-site (adjacent to the project footprint) creation of aquatic habitat;
- 16 ● Off-site (within the Delta) restoration or rehabilitation of wetlands converted to uplands
17 due to past land use activities (such as agriculture) or functionally degraded by such
18 activities;
- 19 ● Off-site (within the Delta) creation of aquatic habitat; and/or
- 20 ● Payment into the Corps' Fee-in-Lieu program.

21 *Purchase of Credits or Payment into Fee-in-Lieu Program*

22 It is envisioned that purchase of bank credits and/or payment into a fee-in-lieu program will be
23 utilized for habitat types that would be difficult to restore or create within the Delta. Examples
24 are vernal pool habitat, which requires an intact hardpan or other impervious layer and very
25 specific soil types, and alkali seasonal wetland, which requires a specific set of chemical soil
26 parameters. It is anticipated that only a small amount of compensatory mitigation will fall into
27 these categories.

28 *On-Site Restoration, Rehabilitation and/or Creation*

29 Much of the Delta consists of degraded or converted habitat that is more or less functioning as
30 upland. Opportunities will be sought where on-site restoration, rehabilitation, and/or creation
31 could occur immediately adjacent to the project footprint. It is anticipated that some of the
32 compensatory mitigation will fall into this category.

33 *Off-Site Restoration, Rehabilitation and/or Creation*

34 There exists, within the immediate vicinity of the project area, Delta land which has been subject
35 to agricultural practices or other land uses which have degraded or even converted wetlands
36 that existed historically. Sites within the Delta will be evaluated for their restoration,
37 rehabilitation, and/or creation potential. It is anticipated that most of the compensatory
38 mitigation will fall into this category.

39 Compensatory mitigation will result in no net loss of acreage of waters of the United States and
40 will accomplish full functional replacement of impacted wetlands. All impacted wetlands will be

1 replaced with fully functioning wetland habitat demonstrating high levels of habitat, water
2 quality, and hydrologic/hydraulic function. Since many impacted wetlands are likely to function
3 at significantly less than high levels, the compensatory mitigation will result in a significant net
4 increase in wetland function.

5 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on** 6 **Wetlands and Other Waters of the United States**

7 The habitat protection and restoration activities associated with Alternative 1C's other conservation
8 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and other
9 waters of the United States in the study area during the course of BDCP conservation action
10 implementation. Because these conservation measures have not been defined to the level of site-
11 specific footprints, it is not possible to delineate and quantify these effects in detail. Several of the
12 conservation measures (CM2, CM4, and CM5) have been described with theoretical footprints for
13 purposes of the effects analysis contained in Chapter 5, *Effects Analysis*, of the BDCP.

14 Because the wetland delineation was only conducted within the Conveyance Planning Area and not
15 the remainder of the Plan Area, the effects on potential wetlands and waters of the United States
16 from CM2–CM10 were analyzed by looking at effects on wetland natural communities mapped
17 within the theoretical footprints for CM2, CM4, and CM5 by assuming that 100% of the
18 predominantly wetland natural communities listed in Appendix 12E, *Detailed Accounting of Direct*
19 *Effects of Alternatives on Natural Communities and Covered Species*, and that 10% of all of the non-
20 wetland natural communities listed in that table would qualify as wetlands or other waters of the
21 United States under the CWA. Based on this approach approximately 19,850 acres of potentially
22 jurisdictional wetlands and waters could be affected by CM2–CM10. The majority of these impacts
23 are attributable to the conversion of 13,746 acres of managed wetland to tidal marsh under CM4,
24 which would likely result in an improvement of wetland function in the Plan Area.

25 **NEPA Effects:** The conversion of existing wetland natural communities to other types of wetland
26 natural communities through implementation of CM2–CM10 for Alternative 1C would be
27 approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open
28 water through implementation of CM4. Although the increase in wetland acreage and wetland
29 functions from these restoration actions could in part offset the effects on waters of the United
30 States in these areas, implementation of Mitigation Measure BIO-176, *Compensatory Mitigation for*
31 *Fill of Waters of the United States*, would be required to ensure that these effects are not adverse.

32 **CEQA Conclusion:** The conversion of existing wetland natural communities to other types of
33 wetland natural communities through implementation of CM2–CM10 for Alternative 1C would be
34 approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open
35 water through implementation of CM4. In total, up to 76,721 acres of wetland natural communities
36 would be restored under Alternative 1C. Although the increase in wetland acreage and wetland
37 functions from these restoration could in part offset the effects on waters of the United States in
38 these areas, implementation of Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of*
39 *Waters of the United States*, would be required to ensure that the impacts are reduced to a less-than-
40 significant level.

41 **Shorebirds and Waterfowl**

42 Managed wetlands, tidal natural communities, and cultivated lands (including grain and hay crops,
43 pasture, field crops, rice, and idle lands) provide freshwater nesting, feeding, and resting habitat for

1 a large number of Pacific flyway waterfowl and shorebirds. The primary effects of concern for
 2 shorebirds and waterfowl are related to the conversion of managed wetland and cultivated lands to
 3 tidal marsh associated with habitat restoration. Ducks Unlimited (2013) conducted an analysis to
 4 determine the effects of BDCP conservation measures on waterfowl, as well as to determine whether
 5 BDCP actions would impede attainment of the goals established by the Central Valley Joint Venture
 6 (CVJV) Implementation Plan for the Delta, Yolo, and Suisun Marsh drainage basins. The CVJV efforts
 7 are guided by its 2006 Implementation Plan, which is founded on the principles of strategic habitat
 8 conservation (Central Valley Joint Venture 2006). Those principles emphasize the establishment of
 9 population abundance objectives and the use of species-habitat models to link population objectives
 10 to habitat needs. The CVJV has used species-habitat models to translate bird abundance objectives
 11 into habitat objectives, while explicitly identifying the biological assumptions that underpin these
 12 models and the data used to populate them. As a result, the CVJV's biological planning provides a
 13 framework for evaluating the effects of the BDCP on waterfowl.

14 The Ducks Unlimited waterfowl analysis focused primarily on dabbling ducks. Less than 5% of all
 15 geese in the Central Valley occur in the Yolo, Delta, and Suisun Marsh drainage basins. Moreover,
 16 geese in the Central Valley rely mostly on agricultural habitats to meet their food energy needs. The
 17 BDCP's effect on agricultural habitats is limited to the Delta Basin where about 2500 acres of corn
 18 now available to geese would be converted to other habitats (Ducks Unlimited 2013: Table 5). Food
 19 supplies for geese would still be well in excess of demand even with the loss of these agricultural
 20 habitats (Central Valley Joint Venture 2006, Ducks Unlimited 2013). The duck population objectives
 21 used in the analysis were taken directly from the CVJV Plan. Dabbling duck species make up 92% of
 22 this objective, while diving duck species make up the remaining 8%. Thus, the results were mostly
 23 driven by dabbling duck needs and largely interpreted in the context of dabbling duck foraging
 24 ecology. The 55,000 acres of Tidal Natural Communities Restoration (CM4) would be expected to
 25 benefit diving ducks by providing deep water foraging habitat. Refer to the Ducks Unlimited Report
 26 (Ducks Unlimited 2013) for details of the analysis and methods with respect to the TRUMET model
 27 used to quantify effects on food biomass and food quality.

28 An analysis was conducted to determine the effects of the BDCP covered activities on wintering and
 29 breeding shorebird habitat (ICF International 2013). This analysis evaluated the relative increase
 30 and decrease in natural communities known to provide important foraging, roosting, and breeding
 31 habitat. Similar to the waterfowl analysis, the results were broken up into the three Central Valley
 32 Joint Venture Basins that overlap with the BDCP study area: Yolo, Delta, and Suisun. Natural
 33 community losses and gains were then translated into species-specific outcomes, comparing the
 34 relative habitat value of each BDCP natural community for each Central Valley shorebird species
 35 (Table 1, ICF International 2013). The shorebird species ranking system displayed in Table 1 (ICF
 36 International 2013) was modified from a table in Stralberg et. al (2010). The table was created using
 37 survey data and experts' species-specific habitat rankings. The survey data included fall, winter, and
 38 spring density data. This resulted in an overall, cross-season representation of habitat requirements.

39 **Impact BIO-178: Loss or Conversion of Habitat for Waterfowl and Shorebirds as a Result of**
 40 **Water Conveyance Facilities Construction**

41 Development of the water conveyance facilities (CM1) would result in the permanent removal of
 42 approximately 1 acre of managed wetland, 22 acres of nontidal wetlands, and 4,140 acres of suitable
 43 cultivated lands (including grain and hay crops, pasture, field crops, rice, and idle lands). In addition,
 44 145 acres of managed wetland, 1 acre of tidal wetlands, 26 acres of nontidal wetlands, and 5,429
 45 acres of cultivated lands would be temporarily impacted.

1 These losses of habitat would occur within the first 10 years of Alternative 1C implementation in the
2 Delta Basin. The BDCP has committed to the near-term protection of 15,400 acres of non-rice
3 cultivated lands, 200 acres of rice, and 700 acres of rice or “rice equivalent” natural communities
4 including nontidal wetlands in the near-term. In addition, 4,100 acres of managed wetlands would
5 be created, protected, and enhanced, 8,850 acres of freshwater tidal wetlands would be restored,
6 and 2,000 acres of tidal brackish emergent wetland would be restored (Table 3-4, Chapter 3).

7 Construction activities could have an adverse effect on nesting shorebirds or waterfowl if they were
8 present in or adjacent to work areas and could result in destruction of nests or disturbance of
9 nesting and foraging behaviors. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
10 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on
11 nesting birds.

12 **NEPA Effects:** Habitat loss from construction of the Alternative 1C water conveyance facilities would
13 not result in an adverse effect on shorebirds and waterfowl because of the acres of natural
14 communities and cultivated lands that would be restored and protected in the near-term timeframe.
15 If waterfowl were present in or adjacent to work areas, construction activities could result in
16 destruction of nests or disturbance of nesting and foraging behaviors, which would be an adverse
17 affect on nesting shorebirds and waterfowl. Mitigation Measure BIO-75, *Conduct Preconstruction*
18 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse
19 effects on nesting birds.

20 **CEQA Conclusion:** Habitat loss from construction of the Alternative 1C water conveyance facilities
21 would have a less-than-significant impact on shorebirds and waterfowl because of the acres of
22 natural communities and cultivated lands that would be restored and protected in the near-term
23 timeframe. If waterfowl were present in or adjacent to work areas, construction activities could
24 result in destruction of nests or disturbance of nesting and foraging behaviors, which would be a
25 significant impact. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
26 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact on nesting birds to a
27 less-than-significant level.

28 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
29 **Disturbance of Nesting Birds**

30 See Mitigation Measure BIO-75 under Impact BIO-75.

31 **Impact BIO-179: Loss or Conversion of Habitat for Wintering Waterfowl as a Result of**
32 **Implementation of Conservation Components**

33 **Suisun Marsh:** Managed seasonal wetlands in Suisun Marsh would be reduced by an estimated
34 8,818 acres as a result of Alternative 1C implementation. This would represent a 25% decrease in
35 managed seasonal wetlands compared with long-term conditions without Alternative 1C (Ducks
36 Unlimited 2013, Table 5). There is considerable uncertainty about the biomass and nutritional
37 quality of waterfowl foods produced in Suisun Marsh’s managed wetlands, which makes it difficult
38 to identify the amount of mitigation needed. To address this uncertainty, three levels of food
39 biomass and three levels of nutritional quality were modeled for these existing habitats (Ducks
40 Unlimited 2013, Table 7). Three mitigation scenarios based on these energetic assumptions of
41 biomass and food quality were then run to determine a minimum acreage of managed seasonal
42 wetlands to be protected and enhanced to compensate for the loss of productivity resulting from
43 habitat conversion to tidal wetlands.

- 1 • Scenario 1) Assume that existing managed seasonal wetlands provide low food biomass and low
2 food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh produce
3 50% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds
4 have 60% of the metabolizable energy of seeds produced outside of Suisun Marsh. Given the
5 assumption that managed seasonal wetlands in Suisun could be enhanced to provide high food
6 biomass and high food quality (equal to wetlands in the Central Valley), 5,000 acres of managed
7 wetlands protected and managed for high biomass and high food quality would mitigate the
8 conversion of 8,857 acres of managed seasonal wetland to tidal marsh.
- 9 • Scenario 2) Assume that the managed seasonal wetlands lost provide medium food biomass and
10 medium food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh
11 produce 75% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and
12 these seeds have 80% of the metabolizable energy of seeds produced outside of Suisun Marsh.
13 Given the assumption that managed seasonal wetlands in Suisun Marsh could be enhanced to
14 provide high food biomass and high food quality (equal to wetlands in the Central Valley),
15 13,300 acres of managed wetlands protected and managed for high biomass and high food
16 quality would mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal
17 marsh.
- 18 • Scenario 3) Assume that existing managed seasonal wetlands provide low food biomass and low
19 food quality. Given the assumption that managed seasonal wetlands in Suisun Marsh could only
20 be enhanced to provide medium food biomass and medium food quality (produce 75% of the
21 seed biomass of seasonal wetlands elsewhere in the Central Valley, with these seeds having 80%
22 of the metabolizable energy of seeds produced outside of Suisun Marsh), 8,800 acres of
23 managed wetlands protected and managed for medium biomass and medium food quality would
24 mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal marsh.

25 The BDCP has committed to protecting and enhancing a minimum of 5,000 acres of managed
26 seasonal wetlands in Suisun Marsh to compensate for the loss of productivity from habitat
27 conversion to tidal marsh. This minimum commitment of 5,000 acres would mitigate the reduced
28 productivity resulting from conversion of managed seasonal wetlands under the assumptions that
29 1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-
30 quality food to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce
31 high biomass and high food quality. However, the food biomass and productivity in Suisun Marsh
32 would need to be quantified in order to determine if the 5,000 acres was sufficient to avoid an
33 adverse effect on wintering waterfowl in the Suisun Marsh, or if additional mitigation would be
34 needed. Mitigation Measure BIO-179a, *Conduct Food Studies and Monitoring for Wintering Waterfowl*
35 *in Suisun Marsh*, would be available to address this potential effect.

36 **Yolo and Delta Basins:** The replacement of 1,400 acres of managed seasonal wetland with 19,000
37 acres of palustrine tidal wetlands in the Delta watershed, and the replacement of 600 acres of
38 managed seasonal wetlands with 2,000 acres of palustrine tidal wetlands in the Yolo watershed
39 would not be expected to have an adverse effect on food productivity, under the assumption that
40 these wetlands would provide adequate food sources. However, a monitoring component and a food
41 study in these tidal habitats would be necessary in order to demonstrate that there would be a less
42 than significant loss of food value in these habitats for wintering waterfowl. If it is determined from
43 monitoring that there in fact would be a significant loss in food productivity resulting from habitat
44 conversion to tidal wetlands, the protection and enhancement of managed wetlands in these
45 watersheds would require mitigation for the change in food biomass and quality. Mitigation

1 Measure *BIO-179b, Conduct Food Studies and Monitoring to Demonstrate Food Quality of Palustrine*
2 *Tidal Wetlands in the Yolo and Delta Basins*, would be available to address this uncertainty.

3 **NEPA Effects:** There is considerable uncertainty about the biomass and nutritional quality of
4 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify
5 the level of effect that Alternative 1C habitat loss or conversion would have. The BDCP has
6 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in
7 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal
8 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.
9 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced
10 productivity from conversion of managed seasonal wetlands under the assumptions that 1) existing
11 managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food
12 to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high
13 biomass and high-quality food. However, the food biomass and productivity in Suisun Marsh would
14 need to be quantified to determine if the 5,000 acres would be sufficient for Alternative 1C to avoid
15 an adverse effect on wintering waterfowl in the Suisun Marsh. Mitigation Measure *BIO-179a,*
16 *Conduct Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would be available to
17 address this adverse effect.

18 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal
19 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands
20 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter
21 food productivity for wintering waterfowl. However, the conclusion that these new wetlands would
22 provide adequate food sources is entirely dependent on assumptions about food production in
23 palustrine tidal habitats. Mitigation Measure *BIO-179b, Conduct Food Studies and Monitoring to*
24 *Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would be
25 available to address this uncertainty and avoid an adverse effect on wintering waterfowl.

26 **CEQA Conclusion:** There is considerable uncertainty about the biomass and nutritional quality of
27 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify
28 the level of impact that Alternative 1C habitat loss or conversion would have. The BDCP has
29 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in
30 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal
31 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.
32 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced
33 productivity resulting from conversion of managed seasonal wetlands under the assumptions that
34 1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-
35 quality food for wintering waterfowl and 2) protected seasonal wetlands can be managed to
36 produce high biomass and high-quality food. However, the food biomass and productivity in Suisun
37 Marsh would need to be quantified to determine if the 5,000 acres would be sufficient for
38 Alternative 1C to avoid having a significant impact on wintering waterfowl in the Suisun Marsh, or if
39 additional mitigation would be needed. Implementation of Mitigation Measure *BIO-179a, Conduct*
40 *Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would address this potential
41 significant impact.

42 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal
43 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands
44 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter
45 food productivity. However, the conclusion that these tidal wetlands would provide adequate food

1 sources for wintering waterfowl is entirely dependent on assumptions about food production in
2 palustrine tidal habitats. Studies of food biomass and food quality in palustrine tidal habitats are
3 needed to confirm that no mitigation for wintering waterfowl would be required in the Yolo and
4 Delta Basins. Implementation of Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring*
5 *to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would address
6 this uncertainty and would reduce this impact on wintering waterfowl to a less-than-significant
7 level.

8 **Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering**
9 **Waterfowl in Suisun Marsh**

10 Poorly managed wetlands (considered low biomass and food quality) will be identified and
11 managed by BDCP proponents to improve food quality and biomass. Studies will be required to
12 quantify 1) food production of existing managed wetlands in Suisun Marsh and 2) energetic
13 productivity of brackish and tidal marsh habitats. Protected wetlands will be monitored to
14 measure changes in the energetic productivity of these sites. Based on the food studies and
15 monitoring results, BDCP proponents will determine if the minimum commitment of 5,000 acres
16 is sufficient to meet the goal of 1:1 compensation for loss of wintering waterfowl habitat with
17 the protection and management of managed wetlands in perpetuity. If monitoring demonstrates
18 that additional acreage is needed to meet this goal, additional acreage of protection or creation
19 of managed wetlands and management will be required.

20 **Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate**
21 **Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins**

22 In order to address the uncertainty of the impact of loss of managed wetlands in the Yolo and
23 Delta Basins on wintering waterfowl, BDCP proponents will conduct food studies and
24 monitoring to demonstrate the food quality of palustrine tidal habitats in these basins. If studies
25 show that the assumption of no effect was inaccurate, and the food quality goal of 1:1
26 compensation for wintering waterfowl food value is not met, additional acreage of protection or
27 creation of managed wetland and management will be required.

28 **Impact BIO-180: Loss or Conversion of Habitat for Breeding Waterfowl from Implementation**
29 **of Conservation Components**

30 Implementation of Alternative 1C would reduce managed wetlands in the Yolo and Delta basins by
31 437 acres and 1,155 acres respectively. Under the assumption that 15% of these wetlands are
32 managed as semi-permanent wetlands, Alternative 1C implementation would reduce
33 semipermanent wetlands in the Yolo and Delta drainage basins by 77 acres and 203 acres
34 respectively. While a reduction in these semipermanent habitats would represent a habitat loss for
35 breeding waterfowl, with the restoration of 24,000 acres of palustrine tidal wetlands (Table 3-4,
36 Chapter 3) in the Yolo and Delta basins there would be a less than adverse effect on breeding
37 waterfowl. These palustrine habitats would presumably contain water during the breeding period
38 (i.e., March through July), and would be expected to compensate for the loss of 280 acres of managed
39 semi-permanent wetlands in the Yolo and Delta watersheds attributed to Alternative 1C.

40 **Suisun Marsh:** Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640
41 acres from the conversion of managed seasonal and semi-permanent wetlands to tidal habitats.
42 Some of the remaining seasonal wetlands could be managed as semi-permanent wetlands to offset

1 the loss of breeding habitat, but this could further reduce food supplies available to wintering
2 waterfowl under the assumption that semi-permanent wetlands provide few food resources
3 compared to seasonally managed habitats (Central Valley Joint Venture 2006).

4 The BDCP includes a commitment to protect and enhance 1,600 acres of permanently flooded
5 managed wetlands in Suisun Marsh to provide habitat for breeding waterfowl. In addition, 5,000
6 acres of semipermanent wetlands that would be protected and enhanced for wintering and
7 migratory waterfowl (Objective MWNC1.1, BDCP Chapter 3, *Conservation Strategy*).

8 Food studies and monitoring would be necessary to determine how increases in tidal marsh and
9 salinity levels would affect the overall reproductive capacity of the marsh. These studies would be
10 needed in order to quantify impacts on breeding waterfowl in Suisun Marsh and to determine not
11 only the number of acres that would compensate for loss of breeding habitat at a ratio of 1:1 for
12 habitat value, but how those acres should be managed. Mitigation Measure BIO-180, *Conduct Food
13 and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address the
14 uncertainty of this effect.

15 In addition to providing semipermanent wetlands to breeding waterfowl, the Suisun Marsh contains
16 several key upland areas that have significant nesting value. The largest block of upland habitat in
17 the region is the core area on the Grizzly Island Wildlife Area. This area does not overlap with the
18 hypothetical footprint for *CM4 Tidal Natural Communities Restoration*. However, this core area
19 includes over 2,000 acres of upland grasslands that have some of the highest duck nesting densities
20 in California (Central Valley Joint Venture 2006). A few small wetland areas are scattered within this
21 core grassland mosaic that provide necessary freshwater brooding habitat. If restoration footprints
22 were changed during the implementation process of BDCP to overlap with this area, the effects on
23 breeding waterfowl would likely be greatly increased.

24 **NEPA Effects:** Alternative 1C would reduce managed wetlands in the Yolo and Delta basins by 437
25 acres and 1,155 acres, respectively. Under the assumption that 15% of these wetlands are managed
26 as semi-permanent wetlands, Alternative 1C would reduce semi-permanent wetlands in the Yolo
27 and Delta drainage basins by 77 acres and 203 acres, respectively. The reduction in these semi-
28 permanent habitats would represent a habitat loss for breeding waterfowl. However, with the
29 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 1C
30 would not have an adverse effect on breeding waterfowl. These palustrine habitats would
31 presumably contain water during the breeding period (March through July), and would be expected
32 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta
33 watersheds attributed to Alternative 1C implementation. Total managed wetlands in Suisun Marsh
34 would decline from 41,012 acres to 30,640 acres with the conversion of managed seasonal and
35 semi-permanent wetlands to tidal habitats. Some of the remaining seasonal wetlands could be
36 managed as semi-permanent wetlands to offset the loss of breeding habitat, but such management
37 could further reduce food supplies available to wintering waterfowl under the assumption that
38 semi-permanent wetlands provide few food resources compared with seasonally managed habitats.
39 The protection and enhancement of 1,600 acres of permanently flooded managed wetlands would
40 provide habitat for breeding waterfowl. However, food studies and monitoring would be necessary
41 to determine how increases in tidal marsh and salinity levels would affect the overall reproductive
42 capacity of the marsh. Therefore, the loss of breeding waterfowl habitat resulting from
43 implementation of Alternative 1C could have an adverse effect. Mitigation Measure BIO-180, *Conduct
44 Food and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address

1 the uncertainty of model assumptions and the potential adverse effect of habitat conversion on
2 breeding waterfowl in Suisun Marsh.

3 **CEQA Conclusion:** Alternative 1C would reduce managed wetlands in the Yolo and Delta basins by
4 437 acres and 1,155 acres, respectively. Under the assumption that 15% of these wetlands are
5 managed as semi-permanent wetlands, Alternative 1C would reduce semi-permanent wetlands in
6 the Yolo and Delta drainage basins by 77 acres and 203, acres respectively. The reduction in these
7 semi-permanent habitats would represent a habitat loss for breeding waterfowl. However, with the
8 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 1C
9 would have a less-than-significant impact on breeding waterfowl. These palustrine habitats would
10 presumably contain water during the breeding period (March through July), and would be expected
11 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta
12 watersheds attributed to Alternative 1C.

13 Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640 acres with the
14 conversion of managed seasonal and semi-permanent wetlands to tidal habitats. Some of the
15 remaining seasonal wetlands could be managed as semi-permanent wetlands to offset the loss of
16 breeding habitat, but this management could further reduce food supplies available to wintering
17 waterfowl under the assumption that semi-permanent wetlands provide few food resources
18 compared with seasonally managed habitats. The protection and enhancement of 1,600 acres of
19 permanently flooded managed wetlands would provide habitat for breeding waterfowl. However,
20 food studies and monitoring would be necessary to determine how increases in tidal marsh and
21 salinity levels would affect the overall reproductive capacity of the marsh. Therefore, the loss or
22 conversion of habitat from implementation of Alternative 1C could have a significant impact on
23 breeding waterfowl in Suisun Marsh. Implementation of Mitigation Measure BIO-180, *Conduct Food
24 and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would address the uncertainty of
25 model assumptions and reduce the impact to a less-than-significant level.

26 **Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding** 27 **Waterfowl in Suisun Marsh**

28 To address the uncertainty of the impact of loss of managed wetlands in Suisun Marsh on
29 breeding waterfowl, BDCP proponents will conduct food studies and monitoring to determine
30 how increases in tidal marsh and salinity levels will affect the overall reproductive capacity of
31 the marsh.

32 The required studies will examine how increases in tidal marsh and salinity levels will affect the
33 overall reproductive capacity of the Marsh. Reproductive studies will address but will not be
34 limited to the following questions:

- 35 • How does the distribution of breeding waterfowl in Suisun Marsh differ in tidal versus
36 managed habitats and across salinity gradients?
- 37 • How does waterfowl nest success and nest density vary with respect to tidal versus
38 managed habitats and across salinity gradients?
- 39 • What are the patterns of habitat selection and movements by waterfowl broods in relation
40 to tidal vs. managed habitats, and are there impacts on duckling survival?

- 1 • What is the current relationship between waterfowl reproductive success and interactions
2 with alternate prey and predators, and how is tidal restoration likely to alter these
3 relationships?

4 **Impact BIO-181: Loss or Conversion of Habitat for Shorebirds from Implementation of**
5 **Conservation Components**

6 Shorebird use of the study area varies by species and fluctuates both geographically and by habitat
7 type throughout the year. Shallow flooded agricultural fields and wetlands support large numbers of
8 wintering and migrating shorebirds (Shuford et al. 1998), particularly least and western sandpipers,
9 dunlin, greater yellowlegs and long-billed dowitcher. Rice lands of the Sacramento Valley provide
10 important breeding habitat for shorebirds such as American avocet and black-necked stilt (Shuford
11 et al. 2004) and have been designated as a Western Hemisphere Shorebird Reserve Network Site of
12 International Importance (Hickey et al. 2003). Managed wetlands provide suitable foraging and
13 roosting habitat for shorebirds; black-necked stilts, avocets, and yellowlegs use this habitat type
14 almost exclusively. Water depth in all of these habitat types is an important habitat variable as the
15 majority of shorebird species require water depths of approximately 10–20cm for foraging (Isola et
16 al. 2000, Hickey et al. 2003).

17 **Managed Wetlands**

18 **Yolo Basin:** Primarily as a result of *CM4 Tidal Natural Communities Restoration* within the Yolo
19 Basin, 1,185 acres of managed wetland habitat would be permanently converted; 1,066 acres of
20 which are protected. In addition, 42 acres of managed wetland habitat would be temporarily lost by
21 construction-related activities associated with tidal restoration (CM4) and fisheries enhancement
22 activities (CM2). Increased inundation frequency, depth and duration associated with the ongoing
23 operation of a modified Fremont Weir (CM2) could periodically affect managed wetlands ranging
24 from an estimated 643 acres during a notch flow of 1,000 cfs to an estimated 2,055 acres during a
25 notch flow of 4,000 cfs (Table 5.4-2, in BDCP Chapter 5, *Effects Analysis*) in the Yolo Basin.

26 **Delta Basin:** Within the Delta Basin, 90 acres of managed wetland habitat would be permanently
27 converted, as a result of tidal restoration (CM4). Thirteen of the 90 acres are protected (Table 3, ICF
28 International 2013). Periodic flooding would not affect this natural community type in Delta Basin.

29 **Suisun Basin:** Within the Suisun Basin, 11,532 acres of managed wetland habitat would be
30 permanently converted as a result of tidal restoration (CM4); 10,354 of which are protected. (Table
31 4, ICF International 2013). Periodic flooding would not affect this natural community type in Suisun
32 Basin.

33 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for
34 managed wetland habitat suitability (Table 1, ICF International 2013): black-necked stilt
35 (*Himantopus mexicanus*), greater yellowlegs (*Tringa melanoleuca*), and long-billed dowitcher
36 (*Limnodromus scolopaceus*). Dunlin (*Calidris alpina*), least sandpiper (*Calidris minutilla*),
37 semipalmated plover (*Charadrius semipalmatus*), and western sandpiper (*Calidris mauri*), had a rank
38 2 for managed wetland habitat suitability. Black-bellied plover (*Pluvialis squatarola*) and whimbrel
39 (*Numenius phaeopus*) both had rank 3 for managed wetland habitat suitability.

40 Managed wetlands would decrease in overall extent by 20% (Table 5, ICF International 2013). Most
41 of this loss would occur in Suisun with some additional acreage loss in the Yolo Basin. The loss of
42 managed wetland habitat for covered species and waterfowl would be compensated for with 8,200

1 acres remaining managed wetland protection in Suisun Marsh. Of these 8,200 acres, the 5,000 acres
2 of seasonal wetland protected, enhanced, and managed to provide overwintering waterfowl foraging
3 habitat would be the habitat type most likely to benefit overwintering shorebirds. However, the
4 1,600 acres of semi-permanent and permanent managed wetlands for breeding waterfowl and 1,500
5 acres of managed wetlands for salt marsh harvest mouse would also be expected to have some
6 benefit to wintering and breeding shorebirds.

7 **Cultivated Lands**

8 **Yolo Basin:** Primarily as a result of tidal restoration (CM4) and Fisheries Enhancement activities
9 (CM2) within the Yolo Basin, 8,309 acres of cultivated lands would be permanently converted; 1,272
10 acres of which are protected. Also within the Yolo Basin, increased inundation frequency, depth and
11 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could affect an
12 estimated 3,219 acres of cultivated lands during a notch flow of 1,000 cfs to an estimated 5,512
13 acres during a notch flow of 6,000 cfs (Table 5.4-2 in BDCP Chapter 5, *Effects Analysis*).

14 **Delta Basin:** Within the Delta Basin, as a result of tidal restoration (CM4) and floodplain restoration
15 (CM5), 25,633 acres of cultivated lands would be permanently converted. There would also be an
16 additional 112 acres lost temporarily due to CM5 activities. Of the total permanently converted
17 lands, 3,925 acres are protected (Table 3, ICF International 2013). Seasonal flooding (CM5) on the
18 restored floodplain would periodically affect 738 acres of cultivated lands in Delta.

19 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for
20 cultivated lands habitat suitability (Table 1, ICF International 2013): killdeer (*Charadrius*
21 *vociferous*), long-billed curlew, and whimbrel within pasture habitat. Long-billed dowitcher and
22 killdeer both had a rank 2 for idle crop habitat suitability and black-bellied plover was ranked 2 for
23 pasture habitat. Red-necked phalarope (*Phalaropus lobatus*) and Wilson's phalarope (*Phalaropus*
24 *tricolor*) were both ranked 2 for grain and hay crops. Long-billed dowitcher, dunlin, least sandpiper,
25 and long-billed curlew were all ranked 3 for rice habitat suitability and killdeer was ranked 3 for
26 field crop habitat suitability.

27 Cultivated land loss would occur in all three basins, but the majority of acreage loss would occur in
28 the Delta basin. Pasture crop types would decrease in overall extent by 15% over baseline (Table 5,
29 ICF International 2013), but would increase in protection by 135%. More than half of all cultivated
30 lands within the 48,000-acre BDCP cultivated lands reserve would be in pasture production
31 (primarily alfalfa) and enhanced and managed to benefit Swainson's hawk. Idle crop types are not
32 identified as a specific conservation target in the BDCP, are expected to occur within the reserve and
33 are recognized in the BDCP as having "moderate" foraging habitat value for Swainson's hawk, white-
34 tailed kite, and greater sandhill crane.

35 Grain and hay crop would be expected to decrease by 13% (Table 5, ICF International 2013) while
36 protection, enhancement and management would be expected to increase by 28% (Table 6, ICF
37 International 2013). These crop types would be managed for a tricolored blackbirds, Swainson's
38 hawk, white-tailed kite, greater sandhill crane, and burrowing owls.

39 Rice would decrease in overall extent by 2% (Table 5, ICF International 2013) but increase in total
40 protection by 57%. Rice lands would be protected, enhanced, and managed for the benefit for giant
41 garter snake.

1 **Tidal Wetlands**

2 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)
3 within the Yolo Basin, 194 acres of tidal wetland habitat would be permanently converted; 180 acres
4 of which are protected. In addition, 12 acres of tidal wetland habitat would be temporarily lost by
5 construction-related activities associated with Fisheries Enhancement activities (CM2) (Table 2, ICF
6 International 2013). Periodic flooding in Yolo Bypass would affect 3,957 acres of tidal wetlands in
7 Yolo Basin.

8 **Delta Basin:** Within the Delta Basin, 54 acres of tidal wetlands would be permanently converted as
9 a result of tidal restoration (CM4) (Table 3, ICF International 2013). Of the total permanently
10 converted lands, 26 acres are protected. Periodic flooding in Yolo Bypass would affect 26 acres of
11 tidal wetlands in Delta Basin.

12 **Suisun Basin:** Within the Suisun Basin, 219 acres of tidal wetland habitat would be permanently
13 converted as a result of tidal restoration (CM4); 215 of which are protected. (Table 4, ICF
14 International 2013). Periodic flooding would not affect this natural community type in Suisun Basin.

15 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for
16 tidal mudflat habitat suitability (Table 6, ICF International 2013): black-bellied plover, dunlin, least
17 sandpiper, marbled godwit (*Limosa fedoa*), semipalmated plover, short-billed dowitcher
18 (*Limnodromus griseus*), western sandpiper, and willet (*Tringa semipalmata*). Long-billed curlew
19 (*Numenius americanus*) and whimbrel both had a rank 2 for tidal mudflat habitat suitability.
20 American avocet (*Recurvirostra americana*) was ranked 3 for tidal mudflat habitat suitability. For
21 tidal brackish emergent wetland/tidal freshwater emergent wetland, willet was ranked 2 and long-
22 billed curlew and whimbrel were both ranked 3 for habitat suitability.

23 Tidal mudflat habitat would be estimated to increase in extent by 1,780 acres. This extremely large
24 increase in tidal mudflat habitat would occur almost exclusively in Suisun Marsh as the result of
25 tidal restoration and the conversion of existing mid- and high-marsh types to low marsh and tidal
26 mudflats in response to sea level rise. BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*,
27 details the methods and assumptions modeled to come about this result. Tidal mudflat habitats
28 would be expected to require management, however, sediment augmentation has been discussed as
29 an experimental method that could be employed in places like Suisun to combat the loss of intertidal
30 marshes in the face of sea level rise and reduced sediment supplies.

31 Tidal emergent wetland habitat would increase in extent by 152% (Table 5, ICF International 2013).
32 Of the 30,000 acres of emergent wetland restoration, 6,000 acres would be in the Suisun Basin and
33 the rest would be distributed between the Yolo and Delta Basins. Enhancement and management on
34 these lands would be likely to be focused on nonnative, invasive species management. Any
35 additional actions in Suisun would be focused on salt marsh harvest mouse, Suisun shrew, California
36 clapper rail, black rail, Suisun thistle, and soft bird's-beak. In freshwater marshes, enhancement and
37 management would be likely to focus on black rail, western pond turtle, and, in some cases, giant
38 garter snake.

39 **Nontidal Wetlands**

40 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)
41 within the Yolo Basin, 313 acres of nontidal wetland habitat would be permanently converted; 119
42 acres of which are protected. In addition, 11 acres of nontidal wetland habitat would be temporarily
43 lost by construction-related activities associated with Fisheries Enhancement activities (CM2)

1 (Table 2, ICF International 2013). Periodic flooding in Yolo Bypass associated with ongoing Fremont
2 Weir operation (CM2) would affect 305 acres of nontidal wetlands in Yolo Basin, specifically
3 nontidal perennial aquatic habitat.

4 **Delta Basin:** Within the Delta Basin, 99 acres of nontidal wetlands would be permanently converted
5 as a result of tidal restoration (CM4) and floodplain restoration (CM5) (Table 3, ICF International
6 2013). There would also be 8 acres of nontidal perennial aquatic habitat temporarily lost from CM5
7 activities. Of the total permanently converted lands, 29 acres are protected. Periodic flooding from
8 CM5 would affect 4 acres of nontidal perennial aquatic habitat in Delta Basin.

9 **Suisun Basin:** Within the Suisun Basin, 1 acre of nontidal wetland habitat, specifically vernal pool
10 complex, would be permanently converted as a result of tidal restoration (CM4); and is not
11 protected. (Table 4, ICF International 2013). Periodic flooding would not affect this natural
12 community type in Suisun Basin.

13 According to Stralberg et al. 2010, the following species of shorebirds had a rank 1 designation for
14 nontidal wetland habitat suitability (Table 6, ICF International 2013): red-necked phalarope and
15 Wilson's phalarope for nontidal freshwater perennial emergent wetland and American avocet for
16 alkali seasonal wetland complex. Greater yellowlegs had a rank 2 for vernal pool complex habitat
17 suitability. Red-necked phalarope and western sandpiper were both ranked 3 for alkali seasonal
18 wetland habitat suitability and greater yellowlegs was ranked 3 for nontidal freshwater perennial
19 emergent wetland habitat suitability.

20 Nontidal freshwater emergent wetland would increase in extent by 88% as a result of BDCP
21 implementation (Table 5, ICF International 2013). These lands would be managed to benefit giant
22 garter snake and located within the Delta Basin (likely in the vicinity of White Slough) and the Yolo
23 Basin (in the Cache Slough area).

24 Impacts on wetted acres of vernal pool complex and alkali seasonal wetland complex would be
25 avoided and thus loss of this community is not expected. However, up to 10 acres of wetted acre loss
26 could be permitted under the Plan. Protection of vernal pool complex natural community would
27 increase by 13% and by 6% for alkali seasonal wetlands (Table 6, ICF International 2013).
28 Protection of these two community types would enhance and manage habitat for vernal pool
29 crustaceans and alkali-related plant species.

30 The protection and restoration of natural communities would also include management and
31 enhancement actions under *CM11 Natural Communities Enhancement and Management*. The
32 following management activities to benefit shorebirds would be considered for implementation
33 under CM11, in areas where they would not conflict with covered species management.

34 ● **Managed Wetlands**

- 35 ○ Managed wetlands can be potentially manipulated to provide the optimum water depths for
36 foraging shorebirds and islands for nesting (Hickey et al. 2003).
- 37 ○ During fall and spring, stagger the timing and location of draining and flooding to optimize
38 the extent of shallow-water habitat; varying depths within the wetland unit helps to create
39 temporal variation in foraging opportunities. During warm, dry springs when wetland units
40 dry quickly, wetland units can be re-supplied with water to extend habitat availability for
41 shorebirds.

- 1 ○ Provide open, shallow water habitat adjacent to minimally vegetated, shallowly sloped
2 edges for nesting shorebirds between April and July.
- 3 ○ Provide islands with little to no vegetation to increase the likelihood of shorebird roosting
4 and nesting.
- 5 ○ Create low slopes on islands and levees; gradual angles (10-12:1) are better than steep
6 angles.
- 7 ○ Limit levee maintenance during the nesting season (April through July). However, mowing
8 the center of levees is fine.
- 9 ○ Potentially add material to levees or to islands to encourage nesting for some species.
- 10 ● Cultivated Lands
- 11 ○ Maintaining a mosaic of dry and flooded crop types, and varying water depths will promote
12 a diverse community of waterbirds, including shorebirds, during fall migration and winter
13 (Shuford et al. 2013).
- 14 ○ To provide wintering habitat for multiple waterbird guilds, including shorebirds, use a
15 combination of flooding practices that include one-time water application and maintenance
16 flooding while also providing unflooded habitat (Strum et al. *in review*).
- 17 ○ The post-harvest flooding of winter wheat and potato fields in early fall (July- September)
18 can provide substantial benefits to shorebirds at a time of very limited shallow-water
19 habitat on the landscape (Shuford et al. 2013).
- 20 ○ Stagger the drawdown of flooded rice and other winter-flooded agricultural fields to
21 prolong the availability of flooded habitat (Iglecia et al. 2012). Be aware of soil type because
22 this practice may not be as effective on soils that drain quickly.
- 23 ○ Remove as much stubble as possible in rice and other agricultural fields after harvest to
24 increase the potential shorebird habitat on intentionally flooded or unflooded fields that
25 may passively gather rain water (Iglecia et al. 2012).
- 26 ○ Shallowly flood available agricultural fields during July, August, and September to provide
27 early fall migration habitat for shorebirds. Fields should be free of vegetation prior to
28 flooding, have minimal micro-topography (e.g., no large clods), and should remain flooded
29 for up to three week periods (after three weeks, vegetation encroachment reduces habitat
30 value for shorebirds; ICF International 2013).
- 31 ○ Manage levee habitats to have minimal vegetation but do not spray herbicide directly or
32 drive on levees during the nesting season (April- July, Iglecia et al. 2012).
- 33 ○ Maintain a minimum top-width of 30 inches for levees, based on increased avocet use of
34 wider levees (Iglecia et al. 2012).
- 35 ○ When possible, flood fields with nesting habitat (modified levees and islands) in late April to
36 provide nesting habitat for American avocets (Iglecia et al. 2012).
- 37 ○ Finer grained substrate (clods smaller than a fist) in rice and other agricultural fields may be
38 more appealing for nesting shorebirds (Iglecia et al. 2012).
- 39 ○ Maintain gently sloping levees and island sides (10-12:1; Iglecia et al. 2012).

- Islands should be disked along with the rest of the field after harvest to help inhibit vegetation growth (Iglecia et al. 2012).

NEPA Effects: Alternative 1C implementation would result in the conversion of managed wetland and cultivated lands to tidal natural communities, including tidal mudflat. The result would be substantial loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs, and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and willet. While substantial losses of cultivated lands would be incurred, protection, enhancement, and management of the remaining acres would likely have substantial benefits for select species of wintering and breeding shorebirds. This is because impacts on crop types would be distributed across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn, and rice types. While the protection, enhancement, and management of these crop types are being driven by covered species, these management actions would also benefit shorebirds. The protection, enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation for the loss of substantial acreage, would have some incremental benefits for shorebirds, but would be unlikely to compensate for the overall loss. However, with the protection and restoration of acres in the Delta and Yolo watersheds, in addition to the implementation of the management actions outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would not be expected to result in an adverse effect on shorebird populations in the study area.

CEQA Conclusion: Alternative 1C implementation would result in the conversion of managed wetland and cultivated lands to tidal natural communities, including tidal mudflat. The result would be significant loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs, and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and willet. While significant losses of cultivated lands would be incurred, protection, enhancement, and management of the remaining acres would likely have substantial benefits for select species of wintering and breeding shorebirds. This is because impacts on crop types would be distributed across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn, and rice types. While the protection, enhancement, and management of these types are being driven by covered species, these management actions would also benefit shorebirds. The protection, enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation for substantial acreage loss, would have some incremental benefits for shorebirds, but would be unlikely to compensate for the overall loss. However, with the protection and restoration of acres in the Delta and Yolo watersheds, in addition to the implementation of the management actions outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would be expected to have a less-than-significant impact on shorebird populations in the study area.

Impact BIO-182: Effects on Shorebirds and Waterfowl Associated with Electrical Transmission Facilities

New transmission lines installed in the study area would increase the risk for bird-power line strikes, which could result in injury or mortality of shorebirds and waterfowl. The existing network of power lines in the study currently poses a risk for shorebirds and waterfowl in the Delta. New transmission lines would increase this risk and have an adverse effect on shorebird and waterfowl species in the absence of other conservation actions. The implementation of *AMM20 Greater Sandhill Crane* would reduce potential effects through the installation of flight-diverters on new transmission lines, and selected existing transmission lines in the study area.

1 **NEPA Effects:** New transmission lines would increase the risk for shorebird and waterfowl power
2 line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the potential effect of the
3 construction of new transmission lines on shorebird and waterfowl would not be adverse.

4 **CEQA Conclusion:** New transmission lines would increase the risk for shorebird and waterfowl
5 power line strikes. The implementation of *AMM20 Greater Sandhill Crane* would reduce the potential
6 impact of the construction of new transmission lines on shorebirds and waterfowl to a less-than-
7 significant level.

8 **Impact BIO-183: Indirect Effects of Plan Implementation on Shorebirds and Waterfowl**

9 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
10 with construction-related activities could result in temporary disturbances that affect shorebird and
11 waterfowl use of modeled habitat. Indirect effects associated with construction include noise, dust,
12 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
13 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
14 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
15 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
16 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use
17 of mechanical equipment during water conveyance construction could cause the accidental release
18 of petroleum or other contaminants that could affect shorebirds and waterfowl or their prey in the
19 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
20 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge
21 of sediment or excessive dust adjacent to shorebirds and waterfowl in the study area could also have
22 a negative effect on these species. AMM1–AMM7 would ensure that measures were in place to
23 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to
24 work areas.

25 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
26 mercury in avian species, including shorebird and waterfowl species. Marsh (tidal and nontidal) and
27 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
28 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
29 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
30 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
31 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity
32 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-
33 specific effects. Increased methylmercury associated with natural community and floodplain
34 restoration could indirectly affect shorebirds and waterfowl, via uptake in lower trophic levels (as
35 described in BDCP Appendix 5.D, *Contaminants*).

36 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
37 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
38 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
39 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
40 adaptive management as described in CM12 would be available to address the uncertainty of
41 methylmercury levels in restored tidal marsh and potential impacts on shorebirds and waterfowl.

42 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
43 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
44 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,

1 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
2 2009). The effect of selenium toxicity differs widely between species and also between age and sex
3 classes within a species. In addition, the effect of selenium on a species can be confounded by
4 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
5 2009).

6 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
7 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
8 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
9 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
10 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
11 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
12 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
13 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
14 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
15 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
16 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
17 levels of selenium have a higher risk of selenium toxicity.

18 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
19 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
20 exacerbate bioaccumulation of selenium in avian species, including shorebird and waterfowl
21 species. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
22 selenium, and therefore increase avian exposure from ingestion of prey items with elevated
23 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase
24 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).
25 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was
26 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
27 in substantial, long-term increases in selenium concentrations in water in the Delta under any
28 alternative. However, it is difficult to determine whether the effects of potential increases in
29 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)
30 would lead to adverse effects on shorebirds and waterfowl species.

31 Because of the uncertainty that exists at this programmatic level of review, there could be a
32 substantial effect on shorebirds and waterfowl from increases in selenium associated with
33 restoration activities. This effect would be addressed through the implementation of *AMM27*
34 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
35 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
36 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
37 selenium management to reduce selenium concentrations and/or bioaccumulation would be
38 evaluated separately for each restoration effort as part of design and implementation. This
39 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
40 design schedule.

41 **NEPA Effects:** Noise and visual disturbances from the construction of Alternative 1C water
42 conveyance facilities could reduce shorebird and waterfowl use of modeled habitat adjacent to work
43 areas. Moreover, operation and maintenance of the water conveyance facilities, including the
44 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could
45 affect shorebird and waterfowl use of the surrounding habitat. AMM1–AMM7 would minimize these

1 effects, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
2 *Disturbance of Nesting Birds*, would be available to address adverse effects on nesting individuals.
3 Tidal habitat restoration could result in increased exposure of shorebirds and waterfowl to
4 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
5 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
6 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the
7 indirect effects associated with noise and visual disturbances, and increased exposure to selenium
8 from Alternative 1C implementation would not have an adverse effect on shorebirds and waterfowl.
9 Tidal habitat restoration is unlikely to have an adverse effect on shorebirds and waterfowl through
10 increased exposure to methylmercury, as these species currently nest and forage in tidal marshes
11 with elevated methylmercury levels. However, it is unknown what concentrations of methylmercury
12 are harmful to species of waterfowl and shorebirds, and the potential for increased exposure would
13 vary substantially within the study area. Site-specific restoration plans in addition to monitoring and
14 adaptive management, described in *CM12 Methylmercury Management*, would address the
15 uncertainty of methylmercury levels in restored tidal marsh. Once site-specific sampling and other
16 information is developed, the site-specific planning phase of marsh restoration would be the
17 appropriate place to assess the potential risk of shorebird and waterfowl exposure to
18 methylmercury.

19 **CEQA Conclusion:** Noise, potential hazardous spills, and increased dust and sedimentation as a
20 result of Alternative 1C water conveyance facilities construction and operation and maintenance
21 would have a significant impact on shorebirds and waterfowl. AMM1–AMM7 would minimize these
22 impacts, and implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
23 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce the impacts to a less-than-significant
24 level. Tidal habitat restoration is unlikely to have a significant impact on shorebirds and waterfowl
25 species through increased exposure to methylmercury, as these species currently nest and forage in
26 tidal marshes with elevated methylmercury levels. However, it is unknown what concentrations of
27 methylmercury are harmful to species of waterfowl and shorebirds. Site-specific restoration plans
28 that address the creation and mobilization of mercury, as well as the monitoring and adaptive
29 management described in *CM12*, would be the appropriate place to assess the potential risk of
30 shorebird and waterfowl exposure to methylmercury in the study area. Tidal habitat restoration
31 could result in increased exposure of shorebirds and waterfowl to selenium. This effect would be
32 addressed through the implementation of *AMM27 Selenium Management*, which would provide
33 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
34 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 1C
35 implementation would have a less-than-significant impact on shorebirds and waterfowl.

36 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
37 **Disturbance of Nesting Birds**

38 See Mitigation Measure BIO-75 under Impact BIO-75.

39 **Common Wildlife and Plants**

40 Common wildlife and plants are widespread, often abundant, species that are not covered under
41 laws or regulations that address conservation or protection of individual species. Examples of
42 common wildlife and plants occurring in the study area are provided within the discussion for each
43 natural community type in Section 12.1.2.2, *Special-Status and Other Natural Communities*. Impacts

1 on common wildlife and plants would occur through the same mechanisms discussed for natural
2 communities and special-status wildlife and plants for each alternative.

3 **Impact BIO-184: Effects on Habitat and Populations of Common Wildlife and Plants**

4 Effects on habitat of common wildlife and plants, including habitat removal and conversion, are
5 discussed in the analysis of Alternative 1C effects on natural communities (Impacts BIO-1 through
6 BIO-31). In general, effects on habitat of common wildlife and plants would not be adverse because
7 effects would be greatly offset by protection, restoration and other conservation activities contained
8 in the BDCP, including *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural*
9 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM6 Channel Margin*
10 *Enhancement*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community*
11 *Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM10 Nontidal Marsh*
12 *Restoration*, and *CM11 Natural Communities Enhancement and Management*. In addition, the AMMs
13 contained in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, are in place to reduce or
14 eliminate the potential to adversely affect both special-status and common wildlife and plants.

15 Direct effects on common wildlife and plants from constructing water conveyance facilities and
16 implementing Alternative 1C conservation measures would include construction or inundation-
17 related disturbances that result in injury or mortality of wildlife or plants and the immediate
18 displacement of wildlife, including increased traffic on local roads from construction vehicles that
19 could increase wildlife mortality and impede wildlife movement. Effects of construction traffic on
20 wildlife moving in the vicinity of Stone Lakes NWR would be minimized by *AMM20 Greater Sandhill*
21 *Crane*, which includes a measure for the installation of a vegetation screen or other noise and visual
22 barrier along Hood Frankling Road for the benefit of cranes, which would be a minimum of 5 feet
23 high (above the adjacent elevated road, if applicable) and would provide a continuous surface
24 impenetrable by light. This measure would potentially direct wildlife wishing to cross Hood Franklin
25 Road toward the overcrossing of the canal that links the Stone Lakes properties (just east of the
26 town of Hood). The overcrossing includes strips of terrestrial habitat on either side of the canal.

27 Indirect effects include project-related disturbances to nearby wildlife and plants during
28 construction (e.g., disruption of breeding and foraging behaviors, fugitive dust, runoff) and effects
29 occurring later in time (e.g., collisions of birds with transmission lines, habitat fragmentation).
30 Indirect effects could result both from construction and from operations and maintenance (e.g.,
31 ground disturbances could result in the spread and establishment of invasive plants or noxious
32 weeds).

33 **NEPA Effects:** The effects of constructing water conveyance facilities and restoring tidal and other
34 habitats associated with Alternative 1C would not be adverse to common wildlife and plants
35 because conservation measures to avoid or minimize effects on special-status species, to prevent the
36 introduction and spread of invasive species, and to enhance natural communities would result in
37 avoiding and minimizing effects on common wildlife and plants as well.

38 **CEQA Conclusion:** Construction and operation of the water conveyance facilities and habitat
39 restoration activities would have impacts on common wildlife and plants in the study area through
40 habitat loss and through direct or indirect loss or injury of individuals. The loss of habitat would not
41 be substantial, because habitat restoration would increase the amount and extent of habitat
42 available for use by common wildlife and plant species. Conservation measures to avoid or minimize
43 effects on special-status species, to prevent the introduction and spread of invasive species, and to
44 enhance natural communities also would result in avoiding and minimizing effects on common

1 wildlife and plants. Consequently, implementation of Alternative 1C is not expected to cause any
2 populations of common wildlife or plants to drop below self-sustaining levels, and this impact would
3 be less than significant. No mitigation would be required.

4 **Wildlife Corridors**

5 Essential Connectivity Areas (ECAs) are lands likely to be important to wildlife movement between
6 large, mostly natural areas at the state wide level. The ECAs form a functional network of wildlands
7 that are considered important to the continued support of California's diverse natural communities.
8 Four general areas were identified within the study area that contain ECAs (Figure 12-2). The BDCP
9 also identified important landscape linkages in the Plan Area to guide reserve design, which can also
10 be seen on Figure 12-2.

11 **Impact BIO-185: Effect of BDCP Conservation Measures on Wildlife Corridors**

12 Alternative 1C water conveyance facilities would cross one of the ECAs identified during the
13 analysis, the Stone Lake-Yolo Bypass ECA. The conveyance facilities would also cross one landscape
14 linkage identified in the BDCP, the *West to Contra Costa County* linkage (#2 in Figure 12-2). Though
15 the conveyance facilities shown on Figure 12-2 overlap with the line representing the *Yolo Bypass*
16 (#3 in Figure 12-2) and the *Sacramento River* linkage (#9 in Figure 12-2) these lines generally
17 represent the course of the flooded Yolo Bypass and Sacramento River, respectively, and are
18 intended to address the needs of fish species and will thus not be addressed in this chapter.

19 The construction of Intakes 1 and 2 and associated borrow/spoils areas near Clarksburg would
20 occur within the Stone Lake-Yolo Bypass ECA. These activities would result in the permanent loss of
21 narrow strips of riparian vegetation along the Sacramento River and the permanent and temporary
22 loss of agricultural lands. These habitat losses would not substantially impede the movement of any
23 wildlife that could move from Stone Lakes to Yolo Bypass because the Sacramento River and
24 Sacramento Deep Water Shipping Channel already create a barrier to dispersal for nonavian species
25 and the loss of the narrow strips of riparian vegetation and agricultural lands would not impede the
26 movement of bird species between these areas. Though the loss of the narrow strips of riparian
27 vegetation and cultivated lands would not substantially impede the movement of bird species
28 between these areas the addition of new transmission lines could adversely affect birds during
29 periods of low visibility. Sandhill cranes that are known to roost at Stones Lakes could particularly
30 be adversely affected by the addition of the north-south running transmission line to the west of
31 Stone Lakes (see impact discussions for greater and lesser sandhill cranes). One record for
32 Swainson's hawk would be affected by a borrow/spoils area. These effects are addressed in the
33 Swainson's hawk effects analysis.

34 In general, the Alternative 1C conveyance canal would create a substantial barrier to the movement
35 of nonavian terrestrial wildlife from north to south in CZ 3 from Hood west to the Sacramento Deep
36 Water Ship Channel, from east to west where the canal turns to the south to where the canal flows
37 into the pipeline, and another barrier from east to west from where the pipeline spills into the canal
38 east of Oakley south to where the canal would flow into the Byron Tract Forebay. There are records
39 of Swainson's hawk, burrowing owl, and pond turtle that would be impacted by the canal but would
40 not likely isolate any known populations of special-status species (California Department of Fish and
41 Wildlife 2013). Transmission lines associated with this alternative could also affect the movement of
42 avian species during periods of low visibility. Sandhill cranes are known to roost in the vicinity of a

1 few of the lines, yet in general these lines are further to the west of the major roost sites and likely
2 flight paths.

3 The Alternative 1C canal, work areas, and potential borrow and spoils area cross the *West to Contra*
4 *Costa County* linkage just west of Clifton Court Forebay. This linkage was established to guide
5 restoration and protection to provide habitat connectivity for vernal pool and alkali seasonal
6 wetland species, California red-legged frog, California tiger salamander, and San Joaquin kit fox
7 between the Plan Area and lands protected to the west in East Contra Costa County. The
8 construction of these conveyance features would impact habitat and known populations vernal pool
9 fairy shrimp, California tiger salamander, and California red-legged frog. The canal would not be a
10 barrier for species moving from Clifton Court Forebay to the west because it is right up against the
11 forebay but would remove and impact populations that are linked to populations to the west. The
12 temporary work area on the west side of Italian Slough, where there is a record for California red-
13 legged frog, would not serve as permanent barrier between this population and ones to the west.

14 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*
15 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*
16 *Restoration*). These activities would generally improve the movement of wildlife within and outside
17 of the study area. In addition, the preservation of restored lands (CM3) and the enhancement and
18 management of these areas (CM11) would improve and maintain wildlife corridors within the study
19 area.

20 **NEPA Effects:** Despite the contributions from restoration and protection activities, Alternative 1C
21 would create a substantial barrier to the movement of nonavian terrestrial wildlife in the central
22 portion of the study area and the east-west movement of wildlife in south-central Delta to the west,
23 and create barriers to safe movement of avian species during periods of low visibility. Alternative 1C
24 would adversely affect wildlife corridors within the study area.

25 **CEQA Conclusion:** Alternative 1C water conveyance facilities would create a substantial barrier to
26 the movement of nonavian terrestrial wildlife from north to south in CZ 3 from Hood west to the
27 Sacramento Deep Water Ship Channel, from east to west where the canal turns to the south to where
28 the canal flows into the pipeline, and another barrier from east to west from where the pipeline
29 spills into the canal east of Oakley, south to where the canal would flow into the Byron Tract
30 Forebay. There are records of Swainson's hawk, burrowing owl, and pond turtle that would be
31 impacted by the canal but would not likely isolate any known populations of special-status species
32 (California Department of Fish and Wildlife 2013). Transmission lines associated with this
33 alternative could also affect the movement of avian species during periods of low visibility. Sandhill
34 cranes are known to roost in the vicinity of a few of the lines, yet in general these lines are further to
35 the west of the major roost sites and likely flight paths.

36 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*
37 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*
38 *Restoration*). These activities would generally improve the movement of wildlife within and outside
39 of the study area. In addition, the preservation of restored lands (CM3) and the enhancement and
40 management of these areas (CM11) would improve and maintain wildlife corridors within the study
41 area.

1 Despite the contributions from restoration and protection activities, Alternative 1C would create a
2 substantial barrier to the movement of nonavian terrestrial wildlife the central portion of the study
3 area and create barriers to safe movement of avian species during periods of low visibility.
4 Alternative 1C would result in significant unavoidable impacts on wildlife corridors within the study
5 area. There is no practicable mitigation measure to reduce this impact to a less-than-significant
6 level.

7 **Invasive Plant Species**

8 The invasive plant species that primarily affect each natural community in the study area, which
9 include water hyacinth, perennial pepperweed, giant reed, and Brazilian waterweed, are discussed
10 in Section 12.1.4. Invasive species compete with native species for resources and can alter natural
11 communities by altering fire regimes, hydrology (e.g., sedimentation and erosion), light availability,
12 nutrient cycling, and soil chemistry but also have the potential to harm human health and the
13 economy by adversely affecting natural ecosystems, water delivery, flood protection systems,
14 recreation, agricultural lands, and developed areas (Randall and Hoshovsky 2000). The construction
15 and restoration activities covered under the BDCP could result in the introduction or spread of
16 invasive plant species by creating temporary ground disturbance that provides opportunities for
17 colonization by invasive plants in the study area.

18 The primary mechanisms for the introduction of invasive plants as the result of implementation of
19 the BDCP are:

- 20 ● Grading, excavation, grubbing, and placement of fill material.
- 21 ● Breaching, modification, or removal of existing levees and construction of new levees.
- 22 ● Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,
23 electric transmission and gas lines, irrigation infrastructure).
- 24 ● Maintenance of infrastructure.
- 25 ● Removal of existing vegetation and planting/seeding of vegetation.
- 26 ● Maintaining vegetation and vegetation structure (e.g., grazing, mowing, burning, trimming).
- 27 ● Dredging waterways.

28 Clearing operations and the movement of vehicles, equipment, and construction materials in the
29 study area would facilitate the introduction and spread of invasive plants by bringing in or moving
30 seeds and other propagules. These effects would result from:

- 31 ● Spreading chipped vegetative material from clearing operations over topsoil after earthwork
32 operations are complete.
- 33 ● Importing, distributing, storing, or disposing of fill, reusable tunnel material, borrow, spoil, or
34 dredge material.
- 35 ● Traffic from construction vehicles (e.g., water and cement trucks) and personal vehicles of
36 construction staff.
- 37 ● Transport of construction materials and equipment within the study area and to/from the study
38 area.

1 Table 12-1C-70 lists the acreages of temporary disturbance in each natural community in the study
2 area that would result from implementation of Alternative 1C of the BDCP.

3 **Table 12-1C-70. Summary of Temporary Disturbance in Natural Communities under Alternative 1C**

Natural Community	Temporary Impacts (acres)
Tidal perennial aquatic	133
Tidal brackish emergent wetland	0
Tidal freshwater emergent wetland	2
Valley foothill riparian	209
Grassland	594
Inland dune scrub	0
Alkali seasonal wetland complex	9
Vernal pool complex	37
Other natural seasonal wetland	2
Nontidal freshwater perennial emergent wetland	6
Nontidal perennial aquatic	48
Managed wetlands	189
Cultivated lands	11,038
Total	12,267

4

5 **Impact BIO-186: Adverse Effects on Natural Communities Resulting from the Introduction**
6 **and Spread of Invasive Plant Species**

7 Under Alternative 1C, the BDCP would have adverse effects on natural communities from the
8 introduction and spread of invasive plant species through implementation of CM1–CM10 and
9 AMM6. No adverse effects are expected from implementation of CM11–CM21.

- 10
- 11 • *CM1 Water Facilities and Operation*: Construction of the Alternative 1C water conveyance
12 facilities would result in the temporary disturbance of 10,224 acres that would provide
opportunities for colonization by invasive plant species.
 - 13 • *CM2 Yolo Bypass Fisheries Enhancements*: Construction of the Yolo Bypass fisheries
14 enhancements would result in the temporary disturbance of 758 acres that would provide
15 opportunities for colonization by invasive plant species. Vegetation maintenance activities for
16 the Fremont Weir and Yolo Bypass improvements may include the removal of giant reed;
17 however, the clearing of linear areas to facilitate water flow may also result increased
18 opportunities for invasion. Sediment removal, transportation, and application as a source
19 material for restoration or levee projects as part of Fremont Weir and Yolo Bypass maintenance
20 activities could also result in the spread of invasives if the sediment contains viable invasive
21 plant propagules.
 - 22 • *CM3 Natural Communities Protection and Restoration*: The restoration activities in the natural
23 communities located in the eleven CZs would result in the temporary disturbance of restoration
24 areas that would provide opportunities for colonization by invasive plant species.

- 1 ● *CM4 Tidal Natural Communities Restoration:* The activities associated with the restoration of
2 tidal perennial aquatic, tidal mudflat, tidal freshwater emergent wetland, and tidal brackish
3 emergent wetland in ROAs would result in the temporary disturbance of tidal areas that would
4 provide opportunities for colonization by invasive plant species. These adverse effects would be
5 reduced by designing restoration projects to minimize the establishment of nonnative
6 submerged aquatic vegetation, and early restoration projects would be monitored to assess the
7 response of nonnative species to restoration designs and local environmental conditions. If
8 indicated by monitoring results, the BDCP Implementation Office would implement invasive
9 plant control measures in restored natural communities to help ensure the establishment of
10 native marsh plain plant species. Additionally, the BDCP Implementation Office would actively
11 remove submerged and floating aquatic vegetation in subtidal portions of tidal natural
12 community restoration sites.
- 13 ● *CM5 Seasonally Inundated Floodplain Restoration:* Floodplain restoration levee construction
14 would result in the temporary disturbance of 1,285 acres along channels in the north, east, and
15 south Delta (San Joaquin, Old, and Middle Rivers) that would provide opportunities for
16 colonization by invasive plant species.
- 17 ● *CM6 Channel Margin Enhancement:* The temporary effects of channel margin enhancement were
18 not estimated because specific locations for this activity and their areal extent have not been
19 developed. Channel margin enhancement (Sacramento River between Freeport and Walnut
20 Grove, San Joaquin River between Vernalis and Mossdale, Steamboat and Sutter Sloughs, and
21 salmonid migration channels in the interior Delta) would result in the temporary disturbance of
22 channel areas that would provide opportunities for colonization by invasive plant species.
- 23 ● *CM7 Riparian Natural Community Restoration:* The restoration of valley/foothill riparian habitat
24 would result in the temporary disturbance of riparian areas that would provide opportunities
25 for colonization by invasive plant species.
- 26 ● *CM8 Grassland Natural Community Restoration:* The restoration of grassland habitat in CZs 1, 8
27 and/or 11 would result in the temporary disturbance of degraded grassland or cultivated land
28 that would provide opportunities for colonization by invasive plant species.
- 29 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration:* The restoration of vernal pool
30 and alkali seasonal wetland complexes in CZs 1, 8, or 11 would result in the temporary
31 disturbance of grassland areas that would provide opportunities for colonization by invasive
32 plant species.
- 33 ● *CM10 Nontidal Marsh Restoration:* Nontidal marsh restoration, which would take place through
34 conversion of agricultural lands in CZs 2 and 4, would result in the temporary disturbance of
35 fallow agricultural areas that would provide opportunities for colonization by invasive plant
36 species. These adverse effects would be reduced by monitoring the development of marsh
37 vegetation to determine if nonnative vegetation needs to be controlled to facilitate the
38 establishment of native marsh vegetation or if restoration success could be improved with
39 supplemental plantings of native species. If indicated by monitoring, nonnative vegetation
40 control measures and supplemental plantings would be implemented.
- 41 ● *Avoidance and Minimization Measures: AMM6 Disposal and Reuse of Spoils* would have adverse
42 effects if spoil, reusable tunnel material, dredged material, or chipped vegetative materials
43 containing viable invasive plant propagules are used as topsoil in uninfested areas.

1 The adverse effects that would result from the introduction and spread of invasive plants through
2 colonization of temporarily disturbed areas would be minimized by implementation of CM11,
3 AMM4, AMM10, and AMM11.

4 *CM11 Natural Communities Enhancement and Management* would reduce these adverse effects by
5 implementing invasive plant control within the BDCP reserve system to reduce competition on
6 native species, thereby improving conditions for covered species, ecosystem function, and native
7 biodiversity. The invasive plant control efforts would target new infestations that are relatively easy
8 to control or the most ecologically damaging nonnative plants for which effective suppression
9 techniques are available. In aquatic and emergent wetland communities, Brazilian waterweed,
10 perennial pepperweed, barbgrass, and rabbitsfoot grass would be controlled (and tidal mudflats
11 would be maintained). In riparian areas, invasive plant control would focus on reducing or
12 eliminating species such as Himalayan blackberry, giant reed, and perennial pepperweed. In
13 grassland areas, techniques such as grazing and prescribed burning may be used to decrease the
14 cover of invasive plant species.

15 Implementation of AMM4 and AMM10 in CM21 would also reduce the adverse effects that could
16 result from construction activities. The AMMs provide methods to minimize ground disturbance,
17 guidance for developing restoration and monitoring plans for temporary construction effects, and
18 measures to minimize the introduction and spread of invasive plants. AMM4 would include the
19 preparation and implementation of an erosion and sediment control plan that would control erosion
20 and sedimentation and restore soils and vegetation in affected areas. The restoration and
21 monitoring plans for implementation of AMM10 would include methods for stockpiling, storing, and
22 restoring topsoil, revegetating disturbed areas, monitoring and maintenance schedules, adaptive
23 management strategies, reporting requirements, and success criteria. AMM10 would also include
24 planting native species appropriate for the natural community being restored, with the exception of
25 some borrow sites in cultivated lands that would be restored as grasslands.

26 AMM11 specifies that the BDCP Implementation Office would retain a qualified botanist or weed
27 scientist prior to clearing operations to determine if affected areas contain invasive plants. If areas
28 to be cleared do contain invasive plants, then chipped vegetation material from those areas would
29 not be used for erosion control but would be disposed to minimize the spread of invasive plant
30 propagules (e.g., burning, composting). During construction of the water conveyance facilities and
31 construction activities associated with the other CMs, construction vehicles and construction
32 machinery would be cleaned prior to entering construction sites that are in or adjacent natural
33 communities other than cultivated lands and prior to entering any BDCP restoration sites or
34 conservation lands other than cultivated lands. Vehicles working in or travelling off paved roads
35 through areas with infestations of invasive plant species would be cleaned before travelling to other
36 parts of the Plan Area. Cleaning stations would be established at the perimeter of BDCP covered
37 activities along construction routes as well as at the entrance to reserve system lands. Biological
38 monitoring would include locating and mapping locations of invasive plant species within the
39 construction areas during the construction phase and the restoration phase. Infestations of invasive
40 plant species would be targeted for control or eradication as part of the restoration and revegetation
41 of temporarily disturbed construction areas.

42 **NEPA Effects:** The implementation of AMM4, AMM10, AMM11, and CM11 under Alternative 1C
43 would reduce the potential for the introduction and spread of invasive plants and avoid or minimize
44 the potential effects on natural communities and special-status species; therefore, these effects
45 would not be adverse.

1 **CEQA Conclusion:** Under Alternative 1C, impacts on natural communities from the introduction or
2 spread of invasive plants as a result of implementing Alternative 1C would not result in the long-
3 term degradation of a sensitive natural community due to substantial alteration of site conditions
4 and would, therefore, be less-than-significant. No mitigation would be required.

5 **Compatibility with Plans and Policies**

6 **Impact BIO-187: Compatibility of the Proposed Water Conveyance Facilities and Other** 7 **Conservation Measures with Federal, State, or Local Laws, Plans, Policies, or Executive Orders** 8 **Addressing Terrestrial Biological Resources in the Study Area**

9 Constructing the water conveyance facilities (CM1) and implementing CM2–CM21 for Alternative 1C
10 have the potential for being incompatible with plans and policies related to managing and protecting
11 terrestrial biological resources of the study area. A number of laws, plans, policies, programs, and
12 executive orders that are relevant to actions in the study area provide guidance for terrestrial
13 biological resource issues as overviewed in Section 12.2, *Regulatory Setting*. This overview of plan
14 and policy compatibility evaluates whether Alternative 1C would be compatible or incompatible
15 with such enactments, rather than whether impacts would be adverse or not adverse, or significant
16 or less than significant. If the incompatibility relates to an applicable plan, policy, or executive order
17 adopted to avoid or mitigate terrestrial biological resource effects, then an incompatibility might be
18 indicative of a related significant or adverse effect under CEQA and NEPA, respectively. Such
19 physical effects of Alternative 1C on terrestrial biological resources are addressed in the discussions
20 of impacts on natural communities and species. The following is a summary of compatibility
21 evaluations related to terrestrial biological resources for laws, plans, policies, and executive orders
22 relevant to the BDCP.

23 **Federal and State Legislation**

- 24 ● The federal *Clean Water Act*, *Endangered Species Act*, *Fish and Wildlife Coordination Act*,
25 *Migratory Bird Treaty Act*, *Rivers and Harbors Act* and *Marine Mammal Protection Act* all contain
26 legal guidance that either directly or indirectly promotes or stipulates the protection and
27 conservation of terrestrial biological resources in the process of undertaking activities that
28 involve federal decisionmaking. The biological goals and objectives contained in the BDCP that
29 provide the major guidance for implementing the various conservation elements of Alternative
30 1C are all designed to promote the long-term viability of the natural communities, special-status
31 species, and common species that inhabit the Plan Area. While some of the conservation
32 measures of the alternative involve permanent and temporary loss of natural communities and
33 associated habitats during facilities construction and expansion of certain natural communities,
34 the long-term guidance in the Plan would provide for the long-term viability and expansion of
35 the habitats and special-status species populations in the Plan Area. Alternative 1C conservation
36 actions would be compatible with the policies and directives for terrestrial biological resources
37 contained in these federal laws.
- 38 ● The *California Endangered Species Act*, *California Native Plant Protection Act*, *Porter-Cologne*
39 *Water Quality Control Act*, and *Natural Communities Conservation Planning Act* are state laws
40 that have relevance to the management and protection of terrestrial biological resources in the
41 study area. Each of these laws promotes consideration of wildlife and native vegetation either
42 through comprehensive planning or through regulation of activities that may have an adverse
43 effect on the terrestrial and aquatic natural resources of the state. The BDCP, which is the basis
44 for Alternative 1C, contains biological goals and objectives that have been developed to promote

1 the species protection and natural resource conservation that are directed by these state laws.
2 Alternative 1C conservation actions would be compatible with the policies and directives
3 contained in these laws.

- 4 • The *Johnston-Baker-Andal-Boatwright Delta Protection Act of 1992* (Delta Protection Act) and the
5 *Sacramento-San Joaquin Delta Reform Act*, which updated the Delta Protection Act, promote the
6 maintenance and protection of natural resources and the protection of agricultural land uses in
7 the Delta's primary zone through the goals and policies contained in the 2009 updated Land Use
8 and Resources Management Plan (LURMP). While nothing in the LURMP is binding on state
9 agencies that are BDCP proponents, the LURMP does promote restoration and enhancement of
10 habitats for the terrestrial and aquatic species of the Delta on public land. The BDCP biological
11 goals and objectives would be compatible with these LURMP goals (Delta Protection
12 Commission 2010).
- 13 • The *Suisun Marsh Preservation Act* of 1974 was designed to protect the Suisun Marsh for long-
14 term use as wildlife habitat, with a goal of preserving and enhancing the quality and diversity of
15 the Marsh's aquatic and wildlife habitats. The BDCP and its plans for protection and restoration
16 of tidal marsh habitats in Suisun Marsh would be compatible with the intent of the Suisun Marsh
17 Preservation Act.

18 **Plans, Programs, and Policies**

- 19 • *The Delta Plan*, which was developed by the Delta Stewardship Council in compliance with the
20 2009 Sacramento-San Joaquin Delta Reform Act, is mandated to achieve two co-equal goals:
21 provide for a more reliable water supply for California and protect, restore, and enhance the
22 Delta ecosystem. The co-equal goals are to be achieved in a manner that protects and enhances
23 the unique cultural, recreational, natural resource, and agricultural values of the Delta as an
24 evolving place. The BDCP is intended to become a component of the Delta Plan. The Delta
25 Stewardship Council will determine whether the BDCP is compatible with the goals and
26 objectives of the Delta Plan prior to its incorporation into the Plan. The compatibility of the
27 BDCP with the Delta Plan is considered in detail in Section 13.2.2.2 of Chapter 13, *Land Use*.
- 28 • *California Wetlands Conservation Policy*, which was adopted by Executive Order in 1993,
29 promotes a long-term gain in the quantity, quality and permanence of wetlands acreages and
30 values in California. The Alternative 1C conservation measures that provide for a significant
31 expansion of wetland acreage and quality in the Delta and Suisun Marsh would be compatible
32 with the intent of the California Wetlands Conservation Policy.
- 33 • *The North American Waterfowl Management Plan (NAWMP)* and *Central Valley Joint Venture*
34 *(CVJV)* strive to maintain and expand wetlands and uplands for waterfowl and shorebirds in the
35 major basins of California's Central Valley. The NAWMP is a management plan jointly approved
36 by the United States and Canada in 1986. It contains general guidance from the principal wildlife
37 management agencies of the two countries for sustaining abundant waterfowl populations by
38 conserving landscapes through self-directed partnerships (joint ventures) that are guided by
39 sound science. The CVJV is the joint venture established for overseeing NAWMP implementation
40 in the Central Valley. The CVJV is made up of 21 conservation organizations, state and federal
41 government agencies, and one corporation that have formed a partnership to improve the
42 habitat conditions for breeding and nonbreeding waterfowl, breeding and nonbreeding
43 shorebirds, waterbirds, and riparian-dependent songbirds in the Central Valley. The CVJV's
44 2006 Implementation Plan (Central Valley Joint Venture 2006) establishes conservation

1 objectives and priorities for these bird groups within the basins of the Central Valley. The BDCP
2 Plan Area includes all or portions of three Implementation Plan basins—the Delta, Yolo and
3 Suisun basins. The 2006 Implementation Plan contains basin-specific objectives for wetland
4 restoration, protection of existing wetland habitats, wetland enhancement, adequate power and
5 water supplies for wetland management, agricultural land enhancement, farmland easements
6 that maintain waterfowl food resources on agricultural land, and farmland easements that
7 buffer existing wetlands from urban and residential growth.

8 Implementation of the Alternative 1C conservation measures would result in significant
9 reductions in cultivated land and managed wetland acreage in the Delta, Yolo and Suisun basins;
10 however, significant increases in tidal and nontidal wetlands in these basins would be another
11 result. Because of the large conversion of managed wetland in the Suisun basin, the BDCP has
12 included a large managed wetland conservation and enhancement goal for this area. For the
13 Suisun basin conversions to be compatible with the 2006 Implementation Plan goals, this
14 EIR/EIS has added mitigation that would require food production studies and adaptive
15 management to ensure that the Suisun basin would continue to provide the waterfowl and
16 shorebird habitat envisioned in the Implementation Plan.

- 17 ● *Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan, Cosumnes River Preserve*
18 *Management Plan, Brannan Island and Franks Tract State Recreation Areas General Plan, Yolo*
19 *Bypass Wildlife Area Land Management Plan, Grizzly Island Wildlife Area Management Plan, and*
20 *the Lower Sherman Island Wildlife Area Land Management Plan* are primarily designed to
21 preserve and enhance the natural resource and recreation qualities of these areas.
22 Implementing Alternative 1C, especially construction of CM1 and CM2 facilities, and land
23 modification associated with CM4 restoration activities, could create temporary disruptions to
24 the terrestrial biological resource management activities in these management areas. The
25 ultimate goals of aquatic and terrestrial habitat enhancement and restoration contained in the
26 BDCP would be compatible with the long-term management goals of these areas. Proposed
27 restoration areas in the Yolo Bypass, on Sherman Island, and in Suisun Marsh would be designed
28 to be compatible with and to complement the current management direction for these areas and
29 would be required to adapt restoration proposals to meet current policy established for
30 managing these areas.
- 31 ● *Suisun Marsh Preservation Agreement and Suisun Marsh Plan* are the most recent efforts by the
32 state and federal agencies responsible for Suisun Marsh (the Marsh) to maintain its long-term
33 viability as managed wetlands and wildlife habitat, consistent with the Suisun Marsh
34 Preservation Act. The SMPA was signed in 1987 and modified in 2005 by DWR, CDFW,
35 Reclamation and the Suisun Resource Conservation District to establish the mitigation approach
36 in the Marsh for effects of operating the SWP and CVP. The primary concerns were the effects of
37 CVP and SWP Delta diversions on salinity in the Marsh. The SMPA focused on ways to ensure
38 adequate water quality and quantity for the managed wetlands and wildlife habitats in the
39 Marsh to assure equal waterfowl values in the Marsh. The Suisun Marsh Plan, for which a Final
40 EIS/EIR was released in 2010 by these agencies, provides for restoration of tidal marsh habitat
41 and enhancement of managed wetland in the Marsh, maintenance of waterfowl hunting and
42 recreational opportunities in the Marsh, maintenance and improvement of the Marsh levee
43 system, and protection and enhancement of water quality for beneficial uses of the Marsh. An
44 integral component of the Suisun Marsh Plan is balancing continued managed wetland
45 operation with new tidal wetland restoration to provide improved and greater habitat for fish
46 and wildlife species. The Suisun Marsh Plan is a programmatic, long-term plan and does not

1 include specific projects, project proponents, or funding mechanisms. However, the Suisun
2 Marsh Plan relies on tidal restoration to allow for managed wetland operations to continue. The
3 BDCP would provide a funding mechanism and increased management potential relative to
4 existing and restored habitats, assisting the Suisun Marsh Plan in meeting its broader ecological
5 goals, consistent with long-term operation of the SWP and CVP water conveyance facilities. The
6 conservation actions contained in Alternative 1C, which are designed to ensure the long-term
7 protection and recovery of special-status fish and wildlife species dependent on the Marsh,
8 would be compatible with the water quality and habitat restoration goals of the SMPA and
9 Suisun Marsh Plan.

- 10 • *California Aquatic Invasive Species Management Plan* does not address terrestrial invasive
11 species. Implementation of the Plan's long-term control and management objectives affect
12 terrestrial species that utilize study area aquatic habitats. These effects are positive in that Plan
13 objectives are to control and remove invasive aquatic species that are detrimental to native
14 aquatic and terrestrial species. Implementation of BDCP's conservation actions would be
15 undertaken with the goal of avoiding any further spread of aquatic invasive species. Alternative
16 1C would, therefore, be compatible with the objectives of the California Aquatic Invasive Species
17 Management Plan.
- 18 • *Habitat Conservation Plans* and *Natural Community Conservation Plans* are the subject of a
19 detailed analysis at the end of this chapter. The analysis considers the compatibility of the BDCP
20 with all HCPs and NCCPs that share planning area with the BDCP Plan Area.

21 **Executive Orders**

- 22 • *Executive Order 11990: Protection of Wetlands* requires all federal agencies to consider wetland
23 protection in their policies and actions. The BDCP proposes to protect, enhance and expand the
24 wetlands of the Plan Area, and, therefore, would be compatible with Executive Order 11990.
- 25 • *Executive Order 13112: Invasive Species* directs federal agencies to prevent and control the
26 introduction and spread of invasive species in a cost-effective and environmentally sound
27 manner. Alternative 1C construction and restoration actions have the potential to both
28 introduce and spread invasive species in the study area. Implementation of mitigation measures
29 described in this chapter would be capable of making Alternative 1C implementation compatible
30 with Executive Order 13112.
- 31 • *Executive Order 113443: Facilitation of Hunting Heritage and Wildlife Conservation* directs
32 federal agencies whose activities affect public land management, outdoor recreation, and
33 wildlife management to facilitate the expansion and enhancement of hunting opportunities, and
34 the management of game species and their habitat. Alternative 1C conservation measures that
35 involve conversion of cultivated land and managed wetland to tidal and nontidal wetlands and
36 other natural communities would conflict with the hunting expansion and enhancement aspects
37 of this executive order. Refer to Chapter 15, *Recreation*, for a detailed analysis of the effects of
38 alternatives on hunting opportunities. The habitat protection and expansion conservation
39 measures of Alternative 1C would be compatible with the executive order's goal of facilitating
40 the management of habitats for some game species.

1 **CEQA Conclusion:** The potential plan and policy incompatibilities of implementing Alternative 1C
2 identified in the analysis above indicate the potential for a physical consequence to the environment.
3 The primary physical consequence of concern is the conversion of large acreages of cultivated lands
4 and managed wetland to natural wetland and riparian habitat in the Plan Area. The physical effects
5 are discussed in the *Shorebirds and Waterfowl* analysis above and no additional CEQA conclusion is
6 required related to the compatibility of the alternative with relevant plans and polices. The reader is
7 referred to Section 13.2.3 of Chapter 13, *Land Use*, for a further discussion of the responsibilities of
8 state and federal agencies to comply with local regulations and the relationship between plan and
9 policy consistency and physical consequences to the environment.

12.3.3.5 Alternative 2A—Dual Conveyance with Pipeline/Tunnel and Five Intakes (15,000 cfs; Operational Scenario B)

Alternative 2A, which is described in Section 3.5.5 in Chapter 3, *Description of Alternatives*, and depicted in Figure 3-2, would affect terrestrial biological resources in a nearly identical fashion to Alternative 1A. For this reason, Alternative 2A is considered here in a summary fashion; the reader is referred to the discussion of Alternative 1A for a detailed description of impacts that would be associated with implementing Alternative 2A, and to Table 12-ES-1 for a summary comparison of natural community effects of Alternatives 1A and 2A. The impacts associated with Alternatives 1A and 2A were derived by comparing the alternative with the No Action Alternative for NEPA purposes, and with Existing Conditions for CEQA purposes.

Comparative Differences in CM1 Construction Effects for Alternatives 1A and 2A

The principal differences in effect between these two alternatives are related to the differing construction footprints of the water conveyance facilities (CM1). The Alternative 2A water conveyance facilities could entail construction at north Delta Intakes 6 and 7 rather than 4 and 5. The locations of these intakes are depicted in Figure 3-2. Intakes 6 and 7 are located farther south on the Sacramento River, south of Sutter and Steamboat Sloughs. The analysis in this section assumes use of Intakes 6 and 7. The operational scenario for Alternative 2A (Scenario B) is also different from Alternative 1A (Scenario A), but the difference in water operations would not significantly change the operational effects on terrestrial biological resources in the study area. Alternative 2A operations would involve placement of a permanent in-stream operable barrier at the head of Old River in the south Delta and increased Delta freshwater outflows during September through November of some water years. All of the conservation measures other than CM1 would be the same as under Alternative 1A.

Due to the change in location of the two intakes and their associated pumps and pipelines, Alternative 2A would create minor differences in the permanent and temporary loss of natural communities and cultivated lands during water conveyance facilities construction when compared with Alternative 1A (Table 12-2A-1). All of these differences would occur during the near-term timeframe associated with water facilities construction. Alternative 2A would permanently remove 3 fewer acres of valley/foothill riparian habitat along the Sacramento River, 7 acres more of grassland and 14 acres more of cultivated land in the same area when compared with Alternative 1A. Alternative 2A would also permanently affect a larger acreage of jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (2 acres more; see Table 12-2A-2). Refer to Table 12-1A-69 for a summary of Alternative 1A permanent and temporary jurisdictional waters and wetlands impacts.

During the water conveyance facilities construction process, Alternative 2A would involve slightly more temporary loss of habitat when compared with Alternative 1A because of the lengthy pipelines needed to serve Intakes 6 and 7. The differences would include cultivated lands east of the river (492 acres more), tidal perennial aquatic within the river channel (7 acres more), valley/foothill riparian along the river levee (4 acres more), and grassland along the river levee (9 acres more; see Table 12-2A-1). Alternative 2A would also temporarily affect a larger acreage of jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (20 acres more; see Table 12-2A-2).

1 Note that the acres of habitat affected by CM1, as listed in Table 12-2A-1, would be acres affected in
2 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in
3 Table 12-2A-3 and Table 12-2A-4 for other conservation actions are for the late long-term
4 timeframe; the numbers represent acres affected cumulatively over the entire 50-year period of the
5 Plan. Table 3-4 in Chapter 3, *Description of Alternatives*, describes the schedule for implementation
6 of natural community protection and restoration conservation measures over the course of the
7 BDCP.

8 These mostly minor differences in permanent loss of habitat associated with constructing CM1
9 would create minor differences in effects on covered and noncovered wildlife. The small increase in
10 permanent loss of cultivated land (primarily alfalfa and irrigated pasture) associated with
11 Alternative 2A would result in a slightly larger loss of foraging habitat for species such as tricolored
12 blackbird, Swainson's hawk, white-tailed kite, short-eared owl, loggerhead shrike, northern harrier,
13 and California horned lark. Alternative 2A would also increase the loss of low- and moderate-value
14 habitat for western burrowing owl. The reduced level of valley/foothill riparian habitat loss would
15 be a positive influence on breeding habitat for raptors, herons and egrets (great egret, snowy egret,
16 great blue heron, Swainson's hawk, Cooper's hawk, white-tailed kite and black-crowned night
17 heron), and migratory habitat for species that use the river corridor, such as western yellow-billed
18 cuckoo. The larger temporary losses of cultivated land, grassland and valley/foothill riparian natural
19 communities associated with Alternative 2A would have near-term effects on the special-status
20 species that use these communities. There would be 241 more acres of foraging habitat temporarily
21 lost under Alternative 2A for greater sandhill crane when compared to Alternative 1A because of the
22 cultivated land loss. However, the effects would be offset in the near-term by AMMs adopted for
23 specific species, including greater sandhill crane, and over time by on-site restoration required by
24 *AMM10 Restoration of Temporarily Affected Natural Communities*.

25 The differences in effect that constructing CM1 for Alternatives 1A and 2A could have on special-
26 status plant species are extremely minor. Habitat modeling indicates that Alternative 2A would
27 permanently remove 1 less acre of side-flowering skullcap habitat and permanently remove one
28 more acre of both Mason's lilaepsis and delta mudwort habitat when compared with Alternative
29 2A.

30 The near-term conservation activities described and evaluated in Appendix 12D, *Feasibility*
31 *Assessment of Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on*
32 *Terrestrial Biological Resources*, would provide for protection, enhancement and restoration of
33 habitats affected by the near-term water conveyance facilities construction activities. This
34 conservation activity, which is part of the early implementation of the BDCP, would offset water
35 conveyance facilities construction effects on both covered and noncovered special-status species in
36 the study area.

1 **Table 12-2A-1. Alternative 2A Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**
2 **Communities (acres)^a**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option			
		Alternative 2A Removed Habitat (Permanent) ^c	Difference from Alternative 1A	Alternative 2A Removed Habitat (Temporary) ^d	Difference from Alternative 1A
Tidal perennial aquatic ^b	86,263	48	0	140	+7
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	6	0	5	-1
Valley/foothill riparian	17,966	55	-3	32	+4
Nontidal perennial aquatic	5,567	12	0	9	0
Nontidal freshwater perennial emergent wetland	1,509	1	0	1	0
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	3	0	0	0
Managed wetland	70,798	3	0	83	0
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	322	+7	271	+9
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	3,850	+14	2,683	+492

^a Acreages in this table assume Alternative 2A would use north Delta Intakes 6 and 7, not 4 and 5. Impacts of 4 and 5 are addressed in Alternative 1A.

^b Tidal mudflat has been included in the tidal perennial aquatic natural community.

^c Features in this category include the following conveyance-related facilities: Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas.

^d Features in this category include the following construction-related work areas: Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area, Borrow/Spoil Area.

3

1 **Table 12-2A-2 Alternative 2A Effects on Jurisdictional Wetlands and Waters Relative to Alternative**
2 **1A (acres)**

Wetland/Water Type	Alternative 2A Impacts on Jurisdictional Wetlands and Waters			
	Permanent Impact	Difference from Alternative 1A	Temporary Impact	Difference from Alternative 1A
Agricultural Ditch	65.8	0.9	32.6	9.1
Alkaline Wetland	0.1	0.0	0	0.0
Clifton Court Forebay	1.0	0.0	0	0.0
Conveyance Channel	12.7	0.0	1.1	0.0
Depression	1.9	0.0	1.8	0.0
Emergent Wetland	46.8	0.0	6.7	-0.6
Forest	6.4	0.6	15.6	3.6
Lake	0.2	0.2	2.3	2.0
Scrub-Shrub	18.2	-2.4	2.4	-1.9
Seasonal Wetland	18.7	0.0	29.2	2.6
Tidal Channel	45.8	2.9	139.1	5.3
Vernal Pool	0	0.9	0	9.1
Total	218	2.3	231	20.1

3

4 **Effects of Restoration-Related Conservation Actions of Alternative 2A**

5 The reader is referred to the Alternative 1A impact analysis above for the broader discussion of
6 overall terrestrial biological resources effects that would result from implementation of restoration-
7 related conservation measures under Alternative 2A. The principal effects of concern associated
8 with both Alternative 1A and 2A are related to the conversion of large acreages of primarily
9 cultivated lands, managed wetland, grassland and valley/foothill riparian habitat to tidal and other
10 natural communities (CM2, CM4, CM5, CM7, CM8, CM10, and CM18; Table 12-2A-3 and Table 12-2A-
11 4). These effects accrue to special-status species and common wildlife species, especially those that
12 rely on cultivated lands and managed wetlands during some life stage. Foraging raptors and some
13 waterbirds are regular inhabitants of the Delta's cultivated lands. The Delta's managed wetlands
14 provide freshwater nesting, feeding and resting habitat for a large number of Pacific flyway
15 waterfowl and shorebirds, as well as nesting passerines, such as tricolored blackbird. Special-status
16 plant species that occupy the tidal fringe in Suisun Marsh and parts of the Delta would be subject to
17 losses associated with physical construction activity (levee breaching and reconstruction) and
18 changes in water depth and salinity in their current habitat as a result of tidal marsh restoration.

1 **Table 12-2A-3. Alternative 2A Late Long-term Effects of Restoration Activities (CM2, CM4, CM5) that**
2 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 ^b		CM4 ^c		CM5 ^d	
	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f
Tidal perennial aquatic ^a	8	11	18	0	2	5
Tidal brackish emergent wetland	0	0	1	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	2,087	1,194

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Yolo Bypass Fisheries Enhancement.

^c Tidal Natural Communities Restoration.

^d Seasonally Inundated Floodplain Restoration.

^e Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

3

1 **Table 12-2A-4. Alternative 2A Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10,**
2 **CM18) that Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 ^a		CM8 ^b		CM10 ^c		CM18 ^d	
	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

^a Riparian Natural Community Restoration.

^b Grassland Natural Community Restoration.

^c Nontidal Marsh Restoration.

^d Conservation Hatcheries.

^e Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3
4 Some of the permanent habitat loss associated with the restoration components of these
5 alternatives would occur during the early, construction-related stage of the BDCP. Other losses
6 would occur over time as some habitats (cultivated lands, managed wetland, valley/foothill riparian
7 and grassland) are converted to tidal perennial aquatic, tidal brackish emergent wetland and tidal
8 freshwater emergent wetland natural communities. The BDCP conservation components, including
9 the restoration components (CM2-CM10), are designed to eventually replace and expand habitats
10 that would have a positive influence on plant and animal species covered in the Plan. Similar
11 benefits would accrue to noncovered special-status species and common wildlife in the study area.

12 **NEPA Effects:** Alternative 2A would not have adverse effects on the terrestrial natural communities,
13 special-status species and common species that occupy the study area. The alternative also would
14 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive
15 species, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies
16 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat
17 converted by the Plan's conservation actions, including the construction of water conveyance
18 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily affected
19 habitat would be restored to its pre-project condition and the restoration conservation measures
20 (CM2-CM10) would permanently replace primarily cultivated land and managed wetland with tidal
21 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the
22 sensitive natural communities in the study area would have beneficial effects on covered and
23 noncovered species. Where conservation actions would not fully offset effects, the Plan has
24 developed AMMs and this document has included additional mitigation measures to avoid adverse
25 effects. Alternative 2A would not require mitigation measures beyond what is proposed for
26 Alternative 1A to offset effects.

27 **CEQA Conclusion:** Alternative 2A would not have significant and unavoidable impacts on the
28 terrestrial natural communities, special-status species and common species that occupy the study
29 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the

1 risk of introducing invasive species, reduce the value of habitat for waterfowl and shorebirds, or
2 conflict with plans and policies that affect the study area. As with Alternative 1A, there would be
3 large acreages of existing habitat converted by the Plan's conservation actions, including the
4 construction of water conveyance tunnels from the north Delta to Clifton Court Forebay in the south
5 Delta. The temporarily affected habitat would be restored to its pre-project condition and the
6 restoration conservation measures (CM2–CM10) would permanently replace primarily cultivated
7 land and managed wetland with tidal and nontidal marsh, riparian vegetation, and grassland. The
8 increases in acreage and value of the sensitive natural communities in the study area would have
9 beneficial effects on covered, noncovered, and common species. Where conservation actions would
10 not fully offset impacts, the Plan has developed AMMs and this document has included additional
11 mitigation measures to avoid significant impacts. Alternative 2A would not require mitigation
12 measures beyond what is proposed for Alternative 1A to offset effects.

13 As with Alternative 1A, Alternative 2A would require several mitigation measures to be adopted to
14 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
15 measures would be needed beyond the impact offsets provided by Alternative 2A AMMs and CM2–
16 CM21 conservation actions. The relevant mitigation measures, which are included in detail in the
17 analysis of Alternative 1A, are as follows:

- 18 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 19 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 20 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status
21 Reptiles and Implement Applicable AMMs
- 22 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect
23 Effects on Colonies Will Be Minimized
- 24 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater
25 Sandhill Crane Foraging Habitat
- 26 • Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value Lesser
27 Sandhill Crane Foraging Habitat
- 28 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid
29 Disturbance of Nesting Birds
- 30 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing
31 Owl Habitat
- 32 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and
33 Ferruginous Hawk Foraging Habitat
- 34 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 35 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering
36 Habitat
- 37 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 38 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and
39 Grasshopper Sparrow Habitat
- 40 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead
41 Shrike Habitat

- 1 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect
2 Effects on Bank Swallow Will Be Minimized
- 3 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring
4 Flows Upstream of the Study Area
- 5 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 6 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement
7 Protective Measures
- 8 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered
9 Special-Status Plant Species
- 10 • Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United States
- 11 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in
12 Suisun Marsh
- 13 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food
14 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 15 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in
16 Suisun Marsh

17 **12.3.3.6 Alternative 2B—Dual Conveyance with East Alignment and Five** 18 **Intakes (15,000 cfs; Operational Scenario B)**

19 Alternative 2B, which is described in Section 3.5.6 of Chapter 3, *Description of Alternatives*, and
20 depicted in Figure 3-4, would affect terrestrial biological resources in a similar fashion to
21 Alternative 1B. For this reason, Alternative 2B is considered here in a summary fashion; the reader
22 is referred to Alternative 1B for a detailed description of impacts that would be associated with
23 implementing Alternative 2B, and to Table 12-ES-1 for a summary comparison of natural
24 community effects of Alternatives 1B and 2B. The impacts associated with Alternatives 1B and 2B
25 were derived by comparing the alternatives with the No Action Alternative for NEPA purposes, and
26 with Existing Conditions for CEQA purposes.

27 **Comparative Differences in CM1 Construction Effects for Alternatives 1B and 2B**

28 The principal differences between these two alternatives are related to the differing construction
29 footprints of the water conveyance facilities (CM1). The Alternative 2B water conveyance facilities
30 could entail construction at north Delta Intakes 6 and 7 rather than 4 and 5. The locations of these
31 intakes are depicted in Figure 3-2. Intakes 6 and 7 are located farther south on the Sacramento
32 River, south of Sutter and Steamboat Sloughs. This location change results in longer pipeline
33 construction to move water from the Sacramento River to the East Canal. The analysis in this section
34 assumes use of Intakes 6 and 7. The operational scenario for Alternative 2B (Scenario B) is also
35 different from Alternative 1B (Scenario A), but the difference in water operations would not
36 significantly change the operational effects on terrestrial biological resources in the study area.
37 Alternative 2B operations would involve placement of a permanent operable barrier at the head of
38 Old River in the south Delta and increased Delta freshwater outflows during September, October,
39 and November of some water years. All of the conservation measures other than CM1 would be the
40 same as under Alternative 1B.

1 Due to the change in location of the two intakes and their associated pumps and pipelines,
 2 Alternative 2B would create minor differences in permanent and larger differences in temporary
 3 loss of natural communities and cultivated lands during water conveyance facilities construction
 4 when compared with Alternative 1B (Table 12-2B-1). All of these differences would occur in the
 5 near-term timeframe associated with water facilities construction. Alternative 2B would
 6 permanently remove 3 fewer acres of valley/foothill riparian habitat along the Sacramento River
 7 and 1 fewer acre of cultivated land (primarily alfalfa and irrigated pasture) just east of the river.
 8 When compared with Alternative 1B, Alternative 2B would permanently remove 6 acres more of
 9 grassland and 1 acre more of tidal perennial aquatic natural community along the eastern bank of
 10 the river at intake sites. Alternative 2B would also permanently affect a larger acreage of
 11 jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared
 12 to Alternative 1B (3 acres more; see Table 12-2B-2). Refer to Table 12-1B-69 for a summary of
 13 Alternative 1B permanent and temporary jurisdictional waters and wetlands impacts.

14 **Table 12-2B-1. Alternative 2B Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**
 15 **Communities (acres)^a**

	Total Existing Habitat in Study Area	Conveyance Option			
		Alternative 2B Removed Habitat (Permanent) ^c	Difference from Alternative 1B	Alternative 2B Removed Habitat (Temporary) ^d	Difference from Alternative 1B
Natural Community					
Tidal perennial aquatic ^b	86,263	34	+1	171	+26
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	8	0	16	+5
Valley/foothill riparian	17,966	48	-3	56	+17
Nontidal perennial aquatic	5,567	19	0	5	0
Nontidal freshwater perennial emergent wetland	1,509	5	0	7	+1
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	4	0	0	0
Managed wetland	70,798	6	0	20	+2
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	406	+6	382	+24
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	7,885	-1	13,047	+496

^a Acreages in this table assume Alternative 2B would use north Delta Intakes 6 and 7, not 4 and 5. Impacts of 4 and 5 are addressed in Alternative 1B.

^b Tidal mudflat has been included in the tidal perennial aquatic natural community.

^c Features in this category include the following conveyance-related facilities: Canal, Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Storage Areas.

^d Features in this category include the following construction-related work areas: Canal Work Area, Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area, and Borrow/Spoil Areas

1 **Table 12-2B-2 Alternative 2B Effects on Jurisdictional Wetlands and Waters Relative to Alternative**
2 **1B (acres)**

Wetland/Water Type	Alternative 2B Impacts on Jurisdictional Wetlands and Waters			
	Permanent Impact	Difference from Alternative 1B	Temporary Impact	Difference from Alternative 1B
Agricultural Ditch	228.2	0.3	38.5	7.4
Alkaline Wetland	0.1	0	0	0
Clifton Court Forebay	1.0	0	0	0
Conveyance Channel	12.7	0	1.1	0
Depression	35.1	0	1.9	0
Emergent Wetland	77.8	0.2	23.8	3.8
Forest	9.9	0.7	13.7	6.7
Lake	0.2	0	0	-0.3
Scrub-Shrub	11.4	-2.4	11.0	-1.2
Seasonal Wetland	177.7	0.2	4.1	4.1
Tidal Channel	31.9	3.9	174.7	28.4
Vernal Pool	0	0	0	0
Total	586	2.8	269	49.0

3
4 During the water conveyance facilities construction process, Alternative 2B would involve
5 significantly more temporary loss of tidal perennial aquatic habitat (26 acres), valley/foothill
6 riparian habitat (17 acres) and grassland (24 acres). These temporary losses would occur primarily
7 along Snodgrass Slough and the north-south irrigation canal just east of the slough. The Alternative
8 2B pipelines would also temporarily affect greater acreages of cultivated land (496 acres more),
9 including alfalfa, vineyard, orchard and other cultivated cropland. There would be much smaller
10 differences in the acreage of temporary effect on managed wetland and tidal freshwater emergent
11 wetland (Table 12-2B-1). Alternative 2B would also temporarily affect a larger acreage of
12 jurisdictional waters (including wetlands) as regulated by Section 404 of the CWA, when compared
13 to Alternative 1B (49 acres more; see Table 12-2B-2).

14 Note that the acres of habitat affected by CM1, as listed in Table 12-2B-1, would be acres affected in
15 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in
16 Table 12-2B-3 and Table 12-2B-4 for other conservation actions are for the late long-term
17 timeframe; the numbers represent acres affected cumulatively over the entire 50-year period of the
18 Plan. Table 3-4 in Chapter 3, *Description of Alternatives*, describes the schedule for implementation
19 of natural community protection and restoration conservation measures over the course of the
20 BDCP.

21 The mostly minor differences in permanent loss of habitat associated with constructing CM1 would
22 create minor differences in effects on covered and noncovered wildlife species. The small reductions
23 in permanent loss of alfalfa and irrigated pasture associated with Alternative 2B would result in a
24 slightly smaller loss of foraging habitat for species such as tricolored blackbird, Swainson's hawk
25 and white-tailed kite. Alternative 2B would result in a slightly smaller permanent loss (20 acres) of
26 crane foraging habitat compared to Alternative 1B. Alternative 2B would also reduce the loss of low-
27 and moderate-value habitat for western burrowing owl. The reduced level of valley/foothill riparian

1 habitat loss would be a positive influence on breeding habitat for raptors and migratory habitat for
 2 species that use the river corridor, such as western yellow-billed cuckoo.

3 The larger acreages of temporary losses of tidal perennial aquatic and tidal freshwater emergent
 4 wetland habitat would affect a number of wetland habitat-dependent birds and reptiles, including
 5 tricolored blackbird, least bittern, giant garter snake and western pond turtle. Construction across
 6 Snodgrass Slough and the adjacent irrigation canal could disrupt both foraging and migration
 7 activities of giant garter snake. The temporary losses of valley/foothill riparian habitat would affect
 8 roosting and nesting habitat for bird species such as Swainson’s hawk, white-tailed kite, great egret,
 9 snowy egret, great blue heron, Cooper’s hawk, and black-crowned night heron. Temporary losses of
 10 grassland between the Sacramento River and the East Canal would reduce foraging habitat for
 11 species such as short-eared owl, northern harrier, mountain plover, California horned lark, and
 12 greater sandhill crane. Grassland loss would also reduce refugia for giant garter snake. The
 13 temporary losses in cultivated acreage, especially alfalfa and other cultivated cropland, would
 14 reduce foraging habitat for species such as Swainson’s hawk, greater sandhill crane, short-eared
 15 owl, mountain plover, and loggerhead shrike. There would be 214 more acres of foraging habitat
 16 temporarily lost under Alternative 2B for greater sandhill crane when compared to Alternative 1B
 17 because of the cultivated land loss. However, the effects of Alternative 2B would be offset in the
 18 near-term by AMMs adopted for specific species, including greater sandhill crane, and over time by
 19 on-site restoration required by *AMM10 Restoration of Temporarily Affected Natural Communities*.

20 The differences in effect that constructing CM1 for Alternatives 1B and 2B could have on special-
 21 status plant species are extremely minor. Habitat modeling indicates that Alternative 2B would
 22 create 1 less acre of permanent loss of side-flowering skullcap habitat and 1 acre more of temporary
 23 loss for the same plant. For both delta mudwort and Mason’s lilaepsis, Alternative 2B would
 24 permanently remove 1 more acre and temporarily remove 4 more acres of habitat compared to
 25 Alternative 1B. The near-term conservation activities discussed in Appendix 12D, *Feasibility*
 26 *Assessment of Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on*
 27 *Terrestrial Biological Resources*, would provide for conservation, enhancement and replacement of
 28 habitats affected by the early water conveyance facility construction activities. This conservation
 29 activity, which is part of the early implementation of the BDCP, would offset water conveyance
 30 facilities construction effects on both covered and noncovered special-status species in the study
 31 area.

32 **Effects of Restoration-Related Conservation Actions of Alternative 2B**

33 The reader is referred to the Alternative 1B impact analysis above for the broader discussion of
 34 overall terrestrial biological resources effects that would result from implementation of restoration-
 35 related conservation measures under Alternative 2B. The principal effects of concern associated
 36 with both Alternatives 1B and 2B are related to the conversion of large acreages of cultivated lands,
 37 managed wetland, grassland and valley/foothill riparian habitat to tidal marsh and other habitat
 38 types(CM2, CM4, and CM5; Table 12-2B-3 and CM7, CM8, CM10, and CM18; Table 12-2B-4). These
 39 effects accrue to special-status species and common wildlife species, especially those that rely on
 40 cultivated lands and managed wetlands during some life stage. Foraging raptors and some
 41 waterbirds are regular inhabitants of the Delta’s cultivated lands. The Delta’s managed wetlands
 42 provide freshwater nesting, feeding and resting habitat for a large number of Pacific flyway
 43 waterfowl and shorebirds, as well as nesting passerines, such as tricolored blackbird. Special-status
 44 plant species that occupy the tidal fringe in Suisun Marsh and parts of the Delta would be subject to

1 losses associated with physical construction activity (levee breaching and reconstruction) and
2 changes in water depth and salinity in their current habitat as a result of tidal marsh restoration.

3 **Table 12-2B-3. Alternative 2B Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**
4 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 ^b		CM4 ^c		CM5 ^d	
	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f
Tidal perennial aquatic ^a	8	11	18	0	2	5
Tidal brackish emergent wetland	0	0	1	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	2,087	1,194

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Yolo Bypass Fisheries Enhancement.

^c Tidal Natural Communities Restoration.

^d Seasonally Inundated Floodplain Restoration.

^e Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

5

1 **Table 12-2B-4. Alternative 2B Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10,**
2 **CM18) that Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 ^a		CM8 ^b		CM10 ^c		CM18 ^d	
	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

^a Riparian Natural Community Restoration.

^b Grassland Natural Community Restoration.

^c Nontidal Marsh Restoration.

^d Conservation Hatcheries.

^e Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3
4 Some of the permanent habitat loss associated with the restoration components of these
5 alternatives would occur during the early, construction-related stage of the BDCP. Other losses
6 would occur over time as some habitats (cultivated lands, managed wetland, valley/foothill riparian
7 and grassland) are converted to tidal marsh (tidal perennial aquatic, tidal freshwater emergent
8 wetland, tidal brackish emergent wetland) and other natural communities. The BDCP conservation
9 components, including restoration components (CM2-CM10) are designed to eventually replace and
10 expand habitats that would have a positive influence on plant and animal species covered in the
11 Plan. These conservation components would also have a positive effect on noncovered and common
12 species that occupy the study area.

13 **NEPA Effects:** Alternative 2B would not have adverse effects on the terrestrial natural communities,
14 special-status species and common species that occupy the study area except for an adverse effect
15 on giant garter snake population connectivity and on wildlife movement corridors in general. The
16 construction of the canal would substantially inhibit the movement of giant garter snakes and other
17 wildlife from moving within and outside of the Delta. This alternative would not significantly
18 increase the risk of introducing invasive species, reduce the value of habitat for waterfowl and
19 shorebirds, or conflict with plans and policies that affect the study area. As with Alternative 1B,
20 there would be large acreages of existing habitat converted by the Plan's conservation actions,
21 including the construction of the water conveyance canal from the north Delta to Clifton Court
22 Forebay in the south Delta. The temporarily affected habitat would be restored to its pre-project
23 condition and the restoration conservation measures (CM2-CM10) would permanently replace
24 primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian vegetation,
25 and grassland. The increases in acreage and value of the sensitive natural communities in the study
26 area would have beneficial effects on covered and noncovered species. Where conservation actions
27 would not fully offset effects, the Plan has developed AMMs and this document has included
28 additional mitigation measures to avoid and minimize adverse effects to the maximum extent
29 practicable. Alternative 2B would not require mitigation measures beyond what is proposed for
30 Alternative 1B to offset effects.

1 **CEQA Conclusion:** Alternative 2B would not have significant and unavoidable impacts on the
2 terrestrial natural communities, special-status species and common species that occupy the study
3 area except for giant garter snake habitat connectivity and wildlife movement corridors in general.
4 The construction of the canal would substantially inhibit the movement of giant garter snakes and
5 other wildlife from moving within and outside of the Delta. The alternative would not increase the
6 risk of introducing invasive species, reduce the value of habitat for waterfowl and shorebirds, or
7 conflict with plans and policies that affect the study area. As with Alternative 1B, there would be
8 large acreages of existing habitat converted by the Plan's conservation actions, including the
9 construction of water conveyance tunnels from the north Delta to Clifton Court Forebay in the south
10 Delta. The temporarily affected habitat would be restored to its pre-project condition and the
11 restoration conservation measures (CM2–CM10) would permanently replace primarily cultivated
12 land and managed wetland with tidal and nontidal marsh, riparian vegetation, and grassland. The
13 increases in acreage and value of the sensitive natural communities in the study area would have
14 beneficial effects on covered, noncovered, and common species. Where conservation actions would
15 not fully offset impacts, the Plan has developed AMMs and this document has included additional
16 mitigation measures to avoid and minimize significant impacts. Alternative 6B would not require
17 mitigation measures beyond what is proposed for Alternative 1B to offset effects. Despite these
18 measures, there would remain significant and unavoidable impacts on giant garter snake population
19 connectivity and wildlife movement corridors from Alternative 2B.

20 As with Alternative 1B, Alternative 2B would require several mitigation measures to be adopted to
21 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
22 measures would be needed beyond the impact offsets provided by Alternative 2B AMMs and CM2–
23 CM21 conservation actions. The relevant mitigation measures, which are included in detail in the
24 analysis of Alternative 1B, are as follows:

- 25 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 26 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 27 • Mitigation Measure BIO-50a: Provide Connectivity between Coldani Marsh/White Slough
28 Population and the Giant Garter Snake's Historical Range
- 29 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status
30 Reptiles and Implement Applicable AMMs
- 31 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect
32 Effects on Colonies Will Be Minimized
- 33 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater
34 Sandhill Crane Foraging Habitat
- 35 • Mitigation Measure BIO-69b: BDCP-Related Construction Will Not Result in A Net Decrease in
36 Crane Use Days on Bract Tract
- 37 • Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value Lesser
38 Sandhill Crane Foraging Habitat
- 39 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid
40 Disturbance of Nesting Birds
- 41 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing
42 Owl Habitat

- 1 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and
2 Feruginous Hawk Foraging Habitat
- 3 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 4 • Mitigation Measure BIO-121: Compensate for Loss of Short-Eared Owl and Northern Harrier
5 Nesting Habitat
- 6 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering
7 Habitat
- 8 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 9 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and
10 Grasshopper Sparrow Habitat
- 11 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead
12 Shrike Habitat
- 13 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect
14 Effects on Bank Swallow Will Be Minimized
- 15 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring
16 Flows Upstream of the Study Area
- 17 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 18 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement
19 Protective Measures
- 20 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered
21 Special-Status Plant Species
- 22 • Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United States
- 23 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in
24 Suisun Marsh
- 25 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food
26 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 27 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in
28 Suisun Marsh

29 **12.3.3.7 Alternative 2C—Dual Conveyance with West Alignment and** 30 **Intakes W1–W5 (15,000 cfs; Operational Scenario B)**

31 Alternative 2C, which is described in Section 3.5.7 of Chapter 3, *Description of Alternatives*, and
32 depicted in Figure 3-6, would affect terrestrial biological resources in the same manner as
33 Alternative 1C. For this reason, Alternative 2C is considered here in a summary fashion; the reader is
34 referred to Alternative 1C for a detailed description of impacts that would be associated with
35 implementing Alternative 2C. The impacts associated with Alternatives 1C and 2C were derived by
36 comparing the alternatives to the No Action Alternative for NEPA purposes, and to Existing
37 Conditions for CEQA purposes.

1 **Comparative Differences in CM1 Construction Effects for Alternatives 1C and 2C**

2 The Alternative 2C water conveyance facilities would entail construction at north Delta Intakes W1
3 through W5, just as with Alternative 1C. Also, Alternative 2C would involve constructing and
4 operating a combined canal and tunnel conveyance system in the western portion of the Delta using
5 the same construction footprint as Alternative 1C. The Alternative 2C operational scenario (Scenario
6 B) would have terrestrial biology effects essentially the same as Alternative 1C and its operational
7 scenario (Scenario A). Alternative 2C operations would involve placement of a permanent operable
8 barrier at the head of Old River in the south Delta and increased Delta freshwater outflows during
9 September, October and November of some water years. All of the conservation measures other
10 than CM1 operations would be the same as under Alternative 1C.

11 The Alternative 2C water conveyance facilities construction effects on natural communities are
12 included in Table 12-2C-1. The principal effects of concern associated with both Alternative 1C and
13 2C are related to the conversion of cultivated lands, grassland, valley/foothill riparian, vernal pool
14 complex and alkali seasonal wetland complex to water conveyance facilities (CM1; Table 12-2C-1).
15 Similar to Alternative 1C, Alternative 2C would permanently affect a large acreage of jurisdictional
16 waters (including wetlands) regulated by Section 404 of the CWA. Refer to Table 12-1C-69 for a
17 summary of Alternative 1C permanent and temporary jurisdictional waters and wetlands impacts.
18 Alternative 2C would affect the same acreage of wetlands and other waters.

19 Construction of the canal on the west and northwest of Clifton Court Forebay would have significant
20 impacts on vernal pool, alkali seasonal wetland and other natural seasonal wetland natural
21 communities. The acreages impacted here would exceed the offsetting restoration and protection
22 included in the BDCP, so additional mitigation would be required. These effects accrue to special-
23 status species and common wildlife species that rely on cultivated lands, managed wetlands, and
24 seasonal wetlands during some life stage. Foraging raptors and passerines and some waterbirds are
25 regular inhabitants of the Delta's cultivated lands. The Delta's managed wetlands provide freshwater
26 nesting, feeding and resting habitat for a large number of Pacific flyway waterfowl and shorebirds,
27 as well as nesting passerines, such as tricolored blackbird. Vernal pools provide habitat to special-
28 status crustaceans, California tiger salamander, numerous common waterbirds, and a suite of
29 special-status plants. Alkali seasonal wetland complex provides habitat to California tiger
30 salamander, numerous common waterbirds, foraging raptors and its own suite of special-status, salt
31 tolerant plants.

32 The near-term conservation activities described in Appendix 12D, *Feasibility Assessment of*
33 *Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on Terrestrial*
34 *Biological Resources*, would provide for conservation, enhancement and replacement of habitats
35 affected by the early water conveyance facility construction activities. This conservation activity,
36 which is part of the early implementation of the BDCP, would offset some, but not all, water
37 conveyance facilities construction effects on both covered and noncovered special-status species in
38 the study area.

39 Note that the acres of habitat affected by CM1, as listed in Table 12-2C-1, would be acres affected in
40 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in
41 Table 12-2C-2 and Table 12-2C-3 for the late long-term timeframe are acres affected cumulatively
42 over the entire 50-year period of the Plan. Table 3-4 in Chapter 3, *Description of Alternatives*,
43 describes the schedule for implementation of natural community protection and restoration
44 conservation measures over the course of the BDCP.

1 **Table 12-2C-1. Alternative 2C Near-Term Effects of Water Conveyance Facilities (CM1) on Natural Communities (acres)^a**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option			
		Alternative 2C Removed Habitat (Permanent) ^b	Difference from Alternative 1C	Alternative 2C Removed Habitat (Temporary) ^c	Difference from Alternative 1C
Tidal perennial aquatic ^a	86,263	25	0	117	0
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	0	0	1	0
Valley/foothill riparian	17,966	40	0	86	0
Nontidal perennial aquatic	5,567	22	0	21	0
Nontidal freshwater perennial emergent wetland	1,509	0	0	5	0
Alkali seasonal wetland complex	3,723	13	0	9	0
Vernal pool complex	12,133	29	0	37	0
Managed wetland	70,798	1	0	145	0
Other natural seasonal wetland	842	2	0	2	0
Grassland	78,047	359	+1	320	0
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	6,073	0	9,481	0

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Features in this category include the following conveyance-related facilities: Canal, Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas.

^c Features in this category include the following conveyance features: Canal Work Area, Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area and Borrow/Spoil Areas.

2

1 **Effects of Restoration-Related Conservation Actions of Alternative 2C**

2 The reader is referred to the Alternative 1C impact analysis above for the broader discussion of
3 overall terrestrial biological resources effects that would result from implementation of restoration-
4 related conservation measures under Alternative 2C. The principal effects of concern associated
5 with both Alternatives 1C and 2C are related to the conversion of large acreages of cultivated lands,
6 managed wetland, grassland and valley/foothill riparian habitat to tidal marsh and other habitat
7 types(CM2, CM4, and CM5; Table 12-2C-2 and CM7, CM8, CM10, and CM18; Table 12-2C-3). These
8 effects accrue to special-status species and common wildlife species, especially those that rely on
9 cultivated lands and managed wetlands during some life stage. Foraging raptors and some
10 waterbirds are regular inhabitants of the Delta's cultivated lands. The Delta's managed wetlands
11 provide freshwater nesting, feeding and resting habitat for a large number of Pacific flyway
12 waterfowl and shorebirds, as well as nesting passerines, such as tricolored blackbird. Special-status
13 plant species that occupy the tidal fringe in Suisun Marsh and parts of the Delta would be subject to
14 losses associated with physical construction activity (levee breaching and reconstruction) and
15 changes in water depth and salinity in their current habitat as a result of tidal marsh restoration.

16 Some of the permanent habitat loss associated with the restoration components of these
17 alternatives would occur during the early, construction-related stage of the BDCP. Other losses
18 would occur over time as some habitats (cultivated lands, managed wetland, alkali seasonal wetland
19 complex, valley/foothill riparian and grassland) are converted to tidal marsh (tidal perennial
20 aquatic, tidal freshwater emergent wetland, tidal brackish emergent wetland) and other natural
21 communities. The BDCP conservation components, including restoration components (CM2–CM10),
22 are designed to eventually replace and expand habitats that would have a positive influence on plant
23 and animal species covered in the Plan. These conservation components would also have a positive
24 effect on noncovered and common species that occupy the study area.

25 **NEPA Effects:** Alternative 2C would not have adverse effects on the terrestrial natural communities,
26 special-status species and common species that occupy the study. The construction of the canal and
27 associated infrastructure would substantially inhibit the movement of wildlife from moving within
28 and outside of the Delta resulting in an adverse effect. This alternative would not significantly
29 increase the risk of introducing invasive species, reduce the value of habitat for waterfowl and
30 shorebirds, or conflict with plans and policies that affect the study area. As with Alternative 1C,
31 there would be large acreages of existing habitat converted by the Plan's conservation actions,
32 including the construction of the water conveyance canal from the north Delta to Clifton Court
33 Forebay in the south Delta. The temporarily affected habitat would be restored to its pre-project
34 condition and the restoration conservation measures (CM2–CM10) would permanently replace
35 primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian vegetation,
36 and grassland. The increases in acreage and value of the sensitive natural communities in the study
37 area would have beneficial effects on covered and noncovered species. Where conservation actions
38 would not fully offset effects, the Plan has developed AMMs and this document has included
39 additional mitigation measures to avoid and minimize adverse effects to the maximum extent
40 practicable. Alternative 2C would not require mitigation measures beyond what is proposed for
41 Alternative 1C to offset effects.

42 **CEQA Conclusion:** Alternative 2C would not have significant and unavoidable impacts on the
43 terrestrial natural communities, special-status species and common species that occupy the study.

1 **Table 12-2C-2. Alternative 2C Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 ^b		CM4 ^c		CM5 ^d	
	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f
Tidal perennial aquatic ^a	8	11	18	0	2	5
Tidal brackish emergent wetland	0	0	1	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,246	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	2,087	1,194

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Yolo Bypass Fisheries Enhancement.

^c Tidal Natural Communities Restoration.

^d Seasonally Inundated Floodplain Restoration.

^e Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

1 **Table 12-2C-3. Alternative 2C Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10,**
2 **CM18) that Affect Only Grassland and Cultivated Lands (acres)**

	Conservation Measure							
	CM7 ^a		CM8 ^b		CM10 ^c		CM18 ^d	
Natural Community	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

^a Riparian Natural Community Restoration.
^b Grassland Natural Community Restoration.
^c Nontidal Marsh Restoration.
^d Conservation Hatcheries.
^e Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.
^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.
Temp = Temporary.

3

4 The construction of the canal and associated infrastructure would substantially inhibit the
5 movement of wildlife from moving within and outside of the Delta resulting in an adverse effect. The
6 alternative would not increase the risk of introducing invasive species, reduce the value of habitat
7 for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As with
8 Alternative 1C, there would be large acreages of existing habitat converted by the Plan's
9 conservation actions, including the construction of water conveyance tunnels from the north Delta
10 to Clifton Court Forebay in the south Delta. The temporarily affected habitat would be restored to its
11 pre-project condition and the restoration conservation measures (CM2–CM10) would permanently
12 replace primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian
13 vegetation, and grassland. The increases in acreage and value of the sensitive natural communities
14 in the study area would have beneficial effects on covered, noncovered, and common species. Where
15 conservation actions would not fully offset impacts, the Plan has developed AMMs and this
16 document has included additional mitigation measures to avoid and minimize significant impacts.
17 Alternative 2C would not require mitigation measures beyond what is proposed for Alternative 1C
18 to offset effects. Despite these measures, there would remain a significant and unavoidable impact
19 on wildlife movement corridors from Alternative 6C.

20 As with Alternative 1C, Alternative 2C would require several mitigation measures to be adopted to
21 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
22 measures would be needed beyond the impact offsets provided by Alternative 2C AMMs and CM2–
23 CM21 conservation actions. The relevant mitigation measures, which are included in detail in the
24 analysis of Alternative 1C, are as follows:

- 25 ● Mitigation Measure BIO-18: Compensate for Loss of Alkali Seasonal Wetland Complex
- 26 ● Mitigation Measure BIO-27: Compensate for Loss of Other Natural Seasonal Wetland
- 27 ● Mitigation Measure BIO-32: Restore and Protect Vernal Pool Crustacean Habitat

- 1 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 2 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 3 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status
- 4 Reptiles and Implement Applicable AMMs
- 5 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect
- 6 Effects on Colonies Will Be Minimized
- 7 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater
- 8 Sandhill Crane Foraging Habitat
- 9 • Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value Lesser
- 10 Sandhill Crane Foraging Habitat
- 11 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid
- 12 Disturbance of Nesting Birds
- 13 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing
- 14 Owl Habitat
- 15 • Mitigation Measure BIO-91a, Compensate for Permanent Loss of Low-Value Western Burrowing
- 16 Owl Habitat
- 17 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and
- 18 Ferruginous Hawk Foraging Habitat
- 19 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 20 • Mitigation Measure BIO-121: Compensate for Loss of Short-Eared Owl and Northern Harrier
- 21 Nesting Habitat
- 22 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering
- 23 Habitat
- 24 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 25 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and
- 26 Grasshopper Sparrow Habitat
- 27 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead
- 28 Shrike Habitat
- 29 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect
- 30 Effects on Bank Swallow Will Be Minimized
- 31 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring
- 32 Flows Upstream of the Study Area
- 33 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 34 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement
- 35 Protective Measures
- 36 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered
- 37 Special-Status Plant Species
- 38 • Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United States

- 1 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in
2 Suisun Marsh
- 3 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food
4 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 5 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in
6 Suisun Marsh

7 **12.3.3.8 Alternative 3—Dual Conveyance with Pipeline/Tunnel and** 8 **Intakes 1 and 2 (6,000 cfs; Operational Scenario A)**

9 Alternative 3, which is described in Section 3.5.8 of Chapter 3, *Description of Alternatives*, and
10 depicted in Figure 3-2, would affect terrestrial biological resources in a similar fashion to
11 Alternative 1A. For this reason, Alternative 3 is considered here in a summary fashion; the reader is
12 referred to Alternative 1A for a detailed description of impacts that would be associated with
13 implementing Alternative 3. The impacts associated with Alternatives 1A and 3 were derived by
14 comparing the alternatives to the No Action Alternative for NEPA purposes, and to Existing
15 Conditions for CEQA purposes.

16 **Comparative Differences in CM1 Construction Effects for Alternatives 3 and 1A**

17 The principal differences between these two alternatives are related to the differing construction
18 footprints of the water conveyance facilities (CM1). The Alternative 3 water conveyance facilities
19 would entail construction at north Delta Intakes 1 and 2 rather than Intakes 1–5. The locations of
20 these intakes are depicted in Figure 3-2. Eliminating Intakes 3–5 would reduce the construction
21 footprint along the eastern bank of the Sacramento River just upstream and downstream of the
22 community of Hood. The operational scenario for Alternative 3 (Operational Scenario A) is the same
23 as for Alternative 1A, although less water would be diverted from the north Delta during certain
24 periods when compared with Alternative 1A. Also, all of the conservation measures other than CM1
25 would be the same as under Alternative 1A. Therefore, operations and conservation effects on
26 terrestrial biological resources would be identical under these two alternatives.

27 Due to the elimination of Intakes 3–5 and their associated pumps and pipelines, Alternative 3 would
28 create differences in the permanent and temporary loss of natural communities and cultivated lands
29 during water conveyance facilities construction when compared with Alternative 1A (Table 12-3-1).
30 All of these differences would occur during the near-term timeframe associated with water
31 conveyance facilities construction. Alternative 3 would permanently remove 9 fewer acres of tidal
32 perennial aquatic habitat in the Sacramento River, 10 fewer acres of valley/foothill riparian habitat
33 along the eastern bank of the Sacramento River, 11 fewer acres of grassland adjacent to the river,
34 and 118 acres of cultivated land just east of the river, all associated with less intake construction
35 along the eastern bank of the Sacramento River in the vicinity of Hood. Alternative 3 would also
36 permanently affect a smaller acreage of jurisdictional waters (including wetlands) as regulated by
37 Section 404 of the CWA, when compared with Alternative 1A (10 acres fewer; see Table 12-3-2).
38 Refer to Table 12-1A-69 for a summary of Alternative 1A permanent and temporary jurisdictional
39 waters and wetlands impacts.

40 There would be similar reductions in temporary losses of natural communities along the
41 Sacramento River, including 32 fewer acres of tidal perennial aquatic, 3 acres fewer of tidal
42 freshwater emergent wetland, 10 acres fewer of valley/foothill riparian, one acre fewer of nontidal

1 perennial aquatic, 28 acres fewer grassland, and 348 acres fewer of cultivated land (Table 12-3-1).
2 Alternative 3 would also temporarily affect a smaller acreage of jurisdictional waters (including
3 wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (39 acres
4 fewer; see Table 12-3-2).

5 Note that the acres of habitat affected by CM1, as listed in Table 12-3-1, would be acres affected in
6 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in
7 Table 12-3-3 and Table 12-3-4 for other conservation actions are for the late long-term timeframe;
8 the numbers represent acres affected cumulatively over the entire 50-year period of the Plan. Table
9 3-4 in Chapter 3, *Description of Alternatives*, describes the schedule for implementation of natural
10 community protection and restoration conservation measures over the course of the BDCP.

11 **Table 12-3-1. Alternative 3 Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**
12 **Communities (acres)**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option			
		Alternative 3 Removed Habitat (Permanent) ^b	Difference from Alternative 1A	Alternative 3 Removed Habitat (Temporary) ^c	Difference from Alternative 1A
Tidal perennial aquatic ^a	86,263	39	-9	101	-32
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	6	0	3	-3
Valley/foothill riparian	17,966	49	-9	18	-10
Nontidal perennial aquatic	5,567	12	0	9	0
Nontidal freshwater perennial emergent wetland	1,509	1	0	1	0
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	3	0	0	0
Managed wetland	70,798	3	0	83	0
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	304	-11	234	-28
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	3,706	-130	1,843	-348

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Features in this category include the following conveyance-related facilities: Canal, Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, Reusable Tunnel Material Storage Areas and Borrow/Spoil Areas.

^c Features in this category include the following conveyance features: Canal Work Area, Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area.

13

1 **Table 12-3-2 Alternative 3 Effects on Jurisdictional Wetlands and Waters Relative to Alternative 1A**
2 **(acres)**

Wetland/Water Type	Alternative 3 Impacts on Jurisdictional Wetlands and Waters			
	Permanent Impact	Difference from Alternative 1A	Temporary Impact	Difference from Alternative 1A
Agricultural Ditch	64.8	-0.2	21.0	-2.5
Alkaline Wetland	0.1	0	0	0
Clifton Court Forebay	1.0	0	0	0
Conveyance Channel	12.7	0	1.1	0
Depression	1.9	0	1.8	0
Emergent Wetland	46.8	0	4.7	-2.5
Forest	5.8	0	11.3	-0.7
Lake	0	0	0	-0.3
Scrub-Shrub	18.2	-2.4	2.1	-2.2
Seasonal Wetland	18.7	0	26.6	0
Tidal Channel	35.0	-7.9	102.8	-31.0
Vernal Pool	0	0	0	0
Total	205	-10	171	-39

3

4 These differences in loss of natural communities associated with construction of CM1 would create
5 differences in effects on covered and noncovered wildlife. The reduced level of valley/foothill
6 riparian habitat loss would be a positive influence on valley elderberry longhorn beetle, breeding
7 habitat for raptors, herons and egrets (great egret, snowy egret, great blue heron, Swainson's hawk,
8 white-tailed kite, Cooper's hawk, and black-crowned night heron), and migratory habitat for species
9 that use the river corridor, such as western yellow-billed cuckoo. Species that would benefit from
10 smaller permanent losses of grassland and cultivated land would include foraging raptors
11 (Swainson's hawk, short-eared owl, northern harrier, merlin and white-tailed kite), greater sandhill
12 crane, California horned lark, tricolored blackbird, mountain plover and several species of bats.
13 Alternative 3 would result in a slightly smaller permanent loss (94 acres less) of crane foraging
14 habitat compared to Alternative 1A. The significantly smaller temporary habitat conversions
15 associated with Alternative 3 would have comparable benefits to these species. There would be 262
16 fewer acres of foraging habitat temporarily lost under Alternative 3 for greater sandhill crane when
17 compared to Alternative 1A because of the lower acreage of cultivated land loss. However, the
18 effects would be offset in the near-term by AMMs adopted for specific species, including greater
19 sandhill crane, and over time by on-site restoration required by *AMM10 Restoration of Temporarily*
20 *Affected Natural Communities*.

21 The differences in effect that the water conveyance facilities of Alternatives 1A and 3 could have on
22 special-status plant species are minor. Habitat modeling indicates that Alternative 3 would create 1
23 fewer acre of permanent habitat loss for side-flowering skullcap, 3 fewer acres of permanent habitat
24 loss for Mason's lilaepsis and delta mudwort, and 5 acres less temporary loss of habitat for Mason's
25 lilaepsis and delta mudwort when compared with Alternative 1A.

26 The near-term conservation activities described and evaluated in Appendix 12D, *Feasibility*
27 *Assessment of Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on*
28 *Terrestrial Biological Resources*, would provide for protection, enhancement and restoration of

1 habitats affected by the near-term water conveyance facilities construction activities. This
2 conservation activity, which is part of the early implementation of the BDCP, would offset water
3 conveyance facilities construction effects on both covered and noncovered special-status species in
4 the study area.

5 **Effects of Restoration-Related Conservation Actions of Alternative 3**

6 Natural community changes associated with the major restoration-related conservation measures
7 under Alternative 3 (CM2, CM4, and CM5; see Table 12-3-3 and CM7, CM8, CM10, and CM18; Table
8 12-3-4) would be identical to those described for Alternative 1A.

9 **Table 12-3-3. Alternative 3 Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**
10 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 ^b		CM4 ^c		CM5 ^d	
	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f
Tidal perennial aquatic ^a	8	11	18	0	2	5
Tidal brackish emergent wetland	0	0	1	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	2,087	1,194

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Yolo Bypass Fisheries Enhancement.

^c Tidal Natural Communities Restoration.

^d Seasonally Inundated Floodplain Restoration.

^e Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

11

1 **Table 12-3-4. Alternative 3 Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10, CM18)**
2 **that Affect Only Grassland and Cultivated Land (acres)**

Natural Community	Conservation Measure							
	CM7 ^a		CM8 ^b		CM10 ^c		CM18 ^d	
	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

^a Riparian Natural Community Restoration.

^b Grassland Natural Community Restoration.

^c Nontidal Marsh Restoration.

^d Conservation Hatcheries.

^e Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3

4 The reader is referred to the Alternative 1A impact analysis above for the broader discussion of
5 overall terrestrial biological resources effects that would result from implementation of restoration-
6 related conservation measures under Alternative 3. The principal effects of concern associated with
7 both Alternative 1A and 3 are related to the conversion of large acreages of cultivated lands,
8 managed wetland, grassland and valley/foothill riparian habitat to tidal marsh (tidal perennial
9 aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland) and other habitat
10 types during restoration activities. These effects accrue to special-status species and common
11 wildlife species, especially those that rely on cultivated lands and managed wetland during some life
12 stage. Foraging raptors and some waterbirds are regular inhabitants of the Delta's cultivated lands.
13 The Delta's managed wetlands provide freshwater nesting, feeding and resting habitat for a large
14 number of Pacific flyway waterfowl and shorebirds, as well as nesting passerines, such as tricolored
15 blackbird. Special-status plant species that occupy the tidal fringe in Suisun Marsh and parts of the
16 Delta would be subject to losses associated with physical construction activity (levee breaching and
17 reconstruction) and changes in water depth and salinity in their current habitat as a result of tidal
18 marsh restoration.

19 Some of the permanent habitat loss associated with the restoration components of Alternative 3
20 would occur during the early, construction-related stage of the BDCP. Other losses would occur over
21 time as some habitats (cultivated lands, managed wetland, valley/foothill riparian and grassland)
22 are converted to tidal marsh and other natural communities. The BDCP conservation components,
23 including the restoration components (CM2-CM10) are designed to eventually replace and expand
24 habitats that would have a positive influence on plant and animal species covered in the Plan,
25 including those that rely on managed wetland and cultivated land. These conservation components
26 would also have a positive effect on noncovered and common species that occupy the study area.

27 **NEPA Effects:** Alternative 3 would not have adverse effects on the terrestrial natural communities,
28 special-status species and common species that occupy the study area. The alternative also would
29 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive

1 species, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies
2 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat
3 converted by the Plan's conservation actions, including the construction of water conveyance
4 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily affected
5 habitat would be restored to its pre-project condition and the restoration conservation measures
6 (CM2–CM10) would permanently replace primarily cultivated land and managed wetland with tidal
7 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the
8 sensitive natural communities in the study area would have beneficial effects on covered and
9 noncovered species. Where conservation actions would not fully offset effects, the Plan has
10 developed AMMs and this document has included additional mitigation measures to avoid adverse
11 effects. Alternative 3 would not require mitigation measures beyond what is proposed for
12 Alternative 1A to offset effects.

13 **CEQA Conclusion:** Alternative 3 would not have significant and unavoidable impacts on the
14 terrestrial natural communities, special-status species and common species that occupy the study
15 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the
16 risk of introducing invasive species, reduce the value of habitat for waterfowl and shorebirds, or
17 conflict with plans and policies that affect the study area. As with Alternative 1A, there would be
18 large acreages of existing habitat converted by the Plan's conservation actions, including the
19 construction of water conveyance tunnels from the north Delta to Clifton Court Forebay in the south
20 Delta. The temporarily affected habitat would be restored to its pre-project condition and the
21 restoration conservation measures (CM2–CM10) would permanently replace primarily cultivated
22 land and managed wetland with tidal and nontidal marsh, riparian vegetation, and grassland. The
23 increases in acreage and value of the sensitive natural communities in the study area would have
24 beneficial effects on covered, noncovered, and common species. Where conservation actions would
25 not fully offset impacts, the Plan has developed AMMs and this document has included additional
26 mitigation measures to avoid significant impacts. Alternative 3 would not require mitigation
27 measures beyond what is proposed for Alternative 1A to offset effects.

28 As with Alternative 1A, Alternative 3 would require several mitigation measures to be adopted to
29 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
30 measures would be needed beyond the impact offsets provided by Alternative 3 AMMs and CM2–
31 CM21 conservation actions. The relevant mitigation measures, which are included in detail in the
32 analysis of Alternative 1A, are as follows:

- 33 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 34 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 35 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status
36 Reptiles and Implement Applicable AMMs
- 37 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect
38 Effects on Colonies Will Be Minimized
- 39 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater
40 Sandhill Crane Foraging Habitat
- 41 • Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value Lesser
42 Sandhill Crane Foraging Habitat

- 1 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid
2 Disturbance of Nesting Birds
- 3 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing
4 Owl Habitat
- 5 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and
6 Ferruginous Hawk Foraging Habitat
- 7 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 8 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering
9 Habitat
- 10 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 11 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and
12 Grasshopper Sparrow Habitat
- 13 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead
14 Shrike Habitat
- 15 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect
16 Effects on Bank Swallow Will Be Minimized
- 17 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring
18 Flows Upstream of the Study Area
- 19 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 20 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement
21 Protective Measures
- 22 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered
23 Special-Status Plant Species
- 24 • Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United States
- 25 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in
26 Suisun Marsh
- 27 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food
28 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 29 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in
30 Suisun Marsh

1 **12.3.3.9 Alternative 4—Dual Conveyance with Modified Pipeline/Tunnel**
2 **and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H)**

3 Chapter 3, Section 3.5.9, *Alternative 4*, provides details of Alternative 4, and Figures 3-9 and 3-10
4 depict the alternative.

5 **Natural Communities**

6 **Tidal Perennial Aquatic**

7 Construction, operation, maintenance, and management associated with the conservation
8 components of Alternative 4 would have no long-term adverse effects on the habitats associated
9 with the tidal perennial aquatic natural community. Initial development and construction of CM1,
10 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal or modification of
11 this community (see Table 12-4-1). Full implementation of Alternative 4 would also include the
12 following conservation actions over the term of the BDCP to benefit the tidal perennial aquatic
13 natural community (see Chapter 3, Section 3.3, *Biological Goals and Objectives*, of the BDCP).

- 14 • Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
15 accommodate sea level rise (Objective L1.3, associated with CM4).
- 16 • Within the restored and protected tidal natural communities and transitional uplands, restore
17 or create tidal perennial aquatic natural community as necessary when creating tidal emergent
18 wetland (Objective TPANC1.1, associated with CM4).
- 19 • Control invasive aquatic vegetation that adversely affects native fish habitat (Objective
20 TPANC2.1, associated with CM13).

21 There is a variety of other, less specific conservation goals and objectives in Chapter 3, Section 3.3 of
22 the BDCP that would improve the value of tidal perennial aquatic natural community for terrestrial
23 species. As explained below, with the restoration and enhancement of these amounts of habitat, in
24 addition to AMMs, impacts on tidal aquatic natural community would not be adverse for NEPA
25 purposes and would be less than significant for CEQA purposes.

26 Note that two time periods are represented in Table 12-4-1 and the other tables contained in the
27 analysis of Alternative 4. The near-term (NT) acreage effects listed in the table would occur over the
28 near-term of Alternative 4 implementation. The late long-term (LLT) effects contained in these
29 tables represent the combined effects of all activities over the entire 50-year term of the Plan. This
30 table and all impact tables in the chapter include reference to only those conservation measures that
31 would eliminate natural community acreage either through construction or restoration activities, or
32 would result in periodic inundation of the community.

1 **Table 12-4-1. Changes in Tidal Perennial Aquatic Natural Community Associated with Alternative 4**
2 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	280	280	2,019 ^e	2,019	0	0
CM2	8	8	11	11	9-36	0
CM4	14	18	0	0	0	0
CM5	0	2	0	5	0	39
CM6	Unk.	Unk.	0	0	0	0
TOTAL IMPACTS	302	308	2,030	2,035	9-36	39

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

^e The large acreage of tidal perennial aquatic habitat affected by Alternative 4 is related to dredging of Clifton Court Forebay; the habitat would not be permanently removed.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-1: Changes in Tidal Perennial Aquatic Natural Community as a Result of**
5 **Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,
7 CM4, CM5, and CM6 for Alternative 4 would permanently affect an estimated 308 acres and
8 temporarily disturb 2,035 acres of tidal perennial aquatic natural community in the study area. The
9 large temporary loss of this natural community would be largely related to dredging of Clifton Court
10 Forebay (1,931 acres). These modifications represent less than 3% of the 86,263 acres of the
11 community that is mapped in the study area. The majority of the permanent and temporary effects
12 would happen during the near-term time period for Alternative 4 implementation, as water
13 conveyance facilities are constructed and habitat restoration is initiated. Natural communities
14 restoration would add 8,300 acres of tidal wetlands, including an estimated 3,400 acres of tidal
15 perennial aquatic natural community during the same period, which would expand the area of that
16 habitat and offset the losses. The 3,400-acre increase is estimated, based on modeling reported in
17 BDCP Appendix 3.B, Table 5, by comparing existing Plan Area subtidal habitat to near-term subtidal
18 habitat with the Plan. The effects analysis in Chapter 5, Section 5.4.1.2, *Beneficial Effects Analysis*, of
19 the BDCP indicates that, while there would be no minimum restoration requirement for the tidal
20 perennial aquatic natural community, an estimated approximately 27,000 acres of tidal perennial
21 aquatic natural community would be restored based on tidal restoration modeling. This estimate is
22 based on Table 5 in Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*, of the BDCP, by
23 subtracting late long-term acreage without project from late long-term acreage with project.

1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation:* Construction of the Alternative 4 water conveyance facilities
5 would permanently remove 280 acres and temporarily disturb 2,019 acres of tidal perennial
6 aquatic community. Most of the permanent loss would occur where Intakes 2, 3, and 5 encroach
7 on the Sacramento River's east bank between Clarksburg and Courtland (see Terrestrial Biology
8 Mapbook for a view of proposed facilities overlain on natural community mapping). The
9 footings and the screens at the intake sites would be placed into the river margin and would
10 displace moderately deep to shallow, flowing open water with a mud substrate and very little
11 aquatic vegetation. Permanent losses would also occur where new control structures would be
12 built into the California Aqueduct and the Delta Mendota Canal adjacent to Clifton Court
13 Forebay, and where permanent new transmission lines would be constructed along Lambert
14 Road just west of Interstate 5.

15 The temporary effects on tidal perennial aquatic habitats would occur at numerous locations,
16 with the largest affect occurring at Clifton Court Forebay, where the entire forebay would be
17 dredged to provide additional storage capacity. Other temporary effects would occur in the
18 Sacramento River at Intakes 2, 3, and 5, and at temporary barge unloading facilities established
19 at three locations along the tunnel route. The barge unloading construction would temporarily
20 affect Snodgrass Slough just south of Hood, Potato Slough at the south end of Boldin Island,
21 Venice Reach of the San Joaquin River at the south end of Venice Island, Old River on the east
22 side of Clifton Court Forebay, Connection Slough at the north end of Bacon Island, and Old River
23 just south of its junction with North Victoria Canal. The details of these locations can be seen in
24 the Terrestrial Biology Mapbook. These losses would take place during the near-term
25 construction period.

- 26 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
27 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
28 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
29 Sacramento Weir improvements. Some of these activities could involve excavation and grading
30 in tidal perennial aquatic areas to improve passage of fish through the bypasses. Based on
31 hypothetical construction footprints, a total of 8 acres could be permanently lost and another 11
32 acres could be temporarily removed. This activity would occur primarily in the near-term
33 timeframe.

- 34 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration
35 footprints, implementation of CM4 would affect 18 acres of tidal perennial aquatic community.
36 CM4 involves conversion of existing natural communities to a variety of tidal wetlands,
37 including tidal perennial aquatic, tidal brackish emergent, and tidal freshwater emergent
38 wetlands. Specific locations for these conversions are not known. The 18 acres could remain
39 tidal perennial aquatic with a modified tidal prism, or they could eventually be converted to one
40 of the other tidal wetland types. For purposes of this analysis, a conservative approach has been
41 taken and the effect has been discussed simultaneously with the habitat losses associated with
42 other conservation measures.

43 An estimated 65,000 acres of tidal wetlands and transitional uplands would be restored during
44 tidal habitat restoration, consistent with BDCP Objective L1.3. Of these acres, an estimated
45 27,000 acres of tidal perennial aquatic habitat would be restored, based on modeling conducted

1 by ESA PWA (refer to Table 5 in Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*, of the
2 BDCP). This restoration would be consistent with BDCP Objective TPANC1.1. Approximately
3 3,400 acres of the restoration would happen during the near-term time period of Alternative 4
4 implementation, which would coincide with the timeframe of water conveyance facilities
5 construction. The remaining restoration would be spread over the following years of Plan
6 implementation. Tidal natural communities restoration is expected to be focused in the ROAs
7 identified in Figure 12-1. Some of the restoration would occur in the lower Yolo Bypass, but
8 restoration would also be spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne
9 and West Delta ROAs.

- 10 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
11 would permanently remove 2 acres and temporarily remove 5 acres of tidal perennial aquatic
12 habitat. The construction-related losses would be considered a permanent removal of the tidal
13 perennial aquatic habitats directly affected. This activity is scheduled to start following
14 construction of water conveyance facilities. Specific locations for the floodplain restoration have
15 not been identified, but it is expected that much of the activity would occur in the south Delta
16 along the major rivers. Floodplain restoration along the San Joaquin River would improve
17 connectivity for a variety of species that rely on tidal perennial aquatic habitat. The regional and
18 Plan Area landscape linkages along the San Joaquin River are included in Figure 12-2.
- 19 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
20 of small amounts of tidal perennial aquatic habitat along 20 miles of river and sloughs. The
21 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity
22 would occur on tidal perennial aquatic habitat margins, including levees and channel banks. The
23 improvements would occur within the study area on sections of the Sacramento, San Joaquin
24 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

25 The following paragraphs summarize the combined effects discussed above and describe other
26 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
27 also included.

28 ***Near-Term Timeframe***

29 During the near-term timeframe (the first 14 years of BDCP implementation), Alternative 4 would
30 affect the tidal perennial aquatic community through CM1 construction losses (280 acres permanent
31 and 2,019 acres temporary) and the CM2 construction losses (8 acres permanent and 11 acres
32 temporary). These losses would occur primarily at Clifton Court Forebay due to dredging, along the
33 Sacramento River at intake sites, or in the northern Yolo Bypass. Approximately 14 acres of the
34 inundation and construction-related effects resulting from CM4 would occur during the near-term
35 throughout the ROAs mapped in Figure 12-1.

36 The construction losses of this special-status natural community would represent an adverse effect
37 if they were not offset by avoidance and minimization measures and restoration actions associated
38 with BDCP conservation components. Loss of tidal perennial aquatic natural community would be
39 considered both a loss in acreage of a sensitive natural community and a loss of waters of the United
40 States as defined by Section 404 of the CWA. The largest loss would occur at Clifton Court Forebay,
41 and would be temporary. This tidal perennial habitat is of relatively low value to special-status
42 terrestrial species in the study area. The creation of approximately 3,400 acres of high-value tidal
43 perennial aquatic natural community as part of CM4 during the first 14 years of Alternative 4
44 implementation would offset this near-term loss, avoiding any adverse effect. Typical project-level

1 mitigation ratios (1:1 for restoration) would indicate 2,332 acres of restoration would be needed to
2 offset (i.e., mitigate) the 2,332 acres of effect (the total permanent and temporary near-term effects
3 listed in Table 12-4-1) associated with near-term activities, including water conveyance facilities
4 construction.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
6 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
7 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
8 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
9 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
10 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

11 **Late Long-Term Timeframe**

12 Implementation of Alternative 4 as a whole would result in relatively minor (less than 3%)
13 conversions of or losses to tidal perennial aquatic community in the study area. These losses or
14 conversions (308 acres of permanent and 2,035 acres of temporary) would be largely associated
15 with construction of the water conveyance facilities (CM1), construction of Yolo Bypass fish
16 improvements (CM2), and inundation during tidal marsh restoration (CM4). Inundation conversions
17 would occur through the course of the BDCP restoration program at various tidal restoration sites
18 throughout the study area. By the end of the Plan timeframe, a total of more than 27,000 acres of
19 high-value tidal perennial aquatic natural community would be restored (estimated from Table 5 in
20 Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*, of the BDCP). The restoration would occur
21 over a wide region of the study area, including within the Suisun Marsh, Cosumnes/Mokelumne,
22 Cache Creek, and South Delta ROAs (see Figure 12-1).

23 **NEPA Effects:** The creation of approximately 3,400 acres of high-value tidal perennial aquatic
24 natural community as part of CM4 during the first 10 years of Alternative 4 implementation would
25 offset near-term losses associated with construction activities for CM1, CM2, CM4 and CM6, avoiding
26 any adverse effect. Alternative 4, which includes restoration of an estimated 27,000 acres of this
27 natural community over the course of the Plan, would not result in a net long-term reduction in the
28 acreage of a sensitive natural community; the effect would be beneficial.

29 **CEQA Conclusion:**

30 **Near-Term Timeframe**

31 Alternative 4 would result in the near-term loss, conversion, and temporary disturbance of
32 approximately 2,332 acres of tidal perennial aquatic natural community due to construction of the
33 water conveyance facilities (CM1) and fish passage improvements (CM2), and inundation during
34 tidal marsh restoration (CM4). The construction losses would occur primarily at Clifton Court
35 Forebay, along the Sacramento River at intake sites, along various Delta waterways at barge
36 offloading sites, and within the northern section of the Yolo Bypass, while inundation conversions
37 would occur at various tidal restoration sites throughout the study area. The losses and conversions
38 would be spread across the near-term timeframe. These losses and conversions would be offset by
39 planned restoration of an estimated 3,400 acres of high-value tidal perennial aquatic natural
40 community scheduled for the first 10 years of Alternative 4 implementation (CM4). AMM1, AMM2,
41 AMM6, AMM7, and AMM10 would also be implemented to minimize impacts. Because of these
42 offsetting near-term restoration activities and AMMs, impacts would be less than significant. Typical
43 project-level mitigation ratios (1:1 for restoration) would indicate that 2,332 acres of restoration

1 would be needed to offset (i.e., mitigate) the 2,332 acres of loss or conversion. The restoration
2 would be initiated at the beginning of Alternative 4 implementation to minimize any time lag in the
3 availability of this habitat to special-status species, and would result in a net gain in acreage of this
4 sensitive natural community.

5 ***Late Long-Term Timeframe***

6 At the end of the Plan period, 2,343 acres of the natural community would be lost or converted and
7 an estimated 27,000 acres of this community would be restored. There would be no net permanent
8 reduction in the acreage of this sensitive natural community within the study area. Therefore,
9 Alternative 4 would not have a substantial adverse effect on this natural community; the impact
10 would be beneficial.

11 **Impact BIO-2: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 12 **Perennial Aquatic Natural Community**

13 Two Alternative 4 conservation measures would modify the water depths and inundation/flooding
14 regimes of both natural and man-made waterways in the study area. CM2, which is designed to
15 improve fish passage and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase
16 periodic inundation of tidal perennial aquatic natural community on small acreages, while CM5
17 would expose this community to additional flooding as channel margins are modified and levees are
18 set back to improve fish habitat along some of the major rivers and waterways throughout the study
19 area.

- 20 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would
21 result in an increase in the frequency, magnitude and duration of inundation and changes in
22 water depth and velocity of 9–36 acres of tidal perennial aquatic natural community. The
23 methods used to estimate these inundation acreages are described in Appendix 5.J, *Effects on*
24 *Natural Communities, Wildlife, and Plants*, of the BDCP. The area more frequently affected by
25 inundation would vary with the flow volume that would pass through the newly constructed
26 notch in the Fremont Weir. The 9-acre increase in inundation would be associated with a notch
27 flow of 1,000 cfs, and the 36-acre increase would result from a notch flow of 4,000 cfs. Plan-
28 related increases in flow through Fremont Weir would be expected in 30% of the years. Most of
29 the tidal perennial aquatic community occurs in the southern section of the bypass on Liberty
30 Island, and, to a lesser extent, along the eastern edge of the bypass, including the Tule Canal/Toe
31 Drain. The anticipated change in management of flows in the Yolo Bypass includes more
32 frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some
33 years, later releases into the bypass in spring months (April and May). The modification of
34 periodic inundation events would be expected to be beneficial to the ecological function of tidal
35 perennial aquatic habitat in the bypass as it relates to BDCP covered aquatic species. The Yolo
36 Bypass waterway is the key element in the Yolo Bypass landscape linkage mapped in Figure 12-
37 2 and described in detail in BDCP Chapter 3, Table 3.2-3. The change in periodic inundation in
38 the bypass would not substantially modify its value for special-status or common terrestrial
39 species. Water depths and water flow rates would increase over Existing Conditions and the No
40 Action condition in approximately 30% of the years, but it would not fragment the habitat or
41 make it less accessible to special-status or common terrestrial species. The modifications would
42 not result in a loss of this community. The plant species associated with this community are
43 adapted to inundation. The extended inundation would be designed to expand foraging and
44 spawning habitat for Delta fishes. The effects of these changes in the inundation regime on

1 terrestrial species that rely on tidal perennial aquatic habitats are discussed in detail later in this
2 chapter, under the individual species assessments.

- 3 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a
4 seasonal increase in the frequency and duration of flooding of 39 acres of tidal perennial aquatic
5 habitat. Specific locations for this restoration activity have not been identified, but they would
6 likely be focused in the south Delta area, along the major rivers and Delta channels. The more
7 frequent exposure of these wetlands to stream flooding events would be beneficial to the
8 ecological function of tidal perennial aquatic habitats, especially as they relate to BDCP target
9 aquatic species. The plant species associated with these tidal perennial aquatic areas are
10 adapted to inundation and would not be substantially modified.

11 In summary, 48–75 acres of tidal perennial aquatic community in the study area would be subjected
12 to more frequent increases in water depth and velocity as a result of implementing two Alternative 4
13 conservation measures (CM2 and CM5). Tidal perennial aquatic community is already, by definition,
14 permanently inundated aquatic habitat of value to terrestrial and aquatic species in the study area;
15 therefore, periodic changes in water depth and velocity would not result in a net permanent
16 reduction in the acreage of this community in the study area.

17 **NEPA Effects:** Increasing periodic inundation of tidal perennial aquatic natural community would
18 not have an adverse effect on the community.

19 **CEQA Conclusion:** An estimated 48–75 acres of tidal perennial aquatic community in the study area
20 would be subjected to more frequent increases in water depth and velocity from flood flows as a
21 result of implementing CM2 and CM5 under Alternative 4. Tidal perennial aquatic community is
22 already, by definition, permanently inundated aquatic habitat of value to terrestrial and aquatic
23 species in the study area. The periodic inundation would not result in a net permanent reduction in
24 the acreage of this community in the study area. Therefore, there would be no substantial adverse
25 effect on the community. The impact would be less than significant.

26 **Impact BIO-3: Modification of Tidal Perennial Aquatic Natural Community from Ongoing** 27 **Operation, Maintenance and Management Activities**

28 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
29 associated with changed water management is in effect, there would be new ongoing and periodic
30 actions associated with operation, maintenance and management of the BDCP facilities and
31 conservation lands that could affect tidal perennial aquatic natural community in the study area. The
32 ongoing actions include diverting Sacramento River flows in the north Delta, and reduced diversion
33 from south Delta channels. These actions are associated with CM1 (see Impact BIO-2 for effects
34 associated with CM2). The periodic actions would involve access road and conveyance facility
35 repair, vegetation management at the various water conveyance facilities and habitat restoration
36 sites (CM13), levee repair and replacement of levee armoring, channel dredging, and habitat
37 enhancement in accordance with natural community management plans. The potential effects of
38 these actions are described below.

- 39 • *Modified river flows upstream of and within the study area and reduced diversions from south*
40 *Delta channels*. Changes in releases from reservoirs upstream of the study area, increased
41 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta
42 channels (associated with Operational Scenario H) would not result in the permanent reduction
43 in acreage of a sensitive natural community in the study area. Flow levels in the upstream rivers

1 would not change such that the acreage of tidal perennial aquatic community would be reduced
 2 on a permanent basis. Some increases and some decreases would be expected to occur during
 3 some seasons and in some water-year types, but there would be no permanent loss. Similarly,
 4 increased diversions of Sacramento River flows in the north Delta would not result in a
 5 permanent reduction in tidal perennial aquatic community downstream of these diversions.
 6 Tidal influence on water levels in the Sacramento River and Delta waterways would continue to
 7 be dominant. Reduced diversions from the south Delta channels would not create a reduction in
 8 this natural community.

9 The periodic changes in flows in the Sacramento River, Feather River, and American River
 10 associated with Alternative 4 operations would affect salinity, water temperature, dissolved
 11 oxygen levels, turbidity, contaminant levels, and dilution capacity in these rivers and Delta
 12 waterways. These changes are discussed in detail in Chapter 8, *Water Quality*. Potentially
 13 substantial increases in electrical conductivity (salinity) are predicted for the Delta and Suisun
 14 Marsh as a result of increased export of Sacramento River water. These salinity changes are not
 15 expected to result in a permanent reduction in the acreage or value of tidal perennial aquatic
 16 natural community for terrestrial species in the study area.

- 17 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
 18 conveyance facilities and levees associated with the BDCP actions have the potential to require
 19 removal of adjacent vegetation and could entail earth and rock work in tidal perennial aquatic
 20 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering tidal
 21 perennial aquatic habitats. These activities would be subject to normal erosion, turbidity and
 22 runoff control management practices, including those developed as part of *AMM2 Construction*
 23 *Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
 24 vegetation removal or earthwork adjacent to or within aquatic habitats would require use of
 25 sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces. Proper
 26 implementation of these measures would avoid permanent adverse effects on this community.
- 27 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical
 28 treatment, would be a periodic activity associated with the long-term maintenance of water
 29 conveyance facilities and restoration sites. Vegetation management is also the principal activity
 30 associated with *CM13 Invasive Aquatic Vegetation Control* and is consistent with BDCP Objective
 31 TPANC2.1. Use of herbicides to control nuisance vegetation could pose a long-term hazard to
 32 tidal perennial aquatic natural community at or adjacent to treated areas. The hazard could be
 33 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
 34 onto the natural community, or direct discharge of herbicides to tidal perennial aquatic areas
 35 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
 36 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce
 37 hazards to humans and the environment from use of various chemicals during maintenance
 38 activities, including the use of herbicides. These commitments, including the commitment to
 39 prepare and implement spill prevention, containment, and countermeasure plans and
 40 stormwater pollution prevention plans, are described in Appendix 3B, *Environmental*
 41 *Commitments, AMMs, and CMs*. Best management practices, including control of drift and runoff
 42 from treated areas, and use of herbicides approved for use in aquatic environments would also
 43 reduce the risk of affecting natural communities adjacent to water conveyance features and
 44 levees associated with restoration activities.

45 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
 46 normal ecological function of tidal aquatic habitats in planned restoration areas. The treatment

1 activities would be conducted in concert with the California Department of Boating and
2 Waterways' invasive species removal program. Eliminating large stands of water hyacinth and
3 Brazilian waterweed would improve habitat conditions for some aquatic species by removing
4 cover for nonnative predators, improving water flow and removing barriers to movement (see
5 Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also benefit terrestrial
6 species that use tidal perennial aquatic natural community for movement corridors and for
7 foraging. Vegetation management effects on individual species are discussed in the species
8 sections on following pages.

- 9 • *Channel dredging.* Long-term operation of the Alternative 4 intakes on the Sacramento River
10 would include periodic dredging of sediments that might accumulate in front of intake screens.
11 The dredging would occur in tidal perennial aquatic natural community and would result in
12 short-term increases in turbidity and disturbance of the substrate. These conditions would not
13 eliminate the community, but would diminish its value for special-status and common species
14 that rely on it for movement corridor or foraging area. The individual species effects are
15 discussed later in this chapter.
- 16 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
17 communities within the Plan Area (CM11). For tidal perennial aquatic natural community, a
18 management plan would be prepared that specifies actions to improve the value of the habitats
19 for covered species. Actions would include control of invasive nonnative plant and animal
20 species, restrictions on vector control and application of herbicides, and maintenance of
21 infrastructure that would allow for movement through the community. The enhancement efforts
22 would improve the long-term value of this community for both special-status and common
23 species.

24 The various operations and maintenance activities described above could alter acreage of tidal
25 perennial aquatic natural community in the study area through changes in flow patterns and
26 changes in water quality. Activities could also introduce sediment and herbicides that would reduce
27 the value of this community to common and sensitive plant and wildlife species. Other periodic
28 activities associated with the Plan, including management, protection and enhancement actions
29 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
30 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
31 community. While some of these activities could result in small reductions in acreage, these
32 reductions would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural*
33 *Communities Restoration*. The management actions associated with levee repair, periodic dredging
34 and control of invasive plant species would also result in a long-term benefit to the species
35 associated with tidal perennial aquatic habitats by improving water movement.

36 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net
37 permanent reduction in this sensitive natural community within the study area. Therefore, there
38 would be no adverse effect on the tidal perennial aquatic natural community.

39 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
40 have the potential to create minor losses in total acreage of tidal perennial aquatic natural
41 community in the study area, and could create temporary increases in turbidity and sedimentation.
42 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
43 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize
44 these impacts, and other operations and maintenance activities, including management, protection
45 and enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and

1 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
2 improved water movement in these habitats. Long-term restoration activities associated with *CM4*
3 *Tidal Natural Communities Restoration* would greatly expand this natural community in the study
4 area. Ongoing operation, maintenance and management activities would not result in a net
5 permanent reduction in the acreage or value of this sensitive natural community within the study
6 area. Therefore, there would be a less-than-significant impact on the tidal perennial aquatic natural
7 community.

8 **Tidal Brackish Emergent Wetland**

9 Construction, operation, maintenance and management associated with the conservation
10 components of Alternative 4 would have no adverse effect on the habitats associated with the tidal
11 brackish emergent wetland natural community. Habitat restoration and construction associated
12 with CM1, CM2, CM5 and CM6 would not remove tidal brackish emergent wetland; levee breaching
13 and minor construction associated with CM4 may temporarily remove small amounts of this natural
14 community (see Table 12-4-2). Full implementation of Alternative 4 would include the following
15 conservation actions over the term of the BDCP to benefit the tidal brackish emergent wetland
16 natural community.

- 17 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
18 accommodate sea level rise (Objective L1.3 associated with CM4).
- 19 ● Within the restored and protected tidal natural communities and transitional uplands, include
20 sufficient transitional uplands along the fringes of restored brackish and freshwater tidal
21 emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow for
22 the future upslope establishment of tidal emergent wetland communities (Objective L1.7,
23 associated with CM4).
- 24 ● Within the restored and protected tidal natural communities and transitional uplands, restore
25 or create at least 6,000 acres of tidal brackish emergent wetland in Conservation Zone 11
26 (Objective TBEWNC1.1 associated with CM4).
- 27 ● Restore connectivity to isolated patches of tidal brackish emergent marsh where isolation has
28 reduced effective use of these marshes by the species that depend on them (Objective
29 TBEWNC1.3 associated with CM4).
- 30 ● Create topographic heterogeneity in restored tidal brackish emergent wetland to provide
31 variation in inundation characteristics and vegetative composition (Objective TBEWNC1.4
32 associated with CM4).
- 33 ● Limit perennial pepperweed to no more than 10% cover in tidal brackish emergent wetland
34 natural community within the reserve system (Objective TBEWNC2.1 associated with CM11).

35 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
36 3.3 that would improve the value of tidal brackish emergent wetland natural community for
37 terrestrial species. As explained below, with the restoration and enhancement of these amounts of
38 habitat, in addition to implementation of AMMs, impacts on this natural community would not be
39 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-2. Changes in Tidal Brackish Emergent Wetland Natural Community Associated with**
2 **Alternative 4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0	0
CM4	Unk.	Unk.	Unk.	Unk.	0	0
CM5	0	0	0	0	0	0
CM6	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-4: Changes in Tidal Brackish Emergent Wetland Natural Community as a Result of**
5 **Implementing BDCP Conservation Measures**

6 Construction of the Alternative 4 water conveyance facilities (CM1) would not affect tidal brackish
7 emergent wetland natural community.

8 Restoration of tidal marsh habitats associated with CM4 would require site preparation, earthwork,
9 and other site activities that could remove tidal brackish emergent wetland. Levee modifications,
10 grading or contouring, filling to compensate for land subsidence, and creation of new channels could
11 also result in the removal of tidal brackish emergent wetland. All of this construction and land
12 modification activity that could affect tidal brackish emergent wetland would take place in Suisun
13 Marsh (CZ 11). The acreage of loss has not been calculated because the specific locations for site
14 preparation and earthwork have not been identified, but the loss would likely be very small (less
15 than 1 acre). These activities would occur in small increments during the course of the CM4
16 restoration program. The restoration elements of CM4 would greatly exceed any of the short-term
17 losses described above. At least 6,000 acres of tidal brackish emergent wetland would be restored in
18 the Plan Area (BDCP Objective TBEWNC1.1, associated with CM4), with 2,000 acres of restoration
19 occurring in the near-term timeframe. In addition, the habitat and ecosystem functions of BDCP
20 restored tidal brackish emergent wetland would be maintained and enhanced (CM11). The BDCP
21 beneficial effects evaluation of Alternative 4 (see Chapter 5, Section 5.4.3.2, *Beneficial Effects, of the*
22 *BDCP*) states that at least 6,000 acres of tidal brackish emergent wetland community would be
23 restored in CZ 11, and that tidal natural communities restoration would decrease habitat
24 fragmentation by providing additional connectivity between isolated patches of tidal brackish
25 emergent wetland.

1 The restoration activities associated with CM4 in Suisun Marsh would result in other effects that
 2 could alter the habitat value of tidal brackish emergent wetland. Disturbances associated with levee
 3 breaching and grading or contouring would increase opportunities for the introduction or spread of
 4 invasive species. Implementation of CM11 would limit this risk through invasive species control and
 5 wetland management and enhancement activities to support native species. Tidal flooding of dry
 6 areas could also increase the bioavailability of methylmercury in Suisun Marsh. Site-specific
 7 conditions would dictate the significance of this hazard to tidal brackish marsh vegetation and
 8 associated wildlife. According to the Suisun Marsh Plan EIR/EIS (Bureau of Reclamation et al. 2010,
 9 pg. 5.2-18), marsh creation may generate less methylmercury than is currently being generated by
 10 managed wetlands. A detailed review of the methylmercury issues associated with implementation
 11 of the BDCP is contained in Appendix 11F, *Substantive BDCP Revisions*. Because of the difficulty in
 12 assessing this risk at a programmatic level, it will need to be considered at a project level. Site-
 13 specific restoration plans that address the creation and mobilization of mercury, and monitoring
 14 and adaptive management as described in *CM12 Methylmercury Management*, would be available to
 15 address the uncertainty of methylmercury levels in restored tidal marsh. Water temperature
 16 fluctuations in newly created marsh and the potential for increased nitrogen deposition associated
 17 with construction vehicles are also issues of concern that are difficult to quantify at the current stage
 18 of restoration design. None of these effects is expected to limit the extent or value of tidal brackish
 19 emergent wetland in the study area.

20 **NEPA Effects:** The increase of tidal brackish emergent wetland associated with CM4 would be a
 21 beneficial effect on the natural community.

22 **CEQA Conclusion:** Tidal brackish emergent wetland natural community could experience small
 23 losses in acreage in Suisun Marsh (CZ 11) as a result of the large-scale tidal marsh restoration
 24 planned as part of CM4. These losses (expected to not exceed 1 acre) would be associated with levee
 25 modification, site preparation, and other earthwork needed to expose diked lands to tidal influence.
 26 Because at least 6,000 acres of tidal brackish emergent wetland would be restored in the Plan Area
 27 as part of CM4, including 2,000 acres restored in the near-term timeframe, there would be a large
 28 increase in tidal brackish emergent wetland both in the near-term and over the life of the Plan.
 29 Indirect effects associated with the expansion of tidal brackish emergent wetland natural
 30 community, including the potential spread of invasive species, the generation of methylmercury,
 31 increases in marsh water temperatures, and increased nitrogen deposition are not expected to have
 32 a significant impact on this natural community in the study area. Therefore, this impact would be
 33 beneficial.

34 **Impact BIO-5: Modification of Tidal Brackish Emergent Wetland Natural Community from**
 35 **Ongoing Operation, Maintenance and Management Activities**

36 Once the physical facilities associated with CM1 and CM4 of Alternative 4 are constructed and the
 37 water management practices associated with changed reservoir operations, diversions from the
 38 north Delta, and marsh restoration are in effect, there would be new ongoing and periodic actions
 39 that could affect tidal brackish emergent wetland natural community in the study area. The ongoing
 40 actions include water releases and diversions, access road and levee repair, and replacement of
 41 levee armoring, channel dredging, and habitat enhancement in accordance with natural community
 42 management plans. The potential effects of these actions are described below.

- 43 • *Modified river flows upstream of and within the study area and reduced diversions from south*
 44 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased

1 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta
 2 channels (associated with Operational Scenario H) would not result in the permanent reduction
 3 in acreage of tidal brackish emergent wetland natural community in the study area. Flow levels
 4 in the upstream rivers would not directly affect this natural community because it does not exist
 5 upstream of the Delta. Increased diversions of Sacramento River flows in the north Delta would
 6 not result in a permanent reduction in tidal brackish emergent wetland downstream of these
 7 diversions. Salinity levels in Suisun Marsh channels would be expected to increase with reduced
 8 Sacramento River outflows (see Chapter 8, *Water Quality*, Section 8.3.3.9), but this change would
 9 not be sufficient to change the acreage of brackish marsh. This natural community persists in an
 10 environment that experiences natural fluctuations in salinity due to tidal ebb and flow. Reduced
 11 diversions from the south Delta channels would not create a reduction in this natural
 12 community.

13 The increased diversion of Sacramento River flows in the north Delta would result in reductions
 14 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The
 15 reduction is estimated to be approximately 9% of the river's current sediment load for
 16 Alternative 4, which would have a north Delta diversion capacity of 9,000 cfs under Operational
 17 Scenario H (see Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3, *Summary of Changes to*
 18 *Sediment Supply in the Plan Area due to BDCP Shift in Export Location and Volume*, of the BDCP
 19 for a detailed analysis of this issue). This would contribute to a decline in sediment reaching the
 20 Delta and Suisun Marsh that has been occurring over the past 50-plus years due to a gradual
 21 depletion of sediment from the upstream rivers. The depletion has been caused by a variety of
 22 factors, including depletion of hydraulic mining sediment in upstream areas, armoring of river
 23 channels and a cutoff of sediment due to dam construction on the Sacramento River and its
 24 major tributaries (Wright and Schoellhamer 2004; Barnard et al. 2013).

25 Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on
 26 tidal marsh, including tidal brackish emergent wetland. Sediment trapped by the marsh
 27 vegetation allows the emergent plants to maintain an appropriate water depth as water levels
 28 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The BDCP
 29 proponents have incorporated an environmental commitment (see Appendix 3B, Section
 30 3B.2.18, *Disposal and Reuse of Spoil, Reusable Tunnel Material and Dredged Material*) into the
 31 project that would lessen this potential effect. The Sacramento River water diverted at north
 32 Delta intakes would pass through sedimentation basins before being discharged to water
 33 conveyance structures. The commitment states that sediment collected in these basins would be
 34 periodically removed and reused, to the greatest extent feasible, in the Plan Area for a number of
 35 purposes, including marsh restoration, levee maintenance, subsidence reversal, flood response,
 36 and borrow area fill. The portion of the sediment re-introduced to the Delta and estuary for
 37 marsh restoration would remain available for marsh accretion. With this commitment to reuse
 38 in the Plan Area, the removal of sediment at the north Delta intakes would not result in a net
 39 reduction in the acreage and value of this special-status marsh community. The effect would not
 40 be adverse (NEPA) and would be less than significant (CEQA).

- 41 ● *Access road and levee repair.* Periodic repair of access roads and levees associated with the BDCP
 42 actions have the potential to require removal of adjacent vegetation and could entail earth and
 43 rock work in tidal brackish emergent wetland habitats. This activity could lead to increased soil
 44 erosion, turbidity and runoff entering these habitats. The activities would be subject to normal
 45 erosion, turbidity and runoff control management practices, including those developed as part
 46 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*

1 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic
2 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation
3 of disturbed surfaces. Proper implementation of these measures would avoid permanent
4 adverse effects on this community.

- 5 ● *Vegetation management*. Vegetation management, in the form of physical removal and chemical
6 treatment (CM11), would be a periodic activity associated with the long-term maintenance of
7 restoration sites. Use of herbicides to control nuisance vegetation could pose a long-term hazard
8 to tidal brackish emergent wetland natural community at or adjacent to treated areas. The
9 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
10 stormwater onto the natural community, or direct discharge of herbicides to wetland areas
11 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
12 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce
13 hazards to humans and the environment from use of various chemicals during maintenance
14 activities, including the use of herbicides. These commitments, including the commitment to
15 prepare and implement spill prevention, containment, and countermeasure plans and
16 stormwater pollution prevention plans, are described in Appendix 3B, *Environmental*
17 *Commitments, AMMs, and CMs*. Best management practices, including control of drift and runoff
18 from treated areas, and use of herbicides approved for use in aquatic environments would also
19 reduce the risk of affecting natural communities adjacent to levees associated with tidal wetland
20 restoration activities.
- 21 ● *Channel dredging*. Long-term maintenance of tidal channels that support wetland expansion in
22 Suisun Marsh would include periodic dredging of sediments. The dredging would occur adjacent
23 to tidal brackish emergent wetland natural community and would result in short-term increases
24 in turbidity and disturbance of the substrate. These conditions would not eliminate the
25 community, but would diminish its value in the short term for special-status and common
26 species that rely on it for cover, movement corridor or foraging area. The individual species
27 effects are discussed later in this chapter.
- 28 ● *Habitat enhancement*. The BDCP includes a long-term management element for the natural
29 communities within the Plan Area (CM11). For tidal brackish emergent wetland natural
30 community, a management plan would be prepared that specifies actions to improve the value
31 of the habitats for covered species. Actions would include control of invasive nonnative plant
32 and animal species, fire management, restrictions on vector control and application of
33 herbicides, and maintenance of infrastructure that would allow for movement through the
34 community. The enhancement efforts would improve the long-term value of this community for
35 both special-status and common species.

36 The various operations and maintenance activities described above could alter acreage and value of
37 tidal brackish emergent wetland natural community in the study area through water operations,
38 levee and road maintenance, channel dredging and vegetation management in or adjacent to this
39 community. Activities could also introduce sediment and herbicides that would reduce the value of
40 this community to common and sensitive plant and wildlife species. Other periodic activities
41 associated with the Plan, including management, protection and enhancement actions associated
42 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*
43 *Enhancement and Management*, would be undertaken to enhance the value of the community. While
44 some of these activities could result in small changes in acreage, these changes would be greatly
45 offset by restoration activities planned as part of *CM4 Tidal Natural Communities Restoration*. The
46 management actions associated with levee repair, periodic dredging and control of invasive plant

1 species would also result in a long-term benefit to the species associated with tidal brackish
2 emergent wetland habitats by improving water movement.

3 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
4 Alternative 4 would not result in a net permanent reduction in the tidal brackish emergent wetland
5 natural community within the study area. There would be no adverse effect on the tidal brackish
6 emergent wetland natural community.

7 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
8 have the potential to create minor changes (not exceeding 1 acre) in total acreage of tidal brackish
9 emergent wetland natural community in the study area, and could create temporary increases in
10 turbidity and sedimentation. The activities could also introduce herbicides periodically to control
11 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and
12 AMM5 would minimize these impacts, and other operations and maintenance activities, including
13 management, protection and enhancement actions associated with *CM3 Natural Communities*
14 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
15 create positive effects, including improved water movement in these habitats. Long-term restoration
16 activities associated with *CM4 Tidal Natural Communities Restoration* would greatly expand this
17 natural community in the study area. Ongoing operation, maintenance and management activities
18 would not result in a net permanent reduction in this sensitive natural community within the study
19 area. Therefore, there would be a less-than-significant impact.

20 **Tidal Freshwater Emergent Wetland**

21 Construction, operation, maintenance and management associated with the conservation
22 components of Alternative 4 would have no long-term adverse effects on the habitats associated
23 with the tidal freshwater emergent wetland natural community. Initial development and
24 construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary
25 removal of small acreages of this community (see Table 12-4-3). Full implementation of Alternative
26 4 would also include the following conservation actions over the term of the BDCP to benefit the
27 tidal freshwater emergent wetland natural community.

- 28 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
29 accommodate sea level rise (Objective L1.3 associated with CM4).
- 30 ● Within the 65,000 acres of tidal natural communities and transitional uplands, include sufficient
31 transitional uplands along the fringes of restored brackish and freshwater tidal emergent
32 wetlands to accommodate up to 3 feet of sea level rise where possible and allow for the future
33 upslope establishment of tidal emergent wetland communities (Objective L1.7, associated with
34 CM4).
- 35 ● Within the 65,000 acres of tidal natural communities, restore or create at least 24,000 acres of
36 tidal freshwater emergent wetland in Conservation Zones 1, 2, 4, 5, 6, and/or 7 (Objective
37 TFEWNC1.1, associated with CM4).
- 38 ● Restore tidal freshwater emergent wetlands in areas that increase connectivity among
39 conservation lands (Objective TFEWNC1.2, associated with CM4).
- 40 ● Restore and sustain a diversity of marsh vegetation that reflects historical species compositions
41 and high structural complexity (Objective TFEWNC2.1, associated with CM4).

- Create topographic heterogeneity in restored tidal freshwater emergent wetland to provide variation in inundation characteristics and vegetative composition (Objective TFEWNC2.2, associated with CM4).

There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*, that would improve the value of tidal freshwater emergent wetland natural community for terrestrial species. As explained below, with the restoration and enhancement of these amounts of habitat, in addition to implementation of AMMs, impacts on this natural community would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-4-3. Changes in Tidal Freshwater Emergent Wetland Natural Community Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	1	1	10	10	0	0
CM2	6	6	0	0	24–58	0
CM4	1	1	0	0	0	0
CM5	0	1	0	1	0	3
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	8	9	10	11	24–58	3

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

12

Impact BIO-6: Changes in Tidal Freshwater Emergent Wetland Natural Community as a Result of Implementing BDCP Conservation Measures

Construction and land grading activities that would accompany the implementation of CM1, CM2, CM4, CM5, and CM6 for Alternative 4 would permanently eliminate an estimated 9 acres and temporarily remove 11 acres of tidal freshwater emergent wetland natural community in the study area. These modifications represent less than 1% of the 8,856 acres of the community that is mapped in the study area. The majority of the permanent and temporary losses would happen during the first 14 years of Alternative 4 implementation, as water conveyance facilities are constructed and habitat restoration is initiated. Natural communities restoration would add at least 24,000 acres of tidal freshwater emergent wetland natural community during the course of Plan

1 restoration activities, which would greatly expand the area of that habitat and offset the losses. The
2 BDCP beneficial effects evaluation of Alternative 4 (see Chapter 5, Section 5.4.4.2, *Beneficial Effects*,
3 of the BDCP) states that the implementation of *CM4 Tidal Natural Communities Restoration* would
4 restore at least 24,000 acres of tidal freshwater emergent wetland community in Cache Slough
5 (Conservation Zones 1, 2, and 3), the Cosumnes/Mokelumne (Conservation Zone 4), West Delta
6 (Conservation Zone 5 and 6), and South Delta (Conservation Zone 7) ROAs. The BDCP evaluation
7 also states that the objectives in the Plan would promote vegetation diversity and structural
8 complexity (as incorporated into the restoration design) in restored tidal freshwater marsh.

9 The individual effects of each relevant conservation measure are addressed below. A summary
10 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
11 conservation measure discussions.

- 12 • *CM1 Water Facilities and Operation*: Construction of the Alternative 4 water conveyance facilities
13 would permanently remove 1 acres and temporarily remove 10 acres of tidal freshwater
14 emergent wetland community. Most of the loss would occur along rivers and canals in the
15 central Delta from barge unloading facility construction (Old River on the northwest corner of
16 Victoria Island and Connection Slough at the north end of Mandeville Island), and from
17 transmission line construction (San Joaquin River and Potato Slough at the south and north ends
18 of Venice Island, Connection Slough at the north end of Bacon Island, and Railroad Slough at the
19 north end of Woodward Island; see Terrestrial Biology Mapbook). These losses would take place
20 during the near-term construction period.

21 There is the potential for increased nitrogen deposition associated with construction vehicles
22 during the construction phase of CM1. Appendix 5.J, Attachment 5J.A, *Construction-Related*
23 *Nitrogen Deposition on BDCP Natural Communities*, of the BDCP addresses this issue in detail. It
24 has been concluded that this potential deposition would pose a low risk of changing tidal
25 freshwater emergent wetland natural community because the construction would occur
26 primarily downwind of the natural community and the construction would contribute a
27 negligible amount of nitrogen to regional projected emissions. No adverse effect is expected.

- 28 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of
29 construction or channel modification activities within the Yolo and Sacramento Bypasses,
30 including improvements in flow through the west side channel of the bypass, Putah Creek
31 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. All of
32 these activities could involve excavation and grading in tidal freshwater emergent wetland areas
33 to improve passage of fish through the bypasses. Based on hypothetical construction footprints,
34 a total of 6 acres could be permanently lost to these activities. The loss is expected to occur in
35 the near-term time period of Alternative 4 implementation.

- 36 • *CM4 Tidal Natural Communities Restoration*: Based on hypothetical footprints of this restoration
37 activity, initial land grading and levee modification could permanently remove 1 acre of tidal
38 freshwater emergent wetland natural community. This loss would occur in the near-term
39 timeframe and would occur throughout the ROAs identified for tidal wetland restoration. At the
40 same time, an estimated 24,000 acres of tidal freshwater emergent wetland community would
41 be restored during tidal habitat restoration, consistent with Objective TFEWNC1.1, (associated
42 with CM4). Approximately 8,850 acres of the restoration would happen during the first 10 years
43 of Alternative 4 implementation, which would coincide with the timeframe of water conveyance
44 facilities construction. The remaining restoration would be spread over the following 30 years.
45 Tidal wetland communities restoration is expected to be focused in the ROAs identified in Figure

1 12-1. Restoration would be located and designed to improve habitat connectivity (Objective
 2 TFEWNC1.2), improve marsh species diversity (Objective TFEWNC2.1), and provide variation in
 3 inundation characteristics (Objective TFEWNC2.2). Some of the restoration would be
 4 implemented in the lower Yolo Bypass, but restoration would also be spread among the Suisun
 5 Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.

6 The restoration activities associated with CM4 in the Plan Area ROAs would result in other
 7 effects that could alter the habitat value of tidal freshwater emergent wetland. Disturbances
 8 associated with levee breaching and grading or contouring would increase opportunities for the
 9 introduction or spread of invasive species. Implementation of CM11 would limit this risk
 10 through invasive species control and wetland management and enhancement activities to
 11 support native species. Flooding of dry areas for tidal freshwater marsh creation could also
 12 increase the bioavailability of methylmercury, especially in the Cache Slough,
 13 Cosumnes/Mokelumne and Suisun Marsh ROAs. Site-specific conditions would dictate the
 14 significance of this hazard to marsh vegetation and associated wildlife. A detailed review of the
 15 methylmercury issues associated with implementation of the BDCP is contained in Appendix
 16 11F, *Substantive BDCP Revisions*. Because of the difficulty in assessing this risk at a
 17 programmatic level, it will need to be considered at a project level. Site-specific restoration
 18 plans that address the creation and mobilization of mercury, and monitoring and adaptive
 19 management as described in *CM12 Methylmercury Management*, would be available to address
 20 the uncertainty of methylmercury levels in restored tidal marsh. Water temperature fluctuations
 21 in newly created marsh is also an issue of concern that is difficult to quantify at the current stage
 22 of restoration design. None of these effects is expected to limit the extent or value of tidal
 23 freshwater emergent wetland in the study area.

- 24 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
 25 would permanently remove 1 acre and temporarily remove 1 acre of tidal freshwater emergent
 26 wetland habitat. The construction-related losses would be considered a permanent removal of
 27 the habitats directly affected. The majority of seasonally inundated floodplain restoration is
 28 expected to occur along the lower San Joaquin River in the south and central Delta areas.
 29 Floodplain restoration along the San Joaquin River would improve connectivity for a variety of
 30 species that rely on freshwater marsh and riparian habitats. The regional and Plan Area
 31 landscape linkages along the San Joaquin River are included in Figure 12-2. This activity is
 32 scheduled to start following construction of water conveyance facilities.
- 33 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
 34 of small amounts of tidal freshwater emergent wetland habitat along 20 miles of river and
 35 sloughs. The extent of this loss cannot be quantified at this time, but the majority of the
 36 enhancement activity would occur on narrow strips of habitat, including levees and channel
 37 banks. The improvements would occur within the study area on sections of the Sacramento, San
 38 Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

39 The following paragraphs summarize the combined effects discussed above and describe other
 40 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
 41 also included.

42 ***Near-Term Timeframe***

43 During the near-term timeframe, Alternative 4 would affect the tidal freshwater emergent wetland
 44 natural community through CM1 construction losses (1 acres permanent and 10 acres temporary),

1 CM2 construction losses (6 acres permanent), and CM4 construction losses (1 acre permanent).
2 These losses would occur in the central Delta from construction of barge unloading facilities and
3 transmission lines on the fringes of Venice, Bacon and Woodward Islands, and in various locations
4 within the Yolo Bypass and the tidal restoration ROAs.

5 The construction losses of this special-status natural community would represent an adverse effect
6 if they were not offset by avoidance and minimization measures and restoration actions associated
7 with BDCP conservation components. Loss of tidal freshwater emergent wetland natural community
8 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
9 defined by Section 404 of the CWA. However, the creation of 8,850 acres of tidal freshwater
10 emergent wetland natural community as part of CM4 during the first 10 years of Alternative 4
11 implementation would more than offset this near-term loss, avoiding any adverse effect. Typical
12 project-level mitigation ratios (1:1 for restoration) would indicate that 18 acres of restoration would
13 be needed to offset (i.e., mitigate) the 18 acres of loss (the total permanent and temporary near-term
14 effects listed in Table 12-4-3).

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
16 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
17 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
18 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas.
19 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in
20 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

21 **Late Long-Term Timeframe**

22 Implementation of Alternative 4 as a whole would result in relatively minor (less than 1%) losses of
23 tidal freshwater emergent wetland community in the study area. These losses (9 acres of permanent
24 and 11 acres of temporary loss) would be largely associated with construction of the water
25 conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and levee
26 modification and land grading associated with tidal marsh restoration (CM4) and floodplain
27 restoration (CM5). The CM4 and CM5 losses would occur during the course of conservation actions
28 at various tidal and floodplain restoration sites throughout the study area. By the end of the Plan
29 timeframe, a total of 24,000 acres of this natural community would be restored. The restoration
30 would occur over a wide region of the study area, including within the Suisun Marsh,
31 Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure 12-1).

32 **NEPA Effects:** The creation of 8,850 acres of tidal freshwater emergent wetland natural community
33 as part of CM4 during near-term of Alternative 4 implementation would more than offset the
34 construction and inundation-related effects of implementing CM1, CM2, CM4, and CM5, avoiding any
35 adverse effect in the near-term. Because of the 24,000 acres of tidal freshwater emergent wetland
36 restoration that would occur over the course of the Plan, Alternative 4 would not result in a net
37 long-term reduction in the acreage of a sensitive natural community; the effect would be beneficial.

38 **CEQA Conclusion:**

39 **Near-Term Timeframe**

40 Alternative 4 would result in the loss of approximately 18 acres of tidal freshwater emergent
41 wetland natural community (permanent and temporary) due to construction of the water
42 conveyance facilities (CM1) and fish passage improvements (CM2), and tidal marsh restoration
43 (CM4). The construction losses would occur in primarily in the central Delta on the fringes of Venice,

1 Bacon and Victoria Islands, and in the Yolo Bypass and various tidal restoration ROAs. The losses
2 would be spread across the near-term timeframe and would be offset by planned restoration of
3 8,850 acres of tidal freshwater emergent wetland natural community scheduled for the first 10
4 years of Alternative 4 implementation (CM4). AMM1, AMM2, AMM6, AMM7, and AMM10 would also
5 be implemented to minimize impacts. Because of these offsetting near-term restoration activities
6 and AMMs, impacts would be less than significant and no mitigation would be required. Typical
7 project-level mitigation ratios (1:1 for restoration) would indicate that 18 acres of restoration would
8 be needed to offset (i.e., mitigate) the 18 acres of loss. The restoration would be initiated at the
9 beginning of Alternative 4 implementation to minimize any time lag in the availability of this habitat
10 to special-status species.

11 **Late Long-Term Timeframe**

12 At the end of the Plan period, 20 acres of this community would be lost to construction and
13 restoration activities and 24,000 acres of this community would be restored. There would be no net
14 permanent reduction in the acreage of this sensitive natural community within the study area.
15 Therefore, Alternative 4 would not have a substantial adverse effect on this natural community; the
16 impact on the tidal freshwater emergent wetland natural community would be beneficial.

17 **Impact BIO-7: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 18 **Freshwater Emergent Wetland Natural Community**

19 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both
20 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
21 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
22 of tidal freshwater emergent wetland natural community on small acreages, while CM5 would
23 expose this community to additional flooding as channel margins are modified and levees are set
24 back to improve fish habitat along some of the major rivers and waterways throughout the study
25 area.

- 26 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would
27 result in an increase in the frequency, magnitude and duration of inundation of 24–58 acres of
28 tidal freshwater emergent wetland natural community. The methods used to estimate these
29 inundation acreages are described in Appendix 5.J, *Effects on Natural Communities, Wildlife, and*
30 *Plants*, of the BDCP. The area more frequently inundated would vary with the flow volume that
31 would pass through the newly constructed notch in the Fremont Weir. The 24-acre increase in
32 inundation would be associated with a notch flow of 1,000 cubic feet per second (cfs), and the
33 58-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow
34 through Fremont Weir would be expected in 30% of the years. Most of this community occurs in
35 the southern section of the bypass on Liberty Island, on the fringes of tidal perennial aquatic
36 habitats. Smaller areas are scattered among the cropland within the bypass, south of Interstate
37 80. The anticipated change in management of flows in the Yolo Bypass includes more frequent
38 releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some years,
39 later releases into the bypass in spring months (April and May). The modification of periodic
40 inundation events would not adversely affect the ecological function of tidal freshwater
41 emergent wetland habitats and would not substantially modify its value for special-status or
42 common terrestrial species. The plants in this natural community are adapted to periodic
43 inundation events within the Yolo Bypass. The effects of this inundation on wildlife and plant
44 species are described in detail in later sections of this chapter.

- 1 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a
2 seasonal increase in the frequency and duration of inundation of 3 acres of tidal freshwater
3 emergent wetland habitats. Specific locations for this restoration activity have not been
4 identified, but they would likely be focused in the south Delta area, along the major rivers and
5 Delta channels. The reconnection of these wetlands to stream flooding events would be
6 beneficial to their ecological function, especially as they relate to BDCP target terrestrial and
7 aquatic species. Foraging activity and refuge sites would be expanded into areas currently
8 unavailable or infrequently available to some aquatic species.

9 In summary, 27-618 acres of tidal freshwater emergent wetland natural community in the study
10 area would be subjected to more frequent inundation as a result of implementing two Alternative 4
11 conservation measures (CM2 and CM5). Tidal freshwater emergent wetland natural community is a
12 habitat of great value to both terrestrial and aquatic species in the study area, and increases in
13 inundation for relatively short periods of time would not reduce the acreage or the value of this
14 community.

15 **NEPA Effects:** Periodic inundation would not result in a net permanent reduction in the acreage or
16 value of tidal freshwater emergent wetland in the study area. Therefore, there would be no adverse
17 effect.

18 **CEQA Conclusion:** An estimated 27-61 acres of tidal freshwater emergent wetland natural
19 community in the study area would be subjected to more frequent inundation as a result of
20 implementing CM2 and CM5 under Alternative 4. This community is of great value to aquatic and
21 terrestrial species in the study area. The periodic inundation would not result in a net permanent
22 reduction in the acreage or value of this community in the study area. Therefore, there would be a
23 less-than-significant impact on the tidal freshwater emergent wetland natural community.

24 **Impact BIO-8: Modification of Tidal Freshwater Emergent Wetland Natural Community from** 25 **Ongoing Operation, Maintenance and Management Activities**

26 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
27 associated with changed water management is in effect, there would be new ongoing and periodic
28 actions associated with operation, maintenance and management of the BDCP facilities and
29 conservation lands that could affect tidal freshwater emergent wetland natural community in the
30 study area. The ongoing actions would include modified operation of upstream reservoirs, the
31 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
32 channels. These actions are associated with CM1 (see Impact BIO-7 for effects associated with CM2).
33 The periodic actions would involve access road and conveyance facility repair, vegetation
34 management at the various water conveyance facilities and habitat restoration sites (CM11), levee
35 repair and replacement of levee armoring, channel dredging, and habitat enhancement in
36 accordance with natural community management plans. The potential effects of these actions are
37 described below.

- 38 • *Modified river flows upstream of and within the study area and reduced diversions from south*
39 *Delta channels*. Reduced diversions from the south Delta channels would not create a reduction
40 in tidal freshwater emergent wetland in the study area. However, the periodic changes in flows
41 in the Sacramento River, Feather River, and American River associated with modified reservoir
42 operations, and the increased diversion of Sacramento River flows at north Delta intakes
43 associated with Alternative 4 (Operational Scenario H) would affect salinity, water temperature,
44 dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in these rivers and

1 Delta waterways. These changes are discussed in detail in Chapter 8, *Water Quality*. Potentially
 2 substantial increases in electrical conductivity (salinity) are predicted for the west Delta and
 3 Suisun Marsh as a result of these changed water operations. These salinity changes may alter the
 4 plant composition of tidal freshwater emergent wetland along the lower Sacramento and San
 5 Joaquin Rivers and west Delta islands. The severity and extent of these salinity changes would
 6 be complicated by anticipated sea level rise and the effects of downstream tidal restoration over
 7 the life of the Plan. There is the potential that some tidal freshwater marsh may become
 8 brackish. These potential changes are not expected to result in a significant reduction in the
 9 acreage and value of tidal freshwater emergent wetland natural community in the study area.

10 The increased diversion of Sacramento River flows in the north Delta would result in reductions
 11 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The
 12 reduction is estimated to be approximately 9% of the river's current sediment load for
 13 Alternative 4, which would have a north Delta diversion capacity of 9,000 cfs under Operational
 14 Scenario H (see Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3, *Summary of Changes to*
 15 *Sediment Supply in the Plan Area due to BDCP Shift in Export Location and Volume*, in the BDCP,
 16 for a detailed analysis of this issue). This would contribute to a decline in sediment reaching the
 17 Delta and Suisun Marsh that has been occurring over the past 50-plus years due to a gradual
 18 depletion of sediment from the upstream rivers. The depletion has been caused by a variety of
 19 factors, including depletion of hydraulic mining sediment in upstream areas, armoring of river
 20 channels and a cutoff of sediment due to dam construction on the Sacramento River and its
 21 major tributaries (Wright and Schoellhamer 2004; Barnard et al. 2013).

22 Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on
 23 tidal marsh, including tidal freshwater emergent wetland. Sediment trapped by the marsh
 24 vegetation allows the emergent plants to maintain an appropriate water depth as water levels
 25 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The BDCP
 26 proponents have incorporated an environmental commitment (see Appendix 3B, Section
 27 3B.2.18, *Disposal and Reuse of Spoil, Reusable Tunnel Material and Dredged Material*) into the
 28 project that would lessen this potential effect. The Sacramento River water diverted at north
 29 Delta intakes would pass through sedimentation basins before being discharged to water
 30 conveyance structures. The commitment states that sediment collected in these basins would be
 31 periodically removed and reused, to the greatest extent feasible, in the Plan Area for a number of
 32 purposes, including marsh restoration, levee maintenance, subsidence reversal, flood response,
 33 and borrow area fill. The portion of the sediment re-introduced to the Delta and estuary for
 34 marsh restoration would remain available for marsh accretion. With this commitment to reuse
 35 in the Plan Area, the removal of sediment at the north Delta intakes would not result in a net
 36 reduction in the acreage and value of this special-status marsh community. The effect would not
 37 be adverse (NEPA) and would be less than significant (CEQA).

- 38 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
 39 conveyance facilities and levees associated with the BDCP actions have the potential to require
 40 removal of adjacent vegetation and could entail earth and rock work in or adjacent to tidal
 41 freshwater emergent wetland habitats. This activity could lead to increased soil erosion,
 42 turbidity and runoff entering tidal aquatic habitats. These activities would be subject to normal
 43 erosion, turbidity and runoff control management practices, including those developed as part
 44 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
 45 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within emergent
 46 wetland habitats would require use of sediment and turbidity barriers, soil stabilization and

1 revegetation of disturbed surfaces. Proper implementation of these measures would avoid
2 permanent adverse effects on this community.

- 3 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
4 treatment, would be a periodic activity associated with the long-term maintenance of water
5 conveyance facilities and restoration sites (CM11). Use of herbicides to control nuisance
6 vegetation could pose a long-term hazard to tidal freshwater emergent wetland natural
7 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of
8 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or
9 direct discharge of herbicides to tidal aquatic areas being treated for invasive species removal.
10 Environmental commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan*
11 have been made part of the BDCP to reduce hazards to humans and the environment from use of
12 various chemicals during maintenance activities, including the use of herbicides. These
13 commitments, including the commitment to prepare and implement spill prevention,
14 containment, and countermeasure plans and stormwater pollution prevention plans, are
15 described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*. Best management
16 practices, including control of drift and runoff from treated areas, and use of herbicides
17 approved for use in aquatic environments would also reduce the risk of affecting natural
18 communities adjacent to water conveyance features and levees associated with restoration
19 activities.
- 20 • *Channel dredging.* Long-term operation of the Alternative 4 intakes on the Sacramento River
21 would include periodic dredging of sediments that might accumulate in front of intake screens.
22 The dredging would occur in waterways adjacent to tidal freshwater emergent wetlands and
23 would result in short-term increases in turbidity and disturbance of the substrate. These
24 conditions would not eliminate the community, but would diminish its value for special-status
25 and common species that rely on it for cover or foraging area. The individual species effects are
26 discussed later in this chapter.
- 27 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
28 communities within the Plan Area (CM11). For tidal freshwater emergent wetland community, a
29 management plan would be prepared that specifies actions to improve the value of the habitats
30 for covered species. Actions would include control of invasive nonnative plant and animal
31 species, fire management, restrictions on vector control and application of herbicides, and
32 maintenance of infrastructure that would allow for movement through the community. The
33 enhancement efforts would improve the long-term value of this community for both special-
34 status and common species.

35 The various operations and maintenance activities described above could alter acreage of tidal
36 freshwater emergent wetland natural community in the study area through changes in flow patterns
37 and resultant changes in water quality. Activities could also introduce sediment and herbicides that
38 would reduce the value of this community to common and sensitive plant and wildlife species. Other
39 periodic activities associated with the Plan, including management, protection and enhancement
40 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
41 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
42 community. While some of these activities could result in small changes in acreage, these changes
43 would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural Communities*
44 *Restoration*. The management actions associated with levee repair, periodic dredging and control of
45 invasive plant species would also result in a long-term benefit to the species associated with tidal
46 freshwater emergent wetland habitats by improving water movement.

1 **NEPA Effects:** Ongoing operation, maintenance, and management activities would not result in a net
2 permanent reduction in the tidal freshwater emergent wetland natural community within the study
3 area. Therefore, there would be no adverse effect on this natural community.

4 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4, including
5 changed water operations in the upstream rivers, would have the potential to create minor changes
6 in total acreage of tidal freshwater emergent wetland natural community in the study area, and
7 could create temporary increases in turbidity and sedimentation. The activities could also introduce
8 herbicides periodically to control nonnative, invasive plants. Implementation of environmental
9 commitments and AMM2, AMM4, and AMM5 would minimize these impacts, and other operations
10 and maintenance activities, including management, protection and enhancement actions associated
11 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*
12 *Enhancement and Management*, would create positive effects, including improved water movement
13 in these habitats. Long-term restoration activities associated with *CM4 Tidal Natural Communities*
14 *Restoration* would greatly expand this natural community in the study area. Ongoing operation,
15 maintenance and management activities would not result in a net permanent reduction in this
16 sensitive natural community within the study area. Therefore, there would be a less-than-significant
17 impact on the tidal freshwater emergent wetland natural community.

18 **Valley/Foothill Riparian**

19 Construction, operation, maintenance and management associated with the conservation
20 components of Alternative 4 would have no long-term adverse effects on the habitats associated
21 with the valley/foothill riparian natural community. Initial development and construction of CM1,
22 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this
23 community (see Table 12-4-4). Full implementation of Alternative 4 would also include the
24 following conservation actions over the term of the BDCP to benefit the valley/foothill riparian
25 natural community.

- 26 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000
27 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated
28 with CM7).
- 29 ● Protect 750 acres of existing valley/foothill riparian natural community in Conservation Zone 7
30 by year 10 (Objective VFRNC1.2, associated with CM3).
- 31 ● Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory
32 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated
33 with CM5 and CM7).
- 34 ● Maintain 500 acres of mature riparian forest in Conservation Zones 4 or 7 (Objective VFRNC2.3,
35 associated with CM3 and CM7).
- 36 ● Maintain 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion of the early-
37 to late-successional riparian vegetation (VFRNC2.2,) in large blocks with a minimum patch size
38 of 50 acres and minimum width of 330 feet (Objective VFRNC2.4, associated with CM3 and
39 CM7).
- 40 ● Maintain or increase abundance and distribution of valley/foothill riparian natural community
41 vegetation alliances that are rare or uncommon as recognized by California Department of Fish
42 and Game (2010), such as button willow thickets alliance and blue elderberry stands alliance
43 (Objective VFRNC3.1).

1 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
 2 3.3 that would improve the value of valley/foothill riparian natural community for terrestrial
 3 species. As explained below, with the restoration and enhancement of these amounts of habitat, in
 4 addition to implementation of AMMs, impacts on this natural community would not be adverse for
 5 NEPA purposes and would be less than significant for CEQA purposes.

6 **Table 12-4-4. Changes in Valley/Foothill Riparian Natural Community Associated with Alternative**
 7 **4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	37	37	24	24	0	0
CM2	89	89	88	88	51-92	0
CM4	298	552	0	0	0	0
CM5	0	43	0	35	0	266
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	424	721	112	147	51-92	266

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

8

9 **Impact BIO-9: Changes in Valley/Foothill Riparian Natural Community as a Result of**
 10 **Implementing BDCP Conservation Measures**

11 Construction, land grading and habitat restoration activities that would accompany the
 12 implementation of CM1, CM2, CM4, CM5, and CM6 would permanently eliminate an estimated 721
 13 acres and temporarily remove 147 acres of valley/foothill riparian natural community in the study
 14 area. These modifications represent approximately 5% of the 17,966 acres of the community that is
 15 mapped in the study area. The majority of the permanent and temporary losses would happen
 16 during the near-term time period of Alternative 4 implementation, as water conveyance facilities are
 17 constructed and habitat restoration is initiated. Valley/foothill riparian protection (750 acres) and
 18 restoration (800 acres) would be initiated during the same period, which would begin to offset the
 19 losses. By the end of the Plan period, 5,000 acres of this natural community would be restored. The
 20 analysis in Chapter 5, Section 5.4.5.2, *Beneficial Effects*, of the BDCP indicates that implementation of
 21 Alternative 4 would restore or create 5,000 acres of riparian forest and scrub in Conservation Zones
 22 1, 2, 4, 5, 6, and 7, with at least 3,000 acres occurring on restored seasonally inundated floodplain.
 23 Alternative 4 would also protect 750 acres of existing valley/foothill riparian natural community in
 24 Conservation Zone 7.

1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation:* Construction of the Alternative 4 water conveyance facilities
5 would permanently remove 37 acres and temporarily remove 24 acres of valley/foothill
6 riparian natural community. The permanent losses would occur where Intakes 2, 3, and 5
7 encroach on the Sacramento River's east bank between Freeport and Courtland. The riparian
8 areas here are very small patches, some dominated by valley oak and others by nonnative trees
9 (*acacia*) and scrub vegetation (see Terrestrial Biology Mapbook). Cottonwood, willow and
10 mixed brambles would be permanently lost at the ponds created by excavation for the
11 peripheral canal both north and south of Twin Cities Road just west of Interstate 5, as these sites
12 would be used to deposit reusable tunnel material. Some cottonwood and valley oak riparian
13 would be lost due to construction of a permanent access road from the new forebay west to a
14 reusable tunnel material disposal area. Blackberry brambles would also be lost to deposit of
15 reusable tunnel material at the east end of Bouldin Island. Smaller areas dominated by
16 blackberry would be eliminated at the forebay site adjacent to Clifton Court Forebay and
17 patches of willow and blackberry would be lost along the transmission line corridors where they
18 cross waterways in the central and south Delta. Permanent losses would occur along Lambert
19 Road where permanent utility lines would be installed. Temporary losses would also occur
20 adjacent to temporary intake work areas. The riparian habitat in these areas is also composed of
21 very small patches or stringers bordering waterways, which are composed of valley oak,
22 cottonwood, willow and scrub vegetation. These losses would take place during the near-term
23 construction period.
- 24 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
25 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
26 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
27 Sacramento Weir improvements. All of these activities could involve excavation and grading in
28 valley/foothill riparian areas to improve passage of fish through the bypasses. Based on
29 hypothetical construction footprints, a total of 89 acres could be permanently lost and another
30 88 acres could be temporarily removed. Most of the riparian losses would occur at the north end
31 of Yolo Bypass where major fish passage improvements are planned. This vegetation is a mix of
32 valley oak, cottonwood, sycamore and willow trees. The riparian areas here are primarily small,
33 disconnected patches with moderate to low value as wildlife movement corridors. Most of these
34 patches lack structural complexity. Excavation to improve water movement in the Toe Drain and
35 in the Sacramento Weir would remove similar linear strips of vegetation. These losses would
36 occur primarily in the near-term timeframe.
- 37 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration
38 footprints, implementation of CM4 would permanently inundate or remove 552 acres of
39 valley/foothill riparian community. The losses would be spread among most of the ROAs
40 established for tidal restoration (see Figure 12-1). No losses would occur from Suisun Marsh
41 restoration. These ROAs support a mix of riparian vegetation types, including valley oak stands,
42 extensive willow and cottonwood stringers along waterways, and areas of scrub vegetation
43 dominated by blackberry. These areas are considered of low to moderate habitat value (see
44 Chapter 5, Section 5.4.5.1.1, *Permanent Loss and Fragmentation*, of the BDCP). The actual loss of
45 riparian habitat to marsh restoration would be expected to be smaller than predicted by use of

1 the theoretical footprint. As marsh restoration projects were identified and planned, sites could
2 be selected that avoid riparian areas as much as possible.

- 3 • *CM5 Seasonally Inundated Floodplain Restoration:* Floodplain restoration levee construction
4 would permanently remove 43 acres and temporarily remove 35 acres of valley/foothill
5 riparian natural community. The construction-related losses would be considered a permanent
6 removal of the habitats directly affected. These losses would be expected to occur along the San
7 Joaquin River and other major waterways in CZ 7 (see Figure 12-1). This activity is scheduled to
8 start following construction of water conveyance facilities.
- 9 • *CM6 Channel Margin Enhancement:* Channel margin habitat enhancement could result in
10 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
11 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
12 activity would occur along waterway margins where riparian habitat stringers exist, including
13 levees and channel banks. The improvements would occur within the study area on sections of
14 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 15 • *CM7 Riparian Natural Community Restoration:* The valley/foothill riparian natural community
16 would be restored primarily in association with the tidal (CM4) and floodplain (CM5)
17 restoration and channel margin enhancements. Following community-specific goals and
18 objectives in the Plan, a total of 5,000 acres of this community would be restored (Objective
19 VFRNC1.1) and 750 acres would be protected (Objective VFRNC1.2) over the life of the Plan.
20 Approximately 800 acres would be restored and the entire 750 acres would be protected in the
21 first 10 years of Plan implementation. Riparian restoration and protection would be focused in
22 CZ 4 and CZ 7 (Objective VFRNC2.3), with a goal of adding a 500-acre portion of the restoration
23 in one or the other of these zones. A variety of successional stages would also be sought to
24 benefit the variety of sensitive plant and animal species that rely on this natural community in
25 the study area (Objective VFRNC2.4).

26 The following paragraphs summarize the combined effects discussed above and describe other
27 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
28 also included.

29 ***Near-Term Timeframe***

30 During the near-term timeframe, Alternative 4 would affect the valley/foothill riparian natural
31 community through CM1 construction losses (37 acres permanent and 24 acres temporary) and the
32 CM2 construction losses (89 acres permanent and 88 acres temporary). These losses would occur
33 along the eastern bank of the Sacramento River at intake sites; along transmission lines in the
34 central and south Delta and along Lambert Road; at reusable tunnel material storage sites near Twin
35 Cities Road, Clifton Court Forebay, and on Bouldin Island; and in the northern Yolo Bypass.
36 Approximately 298 acres of the inundation and construction-related loss from CM4 would occur in
37 the near-term. These losses would occur throughout the ROAs mapped in Figure 12-1.

38 The construction losses of this special-status natural community would represent an adverse effect
39 if they were not offset by avoidance and minimization measures and protection/restoration actions
40 associated with BDCP conservation components. Loss of valley/foothill riparian natural community
41 would be considered a loss in acreage of a sensitive natural community, and could be considered a
42 loss of wetlands as defined in Section 404 of the CWA. As indicated above, most of the losses would
43 be in small patches or narrow strips along waterways, with limited structural complexity. However,
44 the restoration of 800 acres and protection (including significant enhancement) of 750 acres of

1 valley/foothill riparian natural community as part of CM7 and CM3 during the first 10 years of
 2 Alternative 4 implementation would minimize this near-term loss, avoiding any adverse effect. At
 3 least 400 acres of the protection is planned for the first 5 years of Alternative 4 implementation. The
 4 restoration areas would be large areas providing connectivity with existing riparian habitats and
 5 would include a variety of trees and shrubs to produce structural complexity. Typical project-level
 6 mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 536 acres of
 7 protection and 536 acres of restoration would be needed to offset (i.e., mitigate) the 536 acres of loss
 8 (the combination of permanent and temporary losses in the near-term listed in Table 12-4-4). The
 9 combination of the two approaches (protection and restoration) are designed to avoid a temporal
 10 lag in the value of riparian habitat available to sensitive species.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 12 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM10*
 13 *Restoration of Temporarily Affected Natural Communities*, and *AMM18 Swainson's Hawk and White-*
 14 *Tailed Kite*. All of these AMMs include elements that avoid or minimize the risk of affecting habitats
 15 at work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been
 16 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
 17 the Final EIR/EIS.

18 **Late Long-Term Timeframe**

19 Implementation of Alternative 4 as a whole would result in approximately 5% losses of
 20 valley/foothill riparian natural community in the study area. These losses (721 acres of permanent
 21 and 147 acres of temporary) would be largely associated with construction of the water conveyance
 22 facilities (CM1), construction of Yolo Bypass fish improvements (CM2), inundation during tidal
 23 marsh restoration (CM4), and setback of levees during floodplain expansion (CM5). Inundation
 24 losses would occur through the course of the BDCP restoration program at various tidal restoration
 25 sites throughout the study area. By the end of the Plan timeframe, a total of 5,000 acres of this
 26 natural community would be restored and 750 acres would be protected (CM7 and CM3,
 27 respectively), primarily in CZ 4 and CZ 7 in the Cosumnes/Mokelumne and South Delta ROAs (see
 28 Figure 12-1).

29 **NEPA Effects:** The restoration of 800 acres and protection (including significant enhancement) of
 30 750 acres of valley/foothill riparian natural community as part of CM7 and CM3 during the first 10
 31 years of Alternative 4 implementation would minimize the near-term loss of this community,
 32 avoiding any adverse effect. Because of the Plan's commitment to restoration of 5,000 acres and
 33 protection of 750 acres of valley/foothill riparian natural community during the course of the Plan,
 34 Alternative 4 would not result in a net long-term reduction in the acreage of a sensitive natural
 35 community; the effect would be beneficial.

36 **CEQA Conclusion:**

37 **Near-Term Timeframe**

38 Alternative 4 would result in the loss of approximately 536 acres of valley/foothill riparian natural
 39 community due to construction of the water conveyance facilities (CM1) and fish passage
 40 improvements (CM2), and inundation during tidal marsh restoration (CM4). The construction losses
 41 would occur primarily along the Sacramento River at intake sites; along transmission corridors in
 42 the central and south Delta and along Lambert Road; at reusable tunnel material storage sites on
 43 Bouldin Island, Clifton Court Forebay and near Twin Cities Road; and within the northern section of

1 the Yolo Bypass, while inundation losses would occur at various tidal restoration sites throughout
 2 the study area. The construction losses would be spread across the near-term timeframe. These
 3 losses would be minimized by planned restoration of 800 acres (CM7) and protection (including
 4 significant enhancement) of 750 acres (CM3) of valley/foothill riparian natural community
 5 scheduled for the first 10 years of Alternative 4 implementation. At least 400 acres of the protection
 6 is planned for the first 5 years of Alternative 4 implementation. AMM1, AMM2, AMM6, AMM7,
 7 AMM10, and AMM18 would also be implemented to minimize impacts. Because of these near-term
 8 restoration and protection activities and AMMs, impacts would be less than significant. Typical
 9 project-level mitigation ratios (1:1 for protection and 1:1 for restoration) would indicate that
 10 536 acres of protection and 536 acres of restoration would be needed to offset (i.e., mitigate) the 536
 11 acres of loss. The combination of the two approaches (protection and restoration) is designed to
 12 avoid a temporal lag in the value of riparian habitat available to sensitive species. The restoration
 13 would be initiated at the beginning of Alternative 4 implementation to minimize any time lag in the
 14 availability of this habitat to special-status species, and would result in a net gain in acreage of this
 15 sensitive natural community.

16 **Late Long-Term Timeframe**

17 At the end of the Plan period, 868 acres of valley/foothill riparian natural community would be
 18 permanently or temporarily removed by conservation actions, 5,000 acres would be restored and
 19 750 acres would be protected. There would be no net permanent reduction in the acreage of this
 20 sensitive natural community within the study area. Therefore, Alternative 4 would not have a
 21 substantial adverse effect on this natural community; the impact would be beneficial.

22 **Impact BIO-10: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
 23 **Valley/Foothill Riparian Natural Community**

24 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both
 25 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
 26 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
 27 of valley/foothill riparian natural community at scattered locations, while CM5 would expose this
 28 community to additional flooding as channel margins are modified and levees are set back to
 29 improve fish habitat along some of the major rivers and waterways of the study area.

- 30 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would
 31 result in an increase in the frequency, magnitude and duration of inundation of 51–92 acres of
 32 valley/foothill riparian natural community. The area more frequently inundated would vary
 33 with the flows that would be passed through the newly constructed notch in the Fremont Weir.
 34 The 51 acres would be created by a notch flow of 8,000 cfs and the 92 acres would be created by
 35 a notch flow of 4,000 cfs. The methods used to estimate these inundation acreages are described
 36 in Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, of the BDCP. These
 37 increased flow conditions would be expected to occur in no more than 30% of all years. The
 38 valley/foothill riparian community occurs throughout the bypass, including a large acreage just
 39 below Fremont Weir in the north end of the bypass. There are other riparian habitat areas on
 40 Liberty Island, and, to a lesser extent, along the eastern and western edges of the bypass,
 41 including along the Tule Canal/Toe Drain, the west side channels and the Sacramento Bypass.
 42 The anticipated change in management of flows in the Yolo Bypass includes more frequent
 43 releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some years,
 44 later releases into the bypass in spring months (April and May). The modification of periodic

1 inundation events would not adversely affect riparian habitats, as they have persisted under
2 similar high flows and extended inundation periods in the Yolo Bypass. The effects of this
3 inundation on wildlife and plant species are described in detail in later sections of this chapter.

- 4 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
5 increase in the frequency and duration of inundation of 266 acres of valley/foothill riparian
6 habitats. Specific locations for this restoration activity have not been identified, but they would
7 likely be focused in the south Delta area, along the major rivers and Delta channels in CZ 7 (see
8 Figure 12-1). The reconnection of riparian vegetation to periodic stream flooding events would
9 be beneficial to the ecological function of this natural community, especially in the germination
10 and establishment of native riparian plants as flood scour increases.

11 In summary, 317–368 acres of valley/foothill riparian community in the study area would be
12 subjected to more frequent inundation as a result of implementing two Alternative 4 conservation
13 measures (CM2 and CM5). The valley/foothill riparian community is conditioned to and benefits
14 from periodic inundation; therefore, periodic inundation would not result in a net permanent
15 reduction in the acreage of this community in the study area. The increased inundation could create
16 a beneficial effect on the community as it relates to germination and establishment of native riparian
17 plants.

18 **NEPA Effects:** Increasing periodic inundation of valley/foothill riparian natural community in the
19 Yolo Bypass and along south Delta waterways would have a beneficial effect on the community.

20 **CEQA Conclusion:** An estimated 317–368 acres of valley/foothill riparian community in the study
21 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5
22 under Alternative 4. The valley/foothill riparian community is conditioned to and benefits from
23 periodic inundation; therefore, periodic inundation would not result in a net permanent reduction in
24 the acreage of this community in the study area. Increasing periodic inundation of valley/foothill
25 riparian natural community in the Yolo Bypass and along south Delta waterways would have a
26 beneficial impact on the community.

27 **Impact BIO-11: Modification of Valley/Foothill Riparian Natural Community from Ongoing** 28 **Operation, Maintenance and Management Activities**

29 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
30 associated with changed water management is in effect, there would be new ongoing and periodic
31 actions associated with operation, maintenance and management of the BDCP facilities and
32 conservation lands that could affect valley/foothill riparian natural community in the study area.
33 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento
34 River flows in the north Delta, reduced diversions from south Delta channels, and recreational use of
35 reserve areas. These actions are associated with CM1 and CM11 (see Impact BIO-10 for effects
36 associated with CM2). The periodic actions would involve access road and conveyance facility
37 repair, vegetation management at the various water conveyance facilities and habitat restoration
38 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat
39 enhancement in accordance with natural community management plans. The potential effects of
40 these actions are described below.

- 41 • *Modified releases and water levels in upstream reservoirs*. Modified releases and water levels at
42 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect
43 valley/foothill riparian natural community. The anticipated water levels over time with

1 Alternative 4, as compared to no action, would be slightly lower in the October to May
2 timeframe. The small changes in frequency of higher water levels in these lakes would not
3 substantially reduce the small patches of riparian vegetation that occupy the upper fringes of
4 the reservoir pools. Changes in releases that would influence downstream river flows are
5 discussed below.

- 6 • *Modified river flows upstream of and within the study area and reduced diversions from south*
7 *Delta channels.* Changes in releases from reservoirs upstream of the study area and their
8 resultant changes in flows in the Sacramento, American and Feather Rivers (associated with
9 Operational Scenario H) would not be expected to result in the permanent reduction in acreage
10 of valley/foothill riparian natural community along these waterways. There is no evidence that
11 flow levels in the upstream rivers would change such that the acreage of this community would
12 be reduced on a permanent basis. Riparian habitats along the rivers of the Sacramento Valley
13 have historically been exposed to significant variations in river stage. Based on modeling
14 conducted for the BDCP (see Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*),
15 flow levels in these upstream rivers could be reduced by as much as 19% in the July to
16 November time frame when compared to No Action, while flow levels in the February to May
17 time frame could increase as much as 48% with implementation of Alternative 4. Similarly,
18 increased diversions of Sacramento River flows in the north Delta would not be expected to
19 result in a permanent reduction in valley/foothill riparian community downstream of these
20 diversions, even though river flows are modeled to be reduced by 11–27% compared with No
21 Action, depending on month and water-year type (see Appendix 11C, Section 11C.4, *Alternative*
22 *4*). Reduced diversions from the south Delta channels would not create a reduction in this
23 natural community.

24 The periodic changes in flows in the Sacramento River, Feather River, and American River
25 associated with modified reservoir operations, and the increased diversion of Sacramento River
26 flows at north Delta intakes associated with Alternative 4 would affect salinity, water
27 temperature, dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in
28 these rivers and Delta waterways. These changes are discussed in detail in Chapter 8, *Water*
29 *Quality*. Potentially substantial increases in electrical conductivity (salinity) are predicted for the
30 west Delta and Suisun Marsh as a result of these changed water operations. These salinity
31 changes may alter the plant composition of riparian habitats along the lower Sacramento and
32 San Joaquin Rivers and west Delta islands. The severity and extent of these salinity changes
33 would be complicated by anticipated sea level rise and the effects of downstream tidal
34 restoration over the life of the Plan. There is the potential that some valley/foothill riparian
35 natural community may be degraded immediately adjacent to river channels. The riparian
36 communities in the west Delta are dominated by willows, cottonwood and mixed brambles.
37 These potential changes are not expected to result in a significant reduction in the acreage and
38 value of valley/foothill riparian natural community in the study area.

- 39 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
40 conveyance facilities and levees associated with the BDCP actions have the potential to require
41 removal of adjacent vegetation and could entail earth and rock work in valley/foothill riparian
42 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering these
43 habitats. These activities would be subject to normal erosion, turbidity and runoff control
44 management practices, including those developed as part of *AMM2 Construction Best*
45 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
46 vegetation removal or earthwork adjacent to or within riparian habitats would require use of

1 sediment barriers, soil stabilization and revegetation of disturbed surfaces (*AMM10 Restoration*
2 *of Temporarily Affected Natural Communities*). Proper implementation of these measures would
3 avoid permanent adverse effects on this community.

- 4 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
5 treatment, would be a periodic activity associated with the long-term maintenance of water
6 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
7 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
8 valley/foothill riparian natural community at or adjacent to treated areas. The hazard could be
9 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
10 onto the natural community, or direct discharge of herbicides to riparian areas being treated for
11 invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment,*
12 *and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and
13 the environment from use of various chemicals during maintenance activities, including the use
14 of herbicides. These commitments, including the commitment to prepare and implement spill
15 prevention, containment, and countermeasure plans and stormwater pollution prevention
16 plans, are described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*. Best
17 management practices, including control of drift and runoff from treated areas, and use of
18 herbicides approved for use in terrestrial environments would also reduce the risk of affecting
19 natural communities adjacent to water conveyance features and levees associated with
20 restoration activities.
- 21 • *Channel dredging.* Long-term operation of the Alternative 4 intakes on the Sacramento River
22 would include periodic dredging of sediments that might accumulate in front of intake screens.
23 The dredging could occur adjacent to valley/foothill riparian natural community. This activity
24 should not adversely affect riparian plants as long as dredging equipment is kept out of riparian
25 areas and dredge spoil is disposed of outside of riparian corridors.
- 26 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
27 communities within the Plan Area (CM11). For the valley/foothill riparian natural community, a
28 management plan would be prepared that specifies actions to improve the value of the habitats
29 for covered species. Actions would include control of invasive nonnative plant and animal
30 species, fire management, restrictions on vector control and application of herbicides, and
31 maintenance of infrastructure that would allow for movement through the community. The
32 enhancement efforts would improve the long-term value of this community for both special-
33 status and common species.
- 34 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to
35 valley/foothill riparian natural community in the reserve system. The activities could include
36 wildlife and plant viewing and hiking. *CM11 Natural Communities Enhancement and*
37 *Management* (Chapter 3, Section 3.4.11 of the BDCP and Appendix 11F, Section 11F.3.2.5 of the
38 EIR/EIS) describes this program and identifies applicable restrictions on recreation that might
39 adversely affect riparian habitat. The BDCP also includes an avoidance and minimization
40 measure (AMM37) that further dictates limits on recreation activities that might affect this
41 natural community. Priority would be given to use of existing trails and roads, with some
42 potential for new trails. Limited tree removal and limb trimming could also be involved.

43 The various operations and maintenance activities described above could alter acreage of
44 valley/foothill riparian natural community in the study area through changes in flow patterns and
45 resultant changes in water quality. Activities could also introduce sediment and herbicides that

1 would reduce the value of this community to common and sensitive plant and wildlife species.
2 Recreation activities could encroach on riparian areas and require occasional tree removal. Other
3 periodic activities associated with the Plan, including management, protection and enhancement
4 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
5 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
6 community. While some of these activities could result in small changes in acreage, these changes
7 would be greatly offset by restoration and protection activities planned as part of *CM7 Riparian*
8 *Natural Community Restoration* and *CM3 Natural Communities Protection and Restoration*, or
9 minimized by implementation of AMM2, AMM4, AMM5, AMM10, AMM18, and AMM37. The
10 management actions associated with levee repair, periodic dredging and control of invasive plant
11 species would also result in a long-term benefit to the species associated with riparian habitats by
12 improving water movement in adjacent waterways and by eliminating competitive, invasive species
13 of plants.

14 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
15 implementation of Alternative 4 would not result in a net permanent reduction in the valley/foothill
16 riparian natural community within the study area. Therefore, there would be no adverse effect on
17 this natural community.

18 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
19 have the potential to create minor changes in total acreage of valley/foothill riparian natural
20 community in the study area, and could create temporary increases in turbidity and sedimentation.
21 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
22 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10, and AMM18
23 would minimize these impacts, and other operations and maintenance activities, including
24 management, protection and enhancement actions associated with *CM3 Natural Communities*
25 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
26 create positive effects, including reduced competition from invasive, nonnative plants in these
27 habitats. Long-term restoration and protection activities associated with *CM7 Riparian Natural*
28 *Community Restoration* and *CM3 Natural Communities Protection and Restoration* would expand this
29 natural community in the study area. Ongoing operation, maintenance and management activities
30 would not result in a net permanent reduction in this sensitive natural community within the study
31 area. Therefore, there would be a less-than-significant impact on the valley/foothill riparian natural
32 community.

33 **Nontidal Perennial Aquatic**

34 Construction, operation, maintenance and management associated with the conservation
35 components of Alternative 4 would have no long-term adverse effects on the habitats associated
36 with the nontidal perennial aquatic natural community. Initial development and construction of
37 CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this
38 community (see Table 12-4-5). Full implementation of Alternative 4 would also include the
39 following conservation actions over the term of the BDCP to benefit the nontidal perennial aquatic
40 natural community.

- 41 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
42 and nontidal freshwater perennial emergent wetland natural communities (Objective
43 NFEW/NPANC1.1, associated with CM10).

1 There is a variety of other, less specific conservation goals and objectives in Chapter 3, Section 3.3,
2 *Biological Goals and Objectives*, of the BDCP that would improve the value of nontidal perennial
3 aquatic natural community for terrestrial species. As explained below, with the restoration and
4 enhancement of these amounts of habitat, in addition to implementation of AMMs, impacts on this
5 natural community would not be adverse for NEPA purposes and would be less than significant for
6 CEQA purposes.

7 **Table 12-4-5. Changes in Nontidal Perennial Aquatic Natural Community Associated with**
8 **Alternative 4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	58	58	6	6	0	0
CM2	24	24	12	12	50-77	0
CM4	34	189	0	0	0	0
CM5	0	28	0	16	0	25
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	116	299	18	34	50-77	25

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

9

10 **Impact BIO-12: Changes in Nontidal Perennial Aquatic Natural Community as a Result of**
11 **Implementing BDCP Conservation Measures**

12 Construction and land grading activities that would accompany the implementation of CM1, CM2,
13 CM4, CM5, and CM6 would permanently eliminate an estimated 299 acres and temporarily remove
14 34 acres of nontidal perennial aquatic natural community in the study area. These modifications
15 represent approximately 6% of the 5,567 acres of the community that is mapped in the study area.
16 Approximately 45% (134 acres) of the permanent and temporary losses would occur during the
17 near-term of Alternative 4 implementation, as water conveyance facilities are constructed and
18 habitat restoration is initiated. Natural communities restoration would add 400 acres (CM10) of
19 nontidal marsh during the same period which would expand the area of that habitat and offset the
20 losses. The nontidal marsh restoration would include a mosaic of nontidal perennial aquatic and
21 nontidal freshwater perennial emergent wetland natural communities, as specified in Objective
22 NFEW/NPANC1.1. The analysis in Chapter 5, Section 5.4.6.2, *Beneficial Effects*, of the BDCP indicates
23 that implementation of Alternative 4 would result in the restoration of 1,200 acres of nontidal

1 marsh, and that the restoration would occur in blocks that are contiguous with the Plan's larger
2 reserve system. The nontidal marsh would be restored in the vicinity of giant garter snake
3 subpopulations identified in the recovery plan for this species (U.S. Fish and Wildlife Service 1998).

4 The individual effects of each relevant conservation measure are addressed below. A summary
5 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
6 conservation measure discussions.

- 7 • *CM1 Water Facilities and Operation*: Construction of the Alternative 4 water conveyance facilities
8 would permanently remove 58 acres and temporarily remove 6 acres of nontidal perennial
9 aquatic community. Most of the permanent loss would occur at the linear ponds associated with
10 the proposed peripheral canal north and south of Twin Cities Road just west of Interstate 5 and
11 a reusable tunnel material storage site on Bouldin Island (see Terrestrial Biology Mapbook).
12 Most of the temporary loss would occur where transmission line construction would cross
13 Mandeville Island. These wetlands are linear ponds or small, isolated areas surrounded by
14 agricultural land. These losses would take place during the near-term construction period.
- 15 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of
16 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
17 stilling basin improvements, west side channels modifications, Putah Creek realignment
18 activities, and Sacramento Weir and Tule Canal improvements. All of these activities could
19 involve excavation and grading in nontidal perennial aquatic areas to improve passage of fish
20 through the bypass. Based on hypothetical construction footprints, a total of 24 acres could be
21 permanently lost and another 12 acres could be temporarily removed. This activity would occur
22 primarily in the near-term timeframe.
- 23 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
24 footprints, implementation of CM4 would permanently change to tidally influenced inundation
25 or remove 189 acres of nontidal perennial aquatic community. These losses would be expected
26 to occur primarily in the Cache Slough and Cosumnes/Mokelumne ROAs (see Figure 12-1). An
27 estimated 1,200 acres of nontidal marsh would be restored. Approximately 400 acres of the
28 restoration (CM10) would happen during the first 10 years of Alternative 4 implementation,
29 which would coincide with the timeframe of water conveyance facilities construction and early
30 restoration activities. The remaining restoration would be spread over the following 30 years.
31 Nontidal natural communities restoration is expected to be focused in the CZs 2, 4 and/or 5 in
32 Figure 12-1.
- 33 • *CM5 Seasonally Inundated Floodplain Restoration*: Based on theoretical footprints, floodplain
34 restoration levee construction would permanently remove 28 acres and temporarily remove 16
35 acres of nontidal perennial aquatic habitat. The construction-related losses would be considered
36 a permanent removal of the nontidal perennial aquatic habitats. It is expected that floodplain
37 restoration would be focused on the south part of the Plan Area, in CZ 7. Floodplain restoration
38 along the southern Delta rivers would improve connectivity for a variety of species that rely on
39 aquatic and riparian habitats. The regional and Plan Area landscape linkages along the San
40 Joaquin River, Middle River and Old River are included in Figure 12-2. This activity is scheduled
41 to start following construction of water conveyance facilities.
- 42 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
43 of small amounts of nontidal perennial aquatic habitat along 20 miles of river and sloughs. The
44 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity
45 would occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.

1 Nontidal marsh adjacent to these tidal areas could be affected. The improvements would be
2 undertaken within the study area on sections of the Sacramento, San Joaquin and Mokelumne
3 Rivers, and along Steamboat and Sutter Sloughs.

- 4 • *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal
5 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic
6 and nontidal freshwater perennial emergent natural communities. This marsh restoration
7 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and
8 would be accompanied by adjacent grassland restoration or protection.

9 The following paragraphs summarize the combined effects discussed above and describe other
10 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
11 also included.

12 ***Near-Term Timeframe***

13 During the near-term timeframe, Alternative 4 would affect the nontidal perennial aquatic
14 community through CM1 construction losses (58 acres permanent and 6 acres temporary) and the
15 CM2 construction losses (24 acres permanent and 12 acres temporary). These losses would occur
16 primarily at linear ponds near Twin Cities Road, on southern Bouldin Island, and along the
17 transmission corridor as it crosses Mandeville Island. Approximately 34 acres of the inundation and
18 construction-related losses from CM4 would occur in the near-term throughout several of the ROAs
19 mapped in Figure 12-1.

20 The construction losses of this special-status natural community would represent an adverse effect
21 if they were not offset by avoidance and minimization measures and restoration actions associated
22 with BDCP conservation components. Loss of nontidal perennial aquatic natural community would
23 be considered both a loss in acreage of a sensitive natural community and a loss of waters of the
24 United States as defined by Section 404 of the CWA. However, creating 400 acres of nontidal marsh
25 as part of CM10 during the first 10 years of Alternative 4 implementation would offset this near-
26 term loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for restoration and
27 1:1 for protection) would indicate 134 acres of restoration and 134 acres of protection would be
28 needed to offset (i.e., mitigate) the 134 acres of loss. While the Plan does not include protection of
29 nontidal perennial aquatic habitat, it includes well in excess of the typical 1:1 restoration acreage
30 (which includes protection in perpetuity), and therefore compensates for the lack of protection.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
32 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
33 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
34 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
35 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
36 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

37 ***Late Long-Term Timeframe***

38 Implementation of Alternative 4 as a whole would result in relatively minor (6%) losses of nontidal
39 perennial aquatic community in the study area. These losses (299 acres of permanent and 34 acres
40 of temporary loss) would be largely associated with construction of the water conveyance facilities
41 (CM1), construction of Yolo Bypass fish improvements (CM2), change to tidally influenced
42 inundation during tidal marsh restoration (CM4), and floodplain restoration (CM5). The changes to
43 tidally influenced inundation would occur during the course of the CM4 restoration activities at

1 various tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of
2 1,200 acres of nontidal marsh would be restored. The restoration would occur over a wide region of
3 the study area, including within the Cosumnes/Mokelumne, Yolo Bypass, South Delta and East Delta
4 ROAs (see Figure 12-1).

5 **NEPA Effects:** During the implementation of Alternative 4 in the near-term, creating 400 acres of
6 nontidal marsh as part of CM10 would offset the construction-related and inundation losses of 134
7 acres of nontidal perennial aquatic natural community. There would be no adverse effect. During the
8 full duration of Plan implementation, Alternative 4 would not result in a net reduction in the acreage
9 of a sensitive natural community; there would be an expansion of nontidal marsh and the effect
10 would be beneficial.

11 **CEQA Conclusion:**

12 ***Near-Term Timeframe***

13 Alternative 4 would result in the loss of approximately 134 acres of nontidal perennial aquatic
14 natural community due to construction of the water conveyance facilities (CM1) and fish passage
15 improvements (CM2), and change to tidally influenced inundation during tidal marsh restoration
16 (CM4). The construction losses would occur primarily at reusable tunnel material storage sites near
17 Twin Cities Road and on Bouldin Island, and along the transmission corridor where it crosses
18 Mandeville Island. The losses would be spread across the near-term timeframe. These losses would
19 be offset by planned restoration of 400 acres of nontidal marsh scheduled for the first 10 years of
20 Alternative 4 implementation (CM10). Also, AMM1, AMM2, AMM6, AMM7, and AMM10 would be
21 implemented to minimize impacts. Because of these offsetting near-term restoration activities and
22 AMMs, impacts would be less than significant. Typical project-level mitigation ratios (1:1 for
23 restoration and 1:1 for protection) would indicate that 134 acres of restoration and 134 acres of
24 protection would be needed to offset (i.e., mitigate) the 134 acres of loss. While the Plan does not
25 include protection in the near-term, it includes well in excess of the typical 1:1 restoration acreage
26 (which includes protection in perpetuity), and therefore compensates for the lack of protection. The
27 restoration would be initiated at the beginning of Alternative 4 implementation to minimize any
28 time lag in the availability of this habitat to special-status species, and would result in a net gain in
29 acreage of this sensitive natural community.

30 ***Late Long-Term Timeframe***

31 At the end of the Plan period, 333 acres of the natural community would be removed and 1,200
32 acres of nontidal marsh would be restored. The nontidal marsh would consist of a mosaic of nontidal
33 perennial aquatic and nontidal freshwater perennial emergent wetland natural communities. There
34 would be no net permanent reduction in the acreage of this sensitive natural community within the
35 study area. Therefore, Alternative 4 would not have a substantial adverse effect on the nontidal
36 perennial aquatic natural community; the impact would be beneficial.

37 **Impact BIO-13: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 38 **Nontidal Perennial Aquatic Natural Community**

39 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both
40 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
41 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
42 of nontidal perennial aquatic natural community on small acreages, while CM5 would expose this

1 community to additional flooding as channel margins are modified and levees are set back to
2 improve fish habitat along some of the major rivers and waterways throughout the study area.

- 3 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would
4 result in an increase in the frequency, magnitude and duration of inundation of 50–77 acres of
5 nontidal perennial aquatic natural community. The methods used to estimate these inundation
6 acreages are described in Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, of
7 the BDCP. The area more frequently affected by inundation would vary with the flow volume
8 that would pass through the newly constructed notch in the Fremont Weir. The 50-acre increase
9 in inundation would be associated with a notch flow of 3,000 cubic feet per second (cfs), and the
10 77-acre increase would result from a notch flow of 6,000 cfs. Plan-related increases in flow
11 through Fremont Weir would be expected in 30% of the years. This community occurs in small
12 stringers and patches throughout the bypass, including along the Tule Canal/Toe Drain, the
13 western channels north of Interstate 80, and below the Fremont and Sacramento Weirs. The
14 anticipated change in management of flows in the Yolo Bypass includes more frequent releases
15 in flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later
16 releases into the bypass in spring months (April and May). The modification of periodic
17 inundation events would not adversely affect the ecological function of this natural community
18 and would not substantially modify its value for special-status or common wildlife species.
19 Nontidal perennial aquatic habitats in the Yolo Bypass have developed under a long-term
20 regime of periodic inundation events. The extended inundation would be designed to expand
21 foraging and spawning habitat for Delta fishes. The effects of this inundation on wildlife and
22 plant species are described in detail in later sections of this chapter.
- 23 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
24 increase in the frequency and duration of inundation of an estimated 25 acres of nontidal
25 perennial aquatic habitat. Specific locations for this restoration activity have not been identified,
26 but they would likely be focused in the south Delta area, along the major rivers and Delta
27 channels. The reconnection of these wetlands to stream flooding events would be beneficial to
28 the ecological function of nontidal perennial aquatic habitats as they relate to BDCP target
29 aquatic species. The periodic flooding may also encourage germination of nontidal marsh
30 vegetation.

31 In summary, 75-102 acres of nontidal perennial aquatic community in the study area would be
32 subjected to more frequent inundation as a result of implementing two Alternative 4 conservation
33 measures (CM2 and CM5). Nontidal perennial aquatic community in the Yolo Bypass has developed
34 under a long-term regime of periodic inundation events and inundation along expanded river
35 floodplains would be infrequent.

36 **NEPA Effects:** The increased inundation of nontidal perennial aquatic natural community in the Yolo
37 Bypass and along south Delta waterways would not reduce the acreage of this natural community
38 and could encourage germination of aquatic vegetation. This increased inundation would not be
39 adverse.

40 **CEQA Conclusion:** An estimated 75–102 acres of nontidal perennial aquatic community in the study
41 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5
42 under Alternative 4. The nontidal perennial aquatic community would not be significantly impacted
43 because its habitats in the Yolo Bypass have developed under a long-term regime of periodic
44 inundation events and inundation along expanded river floodplains would be infrequent. The
45 periodic inundation would not result in a net permanent reduction in the acreage of this community

1 in the study area. Therefore, there would be no substantial adverse effect on the community. The
2 impact would be less than significant.

3 **Impact BIO-14: Modification of Nontidal Perennial Aquatic Natural Community from Ongoing**
4 **Operation, Maintenance and Management Activities**

5 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
6 associated with changed water management is in effect, there would be new ongoing and periodic
7 actions associated with operation, maintenance and management of the BDCP facilities and
8 conservation lands that could affect nontidal perennial aquatic natural community in the study area.
9 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento
10 River flows in the north Delta, and reduced diversions from south Delta channels. These actions
11 would be associated with CM1 (see Impact BIO-13 for effects associated with CM2). The periodic
12 actions would involve access road and conveyance facility repair, vegetation management at the
13 various water conveyance facilities and habitat restoration sites (CM11), levee repair and
14 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with
15 natural community management plans. The potential effects of these actions are described below.

- 16 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
17 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would affect
18 nontidal perennial aquatic natural community, in the form of the reservoir pools. The
19 Alternative 4 operations scheme would alter the surface elevations of these reservoir pools as
20 described in Chapter 6, *Surface Water*. These fluctuations would occur within historic ranges
21 and would not adversely affect the natural community. Changes in releases that would influence
22 downstream river flows are discussed below.
- 23 • *Modified river flows upstream of and within the study area and reduced diversions from south*
24 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
25 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta
26 channels (associated with Operational Scenario H) would not result in the permanent reduction
27 in acreage of the nontidal perennial aquatic natural community in the study area. Flow levels in
28 the upstream rivers would not change such that the acreage of nontidal perennial aquatic
29 community would be reduced on a permanent basis. Some minor increases and some decreases
30 would be expected to occur along the major rivers during some seasons and in some water-year
31 types, but there would be no permanent loss. Similarly, increased diversions of Sacramento
32 River flows in the north Delta would not result in a permanent reduction in nontidal perennial
33 aquatic community downstream of these diversions. Nontidal wetlands below the diversions are
34 not directly connected to the rivers, as this reach of the river is tidally influenced. Reduced
35 diversions from south Delta channels would not create a reduction in this natural community.
- 36 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
37 conveyance facilities and levees associated with the BDCP actions have the potential to require
38 removal of adjacent vegetation and could entail earth and rock work in nontidal perennial
39 aquatic habitats. This activity could lead to increased soil erosion, turbidity and runoff entering
40 nontidal perennial aquatic habitats. These activities would be subject to normal erosion,
41 turbidity and runoff control management practices, including those developed as part of *AMM2*
42 *Construction Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment*
43 *Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic habitats would
44 require use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed

1 surfaces. Proper implementation of these measures would avoid permanent adverse effects on
2 this community.

- 3 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
4 treatment, would be a periodic activity associated with the long-term maintenance of water
5 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
6 *Management*). Vegetation management is also the principal activity associated with *CM13*
7 *Invasive Aquatic Vegetation Control*. Use of herbicides to control nuisance vegetation could pose
8 a long-term hazard to nontidal perennial aquatic natural community at or adjacent to treated
9 areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of
10 contaminated stormwater onto the natural community, or direct discharge of herbicides to
11 nontidal perennial aquatic areas being treated for invasive species removal. Environmental
12 commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been
13 made part of the BDCP to reduce hazards to humans and the environment from use of various
14 chemicals during maintenance activities, including the use of herbicides. These commitments,
15 including the commitment to prepare and implement spill prevention, containment, and
16 countermeasure plans and stormwater pollution prevention plans, are described in Appendix
17 3B, *Environmental Commitments, AMMs, and CMs*. Best management practices, including control
18 of drift and runoff from treated areas, and use of herbicides approved for use in aquatic
19 environments would also reduce the risk of affecting natural communities adjacent to water
20 conveyance features and levees associated with restoration activities.

21 Herbicides to remove aquatic invasive species as part of *CM13* would be used to restore the
22 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
23 The treatment activities would be conducted in concert with the California Department of
24 Boating and Waterways' invasive species removal program. Eliminating large stands of water
25 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
26 by removing cover for nonnative predators, improving water flow and removing barriers to
27 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
28 benefit terrestrial species that use tidal and nontidal perennial aquatic natural community for
29 movement corridors and for foraging. Vegetation management effects on individual species are
30 discussed in the species sections on following pages.

- 31 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
32 communities within the Plan Area (*CM11*). For nontidal perennial aquatic natural community, a
33 management plan would be prepared that specifies actions to improve the value of the habitats
34 for covered species. Actions would include control of invasive nonnative plant and animal
35 species, fire management, restrictions on vector control and application of herbicides, and
36 maintenance of infrastructure that would allow for movement through the community. The
37 enhancement efforts would improve the long-term value of this community for both special-
38 status and common species.

39 The various operations and maintenance activities described above could alter acreage of nontidal
40 perennial aquatic natural community in the study area through changes in flow patterns and
41 changes in periodic inundation of this community. Activities could also introduce sediment and
42 herbicides that would reduce the value of this community to common and sensitive plant and
43 wildlife species. Other periodic activities associated with the Plan, including management,
44 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
45 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
46 enhance the value of the community. While some of these activities could result in small changes in

1 acreage, these changes would be greatly offset by restoration activities planned as part of *CM4 Tidal*
2 *Natural Communities Restoration* and protection actions associated with *CM3 Natural Communities*
3 *Protection and Restoration*. The management actions associated with levee repair and control of
4 invasive plant species would also result in a long-term benefit to the species associated with
5 nontidal perennial aquatic habitats by improving water movement.

6 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net
7 permanent reduction in the nontidal perennial aquatic natural community within the study area.
8 Therefore, there would be no adverse effect on this natural community.

9 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
10 have the potential to create minor changes in total acreage of nontidal perennial aquatic natural
11 community in the study area, and could create temporary increases in turbidity and sedimentation.
12 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
13 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize
14 these impacts, and other operations and maintenance activities, including management, protection
15 and enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
16 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
17 improved water movement in these habitats. Long-term restoration activities associated with *CM10*
18 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*
19 *Protection and Restoration* would expand this natural community in the study area. Ongoing
20 operation, maintenance and management activities would not result in a net permanent reduction in
21 this sensitive natural community within the study area. Therefore, there would be a less-than-
22 significant impact on the nontidal perennial aquatic natural community.

23 **Nontidal Freshwater Perennial Emergent Wetland**

24 Construction, operation, maintenance and management associated with the conservation
25 components of Alternative 4 would have no long-term adverse effects on the habitats associated
26 with the nontidal freshwater perennial emergent wetland natural community. Initial development
27 and construction of CM1, CM2, CM4, and CM6 would result in both permanent and temporary
28 removal of this community (see Table 12-4-6). Full implementation of Alternative 4 would also
29 include the following conservation actions over the term of the BDCP to benefit the nontidal
30 freshwater perennial emergent wetland natural community.

- 31 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
32 and nontidal freshwater perennial emergent wetland natural communities (Objective
33 NFEW/NPANC1.1, associated with CM10).
- 34 ● Protect and manage 50 acres of occupied or recently occupied tricolored blackbird nesting
35 habitat located within 5 miles of high-value foraging habitat in Conservation Zones 1, 2, 8 or 11.
36 Nesting habitat will be managed to provide young, lush stands of bulrush/cattail emergent
37 vegetation (Objective TRBL1.1).

38 There is a variety of other, less specific conservation goals and objectives in Chapter 3, Section 3.3,
39 *Biological Goals and Objectives*, of the BDCP that would improve the value of nontidal freshwater
40 perennial emergent wetland natural community for terrestrial species. As explained below, with the
41 restoration and enhancement of these amounts of habitat, in addition to implementation of AMMs,
42 impacts on this natural community would not be adverse for NEPA purposes and would be less than
43 significant for CEQA purposes.

1 **Table 12-4-6. Changes in Nontidal Freshwater Perennial Emergent Wetland Natural Community**
 2 **Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	2	2	4	4	0	0
CM2	25	25	1	1	6-8	0
CM4	40	99	0	0	0	0
CM5	0	0	0	0	0	8
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	67	126	5	5	6-8	8

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

3

4 **Impact BIO-15: Changes in Nontidal Freshwater Perennial Emergent Wetland Natural**
 5 **Community as a Result of Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,
 7 CM4, and CM6 would permanently eliminate an estimated 126 acres and temporarily remove 5
 8 acres of nontidal freshwater perennial emergent wetland natural community in the study area.
 9 These modifications represent approximately 9% of the 1,509 acres of the community that is
 10 mapped in the study area. Approximately 56% (72 acres) of the permanent and temporary losses
 11 would happen during the near-term of Alternative 4 implementation, as water conveyance facilities
 12 are constructed and habitat restoration is initiated. Natural communities restoration (CM10) would
 13 add 1,200 acres of nontidal marsh, consistent with BDCP Objective NFEW/NPANC1.1, and natural
 14 communities protection (CM3) would protect 50 acres of nontidal marsh, consistent with Objective
 15 TRBL1.1. These actions would be taken over the course of BDCP marsh restoration activities, which
 16 would expand the area of that habitat and offset the losses. The nontidal marsh restoration would
 17 include a mosaic of nontidal perennial aquatic and nontidal freshwater perennial emergent wetland
 18 natural communities, as specified in Objective NFEW/NPANC1.1 (Table 3.3-2 in BDCP Chapter 3,
 19 *Conservation Strategy*). The nontidal marsh protection would be designed to support tricolored
 20 blackbird populations in the study area. The analysis in Chapter 5, Section 5.4.6.2, *Beneficial Effects*,
 21 of the BDCP indicates that implementation of Alternative 4 would result in the restoration of 1,200
 22 acres of nontidal marsh. The restoration would occur in blocks that are contiguous with the
 23 alternative's larger reserve system. The nontidal marsh would be restored in the vicinity of giant

1 garter snake subpopulations identified in the recovery plan for this species (U.S. Fish and Wildlife
2 Service 1998).

3 The individual effects of each relevant conservation measure are addressed below. A summary
4 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
5 conservation measure discussions.

- 6 • *CM1 Water Facilities and Operation:* Construction of the Alternative 4 water conveyance facilities
7 would permanently remove 2 acres and temporarily remove 4 acres of tidal freshwater
8 perennial emergent wetland community. The permanent losses would occur at the Clifton Court
9 Forebay construction site and the reusable tunnel material site on Bouldin Island (see
10 Terrestrial Biology Mapbook). The temporary loss would occur in a temporary work area and
11 where temporary powerlines would be constructed across Mandeville Island. These wetlands
12 are extremely small and remote water bodies, surrounded by agricultural operations. These
13 losses would take place during the near-term construction period.
- 14 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
15 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
16 stilling basin improvements, west side channels and Tule Canal modifications, Putah Creek
17 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. Some of
18 these activities could involve excavation and grading in nontidal freshwater perennial emergent
19 wetland areas to improve passage of fish through the bypasses. Based on hypothetical
20 construction footprints, a total of 25 acres could be permanently lost and 1 acre could be
21 temporarily removed. These losses would most likely occur in the Tule Canal and west side
22 channels at the north end of the bypass. The habitat here includes narrow bands within these
23 side channels of the bypass and is isolated from other marsh or open water habitats. The narrow
24 bands are bordered by riparian habitats, primarily willows and cottonwoods. This activity
25 would occur in the near-term timeframe.
- 26 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration
27 footprints, implementation of CM4 would permanently inundate or remove 99 acres of nontidal
28 freshwater perennial emergent wetland community, primarily in the Cache Slough ROA (see
29 Figure 12-1). An estimated 1,200 acres of nontidal marsh would be restored (CM10) and 50
30 acres would be protected (CM3) during nontidal habitat conservation actions. Approximately
31 400 acres of the restoration and 25 acres of the protection would happen during the first 10
32 years of Alternative 4 implementation, which would coincide with the timeframe of water
33 conveyance facilities construction and early tidal marsh restoration. The remaining restoration
34 would be spread over the following 30 years. Nontidal marsh natural communities restoration is
35 expected to be focused in the vicinity of giant garter snake populations in the eastern Delta and
36 near the Yolo Bypass.
- 37 • *CM5 Seasonally Inundated Floodplain Restoration:* Based on theoretical footprints, floodplain
38 restoration levee construction would not affect nontidal freshwater perennial emergent wetland
39 natural community.
- 40 • *CM6 Channel Margin Enhancement:* Channel margin habitat enhancement could result in filling
41 of small amounts of nontidal freshwater perennial emergent wetland habitat along 20 miles of
42 river and sloughs. The extent of this loss cannot be quantified at this time, but the majority of the
43 enhancement activity would occur on the edges of tidal perennial aquatic habitat, including
44 levees and channel banks. Nontidal marsh adjacent to these tidal areas could be affected. The

1 improvements would occur within the study area on sections of the Sacramento, San Joaquin
2 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

- 3 • *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal
4 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic
5 and nontidal freshwater perennial emergent natural communities. This marsh restoration
6 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and
7 would be accompanied by adjacent grassland restoration or protection.

8 The following paragraphs summarize the combined effects discussed above and describe other
9 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
10 also included.

11 ***Near-Term Timeframe***

12 During the near-term timeframe, Alternative 4 would affect the nontidal freshwater perennial
13 emergent wetland community through CM1 construction losses (2 acres permanent and 4 acres
14 temporary) and the CM2 construction losses (25 acres permanent and 1 acre temporary). These
15 losses would occur at the southern forebay, along powerlines across Mandeville Island, and in the
16 Yolo Bypass. Approximately 40 acres of the inundation and construction-related losses from CM4
17 would occur in the near-term. These losses would occur primarily in the Cache Slough ROA mapped
18 in Figure 12-1.

19 The construction losses of this special-status natural community would represent an adverse effect
20 if they were not offset by avoidance and minimization measures and restoration actions associated
21 with BDCP conservation components. Loss of nontidal freshwater perennial emergent wetland
22 natural community would be considered both a loss in acreage of a sensitive natural community and
23 a loss of wetland as defined by Section 404 of the CWA. However, the combination of creating 400
24 acres and protecting 25 acres of nontidal perennial marsh as part of CM3 and CM10 during the first
25 10 years of Alternative 4 implementation would offset this near-term loss, avoiding any adverse
26 effect. Typical project-level mitigation ratios (1:1 for restoration and 1:1 for protection) would
27 indicate 72 acres of restoration and 72 acres of protection would be needed to offset (i.e., mitigate)
28 the 72 acres of loss. While the Plan includes just 25 acres of protection in the near-term, it includes
29 well in excess of the typical 1:1 restoration acreage (which includes protection in perpetuity), and
30 therefore compensates for the shortfall in protection.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
32 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
33 *Barge Operations Plan* and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
34 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
35 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
36 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

37 ***Late Long-Term Timeframe***

38 Implementation of Alternative 4 as a whole would result in small (9%) losses of nontidal freshwater
39 perennial emergent wetland community in the study area. These losses (126 acres of permanent
40 and 5 acres of temporary loss) would be largely associated with construction of the water
41 conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and inundation
42 during tidal marsh restoration (CM4). Inundation losses would occur during the course of the CM4
43 restoration activities primarily at the Cache Slough ROA. By the end of the Plan timeframe, a total of

1 1,200 acres of nontidal marsh would be restored and 50 acres would be protected. The restoration
2 would occur near giant garter snake occupied habitat in the eastern Delta and near Yolo Bypass, in
3 CZs 2, 4 and 5. The 50 acres of protection would occur in CZ 1, 2, 8 or 11 to provide nesting habitat
4 for tri-colored blackbird (see Figure 12-1).

5 **NEPA Effects:** In the near-term, the combination of creating 400 acres and protecting 25 acres of
6 nontidal perennial marsh as part of CM3 and CM10 would offset the near-term losses associated
7 with construction of CM1, CM2 and CM4 facilities, avoiding any adverse effect. With 1,200 acres of
8 nontidal marsh restoration (BDCP Objective NFEW/NPANC1.1) and 50 acres of protection (BDCP
9 Objective TRBL1.1) included with full implementation of the Plan, Alternative 4 would not result in a
10 net long-term reduction in the acreage of a sensitive natural community; the effect would be
11 beneficial.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Alternative 4 would result in the loss of approximately 32 acres of nontidal freshwater perennial
15 emergent wetland natural community due to construction of the water conveyance facilities (CM1)
16 and fish passage improvements (CM2). The construction losses would occur near Clifton Court
17 Forebay, along transmission line construction areas on Mandeville Island, and in the Yolo Bypass.
18 Approximately 40 acres of the inundation and construction-related losses from CM4 would occur in
19 the near-term. These losses would occur primarily in the Cache Slough ROA (see Figure 12-1).The
20 losses would be spread across the near-term timeframe. These losses would be offset by planned
21 restoration of 400 acres and protection of 25 acres of nontidal marsh scheduled for the first 10 years
22 of Alternative 4 implementation (CM3 and CM10). AMM1, AMM2, AMM6, AMM7, and AMM10 would
23 also be implemented to minimize impacts. Because of these offsetting near-term restoration
24 activities and AMMs, impacts would be less than significant. Typical project-level mitigation ratios
25 (1:1 for restoration and 1:1 for protection) would indicate that 72 acres of restoration and 72 acres
26 of protection would be needed to offset (i.e., mitigate) the 72 acres of loss. While the Plan includes
27 just 25 acres of protection in the near-term, it includes well in excess of the typical 1:1 restoration
28 acreage (which includes protection in perpetuity), and therefore compensates for the shortfall in
29 protection. The restoration and protection would be initiated at the beginning of Alternative 4
30 implementation to minimize any time lag in the availability of this habitat to special-status species,
31 and would result in a net gain in acreage of this sensitive natural community.

32 **Late Long-Term Timeframe**

33 At the end of the Plan period, 131 acres of the natural community would be removed, 1,200 acres of
34 nontidal marsh would be restored (BDCP Objective NFEW/NPANC1.1) and 50 acres of nontidal
35 marsh would be protected (BDCP Objective TRBL1.1). There would be no net permanent reduction
36 in the acreage of this sensitive natural community within the study area. Therefore, Alternative 4
37 would not have a substantial adverse effect on the nontidal freshwater perennial emergent wetland
38 natural community; the impact would be beneficial.

39 **Impact BIO-16: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 40 **Nontidal Freshwater Perennial Emergent Wetland Natural Community**

41 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both
42 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage

1 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
2 of nontidal freshwater perennial emergent wetland natural community on small acreages, while
3 CM5 would expose this community to additional flooding as channel margins are modified and
4 levees are set back to improve fish habitat along some of the major rivers and waterways
5 throughout the study area.

6 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would
7 result in an increase in the frequency and duration of inundation of 6-8 acres of nontidal
8 freshwater perennial emergent wetland natural community. The methods used to estimate
9 these inundation acreages are described in Appendix 5.J, *Effects on Natural Communities,*
10 *Wildlife, and Plants*, of the BDCP. The area more frequently affected by inundation would vary
11 with the flow volume that would pass through the newly constructed notch in the Fremont Weir.
12 The 6-acre increase in inundation would be associated with a notch flow of 1,000 cubic feet per
13 second (cfs), and the 8-acre increase would result from a notch flow of 6,000 cfs. Plan-related
14 increases in flow through Fremont Weir would be expected in 30% of the years. This community
15 occurs in small stringers and isolated patches along the Tule Canal and western channel in the
16 north end of the bypass. These areas are not connected to other adjacent marsh and open water
17 habitats; they are surrounded by riparian habitat, scoured grassland and agricultural lands. The
18 anticipated change in management of flows in the Yolo Bypass includes more frequent releases
19 in flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later
20 releases into the bypass in spring months (April and May). The modification of periodic
21 inundation events would not adversely affect the ecological function of this natural community
22 and would not substantially modify its value for special-status or common wildlife species.
23 Nontidal freshwater perennial emergent wetland plant species in the Yolo Bypass have
24 developed under a long-term regime of periodic inundation events. The extended inundation
25 would be designed to expand foraging and spawning habitat for Delta fishes. The effects of this
26 increased inundation on terrestrial wildlife and plant species are described in detail in later
27 sections of this chapter.

28 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
29 increase in the frequency and duration of inundation of an estimated 8 acres of nontidal
30 freshwater perennial emergent wetland habitat. Specific locations for this restoration activity
31 have not been identified, but they would likely be focused in the south Delta area, along the
32 major rivers and Delta channels. The reconnection of these wetlands to stream flooding events
33 would be beneficial to the ecological function of nontidal freshwater perennial emergent
34 wetland habitats as they relate to BDCP target aquatic species. The added exposure to
35 inundation could also encourage germination of nontidal marsh plant species. Foraging activity
36 and refuge sites would be expanded into areas currently unavailable or infrequently available to
37 some aquatic species.

38 In summary, from 14-16 acres of nontidal freshwater perennial emergent wetland community in the
39 study area would be subjected to more frequent inundation as a result of implementing two
40 Alternative 4 conservation measures (CM2 and CM5). This community would not be adversely
41 affected because its habitats in the Yolo Bypass have developed under a long-term regime of
42 periodic inundation events and inundation along expanded river floodplains would be infrequent.

43 **NEPA Effects:** The increased inundation of nontidal freshwater perennial emergent wetland natural
44 community in the Yolo Bypass and in the southern Delta would not reduce the acreage of this

1 natural community and could encourage germination of emergent wetland vegetation. The
2 increased inundation would not be an adverse effect.

3 **CEQA Conclusion:** An estimated 16-18 acres of nontidal freshwater perennial emergent wetland
4 community in the study area would be subjected to more frequent inundation as a result of
5 implementing CM2 and CM5 under Alternative 4. This community would not be significantly
6 impacted because its habitats in the Yolo Bypass have developed under a long-term regime of
7 periodic inundation events and inundation along expanded river floodplains would be infrequent.
8 The periodic inundation would not result in a net permanent reduction in the acreage of this
9 community in the study area. Therefore, there would be no substantial adverse effect on the
10 community. The impact would be less than significant on the nontidal freshwater perennial
11 emergent wetland natural community.

12 **Impact BIO-17: Modification of Nontidal Freshwater Perennial Emergent Wetland Natural** 13 **Community from Ongoing Operation, Maintenance and Management Activities**

14 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
15 associated with changed water management is in effect, there would be new ongoing and periodic
16 actions associated with operation, maintenance and management of the BDCP facilities and
17 conservation lands that could affect nontidal freshwater perennial emergent wetland natural
18 community in the study area. The ongoing actions include modified operation of upstream
19 reservoirs, the diversion of Sacramento River flows in the north Delta, and reduced diversions from
20 south Delta channels. These actions are associated with CM1 (see Impact BIO-16 for effects
21 associated with CM2). The periodic actions would involve access road and conveyance facility
22 repair, vegetation management at the various water conveyance facilities and habitat restoration
23 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat
24 enhancement in accordance with natural community management plans. The potential effects of
25 these actions are described below.

- 26 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
27 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect
28 the nontidal freshwater perennial emergent wetland natural community. These reservoirs do
29 not support significant stands of freshwater emergent wetlands. Changes in releases that would
30 influence downstream river flows are discussed below.
- 31 • *Modified river flows upstream of and within the study area and reduced diversions from south*
32 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
33 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
34 channels (associated with Operational Scenario H) would not result in the permanent reduction
35 in acreage of the nontidal freshwater perennial emergent wetland natural community in the
36 study area. The majority of this wetland type exists outside of the levees of the larger rivers and
37 would not be affected by flow changes in river or Delta channels. Similarly, increased diversions
38 of Sacramento River flows in the north Delta would not result in a permanent reduction in
39 nontidal freshwater perennial emergent wetland community downstream of these diversions.
40 Nontidal wetlands below the diversions are not directly connected to the rivers, as this reach of
41 the river is tidally influenced. Reduced diversions from south Delta channels would not create a
42 reduction in this natural community.
- 43 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
44 conveyance facilities and levees associated with the BDCP actions have the potential to require

1 removal of adjacent vegetation and could entail earth and rock work in nontidal freshwater
2 perennial emergent wetland habitats. This activity could lead to increased soil erosion, turbidity
3 and runoff entering nontidal freshwater perennial habitats. These activities would be subject to
4 normal erosion, turbidity and runoff control management practices, including those developed
5 as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
6 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic
7 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation
8 of disturbed surfaces. Proper implementation of these measures would avoid permanent
9 adverse effects on this community.

- 10
- 11 • *Vegetation management*. Vegetation management, in the form of physical removal and chemical
12 treatment, would be a periodic activity associated with the long-term maintenance of water
13 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
14 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
15 nontidal freshwater perennial emergent wetland natural community at or adjacent to treated
16 areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of
17 contaminated stormwater onto the natural community, or direct discharge of herbicides to
18 nontidal perennial wetland areas being treated for invasive species removal. Environmental
19 commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been
20 made part of the BDCP to reduce hazards to humans and the environment from use of various
21 chemicals during maintenance activities, including the use of herbicides. These commitments,
22 including the commitment to prepare and implement spill prevention, containment, and
23 countermeasure plans and stormwater pollution prevention plans, are described in Appendix
24 3B, *Environmental Commitments, AMMs, and CMs*. Best management practices, including control
25 of drift and runoff from treated areas, and use of herbicides approved for use in aquatic
26 environments would also reduce the risk of affecting natural communities adjacent to water
conveyance features and levees associated with restoration activities.

27 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
28 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
29 The treatment activities would be conducted in concert with the California Department of
30 Boating and Waterways' invasive species removal program. Eliminating large stands of water
31 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
32 by removing cover for nonnative predators, improving water flow and removing barriers to
33 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
34 benefit terrestrial species that use tidal and nontidal freshwater perennial emergent wetland
35 natural community for movement corridors and for foraging. Vegetation management effects on
36 individual species are discussed in the species sections on following pages.

- 37
- 38 • *Habitat enhancement*. The BDCP includes a long-term management element for the natural
39 communities within the Plan Area (CM11). For nontidal freshwater perennial emergent wetland
40 natural community, a management plan would be prepared that specifies actions to improve the
41 value of the habitats for covered species. Actions would include control of invasive nonnative
42 plant and animal species, fire management, restrictions on vector control and application of
43 herbicides, and maintenance of infrastructure that would allow for movement through the
44 community. The enhancement efforts would improve the long-term value of this community for
both special-status and common species.

45 The various operations and maintenance activities described above could alter acreage of nontidal
46 freshwater perennial emergent wetland natural community in the study area through changes in

1 flow patterns and changes in periodic inundation of this community. Activities could also introduce
2 sediment and herbicides that would reduce the value of this community to common and sensitive
3 plant and wildlife species. Other periodic activities associated with the Plan, including management,
4 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
5 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
6 enhance the value of the community. While some of these activities could result in small changes in
7 acreage, these changes would be greatly offset by restoration activities planned as part of *CM10*
8 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*
9 *Protection and Restoration*. The management actions associated with levee repair and control of
10 invasive plant species would also result in a long-term benefit to the species associated with
11 nontidal freshwater perennial emergent wetland habitats by improving water movement.

12 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
13 Alternative 4 would not result in a net permanent reduction in the nontidal freshwater perennial
14 emergent wetland natural community within the study area. Therefore, there would be no adverse
15 effect on this natural community.

16 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
17 have the potential to create minor changes in total acreage of nontidal freshwater perennial
18 emergent wetland natural community in the study area, and could create temporary increases in
19 turbidity and sedimentation. The activities could also introduce herbicides periodically to control
20 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and
21 AMM5 would minimize these impacts, and other operations and maintenance activities, including
22 management, protection and enhancement actions associated with *CM3 Natural Communities*
23 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
24 create positive effects, including improved water movement in and adjacent to these habitats. Long-
25 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and protection actions
26 associated with *CM3 Natural Communities Protection and Restoration* would expand this natural
27 community in the study area. Ongoing operation, maintenance and management activities would not
28 result in a net permanent reduction in this sensitive natural community within the study area.
29 Therefore, there would be a less-than-significant impact on the nontidal freshwater perennial
30 emergent wetland natural community.

31 **Alkali Seasonal Wetland Complex**

32 Construction, operation, maintenance and management associated with the conservation
33 components of Alternative 4 would have no long-term adverse effects on the habitats associated
34 with the alkali seasonal wetland complex natural community. Initial development and construction
35 of CM1, CM2 and CM4 would result in both permanent and temporary removal of this community
36 (see Table 12-4-7). Full implementation of Alternative 4 would also include the following
37 conservation actions over the term of the BDCP to benefit the alkali seasonal wetland natural
38 community.

- 39 ● Protect 150 acres of alkali seasonal wetland in Conservation Zones 1, 8 and/or 11 among a
40 mosaic of protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with
41 CM3).
- 42 ● Restore or create alkali seasonal wetlands in Conservation Zones 1, 8, and/or 11 to achieve no
43 net loss of wetted acres (up to 72 acres of alkali seasonal wetland complex restoration)
44 (Objective ASWNC1.2, associated with CM3 and CM9).

- Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).

There is a variety of other, less specific conservation goals and objectives in Chapter 3, Section 3.3, *Biological Goals and Objectives*, of the BDCP that would improve the value of alkali seasonal wetland natural community for terrestrial species. As explained below, with the protection, restoration, and enhancement of the amounts of habitat listed in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural community would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-4-7. Changes in Alkali Seasonal Wetland Complex Natural Community Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	1	1	0	0	0	0
CM2	45	45	0	0	264-744	0
CM4	13	27	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	59	73	0	0	264-744	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. They represent the total loss of habitat that would occur over the 50-year life of the Plan. The LLT totals do not reflect the increases in habitat that would result from restoration and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

Impact BIO-18: Changes in Alkali Seasonal Wetland Complex Natural Community as a Result of Implementing BDCP Conservation Measures

Construction, land grading and habitat restoration activities that would accompany the implementation of CM1, CM2 and CM4 under Alternative 4 would permanently eliminate an estimated 73 acres of alkali seasonal wetland complex natural community in the study area. There would be no temporary impacts to alkali seasonal wetlands. These modifications represent approximately 2% of the 3,723 acres of the community that is mapped in the study area. Most of the losses (59 acres or 81%) would happen during the near-term of Alternative 4 implementation, as the water conveyance facility is constructed, the Yolo Bypass improvements are initiated, and habitat restoration is initiated. Alkali seasonal wetland complex protection (120 acres) and restoration (an estimated 58 acres, but determined by actual level of effect) would be initiated

1 during the same period; when combined, these actions would offset the losses. By the end of the
2 Plan period, 150 acres of this natural community would be protected and up to 73 acres would be
3 restored. The analysis for this community in Chapter 5, Section 5.4.7.2, *Beneficial Effects*, of the BDCP
4 states that Alternative 4 would protect 150 acres of alkali seasonal wetland in Conservation Zones 1,
5 8, or 11, in a mosaic of protected grasslands and vernal pool complex. This would protect currently
6 unprotected high-value alkali seasonal wetland complex in the Plan Area.

7 The individual effects of each relevant conservation measure are addressed below. A summary
8 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
9 conservation measure discussions.

- 10 • *CM1 Water Facilities and Operation*: Construction of the Alternative 4 transmission lines
11 immediately west of Clifton Court Forebay would permanently affect 1 acres of alkali seasonal
12 wetland complex natural community, a portion of which includes iodine bush scrub, a sensitive
13 plant community. The alkali seasonal wetland complex at this location is scattered and
14 significantly degraded by past agricultural and water development-related activities. It is
15 surrounded by or adjacent to vernal pool complex natural community.

16 The construction activity associated with CM1 also has the potential to lead to increased
17 nitrogen deposition in alkali seasonal wetland habitats in the vicinity of Clifton Court Forebay. A
18 significant number of cars, trucks, and land grading equipment involved in construction would
19 emit small amounts of atmospheric nitrogen from fuel combustion; this material could be
20 deposited in sensitive alkali seasonal wetland areas that are located west of the major
21 construction areas at Clifton Court Forebay. Nitrogen deposition can pose a risk of adding a
22 fertilizer to nitrogen-limited soils and their associated plants. Nonnative invasive species can be
23 encouraged by the added nitrogen available. Appendix 5.J, Attachment 5J.A, *Construction-Related*
24 *Nitrogen Deposition on BDCP Natural Communities*, of the BDCP addresses this issue in detail. It
25 has been concluded that this potential deposition would pose a low risk of changing the alkali
26 seasonal wetland complex in the construction area because the construction would occur
27 primarily downwind of the natural community and the construction would contribute a
28 negligible amount of nitrogen to regional projected emissions. No adverse effect is expected.

- 29 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of
30 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
31 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
32 Sacramento Weir improvements. Realignment of Putah Creek could involve excavation and
33 grading in alkali seasonal wetland complex as a new channel is constructed. Based on
34 hypothetical construction footprints, a total of 45 acres could be permanently lost. This complex
35 is located immediately south of the existing Putah Creek channel within the bypass, and is a
36 relatively large, moderate to high value, contiguous expanse of this community. This loss would
37 occur in the near-term timeframe.

- 38 • *CM3 Natural Communities Protection and Restoration*: CM3 proposes to protect at least 150 acres
39 of alkali seasonal wetland complex in CZ 1, CZ 8, and CZ 11 (Objective ASWNC1.1). The
40 protection would occur in areas containing a mosaic of grassland and vernal pool complex in
41 unfragmented natural landscapes supporting a diversity of native plant and wildlife species.
42 These areas would be both protected and enhanced to increase the cover of alkali seasonal
43 wetland plants relative to nonnative species.

- 44 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
45 footprints, implementation of CM4 would permanently inundate or remove 13 acres of alkali

1 seasonal wetland complex in the near-term and inundate or remove 27 acres by the end of the
2 Plan timeframe. The losses would be expected to occur in the Cache Slough and Suisun Marsh
3 ROAs established for tidal restoration (see Figure 12-1). The largest losses would likely occur in
4 the Lindsay Slough area and on the northern fringes of Suisun Marsh, north of the Potrero Hills.
5 These losses would not fragment the alkali seasonal wetland communities adjacent to these
6 sloughs because the losses would occur on the edges of the existing habitat.

- 7 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: CM9 includes both vernal
8 pool complex and alkali seasonal wetland complex restoration goals. The intent of the
9 conservation measure is to match the acreage of restoration with the actual acreage lost to other
10 conservation measures (primarily CM2 and CM4). The current estimate for alkali seasonal
11 wetland complex restoration is 58 acres in the near-term and a total of 72 acres by the end of
12 the BDCP restoration period. The goal is for no net loss of this natural community, consistent
13 with BDCP Objective ASWNC1.2. Restoration in the Lindsay Slough area of the Cache Slough ROA
14 and the northern region of the Suisun Marsh ROA would be consistent with essential habitat
15 connectivity goals mapped in Figure 12-2 and described in Table 3.2-2 of BDCP Chapter 3,
16 *Conservation Strategy*.

17 The following paragraphs summarize the combined effects discussed above and describe other
18 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
19 also included.

20 ***Near-Term Timeframe***

21 During the near-term timeframe, Alternative 4 would affect the alkali seasonal wetland complex
22 natural community through CM1 and CM2 construction losses (46 acres permanent). These losses
23 would occur in the Yolo Bypass south of Putah Creek and on land immediately west of Clifton Court
24 Forebay. Approximately 13 acres of the inundation and construction-related losses in habitat from
25 CM4 would occur in the near-term. These losses would occur primarily in the Cache Slough and
26 Suisun Marsh ROAs mapped in Figure 12-1.

27 The construction losses of this special-status natural community would represent an adverse effect
28 if they were not offset by avoidance and minimization measures and restoration actions associated
29 with BDCP conservation components. Loss of alkali seasonal wetland complex natural community
30 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
31 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland
32 complex as part of CM3, the restoration of 58 acres of this community as part of CM9, and the
33 implementation of *AMM30 Transmission Line Design and Alignment Guidelines* during the first 10
34 years of Alternative 4 implementation would offset this near-term loss, avoiding any adverse effect.
35 *AMM30* would require that transmission line construction avoid any losses of alkali seasonal
36 wetland complex natural community (see Appendix 3B, *Environmental Commitments, AMMs, and*
37 *CMs*, for a full description of *AMM30*). Typical project-level mitigation ratios (2:1 for protection and
38 1:1 for restoration) would indicate 118 acres of protection and 59 acres of restoration would be
39 needed to offset (i.e., mitigate) the 59 acres of loss.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
41 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
42 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
43 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas.

1 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in
2 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

3 ***Late Long-Term Timeframe***

4 Implementation of Alternative 4 as a whole would result in relatively minor (2%) losses of alkali
5 seasonal wetland natural community in the study area. These losses (73 acres) would be largely
6 associated with construction of Yolo Bypass fish improvements (CM2) and inundation during tidal
7 marsh restoration (CM4). Inundation losses would occur during the course of BDCP restoration
8 activities, primarily in the Cache Slough and Suisun Marsh ROAs.

9 ***NEPA Effects:*** In the first 10 years of implementing Alternative 4 conservation measures, 120 acres
10 of alkali seasonal wetland complex would be protected as part of CM3 and 58 acres of this
11 community would be restored as part of CM9. These conservation actions would offset the near-
12 term loss of this community associated with CM1, CM2 and CM4, avoiding any adverse effect. By the
13 end of the Plan timeframe, Alternative 4 would protect a total of 150 acres of alkali seasonal wetland
14 natural community (CM3) and would restore up to 72 acres (CM9). The protection and restoration
15 would occur primarily in CZ 1, CZ 8 and/or CZ 11, in the Cache Slough, Suisun Marsh and Clifton
16 Court Forebay areas. Therefore, Alternative 4 would not have an adverse effect on the alkali
17 seasonal wetland complex natural community.

18 ***CEQA Conclusion:***

19 ***Near-Term Timeframe***

20 Alternative 4 would result in the permanent loss of approximately 59 acres of alkali seasonal
21 wetland complex natural community due to water conveyance facility construction (CM1), to
22 construction of fish passage improvements (CM2), and inundation during tidal marsh restoration
23 (CM4). The construction losses would occur primarily in the area just south of Putah Creek in the
24 Yolo Bypass and adjacent to Clifton Court Forebay, while inundation losses would occur in the Cache
25 Slough and Suisun Marsh ROAs. The losses would be spread across the near-term timeframe.

26 The construction losses of this special-status natural community would represent an adverse effect
27 if they were not offset by avoidance and minimization measures and other actions associated with
28 BDCP conservation components. Loss of alkali seasonal wetland complex natural community would
29 be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
30 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland
31 complex as part of CM3, the restoration of 58 acres of this community as part of CM9, and the
32 implementation of *AMM30 Transmission Line Design and Alignment Guidelines* during the first 10
33 years of Alternative 4 implementation would offset this near-term loss, avoiding any significant
34 impact. Because it is not possible to create iodine bush scrub, mitigation for impacts on this plant
35 community must be through avoidance and/or protection of compensating mitigation areas.
36 Protection of iodine bush scrub within the grassland/vernal pool complex/alkali seasonal wetland
37 habitats adjacent to Clifton Court Forebay provides the only opportunity in the Plan Area to protect
38 this habitat. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would
39 indicate 118 acres of protection and 59 acres or restoration would be needed to offset (i.e., mitigate)
40 the 59 acres of loss. AMM1, AMM2, AMM3, AMM4, and AMM10 would also be implemented to
41 minimize impacts. Because of the offsetting protection and restoration activities and AMMs, impacts
42 would be less than significant.

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, 73 acres of alkali seasonal wetland complex natural community would
3 be permanently removed by conservation actions, 150 acres would be protected and up to 73 acres
4 would be restored. The restoration acres actually developed would depend on the number of acres
5 affected during Alternative 4 implementation. There would be no net permanent reduction in the
6 acreage of this natural community within the study area. Therefore, Alternative 4 would have a less-
7 than-significant impact on the alkali seasonal wetland complex natural community.

8 **Impact BIO-19: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
9 **Alkali Seasonal Wetland Complex Natural Community**

10 *CM2 Yolo Bypass Fisheries Enhancement* would modify the inundation regime of the Yolo Bypass, a
11 man-made waterway. CM2, which is designed to improve fish passage and shallow flooded habitat
12 for Delta fishes in the Yolo Bypass, would increase periodic inundation of alkali seasonal wetland
13 complex natural community at scattered locations in the central and southern sections of the
14 bypass.

15 Operation of the Yolo Bypass under Alternative 4 would result in an increase in the frequency and
16 duration of inundation on an estimated 264–744 acres of alkali seasonal wetland complex natural
17 community. The methods used to estimate these inundation acreages are described in Appendix 5.J,
18 *Effects on Natural Communities, Wildlife, and Plants*, of the BDCP. The area more frequently affected
19 by inundation would vary with the flow volume that would pass through the newly constructed
20 notch in the Fremont Weir. The 264-acre increase in inundation would be associated with a notch
21 flow of 1,000 cubic feet per second (cfs), and the 744-acre increase would result from a notch flow of
22 4,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in 30% of the
23 years. The alkali seasonal wetland complex natural community occurs primarily in the central and
24 southern reaches of the bypass, south of Putah Creek. The stands in this location are relatively large,
25 with moderate to high value for associated plant and wildlife species. The anticipated change in
26 management of flows in the Yolo Bypass includes more frequent releases in flows into the bypass
27 from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in spring
28 months (April and May).

29 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with
30 Alternative 4 would not adversely affect alkali seasonal wetland complex habitats, as they have
31 persisted under similar high flows and extended inundation periods. There is the potential for some
32 change in plant species composition as a result of longer inundation periods, but the natural
33 community would persist.

34 **CEQA Conclusion:** An estimated 264–744 acres of alkali seasonal wetland complex natural
35 community in the Yolo Bypass would be subjected to more frequent inundation as a result of
36 implementing CM2 under Alternative 4. This natural community is conditioned to periodic
37 inundation; the slight increase in periodic inundation would not result in a net permanent reduction
38 in the acreage of this community in the study area, although some change in plant species
39 composition could occur. Increasing periodic inundation of alkali seasonal wetland complex natural
40 community in the Yolo Bypass would have a less-than-significant impact on this natural community.
41 The effects of this inundation on wildlife and plant species are described in detail in later sections of
42 this chapter.

1 **Impact BIO-20: Modification of Alkali Seasonal Wetland Complex Natural Community from**
2 **Ongoing Operation, Maintenance and Management Activities**

3 Once the physical facilities associated with Alternative 4 were constructed and the stream flow
4 regime associated with changed water management was in effect, there would be new ongoing and
5 periodic actions associated with operation, maintenance and management of the BDCP facilities and
6 conservation lands that could affect alkali seasonal wetland complex natural community in the study
7 area. The ongoing actions include modified operation of upstream reservoirs, the diversion of
8 Sacramento River flows in the north Delta, reduced diversions from south Delta channels, and
9 recreation in and adjacent to Plan reserves. These actions are associated with CM1 and CM11 (see
10 Impact BIO-19 for effects associated with CM2). The periodic actions would involve access road and
11 conveyance facility repair, vegetation management at the various water conveyance facilities and
12 habitat restoration sites (CM11), levee repair and replacement of levee armoring, channel dredging,
13 and habitat enhancement in accordance with natural community management plans. The potential
14 effects of these actions are described below.

- 15 • *Modified river flows upstream of and within the study area and reduced diversions from south*
16 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
17 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
18 channels (associated with Operational Scenario H) would not affect alkali seasonal wetland
19 natural community. This natural community does not exist within or adjacent to the active
20 Sacramento River system channels and Delta waterways that would be affected by modified
21 flow levels.
- 22 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
23 conveyance facilities and levees associated with the BDCP actions have the potential to require
24 removal of adjacent vegetation and could entail earth and rock work in or adjacent to alkali
25 seasonal wetland complex habitats. This activity could lead to increased soil erosion and runoff
26 entering these habitats. These activities would be subject to normal erosion and runoff control
27 management practices, including those developed as part of *AMM2 Construction Best*
28 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
29 vegetation removal or earthwork adjacent to or within alkali seasonal wetland complex habitats
30 would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces
31 as required by *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper
32 implementation of these measures would avoid permanent adverse effects on this community.
- 33 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
34 treatment, would be a periodic activity associated with the long-term maintenance of water
35 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
36 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
37 alkali seasonal wetland complex natural community at or adjacent to treated areas. The hazard
38 could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
39 stormwater onto the natural community, or direct discharge of herbicides to alkali seasonal
40 wetland complex areas being treated for invasive species removal. Environmental commitments
41 and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been made part of the
42 BDCP to reduce hazards to humans and the environment from use of various chemicals during
43 maintenance activities, including the use of herbicides. These commitments, including the
44 commitment to prepare and implement spill prevention, containment, and countermeasure
45 plans and stormwater pollution prevention plans, are described in Appendix 3B, *Environmental*
46 *Commitments, AMMs, and CMs*. Best management practices, including control of drift and runoff

1 from treated areas, and use of herbicides approved for use in terrestrial environments would
2 also reduce the risk of affecting natural communities adjacent to water conveyance features and
3 levees associated with restoration activities.

- 4 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
5 communities within the Plan Area (CM11). For the alkali seasonal wetland complex natural
6 community, a management plan would be prepared that specifies actions to improve the value
7 of the habitats for covered species. Actions would include control of invasive nonnative plant
8 and animal species, fire management, restrictions on vector control and application of
9 herbicides, and maintenance of infrastructure that would allow for movement through the
10 community. The enhancement efforts would improve the long-term value of this community for
11 both special-status and common species.
- 12 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to alkali
13 seasonal wetland natural community in the reserve system. The activities could include wildlife
14 and plant viewing and hiking. *CM11 Natural Communities Enhancement and Management*
15 describes this program and identifies applicable restrictions on recreation that might adversely
16 affect alkali seasonal wetland habitat (see Chapter 3, Section 3.4.11 of the BDCP and Appendix
17 11F, Section 11F.3.2.5 of the EIR/EIS). BDCP also includes an avoidance and minimization
18 measure (AMM37) that further dictates limits on recreation activities that might affect this
19 natural community. Most recreation would be docent-led wildlife and botanical tours, using
20 existing trails and roads in the vicinity of the reserves. No new trails would be constructed.

21 The various operations and maintenance activities described above could alter acreage of alkali
22 seasonal wetland complex natural community in the study area. Activities could introduce sediment
23 and herbicides that would reduce the value of this community to common and sensitive plant and
24 wildlife species. Other periodic activities associated with the Plan, including management,
25 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
26 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
27 enhance the value of the community. While some of these activities could result in small changes in
28 acreage, these changes would be offset by protection and restoration activities planned as part of
29 *CM3 Natural Communities Protection and Restoration* and *CM9 Vernal Pool and Alkali Seasonal*
30 *Wetland Complex Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, AMM10
31 and AMM37. The management actions associated with control of invasive plant species would also
32 result in a long-term benefit to the species associated with alkali seasonal wetland complex habitats
33 by eliminating competitive, invasive species of plants.

34 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
35 Alternative 4 would not result in a net permanent reduction in this natural community within the
36 study area. Therefore, there would be no adverse effect on the alkali seasonal wetland complex
37 natural community.

38 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
39 have the potential to create minor changes in total acreage of alkali seasonal wetland complex
40 natural community in the study area, and could create temporary increases sedimentation. The
41 activities could also introduce herbicides periodically to control nonnative, invasive plants.
42 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10 and AMM37
43 would minimize these impacts, and other operations and maintenance activities, including
44 management, protection and enhancement actions associated with *CM3 Natural Communities*
45 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would

1 create positive effects, including reduced competition from invasive, nonnative plants in these
2 habitats. Long-term restoration activities associated with *CM9 Vernal Pool and Alkali Seasonal*
3 *Wetland Complex Restoration* and protection actions associated with *CM3 Natural Communities*
4 *Protection and Restoration* would ensure that the acreage of this natural community would not
5 decrease in the study area. Ongoing operation, maintenance and management activities would not
6 result in a net permanent reduction in this natural community within the study area. Therefore,
7 there would be a less-than-significant impact on the alkali seasonal wetland complex natural
8 community.

9 **Vernal Pool Complex**

10 Construction, operation, maintenance and management associated with the conservation
11 components of Alternative 4 would have no long-term adverse effects on the habitats associated
12 with the vernal pool complex natural community. Initial development and construction of CM1 and
13 CM4 would result in permanent removal of 216 acres of this community (see Table 12-4-8). Full
14 implementation of Alternative 4 would also include the following conservation actions over the term
15 of the BDCP to benefit the vernal pool complex natural community.

- 16 • Protect 600 acres of existing vernal pool complex in Conservation Zones 1, 8, and 11, primarily
17 in core vernal pool recovery areas (Objective VPNC1.1, associated with CM3).
- 18 • Restore vernal pool complex in Conservation Zones 1, 8, and/or 11 to achieve no net loss of
19 vernal pool acreage (up to 67 acres of vernal pool complex restoration, assuming that all
20 anticipated impacts [10 wetted acres] occur and that the restored vernal pool complex has 15%
21 density of vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).

22 There is a variety of other, less specific conservation goals and objectives in Chapter 3, Section 3.3
23 *Biological Goals and Objectives*, of the BDCP that would improve the value of vernal pool complex
24 natural community for terrestrial species. As explained below, with the protection, restoration and
25 enhancement of the amounts of habitat listed in the BDCP objectives, in addition to implementation
26 of AMMs, impacts on this natural community would not be adverse for NEPA purposes and would be
27 less than significant for CEQA purposes.

1
2

Table 12-4-8. Changes in Vernal Pool Complex Natural Community Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	19	19	3	3	0	0
CM2	0	0	0	0	0-4	0
CM4	201	372	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	220	391	3	3	0-4	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

3

4 **Impact BIO-21: Changes in Vernal Pool Complex Natural Community as a Result of**
5 **Implementing BDCP Conservation Measures**

6 Construction, land grading and habitat restoration activities that would accompany the
7 implementation of CM1 and CM4 could permanently eliminate an estimated 391 acres and
8 temporarily remove 3 acres of vernal pool complex natural community in the study area. These
9 acreages are based on the proposed location of the CM1 construction footprint and a theoretical
10 footprint for CM4 tidal marsh restoration activities. The loss of this combined 394 acres would
11 represent approximately 3% of the 12,133 acres of the community that is mapped in the study area.
12 An estimated 223 acres of the loss could occur during the near-term of Alternative 4
13 implementation, as the water conveyance facility is constructed and tidal marsh restoration is
14 initiated. Vernal pool complex protection (400 acres) and restoration (an estimated 40 acres, with
15 actual restoration based on level of effect) would be initiated during the first 10 years of Alternative
16 4 implementation to counteract the loss of habitat. By the end of the Plan period, 600 acres of this
17 natural community would be protected and up to 67 acres would be restored. Because of the high
18 sensitivity of this natural community and its shrinking presence in the Plan Area, avoidance and
19 minimization measures have been built into the BDCP to eliminate the majority of this potential loss.
20 The analysis in Chapter 5, Section 5.4.8.2, *Beneficial Effects*, of the BDCP indicates that
21 implementation of Alternative 4 would protect at least 600 acres of vernal pool complex in
22 Conservation Zones 1, 8, and 11 and additional vernal pool complex would be restored to achieve no
23 net loss of this community.

1 The individual effects of the relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation:* Construction of the Alternative 4 water conveyance facilities
5 would directly affect 31 acres of vernal pool complex natural community, including 19 acres
6 permanently affected and 3 acres temporarily affected. The permanent loss would occur along
7 the southern edge of Clifton Court Forebay, where the forebay would be expanded to provide
8 greater storage capacity and from the construction of transmission lines. The temporary losses
9 would occur in a temporary work area immediately adjacent to Clifton Court Forebay (see
10 Figure 12-1 and the Terrestrial Biology Mapbook). A portion of this habitat adjacent to Clifton
11 Court Forebay includes iodine bush scrub, a sensitive plant community.

12 Because of the close proximity of construction activity to adjacent vernal pool complex near
13 Clifton Court Forebay, there is also the potential for indirect loss or damage to vernal pools from
14 changes in pool hydrology or deposition of construction-related sediment. These potential
15 indirect effects are discussed in detail in the vernal pool crustaceans impact analysis later in this
16 chapter.

17 The construction activity associated with CM1 also has the potential to lead to increased
18 nitrogen deposition in vernal pool complex habitats in the vicinity of Clifton Court Forebay and
19 Stone Lakes National Wildlife Refuge. A significant number of cars, trucks, and land grading
20 equipment involved in construction would emit small amounts of atmospheric nitrogen from
21 fuel combustion; this material could be deposited in sensitive vernal pool areas that are located
22 west of the major construction areas at Clifton Court Forebay and east of the construction areas
23 adjacent to Stone Lakes NWR. Nitrogen deposition can pose a risk of adding a fertilizer to
24 nitrogen-limited soils and their associated plants. Nonnative invasive species can be encouraged
25 by the added nitrogen available. Appendix 5.J, Attachment 5J.A, *Construction-Related Nitrogen*
26 *Deposition on BDCP Natural Communities*, of the BDCP addresses this issue in detail. It has been
27 concluded that this potential deposition would pose a low risk of changing the vernal pool
28 complex in the construction areas because the construction would contribute a negligible
29 amount of nitrogen to regional projected emissions. Also, the construction at Clifton Court
30 Forebay would occur primarily downwind of the natural community. At Stone Lakes National
31 Wildlife Refuge, the USFWS refuge management undertakes active invasive species control,
32 including use of grazing. No adverse effect is expected.

- 33 • *CM3 Natural Communities Protection and Restoration:* CM3 proposes to protect at least 600 acres
34 of vernal pool complex in CZ 1, CZ 8, and CZ 11 (BDCP Objective VPNC1.1). The protection would
35 occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented
36 natural landscapes supporting a diversity of native plant and wildlife species. These areas would
37 be both protected and enhanced to increase the cover of vernal pool complex plants relative to
38 nonnative species.
- 39 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration
40 footprints, implementation of CM4 tidal marsh restoration in CZs 1 and 11 (Cache Slough and
41 Suisun Marsh ROAs; see Figure 12-1) could permanently inundate or remove 201 acres of vernal
42 pool complex in the near-term timeframe. By the end of the Plan period, a total of 372 acres
43 could be affected. The principal areas likely to be affected include the Cache Slough drainage just
44 west of the Yolo Bypass and the Nurse Slough drainage just east of the Potrero Hills.

- 1 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: CM9 includes both vernal
2 pool complex and alkali seasonal wetland complex restoration goals. The current estimate for
3 vernal pool complex restoration is 40 acres in the near-term and a total of 67 acres by the end of
4 the BDCP restoration period. This restoration conservation measure includes a “no net loss”
5 policy normally applied to this natural community (BDCP Objective VPNC1.2).

6 The following paragraphs summarize the combined effects discussed above and describe other
7 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
8 also included.

9 ***Near-Term Timeframe***

10 During the near-term timeframe, Alternative 4 could directly affect 223 acres of vernal pool complex
11 natural community through inundation or construction-related losses in habitat from CM1 and CM4
12 activities. This loss would likely occur in the Cache Slough or Suisun Marsh ROAs mapped in Figure
13 12-1, and in the vicinity of Clifton Court Forebay (see the Terrestrial Biology Mapbook).

14 The construction or inundation loss of this special-status natural community would represent an
15 adverse effect if it were not offset by avoidance and minimization measures and restoration actions
16 associated with BDCP conservation components. Loss of vernal pool complex natural community
17 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
18 defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex as part of
19 CM3 and the restoration of up to 40 acres of this community (including a commitment to have
20 restoration keep pace with losses; BDCP Chapter 3, Section 3.4.9, *Conservation Measure 9*) as part of
21 CM9 during the first 10 years of Alternative 4 implementation would partially offset this near-term
22 loss. The Plan focuses this protection in the core vernal pool areas identified in the USFWS vernal
23 pool recovery plan (U.S. Fish and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8 and CZ 11
24 (see Figure 12-1). Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration)
25 would indicate 446 acres of protection and 223 acres of restoration would be needed to offset (i.e.,
26 mitigate) the 223 acres of loss. Without additional avoidance and minimization measures to reduce
27 the potential effect, the proposed protection and restoration would not meet the typical mitigation
28 for vernal pool complex losses. In addition, because it is not possible to create iodine bush scrub,
29 mitigation for impacts on this plant community must be through avoidance and/or protection of
30 compensating mitigation areas. Protection of iodine bush scrub within the grassland/vernal pool
31 complex/alkali seasonal wetland habitats adjacent to Clifton Court Forebay provides the only
32 opportunity in the Plan Area to protect this habitat.

33 To avoid this adverse effect, the BDCP includes commitments to implement *AMM1 Worker*
34 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*
35 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM10 Restoration*
36 *of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM30*
37 *Transmission Line Design and Alignment Guidelines*. All of these AMMs include elements that avoid or
38 minimize the risk of affecting habitats at work areas. AMM12 limits the direct removal of vernal pool
39 crustacean habitat to no more than 10 wetted acres and the indirect effect to no more than 20
40 wetted acres through the life of the Plan. This is equivalent to approximately 67 acres of direct loss
41 and 134 acres of indirect loss of vernal pool complex natural community. BDCP Appendix 3.C
42 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
43 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. With these AMMs in place,
44 Alternative 4 would not adversely affect vernal pool complex natural community in the near-term.

1 **Late Long-Term Timeframe**

2 The late long-term effect on vernal pool complex natural community would be 391 acres of
3 permanent and 3 acres of temporary loss. These losses would be associated with the construction of
4 CM1 facilities in the vicinity of Clifton Court Forebay and the ongoing restoration of tidal wetland in
5 the Cache Slough and Suisun Marsh ROAs. However, 600 acres would be protected (CM3) and up to
6 67 acres would be restored (CM9) through the course of Alternative 4 implementation. In addition,
7 the avoidance and minimization measures listed above would reduce the actual loss of this
8 community to no more than 10 wetted acres of vernal pool crustacean habitat from direct activities
9 and 20 acres of habitat from indirect effects.

10 **NEPA Effects:** The conservation measures associated with Alternative 4 include protection of 400
11 acres (CM3) and restoration of an estimated 40 acres (CM9) of vernal pool complex in the near-term
12 time frame. The Plan focuses the protection in the core vernal pool areas identified in the USFWS
13 vernal pool recovery plan (U.S. Fish and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8 and
14 CZ 11 (see Figure 12-1). In addition, Alternative 4 includes AMM12, which limits the removal of
15 vernal pool crustacean habitat to no more than 10 wetted acres and the indirect effect to no more
16 than 20 wetted acres through the life of the Plan. With this and other AMMs in place, the Alternative
17 4 not adversely affect vernal pool complex natural community in the near-term. With these
18 conservation measures and AMMs in effect through the entire Plan period, Alternative 4 would not
19 have an adverse effect on the vernal pool complex natural community in the long term.

20 **CEQA Conclusion:**

21 **Near-Term Timeframe**

22 During the 10-year near-term time frame, Alternative 4 could result in the direct loss of
23 approximately 223 acres of vernal pool complex natural community due to inundation during tidal
24 marsh restoration (CM4) and construction of the water conveyance facility (CM1). The losses would
25 likely occur in the Cache Slough or Suisun Marsh ROAs, and immediately adjacent to Clifton Court
26 Forebay.

27 The construction- and inundation-related loss of this special-status natural community would
28 represent a significant impact if it were not offset by avoidance and minimization measures and
29 other actions associated with BDCP conservation components. Loss of vernal pool complex natural
30 community would be considered both a loss in acreage of a sensitive natural community and a loss
31 of wetland as defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex
32 as part of CM3 and the restoration of an estimated 40 acres of this community (including a
33 commitment to have restoration keep pace with losses; Chapter 3, Section 3.4.9, *Conservation*
34 *Measure 9*, in the BDCP) as part of CM9 during the first 10 years of Alternative 4 implementation
35 would partially offset this near-term loss. Typical project-level mitigation ratios (2:1 for protection
36 and 1:1 for restoration) would indicate 446 acres of protection and 223 acres of restoration would
37 be needed to offset (i.e., mitigate) the 223 acres of loss. Without additional avoidance and
38 minimization measures to reduce the potential impact, the proposed protection and restoration
39 would not meet the typical mitigation for vernal pool complex losses. However, Alternative 4 also
40 includes AMM1, AMM2, AMM3, AMM4, AMM10, AMM12, and AMM30 to minimize impacts. AMM12
41 places a strict limit on the acres of wetted vernal pool crustacean habitat that can be lost to
42 conservation actions (10 acres of direct and 20 acres of indirect loss). Because of the offsetting
43 protection and restoration activities and implementation of AMMs, impacts would be less than
44 significant.

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, 391 acres of vernal pool complex natural community could be
3 permanently removed and 3 acres could be temporarily removed. Through CMs 3 and 9, 600 acres
4 of vernal pool complex natural community would be protected and up to 67 acres would be
5 restored. In addition, AMM12 would limit the acres of wetted vernal pool crustacean habitat loss to
6 10 acres from direct actions and 20 acres from indirect actions. This is equivalent to the direct loss
7 of 67 acres and the indirect loss of 134 acres of vernal pool complex natural community. There
8 would be no net permanent reduction in the acreage of this natural community within the study
9 area. Alternative 4 would have a less-than-significant impact on this natural community.

10 **Impact BIO-22: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
11 **Vernal Pool Complex Natural Community**

12 *CM2 Yolo Bypass Fisheries Enhancement* would modify the inundation/flooding regime of the Yolo
13 Bypass, a man-made waterway. CM2, which is designed to improve fish passage and shallow flooded
14 habitat for Delta fishes in the Yolo Bypass, could increase periodic inundation of a small acreage of
15 vernal pool complex natural community in the southern section of the bypass, south of Putah Creek.

16 Operation of the Yolo Bypass under Alternative 4 would result in an increase in the frequency,
17 magnitude and duration of inundation on an estimated 0–4 acres of vernal pool complex natural
18 community. The methods used to estimate this inundation acreage are described in BDCP Appendix
19 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected by
20 inundation would vary with the flow volume that would pass through the newly constructed notch
21 in the Fremont Weir. The 4-acre increase in inundation would only occur at the highest modeled
22 flow regime, 8,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in
23 30% of the years.

24 The vernal pool complex natural community that would likely be affected occurs in the southern
25 reaches of the bypass, south of Putah Creek. There are several relatively large, contiguous areas of
26 vernal pools on the western edge of the bypass in this area. The anticipated change in management
27 of flows in the Yolo Bypass includes more frequent releases in flows into the bypass from the
28 Fremont and Sacramento Weirs, and in some years, later releases into the bypass in spring months
29 (April and May).

30 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with
31 Alternative 4 water operations would not adversely affect vernal pool complex habitats, as they
32 have persisted under similar high flows and extended inundation periods. There is the potential,
33 however, for some change in plant species composition as a result of longer inundation periods.

34 **CEQA Conclusion:** An estimated 0–4 acres of vernal pool complex natural community in the Yolo
35 Bypass would be subjected to more frequent inundation as a result of implementing CM2 under
36 Alternative 4. This natural community is conditioned to periodic inundation; the slight increase in
37 periodic inundation would not result in a net permanent reduction in the acreage of this community
38 in the study area, although some change in plant species composition could occur. Increasing
39 periodic inundation of vernal pool complex natural community in the Yolo Bypass would have a less-
40 than-significant impact on the community.

Impact BIO-23: Modification of Vernal Pool Complex Natural Community from Ongoing Operation, Maintenance and Management Activities

Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime associated with changed water management is in effect, there would be new ongoing and periodic actions associated with operation, maintenance and management of the BDCP facilities and conservation lands that could affect vernal pool complex natural community in the study area. The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento River flows in the north Delta, reduced diversions from south Delta channels, and recreation activities in Plan preserves. These actions are associated with CM1 and CM11 (see Impact BIO-22 for effects associated with CM2). The periodic actions would involve access road and conveyance facility repair, vegetation management at the various water conveyance facilities and habitat restoration sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat enhancement in accordance with natural community management plans. The potential effects of these actions are described below.

- *Modified river flows upstream of and within the study area and reduced diversions from south Delta channels.* Changes in releases from reservoirs upstream of the study area, increased diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta channels (associated with Operational Scenario H) would not affect vernal pool complex natural community. This natural community does not exist within or adjacent to the major Sacramento River system and Delta waterways.
- *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water conveyance facilities and levees associated with the BDCP actions have the potential to require removal of adjacent vegetation and could entail earth and rock work adjacent to vernal pool complex habitats. This activity could lead to increased soil erosion and runoff entering these habitats. These activities would be subject to normal erosion and runoff control management practices, including those developed as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or earthwork adjacent to vernal pool complex habitats would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces as part of *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper implementation of these measures would avoid permanent adverse effects on this community.
- *Vegetation management.* Vegetation management, in the form of physical removal and chemical treatment, would be a periodic activity associated with the long-term maintenance of water conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to vernal pool complex natural community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or direct discharge of herbicides to vernal pool complex areas being treated for invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and the environment from use of various chemicals during maintenance activities, including the use of herbicides. These commitments, including the commitment to prepare and implement spill prevention, containment, and countermeasure plans and stormwater pollution prevention plans, are described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*. Best management practices, including control of drift and runoff from treated areas, and use of herbicides approved for use in terrestrial or aquatic

1 environments would also reduce the risk of affecting natural communities adjacent to water
2 conveyance features and levees associated with restoration activities.

- 3 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
4 communities within the Plan Area (CM11). For the vernal pool complex natural community, a
5 management plan would be prepared that specifies actions to improve the value of the habitats
6 for covered species. Actions would include control of invasive nonnative plant and animal
7 species, fire management, restrictions on vector control and application of herbicides, and
8 maintenance of infrastructure that would allow for movement through the community. The
9 enhancement efforts would improve the long-term value of this community for both special-
10 status and common species.
- 11 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to vernal pool
12 complexes in the reserve system. The activities could include wildlife and plant viewing and
13 hiking. *CM11 Natural Communities Enhancement and Management* describes this program and
14 identifies applicable restrictions on recreation that might adversely affect vernal pool habitat
15 (see BDCP Chapter 3, Section 3.4.11, and Appendix 11F, Section 11F.3.2.5, of the EIR/EIS). BDCP
16 also includes an avoidance and minimization measure (AMM37) that further dictates limits on
17 recreation activities that might affect vernal pools. Recreational trails would be limited to
18 existing trails and roads. New trail construction would be prohibited within the vernal pool
19 complex reserves. It is expected that most activities would be docent-led tours of reserves,
20 minimizing adverse effects.

21 The various operations and maintenance activities described above could alter acreage of vernal
22 pool complex natural community in the study area. Activities could introduce sediment and
23 herbicides that would reduce the value of this community to common and sensitive plant and
24 wildlife species. Other periodic activities associated with the Plan, including management,
25 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
26 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
27 enhance the value of the community. While some of these activities could result in small changes in
28 acreage, these changes would be greatly offset by restoration activities planned as part of *CM9*
29 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by implementation of
30 AMM2, AMM4, AMM5, AMM10, AMM12, AMM37, and AMM30. The management actions associated
31 with control of invasive plant species would also result in a long-term benefit to the species
32 associated with vernal pool complex habitats by eliminating competitive, invasive species of plants.

33 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
34 Alternative 4 would not result in a net permanent reduction in the vernal pool complex natural
35 community within the study area. Therefore, there would be no adverse effect on this natural
36 community.

37 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
38 have the potential to create minor changes in total acreage of vernal pool complex natural
39 community in the study area, and could create temporary increases in sedimentation or damage
40 from recreational activity. The activities could also introduce herbicides periodically to control
41 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4,
42 AMM5, AMM10, AMM12, AMM37, and AMM30 would minimize these impacts, and other operations
43 and maintenance activities, including management, protection and enhancement actions associated
44 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*
45 *Enhancement and Management*, would create positive effects, including reduced competition from

1 invasive, nonnative plants in these habitats. Long-term restoration activities associated with *CM9*
2 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and protection actions associated with
3 *CM3 Natural Communities Protection and Restoration* would ensure that the acreage of this natural
4 community would not decrease in the study area. Ongoing operation, maintenance and management
5 activities would not result in a net permanent reduction in this natural community within the study
6 area. Therefore, there would be a less-than-significant impact on the vernal pool complex natural
7 community.

8 **Managed Wetland**

9 The conservation components of Alternative 4 would reduce the acreage of managed wetland
10 currently found in the study area. Initial development and construction of CM1, CM2, CM4, and CM6
11 would result in both permanent and temporary removal of this community (see Table 12-4-9). Full
12 implementation of Alternative 4 would also include the following conservation action over the term
13 of the BDCP to benefit the managed wetland natural community.

- 14 • Protect and enhance 8,100 acres of managed wetland, at least 1,500 acres of which are in the
15 Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 16 • Create 320 acres of managed wetlands consisting of greater sandhill crane roosting habitat in
17 minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in
18 Conservation Zones 3, 4, 5, or 6, with consideration of sea level rise and local seasonal flood
19 events (Objective GSHC1.3, associated with CM10).
- 20 • Create two wetland complexes within the Stone Lakes NWR refuge boundary. Each complex will
21 consist of at least three wetlands totaling 90 acres of greater sandhill crane roosting habitat. One
22 of the wetland complexes may be replaced by 180 acres of cultivated lands that are flooded
23 following harvest for crane roosting and foraging habitat (Objective GSHC1.4, associated with
24 CM10).

25 In addition to this conservation action, creation of similar habitat values by restoring tidal brackish
26 emergent wetland and tidal freshwater emergent wetland as part of CM4 would further offset the
27 losses of managed wetland. The net effect would be a substantial decrease in the amount of
28 managed wetland, but an increase in similar habitat value for special-status and common species as
29 the managed wetland is converted to tidal marsh. Impacts on this natural community would not be
30 adverse for NEPA purposes and would be less than significant for CEQA purposes. Refer to Impacts
31 BIO-178 through BIO-183 in the *Shorebirds and Waterfowl* discussion at the end of this section
32 (Section 12.3.3.9) for further consideration of the effects of removing managed wetland natural
33 community.

1 **Table 12-4-9. Changes in Managed Wetland Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	16	16	25	25	0	0
CM2	24	24	44	44	931-2,612	0
CM4	5,718	13,746	0	0	0	0
CM5	0	0	0	0	0	6
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	5,758	13,786	69	69	931-2,612	6

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

2

3 **Impact BIO-24: Changes in Managed Wetland Natural Community as a Result of Implementing**
4 **BDCP Conservation Measures**

5 Construction, land grading and habitat restoration activities that would accompany the
6 implementation of CM1, CM2, CM4, and CM6 would permanently eliminate an estimated 13,786
7 acres of managed wetland in the study area. This modification represents approximately 19% of the
8 70,798 acres of managed wetland that is mapped in the study area. This loss would occur over the
9 course of BDCP restoration activity, as construction and tidal marsh restoration proceed. Managed
10 wetland protection (8,100 acres) and restoration (500 acres) would take place over the same
11 period, but would not replace the acreage lost. The analysis in Chapter 5, Section 5.4.9.2, *Beneficial*
12 *Effects*, of the BDCP states that at least 8,100 acres of managed wetlands would be protected, of
13 which at least 1,500 acres would be located within the Grizzly Island marsh complex, consistent
14 with the U.S. Fish and Wildlife Service salt marsh harvest mouse recovery plan. Although the
15 primary purpose of the 1,500 acres of protection is to protect and enhance habitat for the salt marsh
16 harvest mouse, it is also expected to benefit the managed wetland natural community and the
17 diversity of species that use it, including migratory waterfowl and the western pond turtle.

18 The individual effects of the relevant conservation measure are addressed below. A summary
19 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
20 conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of the Alternative 4 water conveyance facilities
22 would permanently remove 16 acres and temporarily remove 25 acres of managed wetland

1 community. The permanent losses would occur near the northeast corner of Clifton Court
2 Forebay for the construction of a permanent shaft location and a permanent access road on
3 Bouldin Island. Temporary impacts would occur in association with temporary work areas for a
4 concrete batch plant on Mandeville Island and the reusable tunnel material conveyor facility
5 near Clifton Court Forebay (see Terrestrial Biology Mapbook). Smaller losses would occur from
6 construction of the temporary transmission lines that parallel the tunnel alignment northwest of
7 the intermediate forebay and across the length of Mandeville Island. These losses would take
8 place during the near-term construction period.

- 9 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of
10 construction activities that could permanently or temporarily remove managed wetland,
11 including west side channels modifications, Putah Creek realignment activities, Lisbon Weir
12 modification and Sacramento Weir improvements. All of these activities could involve
13 excavation and grading in managed wetland areas to improve passage of fish through the
14 bypasses. Based on hypothetical construction footprints, a total of 24 acres could be
15 permanently removed and 44 acres could be temporarily removed. This activity would occur
16 primarily in the near-term timeframe.
- 17 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
18 footprints, implementation of CM4 would permanently inundate or remove 13,746 acres of
19 managed wetland community. These losses would be expected to occur primarily in the Suisun
20 Marsh ROA, but could also occur in the Cache Slough and West Delta ROAs (see Figure 12-1).
21 These acres of managed wetland would be converted to natural wetland, including large
22 acreages of tidal brackish emergent wetland and tidal freshwater emergent wetland. These
23 natural wetlands provide comparable or improved habitat for the special-status species that
24 occupy managed wetland. The newly created tidal marsh would not create a barrier or result in
25 fragmentation of managed wetland, as most species are capable of utilizing both communities.
26 An estimated 500 acres of managed wetland would be restored and 8,100 acres would be
27 enhanced and protected through *CM3 Natural Communities Protection and Restoration*, as
28 established by BDCP Objective MWNC1.1 All of the restoration and 4,800 acres of the protection
29 would happen during the first 10 years of Alternative 4 implementation, which would coincide
30 with the timeframe of water conveyance facilities construction and early implementation of
31 CM4. The remaining restoration would be spread over the following 30 years. Managed wetland
32 restoration is expected to include at least 320 acres in CZ 3, CZ 4, CZ 5, and CZ 6 (Figure 12-1) to
33 benefit sandhill crane, as stated in BDCP Objective GSHC1.3. The enhancement and protection
34 would be focused in Suisun Marsh, but could also occur in CZs with existing managed wetland
35 (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and CZ 7).
- 36 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
37 of small amounts of managed wetland habitat along 20 miles of river and sloughs. The extent of
38 this loss cannot be quantified at this time, but the majority of the enhancement activity would
39 occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.
40 Managed wetland adjacent to these tidal areas could be affected. The improvements would
41 occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers,
42 and along Steamboat and Sutter Sloughs.

43 The following paragraphs summarize the combined effects discussed above and describe other
44 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
45 also included.

1 **Near-Term Timeframe**

2 During the near-term timeframe, Alternative 4 would permanently remove 5,758 acres and
 3 temporarily remove 69 acres of managed wetland through inundation or construction-related losses
 4 in habitat from CM1, CM2, and CM4 activities. Sixteen acres of the permanent loss and 25 acres of
 5 the temporary loss would be associated with construction of the water conveyance facilities (CM1).
 6 These near-term losses would occur in various locations, but the majority would occur in Suisun
 7 Marsh and the lower Yolo Bypass as tidal marsh is restored.

8 The construction or inundation loss of this special-status natural community would represent an
 9 adverse effect if it were not offset by other conservation actions. Loss of managed wetland natural
 10 community would be considered both a loss in acreage of a sensitive natural community and
 11 potentially a loss of wetland as defined by Section 404 of the CWA. Many managed wetland areas are
 12 interspersed with small natural wetlands that would be regulated under Section 404. The
 13 restoration of 500 acres (CM10) and protection and enhancement of 4,800 acres (CM3) of managed
 14 wetland during the first 10 years of Alternative 4 implementation would fully offset the losses
 15 associated with CM1, but would only partially offset the total near-term loss. Typical project-level
 16 mitigation ratios (1:1 for protection) would indicate 41 acres of protection would be needed to
 17 offset the 41 acres of loss associated with CM1 (permanent and temporary); a total of 5,827 acres of
 18 protection would be needed to offset (i.e., mitigate) the 5,827 acres of permanent and temporary
 19 loss from all near-term actions. The combined protection and restoration proposed for managed
 20 wetland in the near-term would fall 527 acres short of full replacement. However, the CM4 marsh
 21 restoration activities that would be creating this loss would be simultaneously creating 2,000 acres
 22 of tidal brackish emergent wetland and 8,850 acres of tidal freshwater emergent wetland in place of
 23 the managed wetland in the near-term. This acreage would significantly exceed the number of acres
 24 of managed wetland lost. Mitigation measures would also be undertaken to reduce the effects of
 25 managed wetland loss on waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the
 26 Yolo/Delta basins (Mitigation Measure 179b) if the protection and enhancement actions of CM3 and
 27 CM10 were not sufficient to replace the value of managed wetlands for waterfowl in these basins.
 28 Refer to the *General Terrestrial Biology Effects* discussion later in this section.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*
 32 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting
 33 habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and
 34 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
 35 EIR/EIS.

36 In spite of the managed wetland protection, restoration and avoidance measures contained in
 37 Alternative 4, there would be a net reduction in the acreage of this special-status natural community
 38 in the near-term. This would be an adverse effect when judged by the significance criteria listed
 39 earlier in this chapter. However, the conversion of these managed habitats to natural tidal wetland
 40 types that support similar ecological functions (2,000 acres of tidal brackish emergent wetland and
 41 8,850 acres of tidal freshwater emergent wetland) would offset this adverse effect. Also, there are
 42 other conservation actions contained in the BDCP (CM3 and CM11) that would improve
 43 management and enhance existing habitat values, further offsetting the effects of managed wetland
 44 loss on covered and noncovered special-status terrestrial species and on common species that rely
 45 on this natural community for some life phase. As a result, there would be no adverse effect.

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, 13,855 acres of managed wetland natural community would be
3 permanently and temporarily removed by construction and restoration actions, 8,100 acres would
4 be protected and 500 acres would be restored. There would be a net permanent reduction in the
5 acreage of this special-status natural community within the study area. Simultaneously, there would
6 be the creation of 6,000 acres of tidal brackish emergent wetland and 24,000 acres of tidal
7 freshwater emergent wetland in place of this managed wetland.

8 **NEPA Effects:** Alternative 4 would result in a loss 13,855 acres of managed wetland within the study
9 area; however, it would also protect and enhance 8,100 acres and restore 500 acres of this habitat.
10 In addition, Alternative 4 would restore 6,000 acres of tidal brackish emergent wetland and 24,000
11 acres of tidal freshwater emergent wetland that support similar ecological functions to those of
12 managed wetland. Therefore, there would be no adverse effect on managed wetland natural
13 community.

14 **CEQA Conclusion:**

15 **Near-Term Timeframe**

16 During the near-term timeframe, Alternative 4 would permanently remove 5,758 acres and
17 temporarily remove 69 acres of managed wetland through inundation or construction-related losses
18 in habitat from CM1, CM2, and CM4 activities. Sixteen acres of permanent loss and 25 acres of
19 temporary loss would be associated with construction of the water conveyance facilities (CM1) in
20 various locations. The majority of the near-term loss would be in Suisun Marsh and the lower Yolo
21 Bypass as tidal marsh is restored.

22 The construction or inundation loss of this special-status natural community would represent a
23 significant impact if it were not offset by other conservation actions. Loss of managed wetland
24 natural community would be considered both a loss in acreage of a sensitive natural community and
25 potentially a loss of wetland as defined by Section 404 of the CWA. The restoration of 500 acres and
26 protection and enhancement of 4,800 acres of managed wetland as part of CM3 and CM10 during
27 the first 10 years of Alternative 4 implementation would fully offset the losses associated with CM1,
28 but would only partially offset the total near-term loss. Typical project-level mitigation ratios (1:1
29 for protection) would indicate 41 acres of protection would be needed to offset the 41 acres of loss
30 associated with CM1; a total of 5,827 acres of protection would be needed to offset (i.e., mitigate) the
31 5,827 acres of permanent and temporary loss from all near-term actions. The combined protection
32 and restoration proposed for managed wetland in the near-term would fall 527 acres short of full
33 replacement. However, the CM4 marsh restoration activities that would be creating this loss would
34 be simultaneously creating 2,000 acres of tidal brackish emergent wetland and 8,850 acres of tidal
35 freshwater emergent wetland in place of the managed wetland in the near-term. This acreage would
36 significantly exceed the number of acres of managed wetland lost. Mitigation measures would also
37 be undertaken to reduce the effects of managed wetland loss on waterfowl in Suisun Marsh
38 (Mitigation Measure BIO-179a) and the Yolo/Delta basins (Mitigation Measure 179b) if the
39 protection and enhancement actions of CM3 and CM10 were not sufficient to replace the value of
40 managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial Biology Effects*
41 discussion later in this section (Section 12.3.3.9).

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, and AMM10 Restoration of Temporarily Affected*
2 *Natural Communities.* All of these AMMs include elements that avoid or minimize the risk of affecting
3 habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and
4 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
5 EIR/EIS.

6 In spite of the managed wetland protection, restoration and avoidance measures contained in
7 Alternative 4, there would be a net reduction in the acreage of this special-status natural community
8 in the near-term. This would be a significant impact when judged by the significance criteria listed
9 earlier in this chapter. However, the conversion of these managed habitats to natural tidal wetland
10 types that support similar ecological functions (2,000 acres of tidal brackish emergent wetland and
11 8,850 acres of tidal freshwater emergent wetland) would offset this significant impact. Also, there
12 are other conservation actions contained in the BDCP (CM3 and CM11) that would improve
13 management and enhance existing habitat values, further offsetting the impacts of managed wetland
14 loss on covered and noncovered special-status terrestrial species and on common species that rely
15 on this natural community for some life phase. As a result, there would be a less-than-significant
16 impact.

17 **Late Long-Term Timeframe**

18 At the end of the Plan period, 13,855 acres of managed wetland natural community would be
19 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would
20 be restored. There would be a net permanent reduction in the acreage of this special-status natural
21 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal
22 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this
23 managed wetland. Because these natural wetlands support similar ecological functions to those of
24 managed wetland, there would be a less-than-significant impact.

25 **Impact BIO-25: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 26 **Managed Wetland Natural Community**

27 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both
28 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
29 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
30 of managed wetland on wildlife management areas and duck clubs scattered up and down the
31 central and southern bypass. CM5 would expose this community to additional flooding as channel
32 margins are modified and levees are set back to improve fish habitat along some of the major rivers
33 and waterways in the south Delta.

- 34 • *CM2 Yolo Bypass Fisheries Enhancement:* Operation of the Yolo Bypass under Alternative 4 would
35 result in an increase in the frequency, magnitude and duration of inundation of 931-2,612 acres
36 of managed wetland natural community. The methods used to estimate these inundation
37 acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and*
38 *Plants.* The area more frequently affected by inundation would vary with the flow volume that
39 would pass through the newly constructed notch in the Fremont Weir. The 931-acre increase in
40 inundation would be associated with a notch flow of 8,000 cubic feet per second (cfs), and the
41 2,612-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow
42 through Fremont Weir would be expected in 30% of the years. Based on the theoretical
43 modeling that has been completed to-date, the largest acreages would be associated with the
44 Sacramento Bypass Wildlife Area, the Yolo Bypass Wildlife Area, and private managed wetlands

1 south of Putah Creek. The anticipated change in management of flows in the Yolo Bypass
2 includes more frequent releases in flows into the bypass from the Fremont and Sacramento
3 Weirs, and in some years, later releases into the bypass in spring months (April and May). With
4 larger flows, the water depths may also increase over Existing Conditions. While the managed
5 wetlands of the Yolo Bypass are conditioned to periodic inundation events, the more frequent
6 and extended inundation periods may make it more difficult to actively manage the areas for
7 maximum food production for certain species (waterfowl primarily) and may alter the plant
8 assemblages in some years. The effects of this periodic inundation on birds and other terrestrial
9 species are discussed later in this chapter. The additional inundation would not be expected to
10 reduce the acreage of managed wetland on a permanent basis. The extended inundation would
11 be designed to expand foraging and spawning habitat for Delta fishes.

- 12 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
13 increase in the frequency, magnitude and duration of inundation of an estimated 6 acres of
14 managed wetland. Specific locations for this restoration activity have not been identified, but
15 they would likely be focused in the south Delta area, along the major rivers and Delta channels.
16 The connection of these wetlands to stream flooding events would be beneficial to the ecological
17 function of managed wetlands, especially as they relate to BDCP target aquatic species. Foraging
18 activity and refuge sites would be expanded into areas currently unavailable or infrequently
19 available to some aquatic species. The more frequent flooding would periodically interfere with
20 management activities associated with terrestrial species (primarily waterfowl) and may result
21 in changes in plant composition and management strategies over time.

22 In summary, 937–2,6181 acres of managed wetland community in the study area would be
23 subjected to more frequent inundation as a result of implementing two Alternative 4 conservation
24 measures (CM2 and CM5).

25 **NEPA Effects:** Managed wetland community would not be adversely affected because much of the
26 acreage affected is conditioned to periodic inundation. The more frequent inundation could create
27 management problems associated with certain species, especially waterfowl, and result in changes
28 over time in plant species composition. The total acreage of managed wetland would not be
29 expected to change permanently as a result of the periodic inundation.

30 **CEQA Conclusion:** An estimated 937–2,618 acres of managed wetland community in the study area
31 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under
32 Alternative 4. Managed wetland community would not be significantly impacted because periodic
33 inundation is already experienced by most of the land that would be affected. There could be
34 increased management problems and a long-term shift in plant species composition. The periodic
35 inundation would not be expected to result in a net permanent reduction in the acreage of this
36 community in the study area. Therefore, there would be a less-than-significant impact on the
37 community.

38 **Impact BIO-26: Modification of Managed Wetland Natural Community from Ongoing** 39 **Operation, Maintenance and Management Activities**

40 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
41 associated with changed water management is in effect, there would be new ongoing and periodic
42 actions associated with operation, maintenance and management of the BDCP facilities and
43 conservation lands that could affect managed wetland natural community in the study area. The
44 ongoing actions include changes in operation of upstream reservoirs, the diversion of Sacramento

1 River flows in the north Delta, reduced diversions from south Delta channels, and recreational use of
2 reserve areas. These actions are associated with CM1 and CM11 (see the impact discussion above for
3 effects associated with CM2). The periodic actions would involve access road and conveyance facility
4 repair, vegetation management at the various water conveyance facilities and habitat restoration
5 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat
6 enhancement in accordance with natural community management plans. The potential effects of
7 these actions are described below.

- 8 • *Modified river flows upstream of and within the study area and reduced diversions from south*
9 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
10 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
11 channels (associated with Operational Scenario H) would not result in the reduction in acreage
12 of the managed wetland natural community in the study area. Flow levels in the upstream rivers
13 would not change to the degree that water levels in adjacent managed wetlands would be
14 altered. Similarly, increased diversions of Sacramento River flows in the north Delta would not
15 result in a permanent reduction in the managed wetland community downstream of these
16 diversions. The majority of the managed wetlands below the diversions is not directly connected
17 to the rivers. Reduced diversions from the south Delta channels would not create a reduction in
18 this natural community.
- 19 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
20 conveyance facilities and levees associated with the BDCP actions have the potential to require
21 removal of adjacent vegetation and could entail earth and rock work in managed wetland
22 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering
23 managed wetlands. These activities would be subject to normal erosion, turbidity and runoff
24 control management practices, including those developed as part of *AMM2 Construction Best*
25 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
26 vegetation removal or earthwork adjacent to or within managed wetland habitats would require
27 use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces.
28 Proper implementation of these measures would avoid permanent adverse effects on this
29 community.
- 30 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
31 treatment, would be a periodic activity associated with the long-term maintenance of water
32 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
33 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
34 managed wetland natural community at or adjacent to treated areas. The hazard could be
35 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
36 onto the community, or direct discharge of herbicides to managed wetland areas being treated
37 for invasive species removal. Environmental commitments and *AMM5 Spill Prevention,*
38 *Containment, and Countermeasure Plan* have been made part of the BDCP to reduce hazards to
39 humans and the environment from use of various chemicals during maintenance activities,
40 including the use of herbicides. These commitments, including the commitment to prepare and
41 implement spill prevention, containment, and countermeasure plans and stormwater pollution
42 prevention plans, are described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*.
43 Best management practices, including control of drift and runoff from treated areas, and use of
44 herbicides approved for use in aquatic and terrestrial environments would also reduce the risk
45 of affecting natural communities adjacent to water conveyance features and levees associated
46 with restoration activities.

1 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
 2 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
 3 The treatment activities would be conducted in concert with the California Department of
 4 Boating and Waterways' invasive species removal program. Eliminating large stands of water
 5 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
 6 by removing cover for nonnative predators, improving water flow and removing barriers to
 7 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
 8 benefit terrestrial species that use managed wetland natural community for movement
 9 corridors and for foraging. Vegetation management effects on individual species are discussed in
 10 the species sections on following pages.

- 11 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural
 12 communities within the Plan Area (CM11). For the managed wetland natural community, a
 13 management plan would be prepared that specifies actions to improve the value of the habitats
 14 for covered species. Actions would include control of invasive nonnative plant and animal
 15 species, fire management, restrictions on vector control and application of herbicides, and
 16 maintenance of infrastructure that would allow for movement through the community. The
 17 enhancement efforts would improve the long-term value of this community for both special-
 18 status and common species.
- 19 ● *Recreation.* The BDCP would allow hunting, fishing and hiking in managed wetland reserve
 20 areas. *CM11 Natural Communities Enhancement and Management* describes this program and
 21 identifies applicable restrictions on recreation that might adversely affect managed wetland
 22 habitat (see BDCP Chapter 3, Section 3.4.11 and Appendix 11F, Section 11F.3.2.5, of the
 23 EIR/EIS). BDCP also includes an avoidance and minimization measure (AMM37) that further
 24 dictates limits on recreation activities that might affect this natural community. Hunting would
 25 be the dominant activity in fall and winter months, while fishing and hiking would be allowed in
 26 non-hunting months.

27 The various operations and maintenance activities described above could alter acreage of managed
 28 wetland natural community in the study area through facilities maintenance, vegetation
 29 management, and recreation. Activities could also introduce sediment and herbicides that would
 30 reduce the value of this community to common and sensitive plant and wildlife species. Other
 31 periodic activities associated with the Plan, including management, protection and enhancement
 32 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
 33 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
 34 community. While some of these activities could result in small changes in acreage, these changes
 35 would be offset by restoration activities planned as part of *CM10 Nontidal Marsh Restoration*, *CM4*
 36 *Tidal Natural Communities Restoration*, and protection and restoration actions associated with *CM3*
 37 *Natural Communities Protection and Restoration*. Recreation activity effects would be minimized by
 38 AMM37 (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). The management actions
 39 associated with levee repair and control of invasive plant species would also result in a long-term
 40 benefit to the species associated with managed wetland habitats by improving water movement.

41 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
 42 Alternative 4 would not result in a net permanent reduction in acreage of managed wetland natural
 43 community within the study area. Therefore, there would be no adverse effect on this natural
 44 community.

1 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
2 have the potential to create minor changes in total acreage of managed wetland natural community
3 in the study area, and could create temporary increases in turbidity and sedimentation. The
4 activities could also introduce herbicides periodically to control nonnative, invasive plants. Hunting
5 could intermittently reduce the availability of this community to special-status and common wildlife
6 species. Implementation of environmental commitments and AMM2, AMM4, AMM5, and AMM37
7 would minimize these impacts, and other operations and maintenance activities, including
8 management, protection and enhancement actions associated with *CM3 Natural Communities*
9 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
10 create positive effects, including improved water movement in and adjacent to these habitats. Long-
11 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and *CM4 Tidal Natural*
12 *Communities Restoration*, and protection and restoration actions associated with *CM3 Natural*
13 *Communities Protection and Restoration* would greatly expand the ecological functions of this natural
14 community in the study area. Ongoing operation, maintenance and management activities would not
15 result in a net permanent reduction in this sensitive natural community within the study area.
16 Therefore, there would be a less-than-significant impact on the managed wetland natural
17 community.

18 **Other Natural Seasonal Wetland**

19 The other natural seasonal wetlands natural community encompasses all the remaining natural (not
20 managed) seasonal wetland communities other than vernal pools and alkali seasonal wetlands.
21 These areas mapped by CDFW (Hickson and Keeler-Wolf 2007) and ICF biologists (the western area
22 of additional analysis; see Figure 12-1) consist of seasonally ponded, flooded, or saturated soils
23 dominated by grasses, sedges, or rushes. The largest segments of this community in the study area
24 are located along the Cosumnes River northeast of Thornton, and in the western extension of the
25 study area northwest of Rio Vista. Most of the smaller mapped areas are located in the Suisun Marsh
26 ROA on the western edge of the Montezuma Hills and in the interior of the Potrero Hills. There are
27 also other natural seasonal wetlands mapped along Old River and Middle River in CZ 7 (Figure
28 12-1). The only BDCP conservation component that would potentially affect this natural community
29 is the seasonally inundated floodplain restoration conservation measure (CM5) (see Table 12-4-10).

1 **Table 12-4-10. Changes in Other Natural Seasonal Wetland Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0	0
CM4	0	0	0	0	0	0
CM5	0	0	0	0	0	2
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	0	0	0	0	0	2

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

2

3 **Impact BIO-27: Modification of Other Natural Seasonal Wetland Natural Community as a**
4 **Result of Implementing BDCP Conservation Measures**

5 Based on theoretical footprints for this activity, *CM5 Seasonally Inundated Floodplain Restoration*
6 could expose 2 acres of other natural seasonal wetland community to additional flooding as channel
7 margins are modified and levees are set back to improve fish habitat along some of the major rivers
8 and waterways throughout the study area. Specific locations for this restoration activity have not
9 been identified, but they would likely be focused in the south Delta area, along the major rivers and
10 Delta channels, including the channels of Old River and Middle River. Several small patches of other
11 natural seasonal wetland natural community are mapped along these waterways. The exposure of
12 these seasonal wetlands to increased but infrequent episodes of stream flooding would not alter
13 their ecological function or species composition. Their value to special-status and common plants
14 and wildlife in the study area would not be affected. The effects of this inundation on wildlife and
15 plant species are described in detail in later sections of this chapter.

16 **NEPA Effects:** Alternative 4 conservation actions would not adversely affect other natural seasonal
17 wetland natural community because the small increase in periodic flooding of up to 2 acres would
18 not alter its function or general species makeup.

19 **CEQA Conclusion:** An estimated 2 acres of other natural seasonal wetland community in the study
20 area would be subjected to more frequent inundation from flood flows as a result of implementing
21 CM5 under Alternative 4. This community would not be significantly impacted because a small
22 increase in periodic flooding would not alter its ecological function or species composition. The
23 periodic inundation would not result in a net permanent reduction in the acreage of this community

1 in the study area. Therefore, there would be no substantial adverse effect on the community. The
2 impact would be less than significant.

3 **Impact BIO-28: Modification of Other Natural Seasonal Wetland Natural Community from**
4 **Ongoing Operation, Maintenance and Management Activities**

5 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
6 associated with changed water management is in effect, there would be new ongoing and periodic
7 actions associated with operation, maintenance and management of the BDCP facilities and
8 conservation lands that could affect other natural seasonal wetland natural community in the study
9 area. The ongoing actions include modified operation of upstream reservoirs, the diversion of
10 Sacramento River flows in the north Delta, and reduced diversions from south Delta channels. These
11 actions are associated with CM1. The periodic actions would involve access road and conveyance
12 facility repair, vegetation management at the various water conveyance facilities and habitat
13 restoration sites (CM11), levee repair and replacement of levee armoring, channel dredging, and
14 habitat enhancement in accordance with natural community management plans. The potential
15 effects of these actions are described below.

- 16 • *Modified river flows upstream of and within the study area and reduced diversions from south*
17 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
18 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
19 channels (associated with Operational Scenario H) would not affect other natural seasonal
20 wetland natural community. The small areas mapped in the study area are not in or adjacent to
21 streams that would experience changes in water levels as a result of these operations.
- 22 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
23 conveyance facilities and levees associated with the BDCP actions have the potential to require
24 removal of adjacent vegetation and could entail earth and rock work in other natural seasonal
25 wetland habitats. This activity could lead to increased soil erosion and runoff entering these
26 habitats. These activities would be subject to normal erosion and runoff control management
27 practices, including those developed as part of *AMM2 Construction Best Management Practices*
28 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or
29 earthwork adjacent to or within other natural seasonal wetland habitats would require use of
30 sediment barriers, soil stabilization and revegetation of disturbed surfaces as required by
31 *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper implementation of
32 these measures would avoid permanent adverse effects on this community.
- 33 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
34 treatment, would be a periodic activity associated with the long-term maintenance of water
35 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
36 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
37 the other natural seasonal wetland natural community at or adjacent to treated areas. The
38 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
39 stormwater onto the natural community, or direct discharge of herbicides to wetland areas
40 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
41 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce
42 hazards to humans and the environment from use of various chemicals during maintenance
43 activities, including the use of herbicides. These commitments, including the commitment to
44 prepare and implement spill prevention, containment, and countermeasure plans and
45 stormwater pollution prevention plans, are described in Appendix 3B, *Environmental*

1 *Commitments, AMMs, and CMs.* Best management practices, including control of drift and runoff
2 from treated areas, and use of herbicides approved for use in terrestrial or aquatic
3 environments would also reduce the risk of affecting natural communities adjacent to water
4 conveyance features and levees associated with restoration activities.

- 5 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
6 communities within the Plan Area (CM11). For the other natural seasonal wetland natural
7 community, a management plan would be prepared that specifies actions to improve the value
8 of the habitats for covered species. Actions would include control of invasive nonnative plant
9 and animal species, fire management, restrictions on vector control and application of
10 herbicides, and maintenance of infrastructure that would allow for movement through the
11 community. The enhancement efforts would improve the long-term value of this community for
12 both special-status and common species.

13 The various operations and maintenance activities described above could alter acreage of other
14 natural seasonal wetland natural community in the study area. Activities could introduce sediment
15 and herbicides that would reduce the value of this community to common and sensitive plant and
16 wildlife species. Other periodic activities associated with the Plan, including management,
17 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
18 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
19 enhance the value of the community. While some of these activities could result in small changes in
20 acreage, these changes would be minor when compared to the restoration activities planned as part
21 of *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by
22 implementation of AMM2, AMM4, AMM5, and AMM10. The vernal pool complex conservation
23 measure includes restoration of 139 acres of seasonal wetlands with similar ecological values as the
24 other natural seasonal wetland community. The management actions associated with control of
25 invasive plant species would also result in a long-term benefit to the species associated with other
26 natural seasonal wetland habitats by eliminating competitive, invasive species of plants.

27 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
28 Alternative 4 would not result in a net permanent reduction in this natural community within the
29 study area. Therefore, there would be no adverse effect on the other natural seasonal wetland
30 natural community.

31 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
32 have the potential to create minor changes in total acreage of other natural seasonal wetland natural
33 community in the study area, and could create temporary increases in sedimentation. The activities
34 could also introduce herbicides periodically to control nonnative, invasive plants. Implementation of
35 environmental commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts,
36 and other operations and maintenance activities, including management, protection and
37 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
38 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
39 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration
40 activities associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and
41 protection actions associated with *CM3 Natural Communities Protection and Restoration* would
42 ensure that the ecological values provided by this small natural community would not decrease in
43 the study area. Ongoing operation, maintenance and management activities would not result in a net
44 permanent reduction in this natural community within the study area. Therefore, there would be a
45 less-than-significant impact on the other natural seasonal wetland natural community.

1 **Grassland**

2 Construction, operation, maintenance and management associated with the conservation
3 components of Alternative 4 would have no long-term adverse effects on the habitats associated
4 with the grassland natural community. Initial development and construction of CM1, CM2, CM4,
5 CM5, CM6, CM7, CM11 and CM18 would result in both permanent and temporary removal of this
6 community (see Table 12-4-11). Full implementation of Alternative 4 would also include the
7 following conservation actions over the term of the BDCP to benefit the grassland natural
8 community.

- 9 ● Protect 8,000 acres of grassland with at least 2,000 acres protected in Conservation Zone 1, at
10 least 1,000 acres protected in Conservation Zone 8, and at least 2,000 acres protected in
11 Conservation Zone 11 (Objective GNC1.1, associated with CM3).
- 12 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland and to
13 provide upland habitat adjacent to riparian, tidal, and nontidal natural communities for wildlife
14 foraging and upland refugia (Objective GNC1.2, associated with CM3 and CM8).
- 15 ● Of the 8,000 acres of grassland protected and at least 2,000 acres of grassland restored, protect
16 or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide 200 feet
17 of adjacent grasslands beyond the sea level rise accommodation (Objective GNC1.4, associated
18 with CM3 and CM8).

19 There is a variety of other, less specific conservation goals and objectives in Chapter 3, Section 3.3,
20 *Biological Goals and Objectives*, of the BDCP that would improve the value of grassland natural
21 community for terrestrial species. As explained below, with the protection, restoration and
22 enhancement of the amounts of habitat listed in the BDCP objectives, in addition to implementation
23 of AMMs, impacts on this natural community would not be adverse for NEPA purposes and would be
24 less than significant for CEQA purposes.

1 **Table 12-4-11. Changes in Grassland Natural Community Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	467	467	158	158	0	0
CM2	388	388	239	239	385–1,277	0
CM4	448	1,122	0	0	0	0
CM5	0	51	0	34	0	514
CM6	Unk.	Unk.	Unk.	Unk.	0	0
CM7	4	410	0	0	0	0
CM11	13	50	0	0	0	0
CM18	35	35	0	0	0	0
TOTAL IMPACTS	1,355	2,523	397	431	385–1,277	514

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Unk. = unknown

2

3 **Impact BIO-29: Changes in Grassland Natural Community as a Result of Implementing BDCP**
4 **Conservation Measures**

5 Construction, land grading and habitat restoration activities that would accompany the
6 implementation of CM1, CM2, CM4, CM5, CM6, CM7, CM11 and CM18 would permanently eliminate
7 an estimated 2,523 acres and temporarily remove 431 acres of grassland natural community in the
8 study area. These modifications represent approximately 4% of the 78,047 acres of the community
9 that is mapped in the study area. Approximately 60% (1,752 acres) of the permanent and temporary
10 losses would happen during the near-term time period of Alternative 4 implementation, as water
11 conveyance facilities are constructed and habitat restoration is initiated. Grassland protection
12 (2,000 acres), restoration (1,140 acres) and enhancement would be initiated during the same
13 period. By the end of the Plan period, 2,000 acres of this natural community would be restored and
14 8,000 acres would be protected. The analysis for grassland in Chapter 5, Section 5.4.11.2, *Beneficial*
15 *Effects*, of the BDCP indicates that 8,000 acres of grasslands would be protected in Conservation
16 Zones 1, 2, 4, 5, 7, 8, and 11, and 2,000 acres of grassland would be restored. Grassland protection
17 and restoration would improve connectivity among habitat areas in and adjacent to the Plan Area,
18 improve genetic interchange among native species’ populations, and contribute to the long-term
19 conservation of grassland-associated covered species.

1 The individual effects of each relevant conservation measure are addressed below. A summary
 2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
 3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: Construction of the Alternative 4 water conveyance facilities
 5 would permanently remove 467 acres and temporarily remove 158 acres of grassland natural
 6 community. The permanent losses would occur where Intakes 2, 3, and 5 encroach on the
 7 Sacramento River's east bank between Clarksburg and Courtland; construction of the
 8 intermediate forebay; a reusable tunnel material storage site on Bouldin Island; at a permanent
 9 pipeline shaft access road on the east side of Bacon Island; and at various permanent facility
 10 sites around Clifton Court Forebay, including a reusable tunnel material storage site, new canal
 11 connections from Clifton Court Forebay to the two aqueducts, and in the forebay expansion area
 12 on the south side of the existing forebay. Most of the permanent losses would be of ruderal and
 13 herbaceous grassland areas that exist in very narrow bands adjacent to waterways, levees and
 14 roads (see Terrestrial Biology Mapbook). Some of the grassland lost at the sites of new canals
 15 south of Clifton Court Forebay is composed of larger stands of ruderal and herbaceous
 16 vegetation and California annual grassland. A portion of the grassland habitat adjacent to Clifton
 17 Court Forebay includes iodine bush scrub, a sensitive plant community. The temporary losses
 18 would be associated with construction of the pump stations and temporary access roads along
 19 the Sacramento River; at work areas and barge offloading facility construction sites at the south
 20 end of Bouldin Island, at the north end of Bacon Island, and the south end of Venice Island and at
 21 the northwest corner of Victoria Island; at temporary access road sites on the northern and
 22 southern ends of Bacon Island and the northwest corner of Victoria Island; at temporary work
 23 areas on Mandeville and Bacon Islands; at the operable barrier construction site at the head of
 24 Old River, and various locations around Clifton Court Forebay. These losses would take place
 25 during the near-term construction period.

26 The construction activity associated with CM1 also has the potential to lead to increased
 27 nitrogen deposition in grassland habitats in the vicinity of Clifton Court Forebay. A significant
 28 number of cars, trucks, and land grading equipment involved in construction in and around the
 29 forebay would emit small amounts of atmospheric nitrogen from fuel combustion; this material
 30 could be deposited in sensitive grassland areas that are located west of the major construction
 31 areas at Clifton Court Forebay. Nitrogen deposition can pose a risk of adding a fertilizer to
 32 nitrogen-limited soils and their associated plants. Nonnative invasive species can be encouraged
 33 by the added nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related*
 34 *Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been
 35 concluded that this potential deposition would pose a low risk of changing the grassland in and
 36 adjacent to the construction areas because the construction would contribute a negligible
 37 amount of nitrogen to regional projected emissions and the existing grassland is dominated by
 38 nonnative invasive species of plants. Also, the construction at Clifton Court Forebay would occur
 39 primarily downwind of the natural community. No adverse effect is expected.

- 40 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
 41 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
 42 stilling basin improvements, Putah Creek realignment activities, Toe Drain/Tule Canal and
 43 Lisbon Weir modification and Sacramento Weir improvements. All of these activities could
 44 involve excavation and grading in grassland areas to improve passage of fish through the
 45 bypasses. Based on hypothetical construction footprints, a total of 388 acres could be
 46 permanently lost and another 239 acres could be temporarily removed. Most of the grassland

1 losses would occur at the north end of the bypass below Fremont Weir where a large expanse of
2 grassland is present, along the Toe Drain/Tule Canal, and along the west side channels. These
3 grasslands are composed primarily of upland annual grassland and forbs. Some of this grassland
4 removal along the side channels of the bypass could pose barriers to grassland species moving
5 within the bypass. These losses would occur primarily in the near-term timeframe.

- 6 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
7 footprints, implementation of CM4 would permanently inundate or remove 448 acres of
8 grassland in the near-term and inundate or remove 1,122 acres of grassland by the end of the
9 Plan timeframe. The losses would occur in a number of ROAs established for tidal restoration
10 (see Figure 12-1). The largest losses would likely occur in the vicinity of Cache Slough, on
11 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
12 bands adjacent to waterways in the South Delta ROA. Most of this grassland is ruderal and
13 herbaceous vegetation with low habitat value; some of the larger patches of grassland in the
14 Cache Slough ROA are annual grassland with higher values.
- 15 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
16 would permanently remove 51 acres and temporarily remove 34 acres of grassland natural
17 community. The construction-related losses would be considered a permanent removal of the
18 habitats directly affected. These losses would be expected to occur along the San Joaquin River
19 and other major waterways in CZ 7 (see Figure 12-1). The grassland in this area is primarily
20 composed of narrow bands and small patches of ruderal herbaceous grasses and forbs. This
21 activity is scheduled to start following construction of water conveyance facilities.
- 22 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
23 removal of small amounts of grassland natural community along 20 miles of river and sloughs.
24 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
25 activity would occur along waterway margins where grassland habitat stringers exist, including
26 along levees and channel banks. The improvements would occur within the study area on
27 sections of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter
28 Sloughs.
- 29 ● *CM7 Riparian Natural Community Restoration*: Riparian natural community restoration would
30 occur in a variety of settings in the Plan Area, with an emphasis on improving connectivity of
31 existing riparian areas and stream/river corridors, to benefit the movement and interchange of
32 special-status and common species that use these areas. Large tracts would be restored in
33 concert with floodplain restoration (CM5), while narrower bands would be developed as part of
34 channel margin enhancement (CM6) and tidal marsh restoration (CM4). In the process of
35 expanding woody riparian habitat, existing nonnative grassland would be removed. While
36 specific locations for these restoration activities have not been fully developed, use of
37 theoretical footprints for this activity indicate that up to 410 acres of grassland could be lost
38 through the course of Plan implementation. A majority of this activity would occur in the South
39 Delta and Cosumnes/Mokelumne ROAs (see Figure 12-1).
- 40 ● *CM8 Grassland Natural Community Restoration*: The grassland natural community would be
41 restored primarily on the fringes of the Delta, where upland areas merge with Delta wetland and
42 agricultural lands. Restoration would focus on CZ 1, CZ 8, and CZ 11, as proposed by BDCP
43 Objective GNC1.1 (Figure 12-1), with a goal of improving habitat connectivity and increasing the
44 diversity of grassland species (Objective GNC1.2). Some of the planned 2,000 acres of

1 restoration would occur around existing populations of giant garter snake in the east Delta and
2 the Yolo Bypass area.

- 3 • *CM11 Natural Communities Enhancement and Management*: Natural communities enhancement
4 and management would include a wide range of activities designed to improve habitat
5 conditions in restored and protected lands associated with the BDCP. This measure also
6 promotes sound use of pesticides, vector control activities, invasive species control and fire
7 management in preserve areas. To improve the public's ability to participate in recreational
8 activities in and adjacent to restored and protected habitats, a system of trails is proposed. The
9 location and extent of this system are not yet known, so the analysis of this activity is
10 programmatic. At the current level of planning, it is assumed that the trail system would be
11 located entirely in grassland habitats and would include up to 50 acres of habitat loss.
- 12 • *CM18. Conservation Hatcheries*: The BDCP includes a proposal to design and construct a
13 conservation hatchery to maintain populations of delta smelt and longfin smelt. The location of
14 this facility is not yet firmly established, but for planning purposes it has been assumed that it
15 would be constructed in the vicinity of Rio Vista and would be located in grassland habitat. The
16 grassland in the Rio Vista area includes both California annual grassland and ruderal herbaceous
17 grasses and forbs. The current estimate of the land needed for this facility is 35 acres.

18 The following paragraphs summarize the combined effects discussed above and describe other
19 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
20 also included.

21 ***Near-Term Timeframe***

22 During the near-term timeframe, Alternative 4 would affect the grassland natural community
23 through CM1 construction losses (467 acres permanent and 158 acres temporary), CM2
24 construction losses (388 acres permanent and 239 acres temporary), CM11 recreational trail
25 construction (13 acres permanent), CM18 fish hatchery construction (35 acres permanent), and
26 CM7 riparian habitat restoration (4 acres permanent). These losses would occur along the eastern
27 bank of the Sacramento River at intake sites, adjacent to Clifton Court Forebay associated with
28 forebay expansion, at various permanent and temporary construction sites for barge unloading
29 facilities and tunnel shaft sites through the central Delta, at currently unspecified sites for hatchery
30 and recreational trail construction and riparian restoration, at fish passage construction sites in the
31 northern Yolo Bypass, and along the east and west channels within the Yolo Bypass. Approximately
32 448 acres of the inundation and construction-related losses in habitat from CM4 would occur in the
33 near-term. These tidal restoration losses would occur throughout the ROAs mapped in Figure 12-1.

34 The construction losses of this natural community would not represent an adverse effect based on
35 the significance criteria used for this chapter because grassland is not considered a special-status or
36 sensitive natural community. Most Central Valley grasslands are dominated by nonnative annual
37 grasses and herbs. However, the importance of grassland as a habitat that supports life stages of
38 numerous special-status plants and wildlife is well documented (see BDCP Chapter 3, *Conservation*
39 *Strategy*). The significance of losses in grassland habitat is, therefore, discussed in more detail in
40 species analyses later in this chapter. In addition, the loss of iodine bush scrub located in grassland
41 adjacent to Clifton Court Forebay would be an adverse effect. The combination of restoring 1,140
42 acres (CM8) and protecting 2,000 acres (CM3) of grassland natural community during the first 10
43 years of BDCP implementation, and the commitment to restore temporarily affected grassland (397
44 acres) to its pre-project condition within one year of completing construction as required by *AMM10*

1 *Restoration of Temporarily Affected Natural Communities*, would offset this near-term loss, avoiding
2 any loss in the value of this habitat for special-status species. The restoration of grassland would
3 include protection in perpetuity, and the protected and restored habitat would be managed and
4 enhanced to benefit special-status and common wildlife species (CM3 and CM11). Typical project-
5 level mitigation ratios (2:1 for protection) would indicate that 3,504 acres of protection would be
6 needed to offset (i.e., mitigate) the 1,752 acres of combined permanent and temporary loss. The
7 combination of restoration and protection, along with the enhancement and management associated
8 with CM3 and CM11 contained in the BDCP, is designed to avoid a temporal lag in the value of
9 grassland habitat available to sensitive species. In addition, because it is not possible to create
10 iodine bush scrub, mitigation for impacts on this plant community must be through avoidance
11 and/or protection of compensating mitigation areas. Protection of iodine bush scrub within the
12 grassland/vernal pool complex/alkali seasonal wetland habitats adjacent to Clifton Court Forebay
13 provides the only opportunity in the Plan Area to protect this habitat.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
15 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, and
16 *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or minimize the risk of
17 affecting habitats at work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
18 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
19 *AMMs, and CMs*, of the Final EIR/EIS.

20 ***Late Long-Term Timeframe***

21 Implementation of Alternative 4 as a whole would result in less than 4% losses of grassland natural
22 community in the study area. These losses (2,523 acres of permanent and 431 acres of temporary
23 loss) would be largely associated with construction of the water conveyance facilities (CM1),
24 construction of Yolo Bypass fish improvements (CM2), inundation during tidal marsh restoration
25 (CM4), and riparian habitat restoration (CM7). Inundation losses would occur through the course of
26 BDCP restoration activities at various tidal restoration sites throughout the study area.

27 ***NEPA Effects:*** By the end of the Plan timeframe, a total of 2,000 acres of this natural community
28 would be restored (CM8) and 8,000 acres would be protected (CM3). The restoration would occur
29 primarily in CZ 1, CZ 8, and CZ 11, in the Cache Slough, Suisun Marsh and Clifton Court Forebay
30 areas. Temporarily affected grassland would also be restored following construction activity. The
31 2,000 acres of restoration associated with CM8, and the restoration of temporarily affected
32 grassland required by AMM10 (431 acres for Alternative 4) would not totally replace the grassland
33 acres lost through the Plan timeframe (2,954 acres). There would be a permanent loss of 523 acres
34 of grassland in the study area. However, the combination of restoration, protection and
35 enhancement of grassland associated with Alternative 4 would improve the habitat value of this
36 community in the study area; there would not be an adverse effect on the grassland natural
37 community.

38 ***CEQA Conclusion:***

39 ***Near-Term Timeframe***

40 Alternative 4 would result in the loss of approximately 1,752 acres of grassland natural community
41 due to construction of the water conveyance facilities (CM1), fish passage improvements (CM2),
42 riparian habitat restoration (CM7), recreational trail development (CM11), fish hatchery
43 construction (CM18), and inundation during tidal marsh restoration (CM4). The construction losses

1 would occur along the eastern bank of the Sacramento River at intake sites, adjacent to Clifton Court
2 Forebay associated with forebay expansion, at various permanent and temporary construction sites
3 for barge unloading facilities and tunnel shaft sites through the central Delta, at currently
4 unspecified sites for hatchery and recreational trail construction and riparian habitat restoration, at
5 fish passage improvement sites in the northern Yolo Bypass, and along the east and west channels
6 within the Yolo Bypass. Inundation losses would occur at various tidal restoration sites throughout
7 the study area. The construction losses would be spread across the near-term timeframe.

8 The construction losses of this natural community would not represent a significant impact based
9 on the significance criteria used for this chapter because grassland is not considered a special-status
10 or sensitive natural community. Nonetheless, these losses would be offset by planned restoration of
11 1,140 acres and protection of 2,000 acres of grassland natural community scheduled for the first 10
12 years of Alternative 4 implementation, and the restoration of temporarily affected grassland (397
13 acres for Alternative 4) as dictated by AMM10. Also, AMM1, AMM2, AMM6, and AMM7 would be
14 implemented to minimize impacts. Because of these offsetting near-term restoration and protection
15 activities and AMMs, impacts would be less than significant. Typical project-level mitigation ratios
16 (2:1 for protection) would indicate that 3,504 acres of protection would be needed to offset (i.e.,
17 mitigate) the 1,752 acres of loss. The combination of two approaches (protection and restoration)
18 contained in the BDCP conservation measures and avoidance and minimization measures is
19 designed to avoid a temporal lag in the value of grassland habitat available to special-status species.
20 The protection and restoration would be initiated at the beginning of Alternative 4 implementation
21 to minimize any time lag in the availability of this habitat to special-status species.

22 ***Late Long-Term Timeframe***

23 At the end of the Plan period, 2,954 acres of grassland natural community would be permanently or
24 temporarily removed by conservation actions, 2,000 acres would be restored and 8,000 acres would
25 be protected. Temporarily affected areas would also be restored (431 acres for Alternative 4). While
26 there would be a net permanent reduction in the acreage of this natural community within the study
27 area (total loss of 523 acres), there would be an increase in the value of grassland for special-status
28 and common species in the study area through the combination of conservation actions (CM3 and
29 CM8) and avoidance and minimization measures (AMM1, AMM2, AMM6, AMM7, and AMM10).
30 Therefore, Alternative 4 would have a less-than-significant impact on this natural community.

31 **Impact BIO-30: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 32 **Grassland Natural Community**

33 Two Alternative 4 conservation measures would modify the inundation/flooding regimes of both
34 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
35 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
36 of grassland natural community at scattered locations, while CM5 would expose this community to
37 additional flooding as channel margins are modified and levees are set back to improve fish habitat
38 along some of the major rivers and waterways of the study area.

- 39 ● *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 4 would
40 result in an increase in the frequency, magnitude and duration of inundation of 385–1,277 acres
41 of grassland natural community. The methods used to estimate this inundation acreage are
42 described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area
43 more frequently affected by inundation would vary with the flow volume that would pass
44 through the newly constructed notch in the Fremont Weir. The 385-acre increase in inundation

1 would occur at the 1,000 cfs flow regime, while the 1,277-acre increase would occur at the 4,000
2 cfs flow regime. Plan-related increases in flow through Fremont Weir would be expected in 30%
3 of the years. The grassland community occurs throughout the bypass, including a large acreage
4 just below Fremont Weir in the north end of the bypass, in stringers along the internal
5 waterways of the bypass and in larger patches in the lower bypass. The anticipated change in
6 management of flows in the Yolo Bypass includes more frequent releases in flows into the
7 bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the
8 bypass in spring months (April and May). The modification of periodic inundation events would
9 not adversely affect grassland habitats, as they have persisted under similar high flows and
10 extended inundation periods. There is the potential for some change in grass species
11 composition as a result of longer inundation periods. The effects of this inundation on wildlife
12 and plant species are described in detail in later sections of this chapter.

- 13 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
14 increase in the frequency and duration of inundation of 514 acres of grassland habitats. Specific
15 locations for this restoration activity have not been identified, but they would likely be focused
16 in the south Delta area, along the major rivers and Delta channels in CZ 7 (see Figure 12-1). The
17 increase in periodic stream flooding events would not adversely affect the habitat values and
18 functions of grassland natural community.

19 In summary, 899–1,791 acres of grassland natural community in the study area would be subjected
20 to more frequent inundation as a result of implementing two Alternative 4 conservation measures
21 (CM2 and CM5).

22 ***NEPA Effects:*** The grasslands in the Yolo Bypass and along river floodplains in the south Delta are
23 conditioned to periodic inundation from flood flows; therefore, periodic inundation would not result
24 in a net permanent reduction in the acreage of this community in the study area. Increasing periodic
25 inundation of grassland natural community in the Yolo Bypass and along south Delta waterways
26 would not constitute an adverse effect.

27 ***CEQA Conclusion:*** An estimated 899–1,791 acres of grassland natural community in the study area
28 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under
29 Alternative 4. The grassland natural community is conditioned to periodic inundation; therefore,
30 periodic inundation would not result in a net permanent reduction in the acreage of this community
31 in the study area. Increasing periodic inundation of grassland natural community in the Yolo Bypass
32 and along south Delta waterways would have a less-than-significant impact on the community.

33 **Impact BIO-31: Modification of Grassland Natural Community from Ongoing Operation,** 34 **Maintenance and Management Activities**

35 Once the physical facilities associated with Alternative 4 are constructed and the stream flow regime
36 associated with changed water management is in effect, there would be new ongoing and periodic
37 actions associated with operation, maintenance and management of the BDCP facilities and
38 conservation lands that could affect grassland natural community in the study area. The ongoing
39 actions include modified operation of upstream reservoirs, the diversion of Sacramento River flows
40 in the north Delta, and reduced diversions from south Delta channels. These actions are associated
41 with CM1 (see Impact BIO-30 for effects associated with CM2). The periodic actions would involve
42 access road and conveyance facility repair, vegetation management at the various water conveyance
43 facilities and habitat restoration sites (CM11), levee repair and replacement of levee armoring,

1 channel dredging, and habitat enhancement in accordance with natural community management
 2 plans. The potential effects of these actions are described below.

- 3 • *Modified river flows upstream of and within the study area and reduced diversions from south*
 4 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
 5 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
 6 channels (associated with Operational Scenario H) would not result in the permanent reduction
 7 in acreage of grassland natural community in the study area. Flow levels in the upstream rivers
 8 would not change such that the acreage of this community would be reduced on a permanent
 9 basis. The grassland along rivers upstream of planned north Delta diversions is primarily
 10 ruderal vegetation on levee banks and is dependent on winter and spring rains for germination
 11 and growth rather than river levels. Similarly, increased diversions of Sacramento River
 12 flows in the north Delta would not result in a permanent reduction in grassland natural
 13 community downstream of these diversions. The reductions in flows below the intakes would
 14 occur primarily in the wet months when the existing nonnative annual grasslands along river
 15 levees are dormant, and like upstream grassland, this community is dependent on winter and
 16 spring rains for germination and growth in the winter and spring months, not on river stage.
 17 Anticipated small changes in river salinity in the west Delta and Suisun Marsh would not create
 18 a substantial change in grassland acreage in these areas. Reduced diversions from south Delta
 19 channels would not create a reduction in this natural community.
- 20 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
 21 conveyance facilities and levees associated with the BDCP actions have the potential to require
 22 removal of adjacent vegetation and could entail earth and rock work in grassland habitats. This
 23 activity could lead to increased soil erosion and runoff entering these habitats. These activities
 24 would be subject to normal erosion and runoff control management practices, including those
 25 developed as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4*
 26 *Erosion and Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within
 27 grassland habitats would require use of sediment barriers, soil stabilization and revegetation of
 28 disturbed surfaces (*AMM10 Restoration of Temporarily Affected Natural Communities*). Proper
 29 implementation of these measures would avoid permanent adverse effects on this community.
- 30 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
 31 treatment, would be a periodic activity associated with the long-term maintenance of water
 32 conveyance facilities and restoration sites (*CM11 Natural Community Enhancement and*
 33 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
 34 grassland natural community at or adjacent to treated areas. The hazard could be created by
 35 uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater onto the
 36 natural community, or direct discharge of herbicides to grassland areas being treated for
 37 invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment,*
 38 *and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and
 39 the environment from use of various chemicals during maintenance activities, including the use
 40 of herbicides. These commitments, including the commitment to prepare and implement spill
 41 prevention, containment, and countermeasure plans and stormwater pollution prevention
 42 plans, are described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*. Best
 43 management practices, including control of drift and runoff from treated areas, and use of
 44 herbicides approved for use in terrestrial environments would also reduce the risk of affecting
 45 natural communities adjacent to water conveyance features and levees associated with
 46 restoration activities.

- 1 • *Channel dredging.* Long-term operation of the Alternative 4 intakes on the Sacramento River
2 would include periodic dredging of sediments that might accumulate in front of intake screens.
3 The dredging could occur adjacent to grassland natural community. This activity should not
4 permanently reduce the acreage of grassland natural community because it is periodic in
5 nature; the grassland in the vicinity of the proposed intakes is ruderal grasses and herbs with
6 low habitat value.
- 7 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
8 communities within the Plan Area (CM11). For the grassland natural community, a management
9 plan would be prepared that specifies actions to improve the value of the habitats for covered
10 species. Actions would include control of invasive nonnative plant and animal species, fire
11 management, restrictions on vector control and application of herbicides, and maintenance of
12 infrastructure that would allow for movement through the community. The enhancement efforts
13 would improve the long-term value of this community for both special-status and common
14 species.

15 The various operations and maintenance activities described above could alter acreage of grassland
16 natural community in the study area through changes in flow patterns and changes in periodic
17 inundation of this community. Activities could also introduce sediment and herbicides that would
18 reduce the value of this community to common and sensitive plant and wildlife species. Other
19 periodic activities associated with the Plan, including management, protection and enhancement
20 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
21 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
22 community. While some of these activities could result in small changes in acreage, these changes
23 would be greatly offset by restoration activities planned as part of *CM8 Grassland Natural*
24 *Community Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, and AMM10. The
25 management actions associated with levee repair, periodic dredging and control of invasive plant
26 species would also result in a long-term benefit to the species associated with grassland habitats by
27 improving water movement in adjacent waterways and by eliminating competitive, invasive species
28 of plants.

29 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
30 Alternative 4 would not result in a net permanent reduction in grassland natural community within
31 the study area. Therefore, there would be no adverse effect on this natural community.

32 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4 would
33 have the potential to create minor changes in total acreage of grassland natural community in the
34 study area, and could create temporary increases sedimentation. The activities could also introduce
35 herbicides periodically to control nonnative, invasive plants. Implementation of environmental
36 commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts, and other
37 operations and maintenance activities, including management, protection and enhancement actions
38 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
39 *Communities Enhancement and Management*, would create positive effects, including reduced
40 competition from invasive, nonnative plants in these habitats. Long-term restoration activities
41 associated with *CM8 Grassland Natural Community Restoration* and protection actions associated
42 with *CM3 Natural Communities Protection and Restoration* would increase the value of this natural
43 community in the study area. Ongoing operation, maintenance and management activities would not
44 result in a net permanent reduction in this natural community within the study area. Therefore,
45 there would be a less-than-significant impact on the grassland natural community.

1 **Inland Dune Scrub**

2 The inland dune scrub natural community is composed of vegetated, stabilized sand dunes
 3 associated with river and estuarine systems. In the study area, the inland dune scrub community
 4 consists of remnants of low-lying ancient stabilized dunes related to the Antioch Dunes formation
 5 located near the town of Antioch (CZ 10; see Figure 12-1). While inland dune scrub is within the
 6 BDCP Plan Area, none of the Alternative 4 conservation measures or covered actions is expected to
 7 affect this community.

8 **Cultivated Lands**

9 Cultivated lands is the major land cover type in the study area (487,106 acres, see Table 12-1 in
 10 Section 12.2.2.2, *Special-Status and other Natural Communities*). The Delta, the Yolo Bypass, and the
 11 Cache Slough drainage are dominated by various types of agricultural activities, with crop
 12 production the dominant element (see Figure 12-1). Major crops and cover types in agricultural
 13 production include grain and hay crops (wheat, oats and barley), field crops (corn, beans and
 14 safflower), truck crops (tomatoes, asparagus and melons), pasture (alfalfa, native and nonnative
 15 pasture), rice, orchards, and vineyards. Tables 12-2 and 12-3 list special-status wildlife species
 16 supported by cultivated lands.

17 The effects of Alternative 4 on cultivated lands are discussed from various perspectives in this
 18 document. Chapter 14, *Agricultural Resources*, includes a detailed analysis of cropland conversion as
 19 it relates to agricultural productivity. Many of the discussions of individual terrestrial plant and
 20 wildlife species in this chapter also focus on the relevance of cultivated land loss. Because cultivated
 21 lands is not a natural community and because the effects of its loss are captured in the individual
 22 species analyses, there is no separate analysis of this land cover type presented here. Table 14-8 in
 23 Chapter 14 provides a comparison of important farmland losses that would result from construction
 24 of CM1 water conveyance facilities for each alternative, and Table 14A-1 in Appendix 14A, *Individual
 25 Crop Effects as a Result of BDCP Water Conveyance Facility Construction*, provides a similar
 26 comparison for losses of individual crops. For Alternative 4, the total loss (permanent and
 27 temporary) is estimated to be 58,379 acres. The majority of the permanent loss would be associated
 28 with habitat restoration activities, specifically Yolo Bypass fisheries enhancement (CM2; 629 acres),
 29 tidal marsh restoration (CM4; 39,565 acres), floodplain restoration (CM5; 2,087 acres), riparian
 30 natural community restoration (CM7; 4,553 acres), grassland restoration (CM8; 2,000 acres) and
 31 nontidal marsh restoration (CM10; 1,950 acres). Construction of the modified tunnel and associated
 32 water conveyance facilities (CM1) would permanently remove 4,699 acres of cultivated lands.

33 **Developed Lands**

34 Additional lands in the study area that were not designated with a natural community type have
 35 been characterized as developed lands (90,660 acres). Developed lands include lands with
 36 residential, industrial, and urban land uses, as well as landscaped areas, riprap, road surfaces and
 37 other transportation facilities (see Figure 12-1 and the Terrestrial Biology Mapbook). Developed
 38 lands support some common plant and wildlife species, whose abundance and species richness vary
 39 with the intensity of development. One special-status species, the giant garter snake, is closely
 40 associated with a small element of developed lands; specifically, embankments and levees near
 41 water that are covered with riprap provide giant garter snake habitat.

42 As with cultivated lands, no effort has been made to analyze the effects of Alternative 4 conservation
 43 measures on this land cover type because it is not a natural community. The effects of its conversion

1 are discussed in Chapter 13, *Land Use*. Where the loss of developed lands may affect individual
2 special-status species or common species, the impact analysis is contained in that species
3 discussion.

4 **Wildlife Species**

5 **Vernal Pool Crustaceans**

6 This section describes the effects of Alternative 4, including water conveyance facilities construction
7 and implementation of other conservation components, on vernal pool crustaceans (California
8 linderiella, Conservancy fairy shrimp, longhorn fairy shrimp, midvalley fairy shrimp, vernal pool
9 fairy shrimp, and vernal pool tadpole shrimp). The habitat model used to assess effects for the
10 vernal pool crustaceans consists of: vernal pool complex, which consists of vernal pools and uplands
11 that display characteristic vernal pool and swale visual signatures that have not been significantly
12 affected by agricultural or development practices; alkali seasonal wetlands in CZ 8; and degraded
13 vernal pool complex, which consists of low-value ephemeral habitat ranging from areas with vernal
14 pool and swale visual signatures that display clear evidence of significant disturbance due to
15 plowing, disking, or leveling to areas with clearly artificial basins such as shallow agricultural
16 ditches, depressions in fallow fields, and areas of compacted soils in pastures. For the purpose of the
17 effects analysis, vernal pool complex is categorized as high-value for vernal pool crustaceans and
18 degraded vernal pool complex is categorized as low-value for these species. Alkali seasonal wetlands
19 in CZ 8 were included in the model as high-value habitat for vernal pool crustaceans. Also included
20 as low-value habitat for vernal pool crustaceans are areas along the eastern boundary of CZ 11 that
21 are mapped as vernal pool complex because they flood seasonally and support typical vernal pool
22 plants, but which do not include topographic depressions that are characteristic of vernal pool
23 crustacean habitat.

24 Construction and restoration associated with Alternative 4 conservation measures would result in
25 permanent losses (see Table 12-4-12) and indirect conversions of vernal pool crustacean modeled
26 habitat. The majority of the losses would take place over an extended period of time as tidal marsh is
27 restored in the Plan Area. Full implementation of Alternative 4 would also include the following
28 conservation actions over the term of the BDCP to benefit vernal pool crustaceans (BDCP Chapter 3,
29 *Conservation Strategy*).

- 30 ● Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool
31 recovery areas (Objective VPNC1.1, associated with CM3).
- 32 ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool
33 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective
34 VPNC1.2, associated with CM9).
- 35 ● Increase size and connectivity of protected vernal pool complexes in plan area and increase
36 connectivity with complexes outside the Plan Area (Objective VPNC1.3)
- 37 ● Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective
38 VPNC1.4)
- 39 ● Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for
40 supporting and sustaining vernal pool species (Objective VPNC2.1)
- 41 ● Protect one currently unprotected occurrence of conservancy fairy shrimp (Objective VPC1.1)

1 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 2 implementation of AMMs, impacts on vernal pool crustaceans would not be adverse for NEPA
 3 purposes and would be less than significant for CEQA purposes.

4 **Table 12-4-12. Changes in Vernal Pool Crustacean Modeled Habitat Associated with Alternative 4**
 5 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	13	13	1	1	NA	NA
	Low-value	7	7	2	2	NA	NA
Total Impacts CM1		20	20	3	3	NA	NA
CM2–CM18 ^b	High-value	0	0	0	0	0–4	0
	Low-value	201	372	0	0	0	0
Total Impacts CM2–CM18		201	372	0	0	0–4	0
TOTAL IMPACTS		221	392	3	3	0–4	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

6

7 **Impact BIO-32: Loss or Conversion of Habitat for and Direct Mortality of Vernal Pool**
 8 **Crustaceans**

9 Alternative 4 conservation measures would result in the direct, permanent loss of up to 392 acres of
 10 modeled vernal pool crustacean habitat from conveyance facilities construction (CM1) and tidal
 11 restoration (CM4). In addition, the conservation measures could result in the indirect conversion
 12 due to hydrologic changes of an additional 177 acres of vernal pool crustacean habitat (132 acres of
 13 high-value habitat and 45 acres of low-value habitat) from conveyance facilities construction (CM1)
 14 and based on the hypothetical footprints for tidal restoration (CM4). Construction of the water
 15 conveyance facilities and restoration activities may result in the modification of hardpan and
 16 changes to the perched water table, which could lead to alterations in the rate, extent, and duration
 17 of inundation of nearby vernal pool crustacean habitat. USFWS typically considers construction
 18 within 250 feet of vernal pool crustacean habitat to constitute a possible conversion of crustacean
 19 habitat unless more detailed information is provided to further refine the limits of any such effects.
 20 For the purposes of this analysis, the 250-foot buffer was applied to the water conveyance facilities
 21 work areas where surface and subsurface disturbance activities would take place and to restoration

1 hypothetical footprints. Habitat enhancement and management activities (CM11), which include
2 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.

3 Alternative 4 would also result in impacts on critical habitat for Conservancy fairy shrimp (248
4 acres), vernal pool fairy shrimp (455 acres), and vernal pool tadpole shrimp (270 acres). The
5 hypothetical tidal restoration (CM4) footprints in CZ 11 account for all of the effects on critical
6 habitat for Conservancy fairy shrimp and vernal pool tadpole shrimp. Vernal pool fairy shrimp
7 critical habitat would also be affected by CM4 in this same area and would be affected by
8 conveyance facilities construction (CM1) west of Clifton Court Forebay. *AMM12 Vernal Pool*
9 *Crustaceans* would ensure that there would be no adverse modification of the primary constituent
10 elements of critical habitat for these species in association with restoration projects in CZ 1 and CZ
11 11.

12 Because the estimates of habitat loss resulting from tidal inundation are based on projections of
13 where restoration may occur, actual effects are expected to be lower because sites would be selected
14 and restoration projects designed to minimize or avoid effects on the covered vernal pool
15 crustaceans. As specified in *AMM12 Vernal Pool Crustaceans* and *CM9 Vernal Pool and Alkali Seasonal*
16 *Wetland Complex Restoration*, the BDCP Implementation Office would ensure that tidal restoration
17 projects and other covered activities would be designed such that no more than a total of 10 wetted
18 acres of vernal pool crustacean habitat are permanently lost. AMM12 would also ensure that no
19 more than 20 wetted acres of vernal pool crustacean habitat are indirectly affected by alterations to
20 hydrology resulting from adjacent BDCP covered activities, in particular tidal restoration. *AMM30*
21 *Transmission Line Design and Alignment Guidelines* would ensure that transmission lines are
22 designed avoid removal of wetted acres of aquatic habitats to the maximum extent practicable. The
23 term *wetted acres* refers to an area that would be defined by the three parameter wetland
24 delineation method used by the U.S. Army Corps of Engineers to determine the limits of a wetland,
25 which involve an evaluation of wetland soil, vegetation, and hydrology characteristics. This acreage
26 differs from vernal pool complex acreages in that a vernal pool complex is composed of individual
27 wetlands (vernal pools) and those upland areas that are in between and surrounding them, which
28 provide the supporting hydrology (surface runoff and groundwater input), organic and nutrient
29 inputs, and refuge for the terrestrial phase of some vernal pool species.

30 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the
31 individual conservation measure discussions.

- 32 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
33 result in the permanent and temporary combined loss of approximately 23 acres of vernal pool
34 crustacean habitat, composed of 14 acres of high -value and 9 acres of low-value habitat (Table
35 12-4-12). The construction of the conveyance facilities would result in the permanent loss of one
36 vernal pool fairy shrimp CNDDDB occurrence as a result of the expansion of Clifton Court
37 Forebay. In addition, conveyance facility construction could result in the indirect conversion of
38 42 acres of high quality vernal pool crustacean habitat in the vicinity of Clifton Court Forebay.
39 The indirect effects would result from the construction of permanent transmission lines, from
40 the storage of RTM, and permanent access roads. There are records of vernal pool fairy shrimp
41 and midvalley fairy shrimp in the vicinity of these areas (California Department of Fish and
42 Game 2012). Alternative 4 would also result in the permanent loss of 185 acres of critical
43 habitat for vernal pool fairy shrimp. The permanent impacts on critical habitat are associated
44 with the RTM disposal areas and an associated access road west of Clifton Court Forebay (177
45 acres), a new transmission line (5 acres), and upgrades to a permanent access road just south of

1 this area (3 acres). The RTM disposal areas have been mapped by the BDCP as mostly cultivated
 2 lands with the more eastern portion mapped as grasslands. Existing roads would serve as the
 3 permanent access roads, so there likely would be minimal disturbance to vernal pool crustacean
 4 habitat associated with any improvements to this road. *AMM30 Transmission Line Design and*
 5 *Alignment Guidelines* would ensure that transmission lines are designed to avoid removal of
 6 aquatic habitats to the maximum extent feasible.

- 7 ● *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration would result
 8 in the permanent loss of approximately 372 acres of low-value vernal pool crustacean habitat,
 9 which consists of degraded vernal pool complex. The BDCP describes degraded vernal pool
 10 complex as areas of low-value ephemeral habitat ranging from areas with vernal pool and swale
 11 visual signatures that display clear evidence of significant disturbance due to plowing, disking,
 12 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions
 13 in fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or
 14 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery of
 15 these habitats found that they appear to generally have low densities. However, areas mapped
 16 as degraded vernal pool complex may still provide habitat for vernal pool crustaceans as
 17 evidenced by records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California
 18 linderiella occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and
 19 Game 2012). Helm (1998) notes that many vernal pool crustaceans can occur in degraded
 20 vernal pool habitats and artificial habitats. In CZ 2 and CZ 4, there are several records of covered
 21 vernal pool crustaceans occurring outside of modeled habitat in areas that appear to be road
 22 side ditches. So though degraded vernal pool complexes may not represent botanically diverse
 23 vernal pools they still can provide habitat for vernal pool crustaceans and thus the loss of 372
 24 acres of degraded vernal pool complex may result in the loss of occupied vernal pool crustacean
 25 habitat. In addition, tidal restoration could result in the indirect conversion of 135 acres of
 26 vernal pool crustacean habitat, which consist of 90 acres of high-value and 45 acres of low-value
 27 habitat. The hypothetical restoration footprints overlap with a CNDDDB record for vernal pool
 28 fairy shrimp near the current edge of Suisun Marsh. Tidal natural community restoration under
 29 Alternative 4 would also result in impacts on critical habitat for Conservancy fairy shrimp (248
 30 acres), vernal pool tadpole shrimp (270 acres), and vernal pool fairy shrimp (270 acres). *AMM12*
 31 *Vernal Pool Crustaceans* would ensure that there would be no adverse modification of the
 32 primary constituent elements of critical habitat for these species.
- 33 ● *CM11 Natural Communities Enhancement and Management:* As described in the BDCP,
 34 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of
 35 vernal pool complex would benefit vernal pool crustaceans. A variety of habitat management
 36 actions included in CM11 that are designed to enhance wildlife values in BDCP-protected
 37 habitats may result in localized ground disturbances that could temporarily affect vernal pool
 38 crustacean habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
 39 road and other infrastructure maintenance, are expected to have minor effects on vernal pool
 40 crustacean habitat and are expected to result in overall improvements to and maintenance of
 41 vernal pool crustacean habitat values over the term of the BDCP. These effects cannot be
 42 quantified, but are expected to be minimal and would be avoided and minimized by the AMMs
 43 listed below.

44 The following paragraphs summarize the combined effects discussed above and describe other
 45 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
 46 also included. Table 12-4-13 was prepared to further analyze BDCP effects on vernal pool

1 crustaceans using wetted acres of habitat in order to compare the effects of this alternative with the
 2 effect limits established in BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*, and *AMM12*
 3 *Vernal Pool Crustaceans*, which are measured in wetted acres of habitat. Wetted acres were
 4 estimated by using the BDCP's assumption that restored vernal pool complexes would have a 15%
 5 density of vernal pools (i.e., of 100 acres of vernal pool complex 15 acres would constitute vernal
 6 pools and the remaining 85 acres supporting uplands). Based on an informal evaluation of aerial
 7 photographs of the Plan Area it is likely that the actual densities within the Plan Area are
 8 approximately 10%, but the 15% density value was chosen as a conservative estimate for
 9 determining effects.

10 **Table 12-4-13. Estimated Effects on Wetted Vernal Pool Crustacean Habitat under Alternative 4**
 11 **(acres)**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit ^a		5	10	10	20
Alternative 4 Impact ^b	CM1	3.5	3.5	6.3	6.3
	CM4 ^c	30.2	55.8	11.0	20.3
Total		33.7	59.3	17.3	26.6

^a Because roughly half of the impacts would occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

^b These acreages were generated by assuming that the modeled habitat identified in Table 12-4-12 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.

^c These impacts are based on the hypothetical restoration footprints and would likely be lower based on the BDCP's commitment to minimize and avoid effects on vernal pool crustacean habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

12

13 ***Near-Term Timeframe***

14 Because the water conveyance facilities construction is being evaluated at the project level, the near-
 15 term BDCP conservation strategy has been evaluated to determine whether it would provide
 16 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
 17 construction would not be adverse under NEPA and would be less than significant under CEQA.
 18 Table 12-4-12 lists the impacts on modeled vernal pool crustacean habitat that is based on the
 19 natural community mapping done within the study area. The impacts from tidal natural
 20 communities restoration (CM4) are based on hypothetical footprints and do not reflect actual
 21 impacts on vernal pool crustacean habitat considering the BDCP's commitment to design projects to
 22 minimize or avoid effects on covered vernal pool crustaceans (see AMM12 and AMM30). As seen in
 23 Table 12-4-13, Alternative 4 would not meet the Plan's near-term biological goals and objectives for
 24 direct loss and indirect conversion unless near-term projects are designed to ensure that they do not
 25 exceed these impact limits.

26 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
 27 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are
 28 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 3.5
 29 wetted acres of vernal pool crustacean habitat (or 23 acres of vernal pool complex) should be

1 restored and 19.6 wetted acres (or 131 acres of vernal pool complex) protected to mitigate the CM1
 2 direct and indirect effects on vernal pool crustacean habitat. With the implementation of AMM30,
 3 the effects on aquatic habitat would be avoided to the maximum extent feasible during the designing
 4 of the transmission line west of Clifton Court Forebay. Assuming that the BDCP would apply the
 5 impact limits presented in Table 12-4-13 and implement AMM30, direct impacts on wetted vernal
 6 pools resulting from tidal restoration in the near-term would have to not exceed 1.5 acres of direct
 7 effects on wetted vernal pool crustacean habitat (5 acre limit minus the 3.5 acres from CM1) and
 8 indirect impacts from tidal restoration could not exceed 3.7 wetted acres (10 acre limit minus the
 9 6.3 acres from CM1). The impacts based on the hypothetical tidal restoration footprints would
 10 exceed these limits. When and if these limits are met, the BDCP would need to restore up to 5.1
 11 wetted acres (34 acres of vernal pool complex) and protect up to 30 wetted acres (2:1 protection for
 12 5.1 acres of direct and 10 acres of indirect impact) (200 acres of vernal pool complex) in the near-
 13 term to offset the effects of CM1 and CM4.

14 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
 15 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
 16 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
 17 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
 18 restoration would be determined during implementation based on the following criteria.

- 19 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to
 20 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly
 21 affected (1:1 ratio).
- 22 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
 23 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
 24 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

25 The species-specific biological goals and objectives would also inform the near-term protection and
 26 restoration efforts. These Plan goals represent performance standards for considering the
 27 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
 28 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean
 29 habitat.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
 34 *Natural Communities*, *AMM12 Vernal Pool Crustaceans*, *AMM30 Transmission Line Design and*
 35 *Alignment Guidelines*, and *AMM37 Recreation*. All of these AMMs include elements that avoid or
 36 minimize the risk of affecting habitats and species adjacent to work areas. BDCP Appendix 3.C
 37 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
 38 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

39 **Late Long-Term Timeframe**

40 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
 41 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
 42 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-4-13 and discussed above, the effects
 43 of CM1 alone would be within the near-term limits, but overall Alternative 4 would not meet the

1 Plan's late long-term biological goals and objectives for direct and indirect effects unless tidal
2 restoration projects are designed to ensure that that they do not exceed these impact limits.

3 The Plan has committed to a late long-term goal of protecting 600 acres of vernal pool complex in
4 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
5 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
6 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
7 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection
8 and restoration would be achieved using the criteria presented above as well as by following the
9 other specific biological goals and objectives, which include:

- 10 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 11 ● Protecting the range of inundation characteristics that are currently represented by vernal pool
12 throughout the Plan Area (Objective VPNC1.4)
- 13 ● Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective
14 VPC1.1)

15 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
16 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
17 restoration and protection of alkali seasonal wetlands that could overlap with the species model,
18 could result in the restoration of 51 acres and the protection of 608 acres of modeled habitat for
19 vernal pool crustaceans.

20 **NEPA Effects:** The near-term loss of vernal pool crustacean habitat under Alternative 4 would not be
21 adverse under NEPA because the BDCP has committed to avoiding and minimizing effects from tidal
22 restoration and to restoring and protecting an acreage that meets or exceeds the typical mitigation
23 ratios described above. In the absence of other conservation actions, the modification of vernal pool
24 crustacean habitat and potential mortality of a special-status species resulting from Alternative 4 in
25 the late long-term would represent an adverse effect. However, the BDCP has committed to impact
26 limits for vernal pool crustacean habitat and to habitat protection, restoration, management, and
27 enhancement associated with CM3, CM9, and CM11. This habitat protection, restoration,
28 management and enhancement would be guided by species-specific goals and objectives, and by
29 AMM1–AMM6, AMM10, AMM12, AMM30, and AMM37, which would be in place throughout the
30 BDCP permit term. Considering these commitments, losses and conversion of vernal pool crustacean
31 habitat under Alternative 4 would not be an adverse effect.

32 **CEQA Conclusion:**

33 **Near-Term Timeframe**

34 Because the water conveyance facilities construction is being evaluated at the project level, the near-
35 term BDCP conservation strategy has been evaluated to determine whether it would provide
36 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
37 construction would be less than significant. Table 12-4-12 above lists the impacts on modeled vernal
38 pool crustacean habitat that is based on the natural community mapping done within the study area.
39 The impacts from tidal natural communities restoration (CM4) are based on hypothetical footprints
40 and do not reflect actual impacts on vernal pool crustacean habitat considering the BDCP's
41 commitment to design restoration projects to minimize or avoid effects on covered vernal pool
42 crustaceans (see AMM12 and AMM30). As seen in Table 12-4-13, Alternative 4 would not meet the

1 Plan's near-term biological goals and objectives for direct and indirect effects unless near-term tidal
2 restoration projects are designed to ensure that they do not exceed these impact limits.

3 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
4 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are
5 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 3.5
6 wetted acres of vernal pool crustacean habitat (or 23 acres of vernal pool complex) should be
7 restored and 19.6 wetted acres (or 131 acres of vernal pool complex) protected to mitigate the CM1
8 direct and indirect effects on vernal pool crustacean habitat. With the implementation of AMM30,
9 the effects on aquatic habitat would be avoided to the maximum extent feasible during the designing
10 of the transmission line west of Clifton Court Forebay. Assuming that the BDCP would apply the
11 impact limits presented in Table 12-4-13 and implement AMM30, direct impacts on wetted vernal
12 pools resulting from tidal restoration in the near-term would have to not exceed 1.5 acres of direct
13 effects on wetted vernal pool crustacean habitat and indirect impacts could not exceed 3.7 wetted
14 acres. The impacts based on the hypothetical tidal restoration footprints would exceed these limits.
15 When and if these limits are met, the BDCP would need to restore up to 5.1 wetted acres (34 acres of
16 vernal pool complex) and protect up to 30 wetted acres (200 acres of vernal pool complex) in the
17 near-term to offset the effects of CM1 and CM4.

18 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
19 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
20 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
21 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
22 restoration would be determined during implementation based on the following criteria.

- 23 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to
24 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly
25 affected (1:1 ratio).
- 26 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
27 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
28 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

29 The species-specific biological goals and objectives would also inform the near-term protection and
30 restoration efforts. These Plan goals represent performance standards for considering the
31 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
32 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean
33 habitat.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
38 *Natural Communities*, *AMM12 Vernal Pool Crustaceans*, *AMM30 Transmission Line Design and*
39 *Alignment Guidelines*, and *AMM37 Recreation*. All of these AMMs include elements that avoid or
40 minimize the risk of affecting habitats and species adjacent to work areas. BDCP Appendix 3.C
41 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
42 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 The natural community restoration and protection activities are expected to be concluded in the
2 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts on
3 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with
4 the AMMs and biological goals and objectives, are more than sufficient to support the conclusion
5 that the near-term effects of Alternative 4 would be less than significant under CEQA.

6 **Late Long-Term Timeframe**

7 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
8 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
9 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-4-13, the effects of CM1 alone would
10 be within the near-term limits, but overall Alternative 4 would not meet the Plan's late long-term
11 biological goals and objectives for direct and indirect effects unless tidal restoration projects are
12 designed to ensure that that they do not exceed these impact limits.

13 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in
14 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
15 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
16 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
17 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection
18 and restoration would be achieved using the criteria presented above as well as by following the
19 other specific biological goals and objectives, which include:

- 20 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 21 ● Protecting the range of inundation characteristics that are currently represented by vernal pool
22 throughout the Plan Area (Objective VPNC1.4)
- 23 ● Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective
24 VPC1.1)

25 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
26 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
27 restoration and protection of alkali seasonal wetlands that could overlap with the species model,
28 could result in the restoration of 51 acres and the protection of 608 acres of modeled habitat for
29 vernal pool crustaceans.

30 The effects on vernal pool crustacean habitat from Alternative 4 would represent an adverse effect
31 as a result of habitat modification of a special-status species and potential for direct mortality in the
32 absence of other conservation actions. However, the BDCP has committed to impact limits for vernal
33 pool crustacean habitat and to habitat protection, restoration, management and enhancement
34 associated with CM3, CM9, and CM11. These conservation activities would be guided by species-
35 specific goals and objectives, and by AMM1-AMM6, AMM10, AMM12, AMM30, and AMM37, which
36 would be in place throughout the time BDCP permit term. Considering these commitments,
37 Alternative 4 over the term of the BDCP would not result in a substantial adverse effect through
38 habitat modifications and would not substantially reduce the number or restrict the range of vernal
39 pool crustaceans. Therefore, Alternative 4 would have a less-than-significant impact on vernal pool
40 crustaceans.

1 **Impact BIO-33: Indirect Effects of Plan Implementation on Vernal Pool Crustaceans**

2 Construction and maintenance activities associated with water conveyance facilities, and restoration
3 actions could indirectly affect vernal pool crustaceans and their habitat in the vicinity of
4 construction and restoration areas, and maintenance activities. These potential effects would be
5 minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would be in effect
6 throughout the BDCP permit term.

7 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly
8 affect vernal pool crustaceans and their habitat in the vicinity of construction areas. Ground-
9 disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment could
10 result in the inadvertent release of sediment and hazardous substances into this habitat. These
11 potential effects would be avoided and minimized through AMM1–AMM6, which would be in effect
12 throughout the BDCP permit term. Vernal pool crustaceans and their habitat could be periodically
13 indirectly affected by maintenance activities at water conveyance facilities. Embankment
14 maintenance activities around Clifton Court Forebay could result in the inadvertent discharge of
15 sediments and hazardous materials into vernal pool crustacean habitat that occurs along the
16 southern and western boundaries of the forebays. These potential effects would be avoided and
17 minimized through AMM1–AMM6, which would be in effect throughout the BDCP permit term. The
18 indirect effects of Alternative 4 on vernal pool crustacean habitat would not be adverse under NEPA.

19 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance
20 facilities, and restoration actions could indirectly impact vernal pool crustaceans and their habitat in
21 the vicinity of construction and restoration areas, and maintenance activities. These potential
22 impacts would be minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would
23 be in effect throughout the BDCP permit term. The indirect impacts of Alternative 4 would be less
24 than significant under CEQA.

25 **Impact BIO-34: Periodic Effects of Inundation of Vernal Pool Crustacean Habitat as a Result of**
26 **Implementation of Conservation Components**

27 Flooding of the Yolo Bypass under *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
28 0 to 4 acres of modeled vernal pool crustacean habitat (Table 12-4-12). There would be no periodic
29 effects from *CM5 Seasonally Inundated Floodplain Restoration*.

30 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the
31 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,
32 periodic inundation could affect vernal pool crustaceans occupying areas ranging from 0 acres of
33 habitat during most notch flows to an estimated 4 acres during a notch flow of 6,000 cfs. BDCP-
34 associated inundation of areas that would not otherwise have been inundated is expected to occur in
35 no more than 30% of all years, because Fremont Weir is expected to overtop the remaining 70% of
36 all years, and during those years notch operations would not typically affect the maximum extent of
37 inundation. In more than half of all years under Existing Conditions, an area greater than the BDCP-
38 related inundation area already inundates in the bypass. Yolo Bypass flooding is expected to have a
39 minimal effect on vernal pool crustaceans and would thus not be adverse under NEPA.

1 **CEQA Conclusion:** Alternative 4 would periodically inundate at most 4 acres of vernal pool
2 crustacean habitat during the maximum flows over the Fremont Weir. The periodic inundation is
3 not anticipated to result in a conversion of vernal pool crustacean habitat into different wetland
4 habitat. BDCP-associated inundation of areas that would not otherwise have been inundated is
5 expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop
6 the remaining 70% of all years, and during those years notch operations would not typically affect
7 the maximum extent of inundation. In more than half of all years under Existing Conditions, an area
8 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass
9 flooding is expected to have a minimal effect on vernal pool crustaceans and would thus result in
10 less-than-significant impacts on the species.

11 **Valley Elderberry Longhorn Beetle**

12 The habitat model used to assess the effects for valley elderberry longhorn beetle is based on
13 riparian habitat and nonriparian habitat (vernal pool complexes and grasslands within 200 feet of
14 channels). Construction and restoration associated with Alternative 4 conservation measures would
15 result in both temporary and permanent losses of valley elderberry longhorn beetle modeled habitat
16 as indicated in Table 12-4-14. The majority of the losses would take place over an extended period
17 of time as the restoration conservation measures are being implemented. In addition, an estimated
18 14 elderberry shrubs that were previously mapped by DWR in the DHCCP Conveyance Planning
19 Area could be impacted by the Alternative 4 conveyance alignment (CM1). Full implementation of
20 Alternative 4 would also include the following conservation actions over the term of the BDCP to
21 benefit valley elderberry longhorn beetle (BDCP Chapter 3, *Conservation Strategy*).

- 22 • Mitigate impacts on elderberry shrubs consistent with USFWS conservation guidelines for the
23 species (Objective VELB1.1).
- 24 • Site elderberry longhorn beetle habitat restoration adjacent to occupied habitat (Objective
25 VELB1.2).
- 26 • Restore 5,000 acres of valley/foothill riparian (Objective VFRNC1.1, associated with CM7).
- 27 • Protect 750 acres of valley/foothill riparian (Objective VFRNC1.2, associated with CM3).
- 28 • Maintain or increase the abundance and distribution of rare or uncommon vegetation alliances,
29 such as *Sambuca nigra* (blue elderberry stands) alliance (Objective VFRNC3.1, associated with
30 CM7 and CM11).

31 As explained below, with the restoration or protection of these amounts of habitat, impacts on valley
32 elderberry longhorn beetle would not be adverse for NEPA purposes and would be less than
33 significant for CEQA purposes.

1 **Table 12-4-14. Changes in Valley Elderberry Longhorn Beetle Modeled Habitat Associated with**
2 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	37	37	24	24	NA	NA
	Non-riparian	201	201	87	87	NA	NA
Total Impacts CM1		238	238	111	111	NA	NA
CM2-CM18	Riparian	381	678	76	111	44-80	266
	Non-riparian	142	311	94	108	103-244	287
Total Impacts CM2-CM18		523	989	170	219	161-325	553
TOTAL IMPACTS		761	1,227	281	330	161-325	553

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-35: Loss of Valley Elderberry Longhorn Beetle Habitat**

5 Alternative 4 conservation measures would result in the permanent and temporary loss combined
6 of up to 1,557 acres of modeled valley elderberry longhorn beetle habitat (850 acres of riparian
7 habitat and 707 acres of nonriparian habitat), and an estimated 14 elderberry shrubs from CM1,
8 which represent potential habitat for the species (Table 12-4-14). Due to the limitation of the habitat
9 suitability model, the effects on modeled habitat are assumed to be a large overestimate of the true
10 effect on potential valley elderberry longhorn beetle habitat. Conservation measures that would
11 result in these losses are conveyance facilities and transmission line construction, and establishment
12 and use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal
13 habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management
14 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could
15 result in local adverse habitat effects. In addition, maintenance activities associated with the long-
16 term operation of the water conveyance facilities and other BDCP physical facilities could degrade
17 or eliminate valley elderberry longhorn beetle habitat. Timely implementation of the near-term
18 habitat protection and restoration contained in the Plan and implementation of AMMs committed to
19 in the Plan would result in no adverse effects under NEPA and less-than-significant impacts under
20 CEQA. Each of these activities is described below.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
22 result in the permanent and temporary combined loss of approximately 370 acres of modeled
23 valley elderberry longhorn beetle habitat, composed of 61 acres of riparian habitat and 288

1 acres of nonriparian habitat (Table 12-4-14). In addition, an estimated 14 shrubs could be
 2 removed as a result of conveyance facilities construction. As noted in Section 12.3.2.3, *Methods*
 3 *Used to Assess Species Effects*, elderberry shrubs were mapped in the DHCCP Conveyance
 4 Planning Area where accessible and thus the entire footprint of CM1 was not surveyed. In many
 5 cases, the data collected did not always specify the number of shrubs observed but rather the
 6 size class and a range of stem numbers. The exact number of shrubs to be impacted would be
 7 determined during pre-construction surveys of the footprints of the conveyance facility and
 8 associated work areas as part of the implementation of *AMM15 Valley Elderberry Longhorn*
 9 *Beetle*. Most of these impacts are associated with the intake and forebay construction in the
 10 north delta. There are no records of valley elderberry longhorn beetle within these impact areas.
 11 The portion of the above impacts that result from temporary habitat loss includes 111 acres of
 12 modeled valley elderberry longhorn beetle habitat (24 acres riparian and 87 acres nonriparian
 13 habitat). Elderberry shrubs could be affected from ground-disturbing activities associated with
 14 conveyance construction footprints, reusable tunnel material storage areas, geotechnical boring
 15 areas, temporary access roads, and staging areas.

- 16 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction activity associated with fisheries
 17 improvements in the Yolo Bypass would result in the permanent and temporary removal of
 18 approximately 295 acres of modeled valley elderberry longhorn beetle habitat, composed of 159
 19 acres of riparian habitat and 136 acres of nonriparian habitat. Approximately 125 acres of
 20 permanent impacts (83 acres of riparian and 41 acres of nonriparian) would mostly occur at the
 21 north end of the Yolo Bypass from Fremont Weir improvements. The 170 acres of temporary
 22 impacts (76 acres of riparian and 94 acres of nonriparian) would mostly be from work on the
 23 Fremont Weir, the Sacramento Weir, and levees along the Bypass. Elderberry shrubs could be
 24 affected from ground-disturbing activities associated with the re-contouring of surface
 25 topography, excavation or modification of channels, levee modification, and removal of riprap
 26 and other protections from channel banks.
- 27 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
 28 in the permanent loss of approximately 813 acres of modeled valley elderberry longhorn beetle
 29 habitat, composed of 552 acres of riparian and 260 acres of nonriparian habitat. The majority of
 30 these impacts would be associated with tidal restoration in the Delta and only 42 acres of these
 31 impacts (all nonriparian) would be from tidal restoration in Suisun Marsh. Elderberry shrubs
 32 could be affected from ground-disturbing activities associated with the re-contouring of surface
 33 topography, excavation or modification of channels, type conversion from riparian and
 34 grasslands to tidal habitat, levee removal and modification, and removal of riprap and other
 35 protections from channel banks.
- 36 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
 37 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
 38 approximately 101 acres of valley elderberry longhorn beetle habitat, composed of 78 acres of
 39 riparian and 23 acres of nonriparian. Approximately half of these impacts (52 acres) would be
 40 permanent impacts from levee construction and the other half (49 acres) would be temporary
 41 impacts associated with the levee construction. There is one CNDDDB record of valley elderberry
 42 longhorn beetle occurring in CZ 7 just west of Middle River on Union Island. This record and
 43 other elderberry shrubs could be affected from ground-disturbing activities associated with the
 44 re-contouring of surface topography, excavation or modification of channels, levee removal and
 45 modification, and removal of riprap and other protections from channel banks.

- 1 • *CM11 Natural Communities Enhancement and Management*: Activities associated with natural
2 communities enhancement and management, such as grazing practices and ground disturbance
3 or herbicide use in the control of nonnative vegetation, intended to maintain and improve
4 habitat functions of BDCP protected habitats for covered species could result in loss of
5 elderberry shrubs and the potential for injury or mortality to beetles. These effects cannot be
6 quantified, but are expected to be minimal and would be avoided and minimized by the AMMs
7 listed below.
- 8 • Operations and maintenance: Post-construction operation and maintenance of the above-
9 ground water conveyance facilities and restoration infrastructure could result in ongoing but
10 periodic disturbances that could affect valley elderberry beetle. Maintenance activities would
11 include vegetation management, levee and structure repair, and re-grading of roads and
12 permanent work areas could affect elderberry shrubs occupied by the species. These effects,
13 however, would be reduced by AMMs listed below.

14 The following paragraphs summarize the combined effects discussed above and describe other
15 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
16 also included.

17 ***Near-Term Timeframe***

18 Because the water conveyance facilities construction is being evaluated at the project level, the near-
19 term BDCP conservation strategy has been evaluated to determine whether it would provide
20 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
21 construction would not be adverse under NEPA and would be less than significant under CEQA.
22 Alternative 4 would result in permanent and temporary impacts on 1,042 acres of modeled habitat
23 (518 acres of riparian and 524 acres of nonriparian) for valley elderberry longhorn beetle in the
24 study area in the near-term. These effects would result from the construction of the water
25 conveyance facilities (CM1, 61 acres of riparian and 288 acres of nonriparian), and implementing
26 other conservation measures (Yolo Bypass fisheries improvements [CM2] and tidal restoration
27 [CM4], 693 acres of modeled habitat). These conservation measures (CM2 and CM4) account for 457
28 of the 518 acres (88%) of impacts on riparian habitat. Based on the DHCCP survey data of the
29 Conveyance Planning Area (see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*
30 *Environmental Data Report*), an estimated 14 elderberry shrubs would be impacted in the near-term
31 by CM1 (see Section 12.3.2.3, *Methods Used to Assess Species Effects*, for a discussion on the methods
32 used to make this estimate).

33 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
34 CM1 and that are identified as habitat for valley elderberry longhorn beetle in Chapter 3,
35 *Conservation Strategy*, of the BDCP would be 1:1 for restoration and 1:1 for protection for riparian
36 habitat. Using these typical ratios would indicate that 61 acres of the riparian habitat should be
37 restored/created and 61 acres of existing riparian should be protected to mitigate the CM1 losses of
38 valley elderberry longhorn beetle habitat. The near-term effects of other conservation actions would
39 require 457 acres of riparian restoration and 457 acres of riparian protection using the same typical
40 NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

41 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800
42 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same
43 timeframe as the construction and losses from other conservation measures, thereby minimizing
44 adverse effects on valley elderberry longhorn beetle. In addition, BDCP Objectives VELB 1.1 and 1.2,

1 which call for implementing the USFWS (1999) conservation guidelines for valley elderberry
2 longhorn beetle (transplanting elderberry shrubs and planting elderberry seedlings and associated
3 natives) and siting elderberry restoration within drainages immediately adjacent to or in the vicinity
4 of sites confirmed to be occupied by valley elderberry longhorn beetle. These objectives would be
5 met through the implementation of CM7 *Riparian Natural Community Restoration*. CM7 *Riparian*
6 *Natural Community Restoration* specifically calls for the planting of elderberry shrubs in large,
7 contiguous clusters with a mosaic of associated natives as part of riparian restoration consistent
8 with USFWS (1999) conservation guidelines. These Plan goals represent performance standards for
9 considering the effectiveness of restoration actions. The acres of protection and restoration
10 contained in the near-term Plan goals and the additional species specific measures within CM7
11 satisfy the typical mitigation that would be applied to the project-level effects of CM1, as well as
12 mitigating the near-term effects of the other conservation measures.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
16 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils* and *AMM15 Valley Elderberry Longhorn*
17 *Beetle*. AMM15 requires surveys for elderberry shrubs within 100 feet of any ground disturbing
18 activities, the implementation of avoidance and minimize measures for any shrubs that are
19 identified within this 100-foot buffer, and transplanting shrubs that can't be avoided. All of these
20 AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to
21 work areas and RTM storage sites. BDCP Appendix 3.C describes the AMMs, which have since been
22 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
23 the Final EIR/EIS.

24 ***Late Long-Term Timeframe***

25 Based on modeled habitat, the study area supports approximately 34,456 acres of modeled habitat
26 (17,786 acres of riparian and 16,670 acres of nonriparian) for valley elderberry longhorn beetle.
27 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 1,557 acres
28 of modeled valley elderberry longhorn beetle habitat (850 acres of riparian habitat and 707 acres of
29 nonriparian habitat) during the BDCP permit term (5% of the modeled habitat in the study area).
30 The locations of these losses are described above in the analyses of individual conservation
31 measures. These losses would not fragment any known populations of valley elderberry longhorn
32 beetle. The Plan includes a commitment to protect 750 acres of riparian habitat and
33 restoring/creating 5,000 acres of riparian habitat in the Plan Area. According to Objective VELB1.2,
34 the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied habitat,
35 which would provide connectivity between occupied and restored habitats and improve the species'
36 ability to disperse within and outside the Plan Area. Other factors relevant to effects on valley
37 elderberry longhorn beetle include:

- 38 ● Habitat loss is widely dispersed throughout the study area and would not be concentrated in
39 any one location.
- 40 ● There would be a temporal loss of riparian habitat during the near-term evaluation period
41 because most of the affected riparian vegetation would be removed during the near-term
42 timeframe, while large quantities of riparian habitat would not be restored until the early and
43 late long-term timeframes. Effects on valley elderberry longhorn beetle of this temporal loss of
44 riparian vegetation are expected to be minimal because much of the riparian habitat in the Plan
45 Area is not known to be currently occupied by the species, because all elderberry shrubs that

1 are suitable for transplantation would be moved to conservation areas in the Plan Area, and
2 because most of the affected community is composed of small patches of riparian scrub and
3 herbaceous vegetation that are fragmented and distributed across the agricultural landscape of
4 the Plan Area and thus are likely to provide no or low-value habitat for the beetle.

- 5 • Temporarily disturbed areas would be restored within 1 year following completion of
6 construction and management activities. Under AMM10, a restoration and monitoring plan
7 would be developed prior to initiating any construction-related activities associated with the
8 conservation measures or other covered activities that would result in temporary effects on
9 natural communities.

10 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
11 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as other
12 actions that overlap with the nonriparian portions of the species model, could result in the
13 restoration of 4,857 acres (riparian) and the protection of 2,363 acres (729 acres of riparian and
14 1,634 acres of nonriparian channels and grassland) of modeled habitat for valley elderberry
15 longhorn beetle.

16 **NEPA Effects:** The near-term loss of valley elderberry longhorn beetle habitat under Alternative 4
17 would not be adverse because the BDCP has committed to restoring and protecting an acreage that
18 exceeds the typical mitigation ratios described above, in addition to avoiding impacts on shrubs and
19 transplanting those that can't be avoided. In the absence of other conservation actions, the losses of
20 valley elderberry longhorn beetle habitat and potential for direct mortality of a special-status
21 species associated with Alternative 4 in the late long-term would represent an adverse effect.
22 However, with habitat protection and restoration associated with CM7, guided by species-specific
23 goals and objectives and by AMM1–AMM6, AMM10, and AMM15, which would be in place
24 throughout the BDCP permit term, the effects of Alternative 4 as a whole on valley elderberry
25 longhorn beetle would not be adverse under NEPA.

26 **CEQA Conclusion:**

27 **Near-Term Timeframe**

28 Because the water conveyance facilities construction is being evaluated at the project level, the near-
29 term BDCP conservation strategy has been evaluated to determine whether it would provide
30 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
31 construction would be less than significant. Alternative 4 would result in permanent and temporary
32 impacts on 1,042 acres of modeled habitat (518 acres of riparian and 524 acres of nonriparian) for
33 valley elderberry longhorn beetle in the study area in the near-term. These effects would result from
34 the construction of the water conveyance facilities (CM1, 61 acres of riparian and 288 acres of
35 nonriparian), and implementing other conservation measures (Yolo Bypass fisheries improvements
36 [CM2] and tidal restoration [CM4], 693 acres of modeled habitat). Based on the DHCCP survey data
37 of the Conveyance Planning Area, an estimated 14 elderberry shrubs would be impacted in the near-
38 term (see Section 12.3.2.3, *Methods Used to Assess Species Effects*, for a discussion on the methods
39 used to make this estimate).

40 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
41 CM1 and that are identified in the biological goals and objectives for valley elderberry longhorn
42 beetle in Chapter 3, *Conservation Strategy*, of the BDCP would be 1:1 for restoration and 1:1 for
43 protection for riparian habitat. Using these typical ratios would indicate that 61 acres of the riparian

1 habitat should be restored/created and 61 acres of existing riparian should be protected to mitigate
2 the CM1 losses of valley elderberry longhorn beetle habitat. The near-term effects of other
3 conservation actions would require 457 acres of riparian restoration and 457 acres of riparian
4 protection using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

5 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800
6 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same
7 timeframe as the construction and early restoration losses, thereby minimizing adverse effects on
8 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB 1.1 and 1.2, which call for
9 implementing the USFWS (1999) conservation guidelines for valley elderberry longhorn beetle
10 (transplanting elderberry shrubs and planting elderberry seedlings and associated natives) and
11 siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites
12 confirmed to be occupied by valley elderberry longhorn beetle. These objectives would be met
13 through the implementation of *CM7 Riparian Natural Community Restoration*. CM7 specifically calls
14 for the planting of elderberry shrubs in large, contiguous clusters with a mosaic of associated
15 natives as part of riparian restoration consistent with USFWS (1999) conservation guidelines.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM15 Valley Elderberry Longhorn*
20 *Beetle*. AMM15 requires surveys for elderberry shrubs within 100 feet of any ground disturbing
21 activities, the implementation avoidance and minimize measures for any shrubs that are identified
22 within this 100-foot buffer, and transplanting shrubs that can't be avoided. All of these AMMs
23 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
24 areas and RTM storage sites. BDCP Appendix 3.C describes the AMMs, which have since been
25 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
26 the Final EIR/EIS.

27 The natural community restoration and protection activities are expected to be concluded in the
28 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts to
29 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with
30 the AMMs, are more than sufficient to support the conclusion that the near-term impacts of
31 Alternative 4 would be less than significant under CEQA.

32 ***Late Long-Term Timeframe***

33 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 1,557 acres
34 of modeled valley elderberry longhorn beetle habitat (850 acres of riparian habitat and 707 acres of
35 nonriparian habitat) during the BDCP permit term (5% of the modeled habitat in the study area).
36 The locations of these losses are described above in the analyses of individual conservation
37 measures. The Plan includes a commitment to protect 750 acres of riparian habitat and restore or
38 create 5,000 acres of riparian habitat in the Plan Area. According to Objective VELB1.2, the
39 restoration of elderberry longhorn beetle habitat would occur adjacent to occupied habitat, which
40 would provide connectivity between occupied and restored habitats and improve the species' ability
41 to disperse within and outside the Plan Area. The BDCP also includes a number of AMMs (AMM1–
42 AMM6, AMM10, and AMM15) directed at minimizing or avoiding potential impacts on valley
43 elderberry longhorn beetle. The large acreages of conservation would adequately compensate for
44 the modeled habitats lost to construction and restoration activities.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
2 *Plant Species*,) estimates that the restoration and protection actions discussed above, as well as
3 others actions that overlap with the nonriparian portions of the species model, could result in the
4 restoration of 4,857 acres (riparian) and the protection of 2,363 acres (729 acres of riparian and
5 1,634 acres of nonriparian channels and grassland) of modeled habitat for valley elderberry
6 longhorn beetle.

7 Considering these protection and restoration provisions, which would provide acreages of new or
8 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction
9 and restoration activities, implementation of Alternative 4 as a whole would not result in a
10 substantial adverse effect through habitat modifications and would not substantially reduce the
11 number or restrict the range of the species. Therefore, the alternative would have a less-than-
12 significant impact on valley elderberry longhorn beetle.

13 **Impact BIO-36: Indirect Effects on Valley Elderberry Longhorn Beetle and its Habitat**

14 Construction activities associated with water conveyance facilities, conservation components and
15 ongoing habitat enhancement, as well as operation and maintenance of above-ground water
16 conveyance facilities, including the transmission facilities, could result in ongoing periodic post-
17 construction disturbances with localized impacts on valley elderberry longhorn beetle over the term
18 of the BDCP. Construction related effects could result from ground-disturbing activities, stockpiling
19 of soils, and maintenance and refueling of heavy equipment could result in dust and the inadvertent
20 release of hazardous substances in areas where elderberry shrubs occur. A GIS analysis (see Section
21 12.3.2.3, *Methods Used to Assess Species Effects*, for a discussion on the methods used to make this
22 estimate) estimates that approximately 37 shrubs could be indirectly affected by conveyance
23 facilities construction (CM1). Restoration activities could result in excavation or modification of
24 channels, type conversion from riparian and grasslands to tidal habitat, levee removal and
25 modification, and removal of riprap and other protections from channel banks that occur within 100
26 feet of an elderberry shrubs. These potential effects would be minimized or avoided through AMM1-
27 AMM6, AMM10, and AMM15, which would be in effect throughout the BDCP permit term.

28 **NEPA Effects:** The indirect effects on valley elderberry longhorn beetle as a result of implementing
29 Alternative 4 conservation actions would not have an adverse effect on valley elderberry longhorn
30 beetle.

31 **CEQA Conclusion:** Ground-disturbing activities, stockpiling of soils, and the potential release of dust
32 and hazardous substances would accompany construction of the water conveyance facilities. An
33 estimated 37 shrubs could be indirectly affected by conveyance facilities construction (CM1). In
34 addition, ground-disturbing activities associated with the re-contouring of surface topography,
35 excavation or modification of channels, type conversion from riparian and grasslands to tidal
36 habitat, levee removal and modification, and removal of riprap and other protections from channel
37 banks could indirectly affected elderberry shrubs that occur within 100 feet of these restoration
38 activities. With the implementation of AMM1-AMM6, AMM10, and AMM15 as part of Alternative 4
39 construction, operation, and maintenance, the BDCP would avoid the potential for substantial
40 adverse indirect effects on valley elderberry longhorn beetle in that the Plan would not result in a
41 substantial reduction in numbers or a restriction in the range of valley elderberry longhorn beetle.
42 Therefore, the indirect effects under this alternative would have a less-than-significant impact on
43 valley elderberry longhorn beetle.

1 **Impact BIO-37: Periodic Effects of Inundation of Valley Elderberry Longhorn Beetle Habitat**
2 **as a Result of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
4 161 to 325 acres of modeled valley elderberry longhorn beetle habitat (Table 12-4-14).

5 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 553 acres of modeled
6 valley elderberry longhorn beetle habitat (Table 12-4-14).

7 It is unknown at this time how much of the modeled habitat that would be inundated as a result of
8 CM2 and CM5 actually contains elderberry shrubs. Elderberry shrubs have been found to be
9 intolerant of long periods of inundation and there is evidence that they die very quickly after even
10 short periods of flooding (River Partners 2008). During monitoring of a restoration project at the
11 San Joaquin River National Wildlife Refuge, River Partners found that nearly all (99 to 100%) of the
12 four year old elderberry shrubs in restoration plots died after 15–17 weeks of inundation, and River
13 Partners noted in general that the shrubs died very quickly after even short periods of flooding
14 (River Partners 2008). Talley et al (2006) in their report assisting the USFWS 5-year review of the
15 species, note that elderberry shrubs respond negatively to saturated soil conditions and that they
16 can only tolerate temporary root crown inundation. Therefore, in the areas that would be
17 periodically inundated by the implementation of CM2 it is likely that there are few, if any, mature
18 shrubs in these areas because under current conditions they would be inundated in about 50% of all
19 years for approximately 7 weeks. The areas affected by CM5 are not currently inundated and thus
20 elderberry shrubs could be present in these areas.

21 The periodic effects on modeled habitat for valley elderberry longhorn beetle associated with
22 implementing Alternative 4 could adversely affect valley elderberry longhorn beetle habitat
23 (elderberry shrubs) and make modeled habitat there unsuitable for future elderberry
24 establishment. Based on the information presented above, the current conditions in those areas that
25 would be periodically inundated in Yolo Bypass (CM2) are not likely very suitable for elderberry
26 shrubs and, thus, CM2 would likely have minimal effects, if any, on the species. The modeled habitat
27 that would be periodically inundated from the implementation of CM5 could result in adverse effects
28 on valley elderberry longhorn beetle.

29 **NEPA Effects:** Periodic effects of the inundation of valley elderberry longhorn beetle habitat as a
30 result of implementing Alternative 4 conservation actions would not be adverse under NEPA when
31 taking into consideration CM7 habitat protection and restoration. This habitat protection and
32 restoration would be guided by species-specific goals and objectives, and by AMM1–AMM6, AMM10,
33 and AMM15, which would be in place throughout the time period that periodic effects would occur.

34 **CEQA Conclusion:** Alternative 4 (CM2 and CM5) would have periodic impacts on modeled valley
35 elderberry longhorn beetle habitat. The periodic inundation of between 161 and 325 acres (CM2)
36 and 553 acres (CM5) of modeled habitat could result in the death of elderberry shrubs that may
37 occur there and thus potentially impact valley elderberry longhorn beetle. The Plan includes the
38 restoration of 5,000 acres of riparian habitat (Objective VFRNC1.1) and the protection of 750 acres
39 riparian habitat (VFRNC1.2) would include areas for elderberry restoration and protection. The
40 BDCP also includes AMM1–AMM6, AMM10, and AMM15, which would minimize and avoid impacts
41 on valley elderberry longhorn beetle prior to Yolo Bypass fisheries enhancement and floodplain
42 restoration activities. AMM15, which includes a measure for following the USFWS (1999)
43 conservation guidelines for valley elderberry longhorn beetle, would be used to identify shrubs for
44 transplanting to conservation areas that otherwise could be adversely affected by periodic

1 inundation in Yolo Bypass and floodplain restoration areas. These conservation actions would
2 compensate for the periodic impacts on valley elderberry longhorn beetle.

3 Considering these protection and restoration provisions and avoidance and minimization measures,
4 implementation of Alternative 4 as a whole would not result in a substantial adverse effect through
5 habitat modifications and would not substantially reduce the number or restrict the range of the
6 species. Therefore, periodic effects of inundation resulting from Alternative 4 would have a less-
7 than-significant impact on valley elderberry longhorn beetle.

8 **Nonlisted Vernal Pool Invertebrates**

9 This section describes the effects of Alternative 4, including water conveyance facilities construction
10 and implementation of other conservation components, on nonlisted vernal pool invertebrates that
11 are not covered by the Plan (Blennosperma vernal pool andrenid bee, hairy water flea, Ricksecker's
12 water scavenger beetle, curved-foot hygrotus beetle, molestan blister beetle). Little is known about
13 the range of these species so it is assumed that they have potential to occur in the same areas
14 described by the vernal pool crustacean modeled habitat. That habitat model consists of: vernal pool
15 complex, which consists of vernal pools and uplands that display characteristic vernal pool and
16 swale visual signatures that have not been significantly affected by agricultural or development
17 practices; alkali seasonal wetlands in CZ 8; and degraded vernal pool complex, which consists of
18 low-value ephemeral habitat ranging from areas with vernal pool and swale visual signatures that
19 display clear evidence of significant disturbance due to plowing, disking, or leveling to areas with
20 clearly artificial basins such as shallow agricultural ditches, depressions in fallow fields, and areas of
21 compacted soils in pastures. For the purpose of the effects analysis, vernal pool complex is
22 categorized as high-value and degraded vernal pool complex is categorized as low-value for these
23 species. Alkali seasonal wetlands in CZ 8 were also included as high-value habitat for vernal pool
24 crustaceans in the model. Also included as low-value for vernal pool habitat are areas along the
25 eastern boundary of CZ 11 that are mapped as vernal pool complex because they flood seasonally
26 and support typical vernal pool plants, but do not include topographic depressions that are
27 characteristic of vernal pools.

28 Construction and restoration associated with Alternative 4 conservation measures would result in
29 permanent losses of habitat for nonlisted vernal pool invertebrates as indicated in Table 12-4-15
30 and indirect conversions of vernal pool habitat. The majority of the losses would take place over an
31 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of
32 Alternative 4 would also include the following conservation actions over the term of the BDCP that
33 would benefit nonlisted vernal pool invertebrates (BDCP Chapter 3, *Conservation Strategy*).

- 34 ● Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool
35 recovery areas (ObjectiveVPNC1.1, associated with CM3).
- 36 ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool
37 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective
38 VPNC1.2, associated with CM9).
- 39 ● Increase size and connectivity of protected vernal pool complexes in plan area and increase
40 connectivity with complexes outside the Plan Area (ObjectiveVPNC1.3)
- 41 ● Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective
42 VPNC1.4)

- Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for supporting and sustaining vernal pool species (Objective VPNC2.1)

As explained below, with the restoration or protection of these amounts of habitat, impacts on nonlisted vernal pool invertebrates would not be adverse for NEPA purposes and would be less-than significant for CEQA purposes.

Table 12-4-15. Changes in Nonlisted Vernal Pool Invertebrate Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1 ^g	High-value (vernal pool complex)	13	13	1	1	NA	NA
	Low-value (degraded vernal pool complex)	7	7	2	2	NA	NA
Total Impacts CM1		20	20	3	3	NA	NA
CM2-CM18 ^g	High-value (vernal pool complex)	0	0	0	0	0-4	0
	Low-value (degraded vernal pool complex)	201	372	0	0	0	0
Total Impacts CM2-CM18		201	372	0	0	0-4	0
TOTAL IMPACTS		221	392	3	3	0-4	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-38: Loss or Conversion of Habitat for and Direct Mortality of Nonlisted Vernal Pool Invertebrates

Alternative 4 conservation measures would result in the direct, permanent loss of up to 392 acres of vernal pool habitat from conveyance facilities construction (CM1) and the hypothetical footprints for tidal natural communities restoration (CM4). In addition, the conservation measures could result in the indirect conversion due to hydrologic alteration of an additional 177 acres of vernal pool habitat (132 acres of high-value habitat and 45 acres of low-value habitat) from conveyance facilities construction (CM1) and based on the hypothetical footprints for tidal restoration (CM4). Construction of the water conveyance facilities and restoration activities may result in the modification of hardpan and changes to the perched water table, which could lead to alterations in

1 the rate, extent, and duration of inundation of nearby vernal pool habitat. USFWS typically considers
2 construction within 250 feet of vernal pools to constitute an indirect effect unless more detailed
3 information is provided to further refine the limits of any such effects. For the purposes of this
4 analysis, the 250-foot buffer was applied to the water conveyance facilities work areas where
5 surface and subsurface disturbance activities would take place and to restoration hypothetical
6 footprints. Habitat enhancement and management activities (CM11), which include disturbance or
7 removal of nonnative vegetation, could result in local adverse habitat effects.

8 Because the estimates of habitat loss resulting from tidal inundation are based on projections of
9 where restoration may occur, actual effects are expected to be lower because sites would be selected
10 and restoration projects designed to minimize or avoid effects on the vernal pools. As specified in
11 the BDCP, the BDCP Implementation Office would ensure that tidal restoration projects and other
12 covered activities would be designed such that no more than a total of 10 wetted acres of vernal
13 pools are permanently lost. *AMM12 Vernal Pool Crustaceans* would ensure that no more than 20
14 wetted acres of vernal pool habitat are indirectly affected by alterations to hydrology resulting from
15 adjacent BDCP covered activities, in particular tidal restoration. The term *wetted acres* refers to an
16 area that would be defined by the three parameter wetland delineation method used by the U.S.
17 Army Corps of Engineers to determine the limits of a wetland, which involves an evaluation of
18 wetland soil, vegetation, and hydrology characteristics. This acreage differs from vernal pool
19 complex acreages in that a vernal pool complex is composed of individual wetlands (vernal pools)
20 and those upland areas that are in between and surrounding them, which provide the supporting
21 hydrology (surface runoff and groundwater input), organic and nutrient inputs, and refuge for the
22 terrestrial phase of some vernal pool species.

23 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the
24 individual conservation measure discussions.

- 25 ● *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
26 result in the permanent and temporary combined loss of approximately 23 acres of vernal pool
27 habitat, composed of 14 acres of high-value and 9 acres of low-value habitat (Table 12-4-15). In
28 addition, the conveyance facilities could result in the indirect conversion of 42 acres of vernal
29 pool habitat in the vicinity of Clifton Court Forebay. The indirect effects would result from the
30 construction of permanent transmission lines, storage of reusable tunnel material, and
31 construction of permanent access roads. *AMM30 Transmission Line Design and Alignment*
32 *Guidelines* would ensure that temporary transmission lines are designed to avoid removal
33 wetted acres of aquatic habitats to the maximum extent practicable. There are no records of
34 these nonlisted vernal pool invertebrates at this location (California Department of Fish and
35 Game 2012).
- 36 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
37 in the permanent loss of approximately 372 acres of low-value vernal pool habitat, which
38 consists of degraded vernal pool complex. The BDCP describes degraded vernal pool complex as
39 areas of low-value ephemeral habitat ranging from areas with vernal pool and swale visual
40 signatures that display clear evidence of significant disturbance due to plowing, disking, or
41 leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in
42 fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or
43 other aquatic features in these areas is unknown but a 2012 review of Google Earth imagery of
44 these habitats found that they appear to generally have low densities. However, areas mapped
45 as degraded vernal pool complex may still provide habitat for vernal pool species as evidenced

1 by records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella
2 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Game
3 2012). So though degraded vernal pool complexes may not represent botanically diverse vernal
4 pools they still can provide habitat for vernal pool invertebrates and thus the loss of 372 acres of
5 degraded vernal pool complex may result in the loss of occupied vernal pool invertebrate
6 habitat. In addition, tidal restoration could result in the indirect conversion of 135 acres of
7 vernal pool habitat, which consist of 90 acres of high-value and 45 acres of low-value habitat. No
8 records of nonlisted vernal pool invertebrates would be directly impacted.

- 9 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,
10 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of
11 vernal pool complex would benefit vernal pool invertebrates. A variety of habitat management
12 actions included in CM11 that are designed to enhance wildlife values in BDCP-protected
13 habitats may result in localized ground disturbances that could temporarily affect vernal pool
14 invertebrate habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
15 road and other infrastructure maintenance, are expected to have minor effects on vernal pool
16 invertebrate habitat and are expected to result in overall improvements to and maintenance of
17 vernal pool habitat values over the term of the BDCP. These effects cannot be quantified, but are
18 expected to be minimal and would be avoided and minimized by the AMMs listed below.

19 The following paragraphs summarize the combined effects discussed above and describe other
20 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
21 also included. Table 12-4-16 was prepared to further analyze BDCP effects on nonlisted vernal pool
22 invertebrates using wetted acres of habitat in order to compare the effects of this alternative with
23 the effect limits established in BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*, and
24 AMM12, which are measured in wetted acres of habitat. Wetted acres were estimated by using the
25 BDCP's assumption that vernal pool complexes and degraded vernal pool complexes would have a
26 15% density of vernal pools (i.e., of 100 acres of vernal pool complex 15 acres would constitute
27 vernal pools and the remaining 85 acres supporting uplands). Based on an informal evaluation of
28 aerial photographs of the Plan Area it is likely that the actual densities within the Plan Area are
29 approximately 10%, but the 15% density value was chosen as a conservative estimate for
30 determining effects.

1 **Table 12-4-16. Estimated Effects on Wetted Nonlisted Vernal Pool Species Habitat under**
2 **Alternative 4 (acres)**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit ^a		5	10	10	20
Alternative 4	CM1	3.5	3.5	6.3	6.3
Impact ^b	CM4 ^c	30.2	55.8	11.0	20.3
Total		33.7	59.3	17.3	26.6

^a Because roughly half of the impacts would occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

^b These acreages were generated by assuming that the modeled habitat identified in Table 12-4-15 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.

^c These impacts are based on the hypothetical restoration footprints and would likely be lower based on the BDCP's commitment to minimize and avoid effects on vernal pool habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

3

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction is being evaluated at the project level, the near-
6 term BDCP conservation strategy has been evaluated to determine whether it would provide
7 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
8 construction would not be adverse under NEPA and would be less than significant under CEQA.
9 Table 12-4-15 above lists the impacts on nonlisted vernal pool invertebrate habitat that are based
10 on the natural community mapping done within the study area. The impacts from tidal natural
11 communities restoration (CM4) are based on hypothetical footprints and do not reflect actual
12 impacts on vernal pool habitat considering the BDCP's commitment to design restoration projects to
13 minimize or avoid effects on vernal pools (see AMM12 and AMM30). As seen in Table 12-4-16, the
14 effects of CM1 alone would be well within the near-term limits. As seen in Table 12-4-16, Alternative
15 4 would not meet the Plan's near-term biological goals and objectives for direct and indirect effects
16 unless near-term projects are designed to ensure that they do not exceed these impact limits.

17 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
18 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are
19 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 3.5
20 wetted acres of vernal pool (or 23 acres of vernal pool complex) should be restored and 19.6 wetted
21 acres (or 131 acres of vernal pool complex) protected to mitigate the CM1 direct and indirect effects
22 on nonlisted vernal pool species habitat. However, with the implementation of AMM30, the effects
23 on aquatic habitat would be avoided to the maximum extent feasible during the designing of the
24 transmission line west of Clifton Court Forebay. Assuming that the BDCP would apply the impact
25 limits presented in Table 12-4-13 and implement AMM30, direct impacts on wetted vernal pools
26 resulting from tidal restoration in the near-term would have to not exceed 1.5 acres of direct effects
27 on wetted vernal pool crustacean habitat (5 acre limit minus the 3.5 acres from CM1) and indirect
28 impacts could not exceed 3.7 wetted acres. The impacts based on the hypothetical tidal restoration
29 footprints would exceed these limits. When and if these limits are met, the BDCP would need to

1 restore up to 5.1 wetted acres (34 acres of vernal pool complex) and protect up to 30 wetted acres
2 (200 acres of vernal pool complex) in the near-term to offset the effects of CM1 and CM4.

3 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
4 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
5 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
6 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
7 restoration would be determined during implementation based on the following criteria.

- 8 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to
9 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly
10 affected (1:1 ratio).
- 11 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
12 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
13 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

14 The Plan's biological goals and objectives would also inform the near-term protection and
15 restoration efforts. These Plan goals represent performance standards for considering the
16 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
17 term Plan goals would keep pace with the loss of habitat and effects on nonlisted vernal pool
18 invertebrate habitat.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
23 *Natural Communities*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37*
24 *Recreation*. *AMM12 Vernal Pool Crustaceans*, although developed for vernal pool crustaceans,
25 includes measures to avoid and minimize direct and indirect effects on vernal pools and would thus
26 be applicable to nonlisted vernal pool invertebrates as well. All of these AMMs include elements that
27 avoid or minimize the risk of affecting habitats and species adjacent to work areas. BDCP Appendix
28 3.C describes the AMMs, which have since been updated and which are provided in Appendix 3B,
29 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

30 **Late Long-Term Timeframe**

31 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
32 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
33 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-4-16, the effects of CM1 alone would
34 be within the near-term limits, but overall Alternative 4 would not meet the Plan's late long-term
35 biological goals and objectives for direct and indirect effects unless tidal restoration projects are
36 designed to ensure that they do not exceed these impact limits.

37 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in
38 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
39 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
40 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
41 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection
42 and restoration would be achieved using the criteria presented above as well as by following the
43 other specific biological goals and objectives, which include:

- 1 • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 2 • Protecting the range of inundation characteristics that are currently represented by vernal pool
- 3 throughout the Plan Area (Objective VPNC1.4)

4 **NEPA Effects:** The near-term loss of vernal pool habitat under Alternative 4 would not be adverse
5 under NEPA because the BDCP has committed to avoiding and minimizing effects from tidal
6 restoration and to restoring and protecting an acreage that meets or exceeds the typical mitigation
7 ratios described above. In the absence of other conservation actions, the potential modification of
8 vernal pool habitat and potential mortality of special-status species resulting from Alternative 4 in
9 the late long-term would represent an adverse effect. However, the BDCP has committed to impact
10 limits for vernal pool habitat and to habitat protection, restoration, management and enhancement
11 associated with CM3, CM9, and CM11. This habitat protection, restoration, management, and
12 enhancement would be guided by species-specific goals and objectives, and by AMM1–AMM6,
13 AMM10, AMM12, AMM30, and AMM37, which would be in place throughout the time BDCP permit
14 term. Considering these commitments, losses and conversions of nonlisted vernal pool invertebrates
15 habitat under Alternative 4 would not be adverse.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
19 the near-term BDCP conservation strategy has been evaluated to determine whether it would
20 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
21 impacts of construction would be less than significant under CEQA. Table 12-4-15 above lists the
22 impacts on vernal pool habitat that is based on the natural community mapping done within the
23 study area. The impacts from tidal natural communities restoration (CM4) are based on hypothetical
24 footprints and do not reflect actual impacts on vernal pool habitat considering the BDCP's
25 commitment to design restoration projects to minimize or avoid effects on vernal pools (see AMM12
26 and AMM30). As seen in Table 12-4-16, the effects of CM1 alone would be within the near-term
27 limits. As seen in Table 12-4-16, Alternative 4 would not meet the Plan's near-term biological goals
28 and objectives for direct and indirect effects unless near-term tidal restoration projects are designed
29 to ensure that they do not exceed these impact limits.

30 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by CM1
31 would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are
32 mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would indicate that 3.5
33 wetted acres of vernal pool (or 23 acres of vernal pool complex) should be restored and 19.6 wetted
34 acres (or 131 acres of vernal pool complex) protected to mitigate the CM1 direct and indirect effects
35 on nonlisted vernal pool species habitat. However, with the implementation of AMM30, the aquatic
36 habitat would be avoided to the maximum extent feasible during the designing of the transmission
37 line west of Clifton Court Forebay. Assuming that the BDCP would apply the impact limits presented
38 in Table 12-4-13 and implement AMM30, impacts on wetted vernal pools resulting from tidal
39 restoration in the near-term would have to not exceed 1.5 acres of direct effects on wetted vernal
40 pool crustacean habitat (5 acre limit minus the 3.5 acres from CM1) and indirect impacts could not
41 exceed 3.7 wetted acres. The impacts based on the hypothetical tidal restoration footprints would
42 exceed these limits. When and if these limits are met, the BDCP would need to restore up to 5.1
43 wetted acres (34 acres of vernal pool complex) and protect up to 30 wetted acres (200 acres of
44 vernal pool complex) in the near-term to offset the effects of CM1 and CM4.

1 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
2 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
3 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
4 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
5 restoration would be determined during implementation based on the following criteria.

- 6 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to
7 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly
8 affected (1:1 ratio).
- 9 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
10 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
11 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

12 The species-specific biological goals and objectives would also inform the near-term protection and
13 restoration efforts. These Plan goals represent performance standards for considering the
14 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
15 term Plan goals would keep pace with the loss of habitat and effects on nonlisted vernal pool
16 invertebrates.

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
18 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
20 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
21 *Affected Natural Communities*, *AMM30 Transmission Line Design*, and *Alignment Guidelines*, and
22 *AMM37 Recreation*. *AMM12 Vernal Pool Crustaceans*, although developed for vernal pool crustaceans,
23 includes measures to avoid and minimize direct and indirect effects on vernal pools and would thus
24 be applicable to nonlisted vernal pool invertebrates as well. All of these AMMs include elements that
25 avoid or minimize the risk of affecting habitats and species adjacent to work areas. BDCP Appendix
26 3.C describes the AMMs, which have since been updated and which are provided in Appendix 3B,
27 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

28 The natural community restoration and protection activities are expected to be concluded in the
29 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts on
30 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with
31 the AMMs and biological goals and objectives, are more than sufficient to support the conclusion
32 that the near-term effects of Alternative 4 would be less than significant under CEQA.

33 ***Late Long-Term Timeframe***

34 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
35 and no more than 20 wetted acres of indirect effects on vernal pools by the late long-term (see
36 Objective VPNC1.2 and AMM12). As seen in Table 12-4-16, the impacts of CM1 alone would be
37 within the near-term limits, but overall Alternative 4 would not meet the Plan's late long-term
38 biological goals and objectives for direct and indirect effects unless near-term tidal restoration
39 projects are designed to ensure that that they do not exceed these impact limits.

40 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in
41 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
42 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
43 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools

1 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection
2 and restoration would be achieved using the criteria presented above as well as by following the
3 other specific biological goals and objectives, which include:

- 4 • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 5 • Protecting the range of inundation characteristics that are currently represented by vernal pool
6 throughout the Plan Area (Objective VPNC1.4)

7 The effects on nonlisted vernal pool invertebrate habitat from Alternative 4 would represent an
8 adverse effect as a result of habitat modification of a special-status species and potential for direct
9 mortality in the absence of other conservation actions. However, the BDCP has committed to impact
10 limits for vernal pool habitat and to habitat protection, restoration, management and enhancement
11 associated with CM3, CM9, and CM11. These conservation activities would be guided by goals and
12 objectives, and by AMM1–AMM6, AMM10, AMM12, AMM30, and AMM37, which would be in place
13 throughout the BDCP permit term. Considering these commitments, Alternative 4 over the term of
14 the BDCP would not result in a substantial adverse effect through habitat modifications and would
15 not substantially reduce the number or restrict the range of nonlisted vernal pool invertebrates.
16 Therefore, Alternative 4 would have a less-than-significant impact on nonlisted vernal pool
17 invertebrates.

18 **Impact BIO-39: Indirect Effects of Plan Implementation on Nonlisted Vernal Pool** 19 **Invertebrates**

20 Construction and maintenance activities associated with water conveyance facilities, and restoration
21 actions could indirectly affect nonlisted vernal pool invertebrates and their habitat in the vicinity of
22 construction and restoration areas, and maintenance activities. These potential effects would be
23 minimized or avoided through AMM1–AMM6, and AMM10, which would be in effect throughout the
24 BDCP permit term.

25 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly
26 affect nonlisted vernal pool invertebrates and their habitat in the vicinity of construction areas.
27 Ground-disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment
28 could result in the inadvertent release of sediment and hazardous substances into this habitat.
29 These potential effects would be avoided and minimized through AMM1–AMM6, which would be in
30 effect throughout the BDCP permit term. Nonlisted vernal pool invertebrates and their habitat could
31 be periodically indirectly affected by maintenance activities at water conveyance facilities.
32 Embankment maintenance activities around Clifton Court Forebays could result in the inadvertent
33 discharge of sediments and hazardous materials into vernal pool habitat that occurs along the
34 southern and western boundaries of the forebays. These potential effects would be avoided and
35 minimized through AMM1–AMM6, which would be in effect throughout the BDCP permit term. The
36 indirect effects of plan implementation under Alternative 4 would not be adverse.

37 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance
38 facilities, and restoration actions could indirectly impact nonlisted vernal pool invertebrates and
39 their habitat in the vicinity of construction and restoration areas, and maintenance activities. These
40 potential impacts would be minimized or avoided through AMM1–AMM6, and AMM10, which would
41 be in effect throughout BDCP permit term. The indirect impacts of Alternative 4 would be less than
42 significant.

1 **Impact BIO-40: Periodic Effects of Inundation of Nonlisted Vernal Pool Invertebrates' Habitat**
2 **as a Result of Implementation of Conservation Components**

3 Flooding of the Yolo Bypass under *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
4 0 to 4 acres of modeled habitat for nonlisted vernal pool invertebrates (Table 12-4-15). There would
5 be no periodic effects from *CM5 Seasonally Inundated Floodplain Restoration*

6 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the
7 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,
8 periodic inundation could affect nonlisted vernal pool invertebrates occupying areas ranging from 0
9 acres of habitat during most notch flows to an estimated 4 acres during a notch flow of 6,000 cfs.
10 BDCP-associated inundation of areas that would not otherwise have been inundated is expected to
11 occur in no more than 30% of all years, because Fremont Weir is expected to overtop the remaining
12 70% of all years, and during those years notch operations would not typically affect the maximum
13 extent of inundation. In more than half of all years under Existing Conditions, an area greater than
14 the BDCP-related inundation area already inundates in the bypass. Yolo Bypass flooding is expected
15 to have a minimal effect on nonlisted vernal pool invertebrates and would thus not be adverse.

16 **CEQA Conclusion:** Alternative 4 would periodically inundate at most 4 acres of nonlisted vernal pool
17 invertebrates' habitat during the maximum flows over the Fremont Weir. The periodic inundation is
18 not anticipated to result in a conversion of nonlisted vernal pool invertebrates' habitat into different
19 wetland habitat. BDCP-associated inundation of areas that would not otherwise have been
20 inundated is expected to occur in no more than 30% of all years, because Fremont Weir is expected
21 to overtop the remaining 70% of all years, and during those years notch operations would not
22 typically affect the maximum extent of inundation. In more than half of all years under Existing
23 Conditions, an area greater than the BDCP-related inundation area already inundates in the bypass.
24 Yolo Bypass flooding is expected to have a minimal effect on nonlisted vernal pool invertebrates and
25 would thus result in less-than-significant impacts on the species.

26 **Sacramento and Antioch Dunes Anthicid Beetles**

27 This section describes the effects of Alternative 4, including water conveyance facilities construction
28 and implementation of other conservation components, on Sacramento and Antioch Dunes anthicid
29 beetles. Potential habitat in the study area includes the inland dune scrub at Antioch Dunes NWR,
30 sand bars along the Sacramento and San Joaquin Rivers, and sandy dredge spoil piles (California
31 Department of Fish and Game 2006c and 2006d).

32 The construction, and operations and maintenance of the water conveyance facilities under
33 Alternative 4 would not likely affect Sacramento and Antioch Dunes anthicid beetles. The
34 construction of the water conveyance structure and associated infrastructure would generally avoid
35 affects to channel margins where sand bars are likely to form. Conveyance construction would not
36 affect inland dune scrub habitat at Antioch Dunes NWR. No dredge spoil areas that could be
37 occupied by Sacramento anthicid beetle were identified within conveyance facilities footprints
38 during a review of Google Earth imagery. Also, a review of the locations of the Alternative 4 water
39 intake facilities on aerial imagery did not reveal any sandbars along the channel margins. These
40 portions of the Sacramento River have steep, riprap lined channel banks that are likely not
41 conducive to the formation of sandbars.

1 Implementation of BDCP restoration based conservation measures could affect habitat for
2 Sacramento and Antioch Dunes anthicid beetles. Both species are known to utilize interior sand
3 dunes and sandbar habitat. The only interior sand dune habitat within the Plan Area is at Antioch
4 Dunes, which would not be impacted by the Alternative 4 conservation measures. Both species are
5 known to occur along the Sacramento River and San Joaquin Rivers. The implementation of BDCP
6 restoration actions, and other covered activities could affect habitat for Sacramento and Antioch
7 Dunes anthicid beetles along channels throughout the Plan Area; however the extent of these
8 habitats in the Plan Area is unknown because these areas were not identified at the scale of mapping
9 done within the study area. Because of current and historic channel modifications (channel
10 straightening and dredging) and levee construction throughout the Delta, sandbar habitat is likely
11 very limited and restricted to channel margins. The implementation of *CM4 Tidal Natural*
12 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM6 Channel Margin*
13 *Enhancement* could impact sandbar habitat along the river channels and possibly sandy, dredge
14 piles on Delta islands.

15 Over the term of the BDCP, Alternative 4 would likely result in beneficial effects on Sacramento and
16 Antioch Dunes anthicid beetles. The following Alternative 4 objectives would generally increase
17 opportunities for the formation of sandbars in the Plan Area.

- 18 ● Restore 10,000 acres of seasonally inundated floodplain (Objective L2.11, associated with CM5).
- 19 ● Enhance 20 miles of channel margin habitat (Objective L2.12, associated with CM6).
- 20 ● Restore 5,000 acres of riparian habitat, with at least 3,000 acres occurring on restored
21 seasonally inundated floodplain. (VFRNC1.1, associated with CM7).

22 These measures would improve shoreline conditions by creating benches along levees, shallow
23 habitat along margins and in floodplains, and increasing shoreline vegetation, all of which would
24 likely contribute to the formation of sandbars along Delta river channels where these measures
25 would be implemented. Increasing the structural diversity of Delta river channel margins and
26 floodplains would create opportunities for sand to be deposited and for sandbars to subsequently
27 form. As explained below, potential impacts on Sacramento and Antioch Dunes anthicid beetle
28 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-17. Changes in Sacramento and Antioch Dunes Anthicid Beetles' Habitat Associated**
 2 **with Alternative 4 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2–CM18	UNK	UNK	UNK	UNK	0	UNK
Total Impacts CM2–CM18	UNK	UNK	UNK	UNK	0	UNK
TOTAL IMPACTS	UNK	UNK	UNK	UNK	0	UNK

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

UNK = unknown

3

4 **Impact BIO-41: Loss or Conversion of Habitat for and Direct Mortality of Sacramento and**
 5 **Antioch Dunes Anthicid Beetles**

6 Implementation of Alternative 4 conservation measures could affect Sacramento and Antioch Dunes
 7 anthicid beetles and their habitat. As mentioned above, the extent of this habitat in the study area is
 8 unknown but it is assumed that sand bars likely occur along to some degree along the Sacramento
 9 and San Joaquin Rivers and that some islands in the Delta may contain sandy dredge spoil piles. A
 10 review of Google Earth imagery in the north Delta did identify three general areas that appear to
 11 have accumulations of sandy soils (with some vegetation), possibly from dredge disposal, are
 12 Decker Island, the western portion of Bradford Island, and the southwestern tip of Grand Island. A
 13 review of Google Earth imagery in the south Delta did identify sandbar habitat along the San Joaquin
 14 River from the southern end of the Plan Area downstream to an area just west of Lathrop. An
 15 additional area along Paradise Cut was identified just north of I-5. Conservation measures that could
 16 result in impacts on Sacramento and Antioch Dunes anthicid beetles are tidal habitat restoration
 17 (CM4), floodplain restoration (CM5), and channel margin enhancement (CM6). In addition,
 18 maintenance activities associated with the long-term operation of the water conveyance facilities
 19 and other BDCP physical facilities could degrade or eliminate habitat for Sacramento and Antioch
 20 Dunes anthicid beetles. Each of these individual activities is described below. A summary statement
 21 of the combined impacts and NEPA and CEQA conclusions follows the individual conservation
 22 measure discussions.

- 23 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration could impact
 24 the areas of sandy soils identified from aerial photographs on Decker Island, the western

1 portion of Bradford Island, and on the southwestern tip of Grand Island because these areas fall
2 within the West Delta Restoration Opportunity Area (ROA). The West Delta ROA has been
3 identified in the BDCP (BDCP Chapter 3, Section 3.4.4, *Conservation Measure 4*,) as providing
4 opportunities for creating subtidal aquatic and tidal marsh habitats. The methods and
5 techniques identified in BDCP Chapter 3, Section 3.4.4.3.3, *Methods and Techniques*, that may be
6 used for tidal restoration include the recontouring of lands so that they have elevations suitable
7 for the establishment of marsh plains and the eventual breaching of levees. There are three
8 CNDDDB records of Sacramento anthicid beetle (just north of Rio Vista, one just south of Rio Vista
9 along the west shore of the Sacramento River, and one on Grand Island) and one CNDDDB record
10 of Antioch Dunes anthicid beetle (just north of Rio Vista) that fall within the West Delta ROA
11 (California Department of Fish and Wildlife 2013). Tidal restoration actions in the West Delta
12 ROA may eliminate potential habitat and impact occupied habitat of both Sacramento and
13 Antioch Dunes anthicid beetles.

- 14 • *CM5 Seasonally Inundated Floodplain Restoration*: Seasonally inundated floodplain restoration
15 could impact areas with sandbars that were identified in a review of aerial photographs. The
16 sandbars identified along the San Joaquin River and Paradise Cut are within the conceptual
17 corridors (Corridors 1a, 1b, 2a, and 4) identified in Figure 3.4-20 of the BDCP. There are four
18 CNDDDB records for Sacramento anthicid beetle in the conceptual corridor along the San Joaquin
19 River (California Department of Fish and Wildlife 2013). Floodplain restoration actions in these
20 conceptual corridors could impact potential habitat for both these species and occupied habitat
21 of Sacramento anthicid beetle.
- 22 • *CM6 Channel Margin Enhancement*: Channel margin enhancement could result in impacts on 20
23 miles of channel margin that could contain sandbars.

24 The following paragraphs summarize the combined effects discussed above and describe other
25 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
26 also included.

27 Alternative 4 could result in substantial affects on Sacramento and Antioch Dunes anthicid beetles
28 because all of the habitat identifiable from aerial photo review falls within either the West Delta
29 ROA, which is being considered for tidal restoration (CM4), or within three of the conceptual
30 corridors being considered for floodplain restoration (CM5). Furthermore, all seven of the records
31 for Sacramento anthicid beetle within the study area fall within areas being considered for
32 restoration (CM4 and CM5), which represent over half of the extant records for this species range
33 wide (7 of 13), and the only extant record for Antioch Dunes anthicid beetle, which represent one of
34 five extant records range wide, falls within the West Delta ROA that is just north of Rio Vista. These
35 occurrences could be affected by restoration if these areas are chosen as restoration projects.
36 However, over the term of the BDCP, implementation of conservation components would likely
37 benefit Sacramento and Antioch Dunes anthicid beetles. Under Alternative 4, CM5, CM6, and CM7,
38 would generally contribute to the formation of sandbar habitat in the Plan Area. These measures
39 would improve shoreline conditions by creating benches along levees (CM6), creating shallow
40 margin and floodplain habitat (CM5), and increasing shoreline vegetation (CM7), all of which would
41 likely contribute to the formation of sandbars along Delta river channels where these measures
42 would be implemented. Increasing the structural diversity of Delta river channel margins would
43 create areas of slow water that would allow for sand to be deposited and for sandbars to
44 subsequently form. Other factors relevant to effects on Sacramento and Antioch Dunes anthicid
45 beetles are listed below.

- 1 • The actual extent of suitable and occupied habitat for these species in the plan is unknown.
- 2 • The sandbar habitat occupied by Sacramento anthicid beetle along the San Joaquin River would
3 likely not be directly impacted where floodplain restoration occurs because the physical
4 disturbance would be to adjacent levees and agricultural areas. Though these actions would
5 change hydrologic conditions that could overtime remove the existing sandbars, the expanded
6 floodplain would create conditions suitable for the formation of new and possibly larger
7 sandbars.
- 8 • Floodplain restoration would be phased over a period of 30 years so that not all sandbar habitat
9 within these areas would be affected at once. Furthermore, as floodplain restoration is being
10 implemented new sandbar habitat would likely be forming prior and/or concurrent with future
11 floodplain restoration projects that may affect sandbar habitat on the San Joaquin River and/or
12 Paradise Cut.

13 **NEPA Effects:** The potential impacts on Sacramento and Antioch Dunes anthicid beetles associated
14 with Alternative 4 as a whole would represent an adverse effect as a result of habitat modification of
15 a special-status species and potential for direct mortality in the absence of other conservation
16 actions. However, with implementation of restoration associated with CM5, CM6, and CM7, which
17 would be phased throughout the time period when the impacts would be occurring, the effects of
18 Alternative 4 as a whole on Sacramento and Antioch Dunes anthicid beetles would not be adverse
19 under NEPA.

20 **CEQA Conclusion:** Alternative 4 would impact Sacramento and Antioch Dunes anthicid beetles'
21 habitat and could impact seven occurrences of Sacramento anthicid beetle and one occurrence of
22 Antioch Dunes anthicid beetle. However, over the term of the BDCP, implementation of conservation
23 components would likely benefit Sacramento and Antioch Dunes anthicid beetles. BDCP
24 conservation components, particularly conservation measures CM5, CM6, and CM7, would generally
25 contribute to the formation of sandbar habitat in the Plan Area. Floodplain restoration (CM5) would
26 be phased over a period of 30 years so that not all sandbar habitat within these areas would be
27 affected at once. Furthermore, as floodplain restoration is being implemented new sandbar habitat
28 would likely be forming prior and/or concurrent with future floodplain restoration projects that
29 may affect sandbar habitat on the San Joaquin River and/or Paradise Cut.

30 Considering that floodplain (CM5), channel margin enhancement (CM6), and riparian restoration
31 (CM7) would contribute to the replacement of and possible expansion of sandbar habitat in the
32 Delta and be phased throughout the time period when the impacts would be occurring, the
33 implementation of Alternative 4 as a whole would not result in a substantial adverse effect though
34 habitat modification and would not substantially reduce the number or restrict the range of these
35 species. Therefore, the alternative would have a less-than-significant impact on Sacramento and
36 Antioch Dunes anthicid beetles.

37 **Delta Green Ground Beetle**

38 Suitable habitat in the study area would be vernal pool complexes and annual grasslands in the
39 general Jepson Prairie area. The construction, and operations and maintenance of the water
40 conveyance facilities under Alternative 4 would not affect delta green ground beetle because the
41 facilities and construction area are outside the known range of the species. Implementation of
42 Alternative 4 could affect delta green ground beetle through the protection of grasslands and vernal
43 pool complex (CM3) in the vicinity of Jepson Prairie and the subsequent implementation of habitat

enhancement and management actions and recreational trail construction (CM11) in these areas. In addition, tidal natural communities restoration (CM4) and vernal pool and alkali seasonal wetland complex restoration (CM9) could result in potential impacts on delta green ground beetle and its habitat. Full implementation of Alternative 4 would likely result in beneficial effects on delta green ground beetle through the following conservation actions.

- Protect 2,000 acres of grassland in CZ 1 (Objective GNC1.1, associated with CM3).
- Protect 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective VPNC1.1, associated with CM3).
- Restore up to 67 acres of vernal pool complex in CZs 1, 8, and/or 11 (Objective VPNC1.2, associated with CM9).

These areas could contain currently occupied habitat for delta green ground beetle and/or create conditions suitable for eventual range expansion. As explained below, potential impacts on delta green ground beetle would be adverse for NEPA purposes and would be significant for CEQA purposes. Mitigation Measure BIO-42 would reduce the effects under NEPA and reduce the impacts to a less-than-significant level under CEQA.

Table 12-4-18. Changes in Delta Green Ground Beetle Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2–CM18	0	0	0	0	0	0
	0	0	0	0	0	0
Total Impacts CM2–CM18	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-42: Loss or Conversion of Habitat for and Direct Mortality of Delta Green Ground**
2 **Beetle**

3 Alternative 4 conservation measures could result in the conversion of habitat and/or direct
4 mortality to delta green ground beetle. Conservation measures that could affect delta green ground
5 beetle include tidal natural communities habitat restoration (CM4), vernal pool and alkali seasonal
6 wetland complex restoration (CM9), and habitat enhancement and management activities (CM11) in
7 CZ 1. CZ 1 is the only portion of the Plan Area that contains occupied and potential habitat for delta
8 green ground beetle. The range of the delta green ground beetle is currently believed to be generally
9 bound by Travis Air Force Base to the west, Highway 113 to the east, Hay Road to the north, and
10 Creed Road to the south (Arnold and Kavanaugh 2007; USFWS 2009). Further discussion of this
11 potential effect is provided below, and NEPA and CEQA conclusions follow.

- 12 • *CM4 Tidal Natural Communities Restoration:* Tidal restoration in the Cache Slough ROA could
13 result in the loss of delta green ground beetle habitat if restoration is planned in areas known to
14 be or potentially occupied by the species. CM4 identifies 5,000 acres of freshwater tidal natural
15 communities restoration in the Cache Slough ROA, and Lindsey Slough and Calhoun Cut have
16 been identified as areas suitable for restoration. Lindsey Slough is just east of Jepson Prairie, and
17 Calhoun Cut, which is off of Lindsey Slough (see Figure 12-1), goes into the general Jepson
18 Prairie area and is adjacent to areas of potential habitat for delta green ground beetle. The tidal
19 restoration methods and techniques identified in CM4 (see BDCP Chapter 3, Section 3.4.4.3.3,
20 *Methods and Techniques*) includes excavating channels; modifying ditches, cuts, and levees to
21 encourage tidal circulation; and scalping higher elevation areas to create marsh plains. These
22 disturbances could affect delta green ground beetle through habitat modification, either directly
23 or indirectly through hydrologic modifications, and/or result in direct mortality to the species.
24 No CNDDB records for delta green ground beetle are intersected by the hypothetical tidal
25 restoration footprints being used by the BDCP.
- 26 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration:* Vernal pool restoration may
27 occur in CZ 1 and could result in disturbance to delta green ground beetle habitat if restoration
28 is planned in areas known to be or potentially occupied by the species. These restoration
29 activities would most likely take place in areas that were historically vernal pool complexes that
30 have since been highly degraded, but which are suitable for vernal pool restoration. These areas
31 would not likely provide habitat for delta green ground beetle. However, if these activities do
32 take place in suitable habitat, then disturbances could result in direct mortality of the species.
33 Nevertheless, restoration ultimately would expand habitat available to the species.
- 34 • *CM11 Natural Communities Enhancement and Management:* As described in *CM3 Natural*
35 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in
36 CZ 1 and a portion of the 600 acres of protection and possibly some of the up to 10 wetted acres
37 of vernal pool restoration could also occur in CZ 1. Potential effects from CM11 could include
38 direct mortality to larvae and adults from the implementation of grassland management
39 techniques, which may include livestock grazing, prescribed burning, and mowing. In addition to
40 these grassland and vernal pool complex management actions, CM11 also includes guidelines
41 and techniques for invasive plant control, which may include manual control (hand-pulling and
42 digging), mechanical control (large equipment), and chemical control, though some of these
43 methods would be restricted in areas where rare plants occur or in critical habitat for vernal
44 pool species. The creation of new recreation trails as part of CM11 would result in impacts on
45 15.5 acres of grasslands within CZ 1, which could affect delta green ground beetle if present.

1 **NEPA Effects:** The protection of 2,000 acres of grassland in CZ 1 (CM3) and the protection of 600
2 acres of vernal pool complex and up to 10 wetted acres of vernal pool complex restoration, some of
3 which could occur in CZ 1 (CM3 and CM9) could benefit delta green ground beetle if these areas
4 occur within the range of the species. Tidal natural communities restoration (CM4), vernal pool and
5 alkali seasonal wetland complex restoration (CM9), and recreational trail construction and
6 subsequent enhancement and management actions (CM11) could impact delta green ground beetle.
7 The management of these grasslands and vernal pool complexes according to *CM11 Natural*
8 *Communities Enhancement and Management* and the construction of recreational trails in CZ 1 has a
9 potential to affect this species. AMM37 would ensure that new trails in vernal pool complexes be
10 sited at least 250 feet from wetland features, or closer if site-specific information indicates that local
11 watershed surrounding a vernal pool is not adversely affected. Direct mortality and/or the effects
12 to delta green ground beetle habitat would be an adverse effect under NEPA. Implementation of
13 mitigation measure BIO-42, *Avoid Impacts on Delta Green Ground Beetle and its Habitat*, would
14 reduce this effect.

15 **CEQA Conclusion:** The implementation of grassland and vernal pool complex protection (CM3), tidal
16 natural communities restoration (CM4), vernal pool and alkali seasonal wetland complex
17 restoration (CM9), and recreational trail construction and subsequent enhancement and
18 management actions (CM11) could impact delta green ground beetle. Tidal restoration projects
19 around Calhoun Cut and possible Lindsey Slough could affect habitat and result in direct mortality to
20 the species from excavating channels; modifying ditches, cuts, and levees to encourage tidal
21 circulation; and scalping higher elevation areas to create marsh plains. Potential impacts from CM11
22 could include direct mortality to larvae and adults resulting from the implementation of recreation
23 trail construction in 15.5 acres of grassland in CZ 1 and from grassland management techniques,
24 which may include livestock grazing, prescribed burning, and mowing. AMM37 would ensure that
25 new trails in vernal pool complexes be sited at least 250 feet from wetland features, or closer if site-
26 specific information indicates that local watershed surrounding a vernal pool is not adversely
27 affected. CM11 also includes guidelines and techniques for invasive plant control, which may include
28 manual control (hand-pulling and digging), mechanical control (large equipment), and chemical
29 control, though some of these methods would be restricted in areas where rare plants occur and in
30 critical habitat for vernal pool species. These actions could result in adverse effects through habitat
31 modification and a possible reduction in the number of the species or restrict its range, and
32 therefore result in significant impacts on delta green ground beetle. Implementation of Mitigation
33 Measure BIO-42, *Avoid Impacts on Delta Green Ground Beetle and its Habitat*, would reduce these
34 potential impacts to a less-than-significant level.

35 **Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat**

36 As part of the design and development of management plans for conservation areas in the area
37 of Jepson Prairie, BDCP proponents will implement the following measures to avoid effects on
38 delta green ground beetle.

- 39 • If habitat restoration or protection is planned for the lands adjacent to Calhoun Cut and
40 noncultivated lands on the western side of Lindsey Slough, these areas will be evaluated by a
41 USFWS approved biologist for potential delta green ground beetle habitat (large playa pools,
42 or other similar aquatic features, with low growing vegetation or bare soils around the
43 perimeter). The biologist will have previous experience with identifying suitable habitat
44 requirements for delta green ground beetle.

- 1 • Any suitable habitat identified by the biologist (with previous experience with delta green
2 ground beetle) within the species current range will be considered potentially occupied and
3 all ground disturbing covered activities in these areas will be avoided, which for the Plan
4 Area is generally the area west of State Route 113.
- 5 • Any other areas identified as suitable habitat outside of the current range of the species will
6 be surveyed by a biologist with previous experience in surveying for and identifying delta
7 green ground beetle. No ground disturbing covered activities will occur in areas identified as
8 occupied by delta green ground beetle.
- 9 • Based on the results of the habitat evaluations and surveys, site-specific restoration and
10 management plans will be developed so that they don't conflict with the recovery goals for
11 delta green ground beetle in the USFWS's 2005 *Recovery Plan for Vernal Pool Ecosystems of*
12 *California and Southern Oregon* (U.S. Fish and Wildlife Service 2005). Plans will include
13 measures to protect and manage for delta green ground beetle so that they continue to
14 support existing populations or allow for future colonization.

15 **Callippe Silverspot Butterfly**

16 This section describes the effects of Alternative 4 on callippe silverspot butterfly. Suitable habitats
17 are typically in areas influenced by coastal fog with hilltops that support the specie's host-plant,
18 Johnny jump-ups. Preferred nectar flowers used by adults include thistles, blessed milk thistle, and
19 coyote wild mint. Other native nectar sources include hairy false goldenaster, coast buckwheat,
20 mourning bride, and California buckeye. Suitable habitat in the Plan Area is located in CZ11 in the
21 Cordellia Hills west of I-680 and in the Potrero Hills on the northern edge of Suisun Marsh. The
22 construction, and operations and maintenance of the water conveyance facilities under Alternative 4
23 would not result in impacts on callippe silverspot butterfly or its habitat. If Cordelia Hills and
24 Potrero Hills are identified for grassland protection opportunities as part of *CM3 Natural*
25 *Communities Protection and Restoration* and the subsequent implementation of *CM11 Natural*
26 *Communities Enhancement and Management*, could affect callippe silverspot butterfly. Callippe
27 silverspot butterfly has been documented in the western most portion of the Plan Area (CZ 11) in
28 the Cordelia Hills (Solano County Water Agency 2009). Potential habitat for the species (grassy hills
29 with *Viola pedunculata*) is present in the Potrero Hills, but it has not been observed there (EDAW
30 2005, California Department of Fish and Wildlife 2013). Though CZ 11 has been identified as
31 potential area for grassland restoration in *CM8 Grassland Natural Community Restoration*, the
32 primary goal there is to restore small patches of grassland to connect to Jepson Prairie and/or the
33 restoration of upland grasses adjacent to tidal brackish emergent wetland in Suisun Marsh, both of
34 which would not be areas suitable for callippe silverspot butterfly. The full implementation of
35 Alternative 4 would protect up to 2,000 acres of grassland in CZ 11 (Objective GNC1.1, associated
36 with CM3), some of which may contain habitat for callippe silverspot butterfly. As explained below,
37 potential impacts on callippe silverspot would be adverse for NEPA purposes and would be
38 significant for CEQA purposes. Mitigation Measure BIO-43 would reduce the effects under NEPA and
39 reduce the impacts to a less-than-significant level under CEQA.

1 **Table 12-4-19. Changes in Callippe Silverspot Butterfly Habitat Associated with Alternative 4**
2 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2-CM18	0	0	0	0	0	0
	0	0	0	0	0	0
Total Impacts CM2-CM18	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-43: Loss or Conversion of Habitat for and Direct Mortality of Callippe Silverspot**
5 **Butterfly**

6 Alternative 4 conservation measures could result in the conversion of habitat and/or direct
7 mortality to callippe silverspot butterfly. Only one conservation measure was identified as
8 potentially affecting Callippe silverspot butterfly, *CM11 Natural Communities Enhancement and*
9 *Management*, which could result in the disturbance of callippe silverspot butterfly habitat if such
10 areas are acquired as part of grassland protection under *CM3 Natural Communities Protection and*
11 *Restoration*. Further discussion of this potential effect is provided below and NEPA and CEQA
12 conclusions follow.

13 As described in *CM3 Natural Communities Protection and Restoration*, up to 2,000 acres of grasslands
14 would be protected in CZ 11. If areas chosen for protection include Cordelia Hills or Potrero Hills,
15 where there is known and potential habitat, respectively, then grassland enhancement and
16 management actions could affect the callippe silverspot butterfly. Potential effects from CM11 could
17 include the loss of larval host and nectar sources and direct mortality to larvae and adults from the
18 installation of artificial nesting burrows and structures and the implementation of grassland
19 management techniques, which may include livestock grazing, prescribed burning, and mowing. In
20 addition to these grassland management actions, CM11 also includes guidelines and techniques for
21 invasive plant control, which may include manual control (hand-pulling and digging), mechanical
22 control (large equipment), and chemical control. Several of the preferred nectar sources are thistles,

1 some of which have been identified by the California Invasive Plant Council as having limited to
2 moderate ecological impacts (California Invasive Plant Council 2006).

3 **NEPA Effects:** The protection of 2,000 acres of grassland within CZ 11 could benefit callippe
4 silverspot butterfly if these protected areas include occupied and potential habitat on the hill tops in
5 Cordelia Hills and Potrero Hills. However, the management of these grasslands according to *CM11*
6 *Natural Communities Enhancement and Management* also has a potential to adversely affect this
7 species. Direct mortality and/or the removal of larval host plants and nectar sources for adults
8 would be an adverse effect under NEPA. Implementation of Mitigation Measure BIO-43, *Avoid and*
9 *Minimize Loss of Callippe Silverspot Butterfly Habitat*, would ensure the effect is not adverse.

10 **CEQA Conclusion:** If grasslands within the Cordelia Hills and Potrero Hills are protected as part of
11 *CM3 Natural Communities Protection and Restoration* then the subsequent management of these
12 grasslands according to *CM11 Natural Communities Enhancement and Management* has a potential to
13 affect this species. Potential impacts from CM11 could include the loss of larval host and nectar
14 sources and direct mortality to larvae and adults resulting from the installation of artificial nesting
15 burrows and structures and the implementation of grassland management techniques, which may
16 include livestock grazing, prescribed burning, and mowing. In addition to these grassland
17 management actions, CM11 also includes guidelines and techniques for invasive plant control, which
18 may include manual control (hand-pulling and digging), mechanical control (large equipment), and
19 chemical control, which could result in direct and indirect effects on larval host plants and nectar
20 plants. These actions could result in adverse effects through habitat modification and a possible
21 reduction in the number of the species or restrict its range and would therefore result in significant
22 impact on the species under CEQA. However, over the term of BDCP callippe silverspot butterfly
23 could benefit from the protection of occupied and potential habitat for the species with the
24 implementation of Mitigation Measure BIO-43, which would avoid and minimize effects from
25 management actions and thus reduce the potential impact to a less-than-significant level.

26 **Mitigation Measures BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly** 27 **Habitat**

28 As part of the development of site-specific management plans on protected grasslands in the
29 Cordelia Hills and/or Potrero Hills, BDCP proponents will implement the following measures to
30 avoid and minimize the loss of callippe silverspot habitat.

- 31 • Hilltops in Cordelia Hills and Potrero Hills will be surveyed for callippe silverspot larval host
32 plants (Johnny jump-ups) by a biologist familiar with identifying this plant species. These
33 surveys should occur during the plant's blooming period (typically early January through
34 April)
- 35 • If larval host plants are present, then presence/absence surveys for callippe silverspot
36 butterfly larvae will be conducted according to the most recent USFWS approved survey
37 methods by a biologist with previous experience in surveying for and identifying callippe
38 larvae and/or signs of larval presence. These surveys should be conducted prior to the adult
39 flight season, which usually starts in mid-May.
- 40 • If larvae are detected then no further surveys are necessary. If larvae are not detected then
41 surveys for adults will be conducted by a biologist familiar with surveying for and
42 identifying callippe silverspot. Surveys typically start in mid-May and continue weekly for 8
43 to 10 weeks.

- If callippe silverspot butterflies are detected, then the site-specific management plans will be written to include measures to protect and manage for larval host plants and nectar sources so that they continue to support existing populations and/or allow for future colonization. Mapping of both larval host plants and nectar sources will be incorporated into the management plans.

California Red-Legged Frog

Modeled California red-legged frog habitat in the study area is restricted to freshwater aquatic and grassland habitat, and immediately adjacent cultivated lands along the study area's southwestern edge in CZ 7, CZ 8, CZ 9, and CZ 11. Pools in perennial and seasonal streams and stock ponds provide potential aquatic habitat for this species. While stock ponds are underrepresented as a modeled habitat, none is expected to be affected by BDCP actions.

Construction and restoration associated with Alternative 4 conservation measures would result in both temporary and permanent losses of California red-legged frog modeled habitat as indicated in Table 12-4-20. Factors considered in assessing the value of affected habitat for the California red-legged frog, to the extent that information is available, are presence of limiting habitat (aquatic breeding habitat), known occurrences and clusters of occurrences, proximity of the affected habitat to existing protected lands, and the overall degraded or fragmented nature of the habitat. The study area represents the extreme eastern edge of the species' coastal range, and species' occurrences are reported only from CZ 8 and CZ 11. Full implementation of Alternative 4 would also include the following biological objectives over the term of the BDCP to benefit the California red-legged frog (see BDCP Chapter 3, *Conservation Strategy*).

- Increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of nonnative species (Objective L2.6, associated with CM11, CM13, and CM20).
- Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- Protect stock ponds and other aquatic features within protected grasslands to provide aquatic breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with CM3)
- Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with CM11).
- Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and duration and suitable composition of vegetative cover to support breeding for covered amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

As explained below, with the restoration and protection of these amounts of habitat, in addition to implementation of AMMs, impacts on California red-legged frog would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-4-20. Changes in California Red-Legged Frog Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic	1	1	0	0	NA	NA
	Upland	21	21	32	32	NA	NA
Total Impacts CM1		21	21	32	32	NA	NA
CM2–CM18	Aquatic	0	0	0	0	0	0
	Upland	8	24	0	0	0	0
Total Impacts CM2–CM18		8	24	0	0	0	0
TOTAL IMPACTS		29	45	32	32	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-44: Loss or Conversion of Habitat for and Direct Mortality of California Red-**
5 **Legged Frog**

6 Alternative 4 conservation measures would result in the permanent and temporary loss combined
7 of up to 1 acre of modeled aquatic habitat and 77 acres of modeled upland habitat for California red-
8 legged frog (Table 12-4-20). Conservation measures that would result in these losses are
9 conveyance facilities and transmission line construction (CM1) and recreational facility construction
10 for CM11. Construction activities associated with the water conveyance facilities and recreational
11 facilities, including operation of construction equipment, could result in temporary effects on, as
12 well as injury and mortality of, California red-legged frogs. In addition, natural enhancement and
13 management activities (CM11), which include ground disturbance or removal of nonnative
14 vegetation, could result in local adverse habitat effects. In addition, maintenance activities
15 associated with the long-term operation of the water conveyance facilities and other BDCP physical
16 facilities could degrade or eliminate California red-legged frog habitat including injury and mortality
17 of California red-legged frogs. Each of these individual activities is described below. A summary
18 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual
19 conservation measure discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 4, including transmission line
21 construction, would result in the permanent loss of up to 1 acre of aquatic habitat and 21 acres
22 of upland habitat for California red-legged frog in CZ 8 (Table 12-4-20). Permanent effects
23 would be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension
24 and installation of cross culverts, installation of structural hardscape, and installation and

1 relocation of utilities. Construction-related effects would temporarily disturb 32 acres of upland
2 habitat for the California red-legged frog (Table 12-4-20). Although there are no California red-
3 legged frog occurrences that overlap with the CM1 construction footprint there are a number of
4 occurrences to the west of Clifton Court Forebay.

- 5 • *CM11 Natural Communities Enhancement and Management*: Based on the recreation
6 assumptions described in BDCP Chapter 4, *Covered Activities and Associated Federal Actions*, an
7 estimated 24 acres of upland cover and dispersal habitat for the California red-legged frog
8 would be removed as a result of constructing trails and associated recreational facilities. Passive
9 recreation in the reserve system could result in trampling and disturbance of egg masses in
10 water bodies, degradation of water quality through erosion and sedimentation, and trampling of
11 sites adjacent to upland habitat used for cover and movement. However, *AMM37 Recreation*
12 requires protection of water bodies from recreational activities and requires trail setbacks from
13 wetlands. With these restrictions, recreation related effects on California red-legged frog are
14 expected to be minimal.

15 Activities associated with natural communities enhancement and management in protected
16 California red-legged frog habitat, such as ground disturbance or herbicide use to control
17 nonnative vegetation, could result in local adverse habitat effects on, and injury or mortality of,
18 California red-legged frogs. These effects would be avoided and minimized with implementation
19 of the AMMs discussed below. Herbicides would only be used in California red-legged frog
20 habitat in accordance with the written recommendation of a licensed, registered pest control
21 advisor and in conformance with label precautions and federal, state, and local regulations in a
22 manner that avoids or minimizes harm to the California red-legged frog.

- 23 • Critical habitat: Several conservation measures would be implemented in California red-legged
24 frog habitat and designated critical habitat in CZ 8 and CZ 11. Approximately 2,460 acres of
25 designated critical habitat for the California red-legged frog overlaps with the study area along
26 the western edge of CZ 11 in critical habitat unit SOL-1. An additional 862 acres of designated
27 critical habitat is also present along the western edge of CZ 8 in critical habitat unit ALA-2.
28 Conservation actions to protect and enhance grassland habitat for covered species, including
29 California red-legged frog, in CZ 8 could include acquisition and enhancement of designated
30 critical habitat for the California red-legged frog and California tiger salamander. Any habitat
31 enhancement actions for these species in designated critical habitat are expected to enhance the
32 value of any affected designated critical habitat for conservation of California red-legged frog.
33 These actions would result in an overall benefit to California red-legged frog within the study
34 area through protection and management of grasslands with associated intermittent stream
35 habitat and through restoration of vernal pool complex habitat and its associated grassland
36 habitat.

- 37 • Operations and maintenance: Ongoing water conveyance facilities operation and maintenance is
38 expected to have little if any adverse effect on the California red-legged frog. Postconstruction
39 operation and maintenance of the above-ground water conveyance facilities could result in
40 ongoing but periodic postconstruction disturbances that could affect California red-legged frog
41 use of the surrounding habitat. Operation of maintenance equipment, including vehicle use
42 along transmission corridors in CZ 8, could also result in injury or mortality of California red-
43 legged frogs if present in work sites. Implementation conservation actions and AMM1–AMM6,
44 AMM10, AMM14, and AMM37, would reduce these effects.

- 1 • Injury and direct mortality: Construction activities associated with the water conveyance
2 facilities, vernal pool complex restoration, and habitat and management enhancement-related
3 activities, including operation of construction equipment, could result in injury or mortality of
4 California red-legged frogs. Breeding, foraging, dispersal, and overwintering behavior may be
5 altered during construction activities, resulting in injury or mortality of California red-legged
6 frog. Frogs occupying burrows could be trapped and crushed during ground-disturbing
7 activities. Degradation and loss of estivation habitat is also anticipated to result from the
8 removal of vegetative cover and collapsing of burrows. Injury or mortality would be avoided and
9 minimized through implementation of seasonal constraints and preconstruction surveys in
10 suitable habitat, collapsing unoccupied burrows, and relocating frogs outside of the construction
11 area as described in AMM1–AMM6, AMM10, AMM14, and AMM37.

12 The following paragraphs summarize the combined effects discussed above and describe other
13 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
14 also included.

15 ***Near-Term Timeframe***

16 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
17 the near-term BDCP conservation strategy has been evaluated to determine whether it would
18 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
19 effects of construction would not be adverse under NEPA

20 Alternative 4 would result in permanent and temporary effects combined on approximately 1 acre
21 of aquatic habitat and 61 acres of upland habitat for California red-legged frog. The effects would
22 result from construction of the water conveyance facilities (CM1, 53 acres) and recreational facilities
23 (CM11, 8 acres).

24 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
25 and that are identified in the biological goals and objectives for California red-legged frog in Chapter
26 3, *Conservation Strategy*, of the BDCP would be 1:1 for restoration and 1:1 for protection of nontidal
27 wetlands and 2:1 for protection of grassland habitats. Using these ratios would indicate that 1 acre
28 of aquatic habitat should be restored, 1 acre of aquatic habitat should be protected, and 122 acres of
29 grassland should be protected for California red-legged frog to mitigate the near-term losses.

30 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area
31 (see Table 3-4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of
32 grassland in CZ 8, west of Byron Highway, would benefit California red-legged frog by providing
33 habitat in the portion of the Plan Area with the highest long-term conservation value for the species
34 based on known species occurrences and large, contiguous habitat areas (Objective GNC1.1).
35 Consistent with Objective GNC1.3, ponds and other aquatic features within the grasslands would be
36 protected to provide aquatic habitat for this species, and surrounding grassland would provide
37 dispersal and aestivation habitat which would compensate for the loss of 1 acre of aquatic habitat. In
38 addition, aquatic features in grasslands would be maintained and enhanced to provide suitable
39 inundation depth and duration to support breeding habitat for covered amphibians (Objective
40 GNC2.5).

41 These conservation actions would occur in the same timeframe as the construction losses, thereby
42 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives
43 represent performance standards for considering the effectiveness of CM3 protection and

1 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
2 and the additional detail in the biological objectives for California red-legged frog satisfy the typical
3 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-
4 term effects of the other conservation measures.

5 The plan also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*
6 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
7 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
8 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*
9 *Material, AMM10 Restoration of Temporarily Affected Natural Communities, AMM14 California Red-*
10 *Legged Frog, and AMM37 Recreation.* These AMMs include elements that avoid or minimize the risk
11 of affecting individuals and species habitats adjacent to work areas and storage sites. BDCP
12 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
13 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

14 **Late Long-Term Timeframe**

15 The habitat model indicates that the study area supports approximately 159 acres of aquatic habitat
16 and 7,766 acres of upland habitat for California red-legged frog. Alternative 4 as a whole would
17 result in the permanent loss of and temporary effects on 1 acre of aquatic habitat and 77 acres of
18 upland habitat for California red-legged frog for the term of the plan (less than 1% of the total
19 aquatic habitat in the study area and approximately 1% of the total upland habitat in the study
20 area). The 1 acre of aquatic habitat that would be permanently lost is not known to be used for
21 breeding. Most of the California red-legged frog upland habitat that would be removed consists of
22 naturalized grassland or cultivated land in a highly disturbed or modified setting on lands
23 immediately adjacent to Clifton Court Forebay. The removed upland cover and dispersal habitat is
24 within 0.5 mile of a cluster of known California red-legged frog occurrences to the west. However,
25 this habitat consists mostly of cultivated lands and small patches of grasslands, and past and current
26 surveys in this area have not found any evidence that this habitat is being used (see Appendix 12C,
27 *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*).

28 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (see
29 Table 3-4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of grassland in
30 CZ 8 west of Byron Highway would benefit the California red-legged frog by providing habitat in the
31 portion of the study area with the highest long-term conservation value for the species based on
32 known species occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with
33 Objective GNC1.3, ponds and other aquatic features in the grasslands would also be protected to
34 provide aquatic habitat for this species, and the surrounding grassland would provide dispersal and
35 aestivation habitat. Aquatic features in the protected grasslands in CZ 8 would be maintained and
36 enhanced to provide suitable inundation depth and duration and suitable composition of vegetative
37 cover to support breeding California red-legged frogs (Objective GNC2.5). Additionally, livestock
38 exclusion from streams and ponds and other measures would be implemented as described in CM11
39 to promote growth of aquatic vegetation with appropriate cover characteristics favorable to
40 California red-legged frogs. Lands protected in CZ 8 would connect with lands protected under the
41 *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros Watershed lands, including
42 grassland areas supporting this species. This objective would ensure that California red-legged frog
43 upland and associated aquatic habitats would be protected and enhanced in the largest possible
44 patch sizes adjacent to occupied habitat within and adjacent to the study area.

1 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
2 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above, as
3 well as the restoration of tidal freshwater emergent wetland, grassland, valley/foothill riparian, and
4 vernal pool complex that could overlap with the species model, would result in the restoration of 16
5 acres of aquatic and 351 acres of upland modeled habitat for California red-legged frog. In addition,
6 protection of managed wetland, grassland, valley/foothill riparian, and vernal pool complex could
7 overlap with the species model and would result in the protection of 3 acres of aquatic and 1,047
8 acres of upland California red-legged frog modeled habitat.

9 **NEPA Effects:** In the near-term, the loss of California red-legged frog habitat under Alternative 4
10 would be not be adverse because the BDCP has committed to protecting and restoring the acreage
11 required to meet the typical mitigation ratios described above. In the late long-term, the losses of
12 California red-legged frog aquatic and upland habitat associated with Alternative 4, in the absence of
13 other conservation actions, would represent an adverse effect as a result of habitat modification and
14 potential direct mortality of a special-status species. However, with habitat protection and
15 restoration associated with the conservation components, guided by landscape-scale goals and
16 objectives and by AMM1-AMM6, AMM10, AMM14, and AMM37, the effects of Alternative 4 as a
17 whole on California red-legged frog would not be adverse.

18 **CEQA Conclusion:**

19 **Near-Term Timeframe**

20 Because the water conveyance facilities construction is being evaluated at the project level, the near-
21 term BDCP conservation strategy has been evaluated to determine whether it would provide
22 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impact of
23 conveyance facilities construction would be less than significant under CEQA.

24 Alternative 4 would result in permanent and temporary effects combined on approximately 1 acre
25 of aquatic habitat and 61 acres of upland terrestrial cover habitat for California red-legged frog. The
26 effects would result from construction of the water conveyance facilities (CM1, 53 acres and CM11, 8
27 acres).

28 Typical CEQA project-level mitigation ratios of 1:1 for restored and 1:1 protected for nontidal
29 wetlands and a ratio of 2:1 for protected grassland habitats would indicate that 1 acre of aquatic
30 habitat should be protected, 1 acre of aquatic habitat should be protected, and 122 acres of
31 grassland should be protected in for California red-legged frog to mitigate the near-term losses.

32 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area
33 (see Table 3-4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of
34 grassland in CZ 8, west of Byron Highway, will benefit California red-legged frog by providing
35 habitat in the portion of the Plan Area with the highest long-term conservation value for the species
36 based on known species occurrences and large, contiguous habitat areas (Objective GNC1.1).
37 Consistent with Objective GNC1.3, ponds and other aquatic features within the grasslands will be
38 protected to provide aquatic habitat for this species, and surrounding grassland will provide
39 dispersal and aestivation habitat which would compensate for the loss of 1 acre of aquatic habitat. In
40 addition, aquatic features in grasslands would be maintained and enhanced to provide suitable
41 inundation depth and duration to support breeding habitat for covered amphibians (Objective
42 GNC2.5 in Chapter 3, *Conservation Strategy*, of the BDCP).

1 These conservation actions would occur in the same timeframe as the construction losses, thereby
2 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives
3 represent performance standards for considering the effectiveness of CM3 protection and
4 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
5 and the additional detail in the biological objectives for California red-legged frog satisfy the typical
6 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-
7 term effects of the other conservation measures.

8 The BDCP also contains commitments to implement AMM1–AMM6, AMM10, AMM14, and AMM37.
9 These AMMs include elements that avoid or minimize the risk of affecting individuals and species
10 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
11 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
12 *AMMs, and CMs*, of the Final EIR/EIS.

13 These commitments are more than sufficient to support the conclusion that the near-term effects of
14 Alternative 4 on California red-legged frog would be less than significant, because the number of
15 acres required to meet the typical ratios described above would be only 1 acre of aquatic habitat
16 restored, 1 acre of aquatic habitat protected, and 106 acres of upland communities protected.

17 ***Late Long-Term Timeframe***

18 The habitat model indicates that the study area supports approximately 159 acres of aquatic habitat
19 and 7,766 acres of upland habitat for California red-legged frog. Alternative 4 as a whole would
20 result in the permanent loss of and temporary effects on 1 acre of aquatic habitat and 77 acres of
21 upland habitat for California red-legged frog for the term of the plan (less than 1% of the total
22 aquatic habitat in the study area and approximately 1% of the total habitat in the study area). The 1
23 acre of aquatic habitat that would be permanently lost is not known to be used for breeding. Most of
24 the California red-legged frog upland habitat that would be removed consists of naturalized
25 grassland or cultivated land in a highly disturbed or modified setting on lands immediately adjacent
26 to Clifton Court Forebay. The removed upland cover and dispersal habitat is within 0.5 mile of a
27 cluster of known California red-legged frog occurrences to the west. However, this habitat consists
28 mostly of cultivated lands and small patches of grasslands, and past and current surveys in this area
29 have not found any evidence that this habitat is being used (see Appendix 12C, *2009 to 2011 Bay*
30 *Delta Conservation Plan EIR/EIS Environmental Data Report*).

31 The BDCP has committed to long-term protection of up to 8,000 acres grassland in the Plan Area
32 (see Table 3-4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of
33 grassland in CZ 8 west of Byron Highway would benefit the California red-legged frog by providing
34 habitat in the portion of the study area with the highest long-term conservation value for the species
35 based on known species occurrences and large, contiguous habitat areas (Objective GNC1.1).
36 Consistent with Objective GNC1.3, ponds and other aquatic features in the grasslands would also be
37 protected to provide aquatic habitat for this species, and the surrounding grassland would provide
38 dispersal and aestivation habitat. Aquatic features in the protected grasslands in CZ 8 would be
39 maintained and enhanced to provide suitable inundation depth and duration and suitable
40 composition of vegetative cover to support breeding California red-legged frogs (Objective GNC2.5).
41 Additionally, livestock exclusion from streams and ponds and other measures would be
42 implemented as described in CM11 to promote growth of aquatic vegetation with appropriate cover
43 characteristics favorable to California red-legged frogs. Lands protected in CZ 8 would connect with
44 lands protected under the *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros

1 Watershed lands, including grassland areas supporting this species. This objective would ensure
2 that California red-legged frog upland and associated aquatic habitats would be protected and
3 enhanced in the largest possible patch sizes adjacent to occupied habitat within and adjacent to the
4 Plan Area.

5 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
6 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above, as
7 well as the restoration of tidal freshwater emergent wetland, grassland, valley/foothill riparian, and
8 vernal pool complex that could overlap with the species model, would result in the restoration of 16
9 acres of aquatic and 351 acres of upland modeled habitat for California red-legged frog. In addition,
10 protection of managed wetland, grassland, valley/foothill riparian, and vernal pool complex could
11 overlap with the species model and would result in the protection of 3 acres of aquatic and 1,047
12 acres of upland California red-legged frog modeled habitat.

13 In the absence of other conservation actions, the losses of California red-legged frog aquatic and
14 upland habitat associated with Alternative 4 would represent a significant impact as a result of
15 habitat modification and potential direct mortality of a special-status species. However, with habitat
16 protection and restoration associated with the conservation components, guided by landscape-scale
17 goals and objectives and AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative 4
18 would have a less-than-significant impact on California red-legged frog.

19 **Impact BIO-45: Indirect Effects of Plan Implementation on California Red-Legged Frog**

20 Noise and visual disturbance including artificial nighttime lighting outside the project footprint but
21 within 500 feet of construction activities are indirect effects that could temporarily affect the use of
22 California red-legged frog habitat, all of which is upland cover and dispersal habitat. The areas to be
23 affected are near Clifton Court Forebay, and no California red-legged frogs were detected during
24 recent surveys conducted by DWR in this area (see Appendix 12C, *2009 to 2011 Bay Delta*
25 *Conservation Plan EIR/EIS Environmental Data Report*).

26 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment
27 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability
28 of California red-legged frog habitat downstream of the construction area by filling in pools and
29 smothering eggs. Accidental spills of toxic fluids also could result in the subsequent loss of California
30 red-legged frog if these materials enter the aquatic system. Hydrocarbon and heavy metal pollutants
31 associated with roadside runoff also have the potential to enter the aquatic system, affecting water
32 quality and California red-legged frog.

33 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM14, and AMM37 as part of
34 implementing Alternative 4 would avoid the potential for adverse effects on California red-legged
35 frogs, either indirectly or through habitat modifications. These AMMs would also avoid and
36 minimize effects that could substantially reduce the number of California red-legged frogs, or
37 restrict the species' range. Therefore, the indirect effects of Alternative 4 would not have an adverse
38 effect on California red-legged frog.

39 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance, as well
40 as construction-related noise and visual disturbances including artificial nighttime lighting, could
41 impact California red-legged frog in aquatic and upland habitats. The use of mechanical equipment
42 during construction could cause the accidental release of petroleum or other contaminants that
43 could impact California red-legged frog or its prey. The inadvertent discharge of sediment or

1 excessive dust adjacent to California red-legged frog habitat could also have a negative impact on the
2 species or its prey. With implementation of AMM1–AMM6, AMM10, AMM14, and AMM37,
3 Alternative 4 construction, operation, and maintenance under Alternative 4 would avoid the
4 potential for significant impacts on California red-legged frog, either indirectly or through habitat
5 modifications, and would not result in a substantial reduction in numbers or a restriction in the
6 range of California red-legged frogs. The indirect effects of Alternative 4 would have a less-than-
7 significant impact on California red-legged frogs.

8 **California Tiger Salamander**

9 Modeled California tiger salamander habitat in the study area contains two habitat types: terrestrial
10 cover and aestivation habitat, and aquatic breeding habitat and is restricted to CZ 1, CZ 2, CZ 4, CZ 5,
11 CZ 7, CZ 8, and CZ 11 (Figure 12-14). Modeled terrestrial cover and aestivation habitat contains all
12 grassland types and alkali seasonal wetland with a minimum patch size of 100 acres and within a
13 geographic area defined by species records and areas most likely to support the species. Patches of
14 grassland that were below the 100-acre minimum patch size but were contiguous with grasslands
15 outside of the study area boundary were included. Modeled aquatic breeding habitat for the
16 California tiger salamander includes vernal pools and seasonal and perennial ponds.

17 California tiger salamander occurs within the study area in CZ 8 west of Clifton Court Forebay and in
18 CZ 11 in the Potrero Hills (Figure 12-14). Potential habitat exists in vernal pool habitats in Yolo and
19 Solano Counties (CZs 1, 2, and 3) west of Liberty Island and in the vicinity of Stone Lakes and the
20 Cosumnes River Preserve in Sacramento County (CZ 4). DWR found California tiger salamander west
21 of Clifton Court Forebay in the same vicinity as several of the CNNDDB records (California
22 Department of Fish and Wildlife 2013) (see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
23 *EIR/EIS Environmental Data Report*). There is also a small, isolated population near Manteca, south
24 of Highway 120 in CZ 7.

25 Factors considered in assessing the value of affected habitat for California tiger salamander, to the
26 extent that information is available, include presence of limiting habitat (aquatic breeding habitat),
27 known occurrences and clusters of occurrences, proximity of the affected habitat to existing
28 protected lands, and the overall degraded or fragmented nature of the habitat. While conservation
29 measures implemented in other CZs could have potential effects on California tiger salamander,
30 those activities in CZ 8 and CZ 11 are considered to have a proportionately larger effect due to their
31 closer proximity to known occurrences of the species.

32 Alternative 4 is expected to result in the temporary, permanent, and periodic removal of upland
33 habitat that California tiger salamander uses for cover and dispersal (Table 12-4-21). Potential
34 aquatic habitat for this species would not be affected. While stock ponds are underrepresented as a
35 modeled habitat, none is expected to be affected by BDCP actions. Full implementation of Alternative
36 4 would also include the following biological objectives over the term of the BDCP to benefit the
37 California tiger salamander (BDCP Chapter 3, *Conservation Strategy*).

- 38 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
39 between existing conservation lands (Objective L1.6, associated with CM3).
- 40 ● Increase native species diversity and relative cover of native plant species, and reduce the
41 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).

- 1 • Protect and improve habitat linkages that allow terrestrial covered and other native species to
2 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
3 associated with CM3, CM8, and CM11).
- 4 • Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
5 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 6 • Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali
7 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).
- 8 • Increase burrow availability for burrow-dependent species in grasslands surrounding alkali
9 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective
10 ASWNC2.3, associated with CM11).
- 11 • Protect 600 acres of existing vernal pool complex in in CZ 1, CZ 8, and/or CZ 11, primarily in
12 core vernal pool recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of*
13 *California and Southern Oregon* (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,
14 associated with CM3).
- 15 • Restore vernal pool complex in in CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool
16 acreage (up to 67 acres of vernal pool complex restoration, assuming that all anticipated
17 impacts [10 wetted acres] occur and that the restored vernal pool complex has 15% density of
18 vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).
- 19 • Increase the size and connectivity of protected vernal pool complex within the Plan Area and
20 increase connectivity with protected vernal pool complex adjacent to the Plan Area (Objective
21 VPNC1.3, associated with CM3).
- 22 • Protect the range of inundation characteristics that are currently represented by vernal pools
23 throughout the Plan Area (Objective VPNC1.4, associated with CM3).
- 24 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 25 • Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective
26 GNC1.2, associated with CM3 and CM8).
- 27 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic
28 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with
29 CM3).
- 30 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
31 CM11).
- 32 • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and
33 duration and suitable composition of vegetative cover to support breeding for covered
34 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

35 As explained below, with the restoration or protection of these amounts of habitat, in addition to the
36 implementation of AMMs, impacts on California tiger salamander would not be adverse for NEPA
37 purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-21. Changes in California Tiger Salamander Modeled Habitat Associated with**
2 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic	0	0	0	0	NA	NA
	Upland	19	19	32	32	NA	NA
Total Impacts CM1		19	19	32	32	NA	NA
CM2–CM18	Aquatic	0	0	0	0	0	0
	Upland	292	634	0	0	191–639	0
Total Impacts CM2–CM18		292	634	0	0	191–639	0
TOTAL IMPACTS		311	653	32	32	191–639	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-46: Loss or Conversion of Habitat for and Direct Mortality of California Tiger**
5 **Salamander**

6 Alternative 4 conservation measures would result in the permanent and temporary loss combined
7 of up to 685 acres of modeled upland habitat for California tiger salamander (Table 12-4-21). There
8 would be no effects on aquatic habitat. Conservation measures that would result in these losses are
9 conveyance facilities and transmission line construction, and establishment and use of RTM, borrow,
10 and spoils areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat restoration
11 (CM4), construction of recreation facilities (CM11), and construction of a conservation fish hatchery
12 (CM18). Habitat enhancement and management activities (CM11), which include ground
13 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In
14 addition, maintenance activities associated with the long-term operation of the water conveyance
15 facilities and other BDCP physical facilities could degrade or eliminate California tiger salamander
16 habitat. Each of these individual activities is described below. A summary statement of the combined
17 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure
18 discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities,
20 including transmission lines, would result in the permanent loss of 19 acres of upland habitat
21 for California tiger salamander habitat, primarily in CZ 8 (Table 12-4-21). Permanent effects
22 would be associated with RTM, borrow, and spoils areas, grading, paving, excavating, extension
23 and installation of cross culverts, installation of structural hardscape, and installation and

1 relocation of utilities. Construction-related effects would temporarily disturb 32 acres of upland
 2 habitat for the California tiger salamander (Table 12-4-21). There is one California tiger
 3 salamander occurrence just south of the City of Byron that overlaps with the area of temporary
 4 effects. The area that would be affected by conveyance facilities construction is south of Clifton
 5 Court Forebay, where modeled California tiger salamander habitat is of relatively low value in
 6 that it consists of fragmented patches of primarily terrestrial habitat surrounded by actively
 7 cultivated lands. The highest concentration of California tiger salamander occurrences are in CZ
 8 8 and west of the conveyance facilities alignment, while lands to the east consist primarily of
 9 actively cultivated lands that are not suitable for the species. Habitat loss in this area is not
 10 expected to contribute to habitat fragmentation or impede important California tiger
 11 salamander dispersal.

12 ● *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the
 13 permanent removal of approximately 42 acres of terrestrial cover and aestivation habitat for the
 14 California tiger salamander in the late long-term. The modeled habitat in the Yolo Bypass is of
 15 low potential for California tiger salamander: There have been no observations of California
 16 tiger salamander in this area based on the results of a number of surveys for vernal pool
 17 invertebrates and plants and the bypass lacks vernal pool complexes with large, deep pools or
 18 large grassland areas with stock ponds and similar aquatic features that hold water long enough
 19 to provide potential breeding habitat for this species.

20 ● *CM4 Tidal Natural Communities Restoration*: This activity would result in the permanent
 21 removal of approximately 517 acres of terrestrial cover and aestivation habitat in the study area
 22 in the late long-term. Tidal restoration in the Cache Slough area would result in habitat loss
 23 along the edges of Lindsey Slough and Duck Slough, and adjacent to cultivated land along the
 24 eastern edge of a block of modeled habitat. The modeled aquatic breeding habitat nearby the
 25 hypothetical tidal restoration footprint is of relatively high value, consisting of vernal pool
 26 complex along Lindsey Slough within the Jepson Prairie area in and near open space. The Jepson
 27 Prairie area includes numerous California tiger salamander CNDDDB recorded occurrences and
 28 overlaps with Critical Habitat Unit 2, Jepson Prairie Unit, for this species. However, the
 29 hypothetical tidal restoration footprint does not overlap with critical habitat or recorded
 30 occurrences in this area. The tidal restoration at Lindsey Slough would occur along the
 31 northeastern edge of the Jepson Prairie block of habitat and would not contribute to
 32 fragmentation. Because the estimates of habitat loss resulting from tidal inundation are based
 33 on projections of where restoration may occur, actual effects are expected to be lower because
 34 of the ability to select sites that minimize effects on California tiger salamander.

35 ● *CM11 Natural Communities Enhancement and Management*: Based on the recreation
 36 assumptions described in BDCP Chapter 4, *Covered Activities and Associated Federal Actions*, an
 37 estimated 40 acres of terrestrial cover and aestivation habitat for the California tiger
 38 salamander would be removed as a result of constructing trails and associated recreational
 39 facilities. Passive recreation in the reserve system could result in trampling and disturbance of
 40 eggs and larvae in water bodies, degradation of water quality through erosion and
 41 sedimentation, and trampling of sites adjacent to upland habitat used for cover and movement.
 42 However, *AMM37 Recreation* requires protection of water bodies from recreational activities
 43 and requires trail setbacks from wetlands. With these restrictions, recreation related effects on
 44 California tiger salamander are expected to be minimal.

45 Habitat enhancement- and management-related activities in protected California tiger
 46 salamander habitats would result in overall improvements to and maintenance of California

1 tiger salamander habitat values over the term of the BDCP. Activities associated with natural
2 communities enhancement and management over the term of the BDCP in protected California
3 tiger salamander habitat, such as ground disturbance or herbicide use to control nonnative
4 vegetation, could result in local adverse habitat effects and injury or mortality of California tiger
5 salamander and disturbance effects if individuals are present in work sites. Implementation of
6 AMM1–AMM6, AMM10, AMM13, and AMM37 would reduce these effects. Herbicides would only
7 be used in California tiger salamander habitat in accordance with the written recommendation
8 of a licensed, registered Pest Control Advisor and in conformance with label precautions and
9 federal, state, and local regulations in a manner that avoids or minimizes harm to the California
10 tiger salamander.

- 11 • *CM18 Conservation Hatcheries*: This activity could result in the permanent removal of
12 approximately 35 acres of terrestrial cover and aestivation habitat for California tiger
13 salamander in the Yolo Bypass area (CZ 2). The specifications and operations of this facility have
14 not been developed, although the facility is expected to be constructed near Rio Vista on
15 cultivated lands in low-value habitat for the species.
- 16 • *Critical habitat*: Approximately 1,781 acres of designated Critical Habitat Unit 2, Jepson Prairie
17 Unit, for California tiger salamander overlap the study area in CZ 1. While this area is located
18 within the Cache Slough Complex, it is not expected to be affected by BDCP tidal habitat
19 restoration actions. Tidal habitat would be restored approximately 2 miles east of SR 113, with
20 some restoration taking place along the Barker and Lindsey Slough channels west to
21 approximately SR 113 and a small amount (0.4 acre) taking place along the Lindsey Slough
22 Channel west of SR 113 into Critical Habitat Unit 2.
- 23 • *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have
24 little if any adverse effect on the California tiger salamander. Postconstruction operation and
25 maintenance of the above-ground water conveyance facilities could result in ongoing but
26 periodic disturbances that could affect California tiger salamander use of the surrounding
27 habitat. Operation of maintenance equipment, including vehicle use along transmission
28 corridors in CZ 8, could also result in injury or mortality of California tiger salamanders if
29 present in work sites. These effects, however, would be minimized with implementation of the
30 California tiger salamander measures described in AMM1–AMM6, AMM10, AMM13, and
31 AMM37.
- 32 • *Injury and direct mortality*: Construction activities associated with the water conveyance
33 facilities, vernal pool complex restoration, and habitat and management enhancement-related
34 activities, including operation of construction equipment, could result in injury or mortality of
35 California tiger salamanders. Foraging, dispersal, and overwintering behavior may be altered
36 during construction activities, resulting in injury or mortality of California tiger salamander if
37 the species is present. Salamanders occupying burrows could be trapped and crushed during
38 ground-disturbing activities. Degradation and loss of estivation habitat is also anticipated to
39 result from the removal of vegetative cover and collapsing of burrows. Injury or mortality would
40 be avoided and minimized through implementation of seasonal constraints and preconstruction
41 surveys in suitable habitat, collapsing unoccupied burrows, and relocating salamanders outside
42 of the construction area as described in AMM1–AMM6, AMM10, AMM13, and AMM37.

43 The following paragraphs summarize the combined effects discussed above and describe other
44 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are
45 also included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-
3 term BDCP conservation strategy has been evaluated to determine whether it would provide
4 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
5 construction would not be adverse under NEPA.

6 Alternative 4 would permanently remove and temporarily affect approximately 343 acres of upland
7 terrestrial cover habitat for California tiger salamander. There would be no effects on aquatic
8 habitat. The effects would result from construction of the water conveyance facilities (CM1, 51
9 acres), Yolo Bypass improvements (CM2, 42 acres), tidal habitat restoration (CM4, 203 acres),
10 construction of recreational facilities (CM11, 12 acres), and construction of conservation hatcheries
11 (CM18, 35 acres).

12 Typical NEPA project-level mitigation ratios of 2:1 for protected grassland habitats would indicate
13 that 686 acres of grassland should be protected in the near-term for California tiger salamander to
14 mitigate the near-term losses.

15 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective
16 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic habitat
17 (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective GNC1.1).
18 The landscape-scale goals and objectives would inform the near-term protection and restoration
19 efforts. The natural community restoration and protection activities are expected to be concluded
20 during the first 10 years of plan implementation, which is close enough in time to the occurrence of
21 impacts to constitute adequate mitigation for NEPA purposes.

22 In addition, the plan contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*
26 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM13 California Tiger*
27 *Salamander*, and *AMM37 Recreation*. These AMMs include elements that avoid or minimize the risk
28 of affecting habitats and species adjacent to work areas and storage sites. BDCP Appendix 3.C
29 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
30 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

31 **Late Long-Term Timeframe**

32 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and
33 29,459 acres of upland modeled habitat for California tiger salamander. Alternative 4 as a whole
34 would result in the permanent loss of, and temporary effects on, 685 acres of upland habitat for
35 California tiger salamander for the term of the plan (approximately 2% of the total upland habitat in
36 the study area). The location of these losses is described above in the discussions of CM2, CM4,
37 CM11, and CM18.

38 The BDCP has committed to long-term protection of 8,000 acres of grassland in the Plan Area (see
39 Table 3-4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of grassland in
40 CZ 8 west of Byron Highway would benefit the California tiger salamander by providing habitat in
41 the portion of the study area with the highest long-term conservation value for the species based on
42 known species occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with
43 Objective GNC1.3, ponds and other aquatic features in the grasslands would also be protected to

1 provide aquatic habitat for this species, and the surrounding grassland would provide dispersal and
2 aestivation habitat. Aquatic features in the protected grasslands in CZ 8 would be maintained and
3 enhanced to provide suitable inundation depth and duration and suitable composition of vegetative
4 cover to support breeding California tiger salamanders (Objective GNC2.5). Additionally, livestock
5 exclusion from streams and ponds and other measures would be implemented as described in CM11
6 to promote growth of aquatic vegetation with appropriate cover characteristics favorable to
7 California tiger salamanders. Lands protected in CZ 8 would connect with lands protected under the
8 *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros Watershed lands, including
9 grassland areas supporting this species. This objective would ensure that California tiger
10 salamander upland and associated aquatic habitats would be protected and enhanced in the largest
11 possible patch sizes adjacent to occupied habitat within and adjacent to the study area.

12 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
13 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above, as
14 well as the restoration of alkali seasonal wetland complex, vernal pool complex, and grassland that
15 could overlap with the species model, would result in the restoration of 88 acres of aquatic and 598
16 acres of upland modeled habitat for California tiger salamander. In addition, protection of alkali
17 seasonal wetland complex, vernal pool complex, and grassland that could overlap with the species
18 model, would result in the protection of 750 acres of aquatic and 5,000 acres of upland California
19 tiger salamander modeled habitat.

20 **NEPA Effects:** In the near-term, the loss of California tiger salamander habitat under Alternative 4
21 would be not be adverse because the BDCP has committed to protecting the acreage required to
22 meet the typical mitigation ratios described above. In the late long-term, the losses of California tiger
23 salamander upland habitat associated with Alternative 4, in the absence of other conservation
24 actions, would represent an adverse effect as a result of habitat modification and potential direct
25 mortality of a special-status species. However, with habitat protection and restoration associated
26 with the conservation components, guided by landscape-scale goals and objectives and by AMM1-
27 AMM6, AMM10, AMM13, and AMM37, the effects of Alternative 4 as a whole on California tiger
28 salamander would not be adverse.

29 **CEQA Conclusion:**

30 **Near-Term Timeframe**

31 Because the water conveyance facilities construction is being evaluated at the project level, the near-
32 term BDCP conservation strategy has been evaluated to determine whether it would provide
33 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
34 construction impacts would be less than significant under CEQA.

35 Alternative 4 would permanently and temporarily combined remove approximately 343 acres of
36 upland terrestrial cover habitat for California tiger salamander. There would be no effects on aquatic
37 habitat. The effects would result from construction of the water conveyance facilities (CM1, 51
38 acres), Yolo Bypass improvements (CM2, 42 acres), tidal habitat restoration (CM4, 203 acres)
39 construction of conservation hatcheries (CM18, 35 acres), and construction of recreational facilities
40 (CM11, 12 acres).

41 Typical CEQA project-level mitigation ratios of 2:1 for protected grassland habitats would indicate
42 that 686 acres of grassland should be protected in the near-term for California tiger salamander to
43 mitigate the near-term losses.

1 The BDCP has committed to near-term restoration of 1,140 acres of upland habitat (Objective
2 GNC1.2) and 40 acres of aquatic habitat and to protection of 520 acres of aquatic habitat (Objective
3 ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective GNC1.1). The
4 landscape-scale goals and objectives would inform the near-term protection and restoration efforts.
5 The natural community restoration and protection activities are expected to be concluded during
6 the first 10 years of plan implementation, which is close enough in time to the occurrence of impacts
7 to constitute adequate mitigation for CEQA purposes.

8 In addition, the plan contains commitments to implement AMM1–6, AMM10, AMM13, and AMM37,
9 which include elements that avoid or minimize the risk of affecting habitats and species adjacent to
10 work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been
11 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
12 the Final EIR/EIS. These commitments are more than sufficient to support the conclusion that the
13 near-term impacts of Alternative 4 on California tiger salamander would be less than significant,
14 because the number of acres required to meet the typical ratios described above would be only 636
15 acres of upland communities protected.

16 ***Late Long-Term Timeframe***

17 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and
18 29,459 acres of upland habitat for California tiger salamander. Alternative 4 as a whole would result
19 in the permanent loss of, and temporary effects on, 685 acres of upland habitat for California tiger
20 salamander for the term of the plan (approximately 2% of the total upland habitat in the study area).
21 The location of these losses is described above in the discussions of CM1, CM2, CM4, and CM18.

22 Implementation of BDCP conservation components would result in protection of at least 8,000 acres
23 of grasslands, 600 acres of vernal pool complex and 150 acres of alkali seasonal wetland complex in
24 CZ 1, CZ 8, and CZ 11, and restoration of 2,000 acres of grasslands and 67 acres of vernal pool
25 complex, all of which would benefit California tiger salamander. The protection and restoration
26 would provide habitat in the portions of the study area with the highest long-term conservation
27 value for the species based on known species occurrences and large, contiguous habitat areas. Ponds
28 and other aquatic features in the grasslands would be protected to provide aquatic habitat for this
29 species, and surrounding grassland would provide dispersal and aestivation habitat. Protected
30 grassland and vernal pool complex in CZ 8 would connect with the East Contra Costa County
31 HCP/NCCP reserve system, including grassland areas supporting this species. Protected lands in CZ
32 11 would connect with the future Solano County reserve system, including grassland and vernal
33 pool complex areas supporting this species. The larger habitat area and improved connectivity
34 would increase opportunities for genetic exchange and allow for colonization of restored habitats in
35 areas where the species has been extirpated. Protecting seasonal ponds associated with grasslands
36 would ensure that California tiger salamander aquatic habitat and associated uplands would be
37 preserved and enhanced in the largest possible patch sizes adjacent to occupied habitat within and
38 adjacent to the study area. Grassland restoration would focus specifically on connecting fragmented
39 patches of protected grasslands, thereby increasing dispersal opportunities for the California tiger
40 salamander. Grasslands would be enhanced to increase burrow availability to provide refugia and
41 cover for aestivating and dispersing California tiger salamanders.

42 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
43 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above, as
44 well as the restoration of alkali seasonal wetland complex, vernal pool complex, and grassland that

1 could overlap with the species model, would result in the restoration of 88 acres of aquatic and 598
2 acres of upland modeled habitat for California tiger salamander. In addition, protection of alkali
3 seasonal wetland complex, vernal pool complex, and grassland that could overlap with the species
4 model, would result in the protection of 750 acres of aquatic and 5,000 acres of upland California
5 tiger salamander modeled habitat. In the absence of other conservation actions, the losses of
6 California tiger salamander upland habitat associated with Alternative 4 would represent a
7 significant impact as a result of habitat modification and potential direct mortality of a special-status
8 species. However, with habitat protection and restoration associated with the conservation
9 components, guided by landscape-scale goals and objectives and by AMM1–AMM6, AMM10, AMM13,
10 and AMM37, which would be in place throughout the construction phase, the impacts of Alternative
11 4 as a whole on California tiger salamander would not be significant.

12 **Impact BIO-47: Indirect Effects of Plan Implementation on California Tiger Salamander**

13 Indirect effects could occur outside of the construction footprint but within 500 feet of California
14 tiger salamander habitat. Activities associated with conservation component construction and
15 ongoing habitat enhancement, as well as operation and maintenance of above-ground water
16 conveyance facilities, including the transmission facilities, could result in ongoing but periodic
17 postconstruction disturbances with localized effects on California tiger salamander and its habitat,
18 and temporary noise and visual disturbances, including artificial night lighting at a worksite over the
19 term of the BDCP. Most of the areas indirectly affected are associated with the construction of Byron
20 Forebay and its borrow and spoil areas in CZ 8.

21 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment
22 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability
23 of California tiger salamander habitat downstream of the construction area by filling in pools and
24 smothering eggs. Accidental spills of toxic fluids into the aquatic system could result in the
25 subsequent loss of California tiger salamander habitat. Hydrocarbon and heavy metal pollutants
26 associated with roadside runoff also have the potential to enter the aquatic system, affecting water
27 quality and California tiger salamander.

28 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 under Alternative 4
29 would avoid or minimize the potential for adverse effects on California tiger salamanders, either
30 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that
31 could substantially reduce the number of California tiger salamanders or restrict the species' range.
32 Therefore, the indirect effects of Alternative 4 would not have an adverse effect on California tiger
33 salamander.

34 **CEQA Conclusion:** Indirect effects resulting from conservation measure operations and maintenance
35 as well as construction-related noise and visual disturbances, including artificial night lighting at a
36 worksite could impact California tiger salamander in aquatic and upland habitats. The use of
37 mechanical equipment during construction could cause the accidental release of petroleum or other
38 contaminants that could impact California tiger salamander or its prey. The inadvertent discharge of
39 sediment or excessive dust adjacent to California tiger salamander habitat could also have a negative
40 impact on the species or its prey. With implementation of AMM1–AMM6, AMM10, AMM13, and
41 AMM37 as part of Alternative 4, the BDCP would avoid the potential for significant impacts on
42 California tiger salamander, either indirectly or through habitat modifications, and would not result
43 in a substantial reduction in numbers or a restriction in the range of California tiger salamanders.

1 The indirect effects of Alternative 4 would have a less-than-significant impact on California tiger
2 salamander.

3 **Impact BIO-48: Periodic Effects of Inundation of California Tiger Salamander Habitat as a**
4 **Result of Implementation of Conservation Components**

5 *CM2 Yolo Bypass Fisheries Enhancement* is the only conservation measure expected to result in
6 periodic inundation of California tiger salamander habitat. Periodic inundation of Yolo Bypass could
7 affect from an estimated 191 acres of terrestrial habitat during a notch flow of 1,000 cfs, to an
8 estimated 639 acres of terrestrial habitat during a notch flow of 4,000 cfs in CZ 1 (Table 12-4-21).
9 This effect would only occur during an estimated maximum of 30% of years and in areas that are
10 already inundated in more than half of all years; therefore, these areas are expected to provide only
11 marginal terrestrial habitat for the California tiger salamander under Existing Conditions. No aquatic
12 breeding habitat would be affected (Table 12-4-21): the modeled habitat in the Yolo Bypass, in the
13 vicinity of terrestrial habitat is of low value in that there are no California tiger salamander records
14 in this area and the bypass lacks vernal pool complexes with large, deep pools, or large grassland
15 areas with stock ponds and similar aquatic features that provide the habitat of highest value for this
16 species. Therefore, the terrestrial habitat that would be affected has a small likelihood of supporting
17 California tiger salamanders, and Yolo Bypass operations are expected to have a minimal effect on
18 the species, if any.

19 **NEPA Effects:** The effects of periodic inundation from Alternative 4 would not have an adverse effect
20 on California tiger salamander.

21 **CEQA Conclusion:** Flooding of the Yolo Bypass from Fremont Weir operations would periodically
22 increase the frequency and duration of inundation of 191–639 acres of terrestrial habitat for
23 California tiger salamander. Because this area is considered low-value habitat and there are no
24 California tiger salamander records in the area, and because of the lack of suitable breeding habitat
25 in this area, the effects of periodic inundation of California tiger salamander habitat from Alternative
26 4 would have a less-than-significant impact.

27 **Giant Garter Snake**

28 The habitat model used to assess effects for the giant garter snake is based on aquatic habitat and
29 upland habitat. Modeled aquatic habitat is composed of tidal perennial aquatic (except in Suisun
30 Marsh), tidal freshwater perennial emergent wetland, nontidal freshwater emergent wetland, and
31 nontidal perennial aquatic natural communities; rice fields; and artificial canals and ditches.
32 Modeled upland habitat is composed of all nonwetland and nonaquatic natural communities
33 (primarily grassland and cropland) within 200 feet of modeled aquatic habitat features. The
34 modeled upland habitat is ranked as high-, moderate-, or low-value based on giant garter snake
35 associations between vegetation and cover types (U.S. Fish and Wildlife Service 2012) and historical
36 and recent occurrence records (see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*
37 *Environmental Data Report*), and presence of features necessary to fulfill the species' life cycle
38 requirements. Modeled habitat is expressed in acres for aquatic and upland habitats, and in miles for
39 linear movement corridors in aquatic habitat. Other factors considered in assessing the value of
40 affected habitat for the giant garter snake, to the extent that information is available, are proximity
41 to conserved lands and recorded occurrences of the species, proximity to giant garter snake
42 subpopulations (Yolo Basin/Willow Slough and Coldani Marsh/White Slough) in the study area that

1 are identified in the draft recovery plan for this species (U.S. Fish and Wildlife Service 1999b), and
2 contribution to connectivity between giant garter snake subpopulations.

3 Construction and restoration associated with Alternative 4 conservation measures would result in
4 both temporary and permanent losses of giant garter snake modeled habitat as indicated in Table
5 12-4-22. The majority of the losses would take place over an extended period of time as tidal marsh
6 is restored in the study area. Full implementation of Alternative 4 would also include the following
7 biological objectives over the term of the BDCP to benefit the giant garter snake (BDCP Chapter 3,
8 *Conservation Strategy*).

- 9 ● Increase native species diversity and relative cover of native plant species, and reduce the
10 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 11 ● Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of
12 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective
13 TFEWNC1.1, associated with CM3 and CM4).
- 14 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
15 and nontidal freshwater emergent wetland natural communities, with suitable habitat
16 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,
17 associated with CM3 and CM10).
- 18 ● Protect 48,625 acres of cultivated lands that provide suitable habitat for covered and other
19 native wildlife species (Objective CLNC1.1, associated with CM3 and CM11).
- 20 ● Target cultivated land conservation to provide connectivity between other conservation lands
21 (Objective CLNC1.2, associated with CM3).
- 22 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
23 lands that occur in cultivated lands within the reserve system, including isolated valley oak
24 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
25 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
26 with CM3 and CM11).
- 27 ● Of the at least 1,200 acres of nontidal marsh created under (Objective NFEW/NPANC1.1), create
28 600 acres of aquatic habitat giant garter snake aquatic habitat that is connected to the 1,500
29 acres of rice land or equivalent-value habitat described below in Objective GGS1.4 (Objective
30 GGS1.1, associated with CM3, CM4, and CM10).
- 31 ● Of the 8,000 acres of grassland protected under Objective GNC1.1 and 2,000 acres restored
32 under Objective GNC1.2, create or protect 200 acres of high-value upland giant garter snake
33 habitat adjacent to the at least 600 acres of nontidal perennial habitat being restored and/or
34 created in CZ 4 and/or CZ 5 (Objective GGS1.2, associated with CM3 and CM8).
- 35 ● Protect giant garter snakes on restored and protected nontidal marsh and adjacent uplands
36 (Objectives GGS1.1 and GGS1.2) from incidental injury or mortality by establishing 200-foot
37 buffers between protected giant garter snake habitat and roads (other than those roads
38 primarily used to support adjacent cultivated lands and levees). Establish giant garter snake
39 reserves at least 2,500 feet from urban areas or areas zoned for urban development (Objective
40 GGS1.3, associated with CM3).
- 41 ● Create connections from the White Slough population to other areas in the giant garter snake's
42 historical range in the Stone Lakes vicinity by protecting, restoring, and/or creating at least

1 1,500 acres of rice land or equivalent-value habitat (e.g., perennial wetland) for the giant garter
2 snake in CZ 4 and/or CZ 5. Any portion of the 1,500 acres may consist of tidal freshwater
3 emergent wetland and may overlap with the 24,000 acres of tidally restored freshwater
4 emergent wetland if it meets specific giant garter snake habitat criteria described in CM4. Up to
5 500 (33%) of the 1,500 acres may consist of suitable uplands adjacent to protected or restored
6 aquatic habitat (Objective GGS1.4, associated with CM3 and CM4).

- 7 ● Of the at least 1,200 acres of nontidal marsh created under Objective NFEW/NPANC1.1, create
8 600 acres of connected aquatic giant garter snake habitat outside the Yolo Bypass in CZ 2
9 (Objective GGS2.1, associated with CM3 and CM10).
- 10 ● Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres restored
11 under Objective GNC1.2, create or protect 200 acres of high-value upland habitat adjacent to the
12 600 acres of nontidal marsh created in CZ 2 outside of Yolo Bypass (GGS2.1) (Objective GGS2.2,
13 associated with CM3 and CM8).
- 14 ● To expand upon and buffer the newly restored/created nontidal perennial habitat in CZ 2,
15 protect 700 acres of cultivated lands, with 500 acres consisting of rice land and the remainder
16 consisting of compatible cultivated land that can support giant garter snakes. The cultivated
17 lands may be a subset of lands protected for the cultivated lands natural community and other
18 covered species (Objective GGS2.3, associated with CM3).
- 19 ● Protect giant garter snakes on created nontidal marsh (Objective GGS2.1) and created or
20 protected adjacent uplands (Objective GGS2.2) from incidental injury or mortality by
21 establishing 200-foot buffers between protected giant garter snake habitat and roads, and
22 establishing giant garter snake reserves at least 2,500 feet from urban areas or areas zoned for
23 urban development (Objective GGS2.4, associated with CM3).
- 24 ● Protect, restore, and/or create 2,740 acres of rice land or equivalent-value habitat (e.g.,
25 perennial wetland) for the giant garter snake in CZ 1, CZ 2, CZ 4, or CZ 5. Up to 500 acres may
26 consist of tidal freshwater emergent wetland and may overlap with the at least 5,000 acres of
27 tidally restored freshwater emergent wetland in the Cache Slough ROA if this portion meets
28 giant garter snake habitat criteria specified in CM4. Up to 1,700 acres may consist of rice fields
29 in the Yolo Bypass if this portion meets the criteria specified in CM3, *Reserve Design*
30 *Requirements by Species*. Any remaining acreage will consist of rice land or equivalent-value
31 habitat outside the Yolo Bypass. Up to 915 (33%) of the 2,740 acres may consist of suitable
32 uplands adjacent to protected or restored aquatic habitat (Objective GGS3.1, associated with
33 CM3, CM4, and CM10).

34 As explained below, with the restoration or protection of these amounts of habitat, in addition to the
35 implementation of AMMs, impacts on giant garter snake would not be adverse for NEPA purposes
36 and would be less than significant for CEQA purposes.

1 **Table 12-4-22. Changes in Giant Garter Snake Modeled Habitat Associated with Alternative 4^a**

Conservation Measure ^b	Habitat Type ^c	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT ^d	CM2	CM5
CM1	Aquatic (acres)	210	210	110	110	NA	NA
	Upland (acres)	408	408	206	206	NA	NA
	Aquatic (miles)	11	11	6	6	NA	NA
Total Impacts CM1 (acres)		618	618	316	316	NA	NA
CM2–CM18	Aquatic (acres)	179	498	15	38	NA	NA
	Upland (acres)	1,467	2,443	219	261	582–1,402	606
	Aquatic (miles)	49	189	9	10	NA	NA
Total Impacts CM2–CM18 (acres)		1,646	2,941	234	299	582–1,402	606
TOTAL IMPACTS CM1–CM18 (acres)		2,264	3,559	550	615	582–1,402	606

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c Aquatic acres represent tidal and nontidal habitat combined, and upland acres represent low-, moderate-, and high-value acreages combined.

^d LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^e Periodic effects were estimated for the late long-term only. CM2 periodic impacts on upland habitats only are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-49: Loss or Conversion of Habitat for and Direct Mortality of Giant Garter Snake**

4 Alternative 4 conservation measures would result in the permanent and temporary loss combined
5 of up to 856 acres of modeled aquatic habitat (tidal and nontidal combined), up to 3,381 acres of
6 modeled upland habitat, and up to 216 miles of channels providing aquatic movement habitat for
7 the giant garter snake (Table 12-4-22). Conservation measures that would result in these losses are
8 conveyance facilities and transmission line construction, geotechnical investigation, and
9 establishment and use of RTM, borrow, and spoils areas (CM1), Fremont Weir/Yolo Bypass
10 improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), and
11 construction of a conservation fish hatchery (CM18). Habitat enhancement and management
12 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could
13 result in local adverse habitat effects. Ground-disturbing activities, such as removal of nonnative
14 vegetation and road and other infrastructure maintenance, are expected to have minor effects on
15 available giant garter snake habitat and are expected to result in overall improvements to and
16 maintenance of giant garter snake habitat values. In addition, maintenance activities associated with
17 the long-term operation of the water conveyance facilities and other BDCP physical facilities could
18 degrade or eliminate giant garter snake habitat. Each of these individual activities is described
19 below. Each of these individual activities is described below. A summary statement of the combined

1 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure
2 discussions.

- 3 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
4 result in the permanent loss of approximately 618 acres of modeled giant garter snake habitat,
5 composed of 210 acres of aquatic habitat and 408 acres of upland habitat (Table 12-4-22). The
6 408 acres of upland habitat that would be removed for the construction of the conveyance
7 facilities consists of 116 acres of high-, 262 acres of moderate-, and 30 acres of low-value
8 habitat. In addition, approximately 11 miles of channels providing giant garter snake movement
9 habitat would be removed as a result of conveyance facilities construction. Development of the
10 water conveyance facilities would also result in the temporary removal of up to 110 acres of
11 giant garter snake aquatic habitat and up to 206 acres of adjacent upland habitat in areas near
12 construction and geotechnical investigation in CZ 5 and CZ 6 (see Table 12-4-22 and the
13 Terrestrial Biology Mapbook). In addition, approximately 6 miles of channels providing giant
14 garter snake movement habitat would be temporarily removed as a result of conveyance
15 facilities construction. There are three giant garter snake occurrences in the vicinity of the CM1
16 construction footprint in Snodgrass Slough and Middle River.

- 17 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction activity associated with fisheries
18 improvements in the Yolo Bypass would result in the permanent and temporary removal of
19 approximately 83 acres of aquatic habitat and 458 acres of upland habitat for the giant garter
20 snake in the late long-term. The upland habitat that would be removed is composed of 336 acres
21 of high-value, 121 acres of moderate-value, and 1 acre of low-value habitat. Approximately 14
22 miles (less than 1% of total miles in Plan Area) of channels providing giant garter snake habitat
23 for movements would be removed as a result of Fremont Weir/Yolo Bypass Improvements.
24 Most of this habitat removal would occur at the north end of the Yolo Bypass, near Fremont
25 Weir. Construction is expected to have adverse effects on giant garter snake aquatic habitat in
26 the Yolo Bypass area because it is near the Yolo Basin/Willow Slough subpopulation.

27 In addition to habitat loss from construction related activities in Yolo Bypass, late season
28 flooding in the bypass may result in loss of rice habitat (considered aquatic habitat for giant
29 garter snake) by precluding the preparation and planting of rice fields. The methods for
30 estimating loss of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment
31 5J.E, *Estimation of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo*
32 *Bypass*. This analysis concludes that the estimated loss of rice is 1,662 acres which was
33 considered to occur late long-term.

- 34 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
35 in the permanent loss of approximately 395 acres of aquatic habitat and 2,123 acres of upland
36 habitat for the giant garter snake to tidal marsh in the late long-term. The upland habitat
37 affected by tidal inundation includes 594 acres of high-value, 1,375 acres of moderate-value, and
38 154 acres of low-value habitat. In addition, approximately 138 miles of channels providing giant
39 garter snake movement habitat would be removed as a result of tidal natural communities
40 restoration.

41 Most of the effects of tidal natural communities restoration would occur in the Cache Slough and
42 Yolo Bypass areas (CZ 1 and CZ 2). This aquatic habitat is of low to moderate value: it is in and
43 near Category 1 open space but is not near any giant garter snake occurrences and is not near or
44 between giant garter snake subpopulations identified in the draft recovery plan. Tidal natural
45 communities restoration is expected to have little to no adverse effects on giant garter snake

1 aquatic or upland habitat in the Cache Slough ROA. There are no giant garter snake occurrences
2 in this area, which is already tidally influenced so it has limited value for the giant garter snake
3 (giant garter snakes may occur in tidally muted areas but are not likely to use aquatic areas with
4 a strong tidal influence).

- 5 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
6 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
7 approximately 60 acres of aquatic habitat and 89 acres of upland habitat for giant garter snake.
8 The upland habitat to be removed is composed of 51 acres of moderate-value and 38 acres of
9 low-value upland habitat. Approximately 2 miles of channels providing giant garter snake
10 movement habitat would be removed as a result of floodplain restoration. Seasonally inundated
11 floodplain restoration is expected to have little to no adverse effects on giant garter snake
12 aquatic habitat because the site is not located near or between giant garter snake populations
13 identified in the draft recovery plan. As with CM4, the estimates of the effect of seasonal
14 floodplain levee construction and inundation are based on projections of where restoration may
15 occur. Actual effects are expected to be lower because sites would be selected to minimize
16 effects on giant garter snake habitat.
- 17 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
18 actions included in CM11 that are designed to enhance wildlife values in BDCP-protected
19 habitats may result in localized ground disturbances that could temporarily remove small
20 amounts of giant garter snake habitat. Ground-disturbing activities, such as removal of
21 nonnative vegetation and road and other infrastructure maintenance, are expected to have
22 minor effects on available giant garter snake habitat and are expected to result in overall
23 improvements to and maintenance of giant garter snake habitat values over the term of the
24 BDCP. These effects cannot be quantified, but are expected to be minimal because vegetation
25 removal would occur around existing infrastructure and roads where giant garter snake are not
26 as likely to be present. Any of these minor impacts would be avoided and minimized by the
27 AMMs listed below.

28 Passive recreation in the reserve system could result in human disturbance of giant garter
29 snakes basking in upland areas and compaction of upland burrow sites used for brumation.
30 However, AMM37 requires setbacks for trails in giant garter snake habitat (see Appendix 3B,
31 *Environmental Commitments, AMMs, and CMs*). With this measure in place, recreation related
32 effects on giant garter snake are expected to be minimal.

- 33 ● *CM18 Conservation Hatcheries*: Construction for conservation hatcheries could result in the
34 permanent removal of 35 acres of moderate-value upland habitat for the giant garter snake in
35 the Yolo Bypass area (CZ 2).
- 36 ● *Operations and maintenance*: Postconstruction operation and maintenance of the above-ground
37 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
38 disturbances that could affect giant garter snake use of the surrounding habitat in the Yolo
39 Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, CZ 7,
40 and CZ 8). Maintenance activities would include vegetation management, levee and structure
41 repair, and regrading of roads and permanent work areas. These effects, however, would be
42 reduced by AMMs and conservation actions as described below.
- 43 ● *Injury and direct mortality*: Construction vehicle activity may cause injury or mortality of the
44 giant garter snake. If snakes reside where activities take place (most likely in the vicinity of the

1 two subpopulations: Yolo Basin/Willow Slough [CZ 2] and the Coldani Marsh/White Slough [CZ
2 4]), the operation of equipment for land clearing, construction, conveyance facilities operation
3 and maintenance, and habitat restoration, enhancement, and management could result in injury
4 or mortality of giant garter snakes. This risk is highest from late fall through early spring, when
5 the snakes are dormant. Increased vehicular traffic associated with BDCP actions could
6 contribute to a higher incidence of road kill. However, preconstruction surveys would be
7 implemented after the project planning phase and prior to any ground-disturbing activity. Any
8 disturbance to suitable aquatic and upland sites in or near the project footprint would be
9 avoided to the extent feasible, and the loss of aquatic habitat and grassland vegetation would be
10 minimized through adjustments to project design, as practicable. Construction monitoring and
11 other measures would be implemented to avoid and minimize injury or mortality of this species
12 during construction as described in *AMM16 Giant Garter Snake*.

13 The following paragraphs summarize the combined effects discussed above and describe other
14 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
15 also included.

16 ***Near-Term Timeframe***

17 Because the water conveyance facilities construction is being evaluated at the project level, the near-
18 term BDCP conservation strategy has been evaluated to determine whether it would provide
19 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
20 construction would not be adverse under NEPA.

21 Alternative 4 would permanently and temporarily remove 514 acres of aquatic habitat and 2,300
22 acres of upland habitat for giant garter snake in the study area during the near-term. These effects
23 would result from the construction of the water conveyance facilities (CM1, 320 acres of aquatic and
24 614 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458
25 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres of upland
26 habitat), and conservation hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses
27 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat
28 losses would occur in cropland and grassland communities. In addition, approximately 75 miles of
29 channels (irrigation and drainage canals) providing giant garter snake movement habitat would be
30 removed. The habitat model likely overestimates the relative value of irrigation and drainage canals
31 in the vicinity of White Slough and south due to its proximity to records that likely represent single
32 displaced snakes, not viable populations.

33 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
34 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3,
35 *Conservation Strategy*, of the BDCP would be 1:1 for restoration and 1:1 for protection of aquatic
36 habitats and 2:1 for protection of upland habitats. Using these ratios would indicate that 514 acres
37 of aquatic habitat should be restored, 514 acres of aquatic habitat should be protected, and 4,600
38 acres of upland habitat should be protected for giant garter snake to mitigate the near-term losses.

39 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to
40 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to
41 be protected and restored in the near-term specifically for the giant garter snake total 3,900 acres
42 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least
43 500 acres of rice) in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.
44 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900

1 acres under Objective GGS3.1) would be restored or protected to create connections from the
2 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.
3 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected
4 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected
5 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in
6 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage
7 ditches located in cultivated lands and suitable for giant garter snake movement would be
8 maintained and protected within the reserve system, which would include isolated valley oak trees,
9 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water
10 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

11 These habitat protection and restoration measures would benefit the giant garter snake and the
12 plan's species-specific biological goals and objectives would inform the near-term protection and
13 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and
14 providing connectivity between protected areas, is considered the most effective approach to giant
15 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
16 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and
17 are identified as important for the recovery of the species in the draft recovery plan for the species
18 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat
19 would focus on these two important subpopulations.

20 The species-specific biological goals and objectives would inform the near-term protection and
21 restoration efforts. The natural community restoration and protection activities are expected to be
22 concluded during the first 10 years of plan implementation, which is close enough in time to the
23 occurrence of impacts to constitute adequate mitigation for NEPA purposes. These commitments are
24 more than sufficient to support the conclusion that the near-term effects of Alternative 4 would be
25 not be adverse under NEPA, because the number of acres required to meet the typical ratios
26 described above would be only 514 acres of aquatic communities restored, 514 acres of aquatic
27 communities protected, and 4,600 acres of upland communities protected.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
29 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
30 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*
32 *Material, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural*
33 *Communities, AMM16 Giant Garter Snake, and AMM37 Recreation. All of these AMMs include*
34 *elements that avoid or minimize the risk of BDCP activities affecting habitats and species adjacent to*
35 *work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been*
36 *updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs, of*
37 *the Final EIR/EIS.*

38 **Late Long-Term Timeframe**

39 Based on modeled habitat, the study area supports approximately 31,281 acres of aquatic and
40 53,285 acres of upland habitat for giant garter snake. Alternative 4 as a whole would result in the
41 permanent loss of and temporary effects on 856 acres of aquatic habitat and to 3,318 acres of
42 upland habitat for giant garter snake during the term of the plan (3% of the total aquatic habitat and
43 6% of the total upland habitat in the study area). The locations of these losses are described above in
44 the analyses of individual conservation measures.

1 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands
2 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of
3 grasslands in the study area. Lands to be protected and restored specifically for the giant garter
4 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated
5 lands including at least 500 acres of rice) in CZ 2, and acres of rice or habitat of equivalent value in
6 CZ 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under
7 Objective GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create
8 connections from the Coldani Marsh/White Slough population to other areas in the giant garter
9 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under
10 Objective GGS3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of
11 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice
12 lost due to late season flooding in Yolo Bypass as a result of CM2) (Objective GGS3.1). In addition to
13 the 6,540 acres of high value habitat targeted specifically for giant garter snake, the protection and
14 restoration of other natural communities is expected to provide additional restoration of 4,430
15 acres and protection of 3,733 acres of garter snake habitat.

16 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter
17 snake by providing connectivity and maintaining irrigation and drainage channels that provide
18 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake
19 movement habitat on the protected cultivated lands is proportional to the modeled habitat on
20 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support
21 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by
22 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

23 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the
24 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter
25 snake. Protecting and expanding existing giant garter snake subpopulations, and providing
26 connectivity between protected areas, is considered the most effective approach to giant garter
27 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
28 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area
29 and are identified as important for the recovery of the species in the draft recovery plan for the
30 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake
31 habitat would focus on these two important subpopulations.

32 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
33 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above, as
34 well as the restoration of managed wetland, nontidal freshwater perennial emergent wetland,
35 nontidal perennial aquatic, tidal freshwater emergent wetland, alkali seasonal wetland, grassland,
36 and vernal pool complex that could overlap with the species model, would result in the restoration
37 of 3,450 acres of aquatic and 980 acres of upland modeled habitat for giant garter snake. In addition,
38 protection of cultivated land, grassland, alkali seasonal wetland, and vernal pool complex could
39 overlap with the species model and would result in the protection of 1,547 acres of aquatic and
40 2,185 acres of upland giant garter snake modeled habitat.

41 **NEPA Effects:** In the near-term, the loss of giant garter snake habitat under Alternative 4 would not
42 be adverse because the BDCP has committed to protecting and restoring the acreage required to
43 meet the typical mitigation ratios described above. In the late long-term, the losses of giant garter
44 snake habitat associated with Alternative 4, in the absence of other conservation actions, would
45 represent an adverse effect as a result of habitat modification and potential direct mortality of a

1 special-status species. However, with habitat protection and restoration associated with the
2 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM7,
3 AMM10, AMM16, and AMM37, the effects of Alternative 4 as a whole on giant garter snake would
4 not be adverse.

5 ***CEQA Conclusion:***

6 ***Near-Term Timeframe***

7 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
8 the near-term BDCP conservation strategy has been evaluated to determine whether it would
9 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
10 effects of construction would be less than significant under CEQA.

11 Alternative 4 would permanently and temporarily remove 514 acres of aquatic habitat and 2,300
12 acres of upland habitat for giant garter snake in the study area during the near-term. These effects
13 would result from the construction of the water conveyance facilities (CM1, 320 acres of aquatic and
14 614 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458
15 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres of upland
16 habitat), and conservation hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses
17 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat
18 losses would occur in cropland and grassland communities. In addition, approximately 77 miles of
19 channels (irrigation and drainage canals) providing giant garter snake movement habitat would be
20 removed. The habitat model likely overestimates the relative value of irrigation and drainage canals
21 in the vicinity of White Slough and south due to its proximity to records that likely represent single
22 displaced snakes, not viable populations.

23 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
24 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3,
25 *Conservation Strategy*, of the BDCP would be 1:1 for restoration and 1:1 for protection of aquatic
26 habitats and 2:1 for protection of upland habitats. Using these ratios would indicate that 514 acres
27 of aquatic habitat should be restored, 514 acres of aquatic habitat should be protected, and 4,600
28 acres of upland habitat should be protected for giant garter snake to mitigate the near-term losses.

29 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to
30 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to
31 be protected and restored in the near term specifically for the giant garter snake total 3,900 acres
32 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least
33 500 acres of rice) in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.
34 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900
35 acres under Objective GGS3.1) would be restored or protected to create connections from the
36 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.
37 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected
38 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected
39 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in
40 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage
41 ditches located in cultivated lands and suitable for giant garter snake movement would be
42 maintained and protected within the reserve system, which would include isolated valley oak trees,
43 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water
44 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

1 These habitat protection and restoration measures would benefit the giant garter snake and the
2 plan's species-specific biological goals and objectives would inform the near-term protection and
3 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and
4 providing connectivity between protected areas, is considered the most effective approach to giant
5 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
6 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area
7 and are identified as important for the recovery of the species in the draft recovery plan for the
8 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake
9 habitat would focus on these two important subpopulations.

10 The natural community restoration and protection activities are expected to be concluded during
11 the first 10 years of plan implementation, which is close enough in time to the occurrence of impacts
12 to constitute adequate mitigation for CEQA purposes. These commitments are more than sufficient
13 to support the conclusion that the near-term effects of Alternative 4 would be less than significant
14 under CEQA, because the number of acres required to meet the typical ratios described above would
15 be only 514 acres of aquatic communities restored, 514 acres of aquatic communities protected, and
16 4,600 acres of upland communities protected.

17 The Plan also includes commitments to implement AMM1–AMM7, AMM10, AMM16, and AMM37. All
18 of these AMMs include elements that avoid or minimize the risk of BDCP activities affecting habitats
19 and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
20 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
21 *AMMs, and CMs*, of the Final EIR/EIS.

22 ***Late Long-Term Timeframe***

23 Based on modeled habitat, the study area supports approximately 31,281 acres of aquatic and
24 53,285 acres of upland habitat for giant garter snake. Alternative 4 as a whole would result in the
25 permanent loss of and temporary effects on 856 acres of aquatic habitat and to 3,318 acres of
26 upland habitat for giant garter snake during the term of the plan (3% of the total aquatic habitat in
27 the study area and 6% of the total upland habitat in the study area). The locations of these losses are
28 described above in the analyses of individual conservation measures.

29 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands
30 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of
31 grasslands in the study area. Lands to be protected and restored specifically for the giant garter
32 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated
33 lands including at least 500 acres of rice in CZ 2, and acres of rice or habitat of equivalent value in CZ
34 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under Objective
35 GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create
36 connections from the Coldani Marsh/White Slough population to other areas in the giant garter
37 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under
38 Objective GGS3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of
39 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice
40 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of
41 high-value habitat targeted specifically for giant garter snake, the protection and restoration of
42 other natural communities is expected to provide additional restoration of 4,430 acres and
43 protection of 3,733 acres of garter snake habitat.

1 Protection and management of cultivated lands (*CM3 and CM11*) would also benefit the giant garter
2 snake by providing connectivity and maintaining irrigation and drainage channels that provide
3 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake
4 movement habitat on the protected cultivated lands is proportional to the modeled habitat on
5 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support
6 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by
7 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

8 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the
9 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter
10 snake. Protecting and expanding existing giant garter snake subpopulations, and providing
11 connectivity between protected areas, is considered the most effective approach to giant garter
12 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
13 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and
14 are identified as important for the recovery of the species in the draft recovery plan for the species
15 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat
16 would focus on these two important subpopulations.

17 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
18 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above, as
19 well as the restoration of managed wetland, nontidal freshwater perennial emergent wetland,
20 nontidal perennial aquatic, tidal freshwater emergent wetland, alkali seasonal wetland, grassland,
21 and vernal pool complex that could overlap with the species model, would result in the restoration
22 of 3,450 acres of aquatic and 980 acres of upland modeled habitat for giant garter snake. In addition,
23 protection of cultivated land, grassland, alkali seasonal wetland, and vernal pool complex could
24 overlap with the species model and would result in the protection of 1,547 acres of aquatic and
25 2,185 acres of upland giant garter snake modeled habitat.

26 The BDCP also includes AMM1–AMM7, AMM10, AMM16, and AMM37, which are directed at
27 minimizing or avoiding potential impacts on adjacent habitats during construction and operation of
28 the conservation measures. Considering the protection and restoration provisions, which would
29 provide acreages of new or enhanced habitat in amounts greater than necessary to compensate for
30 habitats lost to construction and restoration activities, implementation of Alternative 4 as a whole
31 would not result in a significant impact through habitat modifications and would not substantially
32 reduce the number or restrict the range of the species. Therefore, the loss of giant garter snake
33 habitat and potential mortality of snakes would have a less-than-significant impact on giant garter
34 snake under CEQA.

35 **Impact BIO-50: Indirect Effects of Plan Implementation on Giant Garter Snake**

36 Construction activities outside the project footprint but within 200 feet of construction associated
37 with water conveyance facilities, conservation components and ongoing habitat enhancement, as
38 well as operation and maintenance of above-ground water conveyance facilities, including the
39 transmission facilities, could result in ongoing periodic postconstruction disturbances with localized
40 effects on giant garter snake habitat, and temporary noise and visual disturbances over the term of
41 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM7, AMM10,
42 AMM16, and AMM37, which would be in effect throughout the plan's construction phase.

43 The use of mechanical equipment during water conveyance facilities construction could cause the
44 accidental release of petroleum or other contaminants that could affect giant garter snake or its

1 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to giant garter snake
2 habitat could also have a negative effect on the species or its prey. AMM1–AMM6 would minimize
3 the likelihood of such spills and would ensure measures are in place to prevent runoff from the
4 construction area and potential effects of sediment or dust on giant garter snake or its prey.

5 Covered activities have the potential to exacerbate bioaccumulation of mercury in covered species
6 that feed on aquatic species, including giant garter snake. The operational impacts of new flows
7 under CM1 were analyzed to assess potential effects on mercury concentration and bioavailability.
8 Results indicated that changes in total mercury levels in water and fish tissues due to future
9 operational conditions were insignificant (see Appendix 11F, *Substantive BDCP Revisions*).

10 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to
11 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
12 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
13 floodplains. Thus, BDCP restoration activities that create newly inundated areas could increase
14 bioavailability of mercury. Increased methylmercury associated with natural community and
15 floodplain restoration may indirectly affect giant garter snake, which feeds on small fishes, tadpoles,
16 and small frogs, especially introduced species, such as small bullfrogs (*Rana catesbeiana*) and their
17 larvae, carp (*Cyprinus carpio*), and mosquitofish (*Gambusia affinis*). In general, the highest
18 methylation rates are associated with high tidal marshes that experience intermittent wetting and
19 drying and associated anoxic conditions (Alpers et al. 2008). Along with minimization and
20 mitigation measures and adaptive management and monitoring, *CM12 Methylmercury Management*
21 (as revised in Appendix 11F, *Substantive BDCP Revisions*) is expected to reduce the amount of
22 methylmercury resulting from the restoration of natural communities and floodplains.

23 Extant populations of giant garter snake within the study area are known only from the upper Yolo
24 Basin and at the Coldani Marsh/White Slough area. Davis et al. (2007) found mercury
25 concentrations in fish at White Slough (and the Central Delta in general) to be relatively low
26 compared to other areas of the Delta. No restoration activities involving flooding (and subsequent
27 methylation of mercury) are planned within the known range of the Coldani Marsh/White Slough
28 giant garter snake population. Effects on giant garter snake from increased methylmercury
29 exposures is more likely in the Yolo Basin, where some of the highest concentrations of mercury and
30 methylmercury have been documented (Foe et al. 2008). Effects from exposure to methylmercury
31 may include decreased predator avoidance, reduced success in prey capture, difficulty in shedding,
32 and reduced ability to move between shelter and foraging or thermoregulation areas (Wylie et al.
33 2009). Planned floodplain restoration activities in the Yolo Basin are expected to seasonally increase
34 methylmercury production, although production would be minimized by *CM12 Methylmercury*
35 *Mitigation*. Further, the periods of production and increased exposure to methylmercury do not
36 overlap with giant garter snake seasonal activity periods. This seasonal trend should help to
37 decrease risk to the giant garter snake, although snakes could prey on individuals that have been
38 exposed to methylmercury during the previous season.

39 The potential mobilization or creation of methylmercury within the study area varies with site-
40 specific conditions and would need to be assessed at the project level. Measures described in *CM12*
41 *Methylmercury Management* include provisions for project-specific Mercury Management Plans.
42 Along with avoidance and minimization measures and adaptive management and monitoring, *CM12*
43 is expected to reduce the effects of methylmercury resulting from BDCP natural communities and
44 floodplain restoration on giant garter snake.

1 **NEPA Effects:** Implementation of the AMMs and *Environmental Commitment 12 Methylmercury*
2 *Management* listed above as part of implementing Alternative 4 would avoid the potential for
3 substantial adverse effects on giant garter snakes, either indirectly or through habitat modifications.
4 These AMMs would also avoid and minimize effects that could substantially reduce the number of
5 giant garter snakes or restrict the species' range. Therefore, the indirect effects of Alternative 4
6 would not have an adverse effect on giant garter snake.

7 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
8 as construction-related noise and visual disturbances could impact giant garter snake in aquatic and
9 upland habitats. The use of mechanical equipment during construction could cause the accidental
10 release of petroleum or other contaminants that could impact giant garter snake or its prey. The
11 inadvertent discharge of sediment or excessive dust adjacent to giant garter snake habitat could also
12 have a negative impact on the species or its prey. With implementation of AMM1-AMM7, AMM10,
13 AMM16, and AMM37 as part of Alternative 4 construction, operation and maintenance, the BDCP
14 would avoid and minimize the potential for significant impacts on giant garter snakes, either
15 indirectly or through habitat modifications. Therefore, the indirect effects of Alternative 4 would
16 have a less-than-significant impact on giant garter snakes.

17 Giant garter snake could experience indirect effects from increased exposure to methylmercury as a
18 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects
19 of methylmercury would not result in a substantial reduction in numbers or a restriction in the
20 range of giant garter snakes, and, therefore, would have a less-than-significant impact on giant
21 garter snakes.

22 **Impact BIO-50a: Loss of Connectivity among Giant Garter Snakes in the Coldani Marsh/White** 23 **Slough Subpopulation, Stone Lakes National Wildlife Refuge, and the Delta**

24 Implementation of Alternative 4 would not introduce a substantial barrier to the movement among
25 giant garter snakes in the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife
26 Refuge, and the Delta in the study area.

27 **NEPA Effects:** Alternative 4 would not adversely affect connectivity among giant garter snakes in the
28 Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife Refuge, and the Delta in
29 the study area.

30 **CEQA Conclusion:** Alternative 4 would have a less-than-significant impact on connectivity among
31 giant garter snakes in the study area and therefore no mitigation is required.

32 **Impact BIO-51: Periodic Effects of Inundation of Giant Garter Snake Habitat as a Result of** 33 **Implementation of Conservation Components**

34 *CM2 Yolo Bypass Fisheries Enhancement:* The proposed changes in Fremont Weir operations would
35 occur intermittently from as early as mid-November through as late as mid-May. The core
36 operations would occur during the winter/spring period, which corresponds mostly with the giant
37 garter snake's inactive season. During this time, snakes are overwintering underground. Giant garter
38 snakes that occur in the bypass during the active season could overwinter in the bypass during the
39 inactive season: these snakes may be vulnerable to inundation of the bypass and could be drowned
40 or displaced from overwintering sites. However, most typically, Fremont Weir "notch" operations
41 would occur on the shoulders of time periods in which the Sacramento River rises enough for
42 Fremont Weir to overtop passively, without the proposed project. Project-associated inundation of

1 areas that would not otherwise have been inundated is expected to occur in no more than 30% of all
2 years, since Fremont Weir is expected to overtop the remaining estimated 70% of all years, and
3 during those years notch operations would not typically affect the maximum extent of inundation.
4 Currently, in more than half of all years, an area greater than the area that would be inundated as a
5 result of covered activities is already inundated during the snake's inactive season (Kirkland pers.
6 comm.). Duration of inundation may also be an important factor determining effects on
7 overwintering giant garter snakes. Radiotelemetry studies have revealed giant garter snakes
8 surviving in burrows that had been inundated for 2 to 3 weeks, but it is unknown what duration of
9 inundation the snakes can survive while overwintering in their burrows.

10 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, of the BDCP provides the method
11 used to estimate periodic inundation effects in the Yolo Bypass. Based on this method, periodic
12 inundation could affect giant garter snakes overwintering in upland areas ranging from an
13 estimated 582 acres of upland habitat during notch flow of 1,000 cfs to an estimated 1,402 acres
14 during a 4,000-cfs notch flow. The 4,000-cfs notch flow would affect an estimated 888 acres of high
15 value habitat and 514 acres of moderate value habitat.

16 As noted above under the discussion of habitat loss from construction-related activities in Yolo
17 Bypass, late season flooding in the bypass may result in loss of rice habitat (considered aquatic
18 habitat for giant garter snake) by precluding the preparation and planting of a maximum of 1,662
19 acres of rice fields (BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter
20 Snake Summer Foraging Habitat in the Yolo Bypass*). This analysis concludes that the estimated loss
21 of rice is 1,662 acres which was considered to occur late long-term. Restoration and protection of
22 2,740 acres of rice land or habitat of equivalent value for the giant garter snake would achieve a 1:1
23 ratio of habitat conserved to habitat affected (habitat affected includes uplands periodically flooded
24 and rice lost due to late season flooding in Yolo Bypass as a result of CM2).

25 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 606 acres of upland
26 habitat for the giant garter snake in the south Delta (CZ 7). The upland habitat to be inundated
27 contains 432 acres of moderate-value and 174 acres of low-value habitat. The area between existing
28 levees would be breached and the newly constructed setback levees would be inundated through
29 seasonal flooding. The restored floodplain will include a range of elevations from low-lying areas
30 that flood frequently (e.g., every 1 to 2 years) to high-elevation areas that flood infrequently (e.g.,
31 every 10 years or more). There are no records of giant garter snakes in the vicinity of where
32 floodplain restoration is expected to occur.

33 Based on modeled habitat for the giant garter snake, the study area supports approximately 53,285
34 acres of upland habitat for giant garter snake. Approximately 2,008 acres of giant garter snake
35 upland habitat (4% of total upland habitat in the study area) may be adversely affected by periodic
36 flooding as a consequence of floodplain restoration and the operation of the Fremont Weir.

37 **NEPA Effects:** Periodic effects on upland habitat for giant garter snake associated with
38 implementing Alternative 4 are not expected to result in substantial adverse effects on giant garter
39 snakes, either directly or through habitat modifications, as it would not result in a substantial
40 reduction in numbers or a restriction in the range of giant garter snakes. Therefore, Alternative 4
41 would not adversely affect the species.

42 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in
43 various parts of the study area would periodically affect a total of approximately 2,008 acres of
44 upland habitat for giant garter snake. The inundation could affect overwintering snakes. Project-

1 associated inundation of areas that would not otherwise have been inundated is expected to occur in
2 no more than 30% of all years, since Fremont Weir is expected to overtop the remaining estimated
3 70% of all years, and during those years notch operations would not typically affect the maximum
4 extent of inundation. Currently, in more than half of all years, an area greater than the area that will
5 be inundated as a result of covered activities is already inundated during the snake's inactive season
6 (Kirkland pers. comm.).

7 Therefore, increased inundation in the Yolo Bypass as a result of BDCP is expected to have a minimal
8 effect on the Yolo Basin/Willow Slough population. Therefore, implementing Alternative 4, including
9 AMM1-AMM7, AMM10, and AMM16, would not be expected to result in substantial adverse effects
10 on giant garter snakes, either directly or through habitat modifications, because it would not result
11 in a substantial reduction in numbers or a restriction in the range of giant garter snakes. Periodic
12 effects of inundation under Alternative 4 would have a less-than-significant impact on the species.

13 **Western Pond Turtle**

14 The habitat model used to assess effects on the western pond turtle is based on aquatic and upland
15 nesting and overwintering habitat. Further details regarding the habitat model, including
16 assumptions on which the model is based, are provided in BDCP Appendix 2A, Section 2A.30,
17 *Western Pond Turtle*. The model quantified two types of upland nesting and overwintering habitat,
18 including upland habitat in natural communities as well as upland in agricultural areas adjacent to
19 aquatic habitats. Both of these upland habitat types are combined for this analysis. Factors
20 considered in assessing the value of affected aquatic habitat are natural community type and
21 availability of adjacent nesting and overwintering habitat. The highest value aquatic habitat types in
22 the study area consist of nontidal freshwater perennial emergent wetlands and ponds adjacent to
23 suitable nesting and overwintering habitat (Patterson pers. comm.). Less detail is provided on
24 effects on dispersal habitat because, although dispersal habitat is important for maintaining and
25 increasing distribution and genetic diversity, turtles have been known to travel over many different
26 land cover types; therefore, this habitat type is not considered limiting. The value of dispersal
27 habitat depends less on the habitat type itself than on the proximity of that habitat type to high-
28 value aquatic and nesting and overwintering habitat.

29 Construction and restoration associated with Alternative 4 conservation measures would result in
30 both temporary and permanent losses of western pond turtle modeled habitat, as indicated in Table
31 12-4-23. The majority of these losses would take place over an extended period of time as tidal
32 marsh is restored in the study area.

33 Full implementation of Alternative 4 would also include the following biological objectives over the
34 term of the BDCP to benefit the western pond turtle (BDCP Chapter 3, *Conservation Strategy*).

- 35 ● Protect or restore 142,200 acres of high-value natural communities and covered species
36 habitats (Objective L1.1, associated with CM3).
- 37 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
38 accommodate sea level rise. Minimum restoration targets for tidal natural communities in
39 each ROA are 7,000 acres in Suisun Marsh ROA, 5,000 acres in Cache Slough ROA, 1,500 acres in
40 Cosumnes/Mokelumne ROA, 2,100 acres in West Delta ROA, and 5,000 acres in South Delta ROA
41 (Objective L1.3, associated with CM2, CM3, and CM4).
- 42 ● Within the 65,000 acres of tidal natural communities and transitional uplands (Objective L1.3),
43 include sufficient transitional uplands along the fringes of restored brackish and freshwater

- 1 tidal emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow
2 for the future upslope establishment of tidal emergent wetland communities (Objective L1.7,
3 associated with CM3, CM4, and CM8).
- 4 ● Allow floods to promote fluvial processes, such that bare mineral soils are available for natural
5 recolonization of vegetation, desirable natural community vegetation is regenerated, and
6 structural diversity is promoted, or implement management actions that mimic those natural
7 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
 - 8 ● Allow lateral river channel migration (Objective L2.2, associated with CM3 and CM5).
 - 9 ● Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of
10 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective
11 TFEWNC1.1, associated with CM3 and CM4).
 - 12 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
13 and nontidal freshwater emergent wetland natural communities, with suitable habitat
14 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,
15 associated with CM3 and CM10).
 - 16 ● Protect and enhance 8,100 acres of managed wetland, 1,500 acres of which are in the Grizzly
17 Island Marsh Complex (Objective MWNC1.1, associated with CM3 and CM11).
 - 18 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
 - 19 ● Protect stock ponds and other aquatic features within protected grasslands to provide aquatic
20 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with
21 CM3).
 - 22 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
23 lands that occur in cultivated lands within the reserve system, including isolated valley oak
24 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
25 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
26 with CM3 and CM11).
- 27 As explained below, with the restoration and protection of these amounts of habitat, in addition to
28 implementation of AMMs, impacts on western pond turtle would not be adverse for NEPA purposes
29 and would be less than significant for CEQA purposes.

1 **Table 12-4-23. Changes in Western Pond Turtle Modeled Habitat Associated with Alternative 4^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic (acres)	335	335	2,005	2,005	NA	NA
	Upland (acres) ^e	261	261	84	84	NA	NA
	Aquatic (miles)	7	7	4	4	NA	NA
Total Impacts CM1 (acres)		596	596	2,089	2,089	NA	NA
CM2–CM18	Aquatic (acres)	82	114	23	44	NA	NA
	Upland (acres) ^e	414	1,028	119	136	283–798	331
	Aquatic (miles)	25	109	3	4	0	0
Total Impacts CM2–CM18 (acres)		496	1,142	142	180	283–798	331
TOTAL IMPACTS CM1–CM18 (acres)		1,092	1,738	2,231	2,269	283–798	331

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

^e Upland acres represent upland nesting and overwintering habitat acreages combined for both natural communities and agricultural lands adjacent to aquatic habitats.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-52: Loss or Conversion of Habitat for and Direct Mortality of Western Pond Turtle**

4 Alternative 4 conservation measures would result in the permanent and temporary loss of up to
5 2,498 acres of aquatic habitat and 1,509 acres of upland nesting and overwintering habitat (Table
6 12-4-23). Activities that would result in the temporary and permanent loss of western pond turtle
7 modeled habitat are conveyance facilities and transmission line construction, geotechnical
8 investigations, and establishment and use of RTM, borrow, and spoils areas (CM1), Yolo Bypass
9 improvements (CM2), tidal habitat restoration (CM4) floodplain restoration (CM5), and riparian
10 habitat restoration (CM7). Habitat enhancement and management activities (CM11), such as ground
11 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In
12 addition, maintenance activities associated with the long-term operation of the water conveyance
13 facilities and other BDCP physical facilities could degrade or eliminate western pond turtle habitat.
14 The activity accounting for most (80%) of the habitat loss or conversion would be *CM4 Tidal Natural*
15 *Communities Restoration*. Each of these individual activities is described below. A summary
16 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual
17 conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
19 result in the permanent loss of approximately 335 acres of aquatic habitat and 261 acres of

1 upland nesting and overwintering habitat for the western pond turtle in the study area (Table
2 12-4-23). Development of the water conveyance facilities would also result in the temporary
3 removal of up to 2,005 acres of aquatic habitat and 84 acres of nesting and overwintering
4 habitat for the western pond turtle in the study area (see Table 12-4-23). Approximately 7 miles
5 of channels providing western pond turtle movement habitat would be removed and 4 miles
6 would be temporarily disturbed. There are four western pond turtle occurrences that overlap
7 with the CM1 footprint in CZ 2, one occurrence that overlaps with an RTM area on the southern
8 tip of Bouldin Island in CZ 5, and one occurrence that overlaps with an RTM area along Twin
9 Cities Road in CZ 4.

10 An estimated 162 of the total 596 aquatic and upland acres combined and 4 of the 7 miles would
11 be lost as storage areas for reusable tunnel material, which would likely be moved to other sites
12 for use in levee build-up and restoration, and the affected area would likely be restored: while
13 this effect is categorized as permanent because there is no assurance that the material would
14 eventually be moved, the effect would likely be temporary. Furthermore, the amount of storage
15 area needed for reusable tunnel material is flexible and the footprint used in the effects analysis
16 is based on a worst case scenario: the actual area to be affected by reusable tunnel material
17 storage would likely be less than the estimated acreage.

18 The majority of the permanent loss of aquatic habitat and nesting and overwintering habitat
19 would be near Clifton Court Forebay in CZ 8. Refer to the Terrestrial Biology Mapbook for a
20 detailed view of Alternative 4 construction locations. The aquatic habitat in the Clifton Court
21 Forebay area is considered to be of reasonably high-value because it consists of agricultural
22 ditches in or near known species occurrences. The nesting and overwintering and dispersal
23 habitat that would be lost consists primarily of cultivated lands with some small portion of
24 ruderal grassland habitat. Except for remnant, uncultivated patches, the cultivated lands are not
25 suitable for nesting and overwintering unless left fallow. Construction of the water conveyance
26 facilities would also affect dispersal habitat, which is primarily cultivated lands. While there are
27 western pond turtle occurrences scattered throughout CZ 3, CZ 4, CZ 5, and CZ 6, this effect is
28 widely dispersed because of the long, linear nature of the pipeline footprint.

- 29 ● *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the
30 permanent and temporary removal of approximately 60 acres of aquatic habitat and 249 acres
31 of upland nesting and overwintering habitat for the western pond turtle. Approximately 4 miles
32 of channels providing western pond turtle movement habitat would be permanently or
33 temporarily removed as a result of Yolo Bypass improvements. Although there are no CNDDB
34 occurrences for western pond turtle in the Yolo Bypass, the species is known to be present in
35 the Yolo Bypass Wildlife Area (California Department of Fish and Wildlife 2013).
- 36 ● *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
37 in the conversion of approximately 45 acres of aquatic habitat and 872 acres of upland nesting
38 and overwintering habitat for western pond turtle to tidal marsh. Approximately 106 miles of
39 channels providing western pond turtle movement habitat would be removed as a result of
40 restoration. Tidal habitat restoration is expected to change existing salinity and flow conditions
41 rather than lead to complete loss of aquatic habitat. Restoration of tidal flow where habitat
42 consists of the calm waters of managed freshwater ponds and wetlands could have an adverse
43 effect on the western pond turtle. Tidal restoration outside Suisun Marsh is likely to create
44 suitable, slow-moving freshwater slough and marsh habitat.

1 Although the aquatic habitat model includes all tidal perennial aquatic, tidal brackish emergent
 2 wetland, and managed wetland as habitat, almost of the Suisun Marsh pond turtle observations
 3 have been in the interior drainage ditches or near water control structures not hydrologically
 4 connected to Suisun Marsh (Patterson pers. comm.). While the model does not include an
 5 aquatic class type called *drainage ditches* and therefore an effect on this habitat type cannot be
 6 calculated, it is likely that this general type of habitat accounts for a very small portion of the
 7 total modeled aquatic effects; almost certainly less than 5%, or less than 287 acres of the
 8 modeled aquatic habitat affected by tidal restoration. The suitable nesting and overwintering
 9 habitat that would be affected in the interior of Suisun Marsh is limited, because the levees likely
 10 function as the primary nesting and overwintering habitat. The nesting and overwintering
 11 habitat of highest value to be affected is on the fringe of the marsh where the aquatic habitat is
 12 adjacent to undeveloped grassland habitat.

13 The habitat affected in the interior Delta (West Delta and South Delta) is of low value, consisting
 14 of levees and intensively farmed cultivated lands, while the Cache Slough and Cosumnes-
 15 Mokelumne ROAs are less intensively farmed and have higher-value habitat for the turtle.
 16 Because the estimates of the effect of tidal inundation are based on projections of where
 17 restoration may occur, actual effects are expected to be lower because sites would be selected to
 18 minimize effects on western pond turtle habitat (see AMM17 in Appendix 3B, *Environmental*
 19 *Commitments, AMMs, and CMs*).

- 20 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
 21 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
 22 approximately 53 acres of aquatic habitat and 33 acres of upland habitat for western pond
 23 turtle. Approximately 3 miles of channels providing western pond turtle movement habitat
 24 would be removed as a result of floodplain restoration. Although there are no CNDDDB
 25 occurrences of the western pond turtle in the areas where floodplain restoration is likely to
 26 occur, the species is known to occur along the San Joaquin River to the south in the San Joaquin
 27 River National Wildlife Refuge. As with CM4, the estimates of the effect of seasonal floodplain
 28 levee construction and inundation are based on projections of where restoration may occur.
 29 Actual effects are expected to be lower because sites would be selected to minimize effects on
 30 western pond turtle habitat.
- 31 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration that is part of tidal natural
 32 communities restoration in CZ 1 and CZ 2, would result in the permanent removal of 10 acres of
 33 upland nesting and overwintering habitat for western pond turtle.
- 34 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
 35 actions included in CM11 that are designed to enhance wildlife values in BDCP protected
 36 habitats may result in localized ground disturbances that could temporarily remove small
 37 amounts of western pond turtle habitat. Ground-disturbing activities, such as removal of
 38 nonnative vegetation and road and other infrastructure maintenance, are expected to have
 39 minor adverse effects on available western pond turtle habitat and are expected to result in
 40 overall improvements to and maintenance of western pond turtle habitat values over the term
 41 of the BDCP. In addition, effects would be avoided and minimized by the AMMs listed below.

42 Management of the 6,600 acres of managed wetlands to be protected for waterfowl and
 43 shorebirds is not expected to result in overall adverse effects for the western pond turtle.
 44 Management actions that would improve wetland quality and diversity on managed wetlands
 45 include control and eradication of invasive plants; maintenance of a diversity of vegetation types

1 and elevations, including upland areas to provide flood refugia; water management and leaching
2 to reduce salinity; and enhancement of water management infrastructure (improvements to
3 enhance drainage capacity, levee maintenance). These management actions could benefit the
4 western pond turtle. The 6,600 acres of protected managed wetlands would be monitored and
5 adaptively managed to ensure that management options are implemented to avoid adverse
6 effects on the western pond turtle.

- 7 • Operations and maintenance: Ongoing maintenance of BDCP facilities is expected to have little if
8 any adverse effect on the western pond turtle. Postconstruction operation and maintenance of
9 the above-ground water conveyance facilities and restoration infrastructure could result in
10 ongoing but periodic disturbances that could affect western pond turtle use where there is
11 suitable habitat in the study area. Maintenance activities would include vegetation management,
12 levee and structure repair, and regrading of roads and permanent work areas. These effects,
13 however, would be minimized by AMMs and conservation actions described below.
- 14 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
15 western pond turtles. If turtles reside where conservation measures are implemented (most
16 likely in the vicinity of aquatic habitats in the study area), the operation of equipment for land
17 clearing, construction, conveyance facilities operation and maintenance, and habitat restoration,
18 enhancement, and management could result in injury or mortality of western pond turtles.
19 However, to avoid injury or mortality, preconstruction surveys would be conducted in suitable
20 aquatic or upland habitat for the western pond turtle, and turtles found would be relocated
21 outside the construction areas, as required by the AMMs listed below.

22 The following paragraphs summarize the combined effects discussed above and describe other
23 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
24 also included.

25 ***Near-Term Timeframe***

26 Because the water conveyance facilities construction is being evaluated at the project level, the near-
27 term BDCP conservation strategy has been evaluated to determine whether it would provide
28 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
29 construction would not be adverse under NEPA.

30 Alternative 4 would temporarily and permanently remove 2,445 acres of aquatic habitat and 878
31 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These
32 effects would result from water conveyance facilities construction (CM1, 2,340 acres of aquatic and
33 345 acres of upland habitats), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of
34 upland habitats), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland
35 habitats), and riparian restoration (CM7, 4 acres of upland habitat).

36 Typical project-level mitigation ratios for those natural communities that would be affected and that
37 are identified in the biological goals and objectives for western pond turtle in Chapter 3,
38 *Conservation Strategy*, of the BDCP would be 1:1 for restoration and 1:1 for protection of aquatic
39 habitats and 2:1 for protection of upland habitats. Using these ratios would indicate that 2,445 acres
40 of aquatic habitat should be restored, 2,445 acres of aquatic habitat should be protected, and 1,756
41 acres of upland habitat should be protected for western pond turtle to mitigate the near-term losses.

42 The conservation strategy for western pond turtle involves restoration and protection of aquatic
43 and adjacent upland habitat, and establishment of an interconnected reserve system that provides

1 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
2 addressed at the landscape and natural community levels. The BDCP has committed to near-term
3 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,
4 Objective NFEW/NPANC1.1, MWNC1.1) and up to 2,000 acres of upland habitat (Objective GNC1.1).
5 In addition, the protection and management of existing managed wetland habitat in Suisun Marsh
6 may increase the value of aquatic habitat. The most beneficial restoration would occur in freshwater
7 emergent wetland consisting of slow-moving slough and marsh adjacent to protected, undisturbed
8 grassland. Additionally, basking platforms will be installed as needed in restored freshwater marsh
9 to benefit the western pond turtle.

10 The natural community restoration and protection activities would be concluded in the first 10
11 years of plan implementation, which is close enough in time to the impacts of construction to
12 constitute adequate mitigation. Because the number of acres required to meet the typical ratios
13 described above would be only 2,445 acres of aquatic communities protected, 2,445 acres restored,
14 and 1,756 acres of upland communities protected, the 24,350 acres of aquatic and 2,000 acres of
15 upland habitats restored or created in the near-term Plan goals, and the additional detail in the
16 biological goals for western pond turtle, are more than sufficient to support the conclusion that the
17 near-term impacts of habitat loss and direct mortality under Alternative 4 on western pond turtles
18 would not be adverse.

19 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils, Reusable Tunnel Material, and Dredged*
23 *Material*, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM17 Western*
24 *Pond Turtle*. These AMMs include elements that would avoid or minimize the risk of affecting
25 habitats and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes the
26 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
27 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

28 **Late Long-Term Timeframe**

29 Based on the habitat model, the study area supports approximately 81,666 acres of aquatic and
30 28,864 acres of upland habitat for western pond turtle. Alternative 4 would remove 2,498 acres of
31 aquatic habitat and 1,509 acres of upland nesting and overwintering habitat for western pond turtle
32 in the late long-term.

33 Implementation of Alternative 4 as a whole would increase the extent and distribution of high-value
34 aquatic and upland nesting and overwintering habitat for western pond turtle in the study area.
35 While the extent of dispersal habitat is expected to be reduced by approximately 5%, this habitat is
36 abundant in the study area (composed primarily of cultivated lands), is not believed to be a factor
37 limiting the turtle, and would be replaced with higher-value habitats for western pond turtle.

38 The conservation strategy for western pond turtle involves restoration and protection of aquatic
39 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
40 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
41 addressed at the landscape and natural community levels. The BDCP has committed to late long-
42 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective
43 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) and up to 8,000 acres of upland habitat (Objective
44 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun

1 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in
2 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,
3 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are
4 preserved and managed as part of the 48,625 acres of protected cultivated lands described above for
5 giant garter snake are also expected to benefit the species. Additionally, basking platforms would be
6 installed as needed in restored freshwater marsh to benefit the western pond turtle.

7 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and
8 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow
9 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species
10 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to
11 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat
12 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle
13 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident
14 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the
15 rabbit.

16 The study area represents only a small portion of the range of the western pond turtle in California
17 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and
18 temporary loss or conversion of habitat for the western pond turtle, and other effects described
19 above, are not expected to result in an adverse effect on the long-term survival and recovery of
20 western pond turtle because for the following reasons.

- 21 ● The study area represents a small portion of the species' entire range.
- 22 ● Only 1% of the habitat in the study area would be removed or converted.

23 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
24 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above, as
25 well as the restoration of managed wetland, nontidal freshwater perennial emergent wetland,
26 nontidal perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland,
27 grassland, valley foothill riparian, that could overlap with the species model, would result in the
28 restoration of 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western pond
29 turtle. In addition, protection of cultivated land, managed wetland, grassland, and valley/foothill
30 riparian could overlap with the species model and would result in the protection of 1,281 acres of
31 aquatic and 4,993 acres of upland western pond turtle modeled habitat.

32 **NEPA Effects:** In the near-term, the loss of western pond turtle habitat under Alternative 4 would
33 not be adverse because the BDCP has committed to protecting and restoring the acreage required to
34 meet the typical mitigation ratios described above. In the late long-term, the losses of western pond
35 turtle habitat associated with Alternative 4, in the absence of other conservation actions, would
36 represent an adverse effect as a result of habitat modification and potential direct mortality of a
37 special-status species. However, with habitat protection and restoration associated with the
38 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,
39 AMM10, and AMM17, the effects of Alternative 4 as a whole on western pond turtle would not be
40 adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
6 effects of construction would be less than significant under CEQA.

7 Alternative 4 would temporarily and permanently remove 2,445 acres of aquatic habitat and 878
8 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These
9 effects would result from water conveyance facilities construction (CM1, 2,340 acres of aquatic and
10 345 acres of upland habitats), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of
11 upland habitats), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland
12 habitats) and riparian restoration (CM7, 4 acres of upland habitat) (Table 12-4-23).

13 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
14 and that are identified in the biological goals and objectives for western pond turtle in Chapter 3,
15 *Conservation Strategy*, of the BDCP would be 1:1 for restoration and 1:1 for protection of aquatic
16 habitats and 2:1 for protection of upland habitats. Using these ratios would indicate that 2,445 acres
17 of aquatic habitat should be restored, 2,445 acres of aquatic habitat should be protected, and 1,756
18 acres of upland habitat should be protected for western pond turtle to mitigate the near-term losses.

19 The conservation strategy for western pond turtle involves restoration and protection of aquatic
20 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
21 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
22 addressed at the landscape and natural community levels. The BDCP has committed to near-term
23 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,
24 Objective NFEW/NPANC1.1, MWNC1.1) and up to 2,000 acres of upland habitat (Objective GNC1.1).
25 In addition, the protection and management of existing managed wetland habitat in Suisun Marsh
26 may increase the value of aquatic habitat. The most beneficial restoration would occur in freshwater
27 emergent wetland consisting of slow-moving slough and marsh adjacent to protected, undisturbed
28 grassland. Additionally, basking platforms will be installed as needed in restored freshwater marsh
29 to benefit the western pond turtle.

30 The natural community restoration and protection activities would be concluded in the first 10
31 years of plan implementation, which is close enough in time to the impacts of construction to
32 constitute adequate mitigation for CEQA purposes. Because the number of acres required to meet
33 the typical ratios described above would be only 2,445 acres of aquatic communities protected,
34 2,445 acres of aquatic communities, and 1,756 acres of upland communities protected, the 24,350
35 acres of aquatic and 2,000 acres of upland habitats restored or created in the near-term Plan goals,
36 and the additional detail in the biological goals for western pond turtle, are more than sufficient to
37 support the conclusion that the near-term impacts of habitat loss and direct mortality under
38 Alternative 4 on western pond turtles would be less than significant.

39 In addition, the plan also contains commitments to implement AMM1–AMM6, AMM10, and AMM17,
40 which include elements that would avoid or minimize the risk of directly and indirectly affecting
41 habitats and species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes
42 the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
43 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 Based on the habitat model, the study area supports approximately 81,666 acres of aquatic and
3 28,864 acres of upland habitat for western pond turtle. Alternative 4 would remove 2,498 acres of
4 aquatic habitat and 1,509 acres of upland nesting and overwintering habitat for western pond turtle
5 in the late long-term.

6 Implementation of Alternative 4 as a whole would increase the extent and distribution of high-value
7 aquatic and upland nesting and overwintering habitat for western pond turtle in the study area.
8 While the extent of dispersal habitat is expected to be reduced by approximately 5%, this habitat is
9 abundant in the study area (composed primarily of cultivated lands), is not believed to be a factor
10 limiting the turtle, and would be replaced with higher-value habitats for western pond turtle.

11 The conservation strategy for western pond turtle involves restoration and protection of aquatic
12 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
13 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
14 addressed at the landscape and natural community levels. The BDCP has committed to late long-
15 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective
16 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) and up to 8,000 acres of upland habitat (Objective
17 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun
18 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in
19 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,
20 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are
21 preserved and managed as part of the 48,625 acres of protected cultivated lands described above for
22 giant garter snake are also expected to benefit the species. Additionally, basking platforms will be
23 installed as needed in restored freshwater marsh to benefit the western pond turtle.

24 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and
25 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow
26 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species
27 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to
28 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat
29 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle
30 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident
31 western pond turtles because riparian-adjacent grassland is an important habitat characteristic for
32 the rabbit.

33 The study area represents only a small portion of the range of the western pond turtle in California
34 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and
35 temporary loss or conversion of habitat for the western pond turtle, and other effects described
36 above, are not expected to result in an adverse effect on the long-term survival and recovery of
37 western pond turtle because for the following reasons.

- 38
- The study area represents a small portion of the species' entire range.
 - Only 1% of the habitat in the study area would be removed or converted.
- 39

40 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
41 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above, as
42 well as the restoration of managed wetland, nontidal freshwater perennial emergent wetland,
43 nontidal perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland,

1 grassland, valley foothill riparian, that could overlap with the species model, would result in the
2 restoration of 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western pond
3 turtle. In addition, protection of cultivated land, managed wetland, grassland, and valley/foothill
4 riparian could overlap with the species model and would result in the protection of 1,281 acres of
5 aquatic and 4,993 acres of upland western pond turtle modeled habitat.

6 The loss of western pond turtle habitat associated with Alternative 4 would represent a significant
7 impact as a result of special-status species habitat modification and the potential for direct mortality
8 of turtles. However, considering the habitat restoration and protection associated with the
9 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,
10 AMM10, and AMM17, which would be in place during all project activities, the loss of habitat and
11 potential mortality would not have a significant impact on western pond turtle. Therefore, the loss
12 of western pond turtle habitat and potential mortality of turtles from Alternative 4 would have a
13 less-than-significant impact on western pond turtle.

14 **Impact BIO-53: Indirect Effects of Plan Implementation on Western Pond Turtle**

15 Indirect effects on western pond turtle within 200 feet of construction activities could temporarily
16 affect the use of aquatic habitat and upland nesting, overwintering, and dispersal habitat for the
17 western pond turtle. Construction activities outside the construction footprint but within 200 feet of
18 water conveyance facilities, conservation components, and ongoing habitat enhancement, as well as
19 operation and maintenance of above-ground water conveyance facilities, including the transmission
20 facilities, could result in ongoing periodic postconstruction disturbances with localized impacts on
21 western pond turtle habitat, and temporary noise and visual disturbances over the term of the
22 BDCP.

23 The use of mechanical equipment during water conveyance facilities construction could cause the
24 accidental release of petroleum or other contaminants that could affect western pond turtle or its
25 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond
26 turtle aquatic habitat could also have a negative effect on the species or its prey. AMM1–AMM6, and
27 AMM10 would minimize the likelihood of such spills and would ensure measures are in place to
28 prevent runoff from the construction area and potential effects of sediment or dust on western pond
29 turtle or its prey.

30 Water operations would affect salinity gradients in Suisun Marsh. This effect mechanism cannot be
31 disaggregated from tidal natural community restoration in Suisun Marsh. It is expected that the
32 salinity of water in Suisun Marsh would generally increase as a result of water operations and
33 operation of salinity control gates to mimic a more natural water flow. Results of modeling for full
34 implementation of the BDCP show salinity to double by the late long-term compared with current
35 conditions during late fall and winter months. Changes in salinity would not be uniform across
36 Suisun Marsh, as salinity would likely be more pronounced in some tidal channels and sloughs than
37 others, and most of the salinity increase would occur during the fall and winter. Western pond
38 turtles are primarily a freshwater species, although they can also be found in brackish marsh, and
39 could respond negatively to increased salinity in Suisun Marsh. However, most of the Suisun Marsh
40 pond turtle observations have been in the interior drainage ditches or near water control structures
41 not connected to tidal channels and sloughs in Suisun Marsh which is where increases in salinity
42 would occur. Therefore, the potential effects associated with changes in salinity are not expected to
43 adversely affect western pond turtles.

1 **NEPA Effects:** With implementation of AMM1–AMM6, AMM10, and AMM17 as part of Alternative 4,
2 the BDPC would avoid the potential for substantial adverse effects on western pond turtles, either
3 directly or through habitat modifications. These AMMs would also avoid and minimize effects that
4 could substantially reduce the number of western pond turtles or restrict the species range.
5 Therefore, the indirect effects of Alternative 4 would not have an adverse effect on western pond
6 turtle.

7 **CEQA Conclusion:** Indirect effects resulting from conservation measure operations and maintenance
8 as well as construction-related noise and visual disturbances could impact western pond turtle in
9 aquatic and upland habitats. The use of mechanical equipment during construction could cause the
10 accidental release of petroleum or other contaminants that could affect western pond turtle or its
11 prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond turtle
12 habitat could also have a negative effect on the species or its prey. Changes in water salinity would
13 have a less-than-significant impact on western pond turtles because most of the salinity increases
14 would occur in areas not used extensively by western pond turtles.

15 With implementation of AMM1–AMM6, AMM10, and AMM17 as part of Alternative 4 construction,
16 operation, and maintenance, the BDCP would avoid the potential for significant impacts on western
17 pond turtles, either indirectly or through habitat modifications, and would not result in a substantial
18 reduction in numbers or a restriction in the range of western pond turtles. The indirect effects of
19 Alternative 4 would have a less-than-significant impact on western pond turtles.

20 **Impact BIO-54: Periodic Effects of Inundation of Western Pond Turtle Habitat as a Result of** 21 **Implementation of Conservation Components**

22 *CM2 Yolo Bypass Fisheries Enhancement* would result in periodic inundation that could affect
23 western pond turtle and its upland habitat. BDCP Appendix 5.J, *Effects on Natural Communities,*
24 *Wildlife, and Plants*, provides the method used to estimate periodic inundation effects in the Yolo
25 Bypass. Based on this method, periodic inundation could affect from an estimated 283 acres of
26 habitat during 1,000 cfs notch flow to an estimated 798 acres of habitat during 4,000 cfs notch flow
27 (Table 12-4-23). This effect would occur during an estimated maximum of 30% of years, in areas
28 that are already inundated in more than half of all years; therefore, these areas are expected to
29 provide only marginal overwintering habitat for the western pond turtle under Existing Conditions.
30 Furthermore, Yolo Bypass inundation is not expected to affect nesting western pond turtles because
31 operations would not occur during the nesting season (approximately May through October).
32 Therefore, Yolo Bypass operations are expect to have a minimal effect, if any, on western pond
33 turtles in the Yolo Bypass.

34 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 331 acres of upland
35 habitat for the western pond turtle in the south Delta (CZ 7). Seasonal flooding in restored
36 floodplains is not expected to adversely affect aquatic and dispersal habitat, because these habitat
37 functions are expected to remain in the seasonally inundated floodplains. Floodplains are not
38 expected to be inundated during the nesting season, however, turtle hatchlings may overwinter in
39 the nest and could be affected by flooding. Restored floodplains would transition for areas that flood
40 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more);
41 adverse effects on turtle hatchlings are most likely at the lower elevations of the restored floodplain,
42 where frequent flooding occurs.

43 **NEPA Effects:** Periodic effects on upland habitat for western pond turtle from CM2 and CM5
44 associated with implementing Alternative 4 are not expected to result in substantial adverse effects

1 either directly or through habitat modifications, as it would not result in a substantial reduction in
2 numbers or a restriction in the range of western pond turtles. Therefore, Alternative 4 would not
3 adversely affect the species.

4 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in
5 various parts of the study area would periodically affect 283-798 acres from CM2 and approximately
6 331 acres from CM5 of upland habitat for western pond turtle. These acreages represent only 1% of
7 the total upland western pond turtle habitat in the study area. Most of the increase in inundation
8 would occur in the winter and early spring months, when western pond turtles may be in the water
9 or overwintering and occupying upland habitats. Therefore, implementing Alternative 4, including
10 AMM1-AMM6, AMM10, and AMM17, would not be expected to result in significant impacts on
11 western pond turtle, either directly or through habitat modifications, because it would not result in
12 a substantial reduction in numbers or a restriction in the range of western pond turtles. Periodic
13 effects of inundation under Alternative 4 would have a less-than-significant impact on the species.

14 **Silvery Legless Lizard, San Joaquin Coachwhip, and Blainville's Horned Lizard**

15 This section describes the effects of Alternative 4 on the silvery legless lizard, San Joaquin
16 coachwhip and Blainville's horned lizard (special-status reptiles). The habitat types used to assess
17 effects on silvery legless lizard are limited to inland sand dunes near Antioch (CZ 9 and CZ 10),
18 (Figure 12-17). There are isolated patches of sandy habitat in the vicinity of Oakley and along the
19 railroad in the East Bay Regional Park Legless Lizard Preserve that are not shown in Figure 12-17
20 because project mapping was not available at this level of detail. Because none of these areas would
21 be affected by construction or restoration activities, this species is not discussed any further. The
22 habitat types used to assess effects on the San Joaquin coachwhip are alkali seasonal wetland
23 complex, grassland, and inland dune scrub west of Byron Highway (CZ 7) and west of Old River and
24 West Canal (CZ 8). The habitat types used to assess effects on the Blainville's horned lizard are the
25 same as those for the whipsnake in CZ 7 and CZ 8. There is also potential habitat for the horned
26 lizard to occur in grassland habitat around Stone Lake (CZ 4). Although the expected range for San
27 Joaquin coachwhip and Blainville's horned lizard extends into the study area, there are no records
28 for either of these species within the study area (California Department of Fish and Wildlife 2013).
29 In addition, historic museum records show that Blainville's horned lizard occurrences could have been
30 extirpated within the study area (Jennings and Hayes 1994).

31 Alternative 4 is expected to result in the temporary and permanent removal of habitat that special-
32 status reptiles uses for cover and dispersal (Table 12-4-24). BDCP actions that could affect this
33 habitat are limited to construction and maintenance of the water conveyance facilities in the vicinity
34 of Clifton Court Forebay, and grassland restoration, protection and management. Full
35 implementation of Alternative 4 would also include the following biological objectives over the term
36 of the BDCP that would also benefit special-status reptiles (see Chapter 3, *Conservation Strategy*, of
37 the BDCP).

- 38 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
39 between existing conservation lands (Objective L1.6, associated with CM3).
- 40 ● Increase native species diversity and relative cover of native plant species, and reduce the
41 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).

- 1 • Protect and improve habitat linkages that allow native terrestrial species to move between
- 2 protected habitats within and adjacent to the Plan Area (Objective L3.1, associated with CM3,
- 3 CM8, and CM11).
- 4 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 5 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland
- 6 (Objective GNC1.2, associated with CM3 and CM8).

7 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 8 implementation of AMMs, impacts on special-status reptiles would not be adverse for NEPA
 9 purposes and would be less than significant for CEQA purposes.

10 **Table 12-4-24. Changes in Special-Status Reptile Habitat Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type ^c	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT ^d	CM2	CM5
CM1	Grassland	269	269	102	102	NA	NA
Total Impacts CM1		269	269	102	102	NA	NA
CM2–CM18	Grassland	0	0	0	0	0	0
Total Impacts CM2–CM18		0	0	0	0	0	0
TOTAL IMPACTS		269	269	102	102	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c Grassland impacts include alkali seasonal wetland complex, grassland, and inland dune scrub natural communities.

^d LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^e Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

11

12 **Impact BIO-55: Loss or Conversion of Habitat for and Direct Mortality of Special-Status**
 13 **Reptiles**

14 Alternative 4 conservation measures would result in the permanent and temporary loss of 371 acres
 15 of habitat for special-status reptiles (Table 12-4-24). Water conveyance facilities and transmission
 16 line construction, including establishment and use of RTM, borrow, and spoils areas, and
 17 geotechnical investigations (CM1) would cause the loss of special-status reptile habitat. In addition,
 18 habitat enhancement and management activities (CM11), such as ground disturbance or removal of
 19 nonnative vegetation, could result in local adverse habitat effects for special-status reptiles. For
 20 purposes of this analysis, the acres of total effect are considered the same for both San Joaquin
 21 coachwhip and Blainville’s horned lizard, even though this would result in slightly more acres of

1 permanent effect on the San Joaquin coachwhip resulting from water conveyance facilities activities
2 in CZ 4 where it does not occur.

3 In addition to habitat loss and conversion, construction activities, such as grading, the movement of
4 construction vehicles or heavy equipment, and the installation of water conveyance facilities
5 components and new transmission lines, may result in the direct mortality, injury, or harassment of
6 special-status reptiles, including the potential crushing of individuals and disruption of essential
7 behaviors. Construction of access roads could fragment suitable habitat, impede upland movements
8 in some areas, and increase the risk of road mortality. Construction activities related to conservation
9 components could have similar effects. Each of these individual activities is described below. A
10 summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the
11 individual conservation measure discussions.

- 12 • *CM1 Water Facilities and Operation*: Development of the conveyance facilities would result in the
13 permanent loss of approximately 269 acres of habitat for special-status reptiles in the vicinity of
14 Clifton Court Forebay. Construction-related effects would temporarily disturb 102 acres of
15 suitable habitat for special-status reptiles in the study area. There are no occurrences of either
16 species within the construction footprint for CM1.
- 17 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
18 actions included in *CM11* that are designed to enhance wildlife values in BDCP-protected
19 habitats may result in localized ground disturbances that could temporarily remove small
20 amounts of special-status reptile habitat. Ground-disturbing activities, such as removal of
21 nonnative vegetation and road and other infrastructure maintenance, are expected to have
22 minor adverse effects on available special-status reptile habitat and are expected to result in
23 overall improvements to and maintenance of species habitat values over the term of the BDCP.
24 These effects cannot be quantified, but are expected to be minimal and would be reduced
25 through implementation of Mitigation Measure BIO-55 *Conduct Preconstruction Surveys for*
26 *Noncovered Special-Status Reptiles and Implement Applicable AMMs*.
- 27 • *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have
28 little if any adverse effect on special-status reptiles. Postconstruction operation and
29 maintenance of the above-ground water conveyance facilities could result in ongoing but
30 periodic disturbances that could affect special-status reptiles' use of suitable habitat in the study
31 area. These effects, however, would be minimized with implementation of Mitigation Measure
32 BIO-55.
- 33 • *Injury and direct mortality*: Construction vehicles may cause injury to or mortality of special-
34 status reptiles. The operation of equipment for land clearing, construction, operation and
35 maintenance, and restoration, enhancement, and management activities could result in injury or
36 mortality. This risk is highest from late fall through early spring, when special-status reptiles are
37 not as active. However, the risk of crushing Blainville's horned lizard would not necessarily be
38 lower during the active season, because the species uses crypsis to hide from predators and
39 would be hard to spot from a moving vehicle. Seasonal risk reduction may be more appropriate
40 for the coachwhip, but there is still a risk of crushing the horned lizard during the active season.
41 In addition, both species would not be active under conditions of extreme temperatures and
42 could be taking cover in burrows or crevices or under structures such as rocks or logs (Morey
43 2000). They could also burrow beneath the soil and be crushed by vehicles. *P. blainvillii* may
44 only be active during the early morning and evening hours in the summer (Morey 2000).
45 Increased vehicular traffic associated with BDCP actions could contribute to a higher incidence

1 of road kill. However, conducting construction during the late-spring through early fall periods
2 when feasible, and when temperatures are 67–100 degrees F, and implementation of Mitigation
3 Measure BIO-55 would avoid and minimize injury or mortality of special-status reptiles during
4 construction.

5 The following paragraphs summarize the combined effects discussed above and describe other
6 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
7 also included.

8 ***Near-Term Timeframe***

9 Because the water conveyance facilities construction is being evaluated at the project level, the near-
10 term BDCP conservation strategy has been evaluated to determine whether it would provide
11 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
12 construction effects would not be adverse under NEPA. Alternative 4 would remove 371 acres of
13 grassland habitat for special-status reptiles as a result of CM1.

14 The typical NEPA mitigation ratio (2:1 for protection) for this natural community would indicate
15 that 742 acres should be protected in the near-term to offset CM1 losses.

16 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection
17 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all
18 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and
19 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

20 Considering the BDCP conservation strategy and the implementation of Mitigation Measure BIO-55,
21 to avoid and minimize injury or mortality of special-status reptiles during construction, the
22 permanent and temporary loss of special-status reptile habitat and the potential mortality of either
23 species from Alternative 4 would not be an adverse effect.

24 ***Late Long-Term Timeframe***

25 Alternative 4 as a whole would result in the permanent loss of 371 acres of habitat for special-status
26 reptiles over the life of the plan.

27 Effects of water conveyance facilities construction would be offset through the plan's long-term
28 commitment to protect 8,000 acres of grassland, and grassland associated with alkali seasonal
29 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the Plan Area.
30 Grassland protection would focus in particular on acquiring the largest remaining contiguous
31 patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (Objective GNC1.1
32 and GNC1.2). This area connects to more than 620 acres of existing habitat that is protected under
33 the East Contra Costa County HCP/NCCP.

34 Other effects would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*
35 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable AMMs*. The
36 plan as a whole is expected to benefit special-status reptiles that could be present by protecting
37 potential habitat from loss or degradation that otherwise could occur with future changes in existing
38 land use. To the extent that grassland habitat is restored in CZ 8, restoration would replace
39 unsuitable special-status reptile habitat, such as cultivated land, with high-value cover, foraging, and
40 dispersal habitat. The overall effect would be beneficial because Alternative 4 would result in a net
41 increase in acreage of grassland habitat in the study area.

1 BDCP's commitment to protect the largest remaining contiguous habitat patches (including
2 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in
3 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities
4 construction.

5 **NEPA Effects:** In the near-term and late long-term, the loss of special-status reptile habitat under
6 Alternative 4 would be not be adverse because the BDCP has committed to protecting the acreage
7 required to meet the typical mitigation ratios described above and because of the implementation of
8 Mitigation Measure BIO-55.

9 **CEQA Conclusion:**

10 **Near-Term Timeframe**

11 Because the water conveyance facilities construction is being evaluated at the project level, the near-
12 term BDCP conservation strategy has been evaluated to determine whether it would provide
13 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
14 construction impacts would be less than significant under CEQA. Alternative 4 would remove 371
15 acres of grassland habitat for special-status reptiles as a result of CM1.

16 The typical CEQA mitigation ratio (2:1 for protection) for this natural community would indicate
17 that 742 acres should be protected in the near-term to offset CM1 losses.

18 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection
19 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all
20 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and
21 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

22 The natural community restoration and protection activities are expected to be concluded during
23 the first 10 years of plan implementation, which would be close enough to the timing of construction
24 impacts to constitute mitigation for CEQA purposes. The restoration and protection activities
25 associated with the BDCP conservation strategy would be sufficient to support the conclusion that
26 the near-term impacts of permanent and temporary loss of special-status reptile habitat of either
27 species would be less than significant under CEQA. A significant impact could occur related to the
28 potential for mortality; however, with implementation of Mitigation Measure BIO-55, the impact
29 related to the potential mortality of either species would also be less than significant because this
30 measure would require that special-status reptiles present in the construction work areas be
31 relocated and that other avoidance and minimization measures be taken to reduce the risk for
32 impacts.

33 **Late Long-Term Timeframe**

34 Alternative 4 as a whole would result in the permanent loss of 371 acres of habitat for special-status
35 reptiles over the life of the plan.

36 Effects of water conveyance facilities construction would be offset through the plan's long-term
37 commitment to protect up to 8,000 acres of grassland, and grassland associated with alkali seasonal
38 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the Plan Area
39 (Objective GNC1.1 and Objective GNC1.2). Grassland protection would focus in particular on
40 acquiring the largest remaining contiguous patches of unprotected grassland habitat, which are

1 located south of SR 4 in CZ 8 (Objective GNC1.1). This area connects to more than 620 acres of
2 existing habitat that is protected under the East Contra Costa County HCP/NCCP.

3 Other effects would be reduced through implementation of Mitigation Measure BIO-55. The plan as a
4 whole is expected to benefit special-status reptiles that could be present by protecting potential
5 habitat from loss or degradation that otherwise could occur with future changes in existing land use.
6 To the extent that grassland habitat is restored in CZ 8, restoration would replace unsuitable special-
7 status reptile habitat, such as cultivated land, with high-value cover, foraging, and dispersal habitat.
8 The overall effect would be beneficial because Alternative 4 would result in a net increase in acreage
9 of grassland habitat in the study area.

10 BDCP's commitment to protect the largest remaining contiguous habitat patches (including
11 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in
12 CZ 8 would sufficiently offset the significant impacts resulting from water conveyance facilities
13 construction. Considering the BDCP conservation strategy and the implementation of Mitigation
14 Measure BIO-55, the permanent and temporary loss of special-status reptile habitat and the
15 potential mortality of either species under Alternative 4 would not result in a significant impact
16 under CEQA.

17 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special- 18 Status Reptiles and Implement Applicable AMMs**

19 DWR will retain a qualified biologist to conduct a habitat assessment in construction and
20 restoration areas that are relatively undisturbed or have a moderate to high potential to support
21 noncovered special-status reptiles (Blainville's horned lizard and San Joaquin coachwhip) in CZ
22 4, CZ 7, and CZ 8. The qualified biologist will survey for noncovered special-status reptiles in
23 areas of suitable habitat concurrent with the preconstruction surveys for covered species in CZ
24 4, CZ 7, and CZ 8. If special-status reptiles are found in work areas, the biologist will the first
25 attempt to allow these species to move out of the work area on their own but if conditions do
26 not allow this, individuals will be captured by the biologist and relocated to the nearest suitable
27 habitat outside of the work area as determined in consultation with CDFW. To the extent
28 feasible, work in areas of suitable habitat for Blainville's horned lizard and San Joaquin
29 coachwhip should not be conducted during periods of cold and hot temperatures (below 67
30 degrees F and above 100 degrees F), because both species would be relatively inactive during
31 these periods and could be taking cover in loose soil, in burrows or crevices, or under structures
32 such as rocks or logs (Morey 2000). This would reduce the impact of being crushed by vehicles
33 and equipment.

34 In addition, *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices
35 and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *Reusable Tunnel Material*, and *Dredged
36 Material*, and *AMM10 Restoration of Temporarily Affected Natural Communities*, will be
37 implemented for all noncovered special-status reptiles adversely affected by the BDCP to avoid,
38 minimize, or compensate for impacts.

39 **Impact BIO-56: Indirect Effects of Plan Implementation on Special-Status Reptile Species**

40 Construction activities associated with water conveyance facilities, conservation components and
41 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
42 conveyance facilities, including the transmission facilities, could result in ongoing periodic

1 postconstruction disturbances and noise with localized effects on special-status reptiles and their
2 habitat over the term of the BDCP.

3 In addition, construction activities could indirectly affect special-status reptiles if construction
4 resulted in the introduction of invasive weeds that create vegetative cover that is too dense for the
5 species to navigate. Construction vehicles and equipment can transport in their tires and various
6 parts under the vehicles invasive weed seeds and vegetative parts from other regions to
7 construction sites, resulting in habitat degradation. These potential effects would be reduced
8 through implementation of AMM10. Water conveyance facilities operations and maintenance
9 activities would include vegetation and weed control, ground squirrel control, canal maintenance,
10 infrastructure and road maintenance, levee maintenance, and maintenance and upgrade of electrical
11 systems. While maintenance activities are not expected to remove special-status reptile habitat,
12 operation of equipment could disturb small areas of vegetation around maintained structures and
13 could result in injury or mortality of individual special-status reptiles, if present.

14 **NEPA Effects:** Implementation of the Mitigation Measure BIO-55, *Conduct Preconstruction Surveys*
15 *for Noncovered Special-Status Reptiles and Implement Applicable AMMs* would avoid the potential for
16 substantial adverse effects on these species, either indirectly or through habitat modifications. The
17 mitigation measure would also avoid and minimize effects that could substantially reduce the
18 number of special-status reptiles, or restrict either species' range. Therefore, with implementation
19 of Mitigation Measure BIO-55, the indirect effects of Alternative 4 on special-status reptiles would
20 not be adverse under NEPA.

21 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
22 as construction-related noise and visual disturbances could impact special-status reptiles. In
23 addition, construction activities could indirectly affect special-status reptiles if construction resulted
24 in the introduction of invasive weeds that create vegetative cover that is too dense for the species to
25 navigate. Water conveyance facilities operations and maintenance activities, such as vegetation and
26 weed control, and road maintenance, are not expected to remove special-status reptile habitat, but
27 operation of equipment could disturb small areas of vegetation around maintained structures and
28 could result in injury or mortality of individual special-status reptiles, if present, which would be a
29 significant impact.

30 With implementation of Mitigation Measure BIO-55, *Conduct Preconstruction Surveys for Noncovered*
31 *Special-Status Reptiles and Implement Applicable AMMs* as part of Alternative 4 construction,
32 operation, and maintenance, the BDCP would avoid the potential for significant effects on special-
33 status reptile species, either indirectly or through habitat modifications, and would not result in a
34 substantial reduction in numbers or a restriction in the range of either species. With implementation
35 of Mitigation Measure BIO-55, the indirect effects of Alternative 4 would have a less-than-significant
36 impact on special-status reptiles.

37 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**
38 **Status Reptiles and Implement Applicable AMMs**

39 See description of Mitigation Measure BIO-55 under Impact BIO-55.

1 California Black Rail

2 This section describes the effects of Alternative 4, including water conveyance facilities construction
3 and implementation of other conservation components, on California black rail. The habitat model
4 used to assess effects for the California black rail is based on primary breeding habitat and
5 secondary habitat. Primary (breeding) habitat for this species within the Delta includes all
6 *Schoenoplectus* and *Typha*-dominated tidal and nontidal freshwater emergent wetland in patches
7 greater than 0.55 acre (essentially instream islands of the San Joaquin River and its tributaries and
8 White Slough Wildlife Area). In Suisun Marsh, primary habitat includes all *Schoenoplectus* and
9 *Typha*-dominated, and *Salicornia*-dominated patches greater than 0.55 acre, with the exception that
10 all low marsh habitats dominated by *Schoenoplectus acutus* and *S. californicus* and all managed
11 wetlands, in general, are considered secondary habitat with lesser ecological value. Upland
12 transitional zones that provide refugia during high tides within 150 feet of the tidal wetland edge
13 were also included as secondary habitat. Secondary habitats generally provide only a few ecological
14 functions such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland
15 transition zones), while primary habitats provide multiple functions, including breeding, effective
16 predator cover, and valuable foraging opportunities.

17 Construction and restoration associated with Alternative 4 conservation measures would result in
18 both temporary and permanent losses of California black rail modeled habitat as indicated in Table
19 12-4-25. Full implementation of Alternative 4 would also include the following conservation actions
20 over the term of the BDCP to benefit the California black rail (BDCP Chapter 3, Section 3.3, *Biological*
21 *Goals and Objectives*).

- 22 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11, including at
23 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
24 with CM4).
- 25 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
26 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 27 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
28 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 29 ● Create 1,700 acres of black rail habitat between restored tidal freshwater emergent wetlands
30 and transitional uplands to provide upland refugia (Objective CBR1.1, associated with CM4).
- 31 ● Create topographic heterogeneity in restored tidal brackish and freshwater emergent wetlands
32 (Objectives TBEWNC1.4 and TFEWNC2.2, associated with CM4).
- 33 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
34 natural community within the reserve system (Objective TBEWNC2.1, associated with CM11).

35 As explained below, with the restoration and protection of these amounts of habitat, in addition to
36 natural community enhancement and management commitments (including *CM12 Methylmercury*
37 *Management* as revised in Appendix 11F, *Substantive BDCP Revisions*) and implementation of
38 *AMM1-AMM7*, *AMM39 California Black Rail*, and *AMM27 Selenium Management* (as described in
39 Appendix 3B, *Environmental Commitments, AMMs, and CMs*), impacts on the California black rail
40 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-25. Changes in California Black Rail Modeled Habitat Associated with Alternative 4**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0.5	0.5	11	11	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		0.5	0.5	11	11	NA	NA
CM2-CM18	Primary	76	84	0	0	0-9	0
	Secondary	986	3,044	0	0	0	6
Total Impacts CM2-CM18		1,062	3,128	0	0	0-9	6
TOTAL IMPACTS		1,062.5	3,128.5	11	11	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3
4 **Impact BIO-57: Loss or Conversion of Habitat for and Direct Mortality of California Black Rail**

5 Alternative 4 conservation measures would result in the combined permanent and temporary loss
6 of up to 95.5 acres of modeled primary habitat, and up to 3,044 acres of modeled secondary habitat
7 for California black rail (Table 12-4-25). Conservation measures that would result in these losses are
8 conveyance facilities and transmission line construction, and establishment and use of reusable
9 tunnel material areas (CM1) and tidal habitat restoration (CM4). Habitat enhancement and
10 management activities (CM11) which include ground disturbance or removal of nonnative
11 vegetation, could result in local adverse habitat effects. In addition, maintenance activities
12 associated with the long-term operation of the water conveyance facilities and other BDCP physical
13 facilities could degrade or eliminate California black rail habitat. Each of these individual activities is
14 described below. A summary statement of the combined NEPA effects, and a CEQA conclusion follow
15 the individual conservation measure discussions.

- 16 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
17 result in the permanent loss of up to 0.5 acres and the temporary loss of up to 11 acres of
18 modeled primary California black rail habitat (Table 12-4-25). The construction of a temporary
19 transmission line in the central Delta that extends from Bouldin Island to Victoria Island would
20 impact modeled habitat on Mandeville Island, the north end of Bacon Island, and on in-channel
21 islands along the transmission line alignment. Other temporary impacts on modeled habitat
22 would occur from a temporary barge unloading facility and a temporary access road along the
23 north end of Bacon Island, and from a temporary work area on Mandeville Island. Geotechnical

1 exploration could also impact black rail habitat on an in-channel island east of Bacon Island.
2 Less than 0.5 acre of habitat would be permanently lost from the construction of a permanent
3 transmission line at the northeast corner of Clifton Court Forebay in CZ 8. The CM1 footprint
4 intersects with one California black rail occurrence on Mandeville Island, from the footprint of
5 the temporary transmission line. The implementation of *AMM38 California Black Rail* (Appendix
6 3B, *Environmental Commitments, AMMs, and CMs*) would minimize the effects of construction on
7 rails if present in or adjacent to the work area. Refer to the Terrestrial Biology Mapbook for a
8 detailed views of Alternative 4 construction locations. Impacts from CM1 would occur within the
9 first 10-14 years of Alternative 4 implementation.

- 10 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction or channel modification from fish passage
11 improvements associated with the Yolo Bypass would result in the permanent removal of
12 approximately 5 acres of primary California black rail habitat in CZ 2. There are no occurrences
13 of California black rail that intersect with the CM1 footprint. The loss is expected to occur during
14 the first 10 years of Alternative 4 implementation.
- 15 ● *CM4 Tidal Natural Communities Restoration*: California black rail modeled habitat would be
16 affected by tidal marsh restoration. Some California black rail modeled habitat would be
17 permanently lost such that it no longer serves as habitat, while other modeled habitat would
18 change value through conversion from one habitat type to another. Tidal habitat restoration site
19 preparation and inundation would result in the permanent loss of 79 acres of primary habitat
20 and 3,044 acres of secondary habitat for California black rail. Of the 79 acres of primary habitat
21 lost, an estimated 76 acres would be converted to low marsh, or secondary habitat, for the
22 species due to increased water elevations.

23 The majority of the effects of tidal natural communities restoration would occur in Suisun Marsh
24 (CZ 11). Much of the natural wetland habitat that would be removed occurs in isolated patches
25 and would be replaced by larger continuous areas of tidal wetlands that are expected to support
26 higher habitat functions for the rail than the impacted wetlands. As described in the BDCP,
27 restoration of up to 24,000 acres of tidal freshwater emergent wetland in the Delta and at least
28 6,000 acres of tidal brackish emergent wetland natural communities in CZ 11 by the late long-
29 term would benefit California black rail. The primary habitat for the species in the Delta consists
30 of inchannel islands, which are in areas that are most vulnerable to the effects of sea level rise in
31 the study area. Tidal restoration under CM4 would ensure that land is protected adjacent to
32 current habitat in the delta with the consideration of sea level rise. Tidal restoration projects
33 would include an ecotone between wetlands and transitional uplands which would provide
34 upland refugia for the species.

35 The tidal natural communities restoration would be phased through the course of the BDCP
36 restoration program to allow for recovery of some areas before the initiation of restoration
37 actions in other areas. However, California black rails have a greater use of mature tidal marshes
38 and, therefore, it would be years before the newly restored marshes provided suitable habitat
39 for the species. In the long-term, tidal natural communities restoration is expected to have little
40 to no adverse effects on California black rail habitat because the habitat removed would be
41 replaced by a greater acreage of high-value tidal wetland and, thus, is expected to provide a
42 benefit for California black rail.

- 43 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
44 actions contained in *CM11 Natural Communities Enhancement and Management* that are
45 designed to enhance wildlife values in restored and protected tidal wetland habitats may result

1 in localized ground disturbances that could temporarily remove small amounts of California
2 black rail habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
3 road and other infrastructure maintenance activities, are expected to have minor adverse effects
4 on available California black rail habitat and are expected to result in overall improvements and
5 maintenance of California black rail habitat values over the term of the BDCP. Noise and visual
6 disturbances during implementation of habitat management actions could also result in
7 temporary disturbances that affect California black rail use of the surrounding habitat. These
8 effects cannot be quantified, but would be avoided and minimized by the AMMs listed below.
9 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
10 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.
11 Additional actions under CM11 include the control of nonnative predators to reduce nest
12 predation as needed.

- 13 ● **Operations and Maintenance:** Postconstruction operation and maintenance of the above-ground
14 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
15 disturbances that could affect California black rail use of the surrounding habitat in Suisun and
16 the central Delta. Maintenance activities would include vegetation management, levee and
17 structure repair, and re-grading of roads and permanent work areas. These effects, however,
18 would be reduced by AMMs and conservation actions as described below.
- 19 ● **Injury and Direct Mortality:** Construction vehicle activity may cause injury or mortality to
20 California black rail. If rails are present adjacent to covered activities, the operation of
21 equipment for land clearing, construction, conveyance facilities operation and maintenance, and
22 habitat restoration, enhancement, and management could result in injury or mortality of
23 California black rail. Increased vehicular traffic associated with BDCP actions could contribute to
24 a higher incidence of road kill. However, injury or mortality of the species during project
25 activities would be minimized by establishing 500-foot no-disturbance buffers around identified
26 territorial calling centers during the breeding season, as required by *AMM38 California Black*
27 *Rail*.

28 The following paragraphs summarize the combined effects discussed above and describe other
29 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
30 included.

31 ***Near-Term Timeframe***

32 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
33 the near-term BDCP conservation strategy has been evaluated to determine whether it would
34 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
35 effects of construction would not be adverse under NEPA. With Alternative 4 implementation, there
36 would be a loss of 1,073.5 acres of modeled habitat for California black rail in the study area in the
37 near-term. These effects would result from the construction of the water conveyance facilities (CM1,
38 11.5 acres of primary habitat), and implementing other conservation measures (*CM2 Yolo Bypass*
39 *Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration*—76 acres of primary habitat,
40 986 acres of secondary habitat).

41 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
42 be affected and that are identified in the biological goals and objectives for California black rail in
43 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such
44 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.

1 Using this ratio would indicate that 11.5 acres of tidal natural communities should be
 2 restored/created to compensate for the CM1 losses of 11.5 acres of California black rail habitat. The
 3 near-term effects of other conservation actions would remove 1,062 acres of tidal natural
 4 communities, therefore requiring 1,062 acres of tidal natural communities restoration using the
 5 same typical NEPA and CEQA ratio (1:1 for restoration).

6 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
 7 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in
 8 the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are all
 9 associated with CM4 and would occur in the same timeframe as the construction and early
 10 restoration losses, thereby avoiding adverse effects of habitat loss on California black rail. The tidal
 11 brackish emergent wetland would be restored in CZ 11 among the Western Suisun/Hill Slough
 12 Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton
 13 Marsh complex (Objective TBEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and the tidal
 14 freshwater emergent wetland would be restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7
 15 (Objective TFEWNC1.1). In addition, tidal brackish and tidal freshwater emergent wetlands would
 16 be restored in a way that creates topographic heterogeneity and in areas that increase connectivity
 17 among protected lands (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of
 18 managed wetland protected and enhanced in CZ 11 would benefit the California black rail through
 19 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
 20 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
 21 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). These Plan
 22 objectives represent performance standards for considering the effectiveness of CM4 restoration
 23 actions. The acres of restoration and protection contained in the near-term Plan goals and the
 24 additional detail in the biological objectives for California black rail satisfy the typical mitigation that
 25 would be applied to the project-level effects of CM1, as well as mitigate the near-term effects of the
 26 other conservation measures.

27 The Plan also includes commitments to implement the following avoidance and minimization
 28 measures that will help to avoid and minimize adverse effects on California black rail: *AMM1 Worker*
 29 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*
 30 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*
 31 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge*
 32 *Operations Plan*, and *AMM38 California Black Rail*. *AMM38 California Black Rail* requires surveys for
 33 California black rail and the implementation of avoidance and minimization measures, including the
 34 establishment of a 500-foot no disturbance buffer around any identified calling stations. All of these
 35 AMMs include elements that would avoid or minimize the risk of affecting individuals and species
 36 habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since been
 37 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
 38 the Final EIR/EIS.

39 ***Late Long-Term Timeframe***

40 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary
 41 habitat for California black rail. Alternative 4 as a whole would result in the permanent loss of and
 42 temporary effects on 95.5 acres of primary habitat and 3,044 acres of secondary habitat for
 43 California black rail during the term of the Plan (1% of the total primary habitat in the study area
 44 and 17% of the total secondary habitat in the study area). The locations of these losses are described
 45 above in the analyses of individual conservation measures. The Plan includes conservation

1 commitments through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000
 2 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres
 3 of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). These
 4 tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse
 5 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh
 6 vegetation with dense, tall stands of pickleweed and bulrush cover serving as primary habitat for
 7 California black rail in Suisun Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of
 8 upland refugia for California black rail would be created between the restored tidal freshwater
 9 emergent wetlands and transitional uplands to provide cover from predators (Objectives
 10 TBEWNC1.4, TFEWNC2.2, and CBR1.1). Portions of the 8,100 acres of managed wetland protected
 11 and enhanced in CZ 11 as part of *CM3 Natural Communities Protection and Restoration* would benefit
 12 the California black rail through the enhancement of degraded areas (such as areas of bare ground
 13 or marsh where the predominant vegetation consists of invasive species such as perennial
 14 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
 15 (Objective MWNC1.1). Additional pressures on the species such as loss of habitat from invasive
 16 species and mortality from nest predators would also be addressed through the BDCP. Perennial
 17 pepperweed, which outcompetes suitable nesting habitat for California black rail (such as
 18 pickleweed) would be reduced to no more than 10% cover in the tidal brackish emergent wetland
 19 natural community within CZ 11 (Objective TBEWNC2.1). In addition, nonnative predators would be
 20 controlled to reduce nest predation if necessary through *CM11 Natural Communities Enhancement
 21 and Management*.

22 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and
 23 Plant Species*) estimates that the restoration and protection actions discussed above would result in
 24 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for
 25 California black rail and the protection of 275 acres of secondary habitat for the species.

26 **NEPA Effects:** The loss of California black rail habitat and potential direct mortality of this special-
 27 status species under Alternative 4 would represent an adverse effect in the absence of other
 28 conservation actions. However, with habitat protection and restoration associated with CM4, guided
 29 by the biological objectives for the species and by *AMM1 Worker Awareness Training, AMM2
 30 Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention
 31 Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and
 32 Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM38
 33 California Black Rail*, which would be in place during all project activities, the effects of Alternative 4
 34 as a whole on California black rail would not be adverse under NEPA.

35 **CEQA Conclusion:**

36 **Near-Term Timeframe**

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 38 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 40 effects of construction would be less than significant under CEQA. With Alternative 4
 41 implementation, there would be a loss of 1,073.5 acres of modeled habitat for California black rail in
 42 the study area in the near-term. These effects would result from the construction of the water
 43 conveyance facilities (CM1, 11.5 acres of primary habitat), and implementing other conservation

1 measures (*CM2 Yolo Bypass Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration*–
2 76 acres of primary habitat, 986 acres of secondary habitat).

3 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
4 be affected and that are identified in the biological goals and objectives for California black rail in
5 Chapter 3, *Conservation Strategy*, of the BDCP would be 1:1 for restoration/creation of wetland
6 natural communities such as tidal freshwater emergent wetland, tidal brackish emergent wetland,
7 and managed wetland. Using this ratio would indicate that 11.5 acres of tidal natural communities
8 should be restored/created to mitigate the CM1 losses of California black rail habitat. The near-term
9 effects of other conservation actions would remove 1,062 acres of tidal natural communities,
10 therefore requiring 1,062 acres of tidal natural communities restoration using the same typical
11 NEPA and CEQA ratio (1:1 for restoration).

12 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
13 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in
14 the Plan Area (see Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions
15 are all associated with CM4 and would occur in the same timeframe as the construction and early
16 restoration losses, thereby avoiding adverse effects of habitat loss on California black rail. The tidal
17 brackish emergent wetland would be restored in CZ 11 among the Western Suisun/Hill Slough
18 Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton
19 Marsh complex (Objective TBEWNC1.1) and the tidal freshwater emergent wetland would be
20 restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition, tidal
21 brackish and tidal freshwater emergent wetlands would be restored in a way that creates
22 topographic heterogeneity and in areas that increase connectivity among protected lands
23 (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of managed wetland
24 protected and enhanced in CZ 11 would benefit the California black rail through the enhancement of
25 degraded areas (such as areas of bare ground or marsh where the predominant vegetation consists
26 of invasive species such as perennial pepperweed) to vegetation such as pickleweed-alkali heath-
27 American bulrush plant associations (Objective MWNC1.1). These Plan objectives represent
28 performance standards for considering the effectiveness of CM4 restoration actions.

29 The Plan also includes commitments to implement the following avoidance and minimization
30 measures that will help to avoid and minimize adverse effects on California black rail: *AMM1 Worker*
31 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*
32 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*
33 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge*
34 *Operations Plan*, and *AMM38 California Black Rail*. All of these AMMs include elements that would
35 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and
36 RTM storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
37 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
38 EIR/EIS.

39 In the absence of other conservation actions, the loss of California black rail habitat and potential
40 direct mortality of this species under Alternative 4 would represent an adverse effect as a result of
41 habitat modification of a special-status species and potential for direct mortality. This impact would
42 be significant. However, the BDCP has committed to habitat protection, restoration, management,
43 and enhancement activities. As outlined in BDCP Chapter 3, Section 3.4, *Conservation Measures*,
44 natural community restoration and protection are planned so that they keep pace with project
45 impacts. Thus, there would be minimal lag time between impacts and implementation of those

1 measures designed to offset those impacts on natural communities and the species that use them. In
 2 addition, AMM38 California Black Rail and AMM1–AMM7 would avoid and minimize potential
 3 impacts on the species from construction-related habitat loss and noise and disturbance. Because
 4 the number of acres required to meet the typical mitigation ratio described above would be only
 5 1,084 acres of restored/created tidal natural communities, the 10,850 acres of tidal brackish and
 6 tidal freshwater emergent wetland restoration and the 4,100 acres of managed wetland protection
 7 and enhancement contained in the near-term Plan goals, and the additional detail in the biological
 8 goals and objectives for California black rail, are more than sufficient to support the conclusion that
 9 the near-term impacts of habitat loss and direct mortality under Alternative 4 would be less than
 10 significant under CEQA. No mitigation would be required.

11 **Late Long-Term Timeframe**

12 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary
 13 habitat for California black rail. Alternative 4 as a whole would result in the permanent loss of and
 14 temporary effects on 95.5 acres of primary habitat and 3,044 acres of secondary habitat for
 15 California black rail during the term of the Plan (1% of the total primary habitat in the study area
 16 and 17% of the total secondary habitat in the study area). The locations of these losses are described
 17 above in the analyses of individual conservation measures.

18 The Plan includes conservation commitments through *CM4 Tidal Natural Communities Restoration*
 19 to restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective
 20 TBEWNC1.1) and at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
 21 and/or 7 (TFEWNC1.1). These tidal wetlands would be restored as a mosaic of large, interconnected
 22 and biologically diverse patches and much of the restored marsh would consist of middle- and high-
 23 marsh vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary
 24 habitat for California black rail in Suisun Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700
 25 acres of upland refugia for California black rail would be created between the restored tidal
 26 freshwater emergent wetlands and transitional uplands to provide cover from predators (Objectives
 27 TBEWNC1.4, TFEWNC2.2, and CBR1.1). Portions of the 8,100 acres of managed wetland protected
 28 and enhanced in CZ 11 as part of *CM3 Natural Communities Protection and Restoration* would benefit
 29 the California black rail through the enhancement of degraded areas (such as areas of bare ground
 30 or marsh where the predominant vegetation consists of invasive species such as perennial
 31 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
 32 (Objective MWNC1.1). Additional pressures on the species such as loss of habitat from invasive
 33 species and mortality from nest predators would also be addressed through the BDCP. Perennial
 34 pepperweed, which outcompetes suitable nesting habitat for California black rail (such as
 35 pickleweed) would be reduced to no more than 10% cover in the tidal brackish emergent wetland
 36 natural community within CZ 11 (TBEWNC2.1). In addition, nonnative predators would be
 37 controlled to reduce nest predation if necessary through *CM11 Natural Communities Enhancement*
 38 *and Management*.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM38*
 43 *California Black Rail*. All of these AMMs include elements that would avoid or minimize the risk of
 44 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the

1 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
2 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
4 *Plant Species*) estimates that the restoration and protection actions discussed above would result in
5 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for
6 California black rail and the protection of 275 acres of secondary habitat for the species.

7 In the absence of other conservation actions, the loss of California black rail habitat and potential
8 direct mortality of this species under Alternative 4 would represent an adverse effect as a result of
9 habitat modification of a special-status species and potential for direct mortality. This impact would
10 be considered significant. However, the BDCP has committed to habitat protection, restoration,
11 management, and enhancement activities. Considering these protection and restoration provisions,
12 which would provide acreages of new or enhanced habitat in amounts greater than necessary to
13 compensate for habitats lost to construction and restoration activities, loss of habitat or direct
14 mortality through implementation of Alternative 4 would not result in a substantial adverse effect
15 through habitat modifications and would not substantially reduce the number or restrict the range
16 of the species. Therefore, the alternative would have a less-than-significant impact on California
17 black rail. No mitigation would be required.

18 **Impact BIO-58: Effects on California Black Rail Associated with Electrical Transmission** 19 **Facilities**

20 A variety of rail species are known to suffer mortality from transmission line collision, likely
21 associated with migration and flights between foraging areas (Eddleman et al.1994). Due to their
22 wing shape and body size, rails have low to moderate flight maneuverability (Bevanger 1998),
23 increasing susceptibility to collision mortality. However, there are relatively few records of
24 California black rail collisions with overhead wires. California black rails exhibit daytime site fidelity
25 and a lack of long-distance night migration, two factors which are associated with low collision risk
26 in avian species (Eddleman et al. 1994). California black rail movements in the study area are likely
27 short, seasonal, and at low altitudes, typically less than 16 feet (5 meters) (Eddleman et al, 1994).
28 There are numerous occurrences within 1 mile of the proposed temporary transmission line, which
29 extends north-south between Bouldin Island and Clifton Court Forebay. However, although the
30 species may have low to moderate flight maneuverability, the bird's behavior (e.g., sedentary,
31 nonmigratory, ground-nesting and foraging, solitary, no flocking, secretive) reduces potential
32 exposure to overhead wires and vulnerability to collision mortality (BDCP Appendix 5.J,
33 Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). Marking
34 transmission lines with flight diverters that make the lines more visible to birds has been shown to
35 reduce the incidence of bird mortality (Brown and Drewien 1995). For example, Yee (2008)
36 estimated that marking devices in the Central Valley could reduce avian mortality by 60%. As
37 described in *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted with
38 flight diverters, which would eliminate any potential for mortality of California black rail individuals
39 from powerline collisions.

40 Transmission line poles and towers also provide perching substrate for raptors, which are predators
41 on California black rail. Although there is potential for temporary transmission lines constructed in
42 the Delta to increase perching opportunities for raptors and result in increased predation pressure
43 on local black rails, little is currently known about the seasonal movements of black rails or the
44 potential for increased predation on rails near power poles. Therefore, because of the limited area

1 over which poles would be installed relative to the amount of California black rail habitat in the
2 Delta, it is assumed that the increase in predation risk on California black rail from an increase in
3 raptor perching opportunities would be negligible.

4 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
5 adverse effect because the risk of bird strike is considered to be minimal based on the species' flight
6 behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike
7 diverters on all new powerlines, which would eliminate or nearly eliminate the risk of mortality
8 from bird strike for California black rails from the project. The increase in predation risk on
9 California black rail from an increase in raptor perching opportunities would be negligible because
10 of the limited area over which poles would be installed relative to the amount of California black rail
11 habitat in the Delta. Therefore, the construction and operation of new transmission lines would not
12 result in an adverse effect on California black rail.

13 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
14 significant impact on California black rail because the risk of bird strike is considered to be minimal
15 based on the species' flight behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the
16 commitment to place bird strike diverters on all new transmission lines, which would eliminate or
17 nearly eliminate the risk of bird strike for California black rails from the project. The increase in
18 predation risk on California black rail from an increase in raptor perching opportunities would be
19 negligible because of the limited area over which poles would be installed relative to the amount of
20 California black rail habitat in the Delta. Therefore, the construction and operation of new
21 transmission lines under Alternative 4 would result in a less-than-significant impact on California
22 black rail.

23 **Impact BIO-59: Indirect Effects of Plan Implementation on California Black Rail**

24 **Indirect Construction-Related Effects:** Both primary and secondary habitat for California black
25 rail within the vicinity of proposed construction areas could be indirectly affected by construction
26 activities. Indirect effects associated with construction include noise, dust, and visual disturbance
27 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
28 footprint but within 500 feet from the construction edge. Construction noise above background
29 noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction
30 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
31 *Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP Revisions*, of
32 the Final EIR/EIS), although there is no available data to determine the extent to which these noise
33 levels could affect California black rail. The use of mechanical equipment during water conveyance
34 facilities construction could cause the accidental release of petroleum or other contaminants that
35 could affect California black rail in the surrounding habitat. The inadvertent discharge of sediment
36 or excessive dust adjacent to California black rail habitat could also affect the species.

37 If construction occurs during the nesting season, these indirect effects could result in the loss or
38 abandonment of nests, and mortality of any eggs and/or nestlings. However, there is a commitment
39 in *AMM38 California Black Rail* (Appendix 3B, *Environmental Commitments, AMMs, and CMs*,) that
40 preconstruction surveys of potential breeding habitat would be conducted within 700 feet of project
41 activities, and a 500-foot no-disturbance buffer would be established around any territorial call-
42 centers during the breeding season. In addition, construction would be avoided altogether if
43 breeding territories cannot be accurately delimited.

1 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients
2 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would
3 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh
4 would generally increase as a result of water operations and operations of salinity-control gates to
5 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland
6 plant communities tolerant of more brackish environments, which should be beneficial to California
7 black rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

8 **Methylmercury Exposure:** The modeled primary habitat for California black rail includes tidal
9 brackish emergent wetland and tidal freshwater emergent wetland in Suisun Marsh and the Delta
10 west of Sherman Island, and instream islands and White Slough Wildlife Area in the central Delta.
11 Black rails typically occur in the high marsh zone near the upper limit of tidal flooding in salt and
12 brackish habitats. Low marsh, managed wetlands, and the upland fringe are considered secondary
13 habitat. California black rails are a top predator in the benthic food chain; they nest and forage in
14 dense vegetation and prey on isopods, insects and arthropods from the surface of mud and
15 vegetation. They also consume insects and seeds from bulrushes (*Schoenoplectus* spp.) and cattails
16 (*Typha* spp.) (Eddleman et al. 1994).

17 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
18 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
19 species would overestimate the effects on black rail. Organisms feeding within pelagic-based (algal)
20 foodwebs have been found to have higher concentrations of methylmercury than those in benthic or
21 epibenthic foodwebs; this has been attributed to food chain length and dietary segregation
22 (Grimaldo et al. 2009). Modeled effects of mercury concentrations from changes in water operations
23 under CM1 on largemouth bass did not differ substantially from existing conditions; therefore,
24 results also indicate that black rail mercury tissue concentrations would not measurably increase as
25 a result of CM1 implementation.

26 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
27 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
28 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
29 mercury. In general, the highest methylation rates are associated with high tidal marshes (primary
30 black rail habitat) that experience intermittent wetting and drying and associated anoxic conditions
31 (Alpers et al. 2008); however, the majority of the overlap between restoration areas and black rail
32 habitat is within Suisun Marsh, where conversion of managed wetlands to tidal wetlands is expected
33 to result in an overall reduction in mercury methylation. Mercury is generally elevated throughout
34 the Delta, and restoration of the lower potential areas in total may result in generalized, very low
35 level increases of mercury. Given that some species have elevated mercury tissue levels pre-BDCP,
36 these low level increases could result in some level of effects. Conservation Measure CM 12,
37 described below, will be implemented to address this risk of low level increases in methylmercury
38 which could add to the current elevated tissue concentrations.

39 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
40 the foodweb, *CM12 Methylmercury Management*, is included to provide for site-specific evaluation
41 for each restoration project. If a project is identified where there is a high potential for
42 methylmercury production that could not be fully addressed through restoration design and
43 adaptive management, alternate restoration areas would be considered. CM12 would be
44 implemented in coordination with other similar efforts to address mercury in the Delta, and

1 specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
2 would include the following actions.

- 3 • Assess pre-restoration conditions to determine the risk that the project could result in increased
4 mercury methylation and bioavailability.
- 5 • Define design elements that minimize conditions conducive to generation of methylmercury in
6 restored areas.
- 7 • Define adaptive management strategies that can be implemented to monitor and minimize
8 actual postrestoration creation and mobilization of methylmercury.

9 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
10 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
11 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
12 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
13 2009). The effect of selenium toxicity differs widely between species and also between age and sex
14 classes within a species. In addition, the effect of selenium on a species can be confounded by
15 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
16 2009).

17 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
18 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
19 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
20 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
21 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
22 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
23 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
24 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
25 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
26 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
27 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
28 levels of selenium have a higher risk of selenium toxicity.

29 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
30 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
31 exacerbate bioaccumulation of selenium in avian species, including California black rail. Marsh (tidal
32 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
33 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP
34 restoration activities that create newly inundated areas could increase bioavailability of selenium
35 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
36 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
37 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
38 increases in selenium concentrations in water in the Delta under any alternative. However, it is
39 difficult to determine whether the effects of potential increases in selenium bioavailability
40 associated with restoration-related conservation measures (CM4, CM5) would lead to adverse
41 effects on California black rail.

42 Because of the uncertainty that exists at this programmatic level of review, there could be a
43 substantial effect on California black rail from increases in selenium associated with restoration
44 activities. This effect would be addressed through the implementation of *AMM27 Selenium*

1 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
2 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
3 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
4 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
5 separately for each restoration effort as part of design and implementation. This avoidance and
6 minimization measure would be implemented as part of the tidal habitat restoration design
7 schedule.

8 **NEPA Effects:** Noise and visual disturbances related to construction-related activities from
9 conservation measures could disturb California black rail habitat adjacent to work sites. Potential
10 effects of noise and visual disturbances on California black rail would be minimized with *AMM38*
11 *California Black Rail*. *AMM1–AMM7*, including *AMM2 Construction Best Management Practices and*
12 *Monitoring*, would minimize the likelihood of spills from occurring and ensure that measures were
13 in place to prevent runoff from the construction area and to avoid negative effects of dust on the
14 species.

15 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
16 habitat restoration are expected to increase water salinity in Suisun Marsh, which would be
17 expected to establish tidal marsh similar to historic conditions.

18 Tidal habitat restoration could result in increased exposure of California black rail to selenium. This
19 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
20 would provide specific tidal habitat restoration design elements to reduce the potential for
21 bioaccumulation of selenium and its bioavailability in tidal habitats.

22 Changes in water operations under CM1 would not be expected to result in increased mercury
23 bioavailability or exposures to Delta foodwebs. Restoration Actions that would create high and low
24 tidal marsh, which is Black Rail habitat, could provide biogeochemical conditions for methylation of
25 mercury in the newly inundated soils. There is potential for increased exposure of the foodwebs to
26 methylmercury in these areas, with the level of exposure dependent on the amounts of mercury
27 available in the soils and the biogeochemical conditions. However, the planned ROA's do not overlap
28 with the areas of highest mercury concentrations, which are in the in Yolo Bypass. Also, the
29 conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected to reduce the
30 overall production of methylmercury, resulting in a net benefit to species. Implementation of CM12
31 which contains measures to assess the amount of mercury before project development, followed by
32 appropriate design and adaptation management, would minimize the potential for increased
33 methylmercury exposure, and would result in no adverse effect on the species.

34 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities and other
35 conservation measures could disturb primary and secondary California black rail habitat adjacent to
36 work sites. *AMM38 California Black Rail* would avoid and minimize impacts on California black rail
37 from noise and visual disturbance. The use of mechanical equipment during water conveyance
38 facilities construction could cause the accidental release of petroleum or other contaminants that
39 could affect California black rail in the surrounding habitat. The inadvertent discharge of sediment
40 or excessive dust adjacent to California black rail habitat could also affect the species. These impacts
41 on California black rail would be less than significant with the incorporation of *AMM1–AMM7*,
42 including *AMM2 Construction Best Management Practices and Monitoring*, into the BDCP.

43 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
44 habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity gradient

1 changes should have a beneficial impact on California black rail through the establishment of tidal
2 marsh similar to historic conditions.

3 Tidal habitat restoration could result in increased exposure of California black rail to selenium. This
4 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
5 would provide specific tidal habitat restoration design elements to reduce the potential for
6 bioaccumulation of selenium and its bioavailability in tidal habitats. With implementation of
7 *AMM27*, potential for increased selenium exposure would result in no adverse effect on the species.

8 Changes in water operations under CM1 would not be expected to result in increased mercury
9 bioavailability or exposures to Delta foodwebs. Restoration Actions that would create high and low
10 tidal marsh, which is Black Rail habitat, could provide biogeochemical conditions for methylation of
11 mercury in the newly inundated soils. There is potential for increased exposure of the foodwebs to
12 methylmercury in these areas, with the level of exposure dependent on the amounts of mercury
13 available in the soils and the biogeochemical conditions. However, the planned ROA's do not overlap
14 with the areas of highest mercury concentrations, which are in the in Yolo Bypass. Also, the
15 conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected to reduce the
16 overall production of methylmercury, resulting in a net benefit to species. Implementation of CM12
17 which contains measures to assess the amount of mercury before project development, followed by
18 appropriate design and adaptation management, would minimize the potential for increased
19 methylmercury exposure, and would result in no adverse effect on the species.

20 With these measures in place, indirect effects of plan implementation would not result in a
21 substantial adverse effect on the species through habitat modification or potential mortality of a
22 special-status species. Therefore, the indirect effects of Alternative 4 implementation would have a
23 less-than-significant impact on California black rail. No mitigation would be required.

24 **Impact BIO-60: Fragmentation of California Black Rail Habitat as a Result of Conservation** 25 **Component Implementation**

26 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create
27 temporary barriers to California black rail movements. Grading, filling, contouring and other initial
28 ground-disturbing activities could remove habitat along movement corridors used by individuals
29 and potentially temporarily reduce access to adjacent habitat areas. The temporary adverse effects
30 of fragmentation of tidal brackish emergent wetland habitat for California black rail or restoration
31 activities resulting in barriers to movement would be minimized through sequencing of *CM4 Tidal*
32 *Natural Community Restoration* activities. The tidal natural communities restoration would be
33 phased through the course of the BDCP restoration program to allow for recovery of some areas
34 before restoration actions are initiated in other areas. In addition, *AMM38 California Black Rail*
35 would avoid and minimize effects on California black rail.

36 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to
37 movement would not represent an adverse effect on California black rail as a result of habitat
38 modification of a special-status species because *CM4 Tidal Natural Communities Restoration* would
39 be phased to allow for the recovery of some areas before restoration actions are initiated in other
40 areas. In addition, *AMM38 California Black Rail* would avoid and minimize effects on California black
41 rail.

1 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to
2 movement would represent a less-than-significant impact on California black rail as a result of
3 habitat modification of a special-status species because *CM4 Tidal Natural Communities Restoration*
4 would be phased to allow for the recovery of some areas before restoration actions are initiated in
5 other areas. In addition, *AMM38 California Black Rail* would avoid and minimize impacts on
6 California black rail. No mitigation would be required.

7 **Impact BIO-61: Periodic Effects of Inundation of California Black Rail Habitat as a Result of**
8 **Implementation of Conservation Components**

9 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would not result in the
10 periodic inundation of modeled habitat for California black rail. There are no records for California
11 black rails in the Yolo Bypass, although the species is highly secretive and the extent to which the
12 area has been surveyed for California black rails is unknown. Therefore, there is potential for the
13 species to occur in the Yolo Bypass. In addition, rails may occur in the bypass after restoration
14 activities are completed. However, periodic inundation would not result in permanent habitat loss
15 and would not prevent use of the bypass by current or future rail populations.

16 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,
17 construction of setback levees could result in increased magnitude, frequency and duration of
18 periodic inundation by up to 6 acres of modeled California black rail habitat in CZ 7. The risk of
19 changes in inundation frequency, magnitude, and duration through CM2 and CM5 affecting
20 California black rail are considered to be low, and would not be expected to result in adverse effects
21 on the species.

22 **NEPA Effects:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*
23 *Seasonally Inundated Floodplain Restoration* would not represent an adverse effect on California
24 black rail as a result of habitat modification of a special-status species because periodic inundation
25 would not result in permanent habitat loss and would not prevent use of the bypass by current or
26 future rail populations. The risk of changes in inundation frequency and duration through CM2 and
27 CM5 affecting California black rail is considered to be low.

28 **CEQA Conclusion:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*
29 *Seasonally Inundated Floodplain Restoration* would represent a less-than-significant impact on
30 California black rail because periodic inundation would not result in permanent habitat loss and
31 would not prevent use of the bypass by current or future rail populations. The risk of changes in
32 inundation frequency and duration as a result of CM2 and CM5 affecting California black rail is
33 considered to be low. No mitigation would be required.

34 **California Clapper Rail¹**

35 This section describes the effects of Alternative 4, including water conveyance facilities construction
36 and implementation of other conservation components, on California clapper rail. California clapper
37 rail modeled habitat includes primarily middle marsh habitat with select emergent wetland plant

¹ Based on recent genetic studies by Maley and Brumfield (2013) and Chesser et al. (2014), the "California" (*Rallus longirostris obsoletus*), "Yuma" (*R. l. yumanensis*), and "light-footed" (*R. l. levipes*) subspecies of clapper rail are now recognized by the American Ornithologists' Union (AOU) as a separate species: Ridgway's rail (*Rallus obsoletus*). As such, the taxon formerly known as California clapper rail (*R. l. obsoletus*) is now California Ridgway's rail (*R. o. obsoletus*). For the purposes of this document, the "California clapper rail" common name has been retained due to its use in previous BDCP documents.

1 alliances. High marsh is also used if it is of high value, and low marsh provides foraging habitat for
 2 the species. California clapper rail secondary habitats generally provide only a few ecological
 3 functions such as foraging (low marsh) or high-tide refuge (upland transition zones), while primary
 4 habitats provide multiple functions including breeding, effective predator cover, and foraging
 5 opportunities. Further details regarding the habitat model, including assumptions on which the
 6 model is based, are provided in BDCP Appendix 2.A, *Covered Species Accounts*.

7 Construction and restoration associated with Alternative 4 conservation measures would result in
 8 both temporary and permanent losses of California clapper rail modeled habitat as indicated in
 9 Table 12-4-26. Full implementation of Alternative 4 would also include the following conservation
 10 actions over the term of the BDCP to benefit the California clapper rail (BDCP Chapter 3, Section 3.3,
 11 *Biological Goals and Objectives*).

- 12 • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at
 13 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
 14 with CM4).

15 As explained below, with the restoration and protection of these amounts of habitat, in addition to
 16 natural community enhancement and management commitments (including *CM12 Methylmercury*
 17 *Management* as revised in Appendix 11F, *Substantive BDCP Revisions*) and implementation of
 18 *AMM1–AMM7*, *AMM19 California Clapper Rail*, and *AMM27 Selenium Management* (as described in
 19 Appendix 3B, *Environmental Commitments, AMMs, and CMs*), impacts on the California clapper rail
 20 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

21 **Table 12-4-26. Changes in California Clapper Rail Modeled Habitat Associated with Alternative 4**
 22 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
CM2–CM18	Primary	26	27	0	0	NA	NA
	Secondary	50	50	0	0	NA	NA
Total Impacts CM2–CM18		76	77	0	0		
TOTAL IMPACTS		76	77	0	0		

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

23

1 **Impact BIO-62: Loss or Conversion of Habitat for and Direct Mortality of California Clapper**
2 **Rail**

3 Alternative 4 conservation measures would result in the total loss or conversion of up to 35 acres of
4 modeled clapper rail habitat consisting of 27 acres of primary habitat and 50 acres of secondary
5 habitat (Table 12-4-26). The conservation measure that would result in these losses is tidal natural
6 communities restoration (CM4). Habitat enhancement and management activities (CM11), which
7 include ground disturbance or removal of nonnative vegetation, could also result in local adverse
8 habitat effects. Each of these individual activities is described below. A summary statement of the
9 combined impacts and NEPA effects, and a CEQA conclusion follow the individual conservation
10 measure discussions.

- 11 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would convert
12 approximately 77 acres of modeled California clapper rail habitat (27 acres of primary habitat,
13 50 acres of secondary habitat), the majority of which would occur in CZ 11. The tidal marsh
14 restoration action would not result in the permanent loss of any California clapper rail habitat in
15 the study area. However, approximately 27 acres of primary habitat would be converted to
16 secondary low marsh habitat and 50 acres of secondary habitat would be converted to middle or
17 high marsh. Full implementation of CM4 would restore or create at least 6,000 acres of tidal
18 brackish emergent wetland in CZ 11. Tidal wetlands would be restored as a mosaic of large,
19 interconnected, and biologically diverse patches that supported a natural gradient extending
20 from subtidal to the upland fringe. Much of the restored tidal brackish emergent wetland would
21 meet the primary habitat requirements of the California clapper rail, including development of
22 mid- and high-marsh vegetation with dense, tall stands of pickleweed cover. Restoration would
23 be sequenced and spaced in a manner that minimizes any temporary, initial loss of habitat and
24 habitat fragmentation.
- 25 • *CM11 Natural Communities Enhancement and Management*: Because the entire California
26 clapper rail population is restricted to the San Francisco Bay Area estuary, BDCP enhancement
27 and restoration actions would be expected to benefit the species by creating the potential for
28 extending its abundance and distribution in Suisun Marsh. Occupied California clapper rail
29 habitat would be monitored to determine if there is a need for predator control actions. If
30 implemented, nonnative predators would be controlled as needed to reduce nest predation and
31 to help maintain species abundance. A variety of habitat management actions included in *CM11*
32 *Natural Communities Enhancement and Management* that are designed to enhance wildlife
33 values in restored and protected tidal wetland habitats could result in localized ground
34 disturbances that could temporarily remove small amounts of California clapper rail habitat.
35 Ground-disturbing activities, such as removal of nonnative vegetation and road and other
36 infrastructure maintenance activities, would be expected to have minor adverse effects on
37 available California clapper rail habitat. These potential effects are currently not quantifiable,
38 but would be minimized with implementation of *AMM19 California Clapper Rail* (see Appendix
39 3B, *Environmental Commitments, AMMs, and CMs*).
- 40 • *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration
41 infrastructure could result in ongoing but periodic disturbances that could affect California
42 clapper rail use of the surrounding habitat in Suisun. Maintenance activities could include
43 vegetation management, and levee repair. These effects, however, would be reduced by AMMs
44 and conservation actions as described below.

- 1 • Injury and Direct Mortality: Construction vehicle activity may cause injury or mortality to
2 California clapper rail. If rails are present adjacent to covered activities, the operation of
3 equipment for land clearing, and habitat restoration, enhancement, and management could
4 result in injury or mortality of California clapper rail. Operation of construction equipment could
5 result in injury or mortality of California clapper rails. Risk would be greatest to eggs and
6 nestlings susceptible to land clearing activities, nest abandonment, or increased exposure to the
7 elements or to predators. Injury to adults and fledged juveniles is less likely as these individuals
8 are expected to avoid contact with construction equipment. However, nest sites would be
9 avoided during the nesting season as required by AMM1–AMM7 and *AMM19 California Clapper*
10 *Rail*.

11 The following paragraphs summarize the combined effects discussed above and describe other
12 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
13 included.

14 ***Near-Term Timeframe***

15 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
16 the near-term BDCP conservation strategy has been evaluated to determine whether it would
17 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
18 effects of construction would not be adverse under NEPA. There would be no impacts resulting from
19 the construction of the water conveyance facilities (CM1). However, there would be a loss of 76
20 acres of modeled habitat for California clapper rail in the study area in the near-term. These effects
21 would result from implementing *CM4 Tidal Natural Communities Restoration* (26 acres of primary
22 and 50 acres of secondary habitat).

23 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
24 CM4 and that are identified in the biological goals and objectives for California clapper rail in
25 Chapter 3, *Conservation Strategy*, of the BDCP would be 1:1 for restoration/creation of tidal brackish
26 emergent habitat. Using this ratio would indicate that 76 acres of tidal brackish emergent wetland
27 should be restored/created to compensate for the CM4 losses of California clapper rail habitat.

28 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
29 wetland in the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation
30 actions are associated with CM4 and would occur in the same timeframe as the early restoration
31 losses, thereby avoiding adverse effects on California clapper rail. The tidal brackish emergent
32 wetland would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the
33 Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex
34 (Objective TBEWNC1.1) and would be restored in a way that creates topographic heterogeneity and
35 in areas that increase connectivity among protected lands (Objectives TBEWNC1.4). These biological
36 goals and objectives would inform the near-term restoration efforts and represent performance
37 standards for considering the effectiveness of restoration actions. These Plan objectives represent
38 performance standards for considering the effectiveness of CM4 restoration actions. The acres of
39 restoration contained in the near-term Plan goals satisfy the typical mitigation that would be
40 applied to the near-term effects of tidal restoration.

41 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
42 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
43 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
44 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*

1 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
2 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
3 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
4 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

5 **Late Long-Term Timeframe**

6 The habitat model indicates that the study area supports approximately 296 acres of primary and
7 6,420 acres of secondary habitat for California clapper rail. Alternative 4 as a whole would result in
8 the permanent loss of and temporary effects on 27 acres of primary habitat and to 50 acres of
9 secondary habitat for California clapper rail during the term of the Plan (9% of the total primary
10 habitat in the study area and less than 1% of the total secondary habitat in the study area). The
11 locations of these losses are described above in the analyses of individual conservation measures.
12 The Plan includes commitments through *CM4 Tidal Natural Communities Restoration* to restore or
13 create at least 6,000 acres of tidal brackish emergent wetlands for California clapper rail in Suisun
14 Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would be restored as a mosaic of large,
15 interconnected and biologically diverse patches and at least 1,500 acres of the restored marsh
16 would consist of middle-and high-marsh vegetation, serving as primary habitat for California
17 clapper rail in Suisun Marsh (Objectives TBEWNC1.1 and TBEWNC1.2). Additional pressures on the
18 species such as loss of habitat from invasive species and mortality from nest predators would also
19 be addressed through the BDCP. Perennial pepperweed, which outcompetes suitable clapper rail
20 habitat (such as pickleweed) would be reduced to no more than 10% cover in the tidal brackish
21 emergent wetland natural community within CZ 11 (TBEWNC2.1). In addition, nonnative predators
22 would be controlled to reduce nest predation if necessary through *CM11 Natural Communities*
23 *Enhancement and Management*.

24 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
25 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above,
26 would result in the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary
27 habitat for California clapper rail.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
32 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
33 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
34 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
35 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

36 **NEPA Effects:** The loss of California clapper rail habitat associated with Alternative 4 would
37 represent an adverse effect as a result of habitat modification of a special-status species and
38 potential for direct mortality in the absence of other conservation actions. However, with habitat
39 protection and restoration associated with CM4, guided by biological goals and objectives and by
40 *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*,
41 *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*
42 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge*
43 *Operations Plan*, and *AMM19 California Clapper Rail*, which would be in place during all project
44 activities, the effects of Alternative 4 as a whole on clapper rail would not be adverse under NEPA.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
6 effects of construction would be less than significant under CEQA. There would be no impacts
7 resulting from the construction of the water conveyance facilities (CM1). However, there would be a
8 loss of 76 acres of modeled habitat for California clapper rail in the study area in the near-term from
9 the implementation of *CM4 Tidal Natural Communities Restoration* (26 acres of primary and 50 acres
10 of secondary habitat).

11 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
12 CM4 and that are identified in the biological goals and objectives for California clapper rail in
13 Chapter 3, *Conservation Strategy*, of the BDCP would be 1:1 for restoration/creation of tidal brackish
14 emergent habitat. Using this ratio would indicate that 76 acres of tidal brackish emergent wetland
15 should be restored/created to mitigate the CM4 losses of California clapper rail habitat.

16 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
17 wetland in the study area. These conservation actions are associated with CM4 and would occur in
18 the same timeframe as the early restoration losses, thereby avoiding adverse effects on California
19 clapper rail. The tidal brackish emergent wetland would be restored in CZ 11 among the Western
20 Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse
21 Slough/Denverton Marsh complex (Objective TBEWNC1.1) and would be restored in a way that
22 creates topographic heterogeneity and in areas that increase connectivity among protected lands
23 (Objectives TBEWNC1.4).

24 These biological goals and objectives would inform the near-term restoration efforts and represent
25 performance standards for considering the effectiveness of restoration actions. These Plan
26 objectives represent performance standards for considering the effectiveness of CM4 restoration
27 actions.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
32 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
33 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
34 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
35 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

36 In the absence of other conservation actions, the loss of California clapper rail habitat and potential
37 direct mortality of this species under Alternative 4 would represent an adverse effect as a result of
38 habitat modification of a special-status species and potential for direct mortality. This impact would
39 be significant. However, the BDCP has committed to habitat protection, restoration, management
40 and enhancement activities. As outlined in BDCP Chapter 3, Section 3.4, *Conservation Measures*,
41 natural community restoration and protection are planned so that they keep pace with project
42 impacts. Thus, there would be minimal lag time between impacts and implementation of those
43 measures designed to offset those impacts on natural communities and the species that use them. In

1 addition, *AMM19 California Clapper Rail* and *AMM1–AMM7* would avoid and minimize potential
2 impacts on the species from construction-related habitat loss and noise and disturbance. Because
3 the number of acres required to meet the typical mitigation ratio described above would be only 76
4 acres of restored tidal natural communities, the 2,000 acres of tidal brackish emergent wetland
5 restoration contained in the near-term Plan goals, and the additional detail in the biological
6 objectives for California clapper rail, are more than sufficient to support the conclusion that the
7 near-term impacts of habitat loss and direct mortality under Alternative 4 would be less than
8 significant under CEQA.

9 ***Late Long-Term Timeframe***

10 The habitat model indicates that the study area supports approximately 296 acres of primary and
11 6,420 acres of secondary habitat for California clapper rail. Alternative 4 as a whole would result in
12 the permanent loss of and temporary effects on 27 acres of primary habitat and to 8 acres of
13 secondary habitat for California clapper rail during the term of the Plan (9% of the total primary
14 habitat in the study area and less than 1% of the total secondary habitat in the study area). The
15 locations of these losses are described above in the analyses of individual conservation measures.
16 The Plan includes a commitment to restore or create at least 6,000 acres of tidal brackish emergent
17 wetlands for California clapper rail in Suisun Marsh in CZ 11 (Objective TBEWNC1.1). These tidal
18 wetlands would be restored as a mosaic of large, interconnected and biologically diverse patches
19 and much of the restored marsh would consist of middle-and high-marsh vegetation with dense, tall
20 stands of pickleweed, serving as primary habitat for clapper rail in Suisun Marsh (Objective
21 TBEWNC1.1). Additional pressures on the species such as loss of habitat from invasive species and
22 mortality from nest predators would also be addressed through the BDCP. Perennial pepperweed,
23 which outcompetes suitable clapper rail habitat (such as pickleweed) would be reduced to no more
24 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11
25 (TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if
26 necessary through *CM11 Natural Communities Enhancement and Management*.

27 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
28 *Plant Species*) estimates that the restoration and protection actions discussed above, would result in
29 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat for California
30 clapper rail.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
35 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
36 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
37 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
38 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

39 Considering Alternative 4's protection and restoration provisions, which would provide acreages of
40 new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to
41 construction and restoration activities, loss of habitat or direct mortality through implementation of
42 Alternative 4 would not result in a substantial adverse effect through habitat modifications and
43 would not substantially reduce the number or restrict the range of the species. Therefore, the
44 alternative would have a less-than-significant impact on California clapper rail.

1 **Impact BIO-63: Indirect Effects of Plan Implementation on California Clapper Rail**

2 **Indirect Construction-Related Effects:** California clapper rail habitat within the vicinity of
3 proposed restoration areas could be indirectly affected by construction activities. Indirect effects
4 associated with construction include noise, dust, and visual disturbance caused by grading, filling,
5 contouring, and other ground-disturbing operations outside the project footprint but within 500
6 feet from the construction edge. Construction noise above background noise levels (greater than 50
7 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,
8 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
9 *Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP Revisions*, of the Final EIR/EIS), although
10 there are no available data to determine the extent to which these noise levels could affect California
11 clapper rail. The use of mechanical equipment during construction-related restoration activities
12 could cause the accidental release of petroleum or other contaminants that could affect clapper rail
13 in the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
14 California clapper rail habitat could also affect the species. If construction occurs during the nesting
15 season, these indirect effects could result in the loss or abandonment of nests, and mortality of any
16 eggs and/or nestlings. However, there is a commitment in *AMM19 California Clapper Rail* (see
17 Appendix 3B, *Environmental Commitments, AMMs, and CMs*) that preconstruction surveys of
18 potential breeding habitat would be conducted within 500 feet of project activities, and a 500-foot
19 no-disturbance buffer would be established around any territorial call-centers during the breeding
20 season. In addition, construction would be avoided altogether if breeding territories cannot be
21 accurately delimited.

22 Preconstruction surveys conducted under *AMM19 California Clapper Rail* would ensure
23 construction-related noise and visual disturbances would not have an adverse effect on California
24 clapper rail. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
25 *Monitoring*, would minimize the likelihood of such spills from occurring and ensure measures were
26 in place to prevent runoff from the construction area and to avoid negative effects of dust on the
27 species. Therefore, with the implementation of AMM1–AMM7 and *AMM19 California Clapper Rail*,
28 there would be no adverse effect on California clapper rail.

29 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients
30 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would
31 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh
32 would generally increase as a result of water operations and operations of salinity-control gates to
33 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland
34 plant communities tolerant of more brackish environments, which would be beneficial to California
35 clapper rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

36 **Methylmercury Exposure:** California clapper rail modeled habitat includes primarily middle marsh
37 habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is also used if it is
38 of high value, and low marsh provides foraging habitat for the species. California clapper rails are a
39 top predator in the benthic food chain; they forage by probing their beaks into the mud (Zemba and
40 Fancher 1988) and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects
41 (Eddleman and Conway 1998).

42 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
43 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
44 species would overestimate the effects on California clapper rail. Organisms feeding within pelagic-

1 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
 2 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
 3 segregation (Grimaldo et al. 2009).

4 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
 5 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
 6 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
 7 mercury. Concentrations of methylmercury known to be toxic to bird embryos have been found in
 8 the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003); however, currently,
 9 it is unknown how much of the sediment-derived methylmercury enters the food chain in Suisun
 10 Marsh or what tissue concentrations are actually harmful to the California clapper rail. In general,
 11 the highest methylation rates are associated with high tidal marshes that experience intermittent
 12 wetting and drying and associated anoxic conditions (Alpers et al. 2008). In Suisun Marsh, the
 13 conversion of managed wetlands to tidal wetlands is expected to result in an overall reduction in
 14 mercury methylation. Due to the complex and very site-specific factors that determine if mercury
 15 becomes mobilized into the foodweb, *CM12 Methylmercury Management* is included to provide for
 16 site-specific evaluation for each restoration project. If a project is identified where there is a high
 17 potential for methylmercury production that could not be fully addressed through restoration
 18 design and adaptive management, alternate restoration areas would be considered. CM12 would be
 19 implemented in coordination with other similar efforts to address mercury in the Delta, and
 20 specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
 21 would include the following actions.

- 22 • Assess pre-restoration conditions to determine the risk that the project could result in increased
 23 mercury methylation and bioavailability.
- 24 • Define design elements that minimize conditions conducive to generation of methylmercury in
 25 restored areas.
- 26 • Define adaptive management strategies that can be implemented to monitor and minimize
 27 actual postrestoration creation and mobilization of methylmercury.

28 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 29 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 30 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 31 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 32 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 33 classes within a species. In addition, the effect of selenium on a species can be confounded by
 34 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 35 2009).

36 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 37 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 38 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 39 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 40 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 41 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 42 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 43 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 44 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which

1 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
2 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
3 levels of selenium have a higher risk of selenium toxicity.

4 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
5 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
6 exacerbate bioaccumulation of selenium in avian species, including California clapper rail. Marsh
7 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
8 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
9 BDCP restoration activities that create newly inundated areas could increase bioavailability of
10 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
11 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
12 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
13 long-term increases in selenium concentrations in water in the Delta under any alternative.
14 However, it is difficult to determine whether the effects of potential increases in selenium
15 bioavailability associated with restoration-related conservation measures (CM4, CM5) would lead to
16 adverse effects on California clapper rail.

17 Because of the uncertainty that exists at this programmatic level of review, there could be a
18 substantial effect on California clapper rail from increases in selenium associated with restoration
19 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
20 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
21 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
22 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
23 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
24 separately for each restoration effort as part of design and implementation. This avoidance and
25 minimization measure would be implemented as part of the tidal habitat restoration design
26 schedule.

27 **NEPA Effects:** Noise and visual disturbances related to construction-related activities from
28 conservation measures could disturb California clapper rail habitat adjacent to work sites. Potential
29 effects of noise and visual disturbances on California clapper rail would be minimized with *AMM19*
30 *California Clapper Rail*. *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and*
31 *Monitoring*, would minimize the likelihood of spills from occurring and ensure that measures were
32 in place to prevent runoff from the construction area and to avoid negative effects of dust on the
33 species.

34 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
35 habitat restoration are expected to increase water salinity in Suisun Marsh, which would be
36 expected to establish tidal marsh similar to historic conditions.

37 Tidal habitat restoration could result in increased exposure of California clapper rail to selenium.
38 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
39 would provide specific tidal habitat restoration design elements to reduce the potential for
40 bioaccumulation of selenium and its bioavailability in tidal habitats.

41 Restoration Actions that would create tidal marsh could provide biogeochemical conditions for
42 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
43 the California clapper rail foodweb to methylmercury in these areas, with the level of exposure
44 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.

1 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
2 to reduce the overall production of methylmercury, resulting in a net benefit to species.
3 Implementation of CM12 which contains measures to assess the amount of mercury before project
4 development, followed by appropriate design and adaptation management, would minimize the
5 potential for increased methylmercury exposure, and would result in no adverse effect on the
6 species.

7 The indirect effects associated with noise and visual disturbances, potential spills of hazardous
8 material, changes in salinity, and increased exposure to selenium from Alternative 4 implementation
9 would not have an adverse effect on California clapper rail.

10 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities from
11 conservation measures could disturb California clapper rail habitat adjacent to work sites. *AMM19*
12 *California Clapper Rail* would avoid and minimize impacts on California clapper rail from noise and
13 visual disturbance. The use of mechanical equipment during restoration activities could cause the
14 accidental release of petroleum or other contaminants or the inadvertent discharge of sediment or
15 excessive dust adjacent to California clapper rail habitat which could adversely affect the species.
16 These impacts on California clapper rail would be less than significant with the incorporation of
17 *AMM1-AMM7* into the BDCP.

18 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
19 habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity gradient
20 changes should have a beneficial impact on California clapper rail through the establishment of tidal
21 marsh similar to historic conditions.

22 Tidal habitat restoration could result in increased exposure of California clapper rail to selenium.
23 This effect would be addressed through the implementation of *AMM27 Selenium Management* which
24 would provide specific tidal habitat restoration design elements to reduce the potential for
25 bioaccumulation of selenium and its bioavailability in tidal habitats.

26 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
27 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
28 the California clapper rail foodweb to methylmercury in these areas, with the level of exposure
29 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
30 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
31 to reduce the overall production of methylmercury, resulting in a net benefit to species.
32 Implementation of CM12 which contains measures to assess the amount of mercury before project
33 development, followed by appropriate design and adaptation management, would minimize the
34 potential for increased methylmercury exposure, and would result in no adverse effect on the
35 species. Tidal habitat restoration could result in increased exposure of California clapper rail to
36 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
37 *Management* which would provide specific tidal habitat restoration design elements to reduce the
38 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

39 With these measures in place, indirect effects of plan implementation would not result in a
40 substantial adverse effect on the species through habitat modification or potential mortality of a
41 special-status species. Therefore, the indirect effects of Alternative 4 implementation would have a
42 less-than-significant impact on California clapper rail.

1 **Impact BIO-64: Effects on California Clapper Rail Associated with Electrical Transmission**
2 **Facilities**

3 Isolated patches of suitable California clapper rail habitat may occur in the study area as far east as
4 (but not including) Sherman Island. Home range and territory of the California clapper rail is not
5 known, but in locations outside of California, clapper rail territory ranges 0.3 acre to 8 acres (0.1 to
6 3.2 hectares) (Rush et al. 2012), indicating that known occurrences are not likely to intersect with
7 the proposed lines (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at*
8 *Proposed BDCP Transmission Lines*). The location of the current population and suitable habitat for
9 the species make collision with the proposed transmission lines highly unlikely.

10 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse
11 effect on California clapper rail because the location of the current population and suitable habitat
12 for the species would make collision with the proposed transmission lines highly unlikely.

13 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
14 significant impact on California clapper rail because the location of the current population and
15 suitable habitat for the species would make collision with the proposed transmission lines highly
16 unlikely.

17 **Impact BIO-65: Fragmentation of California Clapper Rail Habitat as a Result of Conservation**
18 **Component Implementation**

19 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create
20 temporary barriers to movements of California clapper rail. Grading, filling, contouring and other
21 initial ground-disturbing activities could remove habitat along movement corridors used by
22 individuals and, thus, temporarily reduce access to adjacent habitat areas. The temporary adverse
23 effects of fragmentation of tidal brackish emergent wetland habitat for California clapper rail or
24 restoration activities resulting in barriers to movement would be minimized through sequencing of
25 restoration activities to minimize effects of temporary habitat loss. The tidal natural communities
26 restoration would be phased through the course of the BDCP restoration program to allow for
27 recovery of some areas before restoration actions are initiated in other areas. In addition, *AMM19*
28 *California Clapper Rail* would avoid and minimize effects on California clapper rail.

29 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to
30 movement would not represent an adverse effect on California clapper rail as a result of special-
31 status species habitat modification because *CM4 Tidal Natural Communities Restoration* would be
32 phased to allow for the recovery of some areas before restoration actions are initiated in other
33 areas. In addition, *AMM19 California Clapper Rail* would avoid and minimize effects on California
34 clapper rail.

35 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to
36 movement would represent a less-than-significant impact on California clapper rail as a result of
37 habitat modification of a special status species because *CM4 Tidal Natural Communities Restoration*
38 would be phased to allow for the recovery of some areas before initiating restoration actions in
39 other areas. In addition, *AMM19 California Clapper Rail* would avoid and minimize
40 effects on California clapper rail.

1 **California Least Tern**

2 This section describes the effects of Alternative 4, including water conveyance facilities construction
3 and implementation of other conservation components, on California least tern. California least tern
4 modeled habitat identifies foraging habitat as all tidal perennial aquatic natural community in the
5 study area. Breeding habitat is not included in the model because most of the natural shoreline in
6 the study area that historically provided nesting sites has been modified or removed.

7 Construction and restoration associated with Alternative 4 conservation measures would result in
8 both temporary and permanent losses of California least tern modeled foraging habitat as indicated
9 in Table 12-4-27. Full implementation of Alternative 4 would also include the following
10 conservation actions over the term of the BDCP to benefit California least tern (BDCP Chapter 3,
11 Section 3.3, *Biological Goals and Objectives*).

- 12 • Restore and protect at least 65,000 acres of tidal natural communities and transitional uplands
13 to accommodate sea level rise (Objective L1.3, associated with CM4).
- 14 • Within the at least 65,000 acres of tidal natural communities and transitional uplands, restore or
15 create tidal perennial aquatic natural community as necessary when creating tidal emergent
16 wetland (Objective TPANC1.1, associated with CM4).
- 17 • Control invasive aquatic vegetation that adversely affects native fish habitat (Objective
18 TPANC2.1, associated with CM13).

19 Least terns currently nest on artificial fill adjacent to tidal perennial aquatic habitat in the vicinity of
20 Suisun Marsh and west Delta, and additional nesting could occur at the edge of tidal perennial
21 waters whenever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy
22 or gravelly substrates with sparse vegetation).

23 As explained below, with the restoration and protection of tidal perennial aquatic foraging habitat,
24 in addition to natural community enhancement and management commitments (including CM12
25 *Methylmercury Management* as revised in Appendix 11F, *Substantive BDCP Revisions*) and
26 implementation of AMM1–AMM7, *AMM27 Selenium Management* (as described in Appendix 3B,
27 *Environmental Commitments, AMMs, and CMs*), and mitigation to avoid impacts on terns should they
28 nest in the study area, impacts on the California least tern would not be adverse for NEPA purposes
29 and would be less than significant for CEQA purposes.

1 **Table 12-4-27. Changes in California Least Tern Modeled Habitat Associated with Alternative 4**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Foraging	281	281	2,019	2,019	NA	NA
Total Impacts CM1		281	281	2,019	2,019	NA	NA
CM2–CM18	Foraging	38	46	11	16	NA	NA
Total Impacts CM2–CM18		38	46	11	16	NA	NA
TOTAL IMPACTS		319	327	2,030	2,035	NA	NA

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-66: Loss or Conversion of Habitat for and Direct Mortality of California Least Tern**

5 Alternative 4 conservation measures would result in the combined permanent and temporary loss
6 of up to 2,362 acres of modeled foraging habitat for California least tern (Table 12-4-27). The
7 conservation measures that would result in these losses are construction of water conveyance
8 facilities and operation (CM1), Yolo Bypass Fisheries Enhancement (CM2), Tidal Natural
9 Communities Restoration (CM4), and Seasonally Inundated Floodplain Restoration (CM5). Habitat
10 enhancement and management activities (CM11), which include ground disturbance or removal of
11 nonnative vegetation, could also result in local adverse habitat effects. In addition, maintenance
12 activities associated with the long-term operation of the water conveyance facilities and other BDCP
13 physical facilities could degrade or eliminate California least tern foraging habitat. Each of these
14 individual activities is described below. A summary statement of the combined impacts, NEPA
15 effects, and CEQA conclusion follow the individual conservation measure discussions.

- 16 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
17 result in the combined permanent and temporary loss of up to 2,300 acres of modeled California
18 least tern aquatic foraging habitat (Table 12-4-27). Of these acres, 281 acres would be a
19 permanent loss the majority of which would occur where Intakes 2, 3 and 5 encroach on the
20 Sacramento River’s east bank between Clarksburg and Courtland. Permanent losses would also
21 occur where new control structures would be built into the California Aqueduct and the Delta
22 Mendota Canal adjacent to Clifton Court Forebay. The temporary effects on tidal perennial
23 aquatic habitats would occur at numerous locations, with the largest affect occurring at Clifton
24 Court Forebay, where the entire forebay would be dredged to provide additional storage
25 capacity. Other temporary effects would occur in the Sacramento River at Intakes 2, 3, and 5,

1 and at temporary barge unloading facilities established at three locations along the tunnel route.
2 The CM1 footprint does not overlap with any California least tern occurrences. Refer to the
3 Terrestrial Biology Mapbook for a detailed views of Alternative 4 construction locations.
4 Impacts from CM1 would occur within the first 10-14 years of Alternative 4 implementation.

- 5 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancement
6 (CM2) would result in the permanent loss of 8 acres and the temporary loss of 11 acres of
7 modeled aquatic foraging habitat for California least tern in CZ 2. Activities from Fremont and
8 Sacramento Weir improvements, Putah Creek realignment, and Lisbon Weir modification could
9 involve excavation and grading in tidal perennial aquatic areas to improve passage of fish
10 through the bypasses. The loss is expected to occur during the first 10 years of Alternative 4
11 implementation.
- 12 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration actions would result in the
13 permanent loss of 36 acres of modeled aquatic foraging habitat for California least tern. An
14 estimated 65,000 acres of tidal wetlands would be restored during tidal habitat restoration,
15 consistent with BDCP Objective L1.3. Of these acres, an estimated 27,000 acres of tidal perennial
16 aquatic would be restored, based on modeling conducted by ESAPWA (refer to Table 5 in BDCP
17 Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). This restoration is consistent with
18 BDCP Objective TPANC1.1. Tidal perennial aquatic restoration would be expected to
19 substantially increase the primary productivity of fish, increasing the prey base for California
20 least tern. Approximately 3,400 acres of the restoration would happen during the first 10 years
21 of BDCP implementation, which would coincide with the timeframe of water conveyance
22 facilities construction. The remaining restoration would be phased over the following 30 years.
23 Some of the restoration would occur in the lower Yolo Bypass, but restoration would also be
24 spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.
- 25 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
26 seasonally inundated floodplain would result in the permanent loss of 2 acres and the
27 temporary loss of 5 acres of modeled aquatic foraging habitat for California least tern. This
28 activity is scheduled to start following construction of water conveyance facilities, which is
29 expected to take 10 years. Specific locations for the floodplain restoration have not been
30 identified, but it is expected that much of the activity would occur in the south Delta along the
31 major rivers.
- 32 ● *CM11 Natural Communities Enhancement and Management*: Noise and visual disturbances
33 during implementation of habitat management actions could result in temporary disturbances
34 that affect California least tern use of the surrounding habitat. These effects cannot be
35 quantified, but are expected to be minimal because few management activities would be
36 implemented in aquatic habitat and because terns are not expected to nest on protected lands.
37 Surveys would be conducted prior to ground disturbance in any areas that have suitable nesting
38 substrate for California least tern (flat, unvegetated areas near aquatic foraging habitat) and
39 injury mortality and noise and visual disturbance of nesting terns would be avoided and
40 minimized by the AMMs and Mitigation Measure BIO-66, *California Least Tern Nesting Colonies
41 Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, described below.
- 42 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
43 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
44 postconstruction disturbances, localized impacts on California least tern foraging habitat, and
45 temporary noise and disturbances over the term of the BDCP. Maintenance activities would

1 include vegetation management, levee and structure repair, and re-grading of roads and
2 permanent work areas which could be adjacent to California least tern foraging habitat. These
3 effects, however, would be reduced by AMMs listed below.

- 4 • Injury and Direct Mortality: California least terns currently nest in the vicinity of potential
5 restoration sites in Suisun Marsh and west Delta area (CZ 10 and CZ 11). New nesting colonies
6 could establish if suitable nesting habitat is created during restoration activities (e.g., placement
7 of unvegetated fill to raise surface elevations prior to breaching levees during restoration
8 efforts). If nesting occurs where covered activities are undertaken, the operation of equipment
9 for land clearing, construction, conveyance facilities operation and maintenance, and habitat
10 restoration, enhancement, and management could result in injury or mortality of California least
11 tern. Risk of injury or disturbance would be greatest to eggs and nestlings susceptible to land-
12 clearing activities, abandonment of nests and nesting colonies, or increased exposure to the
13 elements or to predators. Injury to adults or fledged juveniles is less likely as these individuals
14 would be expected to avoid contact with construction equipment. However, injury or mortality
15 would be avoided through planning and preconstruction surveys to identify nesting colonies,
16 the design of projects to avoid locations with least tern colonies, and the provision for 500-foot
17 buffers as required by Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be*
18 *Avoided and Indirect Effects on Colonies Will Be Minimized.*

19 The following paragraph summarizes the combined effects discussed above and describes other
20 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
21 included.

22 ***Near-Term Timeframe***

23 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
24 the near-term BDCP conservation strategy has been evaluated to determine whether it would
25 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
26 the effects of construction would not be adverse under NEPA. With Alternative 4 implementation,
27 there would be a loss of 2,349 acres of modeled foraging habitat for California least tern in the study
28 area in the near-term. These effects would result from the construction of the water conveyance
29 facilities (CM1, 2,300 acres), and implementing other conservation measures (Yolo Bypass fisheries
30 improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled foraging habitat
31 impacts would occur in tidal perennial aquatic natural communities.

32 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
33 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would
34 indicate that 2,300 acres of the tidal perennial aquatic natural community should be
35 restored/created to compensate for the CM1 losses of California least tern foraging habitat. The
36 near-term effects of other conservation actions would remove 49 acres of tidal perennial aquatic
37 habitat, and therefore require 49 acres of tidal perennial aquatic natural community restoration
38 using the same typical NEPA and CEQA ratio (1:1 for restoration).

39 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities
40 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3,
41 *Description of Alternatives*). This conservation action would result in the creation of approximately
42 3,400 acres of high quality tidal perennial aquatic natural community, based on modeling conducted
43 by ESAPWA (refer to Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*,
44 *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*).

1 Tidal perennial aquatic restoration would occur in the same timeframe as the construction and early
2 restoration losses, thereby avoiding adverse effects on California least tern from loss of foraging
3 habitat.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
8 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
9 species habitats at or adjacent to work areas and storage sites. BDCP Appendix 3.C describes the
10 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
11 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

12 The California least tern is not a species that is covered under the BDCP. Although nesting by
13 California least tern is not expected to occur, restoration sites could attract individuals wherever
14 disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly
15 substrates with sparse vegetation). If nesting were to occur, construction activities could have an
16 adverse effect on California least tern. Mitigation Measure BIO-66, *California Least Tern Nesting*
17 *Colonies Shall be Avoided and Indirect Effects on Colonies Will be Minimized*, would be available to
18 address this adverse effect on nesting California least terns.

19 **Late Long-Term Timeframe**

20 The habitat model indicates that the study area supports approximately 86,263 acres of foraging
21 habitat for California least tern. Alternative 4 as a whole would result in the permanent loss of and
22 temporary effects on 2,362 acres of foraging habitat during the term of the Plan (3% of the total
23 habitat in the study area). The locations of these losses are described above in the analyses of
24 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*
25 *Natural Communities Restoration* would restore an estimated 27,000 acres of high quality tidal
26 perennial aquatic natural community would be restored (estimated from Table 5 in BDCP Appendix
27 3.B, *BDCP Tidal Habitat Evolution Assessment*). The restoration would occur over a wide region of
28 the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South
29 Delta ROAs (see Figure 12-1).

30 **NEPA Effects:** The loss of California least tern foraging habitat and potential direct mortality
31 associated with Alternative 4 would represent an adverse effect in the absence of other conservation
32 actions. Although nesting by California least tern is not expected to occur in the study area,
33 restoration sites could attract individuals wherever disturbed or artificial sites mimic habitat
34 conditions sought for nesting (i.e., sandy or gravelly substrates with sparse vegetation). If nesting
35 were to occur, construction activities could have an adverse effect on California least tern. Mitigation
36 Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on*
37 *Colonies will be Minimized*, would be available to address this effect on nesting California least terns.
38 With habitat restoration associated with CM4, guided by *AMM1 Worker Awareness Training*, *AMM2*
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
41 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*, which
42 would be in place during all project activities, the effects of Alternative 4 as a whole on California
43 least tern would not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
6 the effects of construction would be less than significant under CEQA. With Alternative 4
7 implementation, there would be a loss of 2,349 acres of modeled foraging habitat for California least
8 tern in the study area in the near-term. These effects would result from the construction of the
9 water conveyance facilities (CM1, 2,300 acres), and implementing other conservation measures
10 (Yolo Bypass fisheries improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All
11 modeled foraging habitat impacts would occur in tidal perennial aquatic natural communities.

12 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
13 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would
14 indicate that 2,300 acres of the tidal perennial aquatic natural community should be
15 restored/created to compensate for the CM1 losses of California least tern foraging habitat. The
16 near-term effects of other conservation actions would remove 49 acres of tidal perennial aquatic
17 habitat, and therefore require 49 acres of tidal perennial aquatic natural community restoration
18 using the same typical NEPA and CEQA ratio (1:1 for restoration).

19 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities
20 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (see Table 3-4 in Chapter 3,
21 *Description of Alternatives*). Modeling conducted by ESA PWA indicates that this conservation action
22 would result in the creation of approximately 3,400 acres of high-value tidal perennial aquatic
23 natural community (refer to Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution*
24 *Assessment*). Tidal perennial aquatic restoration would occur in the same timeframe as the
25 construction and early restoration losses, thereby avoiding adverse effects on California least tern.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
29 *Countermeasure Plan*, *AMM6 Spoils, Reusable Tunnel Material*, and *AMM7 Barge Operations Plan*. All
30 of these AMMs include elements that would avoid or minimize the risk of affecting individuals and
31 species habitats at or adjacent to work areas and storage sites. BDCP Appendix 3.C describes the
32 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
33 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

34 In the absence of other conservation measures, the effects on California least tern habitat from
35 Alternative 4 would represent an adverse effect as a result of habitat modification of a special-status
36 species and potential for direct mortality. Although nesting by California least tern is not expected to
37 occur, restoration sites could attract individuals wherever disturbed or artificial sites mimic habitat
38 conditions sought for nesting (i.e., sandy or gravelly substrates with sparse vegetation). If nesting
39 were to occur, construction activities could have a significant impact on California least tern.
40 Implementation of Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall be*
41 *Avoided and Indirect Effects on Colonies Will be Minimized*, would reduce the impact on nesting
42 California least terns to a less-than-significant level. As outlined in BDCP Chapter 3, Section 3.4,
43 *Conservation Measures*, natural community restoration and protection are planned so that they keep
44 pace with project impacts. Thus, there would be minimal lag time between impacts and

1 implementation of those measures designed to offset those impacts on natural communities and the
2 species that use them. In addition, AMM1–AMM7 and Mitigation Measure BIO-66, *California Least*
3 *Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies will be Minimized*, would avoid
4 and minimize potential impacts on the species from construction-related habitat loss and noise and
5 disturbance. Because the number of acres required to meet the typical mitigation ratio described
6 above would be only 2,309 acres of restored tidal perennial aquatic habitat, the 3,400 acres of tidal
7 perennial aquatic restoration estimated in the near-term, are more than sufficient to support the
8 conclusion that the near-term impacts of habitat loss and direct mortality under Alternative 4 would
9 be less than significant under CEQA. No mitigation would be required.

10 **Late Long-Term Timeframe**

11 The habitat model indicates that the study area supports approximately 86,263 acres of foraging
12 habitat for California least tern. Alternative 4 as a whole would result in the permanent loss of and
13 temporary effects on 2,362 acres of foraging habitat during the term of the Plan (3% of the total
14 habitat in the study area). The locations of these losses are described above in the analyses of
15 individual conservation measures. The Plan includes conservation commitments through CM4 Tidal
16 Natural Communities Restoration to restore an estimated 27,000 acres of high-value tidal perennial
17 aquatic natural community (estimated from Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat*
18 *Evolution Assessment*). The restoration would occur over a wide region of the study area, including
19 within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure
20 12-1).

21 In the absence of other conservation actions, the loss of California least tern foraging habitat and
22 potential direct mortality associated with Alternative 4 would represent an adverse effect as a result
23 of habitat modification of a special-status species and potential for direct mortality. Although
24 nesting by California least tern is not expected to occur, restoration sites could attract individuals
25 wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or
26 gravelly substrates with sparse vegetation). If nesting were to occur, construction activities could
27 have a significant impact on California least tern. The loss of California least tern foraging habitat
28 and potential direct mortality associated with Alternative 4 would represent a significant impact in
29 the absence of other conservation actions.

30 However, with habitat restoration associated with CM4, guided by *AMM1 Worker Awareness*
31 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater*
32 *Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention,*
33 *Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations*
34 *Plan*, and implementation of Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall*
35 *Be Avoided and Indirect Effects on Colonies Will Be Minimized*, the loss of habitat or mortality under
36 this alternative would have a less-than-significant impact on California least tern. No mitigation
37 would be required.

38 **Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and** 39 **Indirect Effects on Colonies Will Be Minimized**

40 If suitable nesting habitat for California least tern (flat unvegetated areas near aquatic foraging
41 habitat) is identified during planning level surveys, DWR will ensure that a qualified biologist
42 with experience observing the species and its nests conducts at least three preconstruction
43 surveys for this species during the nesting season. DWR will design projects to avoid the loss of

1 California least tern nesting colonies. No construction will take place within 500 feet California
2 least tern nests during the nesting season (April 15 to August 15 or as determined through
3 surveys). Only inspection, maintenance, research, or monitoring activities may be performed
4 during the least tern breeding season in areas within or adjacent to least tern breeding habitat
5 with USFWS and CDFW approval under the supervision of a qualified biologist.

6 **Impact BIO-67: Indirect Effects of Plan Implementation on California Least Tern**

7 **Indirect Construction- and Operation-Related Effects:** Indirect effects associated with
8 construction that could affect California least tern include noise, dust, and visual disturbance caused
9 by grading, filling, contouring, and other ground-disturbing operations outside the project footprint
10 but within 500 feet from the construction edge. Construction noise above background noise levels
11 (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP
12 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*
13 *Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP Revisions*, of the Final EIR/EIS),
14 although there are no available data to determine the extent to which these noise levels could affect
15 California least tern. The use of mechanical equipment during water conveyance facilities
16 construction could cause the accidental release of petroleum or other contaminants that could affect
17 California least tern or their prey species in the surrounding habitat. The inadvertent discharge of
18 sediment or excessive dust adjacent to foraging habitat could also affect the species. Noise and visual
19 disturbance is not expected to have an adverse effect on California least tern foraging behavior. As
20 described in Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and*
21 *Indirect Effects on Colonies Will Be Minimized*, if least tern nests were found during planning or
22 preconstruction surveys, no construction would take place within 500 feet of active nests. In
23 addition, AMM1–AMM7, including construction best management practices, would minimize the
24 likelihood of spills or excessive dust being created during construction. Should a spill occur,
25 implementation of these AMMs would greatly reduce the likelihood of individuals being affected.

26 **Methylmercury Exposure:** Covered activities have the potential to exacerbate the bioaccumulation
27 of mercury in the California least tern.

28 The operational impacts of new flows under CM1 were analyzed using a DSM-2 based model to
29 assess potential effects on mercury concentration and bioavailability. Largemouth bass were used as
30 a surrogate species for this analysis and results would be expected to be similar or lower for the
31 California least tern. Results indicated that changes in total mercury levels in water and large mouth
32 bass tissues were insignificant (see BDCP Appendix 5.D, *Contaminants*, Tables 5D.4-3, 5D.4-4, and
33 5D.4-5).

34 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to
35 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
36 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
37 flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase
38 bioavailability of mercury. Increased methylmercury associated with natural community and
39 floodplain restoration may indirectly affect California least tern, via uptake through consumption of
40 prey (as described in the BDCP, Appendix 5.D, *Contaminants*).

41 Schwarzbach and Adelsbach (2003) investigated mercury exposure in 15 species of birds inhabiting
42 the Bay-Delta ecosystem. Among the species studied, the highest concentrations of mercury were
43 found in the eggs of piscivorous birds (terns and cormorants) that bioaccumulate mercury from
44 their fish prey. The very highest concentrations were found in Caspian and Forster's terns, especially

1 those inhabiting South San Francisco Bay. Based on three California least tern eggs collected from
2 Alameda Naval Air Station in the San Francisco Central Bay, concentrations in California least tern
3 eggs were a third (0.3 ppm) those of the eggs of the other two terns. Because of the small sample
4 size, there is a high degree of uncertainty regarding the levels of mercury that may be present in
5 California least tern eggs. If the mercury levels measured at Alameda Naval Air Station are
6 representative of the population in the San Francisco Bay, they would not be expected to result in
7 adverse effects on tern hatchlings. Hatching and fledging success were not reduced in common tern
8 eggs in Germany with mercury concentrations of 6.7 ppm (Hothem and Powell 2000).

9 Mercury is generally elevated throughout the Delta, and restoration of the lower potential areas in
10 total may result in generalized, very low level increases of mercury. Given that some species have
11 elevated mercury tissue levels pre-BDCP, these low level increases could result in some level of
12 effects. CM12, described below, will be implemented to address this risk of low level increases in
13 methylmercury which could add to the current elevated tissue concentrations.

- 14 • Assess pre-restoration conditions to determine the risk that the project could result in increased
15 mercury methylation and bioavailability.
- 16 • Define design elements that minimize conditions conducive to generation of methylmercury in
17 restored areas.
- 18 • Define adaptive management strategies that can be implemented to monitor and minimize
19 actual postrestoration creation and mobilization of methylmercury.

20 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
21 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
22 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
23 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
24 2009). The effect of selenium toxicity differs widely between species and also between age and sex
25 classes within a species. In addition, the effect of selenium on a species can be confounded by
26 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
27 2009).

28 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
29 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
30 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
31 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
32 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
33 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
34 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
35 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
36 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
37 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
38 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
39 levels of selenium have a higher risk of selenium toxicity.

40 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
41 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
42 exacerbate bioaccumulation of selenium in avian species, including California least tern. Marsh (tidal
43 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
44 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP

1 restoration activities that create newly inundated areas could increase bioavailability of selenium
2 (see Chapter 3, *Conservation Strategy*, of the BDCP for details of restoration). Changes in selenium
3 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
4 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
5 increases in selenium concentrations in water in the Delta under any alternative. However, it is
6 difficult to determine whether the effects of potential increases in selenium bioavailability
7 associated with restoration-related conservation measures (CM4, CM5) would lead to adverse
8 effects on California least tern.

9 Because of the uncertainty that exists at this programmatic level of review, there could be a
10 substantial effect on California least tern from increases in selenium associated with restoration
11 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
12 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
13 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
14 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
15 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
16 separately for each restoration effort as part of design and implementation. This avoidance and
17 minimization measure would be implemented as part of the tidal habitat restoration design
18 schedule.

19 **NEPA Effects:** Noise and visual disturbances within 500 feet of construction-related activities from
20 the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation
21 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*
22 *Colonies Will Be Minimized*, would be available to address this potential adverse effect. AMM1–
23 AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would minimize
24 the likelihood of spills from occurring and ensure that measures were in place to prevent runoff
25 from the construction area and to avoid negative effects of dust on the species.

26 Tidal habitat restoration could result in increased exposure of California least tern to selenium. This
27 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
28 would provide specific tidal habitat restoration design elements to reduce the potential for
29 bioaccumulation of selenium and its bioavailability in tidal habitats.

30 Changes in water operations under CM1 would not be expected to result in increased mercury
31 bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased
32 exposure of California least tern to methylmercury. There is potential for increased exposure of the
33 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
34 mercury available in the soils and the biogeochemical conditions. However, it is unknown what
35 concentrations of methylmercury are harmful to the species, and the potential for increased
36 exposure varies substantially within the study area. Implementation of CM12 which contains
37 measures to assess the amount of mercury before project development, followed by appropriate
38 design and adaptation management, would minimize the potential for increased methylmercury
39 exposure, and would result in no adverse effect on the species.

40 **CEQA Conclusion:** Noise and visual disturbances within 500 feet of construction-related activities
41 from the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation
42 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*
43 *Colonies Will Be Minimized*, would avoid this potential adverse effect.

1 AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would
2 minimize the likelihood of spills from occurring and ensure that measures were in place to prevent
3 runoff from the construction area and to avoid negative effects of dust on the species.

4 Tidal habitat restoration could result in increased exposure of California least tern to selenium. This
5 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
6 would provide specific tidal habitat restoration design elements to reduce the potential for
7 bioaccumulation of selenium and its bioavailability in tidal habitats.

8 Changes in water operations under CM1 would not be expected to result in increased mercury
9 bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased
10 exposure of California least tern to methylmercury. There is potential for increased exposure of the
11 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
12 mercury available in the soils and the biogeochemical conditions. However, it is unknown what
13 concentrations of methylmercury are harmful to the species, and the potential for increased
14 exposure varies substantially within the study area. Implementation of CM12 which contains
15 measures to assess the amount of mercury before project development, followed by appropriate
16 design and adaptation management, would minimize the potential for increased methylmercury
17 exposure, and would result in no adverse effect on the species.

18 With AMM1-AMM7, AMM12, AMM27, and CM12 in place, in addition to the implementation of
19 Mitigation Measure BIO-66, the indirect effects of plan implementation would not result in a
20 substantial adverse effect on the species through habitat modification or potential mortality of a
21 special-status species. Therefore, the indirect effects of Alternative 4 implementation would have a
22 less-than-significant impact on California least tern.

23 **Mitigation Measure BIO-66, California Least Tern Nesting Colonies Shall Be Avoided and**
24 **Indirect Effects on Colonies Will Be Minimized**

25 See Mitigation Measure BIO-66 under Impact BIO-66.

26 **Impact BIO-68: Effects on California Least Tern Associated with Electrical Transmission**
27 **Facilities**

28 The risk of mortality of California least tern from the construction of new transmission lines is
29 considered to be minimal based on tern flight behaviors and its unlikely use of habitats near the
30 transmission line corridors. Terns exhibit low wing loading and high aspect-ratio wings and as a
31 result can maneuver relatively quickly around an obstacle such as a transmission line. Their wing
32 structure and design allows for rapid flight and quick, evasive actions (see BDCP Appendix 5.J,
33 *Attachment 5J.C, Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). Marking
34 transmission lines with flight diverters that make the lines more visible to birds has been shown to
35 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
36 marking devices in the Central Valley could reduce avian mortality by 60%. All new project
37 transmission lines would be fitted with flight diverters. Bird flight diverters would make
38 transmission lines highly visible to California least terns and would substantially reduce the
39 potential for powerline collisions.

40 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
41 adverse effect on California least tern as a result of direct mortality of a special-status species
42 because they are uncommon in the vicinity of proposed transmission lines and because the

1 probability of bird-powerline strikes is highly unlikely due to tern flight behaviors. All new
2 transmission lines constructed as a result of the project would be fitted with bird diverters, which
3 have been shown to reduce avian mortality by 60%. With the implementation of *AMM20 Greater*
4 *Sandhill Crane*, the construction and operation of transmission lines would not result in an adverse
5 effect on California least tern

6 **CEQA Conclusion:** The construction and presence of new transmission lines would represent a less-
7 than-significant impact on California least tern as a result of direct mortality of a special-status
8 species because they are uncommon in the vicinity of proposed transmission lines and because the
9 probability of bird-powerline strikes is highly unlikely due to tern flight behaviors. All new
10 transmission lines constructed as a result of the project would be fitted with bird diverters, which
11 have been shown to reduce avian mortality by 60%. With the implementation of *AMM20 Greater*
12 *Sandhill Crane*, the construction and operation of transmission lines would result in a less-than-
13 significant impact on California least tern.

14 **Greater Sandhill Crane**

15 This section describes the effects of Alternative 4, including water conveyance facilities construction
16 and implementation of other conservation components, on greater sandhill crane. Greater sandhill
17 cranes in the study area are almost entirely dependent on privately owned agricultural lands for
18 foraging. Long-term sustainability of the species is thus dependent on providing a matrix of
19 compatible crop types that afford suitable foraging habitat and maintaining compatible agricultural
20 practices, while sustaining and increasing the extent of other essential habitat elements such as
21 night roosting habitat. The habitat model for greater sandhill crane includes “roosting and foraging”
22 and “foraging” habitat. These habitat types include certain agricultural types, specific grassland
23 types, irrigated pastures and hay crops, managed seasonal wetland, and other natural seasonal
24 wetland. Roosting and foraging habitat includes known, traditional roost sites that also provide
25 foraging habitat (BDCP Appendix 2.A *Covered Species Accounts*). Both temporary and permanent
26 roost sites were identified for greater Sandhill crane. Permanent roosting and foraging sites are
27 those used regularly, year after year, while temporary roosting and foraging sites are those used in
28 some years. Factors included in assessing the loss of foraging habitat for the greater sandhill crane
29 includes the relative habitat value of specific crop or land cover types, and proximity to known roost
30 sites. Foraging habitat for greater sandhill crane included crop types and natural communities up to
31 4 miles from known roost sites, within the boundary of the winter crane use area (BDCP Appendix
32 2.A).

33 Construction and restoration associated with Alternative 4 conservation measures would result in
34 both temporary and permanent losses of foraging and roosting habitat for greater sandhill crane as
35 indicated in Table 12-4-28. Full implementation of Alternative 4 would also include the following
36 conservation actions over the term of the BDCP to benefit the greater sandhill crane (BDCP Chapter
37 3, Section 3.3, *Biological Goals and Objectives*).

- 38 • Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at
39 least 80% maintained in very high-value types in any given year. This protected habitat will be
40 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
41 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
42 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective
43 GSHC1.1, associated with CM3).

- 1 • To create additional high-value greater sandhill crane winter foraging habitat, 10% of the
2 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or
3 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be
4 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
5 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
6 habitat loss (Objective GSHC1.2, associated with CM3).
- 7 • Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the
8 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise
9 and local seasonal flood events. The wetlands will be located within 2 miles of existing
10 permanent roost sites and protected in association with other protected natural community
11 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide
12 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 13 • Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge
14 project boundary. The complexes will be no more than 2 miles apart and will help provide
15 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each
16 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane
17 roosting habitat, and will be protected in association with other protected natural community
18 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,
19 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be
20 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
21 support roosting cranes and provide highest-value foraging habitat, provided such substitution
22 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for
23 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
- 24 • Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost
25 sites. The habitat will consist of active cornfields that are flooded following harvest to support
26 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least
27 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will
28 be sited with consideration of the location of roosting habitat loss and will be in place prior to
29 roosting habitat loss (Objective GSHC1.5, associated with CM3).
- 30 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
31 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 32 • Target cultivated land conservation to provide connectivity between other conservation lands
33 (Objective CLNC1.2, associated with CM3).
- 34 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
35 lands that occur in cultivated lands within the reserve system, including, water conveyance
36 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

37 As explained below, with the restoration and protection of these amounts of habitat, in addition to
38 natural community enhancement and management commitments (including *CM12 Methylmercury*
39 *Management* as revised in Appendix 11F, *Substantive BDCP Revisions*) and implementation of
40 *AMM1–AMM6*, *AMM20 Greater Sandhill Crane*, *AMM27 Selenium Management*, and *AMM30*
41 *Transmission Line Design and Alignment Guidelines* (as described in Appendix 3B, *Environmental*
42 *Commitments, AMMs, and CMs*), impacts on the greater sandhill crane would not be adverse for
43 NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-4-28. Changes in Greater Sandhill Crane Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	4	4	NA	NA
	Roosting and Foraging - Temporary	16	16	71	71	NA	NA
	Foraging	1,695	1,695	772	772	NA	NA
Total Impacts CM1		1,711	1,711	847	847	NA	NA
CM2–CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	2,776	4,367	0	0	0	0
Total Impacts CM2–CM18		2,776	4,408	0	0	0	0
Total Roosting/Foraging - Permanent		0	0	4	4	0	0
Total Roosting/Foraging - Temporary		16	57	71	71	0	0
Total Foraging		4,471	6,062	772	772	0	0
TOTAL IMPACTS		4,487	6,119	847	847	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-69: Loss or Conversion of Habitat for and Direct Mortality of Greater Sandhill**
5 **Crane**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up to 128 acres of modeled roosting and foraging habitat (57 acres of permanent loss, 71 acres of
8 temporary loss) and 6,834 acres of foraging habitat for greater sandhill crane (6,062 of permanent
9 loss, 772 acres of temporary loss; see Table 12-4-28). Conservation measures that would result in
10 these losses are conveyance facilities and transmission line construction, and establishment and use
11 of reusable tunnel material areas (CM1), Tidal Natural Communities Restoration (CM4), Grassland
12 Natural Community Restoration (CM8), Nontidal Marsh Natural Community Restoration (CM10),
13 and Natural Communities Enhancement and Management (CM11). The majority of habitat loss
14 would result from water conveyance facility construction and conversion of habitat to tidal natural

1 communities through CM4. Habitat enhancement and management activities through CM11, which
2 include ground disturbance or removal of nonnative vegetation, could also result in local adverse
3 habitat effects. In addition, maintenance activities associated with the long-term operation of the
4 water conveyance facilities and other BDCP physical facilities could degrade or eliminate greater
5 sandhill crane modeled habitat. Each of these individual activities is described below. A summary
6 statement of the combined impacts, NEPA effects and a CEQA conclusion follow the individual
7 conservation measure discussions.

- 8 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities as they
9 are currently designed would result in the combined permanent loss of up to 1,711 acres of
10 modeled greater sandhill crane habitat. This would consist of the permanent removal of 16
11 acres of temporary roosting and foraging habitat, and 1,695 acres of foraging habitat. Foraging
12 habitat that would be permanently impacted by CM1 would consist of 1,050 acres of very high-
13 value, 180 acres of medium-value, and 465 acres of low-value foraging habitat (Table 12-4-29).
14 In addition, 4 acres of permanent roosting and foraging habitat, 71 acres of temporary roosting
15 and foraging habitat, and 772 acres of foraging habitat would be temporarily removed (Table
16 12-4-29). The temporarily removed habitat would consist primarily of cultivated lands and it
17 would be restored within one year following construction; however, it would not necessarily be
18 restored to its original topography and it could be restored as grasslands in the place of
19 cultivated lands. CM1 activities that would result in temporary impacts would include
20 temporary access roads, reusable tunnel material sites, and work areas for construction.

21 The acres of roosting and foraging habitat that would be removed would occur from the
22 construction of a temporary transmission line on Zacharias Island, Bouldin Island, and Venice
23 Island and from the construction of a temporary concrete batch plant and a permanent access
24 road on Bouldin Island; however, the implementation of *AMM20 Greater Sandhill Crane* would
25 require that CM1 activities be designed to avoid direct loss of crane roost sites. This includes a
26 provision that the final transmission line alignment would be designed to avoid crane roost
27 sites. Avoidance of crane roost sites would be accomplished either by siting activities outside of
28 identified roost sites or by relocating the roost site if it consisted of cultivated lands (roost sites
29 consisting of wetlands would not be subject to re-location). Relocated roost sites would be
30 established prior to construction activities affecting the original roost site (as described in
31 *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental Commitments, AMMs, and CMs*).
32 Therefore, there would be no loss of crane roosting and foraging habitat as a result of water
33 conveyance facility construction once the facilities were fully designed. The potential for greater
34 sandhill crane bird strike on electrical transmission facilities is addressed below under Impact
35 BIO-70.

36 Approximately 1,502 acres of the permanent loss of foraging habitat would be from the storage
37 of reusable tunnel material. This material would likely be moved to other sites for use in levee
38 build-up and restoration, and the affected area would likely eventually be restored. This effect is
39 categorized as permanent because there is no assurance that the material would eventually be
40 moved. The implementation of *AMM6 Disposal and Reuse of Spoils* would require that the areas
41 used for reusable tunnel material storage be minimized in crane foraging habitat and completely
42 avoid crane roost sites (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*).

43 Construction-related activities would not be expected to result in direct mortality of greater
44 sandhill crane if they were present in the study area, because cranes would be expected to avoid
45 contact with construction and other equipment. The potential for greater sandhill crane bird
46 strike on electrical transmission lines is discussed below under Impact BIO-70.

1 The effects of noise and visual disturbance from CM1 construction activities are discussed under
 2 Impact BIO-71. Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4
 3 construction locations. Impacts from CM1 would occur within the first 10-14 years of
 4 Alternative 4 implementation.

5 **Table 12-4-29. Value of Greater Sandhill Crane Foraging Habitat affected by Alternative 4**

Foraging Habitat Value Class	Land Cover Type	Acres Affected by CM1 permanent [temporary] (acres)	Acres Affected by CM2-CM18 [permanent] (acres)
Very high	Corn, rice	1,050 [216]	1,155 (0)
High	Wheat, managed wetlands, Alfalfa and alfalfa mixtures, irrigated mixed pasture, irrigated native pasture, irrigated pasture, irrigated other pasture, grain and hay crops, miscellaneous grain and hay, mixed grain and hay, nonirrigated mixed grain and hay, other grain crops, sudan, miscellaneous grasses, grassland, alkali seasonal wetlands, vernal pool complex	0 [21]	489 (0)
Medium	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry), native vegetation	180 [307]	1,403 (0)
Low		465 [229]	1,320 (0)
Total		1,695 [772]	4,367

- 6
- 7 • *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration
 8 footprint, this activity would result in the permanent loss or conversion of approximately 2,754
 9 acres of greater sandhill crane habitat, consisting of 41 acres of temporary roosting and foraging
 10 habitat and 2,713 acres of foraging habitat. Loss of foraging habitat from CM4 would consist of
 11 716 acres of very high-value, 304 acres of high value, 873 acres of medium-value, and 821 acres
 12 of low-value foraging habitat This loss would occur in the Cosumnes-Mokelumne River and West
 13 Delta ROAs. Tidal wetland restoration in CZ 4 could occur between the high crane use areas of
 14 the central Delta and the Cosumnes River Preserve. However, the conversion of grasslands and
 15 cultivated lands to tidal wetlands would not prohibit crane movement or reduce use of these
 16 areas. In CZ 5, loss of modeled habitat would occur along the western edge of the greater
 17 sandhill crane winter use area and therefore would not result in fragmentation of traditional
 18 crane habitats. Therefore fragmentation of habitat from tidal restoration activities would be
 19 expected to be minimal. Approximately 1,951 acres of foraging habitat would be impacted
 20 within the first 10 years of Alternative 4 implementation.
 - 21 • *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands that
 22 provide foraging habitat for greater sandhill crane would be converted to grassland by the late
 23 long-term timeframe. No roosting/foraging habitat would be impacted by grassland restoration
 24 activities. The restored grasslands would continue to provide foraging habitat value for the
 25 greater sandhill crane. Approximately 257 acres would be impacted within the first 10 years of
 26 Alternative 4 implementation.

- 1 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent
2 conversion of approximately 1,350 acres of modeled foraging habitat for the greater sandhill
3 crane. A portion of the restored nontidal marsh would be expected to continue to provide
4 roosting and foraging habitat value for the greater sandhill crane. However, some of this
5 restored marsh would be unsuitable as it would lack emergent vegetation and consist of open
6 water that would be too deep to provide suitable roosting or foraging habitat. Approximately
7 567 acres of habitat would be converted to nontidal marsh within the first 10 years of
8 Alternative 4 implementation.

- 9 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
10 actions included in CM11 that are designed to enhance wildlife values in restored or protected
11 habitats could result in localized ground disturbances that could temporarily remove small
12 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
13 vegetation and road and other infrastructure maintenance activities, would be expected to have
14 minor adverse effects on available habitat and would be expected to result in overall
15 improvements to and maintenance of habitat values over the term of the BDCP. The potential for
16 these activities to result in direct mortality of greater sandhill crane would be minimized with
17 the implementation of *AMM20 Greater Sandhill Crane*. CM11 would also include the construction
18 of recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP
19 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead
20 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
21 disturbed areas when and where possible. If new ground disturbance was necessary, greater
22 sandhill crane habitat would be avoided, with the exception of a permanent loss of 4 acres of
23 grassland foraging habitat (1 acre of which would be impacted within the first 10 years of
24 Alternative 4 implementation).

- 25 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
26 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
27 disturbances that could affect greater sandhill crane use of the surrounding habitat.
28 Maintenance activities would include vegetation management, levee and structure repair, and
29 re-grading of roads and permanent work areas. These effects, could be adverse as sandhill
30 cranes are sensitive to disturbance. However, potential impacts would be reduced by AMMs and
31 conservation actions as described below.

- 32 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
33 direct mortality of greater sandhill crane if they were present in the study area, because they
34 would be expected to avoid contact with construction and other equipment. Potential effects
35 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.
36 The potential for injury and direct mortality from electrical transmission facilities is discussed
37 below under Impact BIO-70.

38 The following paragraphs summarize the combined effects discussed above and describe other
39 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
40 included.

41 ***Near-Term Timeframe***

42 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
43 the near-term BDCP conservation strategy has been evaluated to determine whether it would
44 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the

1 effects of construction would not be adverse under NEPA. Based on current design footprints,
2 Alternative 4 would remove 91 acres roosting and foraging habitat (16 acres of permanent loss, 75
3 acres of temporary loss) in the study area in the near-term. These effects would result from the
4 construction of the water conveyance facilities (CM1). In addition, 5,243 acres of foraging habitat
5 would be removed or converted in the near-term (CM1, 2,467 acres; *CM4 Tidal Natural Communities*
6 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural Communities*
7 *Enhancement and Management*—2,776 acres). Of these near-term acres of foraging habitat impact,
8 3,708 acres would be medium- to very high-value habitat (CM1,1,773 acres, CM4-11, 1,935 acres).

9 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
10 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in
11 Chapter 3, *Conservation Strategy*, of the BDCP would be 1:1 protection and 1:1 restoration for loss of
12 roost sites and 1:1 protection of high- to very high-value foraging habitat for loss of medium- to very
13 high-value foraging habitat. Using these ratios would indicate that 91 acres of greater sandhill crane
14 roosting habitat should be restored/created and 91 acres should be protected to compensate for the
15 CM1 losses of greater sandhill crane roosting and foraging habitat. In addition, 1,773 acres of high-
16 to very high-value foraging habitat should be protected to mitigate the CM1 losses of greater
17 sandhill crane medium- to very high-value foraging habitat. The near-term effects of other
18 conservation actions would remove 1,935 acres of moderate- to very high-value foraging habitat,
19 and therefore require 1,935 acres of protection of high- to very high-value foraging habitat using the
20 same typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and
21 foraging habitat; 1:1 protection for the loss of foraging habitat).

22 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane
23 roost sites were directly impacted by CM1 covered activities (including transmission lines and their
24 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
25 result of water conveyance facility construction once the facilities were fully designed, which would
26 avoid the CM1 impact on 91 acres of roosting and foraging habitat once the project design is final.
27 Indirect effects of construction-related noise and visual disturbance are discussed below under
28 Impact BIO-71.

29 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
30 protecting 15,600 acres of cultivated lands in the Plan Area (see Table 3-4 in Chapter 3, *Description*
31 *of Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in
32 the same timeframe as the construction and early restoration losses.

33 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
34 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
35 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
36 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
37 Sandhill Crane Winter Use Area, and would be in place prior to roosting habitat loss. Of the 500
38 acres of managed wetlands to be created for roosting habitat, 320 acres would be created in
39 minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or
40 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise and
41 local seasonal flood events. These wetlands would be created within 2 miles of existing permanent
42 roost sites and protected in association with other protected natural community types at a ratio of
43 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
44 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
45 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be

1 constructed within the Stone Lakes NWR project boundary (see BDCP Chapter 3, Figure 3.3-6) and
2 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
3 crane populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would
4 provide additional conservation to address the threats of vineyard conversion, urbanization to the
5 east, and sea level rise to the west of greater sandhill crane wintering habitat.

6 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
7 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
8 BIO-69a would be available to guide the near-term protection of cultivated lands to ensure that the
9 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were
10 compensated for with appropriate crop types and natural communities.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
15 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
16 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
17 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
18 of the Final EIR/EIS.

19 ***Late Long-Term Timeframe***

20 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676
21 acres of foraging habitat for greater sandhill crane. Alternative 4 as a whole would result in the
22 permanent loss of and temporary effects on 132 acres of roosting and foraging habitat (less than 1%
23 of the total habitat in the study area) and 6,834 acres of foraging habitat (4% of the total habitat in
24 the study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost
25 by the late long-term timeframe would consist of 4,820 acres of medium- to very high-value foraging
26 habitat. The locations of these losses are described above in the analyses of individual conservation
27 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites
28 were directly affected by water conveyance facilities including transmission lines and associated
29 footprints. In addition, temporarily removed habitat would be restored within 1 year following
30 construction. However, it would not necessarily be restored to its original topography and it could
31 result in the conversion of cultivated lands to grasslands.

32 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
33 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
34 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
35 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
36 GSHC1.1).

37 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
38 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
39 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
40 and local seasonal flood events. These wetlands would be created within 2 miles of existing
41 permanent roost sites and protected in association with other protected natural community types at
42 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
43 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
44 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be

1 constructed within the Stone Lakes NWR project boundary (see BDCP Chapter 3, Figure 3.3-6) and
2 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
3 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
4 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The
5 large patch sizes of these wetland complexes would provide additional conservation to address the
6 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
7 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
8 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
9 active cornfields that are flooded following harvest to support roosting cranes and also provide the
10 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
11 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with
12 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat
13 loss.

14 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
15 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
16 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
17 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
18 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
19 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives
20 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
21 economically driven agricultural practices, protecting crane habitat would provide enhanced
22 stability to agricultural habitat value within the crane use area that does not currently exist.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
26 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
27 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
28 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
29 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
30 of the Final EIR/EIS.

31 Considering habitat protection, restoration, management, and enhancement would be guided by
32 performance standards, and the aforementioned AMMs, which would be in place throughout the
33 period of construction, greater sandhill crane habitat losses and conversions under Alternative 4
34 would not be an adverse effect under NEPA.

35 ***CEQA Conclusion:***

36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would
39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
40 effects of construction would not be adverse under NEPA. Based on current design footprints,
41 Alternative 4 would remove 91 acres roosting and foraging habitat (16 acres of permanent loss, 75
42 acres of temporary loss) in the study area in the near-term. These effects would result from the
43 construction of the water conveyance facilities (CM1). In addition, 5,243 acres of foraging habitat
44 would be removed or converted in the near-term (CM1, 2,567 acres; *CM4 Tidal Natural Communities*

1 *Restoration, CM8 Grassland Natural Community Restoration, and CM11 Natural Communities*
2 *Enhancement and Management—2,776 acres). Of these near-term acres of foraging habitat impact,*
3 *3,708 acres would be medium- to very high-value habitat (CM1, 1,773 acres, CM4-11, 1,935 acres).*

4 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
5 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in
6 Chapter 3, *Conservation Strategy*, of the BDCP would be 1:1 protection and 1:1 restoration for loss of
7 roost sites and 1:1 protection of high- to very high-value foraging habitat for loss of medium- to very
8 high-value foraging habitat. Using these ratios would indicate that 91 acres of greater roosting
9 habitat should be restored/created and 91 acres should be protected to compensate for the CM1
10 losses of greater sandhill crane roosting and foraging habitat. In addition, 1,773 acres of high- to
11 very high-value foraging habitat should be protected to mitigate the CM1 losses of greater sandhill
12 crane medium- to very high-value foraging habitat. The near-term effects of other conservation
13 actions would remove 1,935 acres of medium- to very high-value foraging habitat, and therefore
14 require 1,935 acres of protection of high- to very high-value foraging habitat using the same typical
15 NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging
16 habitat; 1:1 protection for the loss of foraging habitat).

17 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane
18 roost sites were directly impacted by CM1 covered activities (including transmission lines and their
19 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
20 result of water conveyance facility construction once the facilities were fully designed, which would
21 avoid the CM1 impact on 91 acres of roosting and foraging habitat once the project design is final.
22 Indirect effects of construction-related noise and visual disturbance are discussed below under
23 Impact BIO-71.

24 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
25 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3, *Description of*
26 *Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in the
27 same timeframe as the construction and early restoration losses.

28 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
29 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
30 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
31 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
32 Sandhill Crane Winter Use Area, and would be in place prior to roosting habitat loss. Of the 500
33 acres of managed wetlands to be created for roosting habitat, 320 acres would be created in
34 minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or
35 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise and
36 local seasonal flood events. These wetlands would be created within 2 miles of existing permanent
37 roost sites and protected in association with other protected natural community types at a ratio of
38 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
39 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
40 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
41 constructed within the Stone Lakes NWR project boundary (see BDCP Chapter 3, Figure 3.3-6) and
42 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
43 crane populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would
44 provide additional conservation to address the threats of vineyard conversion, urbanization to the
45 east, and sea level rise to the west of greater sandhill crane wintering habitat.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
8 of the Final EIR/EIS.

9 In the absence of other conservation actions, the effects on greater sandhill crane habitat from
10 Alternative 4 would represent an adverse effect as a result of habitat modification of a special-status
11 species and potential for direct mortality. At least 15,600 acres of cultivated lands that provide
12 habitat for covered and other native wildlife species would be protected in the near-term time
13 period (Objective CLNC1.1). Mitigation Measure BIO-69a would be available to guide the near-term
14 protection of cultivated lands to ensure that the near-term impacts of moderate- to very high-value
15 habitat for greater sandhill crane were compensated for with appropriate crop types and natural
16 communities. Considering the conservation actions described above, and AMM1–AMM7 and
17 AMM20, Alternative 4 over the term of the BDCP would not result in a substantial adverse effect
18 through habitat modifications and would not substantially reduce the number or restrict the range
19 of greater sandhill cranes. Therefore, Alternative 4 would have a less-than-significant impact on
20 greater sandhill cranes. No mitigation would be required.

21 **Late Long-Term Timeframe**

22 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676
23 acres of foraging habitat for greater sandhill crane. Alternative 4 as a whole would result in the
24 permanent loss of and temporary effects on 132 acres of roosting and foraging habitat (less than 1%
25 of the total habitat in the study area) and 6,834 acres of foraging habitat (4% of the total habitat in
26 the study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost
27 by the late long-term timeframe would consist of 4,820 acres of medium- to very high-value foraging
28 habitat. The locations of these losses are described above in the analyses of individual conservation
29 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites
30 were directly affected by water conveyance facilities including transmission lines and associated
31 footprints. In addition, temporarily removed habitat would be restored within 1 year following
32 construction. However, it would not necessarily be restored to its original topography and it could
33 result in the conversion of cultivated lands to grasslands.

34 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
35 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
36 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
37 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
38 GSHC1.1).

39 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
40 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
41 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
42 and local seasonal flood events. These wetlands would be created within 2 miles of existing
43 permanent roost sites and protected in association with other protected natural community types at
44 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of

1 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
2 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
3 constructed within the Stone Lakes NWR project boundary (see BDCP Chapter 3, Figure 3.3-6) and
4 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
5 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
6 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. The
7 large patch sizes of these wetland complexes would provide additional conservation to address the
8 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
9 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
10 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
11 active cornfields that are flooded following harvest to support roosting cranes and also provide the
12 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
13 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with
14 consideration of the location of roosting habitat loss and would be in place prior to roosting habitat
15 loss.

16 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
17 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
18 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
19 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
20 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
21 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives
22 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
23 economically driven agricultural practices, protecting crane habitat would provide enhanced
24 stability to agricultural habitat value within the crane use area that does not currently exist.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
26 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
27 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
28 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
29 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
30 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
31 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
32 of the Final EIR/EIS.

33 In the absence of other conservation actions, the effects on greater sandhill crane habitat from
34 Alternative 4 would represent an adverse effect as a result of habitat modification of a special-status
35 species and potential for direct mortality. Considering Alternative 4's protection and restoration
36 provisions, in addition to Mitigation Measure BIO-69a, which would compensate for the loss of
37 medium- to very high-value foraging habitat at a ratio of 1:1 prior to or concurrent with impacts,
38 loss of habitat and direct mortality through implementation of Alternative 4 would not result in a
39 substantial adverse effect through habitat modifications and would not substantially reduce the
40 number or restrict the range of the species. Therefore, Alternative 4 would have a less-than-
41 significant impact on greater sandhill crane.

1 **Mitigation Measure BIO-69a: Compensate for the Loss of Medium- to Very High-Value**
2 **Greater Sandhill Crane Foraging Habitat**

3 DWR must compensate for loss of greater sandhill crane medium to very high-value foraging
4 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan
5 Area. Compensation must occur prior to or concurrent with the impacts, to minimize the effects
6 of habitat loss. The crop types and natural communities that are included in foraging habitat
7 value categories are listed in Table 12-4-29. Foraging habitat conservation must occur within
8 the greater sandhill crane winter use area and the location of protected habitat or conservation
9 easements must be preapproved by the USFWS and CDFW.

10 **Impact BIO-70: Effects on Greater Sandhill Crane Associated with Electrical Transmission**
11 **Facilities**

12 Greater sandhill cranes are susceptible to collision with power lines and other structures during
13 periods of inclement weather and low visibility (Avian Power Line Interaction Committee 1994,
14 Brown and Drewien 1995, Manville 2005). There are extensive existing transmission and
15 distribution lines in the sandhill crane winter use area. These include a network of distribution lines
16 that are between 11- and 22-kV. In addition, there are two 115-kV lines that cross the study area,
17 one that overlaps with the greater sandhill crane winter use area between Antioch and I-5 east of
18 Hood, and one that crosses the northern tip of the crane winter use area north of Clarksburg. There
19 are 69-kV lines within the study area that parallel Twin Cities Road, Herzog Road, Lambert Road,
20 and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes National Wildlife Refuge. At the
21 south end of the winter use area, there are three 230-kV transmission lines that follow I-5, and then
22 cut southwest through Holt, and two 500-kV lines cross the southwestern corner of the winter use
23 area. This existing network of power lines in the study currently poses a collision and electrocution
24 risk for sandhill cranes, because they cross over or surround sandhill crane roost sites in the study
25 area.

26 Both permanent and temporary electrical transmission lines would be constructed to supply
27 construction and operational power to Alternative 4 facilities, as described below. The potential for
28 birdstrikes could also be exacerbated by construction-related effects, especially in low-visibility
29 conditions. The potential mortality of greater sandhill crane in the area of the proposed
30 transmission lines was estimated for the BDCP using collision mortality rates developed by Brown
31 and Drewien (1995) and an estimate of potential crossings along the proposed lines (see BDCP
32 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*).
33 This analysis concluded that mortality risk could be substantially reduced by marking new
34 transmission lines to increase their visibility to sandhill cranes.

35 Alternative 4 substantially reduced the length of permanent and temporary transmission lines as
36 compared to the BDCP, substantially reducing the likelihood of crane collisions. Under Alternative 4,
37 no permanent transmission lines would be constructed within the greater sandhill crane winter use
38 area. In addition, no new transmission lines (permanent or temporary) would be constructed in the
39 vicinity of Staten Island which is one of the most important wintering sites for greater sandhill
40 cranes in the Delta. The Alternative 4 transmission line alignment within the greater sandhill crane
41 winter use area would be limited to three segments of temporary transmission lines: a temporary
42 11-mile segment extending north and south between Intake 2 and the intermediate forebay, a
43 temporary 9-mile segment extending east and west between the intermediate forebay and the
44 SMUD/WAPA substation, and an 11-mile segment extending north and south between Bouldin

1 Island and Victoria Island. These three temporary lines would be removed after construction of the
2 water conveyance facilities, after 10–14 years. Limiting the proposed transmission line footprint to
3 temporary lines and siting these lines away from the highest use areas by greater sandhill cranes,
4 substantially reduces the potential for sandhill crane bird strike in Alternative 4 as compared to the
5 BDCP.

6 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
7 transmission line alignment, such as co-locating transmission lines when it would minimize effects
8 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. In
9 addition, after the Draft EIR/EIS was issued in December 2013, additional avoidance features were
10 added to *AMM20 Greater Sandhill Crane*. *AMM20 Greater Sandhill Crane* requires that Alternative 4
11 meet the performance standard of no mortality of greater sandhill crane associated with the new
12 facilities. This would be achieved by implementing one or any combination of the following: 1) siting
13 new transmission lines in lower bird strike risk zones; 2) removing, relocating or undergrounding
14 existing lines where feasible; 3) using natural gas generators in lieu of installing transmission lines
15 in high-risk zones of the greater sandhill crane winter use area; 4) undergrounding new lines in
16 high-risk zones of the greater sandhill crane winter use area; 5) permanently installing flight
17 diverters on existing lines over lengths equal to or greater than the length of the new temporary
18 transmission lines in the crane winter use area; 6) for areas outside of the Stone Lakes NWR project
19 boundary, shifting locations of flooded areas that provide crane roosts to lower risk areas. These
20 measures are described in detail in *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental*
21 *Commitments, AMMs, and CMs*.

22 The implementation of the measures described above under *AMM20 Greater Sandhill Crane*, in
23 addition to the project design changes to avoid high crane use areas, would substantially reduce the
24 potential for crane collisions with transmission lines. Potential measures that would eliminate this
25 risk include using natural gas generators in lieu of transmission lines or undergrounding new lines
26 in high-risk zones in the greater sandhill crane winter use area. Marking transmission lines with
27 flight diverters that make the lines more visible to birds has been shown to reduce the incidence of
28 bird mortality, including for sandhill cranes (Brown and Drewien 1995). Yee (2008) estimated that
29 marking devices in the Central Valley could reduce avian mortality by 60%. All new temporary
30 transmission lines would be fitted with flight diverters. The installation of flight diverters on existing
31 permanent lines would be prioritized in the highest risk zones for greater sandhill crane (as
32 described in BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*
33 *BDCP Powerlines*) and diverters would be installed in a configuration that research indicates would
34 reduce bird strike risk by at least 60%. The length of existing line to be fitted with bird strike
35 diverters will be equal to the length of new transmission lines constructed as a result of the project,
36 in an area with the same or higher greater sandhill crane strike risk to provide a net benefit to the
37 species. For optimum results, the recommended spacing distance for bird flight diverters is 15 to
38 16.5 feet (4.5 to 5 meters) (Avian Power Line Interaction Committee 1994). Placing diverters on
39 existing lines would be expected to reduce existing mortality in the Plan Area and therefore result in
40 a net benefit to the greater sandhill crane population because these flight diverters would be
41 maintained in perpetuity.

42 **NEPA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
43 existing network of power lines in the study area currently poses a risk for sandhill cranes. Under
44 Alternative 4, proposed transmission lines have been designed to substantially reduce the likelihood
45 of a crane collision with transmission lines. New transmission lines constructed as part of the
46 project would be limited to temporary lines which would be removed within the first 10–14 years of

1 Alternative 4 implementation. In addition, no new transmission lines would be sited in the vicinity
 2 of Staten Island, which has the highest crane-use in the greater sandhill crane winter use area.
 3 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
 4 transmission line alignment, such as co-locating transmission lines when it would minimize effects
 5 on sandhill cranes to avoid impacts on sensitive habitats to the maximum extent feasible. All new
 6 transmission lines constructed for the project would be fitted with bird diverters, which have been
 7 shown to reduce avian mortality by 60%. With implementation of *AMM30 Transmission Line Design*
 8 *and Alignment Guidelines* and one or a combination of the measures to greatly reduce the risk of bird
 9 strike described in *AMM20 Greater Sandhill Crane*, the construction and operation of transmission
 10 lines under Alternative 4 would not result in an adverse effect on greater sandhill crane.

11 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
 12 existing network of power lines in the study area currently poses a risk for sandhill cranes. Under
 13 Alternative 4, proposed transmission lines have been designed to substantially reduce the likelihood
 14 of a crane collision with transmission lines. New transmission lines constructed as part of the
 15 project would be limited to temporary lines which would be removed within the first 10–14 years of
 16 Alternative 4 implementation. In addition, no new transmission lines would be sited in the vicinity
 17 of Staten Island, which has the highest crane-use in the greater sandhill crane winter use area.
 18 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
 19 transmission line alignment, such as co-locating transmission lines when it would minimize effects
 20 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. All new
 21 transmission lines constructed as a result of the project would be fitted with bird diverters, which
 22 have been shown to reduce avian mortality by 60%. With incorporation of *AMM30 Transmission Line*
 23 *Design and Alignment Guidelines* and one or a combination of the measures to greatly reduce the risk
 24 of bird strike described in *AMM20 Greater Sandhill Crane*, and the construction and operation of
 25 transmission lines under Alternative 4 would have a less-than-significant impact on greater sandhill
 26 crane.

27 **Impact BIO-71: Indirect Effects of Plan Implementation on Greater Sandhill Crane**

28 **Indirect Construction- and Operation-Related Effects:** Sandhill cranes are sensitive to
 29 disturbance. Noise and visual disturbances from the construction of water conveyance facilities and
 30 other conservation measures could reduce greater sandhill crane use of modeled habitat adjacent to
 31 work areas. Indirect effects associated with construction include noise, dust, and visual disturbance
 32 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
 33 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the
 34 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise
 35 and visual disturbances that could affect greater sandhill crane use of surrounding habitat. These
 36 effects could result from periodic vehicle use along the conveyance corridor, inspection and
 37 maintenance of aboveground facilities, and similar activities. These potential effects would be
 38 minimized with implementation of *AMM20 Greater Sandhill Crane*, which is described in Appendix
 39 3B, *Environmental Commitments, AMMs, and CMs*.

40 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would
 41 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill
 42 crane (Appendix 11F, *Substantive BDCP Revisions*). The analysis addressed the potential noise effects
 43 on cranes, and concluded that as much as 20,243 acres of crane habitat could potentially be affected
 44 by general construction noise (including pile driving) above baseline level (50–60 dBA; Table 12-4-
 45 30). This would include 1,008 acres of permanent crane roosting habitat, 1,909 acres of temporary

1 crane roosting habitat, and 17,327 acres of crane foraging habitat. The analysis was conducted
 2 based on the assumption that there would be direct line-of-sight from sandhill crane habitat areas to
 3 the construction site, and, therefore, provides a worst-case estimate of effects. In many areas the
 4 existing levees would partially or completely block the line-of-sight and would function as effective
 5 noise barriers, substantially reducing noise transmission. However, there is insufficient data to
 6 assess the effects that increased noise levels would have on sandhill crane behavior.

7 **Table 12-4-30. Greater Sandhill Crane Habitat Affected by General Construction and Pile Driving**
 8 **Noise Under Alternative 4 (acres)**

Habitat Type	General Construction	
	Above 60 dBA	Above 50 dBA
Permanent Roosting	196	1,008
Temporary Roosting	810	1,909
Foraging	7,676	17,327
Total Habitat	8,681	20,243

9
 10 Evening and nighttime construction activities would require the use of extremely bright lights.
 11 Nighttime construction could also result in headlights flashing into roost sites when construction
 12 vehicles are turning onto or off of construction access routes. Proposed surge towers would require
 13 the use of safety lights that would alert low-flying aircraft to the presence of these structures
 14 because of their height. Little data is available on the effects of impact of artificial lighting on
 15 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes
 16 to flush and it is thought that they may avoid roosting in areas where lighting is bright (see Chapter
 17 5, *Effects Analysis*, of the BDCP). If the birds were to roost in a brightly lit site, they may be
 18 vulnerable to sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts
 19 from lighting include a reduction in the cranes' quality of nocturnal rest, and effects on their sense of
 20 photo-period which might cause them to shift their physiology towards earlier migration and
 21 breeding (see BDCP Chapter 5, *Effects Analysis*, of the BDCP). Effects such as these could prove
 22 detrimental to the cranes' overall fitness and reproductive success (which could in turn have
 23 population-level impacts). A change in photo-period interpretation could also cause cranes to fly out
 24 earlier from roost sites to forage and might increase their risk of power line collisions if they were to
 25 leave roosts before dawn (see BDCP Chapter 5, *Effects Analysis*, of the BDCP).

26 The effects of noise and visual disturbance on greater sandhill crane would be minimized through
 27 the implementation of *AMM20 Greater Sandhill Crane* (Appendix 3B, *Environmental Commitments*,
 28 *AMMs*, and *CMs*). Activities within 0.75 mile of crane roosting habitat would reduce construction
 29 noise during night time hours (from one hour before sunset to one hour after sunrise) such that
 30 construction noise levels do not exceed 50 dBA L_{eq} (1 hour) at the nearest temporary or permanent
 31 roosts during periods when the roost sites are available (flooded). In addition, the area of crane
 32 foraging habitat that would be affected during the day (from one hour after sunrise to one hour
 33 before sunset) by construction noise exceeding 50 dBA L_{eq} (1 hour) would also be minimized.
 34 Unavoidable noise related effects would be compensated for by the enhancement of 0.1 acre of
 35 foraging habitat for every acre indirectly affected within the 50 dBA L_{eq} (1 hour) construction noise
 36 contour. With these measures in place, indirect effects of noise and visual disturbance from
 37 construction activities are not expected to reduce the greater sandhill crane population in the study
 38 area.

1 The use of mechanical equipment during water conveyance facilities construction could cause the
2 accidental release of petroleum or other contaminants that could affect greater sandhill crane in the
3 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to greater
4 sandhill crane habitat could also affect the species. AMM1–AMM7, including *AMM2 Construction Best
5 Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that
6 measures were in place to prevent runoff from the construction area and negative effects of dust on
7 foraging habitat.

8 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
9 mercury in covered species, including greater sandhill crane. Largemouth bass was used as a
10 surrogate species for analysis (Appendix 11F, *Substantive BDCP Revisions*). Results of the
11 quantitative modeling of mercury effects on largemouth bass as a surrogate species would
12 overestimate the effects on greater sandhill crane. Organisms feeding within pelagic-based (algal)
13 foodwebs have been found to have higher concentrations of methylmercury than those in benthic or
14 epibenthic foodwebs; this has been attributed to food chain length and dietary segregation
15 (Grimaldo et al. 2009). Therefore, potential indirect effects of increased mercury exposure is likely
16 low for greater sandhill crane because they primarily forage on cultivated crops. Modeled effects of
17 mercury concentrations from changes in water operations under CM1 on largemouth bass did not
18 differ substantially from existing conditions; therefore, results also indicate that greater sandhill
19 crane tissue concentrations would not measurably increase as a result of CM1 implementation.

20 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
21 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
22 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
23 mercury. Increased methylmercury associated with natural community and floodplain restoration
24 may indirectly affect greater sandhill crane via uptake in lower trophic levels (BDCP Appendix 5.D,
25 *Contaminants*). Mercury is generally elevated throughout the Delta, and restoration of the lower
26 potential areas in total may result in generalized, very low level increases of mercury. Given that
27 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in
28 some level of effects.

29 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
30 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
31 each restoration project. If a project is identified where there is a high potential for methylmercury
32 production that could not be fully addressed through restoration design and adaptive management,
33 alternate restoration areas would be considered. CM12 would be implemented in coordination with
34 other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury
35 Monitoring and Analysis Section. This conservation measure would include the following actions.

- 36 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
37 mercury methylation and bioavailability.
- 38 ● Define design elements that minimize conditions conducive to generation of methylmercury in
39 restored areas.
- 40 ● Define adaptive management strategies that can be implemented to monitor and minimize
41 actual postrestoration creation and mobilization of methylmercury.

42 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
43 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
44 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,

1 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
2 2009). The effect of selenium toxicity differs widely between species and also between age and sex
3 classes within a species. In addition, the effect of selenium on a species can be confounded by
4 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
5 2009).

6 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
7 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
8 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
9 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
10 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
11 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
12 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
13 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
14 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
15 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
16 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
17 levels of selenium have a higher risk of selenium toxicity.

18 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
19 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
20 exacerbate bioaccumulation of selenium in avian species, including greater sandhill crane. Marsh
21 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
22 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
23 BDCP restoration activities that create newly inundated areas could increase bioavailability of
24 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
25 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
26 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
27 long-term increases in selenium concentrations in water in the Delta under any alternative.
28 However, it is difficult to determine whether the effects of potential increases in selenium
29 bioavailability associated with restoration-related conservation measures (CM4, CM5) would lead to
30 adverse effects on greater sandhill crane.

31 Because of the uncertainty that exists at this programmatic level of review, there could be a
32 substantial effect on greater sandhill crane from increases in selenium associated with restoration
33 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
34 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
35 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
36 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
37 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
38 separately for each restoration effort as part of design and implementation. This avoidance and
39 minimization measure would be implemented as part of the tidal habitat restoration design
40 schedule.

41 **NEPA Effects:** Crane habitat could potentially be affected by general construction noise above
42 baseline level (50–60 dBA). Construction in certain areas would take place 7 days a week and 24
43 hours a day and evening and nighttime construction activities would require the use of extremely
44 bright lights, which could adversely affect roosting cranes by impacting their sense of photo-period
45 and by exposing them to predators. Effects of noise and visual disturbance could substantially alter

1 the suitability of habitat for greater sandhill crane. *AMM20 Greater Sandhill Crane* would include
2 requirements (described above) to minimize the effects of noise and visual disturbance on greater
3 sandhill cranes and to mitigate effects on habitat.

4 Tidal habitat restoration could result in increased exposure of greater sandhill crane to selenium
5 which could result in the potential mortality of a special-status species. This effect would be
6 addressed through the implementation of *AMM27 Selenium Management*, which would provide
7 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
8 selenium and its bioavailability in tidal habitats.

9 The implementation of tidal natural communities restoration or floodplain restoration could result
10 in increased exposure of greater sandhill crane to methylmercury. The potential indirect effects of
11 increased mercury exposure is likely low for greater sandhill crane because they primarily forage on
12 cultivated crops. Implementation of CM12 which contains measures to assess the amount of
13 mercury before project development, followed by appropriate design and adaptation management,
14 would minimize the potential for increased methylmercury exposure, and would result in no
15 adverse effect on the species.

16 **CEQA Conclusion:** Crane habitat could potentially be affected by general construction noise above
17 baseline level (50–60 dBA). Construction in certain areas would take place 7 days a week and 24
18 hours a day and evening and nighttime construction activities would require the use of extremely
19 bright lights, which could adversely affect roosting cranes by impacting their sense of photo-period
20 and by exposing them to predators. Effects of noise and visual disturbance could substantially alter
21 the suitability of habitat for greater sandhill crane. This would be a significant impact. *AMM20*
22 *Greater Sandhill Crane* would include requirements (described above) to minimize the effects of
23 noise and visual disturbance on greater sandhill cranes and to mitigate effects on habitat.

24 Tidal habitat restoration could result in increased exposure of greater sandhill crane to selenium
25 which could result in the potential mortality of a special-status species. This would be a significant
26 impact. This effect would be addressed through the implementation of *AMM27 Selenium*
27 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
28 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

29 Methylmercury tissue concentrations in greater sandhill cranes would not be expected to
30 measurably increase as a result of water operations under CM1 compared to the No Action
31 Alternative. The implementation of tidal natural communities restoration or floodplain restoration
32 could result in increased exposure of greater sandhill crane to methylmercury. This would be a
33 significant impact. The potential indirect effects of increased mercury exposure is likely low for
34 greater sandhill crane because they primarily forage on cultivated crops. Implementation of CM12
35 which contains measures to assess the amount of mercury before project development, followed by
36 appropriate design and adaptation management, would minimize the potential for increased
37 methylmercury exposure, and would result in no adverse effect on the species.

38 With AMM1–AMM7, AMM20, AMM27, and CM12 in place, the indirect effects of plan implementation
39 under Alternative 4 would not substantially reduce the number or restrict the range of greater
40 sandhill cranes. Therefore, the indirect effects of Alternative 4 implementation would have a less-
41 than-significant impact on greater sandhill crane.

1 **Lesser Sandhill Crane**

2 This section describes the effects of Alternative 4, including water conveyance facilities construction
 3 and implementation of other conservation components, on lesser sandhill crane. Lesser sandhill
 4 cranes in the study area are almost entirely dependent on privately owned agricultural lands for
 5 foraging. Long-term sustainability of the lesser sandhill crane is thus dependent on providing a
 6 matrix of compatible crop types that afford suitable foraging habitat and maintaining compatible
 7 agricultural practices, while sustaining and increasing the extent of other essential habitat elements
 8 such as night roosting habitat. The habitat model for lesser sandhill crane includes “roosting and
 9 foraging” and “foraging” habitat. Suitable roosting and foraging habitat in the study area includes
 10 certain agricultural types, specific grassland types, irrigated pastures and hay crops, managed
 11 seasonal wetland, and other natural seasonal wetland. Roosting and foraging habitat includes
 12 traditional roost sites that are known to be used by sandhill cranes (both greater and lesser) and
 13 that also provide foraging habitat. Detail regarding the roosting and foraging modeled habitat for
 14 both subspecies of sandhill crane is included in the BDCP (BDCP Appendix 2.A, *Covered Species*
 15 *Accounts*). Both temporary and permanent roost sites were identified for sandhill cranes. Permanent
 16 roosting and foraging sites are those used regularly, year after year, while temporary roosting and
 17 foraging sites are those used in some years. Factors included in assessing the loss of foraging habitat
 18 for the lesser sandhill crane considers the relative habitat value of specific crop or land cover types.
 19 Although both the greater and the lesser Sandhill crane use similar crop or land cover types, these
 20 provide different values of foraging habitat for the two subspecies based on proportional use of
 21 these habitats. Lesser sandhill cranes are less traditional than greater sandhill cranes and are more
 22 likely to move between different roost site complexes and different wintering regions (Ivey pers.
 23 comm.) The wintering range is ten times larger than the greater sandhill crane and their average
 24 foraging flight radius from roost sites is twice that of greater sandhill cranes. Because of this higher
 25 mobility, lesser sandhill cranes are more flexible in their use of foraging areas than the greater
 26 sandhill crane.

27 Construction and restoration associated with Alternative 4 conservation measures would result in
 28 both temporary and permanent losses of foraging and roosting habitat for lesser sandhill crane as
 29 indicated in Table 12-4-31. Full implementation of Alternative 4 would include the following
 30 conservation actions over the term of the BDCP for the greater sandhill crane (BDCP Chapter 3,
 31 Section 3.3, *Biological Goals and Objectives*) that would also benefit the lesser sandhill crane.

- 32 • Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at
 33 least 80% maintained in very high-value types in any given year. This protected habitat will be
 34 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
 35 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
 36 habitat loss. Patch size of protected cultivated lands will be at least 160 acres (Objective
 37 GSHC1.1, associated with CM3).
- 38 • To create additional high-value greater sandhill crane winter foraging habitat, 10% of the
 39 habitat protected under Objective GSHC1.1 will involve acquiring low-value habitat or
 40 nonhabitat areas and converting it to high- or very high-value habitat. Created habitat will be
 41 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and
 42 local seasonal flood events, greater sandhill crane population levels, and the location of foraging
 43 habitat loss (Objective GSHC1.2, associated with CM3).
- 44 • Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the
 45 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise

1 and local seasonal flood events. The wetlands will be located within 2 miles of existing
2 permanent roost sites and protected in association with other protected natural community
3 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide
4 buffers around the wetlands (Objective GSHC1.3, associated with CM3).

- 5 ● Create at least two 90-acre wetland complexes within the Stone Lakes National Wildlife Refuge
6 project boundary. The complexes will be no more than 2 miles apart and will help provide
7 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations. Each
8 complex will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane
9 roosting habitat, and will be protected in association with other protected natural community
10 types (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e.,
11 two sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be
12 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
13 support roosting cranes and provide highest-value foraging habitat, provided such substitution
14 is consistent with the long-term conservation goals of Stone Lakes National Wildlife Refuge for
15 greater sandhill crane. (Objective GSHC1.4, associated with CM10).
- 16 ● Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost
17 sites. The habitat will consist of active cornfields that are flooded following harvest to support
18 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least
19 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will
20 be sited with consideration of the location of roosting habitat loss and will be in place prior to
21 roosting habitat loss (Objective GSCH1.5, associated with CM3).
- 22 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
23 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 24 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
25 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value
26 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 27 ● Target cultivated land conservation to provide connectivity between other conservation lands
28 (Objective CLNC1.2, associated with CM3).
- 29 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
30 lands that occur in cultivated lands within the reserve system, including, water conveyance
31 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

32 As explained below, with the restoration and protection of these amounts of habitat, in addition to
33 natural community enhancement and management commitments (including *CM12 Methylmercury*
34 *Management* as revised in Appendix 11F) and implementation of *AMM1-AMM7*, *AMM20 Greater*
35 *Sandhill Crane*, *AMM27 Selenium Management*, and *AMM30 Transmission Line Design and Alignment*
36 *Guidelines* (as described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*), impacts on
37 the lesser sandhill crane would be less than significant for CEQA purposes, and would not be
38 adverse for NEPA purposes.

1
2

Table 12-4-31. Changes in Lesser Sandhill Crane Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	4	4	NA	NA
	Roosting and Foraging - Temporary	16	16	71	71	NA	NA
	Foraging	1,707	1,707	860	860	NA	NA
Total Impacts CM1		1,723	1,723	935	935		
CM2–CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	3,610	12,172	2	4	0	0
Total Impacts CM2–CM18		3,610	12,213	2	4	0	0
Total Roosting and Foraging - Permanent		0	0	4	4		
Total Roosting and Foraging - Temporary		16	57	71	71		
Total Foraging		5,371	13,879	862	864		
TOTAL IMPACTS		5,333	13,936	937	939	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-72: Loss or Conversion of Habitat for and Direct Mortality of Lesser Sandhill**
5 **Crane**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up to 132 acres of modeled roosting and foraging habitat (57 acres of permanent loss, 75 acres of
8 temporary loss) and 14,743 acres of foraging habitat (13,879 acres of permanent loss, 864 acres of
9 temporary loss, Table 12-4-31). Conservation measures that would result in these losses are
10 conveyance facilities and transmission line construction, and establishment and use of reusable
11 tunnel material areas (CM1), Yolo Bypass Fisheries Improvements (CM2), Tidal Natural
12 Communities Restoration (CM4), Seasonally Inundated Floodplain Restoration (CM5), Grassland
13 Natural Community Restoration (CM8), Nontidal Marsh Natural Community Restoration (CM10),
14 and Natural Communities Enhancement and Management (CM11). The majority of habitat loss

1 would result from water conveyance facility construction and conversion of habitat to tidal natural
 2 communities through CM4. Habitat enhancement and management activities through CM11, which
 3 include ground disturbance or removal of nonnative vegetation, could also result in local adverse
 4 habitat effects. In addition, maintenance activities associated with the long-term operation of the
 5 water conveyance facilities and other BDCP physical facilities could degrade or eliminate lesser
 6 sandhill crane modeled habitat. Each of these individual activities is described below. A summary
 7 statement of the combined impacts, NEPA effects and a CEQA conclusion follow the individual
 8 conservation measure discussions.

- 9 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
 10 result in the combined permanent loss of up to 1,723 acres of modeled lesser sandhill crane
 11 habitat. This would consist of the permanent removal of 16 acres of temporary roosting and
 12 foraging habitat, and 1,707 acres of foraging habitat. Foraging habitat that would be
 13 permanently impacted by CM1 would consist of 1,018 acres of very high-value, 135 acres of
 14 high-value, and 301 acres of medium-value foraging habitat (Table 12-4-32). In addition, 4 acres
 15 of permanent roosting and foraging habitat, 71 acres of temporary roosting and foraging habitat,
 16 and 860 acres of foraging habitat would be temporarily removed (Table 12-4-31). The
 17 temporarily removed habitat would consist primarily of cultivated lands and it would be
 18 restored within 1 year following construction. However, it would not necessarily be restored to
 19 its original topography and it could be restored as grasslands. CM1 activities that would result in
 20 temporary impacts would include temporary access roads, reusable tunnel material sites, and
 21 work areas for construction.

22 The acres of temporary and permanent roosting and foraging habitat that would be
 23 permanently removed is located on Bouldin Island, from the construction of a permanent access
 24 road. Temporary impacts on roosting and foraging habitat would occur on Bouldin Island from
 25 the construction of a temporary concrete batch plant and a fuel station. Temporary losses would
 26 also occur from the construction of temporary transmission lines between the Lambert Road
 27 vent shaft and the intermediate forebay, and on Venice Island. However, the implementation of
 28 *AMM20 Greater Sandhill Crane* would require that CM1 activities be designed to avoid direct loss
 29 of crane roost sites. This includes a provision that the final transmission line alignment would be
 30 designed to avoid crane roost sites. Avoidance of crane roost sites would be accomplished either
 31 by siting activities outside of identified roost sites or by relocating the roost site if it consisted of
 32 cultivated lands (roost sites consisting of wetlands would not be subject to re-location).
 33 Relocated roost sites would be established prior to construction activities affecting the original
 34 roost site (as described for *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental*
 35 *Commitments, AMMs, and CMs*). Therefore, there would be no loss of crane roosting and foraging
 36 habitat as a result of water conveyance facility construction once the facilities were fully
 37 designed.

38 Approximately 1,502 acres of the permanent loss of foraging habitat would be from the storage
 39 of reusable tunnel material. This material would be stored on Bouldin Island, Zacharias Island
 40 and parcels south of Lambert Road and north of the Cosumnes River. The reusable tunnel
 41 material would likely be moved to other sites for use in levee build-up and restoration, and the
 42 affected areas would likely eventually be restored. This effect is categorized as permanent
 43 because there is no assurance that the material would eventually be moved. The implementation
 44 of *AMM6 Disposal and Reuse of Spoils*, would require that the areas used for reusable tunnel
 45 material storage be minimized in crane foraging habitat and completely avoid crane roost sites.

1 Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4 construction locations.
2 Impacts from CM1 would occur within the first 10-14 years of Alternative 4 implementation.

3 **Table 12-4-32. Value of Lesser Sandhill Crane Foraging Habitat Affected By Alternative 4**

Foraging Habitat Value Class	Land Cover Type	CM1 Permanent (Temporary)	CM2-CM18 Permanent (Temporary)
Very high	Corn, alfalfa and alfalfa mixtures	1,018(319)	4,083 (0)
High	Mixed pasture, native pasture, other pasture, irrigated pasture, native vegetation, rice	135 (124)	2,058 (0)
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, non-irrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, wheat, other grain crops, managed wetlands	301 (201)	2,220 (2)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	242 (205)	3,745 (2)
None	Vineyards, orchards	12 (10)	23 (0)

- 4
- 5 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction under CM2 would result in a permanent
6 loss of 267 acres and a temporary loss of 2 acres of lesser sandhill crane foraging habitat in CZ 2.
7 Lesser sandhill crane use in this area is less common than in the central Delta.
- 8 • *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration
9 footprint, this activity would result in the permanent loss or conversion of approximately
10 10,248 acres of lesser sandhill crane habitat, consisting of 41 acres of temporary roosting and
11 foraging habitat and 10,207 acres of foraging habitat. Loss of foraging habitat from CM4 would
12 consist of 3,642 acres of very high-value, 1,529 acres of high value, 2,040 acres of medium-value,
13 and 2,983 acres of low-value foraging habitat (Table 12-4-32). Habitat loss would primarily
14 occur in the Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ 4
15 could occur between the high crane use areas of the central Delta and the Cosumnes River
16 Preserve. However, the conversion of grasslands and cultivated lands to tidal wetlands would
17 not prohibit crane movement or reduce use of these areas. Lesser sandhill cranes are less
18 traditional than greater sandhill cranes and would be more adaptable to changes in land use.
19 Approximately 2,516 acres of foraging habitat would be removed within the first 10 years of
20 Alternative 4 implementation.
- 21 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees would result in
22 the loss of 2 acres of low-value lesser sandhill crane foraging habitat (1 acre of permanent loss, 1

- 1 acres of temporary loss). This impact would occur after the first 10 years of Alternative 4
2 implementation.
- 3 • *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands
4 (foraging habitat) would be converted to grassland. No roosting/foraging habitat would be
5 impacted by grassland restoration activities. The restored grasslands would continue to provide
6 foraging habitat value for the lesser sandhill crane. Approximately 257 acres would be impacted
7 within the first 10 years of Plan implementation.
 - 8 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent
9 conversion of approximately 1,350 acres of modeled foraging habitat for the lesser sandhill
10 crane. A portion of the restored nontidal marsh would be expected to continue to provide
11 roosting and foraging habitat value for the lesser sandhill crane. However, some of this restored
12 marsh would be unsuitable as it would lack emergent vegetation and consist of open water that
13 would be too deep to provide suitable roosting or foraging habitat. Approximately 567 acres of
14 habitat would be converted to nontidal marsh within the first 10 years of Alternative 4
15 implementation.
 - 16 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
17 actions included in *CM11* that are designed to enhance wildlife values in restored or protected
18 habitats could result in localized ground disturbances that could temporarily remove small
19 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
20 vegetation and road and other infrastructure maintenance activities, would be expected to have
21 minor adverse effects on available habitat and would be expected to result in overall
22 improvements to and maintenance of habitat values over the term of the BDCP. The potential for
23 these activities to result in direct mortality of lesser sandhill crane would be minimized with the
24 implementation of *AMM20 Greater Sandhill Crane*. *CM11* would also include the construction of
25 recreational-related facilities including trails, interpretive signs, and picnic tables (see Chapter
26 4, *Covered Activities and Associated Federal Actions*, of the BDCP). The construction of trailhead
27 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
28 disturbed areas when and where possible. If new ground disturbance was necessary, sandhill
29 crane habitat would be avoided, with the exception of a permanent loss of 4 acres of grassland
30 foraging habitat (1 acre of which would be impacted within the first 10 years of Alternative 4
31 implementation).
 - 32 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
33 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
34 disturbances that could affect lesser sandhill crane use of the surrounding habitat. Maintenance
35 activities would include vegetation management, levee and structure repair, and re-grading of
36 roads and permanent work areas. These effects, could be adverse as sandhill cranes are
37 sensitive to disturbance. However, potential impacts would be reduced by AMMs and
38 conservation actions as described below.
 - 39 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
40 direct mortality of lesser sandhill crane if they were present in the study area, because they
41 would be expected to avoid contact with construction and other equipment. Potential effects
42 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.
43 Injury and mortality from electrical transmission facilities are described below under Impact
44 BIO-73.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
3 included.

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
8 effects of construction would not be adverse under NEPA. Based on current design footprints,
9 Alternative 4 would remove 91 acres of permanent and temporary roosting and foraging habitat (16
10 acres of permanent loss, 75 acres of temporary loss) in the study area in the near-term. These effects
11 would result from the construction of the water conveyance facilities (CM1, 91 acres). In addition,
12 6,179 acres of foraging habitat would be removed or converted in the near-term (CM1, 2,567 acres;
13 *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and
14 *CM11 Natural Communities Enhancement and Management*—3,612 acres). Of these near-term acres
15 of foraging habitat impacted, 4,605 acres would be medium- to very high-value habitat (CM1, 2,098
16 acres, CM2-11, 2,507 acres).

17 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
18 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging
19 habitat. Using these ratios would indicate that 91 acres of lesser sandhill crane roosting habitat
20 should be restored/created and 91 acres should be protected to compensate for the CM1 losses of
21 lesser sandhill crane permanent and temporary roosting and foraging habitat. In addition, 2,098
22 acres of high- to very high-value foraging habitat should be protected to mitigate the CM1 losses of
23 lesser sandhill crane medium- to very high-value foraging habitat. The near-term effects of other
24 conservation actions would remove 2,507 acres of medium- to very high-value foraging habitat, and
25 therefore require 2,507 acres of protection of high- to very high-value foraging habitat using the
26 same typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and
27 foraging habitat; 1:1 protection for the loss of foraging habitat).

28 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost
29 sites were directly impacted by CM1 covered activities (including transmission lines and their
30 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
31 result of water conveyance facility construction once the facilities were fully designed, which would
32 avoid the CM1 impact on 91 acres of roosting and foraging habitat once the project design is final.
33 Indirect effects of construction-related noise and visual disturbance are discussed below under
34 Impact BIO-74.

35 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
36 protecting 15,600 acres of cultivated lands in the Plan Area (see Table 3-4 in Chapter 3, *Description*
37 *of Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in
38 the same timeframe as the construction and early restoration losses.

39 The BDCP also includes the following objectives for the greater sandhill crane which would also
40 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
41 winter use areas.

42 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
43 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following

1 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
 2 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
 3 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting
 4 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed
 5 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of
 6 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).
 7 Restoration sites would be identified with consideration of sea level rise and local seasonal flood
 8 events. These wetlands would be created within 2 miles of existing permanent roost sites and
 9 protected in association with other protected natural community types at a ratio of 2:1 upland to
 10 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would
 11 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,
 12 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone
 13 Lakes NWR project boundary (see BDCP Chapter 3, Figure 3.3-6) and would be designed to provide
 14 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Objective
 15 GSHC1.4) which would also benefit lesser sandhill crane. These wetlands would consist of two 90-
 16 acre wetland complexes each consisting of at least three wetlands and would be no more than 2
 17 miles apart. One of the 90-acre wetland complexes created under this objective could be replaced by
 18 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting
 19 cranes and provide highest-value foraging habitat, provided such substitution is consistent with the
 20 long-term conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The
 21 large patch sizes of these wetland complexes would provide additional conservation to address the
 22 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of sandhill
 23 crane wintering habitat.

24 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
 25 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
 26 BIO-72 would be available to guide the near-term protection of cultivated lands to ensure that the
 27 near-term impacts of medium- to very high-value foraging habitat for lesser sandhill crane were
 28 compensated for with appropriate crop types and natural communities described in Table 12-4-32.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 33 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 34 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 35 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 36 of the Final EIR/EIS.

37 ***Late Long-Term Timeframe***

38 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475
 39 acres of foraging habitat for lesser sandhill crane. Alternative 4 as a whole would result in the
 40 permanent loss of and temporary effects on 132 acres of roosting and foraging habitat (57 acres of
 41 permanent loss, 75 acres of temporary loss) and 14,743 acres of foraging habitat (13,879 acres of
 42 permanent loss, 864 acres of temporary loss) for the lesser sandhill crane during the term of the
 43 Plan. The foraging habitat lost by the late long-term timeframe would consist of 10,461 acres of
 44 medium- to very high-value foraging habitat. The locations of these losses are described above in the
 45 analyses of individual conservation measures. The implementation of *AMM20 Greater Sandhill Crane*

1 would require that no crane roost sites were directly affected by water conveyance facilities
2 including transmission lines and associated footprints. In addition, temporarily removed habitat
3 would be restored within 1 year following construction. However, it would not necessarily be
4 restored to its original topography and it could result in the conversion of cultivated lands to
5 grasslands.

6 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
7 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
8 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
9 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
10 GSHC1.1). These croptypes would also provide high-value habitat for the lesser sandhill crane.

11 The BDCP also includes the following objectives for the greater sandhill crane which would also
12 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
13 winter use areas.

14 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
15 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
16 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
17 and local seasonal flood events. These wetlands would be created within 2 miles of existing
18 permanent roost sites and protected in association with other protected natural community types at
19 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
20 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
21 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
22 constructed within the Stone Lakes NWR project boundary (see BDCP Chapter 3, Figure 3.3-6) and
23 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
24 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
25 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. One
26 of the 90-acre wetland complexes created under this objective could be replaced by 180 acres of
27 cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting cranes and
28 provide highest-value foraging habitat, provided such substitution is consistent with the long-term
29 conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The large
30 patch sizes of these wetland complexes would provide additional conservation to address the
31 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
32 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
33 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
34 active cornfields that are flooded following harvest to support roosting cranes and also provide the
35 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
36 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with
37 consideration of the location of roosting habitat loss and would be in place prior to construction
38 activities.

39 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
40 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
41 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
42 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6. The patch size of these
43 protected lands would be at least 160 acres (Objectives GSHC1.1 and GSHC1.2). Because agricultural
44 habitat values change over time based largely on economically driven agricultural practices,
45 protecting crane habitat would provide enhanced stability to agricultural habitat value within the

1 crane use area that does not currently exist. Although lesser sandhill cranes are less traditional in
2 their use of roost sites in the Delta, these objectives for the greater sandhill crane would also benefit
3 the lesser sandhill crane.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
8 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
9 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
10 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
11 of the Final EIR/EIS.

12 **NEPA Effects:** The loss of lesser sandhill crane habitat and potential direct mortality of this special-
13 status species under Alternative 4 would represent an adverse effect in the absence of other
14 conservation actions. However, with habitat protection and restoration associated with *CM3 Natural*
15 *Communities Protection and Restoration* and *CM10 Nontidal Marsh Restoration*, guided by biological
16 goals and objectives for the species and by *AMM1–AMM7* and *AMM20 Greater Sandhill Crane*, which
17 would be in place during all project activities, and with implementation of Mitigation Measure BIO-
18 72, which would be available to compensate for loss of medium- to very high-value foraging habitat,
19 the effects of habitat loss and potential mortality on lesser sandhill crane would not be adverse
20 under Alternative 4.

21 **CEQA Conclusion:**

22 **Near-Term Timeframe**

23 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
24 the near-term BDCP conservation strategy has been evaluated to determine whether it would
25 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
26 effects of construction would be less than significant under CEQA. Based on current design
27 footprints, Alternative 4 would remove 91 acres of permanent and temporary roosting and foraging
28 habitat (16 acres of permanent loss, 75 acres of temporary loss) in the study area in the near-term.
29 These effects would result from the construction of the water conveyance facilities (CM1, 91 acres).
30 In addition, 6,179 acres of foraging habitat would be removed or converted in the near-term (CM1,
31 2,567 acres; *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*
32 *Restoration*, and *CM11 Natural Communities Enhancement and Management*—3,612 acres). Of these
33 near-term acres of foraging habitat impacted, 4,760 acres would be medium- to very high-value
34 habitat (CM1, 2,098 acres, CM2-11, 2,507 acres).

35 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
36 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging
37 habitat. Using these ratios would indicate that 91 acres of lesser sandhill crane roosting habitat
38 should be restored/created and 91 acres should be protected to compensate for the CM1 losses of
39 lesser sandhill crane permanent and temporary roosting and foraging habitat. In addition, 2,098
40 acres of high- to very high-value foraging habitat should be protected to mitigate the CM1 losses of
41 lesser sandhill crane medium- to very high-value foraging habitat. The near-term effects of other
42 conservation actions would remove 2,507 acres of medium- to very high-value foraging habitat, and
43 therefore require 2,507 acres of protection of high- to very high-value foraging habitat using the

1 same typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and
2 foraging habitat; 1:1 protection for the loss of foraging habitat).

3 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost
4 sites were directly impacted by CM1 covered activities (including transmission lines and their
5 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
6 result of water conveyance facility construction once the facilities were fully designed, which would
7 avoid the CM1 impact on 91 acres of roosting and foraging habitat once the project design is final.
8 Indirect effects of construction-related noise and visual disturbance are discussed below under
9 Impact BIO-74.

10 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
11 protecting 15,600 acres of cultivated lands in the Plan Area (see Table 3-4 in Chapter 3, *Description*
12 *of Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in
13 the same timeframe as the construction and early restoration losses.

14 The BDCP also includes the following objectives for the greater sandhill crane which would also
15 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
16 winter use areas.

17 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
18 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
19 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
20 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
21 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting
22 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed
23 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of
24 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).
25 Restoration sites would be identified with consideration of sea level rise and local seasonal flood
26 events. These wetlands would be created within 2 miles of existing permanent roost sites and
27 protected in association with other protected natural community types at a ratio of 2:1 upland to
28 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would
29 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,
30 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone
31 Lakes NWR project boundary (see BDCP Chapter 3, Figure 3.3-6) and would be designed to provide
32 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Objective
33 GSHC1.4) which would also benefit lesser sandhill crane. These wetlands would consist of two 90-
34 acre wetland complexes each consisting of at least three wetlands and would be no more than 2
35 miles apart. One of the 90-acre wetland complexes created under this objective could be replaced by
36 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting
37 cranes and provide highest-value foraging habitat, provided such substitution is consistent with the
38 long-term conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The
39 large patch sizes of these wetland complexes would provide additional conservation to address the
40 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of sandhill
41 crane wintering habitat.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
2 *these AMMs include elements that would avoid or minimize the risk of affecting individuals and*
3 *species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since*
4 *been updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs,*
5 *of the Final EIR/EIS.*

6 In the absence of other conservation actions, the effects on lesser sandhill crane habitat from
7 Alternative 4 would represent an adverse effect as a result of habitat modification of a special-status
8 species and potential for direct mortality. At least 15,600 acres of cultivated lands that provide
9 habitat for covered and other native wildlife species would be protected in the near-term time
10 period (Objective CLNC1.1). Mitigation Measure BIO-72 would be available to guide the near-term
11 protection of cultivated lands to ensure that the near-term impacts of medium- to very high-value
12 foraging habitat for lesser sandhill crane were compensated for with appropriate crop types and
13 natural communities. Considering the conservation actions described above, AMM1–AMM7. and
14 AMM20, Alternative 4 over the term of the BDCP would not result in a substantial adverse effect
15 through habitat modifications and would not substantially reduce the number or restrict the range
16 of greater sandhill cranes. Therefore, Alternative 4 would have a less-than-significant impact on
17 lesser sandhill cranes. No mitigation would be required.

18 ***Late Long-Term Timeframe***

19 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475
20 acres of foraging habitat for lesser sandhill crane. Alternative 4 as a whole would result in the
21 permanent loss of and temporary effects on 132 acres of roosting and foraging habitat (57 acres of
22 permanent loss, 75 acres of temporary loss) and 14,743 acres of foraging habitat (13,879 acres of
23 permanent loss, 864 acres of temporary loss) for the lesser sandhill crane during the term of the
24 Plan. The foraging habitat lost by the late long-term timeframe would consist of 10,461 acres of
25 medium- to very high-value foraging habitat. The locations of these losses are described above in the
26 analyses of individual conservation measures. The implementation of *AMM20 Greater Sandhill Crane*
27 would require that no crane roost sites were directly affected by water conveyance facilities
28 including transmission lines and associated footprints. In addition, temporarily removed habitat
29 would be restored within 1 year following construction. However, it would not necessarily be
30 restored to its original topography and it could result in the conversion of cultivated lands to
31 grasslands.

32 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
33 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres of greater
34 Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at least
35 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
36 GSHC1.1). These croptypes would also provide high-value habitat for the lesser sandhill crane.

37 The BDCP also includes the following objectives for the greater sandhill crane which would also
38 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
39 winter use areas.

40 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
41 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
42 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
43 and local seasonal flood events. These wetlands would be created within 2 miles of existing
44 permanent roost sites and protected in association with other protected natural community types at

1 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
 2 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
 3 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
 4 constructed within the Stone Lakes NWR project boundary (see BDCP Chapter 3, Figure 3.3-6) and
 5 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
 6 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
 7 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. One
 8 of the 90-acre wetland complexes created under this objective could be replaced by 180 acres of
 9 cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting cranes and
 10 provide highest-value foraging habitat, provided such substitution is consistent with the long-term
 11 conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The large
 12 patch sizes of these wetland complexes would provide additional conservation to address the
 13 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
 14 sandhill crane wintering habitat. Approximately 95 acres of roosting habitat would be created
 15 within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts would consist of
 16 active cornfields that are flooded following harvest to support roosting cranes and also provide the
 17 highest-value foraging habitat for the species. Individual fields would be at least 40 acres could shift
 18 locations throughout the Greater Sandhill Crane Winter Use Area, but would be sited with
 19 consideration of the location of roosting habitat loss and would be in place prior to construction
 20 activities.

21 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
 22 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
 23 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
 24 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6. The patch size of these
 25 protected lands would be at least 160 acres (Objectives GSHC1.1 and GSHC1.2). Because agricultural
 26 habitat values change over time based largely on economically driven agricultural practices,
 27 protecting crane habitat would provide enhanced stability to agricultural habitat value within the
 28 crane use area that does not currently exist. Although lesser sandhill cranes are less traditional in
 29 their use of roost sites in the Delta, these objectives for the greater sandhill crane would also benefit
 30 the lesser sandhill crane.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 35 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 36 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 37 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 38 of the Final EIR/EIS.

39 In the absence of other conservation actions, the effects on greater sandhill crane habitat from
 40 Alternative 4 would represent an adverse effect as a result of habitat modification of a special-status
 41 species and potential for direct mortality. Considering Alternative 4's protection and restoration
 42 provisions, in addition to Mitigation Measure BIO-72, which would compensate for the loss of
 43 medium- to very high-value foraging habitat at a ratio of 1:1, loss of habitat or direct mortality
 44 through implementation of Alternative 4 would not result in a substantial adverse effect through
 45 habitat modifications and would not substantially reduce the number or restrict the range of the

1 species. Therefore, the alternative would have a less-than-significant impact on lesser sandhill
2 crane.

3 **Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value**
4 **Lesser Sandhill Crane Foraging Habitat**

5 DWR must compensate for the loss of lesser sandhill crane medium- to very high-value foraging
6 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan
7 Area. Compensation must occur prior to or concurrent with the impacts, to minimize the effects
8 of habitat loss. The crop types and natural communities that are included in foraging value
9 categories are listed in Table 12-4-32. Foraging habitat conservation must occur within 10
10 kilometers of traditional sandhill crane roost sites and the location of protected habitat or
11 conservation easements must be preapproved by CDFW.

12 **Impact BIO-73: Effects on Lesser Sandhill Crane Associated with Electrical Transmission**
13 **Facilities**

14 Sandhill cranes are susceptible to collision with power lines and other structures during periods of
15 inclement weather and low visibility (Avian Power Line Interaction Committee 1994, Brown and
16 Drewien 1995, Manville 2005). There are extensive existing transmission and distribution lines in
17 the sandhill crane winter use area. These include a network of distribution lines that are between
18 11- and 22-kV. In addition, there are two 115-kV lines that cross the study area, one that overlaps
19 with the greater sandhill crane winter use area between Antioch and I-5 east of Hood, and one that
20 crosses the northern tip of the crane winter use area north of Clarksburg. There are 69-kV lines
21 within the study area that parallel Twin Cities Road, Herzog Road, Lambert Road, and the Southern
22 Pacific Dredge Cut in the vicinity of Stone Lakes National Wildlife Refuge. At the south end of the
23 winter use area, there are three 230-kV transmission lines that follow I-5, and then cut southwest
24 through Holt, and two 500-kV lines cross the southwestern corner of the winter use area. This
25 existing network of power lines in the study currently poses a collision and electrocution risk for
26 sandhill cranes, because they cross over or surround sandhill crane roost sites in the study area.

27 Both permanent and temporary electrical transmission lines would be constructed to supply
28 construction and operational power to Alternative 4 facilities, as described below. The potential for
29 birdstrikes could also be exacerbated by construction-related effects, especially in low-visibility
30 conditions. The potential mortality of greater sandhill crane in the area of the proposed
31 transmission lines was estimated for the BDCP using collision mortality rates developed by Brown
32 and Drewien (1995) and an estimate of potential crossings along the proposed lines (see BDCP
33 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*).
34 This analysis concluded that mortality risk could be substantially reduced by marking new
35 transmission lines to increase their visibility to sandhill cranes. Mortality risk would be similarly
36 reduced for lesser sandhill cranes by marking new transmission lines.

37 The transmission line footprint for Alternative 4 was changed substantially from the BDCP to reduce
38 potential risk of greater sandhill crane collisions. The following changes also reduce potential risk of
39 lesser sandhill crane collisions:

40 Alternative 4 substantially reduced the length of permanent and temporary transmission lines as
41 compared to the BDCP, substantially reducing the likelihood of crane collisions. Under Alternative 4,
42 no permanent transmission lines would be constructed within the greater sandhill crane winter use
43 area. In addition, no new transmission lines (permanent or temporary) would be constructed in the

1 vicinity of Staten Island which is one of the most important wintering sites for greater sandhill
 2 cranes in the Delta. The Alternative 4 transmission line alignment within the greater sandhill crane
 3 winter use area would be limited to three segments of temporary transmission lines: a temporary
 4 11-mile segment extending north and south between Intake 2 and the intermediate forebay, a
 5 temporary 9-mile segment extending east and west between the intermediate forebay and the
 6 SMUD/WAPA substation, and an 11-mile segment extending north and south between Bouldin
 7 Island and Victoria Island. These three temporary lines would be removed after construction of the
 8 water conveyance facilities, after 10–14 years. Limiting the proposed transmission line footprint to
 9 temporary lines and siting these lines away from the highest use areas by both greater and lesser
 10 sandhill cranes, substantially reduces the potential for sandhill crane bird strike in Alternative 4 as
 11 compared to the BDCP.

12 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
 13 transmission line alignment, such as co-locating transmission lines when it would minimize effects
 14 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. In
 15 addition, after the Draft EIR/EIS was issued in December 2013, additional avoidance features were
 16 added to *AMM20 Greater Sandhill Crane*. *AMM20 Greater Sandhill Crane* requires that Alternative 4
 17 meet the performance standard of no mortality of greater sandhill crane associated with the new
 18 facilities. This would be achieved by implementing one or any combination of the following: 1) siting
 19 new transmission lines in lower bird strike risk zones; 2) removing, relocating or undergrounding
 20 existing lines where feasible; 3) using natural gas generators in lieu of installing transmission lines
 21 in high-risk zones of the greater sandhill crane winter use area; 4) undergrounding new lines in
 22 high-risk zones of the greater sandhill crane winter use area; 5) permanently installing flight
 23 diverters on existing lines over lengths equal to or greater than the length of the new temporary
 24 transmission lines in the crane winter use area; 6) for areas outside of the Stone Lakes NWR project
 25 boundary, shifting locations of flooded areas that provide crane roosts to lower risk areas. These
 26 measures are described in detail in *AMM20 Greater Sandhill Crane* (Appendix 3B, *Environmental*
 27 *Commitments, AMMs, and CMs*).

28 The implementation of the measures described above under *AMM20 Greater Sandhill Crane*, in
 29 addition to the project design changes to avoid high crane use areas, would substantially reduce
 30 potential collisions of lesser sandhill cranes with transmission lines. Potential measures include
 31 using natural gas generators in lieu of transmission lines or undergrounding new lines in high-risk
 32 zones in the greater sandhill crane winter use area. Marking transmission lines with flight diverters
 33 that make the lines more visible to birds has been shown to reduce the incidence of bird mortality,
 34 including for sandhill cranes (Brown and Drewien 1995). Yee (2008) estimated that marking
 35 devices in the Central Valley could reduce avian mortality by 60%. All new temporary transmission
 36 lines would be fitted with flight diverters. The installation of flight diverters on existing permanent
 37 lines would be prioritized in the highest risk zones for greater sandhill crane (as described in BDCP
 38 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*) and
 39 diverters would be installed in a configuration that research indicates would reduce bird strike risk
 40 by at least 60%. The length of existing line to be fitted with bird strike diverters will be equal to the
 41 length of new transmission lines constructed as a result of the project, in an area with the same or
 42 higher greater sandhill crane strike risk to provide a net benefit to the species. For optimum results,
 43 the recommended spacing distance for bird flight diverters is 15 to 16.5 feet (4.5 to 5 meters) (Avian
 44 Power Line Interaction Committee 1994). Placing diverters on existing lines would be expected to
 45 reduce existing lesser and greater sandhill crane mortality in the Plan Area and therefore result in a

1 net benefit to the lesser sandhill crane population because these flight diverters would be
2 maintained in perpetuity.

3 **NEPA Effects:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
4 existing network of power lines in the study area currently poses a risk for lesser sandhill cranes.
5 Under Alternative 4, proposed transmission lines have been designed to substantially reduce the
6 likelihood of a crane collision with transmission lines. New transmission lines constructed as part of
7 the project would be limited to temporary lines which would be removed within the first 10–14
8 years of Alternative 4 implementation. In addition, no new transmission lines would be sited in the
9 vicinity of Staten Island, which has high use by wintering lesser sandhill cranes. *AMM30*
10 *Transmission Line Design and Alignment Guidelines* would require design features for the
11 transmission line alignment, such as co-locating transmission lines when it would minimize effects
12 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. All new
13 transmission lines constructed for the project would be fitted with bird diverters, which have been
14 shown to reduce avian mortality by 60%. With incorporation of *AMM30 Transmission Line Design*
15 *and Alignment Guidelines* and one or a combination of the measures to greatly reduce the risk of bird
16 strike described in *AMM20 Greater Sandhill Crane*, the construction and operation of transmission
17 lines under Alternative 4 would not result in an adverse effect on lesser sandhill crane.

18 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
19 existing network of power lines in the study area currently poses a risk for lesser sandhill cranes.
20 Under Alternative 4, proposed transmission lines have been designed to substantially reduce the
21 likelihood of a crane collision with transmission lines. New transmission lines constructed as part of
22 the project would be limited to temporary lines which would be removed within the first 10–14
23 years of Alternative 4 implementation. In addition, no new transmission lines would be sited in the
24 vicinity of Staten Island, which has high use by wintering lesser sandhill cranes. *AMM30*
25 *Transmission Line Design and Alignment Guidelines* would require design features for the
26 transmission line alignment, such as co-locating transmission lines when it would minimize effects
27 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. All new
28 transmission lines constructed as a result of the project would be fitted with bird diverters, which
29 have been shown to reduce avian mortality by 60%. With incorporation of *AMM30 Transmission Line*
30 *Design and Alignment Guidelines* and one or a combination of the measures to greatly reduce the risk
31 of bird strike described in *AMM20 Greater Sandhill Crane*, the construction and operation of
32 transmission lines under Alternative 4 would have a less-than-significant impact on lesser sandhill
33 crane.

34 **Impact BIO-74: Indirect Effects of Plan Implementation on Lesser Sandhill Crane**

35 **Indirect Construction- and Operation-Related Effects:** Sandhill cranes are sensitive to
36 disturbance. Noise and visual disturbances from the construction of water conveyance facilities and
37 other conservation measures could reduce lesser sandhill crane use of modeled habitat adjacent to
38 work areas. Indirect effects associated with construction include noise, dust, and visual disturbance
39 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
40 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the
41 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise
42 and visual disturbances that could affect lesser sandhill crane use of surrounding habitat. These
43 effects could result from periodic vehicle use along the conveyance corridor, inspection and
44 maintenance of aboveground facilities, and similar activities. These potential effects would be

1 minimized with implementation of *AMM20 Greater Sandhill Crane* as described in Appendix 3B,
2 *Environmental Commitments, AMMs, and CMs*.

3 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would
4 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill
5 crane (see Appendix 11F, *Substantive BDCP Revisions*). The analysis addressed the potential noise
6 effects on cranes, and concluded that as much as 20,243 acres of crane habitat could potentially be
7 affected by general construction noise (including pile driving) above baseline level (50–60 dBA;
8 Table 12-4-30). This would include 1,008 acres of permanent crane roosting habitat, 1,909 acres of
9 temporary crane roosting habitat, and 17,327 acres of crane foraging habitat. The analysis was
10 conducted based on the assumption that there would be direct line-of-sight from sandhill crane
11 habitat areas to the construction site, and, therefore, provides a worst-case estimate of effects. In
12 many areas the existing levees would partially or completely block the line-of-sight and would
13 function as effective noise barriers, substantially reducing noise transmission. However, there is
14 insufficient data to assess the effects that increased noise levels would have on sandhill crane
15 behavior. Similar acreages of lesser sandhill crane habitat would be expected to be indirectly
16 affected. However, lesser sandhill cranes are less traditional in their winter roost sites and may be
17 more likely to travel away from disturbed areas to roost and forage in more suitable habitat.

18 Evening and nighttime construction activities would require the use of extremely bright lights.
19 Nighttime construction could also result in headlights flashing into roost sites when construction
20 vehicles are turning onto or off of construction access routes. Proposed surge towers would require
21 the use of safety lights that would alert low-flying aircraft to the presence of these structures
22 because of their height. Little data is available on the effects of impact of artificial lighting on
23 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes
24 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP
25 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to
26 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting
27 include a reduction in the cranes' quality of nocturnal rest, and effects on their "sense of photo-
28 period which might cause them to shift their physiology towards earlier migration and breeding"
29 (BDCP Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes'
30 overall fitness and reproductive success (which could in turn have population-level impacts). A
31 change in photo-period interpretation could also cause cranes to fly out earlier from roost sites to
32 forage and might increase their risk of power line collisions if they were to leave roosts before dawn
33 (BDCP Chapter 5, *Effects Analysis*).

34 The effects of noise and visual disturbance on lesser sandhill crane would be minimized through the
35 implementation of *AMM20* (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Activities
36 within 0.75 mile of crane roosting habitat would reduce construction noise during night time hours
37 (from one hour before sunset to one hour after sunrise) such that construction noise levels do not
38 exceed 50 dBA L_{eq} (1 hour) at the nearest temporary or permanent roosts during periods when the
39 roost sites are available (flooded). In addition, the area of crane foraging habitat that would be
40 affected during the day (from one hour after sunrise to one hour before sunset) by construction
41 noise exceeding 50 dBA L_{eq} (1 hour) would also be minimized. Unavoidable noise related effects
42 would be compensated for by the enhancement of 0.1 acre of foraging habitat for every acre
43 indirectly affected within the 50 dBA L_{eq} (1 hour) construction noise contour. With these measures
44 in place, indirect effects of noise and visual disturbance from construction activities are not expected
45 to reduce the lesser sandhill crane population in the study area.

1 The use of mechanical equipment during water conveyance facilities construction could cause the
2 accidental release of petroleum or other contaminants that could affect lesser sandhill cranes in the
3 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to lesser
4 sandhill crane habitat could also affect the subspecies. AMM1–AMM7, including *AMM2 Construction*
5 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure
6 that measures were in place to prevent runoff from the construction area and negative effects of
7 dust on foraging habitat.

8 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
9 mercury in lesser sandhill cranes. Largemouth bass was used as a surrogate species for analysis
10 (Appendix 11F, *Substantive BDCP Revisions*). Results of the quantitative modeling of mercury effects
11 on largemouth bass as a surrogate species would overestimate the effects on lesser sandhill crane as
12 they primarily forage on cultivated crops and invertebrates. Organisms feeding within pelagic-based
13 (algal) foodwebs have been found to have higher concentrations of methylmercury than those in
14 benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
15 segregation (Grimaldo et al. 2009). Modeled effects of mercury concentrations from changes in
16 water operations under CM1 on largemouth bass did not differ substantially from existing
17 conditions; therefore, results also indicate that lesser sandhill crane tissue concentrations would not
18 measurably increase as a result of CM1 implementation.

19 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
20 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
21 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
22 mercury. Increased methylmercury associated with natural community and floodplain restoration
23 may indirectly affect lesser sandhill crane via uptake in lower trophic levels (BDCP Appendix 5.D,
24 *Contaminants*). Mercury is generally elevated throughout the Delta, and restoration of the lower
25 potential areas in total may result in generalized, very low level increases of mercury. Given that
26 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in
27 some level of effects.

28 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
29 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
30 each restoration project. If a project is identified where there is a high potential for methylmercury
31 production that could not be fully addressed through restoration design and adaptive management,
32 alternate restoration areas would be considered. CM12 would be implemented in coordination with
33 other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury
34 Monitoring and Analysis Section. This conservation measure would include the following actions.

- 35 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
36 mercury methylation and bioavailability.
- 37 ● Define design elements that minimize conditions conducive to generation of methylmercury in
38 restored areas.
- 39 ● Define adaptive management strategies that can be implemented to monitor and minimize
40 actual postrestoration creation and mobilization of methylmercury.

41 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
42 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
43 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
44 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz

2009). The effect of selenium toxicity differs widely between species and also between age and sex classes within a species. In addition, the effect of selenium on a species can be confounded by interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium have a higher risk of selenium toxicity.

Selenium toxicity in avian species can result from the mobilization of naturally high concentrations of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to exacerbate bioaccumulation of selenium in avian species, including the lesser sandhill crane. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases in selenium concentrations in water in the Delta under any alternative. However, it is difficult to determine whether the effects of potential increases in selenium bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to adverse effects on lesser sandhill crane.

Because of the uncertainty that exists at this programmatic level of review, there could be a substantial effect on lesser sandhill crane from increases in selenium associated with restoration activities. This effect would be addressed through the implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium management to reduce selenium concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as part of design and implementation. This avoidance and minimization measure would be implemented as part of the tidal habitat restoration design schedule.

NEPA Effects: Crane habitat could potentially be affected by general construction noise above baseline level (50–60 dBA). However, lesser sandhill cranes are less traditional in their winter roost sites than greater sandhill cranes and may be more likely to travel away from disturbed areas to roost in more suitable habitat. Construction in certain areas would take place 7 days a week and 24 hours a day and evening and nighttime construction activities would require the use of extremely bright lights, which could adversely affect roosting cranes by impacting their sense of photo-period

1 and by exposing them to predators. Effects of noise and visual disturbance could substantially alter
2 the suitability of habitat for lesser sandhill crane. *AMM20 Greater Sandhill Crane* would include
3 requirements (described above) to minimize the effects of noise and visual disturbance on sandhill
4 cranes and to mitigate effects on habitat.

5 Tidal habitat restoration could result in increased exposure of lesser sandhill crane to selenium
6 which could result in the mortality of a special status species. This effect would be addressed
7 through the implementation of *AMM27 Selenium Management*, which would provide specific tidal
8 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its
9 bioavailability in tidal habitats.

10 The implementation of tidal natural communities restoration or floodplain restoration could result
11 in increased exposure of lesser sandhill crane to methylmercury. The potential indirect effects of
12 increased mercury exposure is likely low for lesser sandhill crane because they primarily forage on
13 cultivated crops and associated invertebrates. Implementation of CM12 which contains measures to
14 assess the amount of mercury before project development, followed by appropriate design and
15 adaptation management, would minimize the potential for increased methylmercury exposure, and
16 would result in no adverse effect on the species.

17 **CEQA Conclusion:** Crane habitat could potentially be affected by general construction noise above
18 baseline level (50–60 dBA). However, lesser sandhill cranes are less traditional in their winter roost
19 sites and may be more likely to travel away from disturbed areas to roost in more suitable habitat.
20 Construction in certain areas would take place 7 days a week and 24 hours a day and evening and
21 nighttime construction activities would require the use of extremely bright lights, which could
22 adversely affect roosting cranes by impacting their sense of photo-period and by exposing them to
23 predators. Effects of noise and visual disturbance could substantially alter the suitability of habitat
24 for lesser sandhill crane. This would be a significant impact. With *AMM20 Greater Sandhill Crane* in
25 place, which would include requirements (described above) to minimize the effects of noise and
26 visual disturbance on sandhill cranes and to mitigate effects on habitat, there would not be an
27 adverse effect on lesser sandhill crane.

28 Tidal habitat restoration could result in increased exposure of lesser sandhill crane to selenium
29 which could result in the potential mortality of a special-status species. This would be a significant
30 impact. This effect would be addressed through the implementation of *AMM27 Selenium*
31 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
32 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

33 Methylmercury tissue concentrations in lesser sandhill crane would not be expected to measurably
34 increase as a result of water operations under CM1 compared to the No Action Alternative. The
35 implementation of tidal natural communities restoration or floodplain restoration could result in
36 increased exposure of lesser sandhill crane to methylmercury. This would be a significant impact.
37 The potential indirect effects of increased mercury exposure is likely low for lesser sandhill crane
38 because they primarily forage on cultivated crops and associated invertebrates. Implementation of
39 CM12 which contains measures to assess the amount of mercury before project development,
40 followed by appropriate design and adaptation management, would minimize the potential for
41 increased methylmercury exposure, and would result in no adverse effect on lesser sandhill crane.

42 With AMM1–AMM7, AMM20, AMM27, and CM12 in place, the indirect effects of plan implementation
43 under Alternative 4 would not substantially reduce the number or restrict the range of lesser

1 sandhill cranes. Therefore, the indirect effects of Alternative 4 implementation would have a less-
2 than-significant impact on lesser sandhill crane.

3 **Least Bell's Vireo and Yellow Warbler**

4 This section describes the effects of Alternative 4, including water conveyance facilities construction
5 and implementation of other conservation components, on least Bell's vireo and yellow warbler.
6 Least Bell's vireo and yellow warbler modeled habitat identifies suitable nesting and migratory
7 habitat as those plant alliances from the valley/foothill riparian modeled habitat that contain a
8 dense shrub component, including all willow-dominated alliances.

9 Construction and restoration associated with Alternative 4 conservation measures would result in
10 both temporary and permanent losses of least Bell's vireo and yellow warbler modeled habitat as
11 indicated in Table 12-4-33. Full implementation of Alternative 4 would also include the following
12 conservation actions over the term of the BDCP to benefit least Bell's vireo and yellow warbler
13 (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 14 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community with at least
15 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
16 associated with CM7).
- 17 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
18 10 (Objective VFRNC1.2, associated with CM7).
- 19 ● Maintain and enhance structural heterogeneity (Objective VFRNC2.1, associated with CM7).
- 20 ● Maintain at least 1,000 acres of early- to mid-successional vegetation (Objective VFRNC2.2,
21 associated with CM7).
- 22 ● Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,
23 associated with CM3 and CM7).
- 24 ● Maintain the at least 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion
25 of the early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a
26 minimum patch size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4,
27 associated with CM3 and CM7).

28 As explained below, with the restoration and protection of these amounts of habitat, in addition to
29 natural community enhancement and management commitments and implementation of AMM1-
30 AMM7, AMM10 *Restoration of Temporarily Affected Natural Communities*, AMM22 *Suisun Song*
31 *Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo*, and Mitigation
32 Measure BIO-75, impacts on least Bell's vireo and yellow warbler would not be adverse for NEPA
33 purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-33. Changes in Least Bell’s Vireo and Yellow Warbler Modeled Habitat Associated with**
2 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Migratory and breeding	30	30	20	20	NA	NA
Total Impacts CM1		30	30	20	20		
CM2–CM18	Migratory and breeding	382	656	88	109	48–85	148
Total Impacts CM2–CM18		382	656	88	109	48–85	148
TOTAL IMPACTS		412	686	108	129	48–85	148

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-75: Loss or Conversion of Habitat for and Direct Mortality of Least Bell’s Vireo**
5 **and Yellow Warbler**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up to 815 acres of modeled habitat (686 acres of permanent loss and 129 acres of temporary loss)
8 for least Bell’s vireo and yellow warbler (Table 12-4-33). Conservation measures that would result
9 in these losses are conveyance facilities and transmission line construction, and establishment and
10 use of reusable tunnel material areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements
11 (CM2), tidal natural communities restoration (CM4), and seasonally inundated floodplain
12 restoration (CM5). Habitat enhancement and management activities (CM11) which include ground
13 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In
14 addition, maintenance activities associated with the long-term operation of the water conveyance
15 facilities and other BDCP physical facilities could degrade or eliminate least Bell’s vireo and yellow
16 warbler habitat. Each of these individual activities is described below. A summary statement of the
17 combined impacts and NEPA effects and a CEQA conclusion follows the individual conservation
18 measure discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
20 result in the combined permanent and temporary loss of up to 50 acres of modeled least Bell’s
21 vireo and yellow warbler habitat (Table 12-4-33). Of the 50 acres of modeled habitat that would
22 be removed for the construction of the conveyance facilities, 30 acres would be a permanent
23 loss and 20 acres would be a temporary loss of habitat. Activities that would impact modeled

1 habitat consist of the construction of tunnel, forebay, and intake construction, permanent and
 2 temporary access roads, construction of transmission lines, and temporary barge unloading
 3 facilities and work areas. Impacts from CM1 would occur in the central delta in CZs 3, 4, 5, 6, and
 4 8. Permanent habitat loss would occur from the construction of Intakes 2, 3, and 5 on the east
 5 bank of the Sacramento River between Freeport and Courtland. Some habitat would also be
 6 impacted by the construction of a permanent access road from the new forebay west to a
 7 reusable tunnel material disposal area. Additional losses would also occur along Lambert Road
 8 where permanent utility lines would be installed and from the construction of an operable
 9 barrier at the confluence of Old River and the San Joaquin River. Temporary losses of habitat
 10 would occur from the construction of a barge unloading facility west of the intermediate forebay
 11 in Snodgrass Slough and where temporary work areas surround intake sites.

12 Temporarily affected areas would be restored as riparian habitat within 1 year following
 13 completion of construction activities as described in *AMM10 Restoration of Temporarily Affected*
 14 *Natural Communities*. Although the effects are considered temporary, the restored riparian
 15 habitat would require at least four years for ecological succession to occur and for restored
 16 riparian habitat to functionally replace habitat that has been affected. However, restored
 17 riparian vegetation can have the habitat structure to support breeding vireos within 3 to 5
 18 years, particularly if the restored vegetation is adjacent to established riparian areas (Kus
 19 2002), and similar habitat would be suitable for yellow warbler. The majority of the riparian
 20 vegetation to be temporarily removed is early- to mid-successional; therefore, the replaced
 21 riparian vegetation would be expected to have structural components comparable to the
 22 temporarily removed vegetation within the first 5 to 10 years after the initial restoration
 23 activities are complete. There are no occurrences of least Bell's vireo or yellow warbler that
 24 intersect with the CM1 footprint. Refer to the Terrestrial Biology Mapbook for a detailed view of
 25 Alternative 4 construction locations. Impacts from CM1 would occur within the first 10-14 years
 26 of Alternative 4 implementation.

- 27 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancements
 28 would permanently remove approximately 83 acres and temporarily remove 88 acres of
 29 modeled least Bell's vireo and yellow warbler habitat in the Yolo Bypass in CZ 2. The loss is
 30 expected to occur during the first 10 years of Alternative 4 implementation.
- 31 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 32 inundation would permanently remove an estimated 545 acres of modeled least Bell's vireo and
 33 yellow warbler habitat.
- 34 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 35 seasonally inundated floodplain would permanently remove approximately 28 acres and
 36 temporarily remove 21 acres of modeled least Bell's vireo and yellow warbler habitat. Based on
 37 the riparian habitat restoration assumptions, a minimum of 3,000 acres of valley/foothill
 38 riparian habitat would be restored as a component of seasonally inundated floodplain
 39 restoration actions.

40 The actual number of acres of valley/foothill riparian habitat that CM4 and CM5 would restore
 41 may differ from these estimates, depending on how closely the actual outcome of tidal habitat
 42 restoration approximates the assumed outcome. However, riparian restoration from CM4 and
 43 CM5 would increase the extent of least Bell's vireo and yellow warbler habitat within the study
 44 area once the restored riparian vegetation has developed habitat functions for these species.

- 1 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
2 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
3 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
4 activity would occur along waterway margins where riparian habitat stringers exist, including
5 levees and channel banks. The improvements would occur within the study area on sections of
6 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 7 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
8 activities that could be implemented in protected least Bell's vireo and yellow warbler habitats
9 are expected to maintain and improve the functions of the habitat over the term of the BDCP.
10 Least Bell's vireo and yellow warbler would be expected to benefit from the increase in
11 protected habitat, which would maintain conditions favorable for future species establishment
12 in the study area. If least Bell's vireo and yellow warbler established breeding populations in
13 restored riparian habitats in the study area, occupied habitat would be monitored to determine
14 if there were a need to implement controls on brood parasites (brown-headed cowbird) or nest
15 predators. If implemented, these actions would be expected to benefit the least Bell's vireo and
16 yellow warbler by removing a potential stressor that could, if not addressed, adversely affect the
17 stability of newly established populations.
- 18 Habitat management- and enhancement-related activities could disturb least Bell's vireo and
19 yellow warbler nests. If either species were to nest in the vicinity of a worksite, equipment
20 operation could destroy nests, and noise and visual disturbances could lead to their
21 abandonment, resulting in mortality of eggs and nestlings. The potential for these activities to
22 result in direct mortality of least Bell's vireo or yellow warbler would be minimized with the
23 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
24 *Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
25 *Surveys and Avoid Disturbance of Nesting Birds*.
- 26 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
27 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
28 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding
29 habitat. Maintenance activities would include vegetation management, levee and structure
30 repair, and re-grading of roads and permanent work areas. These effects, however, would be
31 reduced by AMMs and conservation actions as described below.
- 32 • *Injury and Direct Mortality*: Nesting of least Bell's vireo and yellow warbler has not been
33 confirmed in the study area. Although there have been recent occurrences of least Bell's vireo in
34 the Yolo Bypass and of both least Bell's vireo and yellow warbler at the San Joaquin River
35 National Wildlife Refuge, the reestablishment of a breeding population of either species is
36 unlikely over the term of the project (14 years). If present in the study area, construction-related
37 activities would not be expected to result in direct mortality of least Bell's vireo or yellow
38 warbler because adults and fledged young would be expected to avoid contact with construction
39 and other equipment. If either species were to nest in the construction area, equipment
40 operation, noise and visual disturbances could destroy nests or lead to their abandonment,
41 resulting in mortality of eggs and nestlings. These effects would be avoided and minimized with
42 the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*
43 *Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-75, *Conduct Preconstruction*
44 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address
45 adverse effects on nesting yellow warblers.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
3 included.

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
8 effects of construction would not be adverse under NEPA. Alternative 4 would remove 520 acres of
9 modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-term. These
10 effects would result from the construction of the water conveyance facilities (CM1, 50 acres of
11 habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements
12 [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5], 470 acres of
13 habitat).

14 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
15 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter
16 3, *Conservation Strategy*, of the BDCP would be 1:1 for restoration/creation and 1:1 protection of
17 dense shrubby successional valley/foothill riparian habitat. Using these ratios would indicate that
18 50 acres of valley/foothill riparian habitat should be restored/created and 50 acres should be
19 protected to compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The
20 near-term effects of other conservation actions would remove 470 acres of modeled habitat, and
21 therefore require 470 acres of restoration and 470 acres of protection of dense shrubby
22 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
23 protection).

24 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
25 valley/foothill riparian natural community in the Plan Area (see Table 3-4 in Chapter 3, *Description*
26 *of Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in
27 the same timeframe as the construction and early restoration losses, thereby avoiding adverse
28 effects of habitat loss on least Bell's vireo and yellow warbler. The majority of the riparian
29 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
30 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in
31 Chapter 3, *Conservation Strategy*, of the BDCP). This restoration would provide the large contiguous
32 patches needed for suitable least Bell's vireo and yellow warbler breeding habitat. Goals and
33 objectives in the Plan for riparian restoration also include the restoration, maintenance and
34 enhancement of structural heterogeneity with adequate vertical and horizontal overlap among
35 vegetation components and over adjacent riverine channels, freshwater emergent wetlands, and
36 grasslands (Objective VFRNC2.1). These Plan objectives represent performance standards for
37 considering the effectiveness of CM7 restoration and CM3 protection actions. The acres of protection
38 contained in the near-term Plan goals and the additional detail in the biological objectives for least
39 Bell's vireo satisfy the typical mitigation ratios that would be applied to the project-level effects of
40 CM1, as well as mitigate the near-term effects of the other conservation measures. The restored
41 riparian habitat could require 5 years to several decades, for ecological succession to occur and for
42 restored riparian habitat to functionally replace habitat that has been affected. However, because
43 the modeled habitat impacted largely consists of small patches of blackberry, willow, and riparian
44 scrub, and because least Bell's vireo and yellow warbler are not known to be established breeders in

1 the study area, BDCP actions would not be expected to have an adverse population-level effect on
2 either species.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
7 *Restoration of Temporarily Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-*
8 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements
9 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
10 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
11 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
12 EIR/EIS. The yellow warbler is not a species that is covered under the BDCP. Although
13 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest
14 in the study area over the course of the BDCP), in order to have a less than adverse effect on
15 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
16 yellow warbler nests were detected and avoided. Mitigation Measure BIO-75 would be available to
17 address adverse effects on nesting yellow warblers.

18 **Late Long-Term Timeframe**

19 The habitat model indicates that the study area supports approximately 14,850 acres of modeled
20 habitat for least Bell's vireo and yellow warbler. Alternative 4 as a whole would result in the
21 permanent loss of and temporary effects on 815 acres of habitat for these species during the term of
22 the Plan (7% of the total habitat in the study area). These losses would occur from the construction
23 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4*
24 *Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The
25 locations of these losses would be in fragmented riparian habitat throughout the study area.

26 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
27 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
28 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
29 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
30 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
31 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives
32 in the Plan for riparian restoration also include the maintenance and enhancement of structural
33 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for
34 the least Bell's vireo and yellow warbler.

35 The BDCP's beneficial effects analysis (BDCP Chapter, Section 5.6, *Effects on Covered Wildlife and*
36 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
37 the restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo,
38 which would also be suitable habitat for the yellow warbler.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
43 *Restoration of Temporarily Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-*
44 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements

1 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
2 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
3 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
4 EIR/EIS.

5 **NEPA Effects:** The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality
6 of these special-status species under Alternative 4 would represent an adverse effect in the absence
7 of other conservation actions. However, neither species is an established breeder in the study area
8 and impacts would likely be limited to loss of migratory habitat. In addition, with habitat protection
9 and restoration associated with CM3 and CM7, guided by biological goals and objectives and by
10 *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and Monitoring,*
11 *AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill*
12 *Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge*
13 *Operations Plan, AMM10 Restoration of Temporarily Affected Natural Communities, and AMM22*
14 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,* which
15 would be in place during all project activities, the effects of habitat loss and potential mortality on
16 least Bell's vireo, and the effect of habitat loss on yellow warbler under Alternative 4 would not be
17 adverse. The yellow warbler is not a species that is covered under the BDCP, and the potential for
18 mortality would be an adverse effect without preconstruction surveys to ensure that nests are
19 detected and avoided. Mitigation Measure BIO-75 would be available to address this effect.

20 **CEQA Conclusion:**

21 **Near-Term Timeframe**

22 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
23 the near-term BDCP conservation strategy has been evaluated to determine whether it would
24 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
25 the impacts of construction would be less than significant under CEQA. Alternative 4 would remove
26 520 acres of modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-
27 term. These effects would result from the construction of the water conveyance facilities (CM1, 50
28 acres of habitat), and implementing other conservation measures (Yolo Bypass fisheries
29 improvements [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5],
30 470 acres of habitat).

31 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
32 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter
33 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby
34 successional valley/foothill riparian habitat. Using these ratios would indicate that 50 acres of
35 valley/foothill riparian habitat should be restored/created and 50 acres should be protected to
36 mitigate the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects of
37 other conservation actions would remove 470 acres of tidal natural communities, and therefore
38 require 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill
39 riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

40 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
41 valley/foothill riparian natural community in the Plan Area (see Table 3-4 in Chapter 3, *Description*
42 *of Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in
43 the same timeframe as the construction and early restoration losses, thereby avoiding adverse
44 effects of habitat loss on least Bell's vireo and yellow warbler. The majority of the riparian

1 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
2 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP
3 Chapter 3, *Conservation Strategy*). This restoration would provide the large contiguous patches
4 needed for suitable least Bell's vireo and yellow warbler breeding habitat. Goals and objectives in
5 the Plan for riparian restoration also include the restoration, maintenance and enhancement of
6 structural heterogeneity with adequate vertical and horizontal overlap among vegetation
7 components and over adjacent riverine channels, freshwater emergent wetlands, and grasslands
8 (Objective VFRNC2.1). These Plan objectives represent performance standards for considering the
9 effectiveness of CM7 restoration and CM3 protection actions.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
14 *Restoration of Temporarily Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-*
15 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements
16 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
17 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
18 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
19 EIR/EIS.

20 In the absence of other conservation actions, the effects on least Bell's vireo and yellow warbler
21 habitat from Alternative 4 would represent an adverse effect as a result of habitat modification and
22 potential for direct mortality of special-status species. The acres of protection contained in the near-
23 term Plan goals and the additional detail in the biological objectives for least Bell's vireo satisfy the
24 typical mitigation ratios that would be applied to the project-level effects of CM1, as well as mitigate
25 the near-term effects of the other conservation measures. The restored riparian habitat could
26 require 5 years to several decades, for ecological succession to occur and for restored riparian
27 habitat to functionally replace habitat that has been affected. However, because the modeled habitat
28 impacted largely consists of small patches of blackberry, willow, and riparian scrub, and because
29 least Bell's vireo and yellow warbler are not known to be established breeders in the study area,
30 temporal losses of potential habitat as a result of BDCP actions would not be expected to have an
31 adverse population-level effect on either species.

32 The yellow warbler is not a species that is covered under the BDCP. Although preconstruction
33 surveys for least Bell's vireo may also detect yellow warblers (if they were to nest in the study area
34 over the course of the BDCP), in order to avoid an adverse effect on individuals, preconstruction
35 surveys for noncovered avian species would be required to ensure that yellow warbler nests are
36 detected and avoided. Mitigation Measure BIO-75 would reduce the potential impact on nesting
37 yellow warblers to a less-than-significant impact, should they become established in the study area.
38 Considering the conservation actions described above, and AMM1–AMM7 AMM 22, and Mitigation
39 Measure BIO-75, Alternative 4 over the term of the BDCP would not result in a substantial adverse
40 effect through habitat modifications and would not substantially reduce the number or restrict the
41 range of either species. Therefore, Alternative 4 would have a less-than-significant impact on least
42 Bell's vireo and yellow warbler.

1 **Late Long-Term Timeframe**

2 The habitat model indicates that the study area supports approximately 14,850 acres of modeled
3 habitat for least Bell's vireo and yellow warbler. Alternative 4 as a whole would result in the
4 permanent loss of and temporary effects on 815 acres of habitat for these species during the term of
5 the Plan (7% of the total habitat in the study area). These losses would occur from the construction
6 of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4*
7 *Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain Restoration*. The
8 locations of these losses would be in fragmented riparian habitat throughout the study area.

9 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
10 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
11 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
12 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
13 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
14 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives
15 in the Plan for riparian restoration also include the maintenance and enhancement of structural
16 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for
17 the least Bell's vireo and yellow warbler. The restored riparian habitat could require 5 years to
18 several decades, for ecological succession to occur and for restored riparian habitat to functionally
19 replace habitat that has been affected. Therefore, there would be a time-lag before the restored
20 habitat would benefit either species. However, neither species are established breeders in the study
21 area and impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow
22 warbler.

23 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
24 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
25 the restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo,
26 which would also be suitable habitat for the yellow warbler.

27 The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality of these
28 special-status species under Alternative 4 would represent an adverse effect in the absence of other
29 conservation actions. However, neither species is an established breeder in the study area and
30 impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow warbler.
31 In addition, with habitat protection and restoration associated with CM3 and CM7, guided by
32 biological goals and objectives and by *AMM1 Worker Awareness Training, AMM2 Construction Best*
33 *Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion*
34 *and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6*
35 *Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily*
36 *Affected Natural Communities, and AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
37 *Vireo, Western Yellow-Billed Cuckoo*, which would be in place during all project activities, the impact
38 of habitat loss and potential mortality on least Bell's vireo and the impact of habitat loss on yellow
39 warbler under Alternative 4 would be less than significant. The yellow warbler is not a species that
40 is covered under the BDCP. Although preconstruction surveys for least Bell's vireo may also detect
41 nesting yellow warblers, for the BDCP to have a less-than-significant impact on individuals,
42 preconstruction surveys for noncovered avian species would be required to ensure that yellow
43 warbler nests are detected and avoided. Implementation of Mitigation Measure BIO-75 would
44 reduce this potential impact on nesting yellow warblers, if present in the study area, to a less-than-
45 significant level.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 To reduce impacts on nesting birds, DWR will implement the measures listed below prior to
4 construction and operations and maintenance activities.

- 5 • To the maximum extent feasible, vegetation removal and trimming will be scheduled during
6 the nonbreeding season of birds (September 1–January 31). If vegetation removal cannot be
7 removed in accordance with this timeframe, preconstruction/preactivity surveys for nesting
8 birds and additional protective measures will be implemented as described below.
- 9 • A qualified wildlife biologist with knowledge of the relevant species will conduct nesting
10 surveys before the start of construction. A minimum of three separate surveys will be
11 conducted within 30 days prior to construction, with the last survey within 3 days prior to
12 construction. Surveys will include a search of all suitable nesting habitat in the construction
13 area. In addition, a 500-foot radius around the construction area, where accessible, will be
14 surveyed for nesting raptors, and an area within 50 feet of construction will be surveyed for
15 other non-special status nesting birds or birds protected by the MBTA. If no active nests are
16 detected during these surveys, no additional measures are required.
- 17 • If active nests are found in the survey area, no-disturbance buffers will be established
18 around the nest sites to avoid disturbance or destruction of the nest site until the end of the
19 breeding season (approximately September 1) or until a qualified wildlife biologist
20 determines that the young have fledged and moved out of the project area (this date varies
21 by species). A qualified wildlife biologist will monitor construction activities in the vicinity
22 of the nests to ensure that construction activities do not affect nest success. The extent of the
23 buffers will be determined by DWR biologists in consultation with USFWS and CDFW and
24 will depend on the level of noise or construction disturbance, line-of-sight between the nest
25 and the disturbance, ambient levels of noise and other disturbances, and other
26 topographical or artificial barriers. Suitable buffer distances may vary between species.

27 **Impact BIO-76: Fragmentation of Least Bell's Vireo and Yellow Warbler Habitat**

28 Grading, filling, contouring, and other initial ground-disturbing operations may temporarily
29 fragment modeled least Bell's vireo and yellow warbler habitat. This could temporarily reduce the
30 affected habitat's extent and functions, including exposure to cowbird parasitism, a nest parasite of
31 both species. Preconstruction surveys under *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
32 *Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, Conduct
33 Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would identify any
34 nesting pairs and the potential for habitat fragmentation to affect either species. If a nesting pairs of
35 either species were detected where fragmentation has occurred, nests would be monitored for edge
36 effects or other effects caused by the disturbance. The habitat would be adaptively managed to avoid
37 or minimize impacts (e.g., cowbird control) under CM11, which includes the control of nonnative
38 predators through habitat manipulation techniques or trapping to reduce nest predation.

39 **NEPA Effects:** Because there are only two recent occurrences of least Bell's vireo within the study
40 area, and no occurrences of yellow warbler breeding in the study area, habitat fragmentation
41 resulting from ground-disturbing operations is not expected to affect either species. If nesting pairs
42 of either species were detected where fragmentation has occurred, nests would be monitored for
43 edge effects or other effects caused by the disturbance. The habitat would be adaptively managed to

1 avoid or minimize impacts (e.g., cowbird control) under CM11. Therefore, habitat fragmentation as a
2 result of Alternative 4 implementation would not have an adverse effect on least Bell's vireo or
3 yellow warbler.

4 **CEQA Conclusion:** Because there are only two recent occurrences of least Bell's vireo within the
5 study area, and no occurrences of yellow warbler breeding in the study area, habitat fragmentation
6 resulting from ground-disturbing operations would not be expected to substantially modify habitat
7 or result in the direct mortality of special status species. If nesting pairs of either species were
8 detected where fragmentation has occurred, nests would be monitored for edge effects or other
9 effects caused by the disturbance. The habitat would be adaptively managed to avoid or minimize
10 impacts (e.g., cowbird control) under CM11. Therefore, habitat fragmentation as a result of
11 Alternative 4 would have a less-than-significant impact on least Bell's vireo and yellow warbler.

12 **Impact BIO-77: Effects on Least Bell's Vireo and Yellow Warbler Associated with Electrical** 13 **Transmission Facilities**

14 Both least Bell's vireo and yellow warbler typically occur in early to mid-successional riparian
15 habitat, which is used to meet all of its life requisites. Least Bell's vireo are rarely observed in open
16 habitats away from riparian vegetation. Neither species form flocks and individuals generally
17 remain at or below the riparian canopy, below the height of proposed transmission lines (see
18 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*, of
19 the BDCP). The behavior and habitat requirements of least Bell's vireo and yellow warbler make
20 collision with the proposed transmission lines unlikely. *AMM30 Transmission Line Design and*
21 *Alignment Guidelines* would ensure that the transmission lines, poles, and towers are designed to
22 avoid sensitive terrestrial habitats (including riparian) to the maximum extent feasible, which would
23 minimize the potential for collision. Marking transmission lines with flight diverters that make the
24 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
25 Drewien 1995). For example, Yee (2008) estimated that marking devices in the Central Valley could
26 reduce avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new project
27 transmission lines would be fitted with flight diverters, which would substantially reduce any
28 potential for mortality of least Bell's vireo or yellow warbler individuals from powerline collisions.

29 **NEPA Effects:** Installation and presence of new transmission lines would not result in an adverse
30 effect on least Bell's vireo or yellow warbler because the probability of bird-powerline strikes is
31 unlikely due to the behavior and habitat requirements of these species. *AMM30 Transmission Line*
32 *Design and Alignment Guidelines* would avoid impacts on riparian habitat to the maximum extent
33 feasible, which would minimize the potential for collision. *AMM20 Greater Sandhill Crane* contains
34 the commitment to place bird strike diverters on all new powerlines, which would substantially
35 reduce the risk of mortality from bird strike for least Bell's vireo and yellow warbler as a result of
36 the project. Therefore, the construction and operation of new transmission lines would not result in
37 an adverse effect on least Bell's vireo or yellow warbler.

38 **CEQA Conclusion:** Installation and presence of new transmission lines would result in less-than-
39 significant impact on least Bell's vireo or yellow warbler because the probability of bird-powerline
40 strikes is unlikely due to the behavior and habitat requirements of these species. *AMM30*
41 *Transmission Line Design and Alignment Guidelines* would avoid impacts on riparian habitat to the
42 maximum extent feasible, which would minimize the potential for collision. *AMM20 Greater Sandhill*
43 *Crane* contains the commitment to place bird strike diverters on all new powerlines, which would
44 substantially reduce the risk of mortality from bird strike for least Bell's vireo and yellow warbler as

1 a result of the project. Therefore, the construction and operation of new transmission lines would
2 result in a less-than-significant impact on least Bell's vireo or yellow warbler.

3 **Impact BIO-78: Indirect Effects of Plan Implementation on Least Bell's Vireo and Yellow** 4 **Warbler**

5 **Indirect Construction- and Operation-Related Effects:** If least Bell's vireo or yellow warbler were
6 to nest in or adjacent to work areas, construction and subsequent maintenance-related noise and
7 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
8 functions of suitable nesting habitat for these species. Construction noise above background noise
9 levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities
10 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
11 *Facility on Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP Revisions*), although
12 there are no available data to determine the extent to which these noise levels could affect least
13 Bell's vireo or yellow warbler. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*
14 *Western Yellow-Billed Cuckoo* would reduce the potential for adverse effects of construction-related
15 activities on survival and productivity of nesting least Bell's vireo and a 500 foot no-disturbance
16 buffer would be established around the active nest. Mitigation Measure BIO-75, *Conduct*
17 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
18 reduce the potential for adverse effects of construction-related activities on nesting yellow warbler.
19 The use of mechanical equipment during water conveyance facilities construction could cause the
20 accidental release of petroleum or other contaminants that could affect least Bell's vireo and yellow
21 warbler in the surrounding habitat. The inadvertent discharge of sediment or excessive dust
22 adjacent to suitable habitat could also have an adverse effect on these species. *AMM2 Construction*
23 *Best Management Practices and Monitoring* would minimize the likelihood of such spills and ensure
24 that measures are in place to prevent runoff from the construction area and negative effects of dust
25 on active nests.

26 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
27 mercury in avian species, including the least Bell's vireo and yellow warbler. Marsh (tidal and
28 nontidal) and floodplain restoration have the potential to increase exposure to methylmercury.
29 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
30 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains
31 (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas could
32 increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of
33 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of
34 uncertainty with respect to species-specific effects. Increased methylmercury associated with
35 natural community and floodplain restoration could indirectly affect least Bell's vireo and yellow
36 warbler, via uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

37 The potential mobilization or creation of methylmercury within the study area varies with site-
38 specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
39 *Management* (as revised in Appendix 11F, *Substantive BDCP Revisions*) contains provisions for
40 project-specific Mercury Management Plans. Site-specific restoration plans that address the creation
41 and mobilization of mercury, as well as monitoring and adaptive management as described in CM12
42 would be available to address the uncertainty of methylmercury levels in restored tidal marsh and
43 potential impacts on least Bell's vireo and yellow warbler.

1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 5 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 6 classes within a species. In addition, the effect of selenium on a species can be confounded by
 7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 8 2009).

9 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
 10 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
 11 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
 12 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
 13 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
 14 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
 15 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
 16 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
 17 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
 18 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
 19 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
 20 have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 22 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 23 exacerbate bioaccumulation of selenium in avian species, including least Bell's vireo and yellow
 24 warbler. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
 25 selenium, and, therefore, increase avian exposure from ingestion of prey items with elevated
 26 selenium levels. Thus, Alternative 4 restoration activities that create newly inundated areas could
 27 increase bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of
 28 restoration). Changes in selenium concentrations are analyzed in Chapter 8, *Water Quality*, which
 29 concludes that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
 30 in substantial, long-term increases in selenium concentrations in water in the Delta under any
 31 alternative. However, it is difficult to determine whether the effects of potential increases in
 32 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)
 33 would lead to adverse effects on least Bell's vireo and yellow warbler.

34 Because of the uncertainty that exists at this programmatic level of review, there could be a
 35 substantial effect on least Bell's vireo and yellow warbler from increases in selenium associated with
 36 restoration activities. This effect would be addressed through the implementation of *AMM27*
 37 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 38 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
 39 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
 40 selenium management to reduce selenium concentrations and/or bioaccumulation would be
 41 evaluated separately for each restoration effort as part of design and implementation. This
 42 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
 43 design schedule.

44 **NEPA Effects:** Impacts of noise, the potential for hazardous spills, increased dust and sedimentation,
 45 and operations and maintenance of the water conveyance facilities on least Bell's vireo would not be

1 adverse with the implementation of AMM1–AMM7, and *AMM22 Suisun Song Sparrow, Yellow-*
2 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct*
3 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
4 address adverse effects on nesting yellow warblers.

5 Tidal habitat restoration could result in increased exposure of least Bell's vireo and yellow warbler
6 to selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
7 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
8 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

9 The implementation of tidal natural communities restoration or floodplain restoration could result
10 in increased exposure of least Bell's vireo or yellow warbler to methylmercury, should they begin to
11 nest in the study area. However, it is unknown what concentrations of methylmercury are harmful
12 to these species. Site-specific restoration plans that address the creation and mobilization of
13 mercury, as well as monitoring and adaptive management as described in *CM12 Methylmercury*
14 *Management*, would be available to address the uncertainty of methylmercury levels in restored
15 tidal marsh and potential adverse effects of methylmercury on least Bell's vireo and yellow warbler.

16 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
17 sedimentation, and operations and maintenance of the water conveyance facilities would have a
18 less-than-significant impact on least Bell's vireo and yellow warbler with the implementation of
19 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*,
20 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
21 *Nesting Birds*, and *AMM2 Construction Best Management Practices and Monitoring*.

22 Tidal habitat restoration could result in increased exposure of least Bell's vireo and yellow warbler
23 to selenium. With the implementation of *AMM27 Selenium Management*, which would provide
24 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
25 selenium and its bioavailability in tidal habitats, the impact of potential increased selenium
26 exposure would be less than significant.

27 The implementation of tidal natural communities restoration or floodplain restoration could result
28 in increased exposure of least Bell's vireo or yellow warbler to methylmercury, should they begin to
29 nest in the study area. However, it is unknown what concentrations of methylmercury are harmful
30 to these species. Sites-specific restoration plans that address the creation and mobilization of
31 mercury, as well as monitoring and adaptive management as described in *CM12 Methylmercury*
32 *Management*, would be available to address the uncertainty of methylmercury levels in restored
33 tidal marsh and significant impacts on least Bell's vireo and yellow warbler.

34 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
35 **Disturbance of Nesting Birds**

36 See Mitigation Measure BIO-75 under Impact BIO-75.

37 **Impact BIO-79: Periodic Effects of Inundation of Least Bell's Vireo and Yellow Warbler**
38 **Habitat as a Result of Implementation of Conservation Components**

39 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
40 duration of inundation of approximately 48–85 acres of modeled least Bell's vireo and yellow
41 warbler habitat in CZ 2. No adverse effects of increased inundation frequency on least Bell's vireo,
42 yellow warbler, or their habitat would be expected, because riparian vegetation supporting habitat

1 has persisted under the existing Yolo Bypass flooding regime and changes to frequency and
2 inundation would be within the tolerance of these vegetation types.

3 Based on hypothetical floodplain restoration for CM5, construction of setback levees could result in
4 periodic inundation of up to 148 acres of modeled least Bell's vireo and yellow warbler habitat in CZ
5 7. Inundation of restored floodplains would not be expected to affect least Bell's vireo, yellow
6 warbler, or their habitat because the breeding period is outside the period when floodplains would
7 likely be inundated. Additionally, periodic inundation of floodplains would be expected to restore a
8 more natural flood regime in support of riparian vegetation types that support least Bell's vireo and
9 yellow warbler habitat. The overall effect of seasonal inundation in existing riparian natural
10 communities would be beneficial, because, historically, flooding was the main natural disturbance
11 regulating ecological processes in riparian areas, and flooding promotes the germination and
12 establishment of many native riparian plants.

13 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85 acres
14 (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler. However,
15 periodic effects of inundation would not result in an adverse effect on least Bell's vireo or yellow
16 warbler because inundation would occur primarily during the nonbreeding season and would
17 promote a more natural flood regime in support of habitat for these species. The effect would be
18 beneficial.

19 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85
20 acres (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler.
21 However, periodic effects of inundation would have a less-than-significant impact on least Bell's
22 vireo or yellow warbler because inundation would occur during the nonbreeding season and would
23 not be expected to adversely modify habitat or result in direct mortality of either species. Flooding
24 promotes the germination and establishment of many native riparian plants. Therefore, the overall
25 impact of seasonal inundation in existing riparian natural communities would be beneficial for least
26 Bell's vireo and yellow warbler.

27 **Suisun Song Sparrow and Saltmarsh Common Yellowthroat**

28 This section describes the effects of Alternative 4, including water conveyance facilities construction
29 and implementation of other conservation components, on Suisun song sparrow and saltmarsh
30 common yellowthroat. The habitat model used to assess effects on Suisun song sparrow and
31 saltmarsh common yellowthroat is based on primary breeding habitat and secondary habitat.
32 Suisun song sparrow and saltmarsh common yellowthroat primary habitat consists of all *Salicornia*-
33 dominated tidal brackish emergent wetland and all *Typha*-, *Scirpus*-, and *Juncus*-dominated tidal
34 freshwater emergent wetland in the study area west of Sherman Island, with the exception that
35 *Scirpus acutus* and *S. californicus* plant communities (low marsh) and all of the plant communities
36 listed below that occur in managed wetlands were classified as secondary habitat. Upland
37 transitional zones, providing refugia during high tides, within 150 feet of the wetland edge were also
38 included as secondary habitat. Secondary habitats generally provide only a few ecological functions
39 such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland transition
40 zones), while primary habitats provide multiple functions, including breeding, effective predator
41 cover, and value forage.

42 Construction and restoration associated with Alternative 4 conservation measures would result in
43 both temporary and permanent losses of Suisun song sparrow and saltmarsh common yellowthroat
44 modeled habitat as indicated in Table 12-4-34. The majority of the losses would take place over an

1 extended period of time as tidal marsh is restored in the study area. Full implementation of
2 Alternative 4 would also include the following conservation actions over the term of the BDCP to
3 benefit the Suisun song sparrow and the saltmarsh common yellowthroat (BDCP Chapter 3, Section
4 3.3, *Biological Goals and Objectives*).

- 5 • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at
6 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
7 with CM4).
- 8 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
9 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 10 • Protect at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area
11 (Objective GNC1.4, associated with CM3).

12 As explained below, with the restoration and protection of these amounts of habitat, in addition to
13 natural community enhancement and management commitments (including *CM12 Methylmercury*
14 *Management*) and implementation of AMM1–AMM7, *AMM22 Suisun Song Sparrow, Yellow-Breasted*
15 *Chat, Least Bell’s Vireo, Western Yellow-Billed Cuckoo*, and Mitigation Measure BIO-75, *Conduct*
16 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, impacts on Suisun song
17 sparrow and saltmarsh common yellowthroat would not be adverse for NEPA purposes and would
18 be less than significant for CEQA purposes.

19 **Table 12-4-34. Changes in Suisun Song Sparrow Saltmarsh Common Yellowthroat Modeled Habitat**
20 **Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1							
CM2–CM18	Primary	54	55	0	0	0	0
	Secondary	1,098	3,633	0	0	0	0
Total Impacts CM2–CM18		1,152	3,633	0	0	0	0
TOTAL IMPACTS		1,152	3,688	0	0	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-80: Loss or Conversion of Habitat for and Direct Mortality of Suisun Song Sparrow and Saltmarsh Common Yellowthroat

Alternative 4 conservation measures would result in the permanent loss of up to 3,510 acres of Suisun song sparrow and saltmarsh common yellowthroat habitat, which would include the conversion of 55 acres of primary habitat to secondary low marsh, and the conversion of 123 acres of secondary habitat to middle or high marsh (Table 12-4-34). The only conservation measure that would affect modeled habitat for Suisun song sparrow and saltmarsh common yellowthroat is *CM4 Tidal Natural Communities Restoration*. Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follows the individual conservation measure discussions.

- CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would permanently remove approximately 3,510 acres of modeled secondary Suisun song sparrow and saltmarsh common yellowthroat habitat from CZ 11 (Table 12-4-34). In addition, 55 acres of primary habitat would be converted to secondary low marsh, and 123 acres of secondary habitat would be converted to middle or high marsh. Most areas proposed for removal would be managed wetlands that serve as relatively marginal habitat for Suisun song sparrow and saltmarsh common yellowthroat, which primarily use brackish tidal wetlands. Approximately 2% of primary habitat for these species would be converted to foraging habitat. Full implementation of CM4 would restore or create at least 6,000 acres of tidal brackish emergent wetland natural community in CZ 11, which would be expected to support Suisun song sparrow and saltmarsh common yellowthroat habitat. It is expected that restoring tidal wetland communities that are self-sustaining and not reliant on ongoing management actions necessary to maintain the existing managed wetland habitats would better ensure the long-term viability of these populations. Furthermore, effects of tidal habitat restoration on sparrow and yellowthroat abundance and distribution would be monitored, and the restoration of tidal habitat would be sequenced and located in a manner that minimizes effects on occupied habitats until functional habitats were restored (see Chapter 3, Section 3.4.4, *Conservation Measure 4 Tidal Natural Communities Restoration*, and Section 3.6, *Adaptive Management and Monitoring Program*, of the BDCP).
- CM11 Natural Communities Enhancement and Management*: Control of nonnative Suisun song sparrow and saltmarsh common yellowthroat predators, if deemed necessary, would be expected to reduce predation loss of nests and, consequently, increase and maintain the abundance of Suisun song sparrow and saltmarsh common yellowthroat in restored tidal habitats over the term of the BDCP. Habitat management- and enhancement-related activities could disturb Suisun song sparrow or saltmarsh common yellowthroat nests if they are located near work sites. The potential for these activities to have an adverse effect on Suisun song sparrow would be avoided and minimized through *AMM22 Suisun Song Sparrow, Yellow-breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address these effects on saltmarsh common yellowthroat. A variety of *CM11 Natural Communities Enhancement and Management* habitat management actions that are designed to enhance wildlife values in restored and protected tidal wetland habitats may result in localized ground disturbances that could temporarily remove small amounts of Suisun song sparrow and saltmarsh common yellowthroat habitat in CZ 11. Ground-disturbing activities,

1 such as removal of nonnative vegetation and road and other infrastructure maintenance
2 activities, are expected to have minor adverse effects on available species' habitat.

- 3 • Operations and Maintenance: Postconstruction operation and maintenance of the restoration
4 infrastructure could result in ongoing but periodic disturbances that could affect Suisun song
5 sparrow and saltmarsh common yellowthroat use of the surrounding habitat in Suisun.
6 Maintenance activities could include vegetation management, and levee repair. These effects,
7 however, would be reduced by AMMs and conservation actions as described below.
- 8 • Construction-related activities could result in nest destruction or disturbance resulting in
9 mortality of eggs and nestlings if restoration activities took place within the nesting period for
10 these species. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
11 *Yellow-Billed Cuckoo* would minimize these potential effects on Suisun song sparrow. Mitigation
12 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
13 *Birds*, would be available to address these effects on saltmarsh common yellowthroat. Grading,
14 filling, contouring, and other initial ground-disturbing operations during restoration activities
15 could temporarily fragment existing modeled tidal brackish emergent wetland habitat for
16 Suisun song sparrow and saltmarsh common yellowthroat which could temporarily reduce the
17 extent and functions of the affected habitat. These temporary effects would be minimized
18 through sequencing of restoration activities and through *AMM22 Suisun Song Sparrow, Yellow-*
19 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75.

20 The following paragraphs summarize the combined effects discussed above and describe other
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
22 included.

23 ***Near-Term Timeframe***

24 Under Alternative 4, there would be no impacts resulting from the construction of the water
25 conveyance facilities (CM1). However, there would be a permanent loss of 1,040 acres of modeled
26 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in
27 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging
28 habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would
29 provide primary nesting habitat for these species. Although there would be a temporal lag in these
30 conversions, there would be no net loss of primary habitat in the near-term. These effects would
31 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun
32 Marsh in CZ 11.

33 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
34 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in
35 Chapter 3, *Conservation Strategy*, of the BDCP would be 1:1 for restoration/creation of tidal brackish
36 emergent habitat. Using this ratio would indicate that 1,152 acres of tidal brackish emergent
37 wetland should be restored/created to compensate for the near-term losses of Suisun song sparrow
38 and saltmarsh common yellowthroat habitat.

39 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent
40 wetland and 4,800 acres of managed wetland in the study area. These conservation actions are
41 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early
42 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and
43 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11

1 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh
2 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in Chapter 3,
3 *Conservation Strategy*, of the BDCP) and would be restored in a way that creates topographic
4 heterogeneity and in areas that increase connectivity among protected lands (Objective
5 TBEWNC1.4). Portions of the 4,800 acres of managed wetland would benefit both the Suisun song
6 sparrow and the saltmarsh common yellowthroat through the enhancement of degraded areas to
7 provide dense native vegetation, which is required for nesting sites, song perches, and refuge from
8 predators. Tidal wetlands would be restored in a mosaic of large, interconnected and biologically
9 diverse patches. Larger and more interconnected patches of suitable habitat would be expected to
10 reduce the effects of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative
11 predators would be controlled as needed to reduce nest predation and to help maintain species
12 abundance (CM11). Restoration would be sequenced over the term of the Plan and occur in a
13 manner that would minimize any temporary, initial loss and fragmentation of habitat. The acres of
14 restoration and protection contained in the near-term Plan goals, and the incorporation of the
15 additional measures in the biological goals and objectives (see Chapter 3, *Conservation Strategy*, of
16 the BDCP) would be sufficient to mitigate the near-term effects of tidal restoration.

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
18 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
20 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
21 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
22 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
23 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
24 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
25 of the Final EIR/EIS. The saltmarsh common yellowthroat is not a species that is covered under the
26 BDCP. Although preconstruction surveys for Suisun song sparrow would likely also detect nesting
27 saltmarsh common yellowthroat, in order to avoid adverse effects on individuals, preconstruction
28 surveys for noncovered avian species would be required to ensure that saltmarsh common
29 yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would be available to
30 address adverse effects of construction activities on nesting saltmarsh common yellowthroat.

31 ***Late Long-Term Timeframe***

32 The habitat model indicates that the study area supports approximately 3,722 acres of primary and
33 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.
34 Alternative 4 as a whole would result in the permanent loss of 3,510 acres of habitat (15% of the
35 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*
36 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary
37 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

38 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or
39 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)
40 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse
41 patches, and at least 1,500 acres of restored marsh would consist of middle- and high-marsh
42 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for
43 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,
44 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to
45 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This

1 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise
2 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be
3 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more
4 interconnected patches of suitable habitat would be expected to reduce the effects of habitat
5 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be
6 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
7 Restoration would be sequenced over the term of the Plan and occur in a manner that would
8 minimize any temporary, initial loss and fragmentation of habitat.

9 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
10 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
11 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat in addition to
12 the protection of 384 acres of secondary habitat for Suisun song sparrow, which would also benefit
13 the saltmarsh common yellowthroat.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
15 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
16 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
17 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
18 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
19 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
20 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
21 which have since been updated and which are provided in Appendix 3B, *Environmental*
22 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

23 **NEPA Effects:** The loss of Suisun song sparrow and saltmarsh common yellowthroat habitat and
24 potential direct mortality of these special-status species under Alternative 4 would represent an
25 adverse effect in the absence of other conservation actions. However, with habitat protection and
26 restoration associated with CM4, with the management and enhancement actions (CM11), and with
27 the incorporation of additional measures in the biological goals and objectives, guided by AMM1–
28 AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*
29 *Billed Cuckoo*, which would be in place during all project activities, the effects of habitat loss and
30 potential mortality on Suisun song sparrow would not be adverse, and the effects of habitat loss and
31 conversion on saltmarsh common yellowthroat would not be adverse under Alternative 4. The
32 saltmarsh common yellowthroat is not a species that is covered under the BDCP. Although
33 preconstruction surveys for Suisun song sparrow would likely also detect nesting saltmarsh
34 common yellowthroat, for the BDCP to avoid adverse effects on individuals, preconstruction surveys
35 for noncovered avian species would be required to ensure that saltmarsh common yellowthroat
36 nests are detected and avoided. Mitigation Measure BIO-75 would be available to address this
37 adverse effect.

38 **CEQA Conclusion:**

39 **Near-Term Timeframe**

40 Under Alternative 4, there would be no impacts resulting from the construction of the water
41 conveyance facilities (CM1). However, there would be a permanent loss of 1,040 acres of modeled
42 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in
43 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging
44 habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would

1 provide primary nesting habitat for these species. Although there would be a temporal lag in these
2 conversions, there would be no net loss of primary habitat in the near-term. These effects would
3 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun
4 Marsh in CZ 11.

5 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
6 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in
7 Chapter 3, *Conservation Strategy*, of the BDCP would be 1:1 for restoration/creation of tidal brackish
8 emergent habitat. Using this ratio would indicate that 1,152 acres of tidal brackish emergent
9 wetland should be restored/created to mitigate the near-term losses of Suisun song sparrow and
10 saltmarsh common yellowthroat habitat.

11 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent
12 wetland and 4,800 acres of managed wetland in the study area. These conservation actions are
13 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early
14 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and
15 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11
16 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh
17 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1 in BDCP Chapter
18 3, *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and
19 in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the
20 4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh
21 common yellowthroat through the enhancement of degraded areas to provide dense native
22 vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal
23 wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.
24 Larger and more interconnected patches of suitable habitat would be expected to reduce the effects
25 of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would
26 be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
27 Restoration would be sequenced over the term of the Plan and occur in a manner that would
28 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and
29 protection contained in the near-term Plan goals, and the incorporation of the additional measures
30 in the biological goals and objectives (BDCP Chapter 3, *Conservation Strategy*) would be sufficient to
31 mitigate the near-term effects of tidal restoration.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
36 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
37 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
38 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
39 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
40 of the Final EIR/EIS. The saltmarsh common yellowthroat is not a species that is covered under the
41 BDCP. Although preconstruction surveys for Suisun song sparrow would likely also detect nesting
42 saltmarsh common yellowthroat, in order to avoid adverse effects on individuals, preconstruction
43 surveys for noncovered avian species would be required to ensure that saltmarsh common
44 yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would reduce the impact of
45 construction activities on nesting saltmarsh common yellowthroat to a less-than-significant level.

1 In the absence of other conservation actions, the effects on Suisun song sparrow and saltmarsh
2 common yellowthroat would represent an adverse effect as a result of habitat modification and
3 potential mortality of special-status species. Because the number of acres required to meet the
4 typical mitigation ratio described above would be only 3,590 acres of restored/created tidal natural
5 communities, the 6,000 acres of tidal brackish and tidal freshwater emergent wetland restoration
6 and the 4,100 acres of managed wetland protection and enhancement contained in the near-term
7 Plan goals, and the additional detail in the biological objectives for Suisun song sparrow, are more
8 than sufficient to support the conclusion that the near-term impacts of habitat loss and direct
9 mortality of Suisun song sparrow or saltmarsh common yellowthroat under Alternative 4 would be
10 less than significant under CEQA.

11 **Late Long-Term Timeframe**

12 The habitat model indicates that the study area supports approximately 3,722 acres of primary and
13 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.
14 Alternative 4 as a whole would result in the permanent loss of 3,510 acres of habitat (15% of the
15 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*
16 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary
17 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

18 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or
19 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)
20 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse
21 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh
22 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for
23 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,
24 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to
25 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This
26 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise
27 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be
28 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more
29 interconnected patches of suitable habitat would be expected to reduce the effects of habitat
30 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be
31 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
32 Restoration would be sequenced over the term of the Plan and occur in a manner that would
33 minimize any temporary, initial loss and fragmentation of habitat.

34 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
35 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above
36 could result in the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat
37 in addition to the protection of 384 acres of secondary habitat for Suisun song sparrow, which
38 would also benefit the saltmarsh common yellowthroat.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
43 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
44 these AMMs include elements that would avoid or minimize the risk of affecting individuals and

1 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
2 which have since been updated and which are provided in Appendix 3B, *Environmental*
3 *Commitments, AMMs, and CMs*, of the Final EIR/EIS. The saltmarsh common yellowthroat is not a
4 covered species under the BDCP. Although preconstruction surveys for Suisun song sparrow may
5 detect nesting saltmarsh common yellowthroat, for the BDCP to have a less-than-significant impact
6 on individuals, preconstruction surveys for noncovered avian species would be required to ensure
7 that saltmarsh common yellowthroat nests are detected and avoided. Mitigation Measure BIO-75
8 would reduce this potential impact on nesting saltmarsh common yellowthroat to a less-than-
9 significant level.

10 Considering Alternative 4's restoration provisions, which would replace low-value secondary
11 habitat with high-value tidal brackish emergent habitat, including both foraging and primary
12 habitat, and provide upland refugia for Suisun song sparrow and saltmarsh common yellowthroat,
13 the acreages of restoration would be sufficient to mitigate habitats lost to construction and
14 restoration activities. Loss of habitat or direct mortality through implementation of Alternative 4,
15 with the implementation of AMM1-AMM7, AMM22, and Mitigation Measure BIO-75, *Conduct*
16 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would not result in a
17 substantial adverse effect through habitat modifications and would not substantially reduce the
18 number or restrict the range of the species. Therefore, the loss of habitat or potential mortality
19 under this alternative would have a less-than-significant impact on Suisun song sparrow and
20 saltmarsh common yellowthroat.

21 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
22 **Disturbance of Nesting Birds**

23 See Mitigation Measure BIO-75 under Impact BIO-75.

24 **Impact BIO-81: Indirect Effects of Plan Implementation on Suisun Song Sparrow and**
25 **Saltmarsh Common Yellowthroat**

26 **Indirect Construction-Related Effects:** If Suisun song sparrow or saltmarsh common yellowthroat
27 were to nest in or adjacent to work areas, construction and subsequent maintenance-related noise
28 and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
29 functions of suitable nesting habitat for these species. Suisun song sparrow and saltmarsh common
30 yellowthroat habitat adjacent to restoration work areas could be affected by such disturbances,
31 which could temporarily result in diminished use of habitat. Construction noise above background
32 noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction
33 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
34 *Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP Revisions*, of
35 the Final EIR/EIS), although there are no available data to determine the extent to which these noise
36 levels could affect either species. If construction occurred during the nesting season, these indirect
37 effects could result in the loss or abandonment of nests and mortality of any eggs and/or nestlings.
38 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*
39 and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
40 *of Nesting Birds*, would avoid the potential for adverse effects of construction-related activities on
41 survival and productivity of Suisun song sparrow and saltmarsh common yellowthroat by requiring
42 preconstruction surveys and, if nests are present, the establishment of a no-disturbance buffer
43 within 250 feet of a nest site. The use of mechanical equipment during water conveyance facilities
44 construction could cause the accidental release of petroleum or other contaminants that could affect

1 species in the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent
2 to suitable habitat could also have an adverse effect on Suisun song sparrow and saltmarsh common
3 yellowthroat. *AMM2 Construction Best Management Practices and Monitoring* would minimize the
4 likelihood of such spills and ensure that measures are in place to prevent runoff from the
5 construction area and any adverse effects of dust on active nests.

6 **Salinity:** Water conveyance facilities operations would have an effect on salinity gradients in Suisun
7 Marsh; however, these effects cannot be reasonably disaggregated from effects resulting from tidal
8 habitat restoration. It is expected that the salinity of water in Suisun Marsh would generally increase
9 as a result of water conveyance facilities operations and operations of salinity control gates to mimic
10 a more natural water flow. This would likely encourage the establishment of tidal wetland plant
11 communities tolerant of more saline environments, which should have a beneficial effect on Suisun
12 song sparrow and saltmarsh common yellowthroat because their historical natural Suisun Marsh
13 habitat is brackish tidal marsh. However, the degree to which salinity changes in all tidal channels
14 and sloughs in and around Suisun Marsh would be highly variable.

15 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
16 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
17 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
18 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
19 newly inundated areas could increase bioavailability of mercury. Although tidal habitat restoration
20 might increase methylation of mercury export to other habitats, restoration is unlikely to
21 significantly increase the exposure of Suisun song sparrow or saltmarsh common yellowthroat to
22 methylmercury, as they currently reside in tidal marshes where elevated methylmercury levels
23 exist. Robinson et al. (2011) found toxic levels of methylmercury levels in song sparrow populations
24 from southern San Francisco Bay, although populations near Suisun Marsh (i.e., San Pablo and Simas
25 Creeks) were much lower. The potential mobilization or creation of methylmercury within the study
26 area varies with site-specific conditions and would need to be assessed at the project level. The
27 Suisun Marsh Plan anticipates that restored tidal wetlands would generate less methylmercury than
28 the existing managed wetlands to be restored (Bureau of Reclamation et al. 2010).

29 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
30 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
31 *Revisions*) is included to provide for site-specific evaluation for each restoration project. Where
32 restoration design and adaptive management cannot fully address the high potential for
33 methylmercury while also meeting restoration objectives, alternate restoration areas would be
34 considered on a project-specific basis. CM12 would be implemented in coordination with other
35 similar efforts to address mercury in the Delta, and specifically with the DWR Mercury Monitoring
36 and Analysis Section. This conservation measure would include the following actions.

- 37 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
38 mercury methylation and bioavailability.
- 39 ● Define design elements that minimize conditions conducive to generation of methylmercury in
40 restored areas.
- 41 ● Define adaptive management strategies that can be implemented to monitor and minimize
42 actual postrestoration creation and mobilization of methylmercury.

1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
5 2009). The effect of selenium toxicity differs widely between species and also between age and sex
6 classes within a species. In addition, the effect of selenium on a species can be confounded by
7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
8 2009).

9 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
10 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
11 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
12 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
13 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
14 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
15 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
16 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
17 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
18 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
19 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
20 have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
22 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
23 exacerbate bioaccumulation of selenium in avian species, including Suisun song sparrow and
24 saltmarsh common yellowthroat. Marsh (tidal and nontidal) and floodplain restoration have the
25 potential to mobilize selenium, and, therefore, increase avian exposure from ingestion of prey items
26 with elevated selenium levels. Thus, Alternative 4 restoration activities that create newly inundated
27 areas could increase bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for
28 details of restoration). Changes in selenium concentrations are analyzed in Chapter 8, *Water Quality*,
29 which concludes that, relative to Existing Conditions and the No Action Alternative, CM1 would not
30 result in substantial, long-term increases in selenium concentrations in water in the Delta under any
31 alternative. However, it is difficult to determine whether the effects of potential increases in
32 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)
33 would lead to adverse effects on Suisun song sparrow and saltmarsh common yellowthroat.

34 Because of the uncertainty that exists at this programmatic level of review, there could be a
35 substantial effect on Suisun song sparrow and saltmarsh common yellowthroat from increases in
36 selenium associated with restoration activities. This effect would be addressed through the
37 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
38 restoration design elements to reduce the potential for bioaccumulation of selenium and its
39 bioavailability in tidal habitats (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*).
40 Furthermore, the effectiveness of selenium management to reduce selenium concentrations and/or
41 bioaccumulation would be evaluated separately for each restoration effort as part of design and
42 implementation. This avoidance and minimization measure would be implemented as part of the
43 tidal habitat restoration design schedule.

1 **NEPA Effects:** Noise and visual disturbances would not have an adverse effect on Suisun song
2 sparrow with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
3 *Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
4 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects of
5 noise and visual disturbance on saltmarsh common yellowthroat. AMM1–AMM7, including *AMM2*
6 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of spills, and
7 ensure that measures were in place to prevent runoff from the construction area and to avoid
8 adverse effects of dust on the species.

9 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
10 habitat restoration would be expected to increase water salinity in Suisun Marsh, which would be
11 expected to establish tidal marsh similar to historic conditions.

12 Tidal habitat restoration is unlikely to have a substantial impact on Suisun song sparrow and
13 saltmarsh common yellowthroat through increased exposure to methylmercury, as these species
14 currently reside in tidal marshes where elevated methylmercury levels exist. However, it is
15 unknown what concentrations of methylmercury are harmful to the species and the potential for
16 increased exposure varies substantially within the study area. Implementation of CM12 which
17 contains measures to assess the amount of mercury before project development, followed by
18 appropriate design and adaptation management, would minimize the potential for increased
19 methylmercury exposure, and would result in no adverse effect on Suisun song sparrow and
20 saltmarsh common yellowthroat.

21 Tidal habitat restoration could result in increased exposure of Suisun song sparrow and saltmarsh
22 common yellowthroat to selenium. This effect would be addressed through the implementation of
23 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
24 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
25 habitats.

26 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
27 sedimentation, and operations and maintenance of the water conveyance facilities would be less
28 than significant with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
29 *Least Bell's Vireo, Western Yellow-Billed Cuckoo*, Mitigation Measure BIO-75, *Conduct Preconstruction*
30 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and *AMM2 Construction Best*
31 *Management Practices and Monitoring*.

32 Changes in salinity gradients would be expected to have a beneficial impact on Suisun song sparrow
33 and saltmarsh common yellowthroat through the establishment of tidal marsh similar to historic
34 conditions. The implementation of tidal natural communities restoration (CM4) is unlikely to
35 substantially increase the exposure of Suisun song sparrow or saltmarsh common yellowthroat to
36 methylmercury, as they currently reside in tidal marshes where elevated methylmercury levels
37 exist. However, it is unknown what concentrations of methylmercury are harmful to these species.
38 Implementation of CM12 which contains measures to assess the amount of mercury before project
39 development, followed by appropriate design and adaptation management, would minimize the
40 potential for increased methylmercury exposure, and would result in no adverse effect on Suisun
41 song sparrow and saltmarsh common yellowthroat.

42 Tidal habitat restoration could result in increased exposure of Suisun song sparrow and saltmarsh
43 common yellowthroat to selenium. This effect would be addressed through the implementation of
44 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design

1 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
2 habitats.

3 With implementation of these avoidance and minimization measures, Mitigation Measure BIO-75,
4 and *CM12 Methylmercury Management*, indirect effects of Alternative 4 implementation would have
5 a less-than-significant impact on Suisun song sparrow and saltmarsh common yellowthroat.

6 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
7 **Disturbance of Nesting Birds**

8 See Mitigation Measure BIO-75 under Impact BIO-75.

9 **Impact BIO-82: Effects on Suisun Song Sparrow and Saltmarsh Common Yellowthroat**
10 **Associated with Electrical Transmission Facilities**

11 The range of the Suisun song sparrow extends eastward into the study area to approximately
12 Kimball Island. There are several reported occurrences from Kimball Island, Browns Island, and in
13 the Suisun Marsh in the western portion of the study area. The easternmost range of the saltmarsh
14 common yellowthroat also ends in Suisun Marsh. These species ranges, along with areas of suitable
15 habitat, are far from the proposed transmission line routes (BDCP Appendix 5.J, Attachment 5.J-2,
16 *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Location of
17 the current populations, species ranges, and suitable habitat in the study area make collision with
18 the proposed transmission lines highly unlikely. Therefore the construction and presence of new
19 transmission lines would not have an adverse effect on Suisun song sparrow and saltmarsh common
20 yellowthroat.

21 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse
22 effect on Suisun song sparrow and saltmarsh common yellowthroat because the location of the
23 current populations, species ranges, and suitable habitat for the species make collision with the
24 proposed transmission lines highly unlikely.

25 **CEQA Conclusion:** The construction and presence of new transmission lines would not be expected
26 to have an adverse effect on Suisun song sparrow and saltmarsh common yellowthroat because the
27 location of the current populations, species ranges, and suitable habitat for the species make
28 collision with the proposed transmission lines highly unlikely. Therefore, the construction and
29 presence of new transmission lines under Alternative 4 would have a less-than-significant impact on
30 Suisun song sparrow and saltmarsh common yellowthroat.

31 **Swainson's Hawk**

32 This section describes the effects of Alternative 4, including water conveyance facilities construction
33 and implementation of other conservation components, on Swainson's hawk. The habitat model
34 used to assess impacts on Swainson's hawk includes plant alliances and land cover types associated
35 with Swainson's hawk nesting and foraging habitat. Construction and restoration associated with
36 Alternative 4 conservation measures would result in both temporary and permanent losses of
37 Swainson's hawk modeled habitat as indicated in Table 12-4-35. The majority of the losses would
38 take place over an extended period of time as tidal marsh is restored in the study area. Although
39 protection and restoration for the loss of nesting and foraging habitat would be initiated in the same
40 timeframe as the losses, it could take one or more decades (for nesting habitat) for restored habitats
41 to replace the functions of habitat lost. This time lag between impacts and restoration of habitat

1 function would be minimized through specific requirements of *AMM18 Swainson's Hawk*, including
2 transplanting mature trees in the near-term time period. Full implementation of Alternative 4 would
3 also include the following conservation actions over the term of the BDCP to benefit the Swainson's
4 hawk (see Chapter 3, Section 3.3, *Biological Goals and Objectives*, of the BDCP).

- 5 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
6 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
7 associated with CM7)
- 8 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
9 10 (Objective VFRNC1.2, associated with CM3).
- 10 • Plant and maintain native trees along roadsides and field borders within protected cultivated
11 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 12 • Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey
13 populations throughout protected cultivated lands (Objective SH2.2, associated with CM11).
- 14 • Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,
15 VPNC2.5, and GNC2.4, associated with CM11).
- 16 • Conserve at least 1 acre of Swainson's hawk foraging habitat for each acre of lost foraging
17 habitat (Objective SH1.1, associated with CM3 and CM11).
- 18 • Protect at least 42,275 acres of cultivated lands as Swainson's hawk foraging habitat with at
19 least 50% in very high-value habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated
20 with CM3 and CM11).
- 21 • Of the at least 42,275 acres of cultivated lands protected as Swainson's hawk foraging habitat
22 under Objective SH1.2, up to 1,500 acres can occur in CZs 5 and 6, and must have land surface
23 elevations greater than -1 foot NAVD88 (Objective SH1.3, associated with CM3).
- 24 • Protect at least 10,750 acres of grassland, vernal pool, and alkali seasonal wetland as Swainson's
25 hawk foraging habitat (Objective SH1.4, associated with CM3).
- 26 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
27 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 28 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
29 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
30 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
31 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

32 As explained below, with the restoration or protection of these amounts of habitat, in addition to
33 management activities that would enhance habitat for the species and implementation of AMM1-
34 AMM7, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM18 Swainson's*
35 *Hawk* to minimize potential effects, impacts on Swainson's hawk would not be adverse for NEPA
36 purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-35. Changes in Swainson’s Hawk Modeled Habitat Associated with Alternative 4**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT	CM2	CM5
CM1	Nesting	16	16	10	10	NA	NA
	Foraging	3,238	3,238	1,052	1,052	NA	NA
Total Impacts CM1		3,254	3,254	1,062	1,062		
CM2–CM18	Nesting	252	412	54	85	41–70	189
	Foraging	8,903	48,511	504	1,540	3,025–6,635	8,008
Total Impacts CM2-CM18		9,155	48,923	558	1,625	3,066–6,705	8,197
Total Nesting		268	428	64	95		
Total Foraging		12,141	51,749	1,556	2,592		
TOTAL IMPACTS		12,409	52,177	1,620	2,687	3,066–6,705	8,197

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-83: Loss or Conversion of Habitat for and Direct Mortality of Swainson’s Hawk**

5 Alternative 4 conservation measures would result in the combined permanent and temporary loss
6 of up to 54,864 acres of modeled habitat (523 acres of nesting habitat and 54,341 acres of foraging
7 habitat) for Swainson’s hawk (Table 12-4-35). Conservation measures that would result in these
8 losses are conveyance facilities and transmission line construction, and establishment and use of
9 reusable tunnel material areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat
10 restoration (CM4), floodplain restoration (CM5), riparian restoration, (CM7), grassland restoration
11 (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and
12 construction of conservation hatcheries (CM18). Habitat enhancement and management activities
13 (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local
14 habitat effects. In addition, maintenance activities associated with the long-term operation of the
15 water conveyance facilities and other BDCP physical facilities could affect Swainson’s hawk modeled
16 habitat. Each of these individual activities is described below. A summary statement of the combined
17 impacts and NEPA effects, and a CEQA conclusion follow the individual conservation measure
18 discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 water conveyance facilities
20 would result in the combined permanent and temporary loss of up to 26 acres of Swainson’s
21 hawk nesting habitat (16 acres of permanent loss habitat and 10 acres of temporary loss). In

1 addition, 4,290 acres of foraging habitat would be removed (3,238 acres of permanent loss,
 2 1,052 acres of temporary loss; Table 12-4-35). Activities that would impact modeled Swainson’s
 3 hawk habitat consist of tunnel, forebay, and intake construction, temporary access roads, and
 4 construction of transmission lines. Most of the permanent loss of nesting habitat would occur
 5 where Intakes 2, 3, and 5 impact the Sacramento River’s east bank between Freeport and
 6 Courtland. The riparian areas here are very small patches, some dominated by valley oak and
 7 others by nonnative trees. Some nesting habitat would be lost due to construction of a
 8 permanent access road from the new forebay west to a reusable tunnel material disposal area.
 9 Permanent losses would also occur along Lambert Road where permanent utility lines would be
 10 installed and from the construction of an operable barrier at the confluence of Old River and the
 11 San Joaquin River. Temporary losses of nesting habitat would occur from the construction of a
 12 barge unloading facility west of the intermediate forebay in Snodgrass Slough and where
 13 temporary work areas surround intake sites. The riparian habitat in these areas is also
 14 composed of very small patches or stringers bordering waterways, which are composed of
 15 valley oak and scrub vegetation. There are at least 12 occurrences of nesting Swainson’s hawk
 16 that overlap with the construction footprint of CM1, primarily from the construction of intakes
 17 2, 3, and 5, and the construction footprint for the permanent and temporary transmission lines.
 18 The implementation of *AMM18 Swainson’s Hawk* would minimize the effects of construction on
 19 nesting Swainson’s hawks if present in the area (see Appendix 3B, *Environmental Commitments*,
 20 *AMMs, and CMs*). Impacts on foraging habitat would occur throughout the central Delta in CZs 3-
 21 6, and CZ 8. Permanent foraging habitat impacts would include 849 acres of very high-value
 22 habitat (Table 12-4-36). Refer to the Terrestrial Biology Mapbook for a detailed view of
 23 Alternative 4 construction locations. Impacts from CM1 would occur within the first 10–14 years
 24 of Alternative 4 implementation.

25 **Table 12-4-36. Acres of Impacted Foraging Habitat by Value Classes for Swainson’s Hawk**

Foraging Habitat Value Class	Cultivated Land and Other Land Cover Types	CM1 Permanent (temporary)	CM2-18 permanent (temporary)
Very high	Alfalfa hay	849 (128)	13,898 (432)
Moderate	Irrigated pasture, other hay crops, tomatoes, grain crops (wheat, barley, oats), fallow fields	745 (350)	15,136 (477)
Low	Other irrigated field and truck crops, dry pasture, grasslands, alkali seasonal wetlands, vernal pool complex, sudan	668 (234)	10,535 (349)
Very low	Safflower, sunflower, corn, grain sorghum, managed wetlands	977 (340)	8,943 (281)

- 26
- 27 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 28 would result in the combined permanent and temporary loss of up to 133 acres of nesting
 29 habitat (79 acres of permanent loss, 54 acres of temporary loss) in the Yolo Bypass in CZ 2. In
 30 addition, 1,500 acres of foraging habitat would be removed (996 acres of permanent loss, 554
 31 acres of temporary loss). Activities through CM2 could involve excavation and grading in
 32 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
 33 riparian losses would occur at the north end of Yolo Bypass where major fish passage
 34 improvements are planned. Excavation to improve water movement in the Toe Drain and in the

1 Sacramento Weir would also remove Swainson's hawk habitat. The loss is expected to occur
2 during the first 10 years of Alternative 4 implementation.

- 3 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
4 inundation would permanently remove an estimated 295 acres of Swainson's hawk nesting
5 habitat and 37,359 acres of foraging habitat. The majority of the acres lost would consist of
6 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity
7 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,
8 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
9 directly impact and fragment grassland just north of Rio Vista in and around French and
10 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
11 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
12 the northern fringes of Suisun Marsh. Impacts on foraging habitat from CM4 would consist of
13 10,757 acres of very high-value (alfalfa), 11,707 acres of moderate-value, and 7,973 acres of
14 low-value habitat (See Table 12-4-36 for land cover types classified by habitat value). Because
15 the species is highly mobile and wide-ranging, habitat fragmentation is not expected to reduce
16 the use of remaining cultivated lands or preclude access to surrounding lands. However, the
17 conversion of cultivated lands to tidal wetlands over fairly broad areas within the tidal
18 restoration footprints could result in the removal or abandonment of nesting territories that
19 occur within or adjacent to the restoration areas. Trees would not be actively removed but tree
20 mortality would be expected over time as areas became tidally inundated. Depending on the
21 extent and value of remaining habitat, this could reduce the local nesting population. There are
22 at least 27 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for
23 CM4, suggesting that numerous nest sites could be directly affected by inundation from tidal
24 restoration activities.
- 25 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
26 seasonally inundated floodplain and riparian restoration actions would remove approximately
27 69 acres of Swainson's hawk nesting habitat (38 acres of permanent loss, 31 acres of temporary
28 loss) and 2,856 acres of foraging habitat (1,820 acres of permanent loss, 1,036 acres of
29 temporary loss). These losses would be expected after the first 10 years of Alternative 4
30 implementation along the San Joaquin River and other major waterways in CZ 7.
- 31 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
32 approximately 953 acres of Swainson's hawk foraging habitat as part of tidal restoration and
33 3,991 acres as part of seasonal floodplain restoration through CM7. There are at least 27
34 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for CM7.
- 35 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
36 implemented on agricultural lands and would result in the conversion of 1,849 acres of
37 Swainson's hawk agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,
38 and 11. If agricultural lands supporting higher value foraging habitat than the restored
39 grassland were removed, there would be a loss of Swainson's hawk foraging habitat value.
- 40 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would
41 result in the permanent removal of 1,440 acres of Swainson's hawk foraging habitat in CZ 2 and
42 CZ 4. Small patches of riparian vegetation that support Swainson's hawk nesting habitat may
43 develop along the margins of restored nontidal marsh if appropriate site conditions are present.
- 44 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
45 enhancement-related activities could disturb Swainson's hawk nests if they were present near

1 work sites. A variety of habitat management actions that are designed to enhance wildlife values
 2 in BDCP-protected habitats may result in localized ground disturbances that could temporarily
 3 remove small amounts of Swainson’s hawk habitat and reduce the functions of habitat until
 4 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
 5 and road and other infrastructure maintenance, are expected to have minor effects on available
 6 Swainson’s hawk habitat and are expected to result in overall improvements to and
 7 maintenance of habitat values over the term of the BDCP. These effects cannot be quantified, but
 8 are expected to be minimal and would be avoided and minimized by the AMMs listed below.
 9 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
 10 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.
 11 CM11 would also include the construction of recreational-related facilities including trails,
 12 interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal*
 13 *Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms,
 14 etc. would be placed on existing, disturbed areas when and where possible. However,
 15 approximately 50 acres of Swainson’s hawk grassland foraging habitat would be lost from the
 16 construction of trails and facilities.

- 17 ● CM18 Conservation Hatcheries: Implementation of CM18 would remove up to 35 acres of
 18 Swainson’s hawk foraging habitat for the development of a delta and longfin smelt conservation
 19 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.
- 20 ● Permanent and temporary nesting habitat losses from the above conservation measures, would
 21 primarily consist of small, fragmented riparian stands. Temporarily affected nesting habitat
 22 would be restored as riparian habitat within 1 year following completion of construction
 23 activities as described in *AMM10 Restoration of Temporarily Affected Natural Communities*. The
 24 restored riparian habitat would require 1 to several decades to functionally replace habitat that
 25 has been affected and for trees to attain sufficient size and structure suitable for nesting by
 26 Swainson’s hawks. *AMM18 Swainson’s Hawk* contains actions described below to reduce the
 27 effect of temporal loss of nesting habitat, including the transplanting of mature trees and
 28 planting of trees near high-value foraging habitat. The functions of cultivated lands and
 29 grassland communities that provide foraging habitat for Swainson’s hawk are expected to be
 30 restored relatively quickly (within 10-14 years of Alternative 4 implementation).
- 31 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
 32 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
 33 disturbances that could affect Swainson’s hawk use of the surrounding habitat. Maintenance
 34 activities would include vegetation management, levee and structure repair, and re-grading of
 35 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7
 36 and *AMM18 Swainson’s Hawk* in addition to conservation actions as described below.
- 37 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in
 38 direct mortality of adult or fledged Swainson’s hawk if they were present in the study area,
 39 because they would be expected to avoid contact with construction and other equipment.
 40 However, if Swainson’s hawk were to nest in the construction area, construction-related
 41 activities, including equipment operation, noise and visual disturbances could affect nests or
 42 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects
 43 would be avoided and minimized with the incorporation of *AMM18 Swainson’s Hawk* into the
 44 BDCP.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
3 included.

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
7 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
8 the effect of construction would not be adverse under NEPA. Alternative 4 would remove 332 acres
9 (268 permanent, 64 temporary) of Swainson's hawk nesting habitat in the study area in the near-
10 term. These effects would result from the construction of the water conveyance facilities (CM1, 26
11 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,
12 *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*,
13 and *CM7 Riparian Natural Community Restoration*—306 acres). In addition, 13,697 acres of
14 Swainson's hawk foraging habitat would be removed or converted in the near-term (CM1, 4,290
15 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5*
16 *Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8*
17 *Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*
18 *Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation*
19 *Hatcheries*—9,407 acres).

20 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and
21 those that are identified in the biological goals and objectives for Swainson's hawk in Chapter 3,
22 *Conservation Strategy*, of the BDCP would be 1:1 for restoration/creation and 1:1 protection of
23 valley/foothill riparian habitat for nesting habitat, and 1:1 protection for foraging habitat. Using
24 these ratios would indicate that 26 acres of nesting habitat should be restored/created and 26 acres
25 should be protected to compensate for the CM1 losses of Swainson's hawk nesting habitat. In
26 addition, 4,290 acres of foraging habitat should be protected to mitigate the CM1 losses of
27 Swainson's hawk foraging habitat. The near-term effects of other conservation actions would
28 remove 306 acres of modeled nesting habitat, and therefore require 306 acres of restoration and
29 306 acres of protection of nesting habitat. Similarly, the near-term effects of other conservation
30 actions would remove 9,407 acres of modeled foraging habitat, and therefore require 9,407 acres of
31 protection of foraging habitat using the same typical NEPA and CEQA ratios (1:1 restoration and 1:1
32 protection for the loss of nesting habitat; 1:1 protection for the loss of foraging habitat).

33 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
34 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
35 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
36 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
37 and protecting 15,400 acres of non-rice cultivated lands (see Table 3-4 in Chapter 3, *Description of*
38 *Alternatives*). These conservation actions are associated with CM3, CM5, CM7, and CM8, and would
39 occur in the same timeframe as the construction and early restoration losses.

40 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
41 system with extensive wide bands or large patches of valley/foothill riparian natural community
42 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
43 restoration would expand the patches of existing riparian forest in order to support nesting habitat
44 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be

1 increased by planting and maintaining native trees along roadsides and field borders within
2 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small
3 but essential nesting habitat for Swainson's hawk associated with cultivated lands would also be
4 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
5 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

6 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
7 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
8 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
9 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
10 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat
11 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
12 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
13 Foraging opportunities would also be improved by enhancing prey populations through the
14 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
15 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
16 would also be protected and maintained as part of the cultivated lands reserve system which would
17 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
18 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
19 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks
20 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
21 would inform the near-term protection and restoration efforts and represent performance
22 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated
23 lands that provide habitat for covered and other native wildlife species would be protected in the
24 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the
25 late long-term time period would be in very high- and high-value crop types for Swainson's hawk
26 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated
27 lands protected in the near-term time period which would provide high-value habitat for Swainson's
28 hawk. The acres of restoration and protection contained in the near-term Plan goals and the
29 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
30 the project-level effects of CM1 on Swainson's hawk foraging habitat, as well as mitigate the near-
31 term effects of the other conservation measures.

32 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
33 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
34 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian
35 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
36 require one to several decades to functionally replace habitat that has been affected and for trees to
37 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between
38 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk
39 in the near-term time period. Nesting habitat is limited throughout much of the study area,
40 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
41 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
42 habitat would further reduce this limited resource and could reduce or restrict the number of active
43 Swainson's hawk nests within the study area until restored riparian habitat is sufficiently
44 developed.

1 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
2 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
3 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
4 within the 125-acre block are removed. These mature trees would be supplemented with additional
5 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
6 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
7 addition, at least 5 trees (five gallon container size) would be planted within the BDCP reserve
8 system for every tree removed by construction during the near-term period that was suitable for
9 nesting by Swainson's hawks (20 feet or taller). A variety of native tree species would be planted to
10 provide trees with differing growth rates, maturation, and life span. Trees would be planted within
11 the BDCP reserve system in areas that support high-value Swainson's hawk foraging habitat to
12 increase nest sites, or within riparian plantings as a component of the riparian restoration (CM5,
13 CM7) where they are in close proximity to suitable foraging habitat. Replacement trees that were
14 incorporated into the riparian restoration would not be clustered in a single region of the study
15 area, but would be distributed throughout the lands protected as foraging habitat for Swainson's
16 hawk.

17 Swainson's hawk foraging habitat would be protected within 3 miles of a known Swainson's hawk
18 nest tree and within 50 miles of the project footprint on land not subject to threat of seasonal
19 flooding, construction disturbances, or other conditions that would reduce the foraging value of the
20 land. With this program in place, Alternative 4 would not have a substantial adverse effect on
21 Swainson's hawk in the near-term timeframe, either through direct mortality or through habitat
22 modifications. Further details of AMM18 are provided in Appendix 3B, *Environmental Commitments,*
23 *AMMs, and CMs*, of the Final EIR/EIS.

24 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
25 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
26 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
27 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan, and*
28 *AMM10 Restoration of Temporarily Affected Natural Communities*. All of these AMMs include
29 elements that would avoid or minimize the risk of affecting individuals and species habitats adjacent
30 to work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which
31 are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

32 ***Late Long-Term Timeframe***

33 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of
34 modeled foraging habitat for Swainson's hawk. Alternative 4 as a whole would result in the
35 permanent loss of and temporary effects on 523 acres of potential nesting habitat (5% of the
36 potential nesting habitat in the study area) and 54,341 acres of foraging habitat (12% of the foraging
37 habitat in the study area).

38 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
39 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community*
40 *Restoration, and CM8 Grassland Natural Community Restoration* to restore or create at least 5,000
41 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000
42 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool
43 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed
44 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
45 species (see Table 3-4 in Chapter 3, *Description of Alternatives*).

1 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
 2 system with extensive wide bands or large patches of valley/foothill riparian natural community
 3 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
 4 restoration would expand the patches of existing riparian forest in order to support nesting habitat
 5 for the species. The distribution and abundance of potential Swainson’s hawk nest trees would be
 6 increased by planting and maintaining native trees along roadsides and field borders within
 7 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but
 8 essential nesting habitat for Swainson’s hawk associated with cultivated lands would also be
 9 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
 10 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

11 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 12 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
 13 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
 14 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
 15 provide foraging habitat for Swainson’s hawk and reduce the effects of current levels of habitat
 16 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
 17 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
 18 Foraging opportunities would also be improved by enhancing prey populations through the
 19 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
 20 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would
 21 also be protected and maintained as part of the cultivated lands reserve system which would
 22 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
 23 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
 24 components) that dry during the spring would also serve as foraging habitat for Swainson’s hawks
 25 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
 26 would inform the near-term protection and restoration efforts and represent performance
 27 standards for considering the effectiveness of restoration actions. Foraging habitat would be
 28 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that
 29 provide Swainson’s hawk foraging habitat would be protected by the late long-term, 50% of which
 30 would be in very high-value habitat production in CZs 1–4, 7–9, and 11 (Objective SH1.2).

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM10*
 35 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that
 36 would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
 37 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
 38 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

39 **NEPA Effects:** The loss of Swainson’s hawk habitat and potential direct mortality of this special-
 40 status species under Alternative 4 would represent an adverse effect in the absence of other
 41 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,
 42 CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, AMM10, and
 43 *AMM18 Swainson’s Hawk*, which would be in place during all project activities, the effects of habitat
 44 loss and potential mortality on Swainson’s hawk under Alternative 4 would not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
6 the effect of construction would be less than significant under CEQA. Alternative 4 would remove
7 332 acres (268 permanent, 64 temporary) of Swainson's hawk nesting habitat in the study area in
8 the near-term. These effects would result from the construction of the water conveyance facilities
9 (CM1, 26 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
10 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*
11 *Restoration, and CM7 Riparian Natural Community Restoration—306 acres). In addition, 13,697*
12 *acres of Swainson's hawk foraging habitat would be removed or converted in the near-term (CM1,*
13 *4,290 acres; CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration,*
14 *CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8*
15 *Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex*
16 *Restoration, CM11 Natural Communities Enhancement and Management and CM18 Conservation*
17 *Hatcheries—9,407 acres).*

18 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and
19 those that are identified in the biological goals and objectives for Swainson's hawk in Chapter 3,
20 *Conservation Strategy*, of the BDCP would be 1:1 for restoration/creation and 1:1 protection of
21 valley/foothill riparian habitat for nesting habitat, and 1:1 protection for foraging habitat. Using
22 these ratios would indicate that 26 acres of nesting habitat should be restored/created and 26 acres
23 should be protected to mitigate the CM1 losses of Swainson's hawk nesting habitat. In addition,
24 4,290 acres of foraging habitat should be protected to mitigate the CM1 losses of Swainson's hawk
25 foraging habitat. The near-term effects of other conservation actions would remove 306 acres of
26 modeled nesting habitat, and therefore require 306 acres of restoration and 306 acres of protection
27 of nesting habitat. Similarly, the near-term effects of other conservation actions would remove 9,407
28 acres of modeled foraging habitat, and therefore require 9,407 acres of protection of foraging
29 habitat using the same typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss
30 of nesting habitat; 1:1 protection for the loss of foraging habitat).

31 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
32 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
33 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
34 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
35 and protecting 15,400 acres of non-rice cultivated lands (see Table 3-4 in Chapter 3, *Description of*
36 *Alternatives*). These conservation actions are associated with CM3, CM5, CM7, and CM8, and would
37 occur in the same timeframe as the construction and early restoration losses.

38 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
39 system with extensive wide bands or large patches of valley/foothill riparian natural community
40 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
41 restoration would expand the patches of existing riparian forest in order to support nesting habitat
42 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be
43 increased by planting and maintaining native trees along roadsides and field borders within
44 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small

1 but essential nesting habitat for Swainson's hawk associated with cultivated lands would also be
2 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
3 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

4 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
5 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
6 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
7 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
8 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat
9 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
10 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
11 Foraging opportunities would also be improved by enhancing prey populations through the
12 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
13 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
14 would also be protected and maintained as part of the cultivated lands reserve system which would
15 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
16 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
17 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks
18 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
19 would inform the near-term protection and restoration efforts and represent performance
20 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated
21 lands that provide habitat for covered and other native wildlife species would be protected in the
22 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the
23 late long-term time period would be in very high- and high-value crop types for Swainson's hawk
24 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated
25 lands protected in the near-term time period which would provide high-value habitat for Swainson's
26 hawk. The acres of restoration and protection contained in the near-term Plan goals and the
27 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
28 the project-level effects of CM1 on Swainson's hawk foraging habitat, as well as mitigate the near-
29 term effects of the other conservation measures.

30 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
31 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
32 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian
33 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
34 require one to several decades to functionally replace habitat that has been affected and for trees to
35 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between
36 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk
37 in the near-term time period. Nesting habitat is limited throughout much of the study area,
38 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
39 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
40 habitat would further reduce this limited resource and could reduce or restrict the number of active
41 Swainson's hawk within the study area until restored riparian habitat is sufficiently developed.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
45 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
46 these AMMs include elements that would avoid or minimize the risk of affecting individuals and

1 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
2 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
3 of the Final EIR/EIS.

4 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
5 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
6 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
7 within the 125-acre block are removed. These mature trees would be supplemented with additional
8 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
9 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
10 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
11 system for every tree removed by construction during the near-term period that was suitable for
12 nesting by Swainson's hawks (20 feet or taller). A variety of native tree species would be planted to
13 provide trees with differing growth rates, maturation, and life span. Trees would be planted within
14 the BDCP reserve system in areas that support high-value Swainson's hawk foraging habitat to
15 increase nest sites, or within riparian plantings as a component of the riparian restoration (CM5,
16 CM7) where they are in close proximity to suitable foraging habitat. Replacement trees that are
17 incorporated into the riparian restoration would not be clustered in a single region of the study
18 area, but would be distributed throughout the lands protected as foraging habitat for Swainson's
19 hawk.

20 Swainson's hawk foraging habitat would be protected within 3 miles of a known Swainson's hawk
21 nest tree and within 50 miles of the project footprint on land not subject to threat of seasonal
22 flooding, construction disturbances, or other conditions that would reduce the foraging value of the
23 land. With this program in place, Alternative 4 would not have a substantial adverse effect on
24 Swainson's hawk in the near-term timeframe, either through direct mortality or through habitat
25 modifications. Therefore, Alternative 4 would have a less-than-significant impact on Swainson's
26 hawks. Further details of AMM18 are provided in Appendix 3B, *Environmental Commitments, AMMs,*
27 *and CMs*, of the Final EIR/EIS.

28 **Late Long-Term Timeframe**

29 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of
30 modeled foraging habitat for Swainson's hawk. Alternative 4 as a whole would result in the
31 permanent loss of and temporary effects on 523 acres of potential nesting habitat (5% of the
32 potential nesting habitat in the study area) and 54,341 acres of foraging habitat (12% of the foraging
33 habitat in the study area).

34 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
35 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community*
36 *Restoration*, and *CM8 Grassland Natural Community Restoration* to restore or create at least 5,000
37 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000
38 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool
39 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed
40 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
41 species (see Table 3-4 in Chapter 3, *Description of Alternatives*).

42 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
43 system with extensive wide bands or large patches of valley/foothill riparian natural community
44 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian

1 restoration would expand the patches of existing riparian forest in order to support nesting habitat
2 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be
3 increased by planting and maintaining native trees along roadsides and field borders within
4 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but
5 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be
6 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
7 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

8 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
9 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
10 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
11 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
12 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat
13 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
14 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
15 Foraging opportunities would also be improved by enhancing prey populations through the
16 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
17 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would
18 also be protected and maintained as part of the cultivated lands reserve system which would
19 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
20 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
21 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks
22 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
23 would inform the near-term protection and restoration efforts and represent performance
24 standards for considering the effectiveness of restoration actions. Foraging habitat would be
25 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that
26 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which
27 would be in very high-value habitat production in CZs 1-4, 7- 9, and 11 (Objective SH1.2).

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
32 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
33 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
34 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
35 of the Final EIR/EIS.

36 In the absence of other conservation actions, the effects on Swainson's hawk habitat from Alternative
37 4 would represent an adverse effect as a result of habitat modification and potential for direct
38 mortality of a special status species; however, considering Alternative 4's protection and restoration
39 provisions, which would provide acreages of new or enhanced habitat in amounts greater than
40 necessary to compensate for the time lag of restoring riparian and foraging habitats lost to
41 construction and restoration activities, and with implementation of AMM1-AMM7, AMM10, and
42 *AMM18 Swainson's Hawk*, the loss of habitat or direct mortality through implementation of
43 Alternative 4 would not result in a substantial adverse effect through habitat modifications and
44 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of
45 habitat or potential mortality under this alternative would have a less-than-significant impact on
46 Swainson's hawk.

1 **Impact BIO-84: Effects on Swainson’s Hawk Associated with Electrical Transmission Facilities**

2 New transmission lines would increase the risk that Swainson’s hawks could be subject to power
3 line strikes, which could result in injury or mortality of Swainson’s hawks. This species would be at
4 low risk of bird strike mortality based on factors assessed in the bird strike vulnerability analysis
5 (BDCP Appendix 5.J, Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed*
6 *BDCP Transmission Lines*). Factors analyzed include the height of the new transmission lines and the
7 flight behavior of the species. The existing network of transmission lines in the study area currently
8 poses the same small risk for Swainson’s hawk, and any incremental risk associated with the new
9 power line corridors would also be expected to be low. Marking transmission lines with flight
10 diverters that make the lines more visible to birds has been shown to reduce the incidence of bird
11 mortality (Brown and Drewien 1995). Yee (2008) estimated that marking devices in the Central
12 Valley could reduce avian mortality by 60%. All new project transmission lines would be fitted with
13 flight diverters. Bird flight diverters would make transmission lines highly visible to Swainson’s
14 hawks and would further reduce any potential for powerline collisions.

15 **NEPA Effects:** New transmission lines would minimally increase the risk for Swainson’s hawk power
16 line strikes. All new transmission lines constructed as a result of the project would be fitted with
17 bird diverters, which have been shown to reduce avian mortality by 60%. With implementation of
18 *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines would not
19 result in an adverse effect on Swainson’s hawk.

20 **CEQA Conclusion:** New transmission lines would minimally increase the risk for Swainson’s hawk
21 power line strikes. All new transmission lines constructed as a result of the project would be fitted
22 with bird diverters, which have been shown to reduce avian mortality by 60%. With implementation
23 of *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines would result
24 in a less-than-significant impact on Swainson’s hawk.

25 **Impact BIO-85: Indirect Effects of Plan Implementation on Swainson’s Hawk**

26 Noise and visual disturbances from the construction of water conveyance facilities and other
27 conservation measures could reduce Swainson’s hawk use of modeled habitat adjacent to work
28 areas. Construction noise above background noise levels (greater than 50 dBA) could extend 500 to
29 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5.J.D, *Indirect*
30 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and
31 Appendix 11F, *Substantive BDCP Revisions*, of the Final EIR/EIS), although there are no available data
32 to determine the extent to which these noise levels could affect Swainson’s hawk. Moreover,
33 operation and maintenance of the water conveyance facilities, including the transmission facilities,
34 could result in ongoing but periodic postconstruction disturbances that could affect Swainson’s
35 hawk use of the surrounding habitat. These construction activities would include water conveyance
36 construction, tidal restoration activities, floodplain restoration, and Fremont Weir/Yolo Bypass
37 Enhancements. Swainson’s hawks are seasonally abundant across much of the study area wherever
38 adequate nest trees occur within a cultivated landscape that supports suitable foraging habitat.
39 There would be a potential for noise and visual disturbances associated with BDCP actions to
40 temporarily displace Swainson’s hawks and temporarily reduce the use of suitable habitat adjacent
41 to construction areas. These adverse effects would be minimized with the implementation of *AMM18*
42 *Swainson’s Hawk*.

1 The use of mechanical equipment during water conveyance facilities construction could cause the
2 accidental release of petroleum or other contaminants that could affect Swainson's hawk foraging in
3 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
4 suitable habitat could also have an adverse effect on these species. *AMM2 Construction Best*
5 *Management Practices and Monitoring* would minimize the likelihood of such spills and ensure that
6 measures are in place to prevent runoff from the construction area and negative effects of dust on
7 habitat.

8 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
9 could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover, operation
10 and maintenance of the water conveyance facilities, including the transmission facilities, could result
11 in ongoing but periodic postconstruction disturbances that could affect Swainson's hawk use of the
12 surrounding habitat. Noise, the potential for hazardous spills, increased dust and sedimentation, and
13 operations and maintenance of the water conveyance facilities would not have an adverse effect on
14 Swainson's hawk with the implementation of AMM1–AMM7, AMM10, and *AMM18 Swainson's Hawk*.

15 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
16 facilities could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover,
17 operation and maintenance of the water conveyance facilities, including the transmission facilities,
18 could result in ongoing but periodic postconstruction disturbances that could affect Swainson's
19 hawk use of the surrounding habitat. The effects of noise, the potential for hazardous spills,
20 increased dust and sedimentation, and operations and maintenance of the water conveyance
21 facilities would result in a less-than-significant impact on Swainson's hawk with the implementation
22 of AMM1–AMM7, AMM10, and *AMM18 Swainson's Hawk*.

23 **Impact BIO-86: Periodic Effects of Inundation of Swainson's Hawk Nesting and Foraging** 24 **Habitat as a Result of Implementation of Conservation Components**

25 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
26 *Enhancement*) would increase the frequency and duration of inundation on approximately 3,066–
27 6,706 acres of modeled Swainson's hawk habitat (consisting of approximately 41–70 acres of
28 nesting habitat and 3,025–6,635 acres of foraging habitat; Table 12-4-35). However, project-
29 associated inundation of areas that would not otherwise have been inundated would be expected to
30 occur in no more than 30% of all years, since Fremont Weir is expected to overtop the remaining
31 estimated 70% of all years, and during those years notch operations would not typically affect the
32 maximum extent of inundation. In more than half of all years under Existing Conditions, an area
33 greater than the project-related inundation area already inundates in the bypass. Therefore, habitat
34 conditions in the bypass would not be expected to change substantially as a result of Yolo Bypass
35 operations. However, increased duration of inundation during years of Fremont Weir operation,
36 may delay the period for which foraging habitat is available to Swainson's hawks by up to several
37 weeks.

38 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
39 *Restoration* could result in the periodic inundation of up to approximately 8,197 acres of modeled
40 Swainson's hawk habitat (Table 12-4-35), consisting of 189 acres of nesting and 8,008 acres of
41 foraging habitat. Floodplain restoration would be expected to restore a more natural flood regime
42 and sustain riparian vegetation types that support regeneration of Swainson's hawk nesting habitat.
43 The restored floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years)
44 to areas that flood infrequently (e.g., every 10 years or more). Foraging habitat that is inundated

1 after Swainson's hawks arrive in the Central Valley in mid-March could result in a periodic loss of
2 available foraging habitat due to the reduction in available prey. Inundated habitats would be
3 expected to recover following draw-down and provide suitable foraging conditions until the
4 following inundation period. Thus, this is considered a periodic and short term effect that is unlikely
5 to affect Swainson's hawk distribution and abundance, or foraging use of the study area.

6 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
7 sites because trees in which nest sites are situated already withstand floods, the increase in
8 inundation frequency and duration is expected to remain within the range of tolerance of riparian
9 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically
10 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.
11 This would be considered a short-term effect that would not result in an adverse effect on
12 Swainson's hawk.

13 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
14 nest sites because trees in which nest sites are situated already withstand floods, the increase in
15 inundation frequency and duration is expected to remain within the range of tolerance of riparian
16 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically
17 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.
18 This would be considered a short-term effect that would have a less-than-significant impact on
19 Swainson's hawk.

20 **Tricolored Blackbird**

21 This section describes the effects of Alternative 4, including water conveyance facilities construction
22 and implementation of other conservation components, on tricolored blackbird. The habitat model
23 used to assess effects for tricolored blackbird is based on breeding habitat and nonbreeding habitat.
24 Although nesting colonies have been documented along the fringe of Suisun Marsh, in the Yolo
25 Bypass, along the southwestern perimeter of the study area, and in the southeast corner of the study
26 area near the San Joaquin River, breeding colonies are uncommon in the study area. Modeled
27 breeding habitat includes bulrush/cattail wetlands and shrub communities that may provide
28 suitable nesting substrate, and adjacent high-value foraging areas that occur within 5 miles of
29 nesting colonies documented in the study area. The nesting component consists of nontidal
30 freshwater perennial emergent marsh, and valley foothill riparian natural communities that occur
31 within 5 miles of breeding colonies documented between 1998 and 2012. The foraging component
32 includes cultivated lands and noncultivated land cover types known to support abundant insect
33 populations such as grasslands, pasturelands (including alfalfa), natural seasonal wetlands, and
34 sunflower croplands. The Delta is recognized as a major wintering area for tricolored blackbird
35 (Hamilton 2004, Beedy 2008). Modeled nonbreeding habitat includes emergent wetlands and shrub
36 stands that provide suitable roosting habitat, as well as cultivated lands and noncultivated lands that
37 provide foods sought by tricolored blackbirds during the winter. Outside of the breeding season,
38 tricolored blackbirds are primarily granivores that forage opportunistically across the study area in
39 grasslands, pasturelands, croplands, dairies, and livestock feed lots. Factors considered in assessing
40 the value of affected habitat for the tricolored blackbird, include patch size, suitability of vegetation,
41 and proximity to recorded occurrences.

42 Construction and restoration associated with Alternative 4 conservation measures would result in
43 both temporary and permanent losses of tricolored blackbird modeled breeding and nonbreeding
44 habitat as indicated in Table 12-4-37. Full implementation of Alternative 4 would also include the

1 following conservation actions over the term of the BDCP to benefit the tricolored blackbird (BDCP
2 Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 3 • Protect and manage at least 50 acres of occupied or recently occupied (within the last 15 years)
4 tricolored blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs
5 1, 2, 8, or 11. (Objective TRBL1.1).
- 6 • Protect at least 26,300 acres of moderate-, high-, or very high-value cultivated lands as
7 nonbreeding foraging habitat, 50% of which is of high or very high value (Objective TRBL1.2).
- 8 • Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat within 5 miles
9 of occupied or recently occupied (within the last 15 years) tricolored blackbird nesting habitat
10 in CZs 1, 2, 3, 4, 7, 8, or 11. At least 1,000 acres of this protected breeding-foraging habitat will
11 be within 5 miles of the 50 acres of nesting habitat protected under Objective TRBL1.1
12 (Objective TRBL1.3).
- 13 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
14 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
15 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
16 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 17 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
18 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
19 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 20 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 21 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
22 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 23 • Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,
24 VPNC2.5, and GNC2.4, associated with CM11).

25 As explained below, with the restoration or protection of these amounts of habitat, in addition to
26 management activities that would enhance these natural communities for the species and
27 implementation of AMM1–AMM7 and AMM21 *Tricolored Blackbird*, impacts on tricolored blackbird
28 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-37. Changes to Tricolored Modeled Habitat Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d		
		NT	LLT	NT	LLT	CM2	CM5	
CM1	Breeding	Nesting	15	15	4	4	NA	NA
		Foraging - cultivated	1,389	1,389	172	172	NA	NA
		Foraging - noncultivated	290	290	105	105	NA	NA
	Nonbreeding	Roosting	9	9	21	21	NA	NA
		Foraging - cultivated	1,047	1,047	487	487	NA	NA
		Foraging - noncultivated	179	179	53	53	NA	NA
Total Impacts CM1		2,929	2,929	842	842			
CM2-CM18	Breeding	Nesting	13	72	75	77	11-26	30
		Foraging - cultivated	1,657	9,525	84	359	1,837-2,598	2,124
		Foraging - noncultivated	704	1,991	155	184	600-1,689	355
	Nonbreeding	Roosting	570	1,642	0	1	0-4	29
		Foraging - cultivated	3,747	23,955	54	420	222-1,057	2,506
		Foraging - noncultivated	459	1,341	0	3	42-191	158
Total Impacts CM2-CM18		7,150	38,526	368	1,044	2,711	5,766	
Total Breeding		4,068	13,282	595	901	2,447-4,312	2,509	
Total Nonbreeding		6,011	28,173	615	985	263-1,252	2,694	
TOTAL IMPACTS		10,079	41,455	1,210	1,886	2,711	5,766	

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

Impact BIO-87: Loss or Conversion of Habitat for and Direct Mortality of Tricolored Blackbird

Alternative 4 conservation measures would result in the combined permanent and temporary loss of up to 43,341 acres of modeled habitat (14,183 acres of breeding habitat and up to 29,158 acres of nonbreeding habitat) for tricolored blackbird (Table 12-4-37). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of reusable tunnel material areas (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate tricolored blackbird habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure discussions.

- CM1 Water Facilities and Operation:* Construction of Alternative 4 conveyance facilities would result in the permanent loss of 1,694 acres of tricolored blackbird breeding habitat (15 acres nesting habitat, 1,389 acres of cultivated lands, and 290 acres of noncultivated lands suitable for foraging) and 1,235 acres of nonbreeding habitat (9 acres roosting habitat, 1,047 acres of cultivated lands, and 179 acres of noncultivated lands suitable for foraging, Table 12-4-37). Approximately 796 of the acres permanently impacted would be lost as reusable tunnel material storage areas, which would likely be moved to other sites for use in levee build-up and restoration, and the affected area would likely be restored. This effect is categorized as permanent because there is no assurance that the material would eventually be moved. In addition, CM1 would result in the temporary removal of 281 acres of breeding habitat (4 acres nesting habitat, 172 acres of cultivated lands, and 105 acres of noncultivated lands suitable for foraging) and 561 acres of nonbreeding habitat (21 acres roosting habitat, 487 acres of cultivated lands, and 53 acres of noncultivated lands suitable for foraging, Table 12-4-37).

Most of the habitat that would be lost is located in the central Delta, from CZs 3-6 and CZ 8. There are no occurrences of tricolored blackbird that overlap with the construction footprint for CM1. However, records exist throughout the study area. *AMM21 Tricolored Blackbird* would minimize the effects of construction on nesting tricolored blackbirds if present in the area (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4 construction locations. Impacts from CM1 would occur within the near-term timeframe of Plan implementation.

- CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries improvements in the Yolo Bypass would permanent loss of 595 acres of tricolored blackbird breeding habitat (13 acres nesting habitat, 477 acres of cultivated lands, and 105 acres of noncultivated lands suitable for foraging) and 8 acres of nonbreeding habitat (consisting entirely of roosting habitat). In addition, CM2 construction would result in the temporary removal of 314 acres of breeding habitat (75 acres nesting habitat, 84 acres of cultivated lands, and 155 acres of noncultivated lands suitable for foraging) and 54 acres of nonbreeding habitat (consisting entirely of cultivated lands). The loss is expected to occur during the first 10 years of Alternative 4 implementation.
- CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration would result in the inundation of approximately 3,937 acres of tricolored blackbird breeding habitat (21

1 acres of nesting, 2,814 acres of cultivated lands, and 1,102 acres of noncultivated lands suitable
 2 for foraging) and 10,794 acres of nonbreeding habitat (1,633 acres of roosting, 18,489 acres of
 3 cultivated lands, and 672 acres of noncultivated lands suitable for foraging). An estimated
 4 13,692 acres of the 28,424 acres to be permanently lost would be expected to convert to tidal
 5 emergent wetland communities that could provide nonbreeding season roosting habitat for
 6 tricolored blackbirds, depending on future vegetation density and composition. Conversion
 7 would result in the loss of an estimated 4,316 acres of tricolored blackbird breeding habitat (34
 8 acres of nesting habitat; plus 3,635 acres of cultivated lands and 647 acres of noncultivated
 9 habitats suitable for foraging) and 9,375 acres of nonbreeding habitat (8,716 acres of cultivated
 10 lands and 659 acres of noncultivated habitats suitable for foraging). These habitat losses and
 11 conversions would occur in CZs 1, 2, 4, 5, 6, 7, 8, and 11. Although considered to be a permanent
 12 loss, due to the uncertainty of the quantity of restored suitable habitat, any areas that develop
 13 into riparian scrub-shrub could provide suitable nesting and roosting habitat for tricolored
 14 blackbird.

- 15 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction and riparian restoration
 16 associated with floodplain restoration in the south Delta (CZ 7) would result in the permanent
 17 removal of up to 554 acres of tricolored blackbird breeding habitat (4 acres of nesting habitat,
 18 503 acres of cultivated lands, and 47 acres of noncultivated habitats suitable for foraging) and
 19 656 acres of nonbreeding habitat (1 acre of roosting habitat, 652 acres of cultivated lands, and 3
 20 acres of noncultivated habitats suitable for foraging) in CZ 7. Patches of riparian scrub
 21 associated with the restoration of approximately 1,000 acres of valley/foothill riparian habitat
 22 managed as early- to mid-successional habitats (as a component of CM5) could provide suitable
 23 nesting, roosting or foraging habitat for tricolored blackbird once these restored habitats have
 24 developed habitat functions for the species.
- 25 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland would result in the
 26 permanent removal of 1,521 acres of tricolored breeding habitat and 210 acres of nonbreeding
 27 habitat. Grassland restoration would be implemented on cultivated lands and would therefore
 28 result in the conversion of tricolored blackbird cultivated foraging habitat to high-value
 29 grassland foraging habitat in CZs 2, 4, and 5.
- 30 ● *CM10 Nontidal Marsh Restoration*: Marsh restoration activities would result in the permanent
 31 removal or conversion of approximately 568 acres of tricolored blackbird breeding habitat and
 32 945 acres of nonbreeding habitat (all cultivated lands suitable for foraging). About two-thirds of
 33 the restored nontidal marsh would be open water, and the remainder would support emergent
 34 wetland vegetation that could provide roosting habitat for tricolored blackbird depending on
 35 vegetation density and composition.
- 36 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
 37 actions that are designed to enhance wildlife values in BDCP-protected habitats could result in
 38 localized ground disturbances that could temporarily remove small amounts of tricolored
 39 blackbird habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
 40 road and other infrastructure maintenance, would be expected to have minor effects on
 41 available tricolored blackbird habitat and are expected to result in overall improvements to and
 42 maintenance of tricolored blackbird habitat values over the term of the BDCP. These effects
 43 cannot be quantified, but are expected to be minimal and would be avoided and minimized by
 44 the AMMs listed below. BDCP Appendix 3.C describes the AMMs, which have since been updated
 45 and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the
 46 Final EIR/EIS. CM11 would also include the construction of recreational-related facilities

1 including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and*
2 *Associated Federal Actions*). Trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc.
3 would be placed on existing, disturbed areas when and where possible. Surveys would be
4 conducted under *AMM21 Tricolored Blackbird* to ensure that areas identified for recreational
5 development did not contain active breeding or foraging tricolored blackbirds. However,
6 approximately 43.5 acres of breeding habitat and 6.5 acres of nonbreeding habitat (all grassland
7 suitable for foraging) would be lost as a result of construction of trails and facilities. Impacts
8 from recreational-related facilities that would occur within the first 10 years of Alternative 4
9 implementation would include a loss of 13 acres of breeding habitat.

- 10 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
11 tricolored blackbird grassland foraging habitat in CZ 1.
- 12 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
13 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
14 disturbances that could affect tricolored blackbird use of the surrounding habitat in or adjacent
15 to work areas. Maintenance activities would include vegetation management, levee and
16 structure repair, and re-grading of roads and permanent work areas. These effects, however,
17 would be reduced by AMMs and conservation actions as described below.
- 18 • *Injury and Direct Mortality*: Operation of construction equipment may cause injury to or
19 mortality of tricolored blackbirds. Risk would be greatest to eggs and nestlings susceptible to
20 land clearing activities, nest abandonment, or increased exposure to the elements or to
21 predators. Injury to or mortality of adults and fledged juveniles would not be expected as
22 individuals would be expected to avoid contact with construction equipment. Construction
23 activities could temporarily fragment existing tricolored blackbird habitat during grading, filling,
24 contouring, and other initial ground-disturbing operations that could temporarily reduce the
25 extent and functions supported by the affected habitat. To the maximum extent practicable,
26 construction activity will be avoided up to 1,300 feet, but not less than a minimum of 300 feet,
27 from an active tricolored blackbird nesting colony. If monitoring determines an activity is
28 adversely affecting a nesting colony, construction will be modified, as practicable, by either
29 delaying construction until the colony site is abandoned or until the end of the breeding season,
30 whichever occurs first, by temporarily relocating staging areas, or temporarily rerouting access
31 to the construction site. Construction and restoration projects would also be designed, in
32 consultation with CDFW, to avoid construction activity within at least 300 feet from occupied
33 active tricolored blackbird roosting habitat. These measures to avoid injury or mortality of
34 nesting and roosting tricolored blackbirds are described in *AMM21 Tricolored Blackbird* in
35 Appendix 3B, *Environmental Commitments, AMMs, and CMs*.

36 The following paragraphs summarize the combined effects discussed above and describe other
37 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
38 included.

39 ***Near-Term Timeframe***

40 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
41 the near-term BDCP conservation strategy has been evaluated to determine whether it would
42 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
43 effects of construction would not be adverse under NEPA. Alternative 4 would remove 4,663 acres
44 of breeding habitat (28 acres of nesting, 1,947 acres of cultivated lands, and 994 acres of

1 noncultivated lands suitable for foraging) and 6,626 acres of nonbreeding habitat (579 acres of
2 roosting, 4,794 acres of cultivated lands, and 638 acres of noncultivated lands suitable for foraging)
3 for tricolored blackbird in the study area in the near-term. These effects would result from the
4 construction of the water conveyance facilities (CM1, 1,975 acres of breeding, 1,796 acres of
5 nonbreeding), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
6 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
7 *Restoration*, and *CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres
8 of nonbreeding).

9 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and
10 1:1 for protection for the loss of nesting and roosting wetland habitat, 1:1 protection for the loss of
11 cultivated lands, and 2:1 protection for loss of noncultivated lands suitable for foraging.

12 Using these ratios would indicate that the compensation for loss or conversion of tricolored
13 blackbird habitat from CM1 would require 19 acres of restoration and 19 acres of protection of
14 nesting habitat, 30 acres of restoration and 30 acres of protection of roosting habitat, 3,095 acres of
15 protection of cultivated lands that provide foraging habitat, and 627 acres of protection of
16 noncultivated lands suitable for foraging. The near-term effects of other conservation actions would
17 remove or convert 88 acres of nesting habitat, 570 acres of roosting habitat, 5,542 acres of
18 cultivated lands, and 1,318 acres of noncultivated lands suitable for foraging. Compensation for
19 these losses from other conservation measures would therefore require 88 acres of restoration and
20 88 acres of protection of nesting habitat, 570 acres of restoration and 570 acres of protection of
21 roosting habitat, 5,542 acres of cultivated lands that provide foraging habitat, and 2,636 acres of
22 noncultivated lands using the same typical NEPA and CEQA ratios.

23 Total compensation for near-term loss or conversion of tricolored blackbird habitat (from the
24 implementation of all conservation measures) that would be required using the typical ratios above
25 would be 108 acres of restoration and 108 acres of protection for nesting habitat, 611 acres of
26 restoration and 611 acres of protection for roosting habitat, 8,793 acres of protection of cultivated
27 foraging habitat, and 3,952 acres of noncultivated lands that provide foraging habitat.

28 The BDCP has committed to near-term goals of protecting 25 acres of nontidal marsh, 750 acres of
29 valley/foothill riparian, 2,000 acres of grassland, 400 acres of vernal pool complex, 120 acres of
30 alkali seasonal wetland complex, 4,800 acres of managed wetland, 15,400 acres of non-rice
31 cultivated lands, and 900 acres of rice (or rice-equivalent wetlands such as nontidal marsh). In
32 addition, the restoration of 800 acres of valley/foothill riparian, 1,140 acres of grassland, 8,850
33 acres of tidal freshwater emergent wetlands, and 2,000 acres of tidal brackish emergent wetlands
34 would be initiated in the near-term timeframe (see Table 3-4 in Chapter 3, *Description of*
35 *Alternatives*). These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and
36 would occur in the same timeframe as the construction and early restoration losses. Some
37 proportion of these natural communities provide suitable habitat for tricolored blackbird as
38 described below.

39 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding
40 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent
41 wetland, in close association with highly productive foraging areas that support abundant insect
42 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some
43 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs
44 1, 2, 8, or 11 (see Table 12-4-38 for foraging habitat values) and would be actively managed to

1 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical
 2 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*
 3 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the
 4 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,
 5 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored
 6 blackbird. The Plan estimates that modeled nesting habitat in the study area currently includes 8%
 7 of valley/foothill riparian and 22% of nontidal freshwater emergent marsh (see Chapter 5, Section
 8 5.6.12.2, *Beneficial Effects*, of the BDCP). Assuming similar proportions of modeled habitat on
 9 conservation lands restored in the near-term, approximately 64 acres of valley foothill riparian and
 10 198 acres of nontidal marsh restored would provide nesting habitat for tricolored blackbird.

11 **Table 12-4-38. Tricolored Blackbird Foraging Habitat Value Classes**

Foraging Habitat Value Class	Agricultural Crop Type/Habitats	
	Breeding Season ^a Foraging Habitat	Nonbreeding Season Foraging Habitat
Very high	Native pasture, nonirrigated native pasture, annual grasslands, vernal pool grasslands, alkali grasslands, unsprayed alfalfa, unsprayed sunflower, unsprayed mixed alfalfa	Livestock feed lots
High	Sunflower, alfalfa and mixed alfalfa, mixed pasture, induced high water table native pasture, nonirrigated mixed pasture, dairies	Corn, sunflower, alfalfa and mixed alfalfa, mixed pasture, native pasture, nonirrigated native pasture, rice, dairies, annual grasslands, vernal pool grasslands, alkali grasslands
Moderate	Miscellaneous grasses, fallow lands cropped within 3 years, new lands prepped for crop production, livestock feed lots, organic rice	Miscellaneous grass pasture, nonirrigated mixed pasture, fallow lands cropped within 3 years, new lands prepped for crop production, organic rice
Low	Wheat, mixed grain and hay crops, farmsteads, non-irrigated mixed grain and hay, rice	Wheat, oats, mixed grain and hay, farmsteads, non-irrigated mixed grain and hay, and non-irrigated misc. grain and hay

^a Generally March through August; occasional breeding in fall (September through November).

12
 13 The Plan estimates that modeled roosting habitat in the study area currently includes 95% of tidal
 14 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,
 15 75% of nontidal marsh, and 15% of managed wetlands (see Chapter 5, Section 5.6.12.2, *Beneficial*
 16 *Effects*, of the BDCP). Assuming similar proportions of modeled habitat on conservation lands
 17 restored in the near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent
 18 wetland, 1,140 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres
 19 of valley foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An
 20 estimated 878 acres of roosting habitat would also be protected in the near-term time period (158
 21 acres of valley/foothill riparian, 720 acres managed wetland).

22 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 23 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
 24 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a
 25 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The
 26 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would

1 provide improved foraging opportunities for tricolored blackbirds during both the breeding and
2 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high
3 reproductive success in tricolored blackbirds. These natural communities are known to support
4 large insect populations, a vital food resource for successful rearing and fledging of young. Those
5 conservation lands that lie within a few miles of active nesting colonies would provide high-value
6 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*
7 *Enhancement and Management*, insect prey populations would be increased on protected lands,
8 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,
9 and GNC2.4).

10 Cultivated lands that provide habitat for covered and other native wildlife species would provide
11 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term
12 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total
13 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-
14 term. Assuming that lands would be protected proportional to the conservation objectives for
15 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat
16 consisting of cultivated lands would be protected in the near-term. These lands would be protected
17 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,
18 7, 8, or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late
19 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in
20 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very
21 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of
22 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the
23 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential
24 habitats for species including tricolored blackbird would also be protected that occur within the
25 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,
26 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for
27 tricolored blackbird (Objective CLNC1.3).

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
32 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
33 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
34 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
35 of the Final EIR/EIS.

36 The acres of protection and restoration contained in the near-term Plan goals, in addition to the
37 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to
38 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the
39 near-term impacts from other conservation measures on nesting, roosting, and foraging habitat.
40 With the protection and restoration acres described above, and the implementation of AMM1–
41 AMM7 and AMM21, potential impacts of Plan implementation in the near-term time period would
42 not result in an adverse effect on tricolored blackbird.

1 **Late Long-Term Timeframe**

2 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093
 3 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for
 4 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled
 5 breeding habitat available, the study area does not currently support many nesting tricolored
 6 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo
 7 Bypass, and along the southwestern perimeter of the study area (see Chapter 5, *Effects Analysis*, of
 8 the BDCP). Alternative 4 as a whole would result in the permanent loss of and temporary effects on
 9 14,183 acres of breeding habitat and 29,158 acres of nonbreeding habitat for tricolored blackbird
 10 during the term of the Plan (9% of the total breeding habitat in the study area and 11% of the total
 11 nonbreeding habitat in the study area). The locations of these losses are described above in the
 12 analyses of individual conservation measures.

13 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 14 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
 15 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*
 16 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
 17 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
 18 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
 19 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that
 20 provide suitable habitat for native wildlife species (see Table 3-4 in Chapter 3, *Description of*
 21 *Alternatives*). In addition, species specific biological goals and objectives for tricolored blackbird
 22 commit to protecting or restoring at least 50 acres of occupied or recently occupied (within the last
 23 15 years) tricolored blackbird nesting habitat located within 5 miles of high-value foraging habitat
 24 in CZs 1, 2, 8, or 11 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are
 25 found in Table 12-4-38. To ensure that natural community conservation benefits tricolored
 26 blackbird, the Plan further specifies that cultivated lands protected for tricolored blackbird retain
 27 residual wetland, grassland patches, shrub stands, and herbaceous edge habitats which may provide
 28 suitable nesting, foraging or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300
 29 acres of moderate-, high-, or very high-value cultivated lands would be conserved and managed as
 30 nonbreeding foraging habitat, 50% of which would be of high- or very high-value (Objective
 31 TRBL1.2). At least 11,050 acres of cultivated lands managed as high to very high breeding foraging
 32 habitat would be conserved within 5 miles of occupied or recently occupied (within the last 15
 33 years) tricolored blackbird nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of
 34 the loss of breeding and nonbreeding habitat would be to cultivated lands that are abundant
 35 throughout the study area, so the loss is not expected to adversely affect the population in the study
 36 area.

37 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
 38 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above
 39 could result in the protection of an estimated 46,566 acres of tricolored blackbird habitat (16,476
 40 acres breeding habitat and 31,090 acres nonbreeding habitat) and restoration of 31,001 acres of
 41 tricolored blackbird habitat (2,190 acres breeding habitat and 28,811 acres nonbreeding habitat).

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 45 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of

1 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
2 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
3 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
4 of the Final EIR/EIS.

5 **NEPA Effects:** The losses of tricolored blackbird habitat and potential direct mortality of a special-
6 status species under Alternative 4 would represent an adverse effect in the absence of other
7 conservation actions. However, with habitat protection and restoration associated with CM3, CM4,
8 CM5, CM7, CM8, and CM11, guided by species-specific goals and objectives and by AMM1–AMM7
9 and *AMM21 Tricolored Blackbird*, which would be in place during all project activities, the effects of
10 habitat loss or potential mortality on tricolored blackbird under Alternative 4 would not be adverse.

11 **CEQA Conclusion:**

12 **Near-Term Timeframe**

13 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
14 the near-term BDCP conservation strategy has been evaluated to determine whether it would
15 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
16 effects of construction would be less than significant under CEQA. Alternative 4 would remove 4,663
17 acres of breeding habitat (28 acres of nesting, 1,947 acres of cultivated lands, and 994 acres of
18 noncultivated lands suitable for foraging) and 6,626 acres of nonbreeding habitat (579 acres of
19 roosting, 4,794 acres of cultivated lands, and 638 acres of noncultivated lands suitable for foraging)
20 for tricolored blackbird in the study area in the near-term. These effects would result from the
21 construction of the water conveyance facilities (CM1, 1,975 acres of breeding, 1,796 acres of
22 nonbreeding), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
23 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
24 *Restoration*, and *CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres
25 of nonbreeding).

26 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and
27 1:1 for protection for the loss of nesting and roosting wetland habitat, 1:1 protection for the loss of
28 cultivated lands, and 2:1 protection for loss of noncultivated lands suitable for foraging.

29 Using these ratios would indicate that the compensation for loss or conversion of tricolored
30 blackbird habitat from CM1 would require 19 acres of restoration and 19 acres of protection of
31 nesting habitat, 30 acres of restoration and 30 acres of protection of roosting habitat, 3,095 acres of
32 protection of cultivated lands that provide foraging habitat, and 627 acres of protection of
33 noncultivated lands suitable for foraging. The near-term effects of other conservation actions would
34 remove or convert 88 acres of nesting habitat, 570 acres of roosting habitat, 5,542 acres of
35 cultivated lands, and 1,318 acres of noncultivated lands suitable for foraging. Compensation for
36 these losses from other conservation measures would therefore require 88 acres of restoration and
37 88 acres of protection of nesting habitat, 570 acres of restoration and 570 acres of protection of
38 roosting habitat, 5,542 acres of cultivated lands that provide foraging habitat, and 2,636 acres of
39 noncultivated lands using the same typical NEPA and CEQA ratios.

40 Total compensation for near-term loss or conversion of tricolored blackbird habitat (from the
41 implementation of all conservation measures) that would be required using the typical ratios above
42 would be 108 acres of restoration and 108 acres of protection for nesting habitat, 611 acres of

1 restoration and 611 acres of protection for roosting habitat, 8,793 acres of protection of cultivated
2 foraging habitat, and 3,952 acres of noncultivated lands that provide foraging habitat.

3 The BDCP has committed to near-term goals of protecting 25 acres of nontidal marsh, 750 acres of
4 valley/foothill riparian, 2,000 acres of grassland, 400 acres of vernal pool complex, 120 acres of
5 alkali seasonal wetland complex, 4,800 acres of managed wetland, 15,400 acres of non-rice
6 cultivated lands, and 900 acres of rice (or rice-equivalent wetlands such as nontidal marsh). In
7 addition, the restoration of 800 acres of valley/foothill riparian, 1,140 acres of grassland, 8,850
8 acres of tidal freshwater emergent wetlands, and 2,000 acres of tidal brackish emergent wetlands
9 would be initiated in the near-term timeframe (see Table 3-4 in Chapter 3, *Description of*
10 *Alternatives*). These conservation actions are associated with CM3, CM4, CM5, CM7, and CM8 and
11 would occur in the same timeframe as the construction and early restoration losses. Some
12 proportion of these natural communities provide suitable habitat for tricolored blackbird as
13 described below.

14 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding
15 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent
16 wetland, in close association with highly productive foraging areas that support abundant insect
17 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some
18 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs
19 1, 2, 8, or 11 (see Table 12-4-38 for foraging habitat values) and would be actively managed to
20 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical
21 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*
22 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the
23 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,
24 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored
25 blackbird. The Plan estimates that modeled nesting habitat in the study area currently includes 8%
26 of valley/foothill riparian and 22% of nontidal freshwater emergent marsh (see Chapter 5, Section
27 5.6.12.2, *Beneficial Effects*, of the BDCP). Assuming similar proportions of modeled habitat on
28 conservation lands restored in the near-term, approximately 64 acres of valley foothill riparian and
29 198 acres of nontidal marsh restored would provide nesting habitat for tricolored blackbird.

30 The Plan estimates that modeled roosting habitat in the study area currently includes 95% of tidal
31 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,
32 75% of nontidal marsh, and 15% of managed wetlands (see Chapter 5, Section 5.6.12.2, *Beneficial*
33 *Effects*, of the BDCP). Assuming similar proportions of modeled habitat on conservation lands
34 restored in the near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent
35 wetland, 1,140 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres
36 of valley foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An
37 estimated 878 acres of roosting habitat would also be protected in the near-term time period (158
38 acres of valley/foothill riparian, 720 acres managed wetland).

39 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
40 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
41 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a
42 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The
43 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would
44 provide improved foraging opportunities for tricolored blackbirds during both the breeding and
45 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high

1 reproductive success in tricolored blackbirds. These natural communities are known to support
2 large insect populations, a vital food resource for successful rearing and fledging of young. Those
3 conservation lands that lie within a few miles of active nesting colonies would provide high-value
4 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*
5 *Enhancement and Management*, insect prey populations would be increased on protected lands,
6 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,
7 and GNC2.4).

8 Cultivated lands that provide habitat for covered and other native wildlife species would provide
9 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term
10 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total
11 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-
12 term. Assuming that lands would be protected proportional to the conservation objectives for
13 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat
14 consisting of cultivated lands would be protected in the near-term. These lands would be protected
15 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,
16 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late
17 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in
18 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very
19 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of
20 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the
21 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential
22 habitats for species including tricolored blackbird would also be protected that occur within the
23 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,
24 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for
25 tricolored blackbird (Objective CLNC1.3).

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
30 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
31 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
32 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
33 of the Final EIR/EIS.

34 In the absence of other conservation actions, the effects on tricolored blackbird habitat from
35 Alternative 4 would represent an adverse effect as a result of habitat modification and potential for
36 direct mortality of a special-status species. The acres of protection and restoration contained in the
37 near-term Plan goals, in addition to the detailed habitat value goals that would be applied to near-
38 term acres, are more than sufficient to satisfy the typical mitigation ratios that would be applied to
39 the project-level effects of CM1 and the near-term impacts from other conservation measures on
40 nesting, roosting, and cultivated lands foraging habitat. With the protection and restoration acres
41 described above, and the implementation of AMM1–AMM7 and AMM21, potential impacts of Plan
42 implementation in the near-term time period would result in a less-than-significant impact on
43 tricolored blackbird.

1 **Late Long-Term Timeframe**

2 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093
 3 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for
 4 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled
 5 breeding habitat available, the study area does not currently support many nesting tricolored
 6 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo
 7 Bypass, and along the southwestern perimeter of the study area (see Chapter 5, *Effects Analysis*, of
 8 the BDCP). Alternative 4 as a whole would result in the permanent loss of and temporary effects on
 9 14,183 acres of breeding habitat and 29,158 acres of nonbreeding habitat for tricolored blackbird
 10 during the term of the Plan (9% of the total breeding habitat in the study area and 11% of the total
 11 nonbreeding habitat in the study area). The locations of these losses are described above in the
 12 analyses of individual conservation measures.

13 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 14 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
 15 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*
 16 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
 17 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
 18 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
 19 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that
 20 provide suitable habitat for native wildlife species (see Table 3-4 in Chapter 3, *Description of*
 21 *Alternatives*).

22 Species specific biological goals and objectives for tricolored blackbird commit to protecting or
 23 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored
 24 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11
 25 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-4-
 26 38. To ensure that natural community conservation benefits tricolored blackbird, the Plan further
 27 specifies that cultivated lands protected for tricolored blackbird retain residual wetland, grassland
 28 patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting, foraging
 29 or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of moderate-, high-,
 30 or very high-value cultivated lands would be conserved and managed as nonbreeding foraging
 31 habitat, 50% of which would be of high- or very high-value (Objective TRBL1.2). At least 11,050
 32 acres of cultivated lands managed as high to very high breeding foraging habitat would be conserved
 33 within 5 miles of occupied or recently occupied (within the last 15 years) tricolored blackbird
 34 nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of the loss of breeding and
 35 nonbreeding habitat would be to cultivated lands that are abundant throughout the study area, so
 36 the loss is not expected to adversely affect the population in the study area.

37 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
 38 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above
 39 could result in the protection of an estimated 46,566 acres of tricolored blackbird habitat (16,476
 40 acres breeding habitat and 31,090 acres nonbreeding habitat) and restoration of 31,001 acres of
 41 tricolored blackbird habitat (2,190 acres breeding habitat and 28,811 acres nonbreeding habitat).

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 45 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of

1 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
2 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
3 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
4 of the Final EIR/EIS.

5 In the absence of other conservation actions, the effects on tricolored blackbird habitat from
6 Alternative 4 would represent an adverse effect as a result of habitat modification and potential for
7 direct mortality of a special-status species. Considering Alternative 4's protection and restoration
8 provisions, which would provide acreages of new or enhanced habitat in amounts greater than
9 necessary to compensate for habitats lost to construction and restoration activities, and with
10 implementation of AMM1-AMM7 and AMM21 *Tricolored Blackbird*, the loss of habitat or direct
11 mortality though the implementation of Alternative 4 as a whole would not result in a substantial
12 adverse effect through habitat modifications and would not substantially reduce the number or
13 restrict the range of the species. Therefore, the alternative would have a less-than-significant impact
14 on tricolored blackbird.

15 **Impact BIO-88: Effects on Tricolored Blackbird Associated with Electrical Transmission** 16 **Facilities**

17 New transmission lines would increase the risk that tricolored blackbirds could be subject to power
18 line strikes, which could result in injury or mortality of individuals. Tricolored blackbirds would
19 have the potential to intersect the proposed transmission lines largely due to winter movements
20 throughout the study area, when individuals are migrating in large flocks and dense fog is common
21 in the area. Although migratory movements and daily flights between roosting and foraging habitat
22 make tricolored blackbird vulnerable to collision with transmission lines, daily flights associated
23 with winter foraging likely occurs in smaller flocks at heights that are lower than the transmission
24 lines (BDCP Appendix 5.J, Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at*
25 *Proposed BDCP Transmission Lines*). Marking transmission lines with flight diverters that make the
26 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
27 Drewien 1995). For example, Yee (2008) estimated that marking devices in the Central Valley could
28 reduce avian mortality by 60%. As described in AMM20 *Greater Sandhill Crane*, all new project
29 transmission lines would be fitted with flight diverters, which would further reduce any potential
30 for tricolored blackbird collision with transmission lines.

31 Transmission line poles and towers provide perching substrate for raptors, which are predators on
32 tricolored blackbird. Although there is potential for transmission lines to result in increased
33 perching opportunities for raptors and result in increased predation pressure on tricolored
34 blackbirds. The existing network of transmission lines in the study area currently poses these risks
35 and any incremental risk associated with the new power line corridors would not be expected to
36 affect the study area population. Therefore, it is assumed that the increase in predation risk on
37 tricolored blackbird from an increase in raptor perching opportunities would be minimal.

38 **NEPA Effects:** New transmission lines would increase the risk for tricolored blackbird powerline
39 strikes, primarily during daily flights between roosting and foraging sites and during winter during
40 migration movements. AMM20 *Greater Sandhill Crane* contains the commitment to place bird strike
41 diverters on all new powerlines, which would reduce the potential impact of the construction of new
42 transmission lines on tricolored blackbird. The increase in predation risk on tricolored blackbird
43 from an increase in raptor perching opportunities would be minimal. Therefore, the construction

1 and operation of new transmission lines under Alternative 4 would not result in an adverse effect on
2 tricolored blackbird.

3 **CEQA Conclusion:** New transmission lines would increase the risk for tricolored blackbird
4 powerline strikes, primarily in winter during daily flights between roosting and foraging sites and
5 during migration movements. *AMM20 Greater Sandhill Crane* contains the commitment to place bird
6 strike diverters on all new powerlines, which would reduce the potential impact of the construction
7 of new transmission lines on tricolored blackbird. The increase in predation risk on tricolored
8 blackbird from an increase in raptor perching opportunities would be minimal. The construction
9 and operation of new transmission lines under Alternative 4 would not substantially reduce the
10 number or restrict the range of the species and would therefore result in a less-than-significant
11 impact on tricolored blackbird.

12 **Impact BIO-89: Indirect Effects of Plan Implementation on Tricolored Blackbird**

13 **Indirect Construction- and Operation-Related Effects:** Tricolored blackbird nesting habitat
14 within the vicinity of proposed construction areas that could be indirectly affected by construction
15 activities. Construction noise above background noise levels (greater than 50 dBA) could extend 500
16 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*
17 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and
18 Appendix 11F, *Substantive BDCP Revisions*, of the Final EIR/EIS), although there are no available data
19 to determine the extent to which these noise levels could affect tricolored blackbird. Indirect effects
20 associated with construction include noise, dust, and visual disturbance caused by grading, filling,
21 contouring, and other ground-disturbing operations outside the project footprint but within 1,300
22 feet from the construction edge. Construction and subsequent maintenance-related noise and visual
23 disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the functions of
24 suitable nesting habitat for these species. *AMM21 Tricolored Blackbird* would require
25 preconstruction surveys, and if detected, covered activities would be avoided within a minimum 300
26 feet of an active nesting colony and up to 1,300 feet where practicable until breeding has ceased.
27 Construction and restoration projects would also be designed, in consultation with CDFW, to avoid
28 construction activity within at least 300 feet from occupied active tricolored blackbird roosting
29 habitat. In addition, monitoring would be implemented to ensure that construction does not
30 adversely affect the nesting colony or roost site. The use of mechanical equipment during water
31 conveyance facilities construction could cause the accidental release of petroleum or other
32 contaminants that could affect tricolored blackbird in the surrounding habitat. The inadvertent
33 discharge of sediment or excessive dust adjacent to tricolored blackbird habitat could also affect the
34 species. *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*,
35 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff
36 from the construction area and negative effects of dust on active nests.

37 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
38 mercury in avian species, including tricolored blackbird. Marsh (tidal and nontidal) and floodplain
39 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed
40 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to
41 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP
42 restoration activities that create newly inundated areas could increase bioavailability of mercury
43 (see Chapter 3, *Conservation Strategy*, of the BDCP for details of restoration).

1 Breeding tricolored blackbirds are not thought to be highly susceptible to methylmercury exposure
 2 because tidal wetlands are not expected to be a major foraging area for the species. Furthermore,
 3 the Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
 4 under the plan would generate less methylmercury than the existing managed wetlands, potentially
 5 reducing the overall risk. However, species sensitivity to methylmercury differs widely and there is
 6 a large amount of uncertainty with respect to species-specific effects and increased methylmercury
 7 associated with natural community and floodplain restoration could indirectly affect tricolored
 8 blackbird, via uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*). A
 9 detailed review of the methylmercury issues associated with implementation of the BDCP is
 10 contained in Appendix 11F, *Substantive BDCP Revisions*. This review includes an overview of the
 11 BDCP-related mechanisms that could result in increased mercury in the foodweb, and how exposure
 12 of individual species to mercury may occur based on feeding habits and where species habitat
 13 overlaps with the areas where mercury bioavailability could increase.

14 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
 15 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
 16 *Revisions*) is included to provide for site-specific evaluation for each restoration project. Where
 17 restoration design and adaptive management cannot fully address the high potential for
 18 methylmercury production while also meeting restoration objectives, alternate restoration areas
 19 would be considered on a project-specific basis. CM12 would be implemented in coordination with
 20 other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury
 21 Monitoring and Analysis Section. This conservation measure would include the following actions.

- 22 • Assess pre-restoration conditions to determine the risk that the project could result in increased
 23 mercury methylation and bioavailability.
- 24 • Define design elements that minimize conditions conducive to generation of methylmercury in
 25 restored areas.
- 26 • Define adaptive management strategies that can be implemented to monitor and minimize
 27 actual postrestoration creation and mobilization of methylmercury.

28 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 29 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 30 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 31 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 32 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 33 classes within a species. In addition, the effect of selenium on a species can be confounded by
 34 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 35 2009).

36 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 37 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 38 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 39 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 40 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 41 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 42 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 43 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 44 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which

1 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
2 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
3 levels of selenium have a higher risk of selenium toxicity.

4 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
5 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
6 exacerbate bioaccumulation of selenium in avian species, including tricolored blackbird. Marsh
7 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
8 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
9 BDCP restoration activities that create newly inundated areas could increase bioavailability of
10 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
11 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
12 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
13 long-term increases in selenium concentrations in water in the Delta under any alternative.
14 However, it is difficult to determine whether the effects of potential increases in selenium
15 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
16 lead to adverse effects on tricolored blackbird.

17 Because of the uncertainty that exists at this programmatic level of review, there could be a
18 substantial effect on tricolored blackbird from increases in selenium associated with restoration
19 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
20 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
21 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
22 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
23 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
24 separately for each restoration effort as part of design and implementation. This avoidance and
25 minimization measure would be implemented as part of the tidal habitat restoration design
26 schedule.

27 **NEPA Effects:** The effects of noise, potential spills of hazardous material, increased dust and
28 sedimentation, and operations and maintenance of the water conveyance facilities would not be
29 adverse with the implementation of AMM1-AMM7 and *AMM21 Tricolored Blackbird*.

30 Tidal habitat restoration could result in increased exposure of tricolored blackbird to selenium. This
31 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
32 would provide specific tidal habitat restoration design elements to reduce the potential for
33 bioaccumulation of selenium and its bioavailability in tidal habitats.

34 The implementation of tidal natural communities restoration or floodplain restoration could result
35 in increased exposure of tricolored blackbird to methylmercury. It is unlikely that breeding
36 tricolored blackbird would be highly susceptible to methylmercury exposure because tidal wetlands
37 are not expected to be a major foraging area for the species. However, it is unknown what
38 concentrations of methylmercury are harmful to this species and the potential for increased
39 exposure varies substantially within the study area. Implementation of CM12 which contains
40 measures to assess the amount of mercury before project development, followed by appropriate
41 design and adaptation management, would minimize the potential for increased methylmercury
42 exposure, and would result in no adverse effect on tricolored blackbird.

1 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
2 sedimentation, and operations and maintenance of the water conveyance facilities would be less
3 than significant with the implementation of *AMM21 Tricolored Blackbird* and *AMM1-AMM7*.

4 Tidal habitat restoration could result in increased exposure of tricolored blackbird to selenium. This
5 impact would be addressed through the implementation of *AMM27 Selenium Management*, which
6 would provide specific tidal habitat restoration design elements to reduce the potential for
7 bioaccumulation of selenium and its bioavailability in tidal habitats.

8 The implementation of tidal natural communities restoration or floodplain restoration could result
9 in increased exposure of tricolored blackbird to methylmercury. It is unlikely that breeding
10 tricolored blackbird would be highly susceptible to methylmercury exposure because tidal wetlands
11 are not expected to be a major foraging area for the species. However, it is unknown what
12 concentrations of methylmercury are harmful to this species. Implementation of *CM12* which
13 contains measures to assess the amount of mercury before project development, followed by
14 appropriate design and adaptation management, would minimize the potential for increased
15 methylmercury exposure, and would result in no adverse effect on tricolored blackbird.

16 Therefore, with *AMM1-AMM7*, *AMM21*, *AMM27*, and *CM12* in place, the indirect effects of
17 Alternative 4 implementation would not result in a substantial adverse effect through habitat
18 modification or potential mortality. Therefore, the indirect effects of Alternative 4 implementation
19 would have a less-than-significant impact on tricolored blackbird.

20 **Impact BIO-90: Periodic Effects of Inundation of Tricolored Blackbird Habitat as a Result of** 21 **Implementation of Conservation Components**

22 Flooding of the Yolo Bypass (*CM2*) would inundate 2,447–4,312 acres of breeding habitat and 263–
23 1,252 acres of nonbreeding habitat (Table 12-4-37). Based on hypothetical floodplain restoration,
24 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in
25 periodic inundation of approximately 2,509 acres of breeding habitat (30 acres of nesting, 2,124
26 acres of cultivated lands, 355 acres of noncultivated lands suitable for foraging) and 2,694 acres of
27 nonbreeding habitat (29 acres of roosting, 2,506 acres of cultivated lands, 158 acres of noncultivated
28 lands suitable for foraging; see Table 12-4-37) resulting in the temporary loss of these habitats.
29 Tricolored blackbirds are highly nomadic during the winter and would be expected to move to
30 adjacent suitable foraging habitat when the bypass is inundated, as they do under the current
31 flooding regime. However, this inundation could reduce the availability of nesting habitat during
32 years when flooding extends into the nesting season (past March). The periodic inundation of the
33 Yolo Bypass (*CM2*) and of other floodplains (*CM5*) is expected to restore a more natural flood
34 regime in support of wetland and riparian vegetation types that support nesting habitat. There
35 would be no expected adverse effect on tricolored blackbird.

36 **NEPA Effects:** Implementation of *CM2* and *CM5* would result in periodic inundation of nesting and
37 foraging habitat for tricolored blackbird. Periodic inundation would not result in an adverse effect
38 on tricolored blackbird because inundation is expected to take place outside of the breeding season.
39 Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly
40 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

41 **CEQA Conclusion:** Implementation of *CM2* and *CM5* would result in periodic inundation of nesting
42 and foraging habitat for tricolored blackbird. Periodic inundation would have a less-than-significant
43 impact on tricolored blackbird because inundation is expected to take place outside of the breeding

1 season. Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly
2 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

3 **Western Burrowing Owl**

4 This section describes the effects of Alternative 4, including water conveyance facilities construction
5 and implementation of other conservation components, on western burrowing owl. Western
6 burrowing owl modeled habitat consisted of high- and low-value habitat for nesting and foraging.
7 High-value habitat consists of plant alliances within the grassland and vernal pool natural
8 communities and pasture. Low-value habitat includes plant alliances and crop types from managed
9 wetland, alkali seasonal wetland, and cultivated lands. Value was determined through reported
10 species use patterns from the literature.

11 Construction and restoration associated with Alternative 4 conservation measures would result in
12 both temporary and permanent losses of western burrowing owl modeled habitat as indicated in
13 Table 12-4-39. Full implementation of Alternative 4 would also include the following conservation
14 actions over the term of the BDCP to benefit the western burrowing owl (see Chapter 3, Section 3.3,
15 *Biological Goals and Objectives*, of the BDCP).

- 16 • Protect at least 1,000 acres of cultivated lands in CZs 1 and 11 that support high-value
17 burrowing owl habitat and are within 0.5 mile of high-value grassland habitat or occupied low-
18 value habitat (Objective WBO1.1, associated with CM3).
- 19 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
20 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
21 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 22 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 23 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
24 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 25 • Restore or create alkali seasonal wetlands and vernal pool complex in CZs 1, 8, and/or 11 to
26 achieve no net loss of wetted acres (Objectives ASWNC1.2 and VPNC1.2, associated with CM9)
- 27 • Increase burrow availability and prey abundance and accessibility (Objectives ASWNC2.3,
28 ASWNC2.4, VPNC2.4, VPNC2.5, GNC2.3, and GNC2.4, associated with CM11)
- 29 • Protect at least 48,600 acres of cultivated lands that provide suitable habitat for covered and
30 other native wildlife species and maintain and protect the small patches of important wildlife
31 habitats associated with cultivated lands (Objectives CLNC1.1 and CLNC1.3, associated with
32 CM3)

33 As explained below, with the restoration or protection of these amounts of habitat, in addition to
34 management activities that would enhance habitat for the species and implementation of AMM1-
35 AMM7, and AMM23 *Western Burrowing Owl*, impacts on western burrowing owl would not be
36 adverse for NEPA purposes and would be less than significant for CEQA purposes.

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Table 12-4-39. Changes in Western Burrowing Owl Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT	NT	LLT	CM2	CM5
CM1	High-value	863	863	314	314	NA	NA
	Low-value	2,294	2,294	559	559	NA	NA
Total Impacts CM1		3,157	3,157	873	873		
CM2-CM18	High-value	4,487	11,570	245	328	1,390-3,303	779
	Low-value	3,527	28,506	144	971	1,522-2,927	6,162
Total Impacts CM2-CM18		8,014	40,076	389	1,299	2,912-6,230	6,941
Total High-value		5,350	12,433	559	642	1,390-3,303	779
Total Low-value		5,821	30,800	703	1,530	1,522-2,927	6,162
TOTAL IMPACTS		11,171	43,233	1,262	2,172	2,912-6,230	6,941

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

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Impact BIO-91: Loss or Conversion of Habitat for and Direct Mortality of Western Burrowing Owl

Alternative 4 conservation measures would result in the combined permanent and temporary loss of up to 45,405 acres of modeled habitat for western burrowing owl (of which 13,075 acres is of high-value and 32,330 acres is of low value, Table 12-4-39). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of reusable tunnel material areas (CM1), *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM10 Nontidal Marsh Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*. The majority of habitat loss (29,668 acres) would result from CM4. Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate western burrowing owl habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would result in the combined permanent and temporary loss of up to 1,177 acres of modeled

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1 high-value western burrowing owl habitat (863 acres of permanent loss, 314 acres of temporary
2 loss) from CZs 3–6 and CZ 8. In addition, 2,853 acres of low-value burrowing owl habitat would
3 be removed (2,294 acres of permanent loss, 559 acres of temporary loss). The majority of high-
4 value grassland habitat that would be removed would be in CZ 8, from the construction of the
5 new forebay in CZ 8. There is a high concentration of CNDDDB and DHCCP survey records for
6 western burrowing owls in CZ 8 to the west and the south of the Clifton Court Forebay. The loss
7 of high-value habitat from facility construction and the establishment of the forebay RTM
8 storage area could remove occupied habitat, displace nesting and wintering owls, and fragment
9 occupied burrowing owl habitat.

10 The RTM storage area overlaps with six occurrences of western burrowing owl and there are
11 also several occurrences west of the new forebay control structure that could be indirectly
12 affected by construction activities. The amount of storage area needed for reusable tunnel
13 material is flexible (dependent on storage pile height and other factors) and the footprint used
14 in the effects analysis is based on a worst case scenario. However, the actual area to be affected
15 by reusable tunnel material storage would likely be less than the estimated acreage. The
16 implementation of *AMM6 Disposal and Reuse of Spoils* and *AMM23 Western Burrowing Owl* would
17 require that, to the extent practicable, the reusable tunnel material storage area footprint
18 avoided locations where active burrows are present. The footprints of a permanent
19 transmission line and a permanent access road, both located west of the Clifton Court Forebay,
20 overlap with an additional 8 occurrences of western burrowing owl. Preconstruction surveys
21 would be conducted prior to any construction activities under *AMM23 Western Burrowing Owl*
22 during the nonbreeding and the breeding season. If avoidance was not possible, passive
23 relocation would be considered in consultation with CDFW. If owls were to be excluded from
24 existing burrows, artificial burrows would be used if it were possible for them to be installed
25 within 100 meters from the existing burrows on protected lands. A substantial portion of the
26 high-value grassland protection and enhancement under *CM8 Grassland Natural Community*
27 *Restoration* would be expected to occur to the west and to the south of these occurrences in CZ
28 8, which would provide high-value protected lands in close proximity to the disturbed habitat.

29 Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4 construction
30 locations. Impacts from CM1 would occur within the first 10-14 years of Alternative 4
31 implementation.

- 32 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
33 would result in the combined permanent and temporary loss of up to 1,127 acres of high-value
34 western burrowing owl habitat (882 acres of permanent loss, 245 acres of temporary loss) in
35 the Yolo Bypass in CZ 2. In addition, 242 acres of low-value habitat would be removed (98 acres
36 of permanent loss, 144 acres of temporary loss). The loss is expected to occur during the first 10
37 years of Alternative 4 implementation.
- 38 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
39 inundation would permanently remove an estimated 29,668 acres of modeled western
40 burrowing owl habitat in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. The majority of removed or converted
41 acres (19,739 acres) is composed of low-value habitat. However, 9,929 acres of high-value
42 habitat would also be lost from tidal restoration actions. Tidal restoration would directly impact
43 and fragment remaining high-value grassland habitat just north of Rio Vista in and around
44 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Tidal
45 natural community restoration efforts would impact one extant record of burrowing owl just
46 northeast of Oakley along Dutch Slough and one possibly extirpated record in Suisun Marsh.

- 1 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
2 seasonally inundated floodplain would permanently and temporarily remove approximately
3 2,504 acres of modeled western burrowing owl in CZs 2, 4, and 7. This total is comprised of
4 2,279 acres of low-value habitat. Also, 225 acres of high-value grassland habitat would be
5 removed (142 permanent, 83 temporary) consisting of small patches of habitat along the San
6 Joaquin, Old, and Middle Rivers in CZ 7.

- 7 ● *CM6 Channel Margin Enhancement*: Sites for channel margin enhancement would be located
8 along levees where western burrowing owl could be present. The species is known to use often
9 the grassland edges along canals and levees in agricultural areas. The implementation of *AMM23*
10 *Western Burrowing Owl* would reduce the potential for channel margin enhancement activities
11 to disturb owls or affect active nests.

- 12 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
13 approximately 11 acres of high-value burrowing owl habitat as part of tidal restoration. In
14 addition, 960 acres of low-value habitat would be removed as a part of tidal restoration and
15 3,991 acres would be removed as part of seasonal floodplain restoration through CM7.

- 16 ● *CM8 Grassland Natural Community Restoration*: Grassland restoration would primarily be
17 implemented on agricultural lands and would result in the permanent loss of 1,676 acres (362
18 acres of high-value and 1,314 acres of low-value) of western burrowing owl habitat. The
19 conversion of 1,676 acres of low-value habitat to high-value grassland, would temporarily
20 remove available habitat but would ultimately have a beneficial effect on the western burrowing
21 owl.

- 22 ● *CM10 Nontidal Marsh Restoration*: Implementation would result in the permanent removal of
23 159 acres of high-value and 952 acres of low-value western burrowing owl habitat.

- 24 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
25 actions that are designed to enhance wildlife values in restored or protected habitats could
26 result in localized ground disturbances that could temporarily remove small amounts of
27 western burrowing owl habitat. The burrowing owl's fossorial habits make the species more
28 sensitive to the effects of ground disturbance than other raptors. Ground-disturbing activities,
29 such as removal of nonnative vegetation and road and other infrastructure maintenance
30 activities, would be expected to have minor adverse effects on available western burrowing owl
31 habitat and would be expected to result in overall improvements to and maintenance of habitat
32 values over the term of the BDCP. CM11 would also include the construction of recreational-
33 related facilities including trails, interpretive signs, and picnic tables (see Chapter 4, *Covered*
34 *Activities and Associated Federal Actions*, of the BDCP). The construction of trailhead facilities,
35 signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas
36 when and where possible. However, approximately 50 acres of grassland habitat would be lost
37 from the construction of trails and facilities.

- 38 Habitat management- and enhancement-related activities and equipment operation could
39 destroy nests burrows, and noise and visual disturbances could lead to their abandonment,
40 resulting in mortality of eggs and nestlings. The potential for these activities to result in nest
41 failure and mortality or other adverse effects on western burrowing owl would be avoided or
42 minimized with the incorporation of *AMM23 Western Burrowing Owl* into the BDCP which would
43 require surveys to determine presence or absence and the establishment of no-disturbance
44 buffers around active sites.

- 1 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
2 value western burrowing owl habitat for the development of a delta and longfin smelt
3 conservation hatchery in CZ 1.
- 4 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
5 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
6 disturbances that could affect western burrowing owl use of the surrounding habitat.
7 Maintenance activities would include vegetation management, levee and structure repair, and
8 re-grading of roads and permanent work areas. These effects, however, would be reduced by
9 AMMs and conservation actions as described below.
- 10 • Injury and Direct Mortality: Construction would not be expected to result in direct mortality of
11 western burrowing owl. However, if nest burrows were occupied in the vicinity of construction
12 activities, equipment operation could destroy nests and noise and visual disturbances could lead
13 to abandonment. *AMM23 Western Burrowing Owl* would ensure that preconstruction surveys
14 detected any occupied burrows and no-disturbance buffers would be implemented.

15 The following paragraphs summarize the combined effects discussed above and describe other
16 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
17 included.

18 ***Near-Term Timeframe***

19 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
20 the near-term BDCP conservation strategy has been evaluated to determine whether it would
21 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
22 effects of construction would not be adverse under NEPA. Alternative 4 would remove 5,909 acres
23 (5,350 acres permanent, 559 acres temporary) of high-value habitat for western burrowing owl in
24 the study area in the near-term. These effects would result from the construction of the water
25 conveyance facilities (CM1, 1,177 acres), and implementing other conservation measures (*CM2 Yolo*
26 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*
27 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*
28 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*
29 and *CM18 Conservation Hatcheries*—4,732 acres). In addition, 6,524 acres of low-value habitat
30 would be removed or converted in the near-term (CM1, 2,853 acres; *CM2-CM18*—3,671 acres).

31 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
32 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. Using these typical
33 ratios would indicate that 2,354 acres should be protected to compensate for the loss of high-value
34 habitat and 2,853 acres should be protected to compensate for the loss of low-value habitat from
35 CM1. The near-term effects of other conservation actions would require 9,464 acres of protection to
36 compensate for the loss of high-value habitat and 3,671 acres of protection to compensate for the
37 loss of low-value habitat using the same typical NEPA and CEQA ratios (2:1 protection for the loss of
38 high-value habitat, 1:1 protection for the loss of low-value habitat).

39 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
40 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
41 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (see Table
42 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3,

1 CM8, and CM9 and would occur in the same timeframe as the construction and early restoration
2 losses.

3 The protection of high-value grasslands is essential in order to sustain existing western burrowing
4 owl populations in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
5 7, 8, and 11 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be
6 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
7 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
8 pool natural communities which would provide habitat for western burrowing owl and reduce the
9 effects of current levels of habitat fragmentation. This protection would not only expand the amount
10 of protected high-value habitat in the study area, but also support existing western burrowing owl
11 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
12 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
13 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
14 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
15 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*
16 *Communities Enhancement and Management*, small mammal and insect prey populations would be
17 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
18 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected
19 natural communities by encouraging ground squirrel occupancy and expansion through the creation
20 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
21 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance
22 standards for considering the effectiveness of conservation actions.

23 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
24 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
25 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
26 CM1 and other near-term effects on western burrowing owl high-value habitat with the
27 consideration that some portion of the 15,400 acres of cultivated lands protected in the near-term
28 timeframe would be managed in suitable crop types to compensate for the loss of high-value
29 burrowing owl habitat at a ratio of 2:1. Mitigation Measure BIO-91, *Compensate for the Near-Term*
30 *Loss of High-Value Burrowing Owl Habitat*, would be available to address the adverse effect of high-
31 value habitat loss in the near-term.

32 The compensation for the loss of low-value burrowing owl habitat from near-term impacts would be
33 sufficient to meet the typical ratio of 1:1 protection. A proportion of the loss of low-value habitat
34 would be a result of the conversion to high-value habitat. In addition, 1,262 acres of impacts on
35 burrowing owl habitat would be temporary and would be restored within 1 year of the completion
36 of construction. The management and enhancement of cultivated lands and protected grasslands
37 including prey enhancement, increasing burrow availability, and reducing existing fragmentation of
38 high-value habitat, would further compensate for any potential effect from the near-term loss of
39 foraging habitat on western-burrowing owl.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
41 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
42 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
43 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
44 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
45 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since

1 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
2 of the Final EIR/EIS.

3 **Late Long-Term Timeframe**

4 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and
5 254,352 acres of low-value habitat for western burrowing owl. Alternative 4 as a whole would result
6 in the permanent loss of and temporary effects on 13,075 acres of high-value habitat and 32,330
7 acres of low-value western burrowing owl habitat over the term of the Plan. The locations of these
8 losses are described above in the analyses of individual conservation measures.

9 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
10 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
11 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural
12 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
13 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
14 species (see Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland restoration and
15 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2) Grassland
16 protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland
17 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
18 grassland, alkali seasonal wetland, and vernal pool natural communities which would provide
19 habitat for western burrowing owl and reduce the effects of current levels of habitat fragmentation.
20 This protection would not only expand the amount of protected high-value habitat in the study area,
21 but also support existing western burrowing owl populations that occur to the west of CZ 8 and in
22 the areas surrounding CZs 1 and 11, which would especially benefit declining populations in the
23 vicinity of Suisun Marsh and San Pablo Bay. Certain types of cultivated lands such as irrigated
24 pasture, alfalfa and other hay crops, and some row crops can provide foraging habitat for western
25 burrowing owl. Under appropriate management regimes, cultivated lands can support breeding and
26 wintering burrowing owls. To ensure that cultivated lands conservation benefits western burrowing
27 owl, the Plan's biological goals and objectives further specify that, of the cultivated lands protected
28 in the late long-term, at least 1,000 acres would be protected in CZs 1 and 11 that support high-value
29 burrowing owl habitat and are within 0.5 miles of high-value grassland habitat or occupied low-
30 value habitat (Objective WBO1.1). Under *CM11 Natural Communities Enhancement and Management*,
31 small mammal and insect prey populations would be increased on protected lands, enhancing the
32 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In
33 addition, burrow availability would be increased on protected natural communities by encouraging
34 ground squirrel occupancy and expansion through the creation of berms, mounds, edges, and
35 through the prohibition of ground squirrel control programs (i.e., poisoning, Objectives ASWNC2.3,
36 VPNC2.4, GNC2.3).

37 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
38 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above
39 could result in the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589
40 acres high-value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western
41 burrowing owl habitat (1,642 acres high-value and 3 acres low-value habitat).

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
2 *these AMMs include elements that would avoid or minimize the risk of affecting individuals and*
3 *species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since*
4 *been updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs,*
5 *of the Final EIR/EIS.*

6 **NEPA Effects:** The loss of western burrowing owl habitat and potential for mortality of this special-
7 status species under Alternative 4 would represent an adverse effect in the absence of other
8 conservation actions. However, with habitat protection and restoration associated with CM3, CM8,
9 and CM11, guided by biological goals and objectives and by AMM1–AMM7, *AMM23 Western*
10 *Burrowing Owl*, and with Mitigation Measure BIO-91, *Compensate for Near-Term Loss of High-Value*
11 *Western Burrowing Owl Habitat*, which would be available to guide the near-term protection and
12 management of cultivated lands, the effects of habitat loss and potential mortality on western
13 burrowing owl under Alternative 4 would not be adverse.

14 **CEQA Conclusion:**

15 **Near-Term Timeframe**

16 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
17 the near-term BDCP conservation strategy has been evaluated to determine whether it would
18 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
19 effects of construction would be less than significant under CEQA. Alternative 4 would remove 5,909
20 acres (5,350 acres permanent, 559 acres temporary) of high-value habitat for western burrowing
21 owl in the study area in the near-term. These effects would result from the construction of the water
22 conveyance facilities (CM1, 1,177 acres), and implementing other conservation measures (*CM2 Yolo*
23 *Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian Natural*
24 *Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali*
25 *Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management*
26 *and CM18 Conservation Hatcheries—4,732 acres). In addition, 6,524 acres of low-value habitat*
27 *would be removed or converted in the near-term (CM1, 2,853 acres; CM2 Yolo Bypass Fisheries*
28 *Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian Natural Community*
29 *Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal*
30 *Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management and CM18*
31 *Conservation Hatcheries—3,671 acres).*

32 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
33 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the
34 loss of low-value habitat would result from conversion and enhancement to high-value habitats.
35 Using these typical ratios would indicate that 2,354 acres should be protected to compensate for the
36 loss of high-value habitat from CM1 and that 2,853 acres should be protected to compensate for the
37 loss of low-value habitat from CM1. The near-term effects of other conservation actions would
38 require 9,464 acres of protection to compensate for the loss of high-value habitat and 3,671 acres of
39 protection to compensate for the loss of low-value habitat using the same typical NEPA and CEQA
40 ratios (2:1 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value
41 habitat).

42 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
43 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
44 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (see Table

1 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3,
2 CM8, and CM9 and would occur in the same timeframe as the construction and early restoration
3 losses.

4 The protection of high-value grasslands is essential in order to sustain existing western burrowing
5 owl populations in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
6 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
7 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
8 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
9 pool natural communities which would provide habitat for western burrowing owl and reduce the
10 effects of current levels of habitat fragmentation. This protection would not only expand the amount
11 of protected high-value habitat in the study area, but also support existing western burrowing owl
12 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
13 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
14 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
15 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
16 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*
17 *Communities Enhancement and Management*, small mammal and insect prey populations would be
18 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
19 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected
20 natural communities by encouraging ground squirrel occupancy and expansion through the creation
21 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
22 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

23 These Plan objectives represent performance standards for considering the effectiveness of
24 conservation actions.

25 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
26 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
27 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
28 CM1 and other near-term effects on western burrowing owl high-value habitat with the
29 consideration that some portion of the 15,400 acres of cultivated lands protected in the near-term
30 timeframe would be managed in suitable crop types to compensate for the loss of high-value
31 burrowing owl habitat at a ratio of 2:1. Mitigation Measure BIO-91, *Compensate for the Near-Term*
32 *Loss of High-Value Burrowing Owl Habitat*, would address the impact of high-value habitat loss in the
33 near-term.

34 The compensation for the loss of low-value burrowing owl habitat from near-term impacts sufficient
35 to meet the typical ratio of 1:1 protection. A proportion of the loss of low-value habitat would be a
36 result of the conversion to high-value habitat. In addition, 1,262 acres of impacts on burrowing owl
37 habitat would be temporary and would be restored within 1 year of the completion of construction.
38 The management and enhancement of cultivated lands and protected grasslands including prey
39 enhancement, increasing burrow availability, and reducing existing fragmentation of high-value
40 habitat, would further compensate for any potential effect from the near-term loss of foraging
41 habitat on western-burrowing owl.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
45 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of

1 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
2 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
3 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
4 of the Final EIR/EIS.

5 The loss of western burrowing owl habitat and potential for mortality of this special-status species
6 under Alternative 4 would represent an adverse effect in the absence of other conservation actions.
7 However, with habitat protection and restoration associated with CM3, CM8, and CM11, guided by
8 biological goals and objectives and by AMM1–AMM7, *AMM23 Western Burrowing Owl*, and with
9 Mitigation Measure BIO-91, *Compensate for Near-Term Loss of High-Value Western Burrowing Owl*
10 *Habitat*, which would be available to guide the near-term protection and management of cultivated
11 lands, the effects of habitat loss and potential mortality on western burrowing owl under Alternative
12 4 would be less than significant.

13 **Late Long-Term Timeframe**

14 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and
15 254,352 acres of low-value habitat for western burrowing owl. Alternative 4 as a whole would result
16 in the permanent loss of and temporary effects on 13,075 acres of high-value habitat and 32,330
17 acres of low-value western burrowing owl habitat over the term of the Plan. The locations of these
18 losses are described above in the analyses of individual conservation measures.

19 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
20 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
21 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural
22 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
23 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
24 species (see Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland restoration and
25 protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland
26 protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland
27 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
28 grassland, alkali seasonal wetland, and vernal pool natural communities which would provide
29 habitat for western burrowing owl and reduce the effects of current levels of habitat fragmentation.
30 This protection would not only expand the amount of protected high-value habitat in the study area,
31 but also support existing western burrowing owl populations that occur to the west of CZ 8 and in
32 the areas surrounding CZs 1 and 11, which would especially benefit declining populations in the
33 vicinity of Suisun Marsh and San Pablo Bay. Certain types of cultivated lands such as irrigated
34 pasture, alfalfa and other hay crops, and some row crops can provide foraging habitat for western
35 burrowing owl. Under appropriate management regimes, cultivated lands can support breeding and
36 wintering burrowing owls. To ensure that cultivated lands conservation benefits western burrowing
37 owl, the Plan's biological goals and objectives further specify that, of the cultivated lands protected
38 in the late long-term, at least 1,000 acres would be protected in CZs 1 and 11 that support high-value
39 burrowing owl habitat and are within 0.5 miles of high-value grassland habitat or occupied low-
40 value habitat (Objective WBO1.1). Under *CM11 Natural Communities Enhancement and Management*,
41 small mammal and insect prey populations would be increased on protected lands, enhancing the
42 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In
43 addition, burrow availability would be increased on protected natural communities by encouraging
44 ground squirrel occupancy and expansion through the creation of berms, mounds, edges, and

1 through the prohibition of ground squirrel control programs (i.e., poisoning, Objectives ASWNC2.3,
2 VPNC2.4, GNC2.3).

3 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
4 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above
5 could result in the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589
6 acres high-value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western
7 burrowing owl habitat (1,642 acres high-value and 3 acres low-value habitat).

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
12 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
13 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
14 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
15 of the Final EIR/EIS.

16 Considering Alternative 4's protection and restoration provisions, which would provide acreages of
17 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
18 construction and restoration activities, and with implementation of *AMM1-AMM7*, *AMM23 Western*
19 *Burrowing Owl*, and Mitigation Measure BIO-91, *Compensate for Near-Term Loss of High-Value*
20 *Western Burrowing Owl Habitat*, which would be available to guide the near-term protection and
21 management of cultivated lands, the loss of habitat or direct mortality through implementation of
22 Alternative 4 would not result in a substantial adverse effect through habitat modifications and
23 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of
24 habitat or potential mortality under this alternative would have a less-than-significant impact on
25 western burrowing owl.

26 **Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western** 27 **Burrowing Owl Habitat**

28 Because the BDCP lacks an acreage commitment for specific crop types that would be managed
29 within the 15,400 acres of cultivated lands protected in the near-term time period, DWR will
30 compensate for the loss of high-value burrowing owl habitat with high-value natural
31 communities or cultivated crop types a ratio of 2:1 in the near-term time period.

32 **Impact BIO-92: Effects on Western Burrowing Owl Associated with Electrical Transmission** 33 **Facilities**

34 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,
35 which could result in injury or mortality of western burrowing owl. The species is large-bodied but
36 with relatively long and rounded wings, making it moderately maneuverable. While burrowing owls
37 may nest in loose colonies, they do not flock or congregate in roosts or foraging groups. Collectively,
38 the species' keen eyesight and largely ground-based hunting behavior make it a relatively low-risk
39 species for powerline collision. While the species is not widespread in the study area, it may become
40 more widely distributed as grassland enhancement improves habitat for the species. Even so, the
41 risk of effects on the population are low, given its physical and behavioral characteristics (BDCP
42 Appendix 5.J, Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP*
43 *Transmission Lines*) and new transmission lines would not be expected to have an adverse effect on

1 the species. Marking transmission lines with flight diverters that make the lines more visible to birds
2 has been shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008)
3 estimated that marking devices in the Central Valley could reduce avian mortality by 60%. All new
4 project transmission lines would be fitted with flight diverters. Bird flight diverters would make
5 transmission lines highly visible to western burrowing owls and would further reduce any potential
6 for powerline collisions.

7 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
8 adverse effect on western burrowing owl because the risk of bird strike is considered to be minimal
9 based on the owl's physical and behavioral characteristics. All new transmission lines constructed as
10 a result of the project would be fitted with bird diverters (*AMM20 Greater Sandhill Crane*), which
11 have been shown to reduce avian mortality by 60% and which would further reduce any potential
12 for powerline collisions.

13 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
14 significant impact on western burrowing owl because the risk of bird strike is considered to be
15 minimal based on the owl's physical and behavioral characteristics. All new transmission lines
16 constructed as a result of the project would be fitted with bird diverters (*AMM20 Greater Sandhill
17 Crane*), which have been shown to reduce avian mortality by 60% and which would further reduce
18 any potential for powerline collisions.

19 **Impact BIO-93: Indirect Effects of Plan Implementation on Western Burrowing Owl**

20 Noise and visual disturbances associated with construction-related activities could result in
21 temporary disturbances that affect western burrowing owl use of up to 13,922 acres of modeled
22 burrowing owl habitat (6,113 acres of high-value habitat) within 500 feet of covered activities will
23 temporarily be made less suitable as a result of construction noise and visual disturbances adjacent
24 to proposed construction areas. Indirect effects associated with construction include noise, dust, and
25 visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations.
26 Any disturbance within 250 feet of a burrow occupied by burrowing owl during the breeding season
27 (February 1–August 31) and within 160 feet during the nonbreeding season (September 1–January
28 31) could potential displace winter owls or cause abandonment of active nests. These potential
29 effects would be minimized with incorporation of *AMM23 Western Burrowing Owl* into the BDCP,
30 which would require preconstruction surveys and establish no-disturbance buffers around active
31 burrows. Construction noise above background noise levels (greater than 50 dBA) could extend 500
32 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect
33 Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and
34 Appendix 11F, *Substantive BDCP Revisions*, of the Final EIR/EIS), although there are no available data
35 to determine the extent to which these noise levels could affect western burrowing owl.

36 The use of mechanical equipment during water conveyance facilities construction could cause the
37 accidental release of petroleum or other contaminants that could affect western burrowing owl in
38 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
39 western burrowing owl habitat could also affect the species. AMM1–AMM7 in addition to *AMM23
40 Western Burrowing Owl* would minimize the likelihood of such spills and ensure that measures were
41 in place to prevent runoff from the construction area and any adverse effects of dust on active nests.

42 **NEPA Effects:** Indirect effects on western burrowing owl as a result of Alternative 4 implementation
43 could have adverse effects on this species through the modification of habitat and potential for
44 direct mortality. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting

1 owls or active burrows in the high-value grassland habitat surrounding Clifton Court Forebay and
2 adjacent to work area. With the implementation of AMM1–AMM7, and *AMM23 Western Burrowing*
3 *Owl*, the indirect effects from Alternative 4 implementation would not be adverse under NEPA.

4 **CEQA Conclusion:** Indirect effects on western burrowing owl as a result of Alternative 4
5 implementation could have significant impacts on these species through the modification of habitat
6 and potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential
7 to disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton
8 Court Forebay and adjacent to work areas. With the implementation of AMM1–AMM7 and *AMM23*
9 *Western Burrowing Owl*, the indirect effects resulting from Alternative 4 implementation would have
10 a less-than-significant impact on western burrowing owl.

11 **Impact BIO-94: Periodic Effects of Inundation on Western Burrowing Owl Habitat as a Result** 12 **of Implementation of Conservation Components**

13 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
14 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,390–
15 3,303 acres of high-value habitat and 1,522–2,927 acres of low-value habitat (Table 12-4-39).

16 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
17 *Restoration* could result in the periodic inundation of up to approximately 6,941 acres of modeled
18 habitat (6,162 acres, of which would be low-value foraging habitat; Table 12-4-39).

19 Burrowing owls cannot use inundated areas for foraging or nesting, and increased inundation
20 frequency and duration of cultivated lands and grassland habitats may affect prey populations that
21 have insufficient time to recover following inundation events. Depending on timing, seasonal
22 inundation of western burrowing owl habitat could result in displacement from nesting burrows or
23 drowning of individuals. The potential for this effect is considered low because suitable burrow sites
24 would most likely be located along setback levees, which are expected to be subject to inundation
25 less frequently than floodplain surfaces that would be less likely to support suitable nesting
26 burrows.

27 **NEPA Effects:** The periodically inundated habitat would not be expected to have an adverse effect on
28 the population. The potential for direct mortality of western burrowing owl caused by inundation
29 would be low because the locations of burrows would likely be above elevations consistently subject
30 to inundation; therefore, the potential impact would not be adverse.

31 **CEQA Conclusion:** The potential for direct mortality of western burrowing owl caused by inundation
32 would be low because the locations of burrows would likely be above elevations consistently subject
33 to inundation. Therefore, periodic inundation would be expected to have a less-than-significant
34 impact on the population.

35 **Western Yellow-Billed Cuckoo**

36 This section describes the effects of Alternative 4, including water conveyance facilities construction
37 and implementation of other conservation components, on western yellow-billed cuckoo. The
38 habitat model for Western yellow-billed cuckoo includes potential breeding habitat, which includes
39 plant alliances from the valley/foothill riparian modeled habitat that contain a dense forest canopy
40 for foraging with understory willow for nesting, and a minimum patch size of 50 acres, and
41 migratory habitat, which includes the same plant alliances as breeding habitat without the minimum
42 50 acres patch size requirement.

1 The western yellow-billed cuckoo is uncommon in the study area at present, and the likelihood that
2 it would be found using the modeled habitat is low relative to more abundant riparian species.
3 Nesting of the species in the study area has not been confirmed for approximately 100 years.
4 Western yellow-billed cuckoo was detected in the study area during 2009 DHCCP surveys, but
5 nesting was not confirmed and the bird is suspected to have been a migrant (see Appendix 12C,
6 *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). Construction and
7 restoration associated with Alternative 4 conservation measures would result in both temporary
8 and permanent losses of Western yellow-billed cuckoo modeled habitat as indicated in Table 12-4-
9 40. Full implementation Alternative 4 would also include the following conservation actions over the
10 term of the BDCP to benefit the western yellow-billed cuckoo (BDCP Chapter 3, Section 3.3,
11 *Biological Goals and Objectives*).

- 12 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
13 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
14 associated with CM7).
- 15 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
16 10 (Objective VFRNC1.2, associated with CM3).
- 17 ● Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,
18 associated with CM3 and CM7).
- 19 ● Maintain the at least 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion
20 of the early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a
21 minimum patch size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4,
22 associated with CM3 and CM7).

23 As explained below, with the restoration or protection of these amounts of habitat, in addition to
24 management activities that would enhance these natural communities for the species and
25 implementation of AMM1–AMM7, *AMM10 Restoration of Temporarily Affected Natural Communities*,
26 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
27 *Cuckoo*, impacts on Western yellow-billed cuckoo would not be adverse for NEPA purposes and
28 would be less than significant for CEQA purposes.

1 **Table 12-4-40. Changes in Western Yellow-Billed Cuckoo Modeled Habitat Associated with**
2 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT	NT	LLT	CM2	CM5
CM1	Breeding	6	6	2	2	NA	NA
	Migratory	15	15	15	15	NA	NA
Total Impacts CM1		21	21	17	17		
CM2-CM18	Breeding	29	142	5	10	11-20	17
	Migratory	278	383	83	94	37-64	125
Total Impacts CM2-CM18		307	525	88	104	48-84	142
Total Breeding		35	148	7	12		
Total Migratory		293	398	98	109		
TOTAL IMPACTS		328	546	105	121	48-84	142

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-95: Loss or Conversion of Habitat for and Direct Mortality of Western Yellow-**
5 **Billed Cuckoo**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up to 667 acres of modeled habitat for western yellow-billed cuckoo (160 acres of breeding
8 habitat, 507 acres of migratory habitat, Table 12-4-40). Conservation measures that would result in
9 these losses are conveyance facilities and transmission line construction, and establishment and use
10 of reusable tunnel material areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal
11 habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management
12 activities (CM11) which include ground disturbance or removal of nonnative vegetation, could result
13 in local adverse habitat effects. In addition, maintenance activities associated with the long-term
14 operation of the water conveyance facilities and other BDCP physical facilities could degrade or
15 eliminate western yellow-billed cuckoo modeled habitat. Each of these individual activities is
16 described below. A summary statement of the combined impacts and NEPA effects and a CEQA
17 conclusion follow the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
19 result in the combined permanent and temporary loss of up to 8 acres of breeding habitat (6
20 acres of permanent loss, 2 acres of temporary loss) for yellow-billed cuckoo. In addition, 30
21 acres of migratory habitat would be removed (15 acres of permanent loss, 15 acres of

1 temporary loss, see Table 12-4-40). Activities that would impact modeled habitat consist of
 2 tunnel, forebay, and intake construction, permanent and temporary access roads, construction
 3 of transmission lines, and temporary barge unloading facilities and work areas. Impacts from
 4 CM1 would occur in the central delta in CZs 3- 6, and 8. Permanent habitat loss would occur
 5 from the construction of Intakes 2, 3, and 5 on the east bank of the Sacramento River between
 6 Freeport and Courtland. Some habitat would also be impacted by the construction of a
 7 permanent access road from the new forebay west to a reusable tunnel material disposal area.
 8 Additional losses would also occur along Lambert Road where permanent utility lines would be
 9 installed and from the construction of an operable barrier at the confluence of Old River and the
 10 San Joaquin River. Temporary losses of habitat would occur from the construction of a barge
 11 unloading facility west of the intermediate forebay in Snodgrass Slough and where temporary
 12 work areas surround intake sites. Permanent and temporary habitat losses from the above CMs,
 13 would primarily consist of small, fragmented riparian stands in CZ 2–CZ 8 that do not provide
 14 high-value habitat for the species. Temporarily affected areas would be restored as riparian
 15 habitat within 1 year following completion of construction activities as described in *AMM10*
 16 *Restoration of Temporarily Affected Natural Communities*. Although the effects are considered
 17 temporary, the restored riparian habitat would require 5 years to several decades, for ecological
 18 succession to occur and for restored riparian habitat to functionally replace habitat that has
 19 been affected. The majority of the riparian vegetation to be temporarily removed is early- to
 20 mid-successional; therefore, the replaced riparian vegetation would be expected to have
 21 structural components comparable to the temporarily removed vegetation within the first 5 to
 22 10 years after the initial restoration activities are complete.

23 There are no extant occurrences of yellow-billed cuckoo nests in the study area; however,
 24 habitat loss from the construction of CM1 facilities would have the potential to displace
 25 individuals, if present, and remove the functions and value of modeled habitat for nesting,
 26 protection, or foraging. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*
 27 *Western Yellow-Billed Cuckoo,* would minimize the effects of construction on nesting cuckoos if
 28 present in the area (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Refer to the
 29 Terrestrial Biology Mapbook for a detailed view of Alternative 4 construction locations. Impacts
 30 from CM1 would occur within the first 10-14 years of Alternative 4 implementation.

- 31 ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
 32 would result in the loss of approximately 31 acres of breeding habitat (26 acres of permanent
 33 loss and 5 acres of temporary loss) and 140 acres of migratory habitat (57 acres of permanent
 34 loss and 83 acres of temporary loss) for yellow-billed cuckoo in the Yolo Bypass in CZ 2. The loss
 35 is expected to occur during the first 10 years of Alternative 4 implementation. There are no
 36 extant occurrences of yellow-billed cuckoo nesting in the study area.
- 37 ● *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and
 38 inundation would permanently remove an estimated 110 acres of modeled yellow-billed cuckoo
 39 breeding habitat and 310 acres of modeled migratory habitat in CZ 1, 2, 6, and 11. There are no
 40 extant nesting records of yellow-billed cuckoo in the study area. However, a yellow-billed
 41 cuckoo detection was recorded during DHCCP surveys in 2009 (Appendix 12C, *2009 to 2011 Bay*
 42 *Delta Conservation Plan EIR/EIS Environmental Data Report*) in CZ 5 between Twin Cities Road
 43 and Walnut Grove. These detections do not overlap with the hypothetical restoration areas for
 44 CM4.
- 45 ● *CM5 Seasonally Inundated Floodplain Restoration:* Construction of setback levees to restore
 46 seasonally inundated floodplain would permanently and temporarily remove approximately 11

1 acres of modeled yellow-billed cuckoo breeding habitat (6 acres of permanent loss and 5 acres
2 of temporary loss) and 27 acres of migratory habitat (16 acres of permanent loss and 11 acres of
3 temporary loss) in CZ 7. Based on the riparian habitat restoration assumptions, approximately
4 3,000 acres of valley/foothill riparian habitat would be restored as a component of seasonally
5 inundated floodplain restoration actions. The actual number of acres that would be restored
6 may differ from these estimates, depending on how closely the outcome of seasonally inundated
7 floodplain restoration approximates the assumed outcome. Once this restored riparian
8 vegetation has developed habitat functions, a portion of it would be suitable to support western
9 yellow-billed cuckoo habitat once the riparian vegetation has developed habitat functions for
10 the cuckoo.

- 11 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
12 activities that could be implemented in protected western yellow-billed cuckoo habitats would
13 maintain and improve the functions of the habitat over the term of the BDCP. With conditions
14 favorable for its future establishment in the study area, western yellow-billed cuckoo would be
15 expected to benefit from the increase in protected habitat. However, habitat management- and
16 enhancement-related activities could disturb western yellow-billed cuckoo nests if they were
17 present near work sites. CM11 actions designed to enhance wildlife values in restored riparian
18 habitats may result in localized ground disturbances that could temporarily remove small
19 amounts of western yellow-billed cuckoo habitat. Ground-disturbing activities, such as removal
20 of nonnative vegetation and road and other infrastructure maintenance activities, would be
21 expected to have minor adverse effects on available western yellow-billed cuckoo habitat and
22 would be expected to result in overall improvements and maintenance of western yellow-billed
23 cuckoo habitat values over the term of the BDCP.
- 24 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
25 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
26 disturbances that could affect western yellow-billed cuckoo use of the surrounding habitat.
27 Maintenance activities would include vegetation management, levee and structure repair, and
28 re-grading of roads and permanent work areas. These effects, however, would be reduced by
29 AMMs and conservation actions as described below.
- 30 • *Injury and Direct Mortality*: Western yellow-billed cuckoo nesting has not been confirmed in the
31 Delta for approximately 100 years. However, an unconfirmed breeding detection in 2009 in
32 DHCCP surveys (*Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*
33 *Data Report*) and the present of suitable habitat indicates that the species is potentially breeding
34 in the study area, or may nest there in the future. Construction-related activities would not be
35 expected to result in direct mortality of adult or fledged western yellow-billed cuckoo if they
36 were present in the study area, because they would be expected to avoid contact with
37 construction and other equipment. Although there is minimal habitat in the Plan Area that is of
38 appropriate width, and suitable understory to support nesting cuckoos, if western yellow-billed
39 cuckoo were to nest in the construction area, construction-related activities, including
40 equipment operation, noise and visual disturbances could destroy nests or lead to their
41 abandonment, resulting in mortality of eggs and nestlings. These effects would be avoided and
42 minimized with the incorporation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least*
43 *Bell's Vireo, Western Yellow-Billed Cuckoo* into the BDCP.

44 The following paragraphs summarize the combined effects discussed above and describe other
45 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
46 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-
3 term BDCP conservation strategy has been evaluated to determine whether it would provide
4 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
5 effects of construction would not be adverse under NEPA. Alternative 4 would remove 433 acres of
6 modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects would
7 result from the construction of the water conveyance facilities (CM1, 38 acres of modeled breeding
8 and migratory habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries*
9 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain*
10 *Restoration*—395 acres of modeled nesting and migratory habitat). These habitat losses would
11 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value
12 habitat for the species.

13 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
14 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter
15 3, *Conservation Strategy*, of the BDCP would be 1:1 for restoration/creation and 1:1 protection of
16 valley/foothill riparian habitat. Using these ratios would indicate that 38 acres of valley/foothill
17 riparian habitat should be restored/created and 38 acres should be protected to compensate for the
18 CM1 losses of yellow-billed cuckoo habitat. The near-term effects of other conservation actions
19 would remove 395 acres of modeled habitat, and therefore require 395 acres of restoration and 395
20 acres of protection of valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for
21 restoration and 1:1 for protection).

22 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
23 valley/foothill riparian natural community in the Plan Area (see Table 3-4 in Chapter 3, *Description*
24 *of Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in
25 the same timeframe as the construction and early restoration losses, thereby avoiding adverse
26 effects of habitat loss on yellow-billed cuckoo. The majority of the riparian restoration acres would
27 occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of
28 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3,
29 *Conservation Strategy*). Goals and objectives in the Plan for riparian restoration also include the
30 restoration, maintenance and enhancement of structural heterogeneity with adequate vertical and
31 horizontal overlap among vegetation components and over adjacent riverine channels, freshwater
32 emergent wetlands, and grasslands (Objective VFRNC2.1). These natural community biological goals
33 and objectives would inform the near-term protection and restoration efforts and represent
34 performance standards for considering the effectiveness of conservation actions for the species.

35 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
36 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the
37 restored riparian habitat would require several years (early-mid successional) and several decades
38 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to
39 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not
40 known to be an established breeder in the study area, the time lag in riparian restoration from BDCP
41 actions would not be expected to have an adverse population-level effect on the species. Overall,
42 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed
43 cuckoo by increasing opportunities for a breeding population to become reestablished in the study
44 area.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
5 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of
6 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
7 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
8 which have since been updated and which are provided in Appendix 3B, *Environmental*
9 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

10 **Late Long-Term Timeframe**

11 The habitat model indicates that the study area supports approximately 12,395 acres of modeled
12 breeding and migratory habitat for yellow-billed cuckoo. Alternative 4 as a whole would result in
13 the permanent loss of and temporary effects on 667 acres of modeled habitat (5% of the modeled
14 habitat in the study area). These losses would occur from the construction of the water conveyance
15 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
16 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The locations of these losses
17 would be in fragmented riparian habitat throughout the study area.

18 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
19 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
20 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
21 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
22 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
23 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least
24 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This
25 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian
26 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet
27 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.
28 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its
29 entirety the vegetative structure needed to support these species, because patch sizes may not be
30 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected
31 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11
32 would expand the patches of existing riparian forest in order to support the species should they
33 become established breeders in the study area.

34 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
35 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above
36 could result in the restoration of 3,397 acres and the protection of 517 acres of habitat for the
37 yellow-billed cuckoo.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
39 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
40 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
41 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
42 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of
43 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
44 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,

1 which have since been updated and which are provided in Appendix 3B, *Environmental*
2 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

3 **NEPA Effects:** The loss of western yellow-billed cuckoo habitat associated with Alternative 4 would
4 represent an adverse effect in the absence of other conservation actions. However, the species is not
5 an established breeder in the study area and current presence is limited to migrants. In addition, the
6 habitat that would be lost consists of small, fragmented riparian stands that do not provide high-
7 value habitat for the species. With habitat protection and restoration associated with CM3, CM7, and
8 CM11, guided by biological goals and objectives and by AMM1–AMM7, AMM10, and *AMM22 Suisun*
9 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be
10 in place during all project activities, the effects of habitat loss and potential mortality on western
11 yellow-billed cuckoo under Alternative 4 would not be adverse.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction is being evaluated at the project level, the near-
15 term BDCP conservation strategy has been evaluated to determine whether it would provide
16 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
17 effects of construction would be less than significant under CEQA. Alternative 4 would remove 433
18 acres of modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects
19 would result from the construction of the water conveyance facilities (CM1, 38 acres of modeled
20 breeding and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass*
21 *Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated*
22 *Floodplain Restoration*—395 acres of modeled nesting and migratory habitat). These habitat losses
23 would primarily consist of small, fragmented riparian stands in CZ 2–CZ 8 that do not provide high-
24 value habitat for the species.

25 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
26 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter
27 3, *Conservation Strategy*, of the BDCP would be 1:1 for restoration/creation and 1:1 protection of
28 valley/foothill riparian habitat. Using these ratios would indicate that 38 acres of valley/foothill
29 riparian habitat should be restored/created and 38 acres should be protected to mitigate the CM1
30 losses of yellow-billed cuckoo habitat. The near-term effects of other conservation actions would
31 remove 395 acres of modeled habitat, and therefore require 395 acres of restoration and 395 acres
32 of protection of valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for
33 restoration and 1:1 for protection).

34 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
35 valley/foothill riparian natural community in the study area (see Table 3-4 in Chapter 3, *Description*
36 *of Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in
37 the same timeframe as the construction and early restoration losses, thereby avoiding adverse
38 effects of habitat loss on yellow-billed cuckoo. The majority of the riparian restoration acres would
39 occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of
40 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3,
41 *Conservation Strategy*). Goals and objectives in the Plan for riparian restoration also include the
42 restoration, maintenance and enhancement of structural heterogeneity with adequate vertical and
43 horizontal overlap among vegetation components and over adjacent riverine channels, freshwater
44 emergent wetlands, and grasslands (Objective VFRNC2.1). These natural community biological goals

1 and objectives would inform the near-term protection and restoration efforts and represent
2 performance standards for considering the effectiveness of conservation actions for the species.

3 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
4 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the
5 restored riparian habitat would require several years (early-mid successional) and several decades
6 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to
7 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not
8 known to be an established breeder in the study area, the time lag in riparian restoration from BDCP
9 actions would not be expected to have an adverse population-level effect on the species. Overall,
10 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed
11 cuckoo by increasing opportunities for a breeding population to become reestablished in the study
12 area.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
16 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
17 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
18 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
19 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
20 which have since been updated and which are provided in Appendix 3B, *Environmental*
21 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

22 In the absence of other conservation actions, the loss of western yellow-billed cuckoo habitat
23 associated with Alternative 4 would represent an adverse effect as a result of habitat modification
24 and potential for direct mortality of a special-status species. However, the species is not an
25 established breeder in the study area and current presence is limited to migrants. In addition, the
26 habitat that would be lost consists of small, fragmented riparian stands that do not provide high-
27 value habitat for the species. With habitat protection and restoration associated with CM3, CM7, and
28 CM11, guided by biological goals and objectives and by AMM1–AMM7, AMM10, and AMM22 *Suisun*
29 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be
30 in place during all project activities, the effects of habitat loss and potential mortality on western
31 yellow-billed cuckoo under Alternative 4 would be less-than-significant.

32 ***Late Long-Term Timeframe***

33 The habitat model indicates that the study area supports approximately 12,395 acres of modeled
34 breeding and migratory habitat for yellow-billed cuckoo. Alternative 4 as a whole would result in
35 the permanent loss of and temporary effects on 667 acres of modeled habitat (5% of the modeled
36 habitat in the study area). These losses would occur from the construction of the water conveyance
37 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
38 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
39 would be in fragmented riparian habitat throughout the study area.

40 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
41 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
42 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
43 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
44 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense

1 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least
2 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This
3 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian
4 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet
5 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.
6 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its
7 entirety the vegetative structure needed to support these species, because patch sizes may not be
8 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected
9 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11
10 would expand the patches of existing riparian forest in order to support the species should they
11 become established breeders in the study area.

12 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
13 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above
14 could result in the restoration of 3,397 acres and the protection of 517 acres of habitat for the
15 yellow-billed cuckoo.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
20 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
21 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
22 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
23 which have since been updated and which are provided in Appendix 3B, *Environmental*
24 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

25 In the absence of other conservation actions, effects on western yellow-billed cuckoo from
26 Alternative 4 would represent an adverse effect as a result of habitat modification and potential for
27 direct mortality of a special-status species; however, considering Alternative 4's protection and
28 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
29 greater than necessary to compensate for the time lag of restoring habitats lost to construction and
30 restoration activities, and with implementation of AMM1-AMM7, AMM10, and AMM22 *Suisun Song*
31 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, the loss of habitat or
32 direct mortality through implementation of Alternative 4 would not result in a substantial adverse
33 effect through habitat modifications and would not substantially reduce the number or restrict the
34 range of the species. Therefore, the loss of habitat or potential mortality under this alternative
35 would have a less-than-significant impact on western yellow-billed cuckoo.

36 **Impact BIO-96: Fragmentation of Western Yellow-Billed Cuckoo Habitat as a Result of** 37 **Constructing the Water Conveyance Facilities**

38 Grading, filling, contouring, and other initial ground-disturbing operations for water conveyance
39 facilities construction may temporarily fragment modeled western yellow-billed cuckoo habitat.
40 This could temporarily reduce the extent and functions supported by the affected habitat. Because
41 western yellow-billed cuckoo is not currently known to breed in the study area, and the protection
42 and restoration of riparian habitat will expand contiguous habitat block requirements, habitat
43 fragmentation would have a minimal effect on the species.

1 **NEPA Effects:** Fragmentation of habitat would not have an adverse effect on western yellow-billed
2 cuckoo. The habitat functions in the study area for the species would be greatly improved through
3 the implementation of CM5, which would restore and protect large contiguous patches of riparian
4 habitat.

5 **CEQA Conclusion:** Fragmentation of habitat would have a less-than-significant impact on western
6 yellow-billed cuckoo. The habitat functions in the study area for the species would be greatly
7 improved through the implementation of CM5, which would restore and protect large contiguous
8 patches of riparian habitat.

9 **Impact BIO-97: Effects on Western Yellow-Billed Cuckoo Associated with Electrical** 10 **Transmission Facilities**

11 New transmission lines would increase the risk for bird-power line strikes, which could result in
12 injury or mortality of western yellow-billed cuckoo. Because the western yellow-billed cuckoo uses
13 riparian forests to meet all of its breeding and wintering life requisites, the species remains
14 primarily within the canopy of riparian forests and rarely ventures into open spaces except during
15 migration, limiting its opportunity to encounter the proposed transmission lines. As a summer
16 resident, if the species were to occur in the study area, it would be during periods of relatively high
17 visibility and clear weather conditions, thus further reducing collision risk from daily use patterns
18 or seasonal migration flights. Finally, western yellow-billed cuckoo wing shape is characterized by
19 low wing loading and a moderate aspect ratio, making the species moderately maneuverable and
20 presumably able to avoid collisions, especially during high-visibility conditions (BDCP Attachment
21 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).

22 Transmission line poles and towers also provide perching substrate for raptors, which are predators
23 on western yellow-billed cuckoo. Although there is potential for transmission lines to result in
24 increased perching opportunities for raptors, the existing network of transmission lines in the study
25 area currently poses these risks and any incremental risk associated with the new power line
26 corridors would not be expected to affect the population. In addition, the transmission lines that
27 would be constructed in the vicinity of modeled western yellow-billed cuckoo habitat would be
28 temporary and would be removed within 10-14 years of Alternative 4 implementation. Because
29 there is low probability for the species to occur in the study area, and because the transmission lines
30 that would be constructed near modeled habitat would be temporary, any increase in predation risk
31 on western yellow-billed cuckoo from an increase in raptor perching opportunities would be
32 minimal.

33 **NEPA Effects:** The risk of bird-strike is considered to be minimal based on the species' rarity in the
34 study area, its proclivity to remain in the riparian canopy, its presence in the study area during
35 periods of relative high visibility, and its overall ability to successfully negotiate around overhead
36 wires that it may encounter. Transmission line poles and towers also provide perching substrate for
37 raptors, which could result in increased predation pressure on western yellow-billed cuckoo.
38 However, because there is a low probability for the species to occur in the study area, and because
39 the transmission lines that would be constructed near modeled habitat would be temporary, any
40 increase in predation risk on western yellow-billed cuckoo from an increase in raptor perching
41 opportunities would be minimal. Therefore the construction and operation of new transmission
42 lines under Alternative 4 would not result in an adverse effect on western yellow-billed cuckoo.

1 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
 2 significant impact on western yellow-billed cuckoo because the risk of bird-strike is considered to
 3 be minimal based on the species' rarity in the study area, its proclivity to remain in the riparian
 4 canopy, its presence during periods of relative high visibility, and its overall ability to successfully
 5 negotiate around overhead wires that it may encounter. Transmission line poles and towers also
 6 provide perching substrate for raptors, which could result in increased predation pressure on
 7 western yellow-billed cuckoo. However, because there is a low probability for the species to occur in
 8 the study area, and because the transmission lines that would be constructed near modeled habitat
 9 would be temporary, any increase in predation risk on western yellow-billed cuckoo from an
 10 increase in raptor perching opportunities would be minimal. Therefore the construction and
 11 operation of new transmission lines under Alternative 4 would result in a less-than-significant
 12 impact on western yellow-billed cuckoo.

13 **Impact BIO-98: Indirect Effects of Plan Implementation on Western Yellow-Billed Cuckoo**

14 **Construction- and operation-related effects:** Noise and visual disturbances associated with
 15 construction-related activities could result in temporary disturbances that affect western yellow-
 16 billed cuckoo use of modeled habitat adjacent to proposed construction areas. Construction noise
 17 above background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge
 18 of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*
 19 *the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP*
 20 *Revisions*, of the Final EIR/EIS), although there are no available data to determine the extent to
 21 which these noise levels could affect western yellow-billed cuckoo. Indirect effects associated with
 22 construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and
 23 other ground-disturbing operations outside the project footprint but within 1,300 feet from the
 24 construction edge. If western yellow-billed cuckoo were to nest in or adjacent to work areas,
 25 construction and subsequent maintenance-related noise and visual disturbances could mask calls,
 26 disrupt foraging and nesting behaviors, and reduce the functions of suitable nesting habitat for these
 27 species. These potential effects would be minimized with incorporation of *AMM22 Suisun Song*
 28 *Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* into the BDCP. The
 29 use of mechanical equipment during water conveyance facilities construction could cause the
 30 accidental release of petroleum or other contaminants that could affect western yellow-billed
 31 cuckoo in the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent
 32 to western yellow-billed cuckoo habitat could also affect the species. *AMM1-AMM7*, *AMM10*, in
 33 addition to *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-*
 34 *Billed Cuckoo* would minimize the likelihood of such spills from occurring and ensure that measures
 35 were in place to prevent runoff from the construction area and any adverse effects of dust on active
 36 nests.

37 **Methylmercury Exposure:** Western yellow-billed cuckoo modeled habitat includes primarily
 38 middle marsh habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is
 39 also used if it is of high value, and low marsh provides foraging habitat for the species. Cuckoos are a
 40 top predator in the benthic food chain; they forage by probing their beaks into the mud (Zemba and
 41 Fancher 1988) and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects
 42 (Eddleman and Conway 1998).

43 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
 44 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
 45 species would overestimate the effects on western yellow-billed cuckoo. Organisms feeding within

1 pelagic-based (algal) foodwebs have been found to have higher concentrations of methylmercury
2 than those in benthic or epibenthic foodwebs; this has been attributed to food chain length and
3 dietary segregation (Grimaldo et al. 2009).

4 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
5 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
6 Thus, Alternative 4 restoration activities that create newly inundated areas could increase
7 bioavailability of mercury. Concentrations of methylmercury known to be toxic to bird embryos
8 have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003);
9 however, currently, it is unknown how much of the sediment-derived methylmercury enters the
10 food chain in Suisun Marsh or what tissue concentrations are actually harmful to the western
11 yellow-billed cuckoo. In general, the highest methylation rates are associated with high tidal
12 marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers
13 et al. 2008). In Suisun Marsh, the conversion of managed wetlands to tidal wetlands is expected to
14 result in an overall reduction in mercury methylation. Because of the complex and very site-specific
15 factors that determine if mercury becomes mobilized into the foodweb, *CM12 Methylmercury*
16 *Management* is included to provide for site-specific evaluation for each restoration project. If a
17 project is identified where there is a high potential for methylmercury production that could not be
18 fully addressed through restoration design and adaptive management, alternate restoration areas
19 would be considered. CM12 would be implemented in coordination with other similar efforts to
20 address mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis
21 Section. This conservation measure would include the following actions.

- 22 • Assess pre-restoration conditions to determine the risk that the project could result in increased
23 mercury methylation and bioavailability
- 24 • Define design elements that minimize conditions conducive to generation of methylmercury in
25 restored areas.
- 26 • Define adaptive management strategies that can be implemented to monitor and minimize
27 actual postrestoration creation and mobilization of methylmercury.

28 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
29 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
30 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
31 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
32 2009). The effect of selenium toxicity differs widely between species and also between age and sex
33 classes within a species. In addition, the effect of selenium on a species can be confounded by
34 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
35 2009).

36 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
37 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
38 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
39 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
40 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
41 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
42 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
43 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
44 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on

1 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
2 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
3 have a higher risk of selenium toxicity.

4 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
5 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
6 exacerbate bioaccumulation of selenium in avian species, including western yellow-billed cuckoo.
7 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
8 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
9 Alternative 4 restoration activities that create newly inundated areas could increase bioavailability
10 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
11 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
12 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
13 increases in selenium concentrations in water in the Delta under any alternative. However, it is
14 difficult to determine whether the effects of potential increases in selenium bioavailability
15 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
16 effects on western yellow-billed cuckoo.

17 Because of the uncertainty that exists at this programmatic level of review, there could be a
18 substantial effect on western yellow-billed cuckoo from increases in selenium associated with
19 restoration activities. This effect would be addressed through the implementation of *AMM27*
20 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
21 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
22 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
23 selenium management to reduce selenium concentrations and/or bioaccumulation would be
24 evaluated separately for each restoration effort as part of design and implementation. This
25 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
26 design schedule.

27 **NEPA Effects:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 4
28 implementation could have adverse effects on the species through the modification of habitat and
29 potential for direct mortality.

30 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
31 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
32 the western yellow-billed cuckoo foodweb to methylmercury in these areas, with the level of
33 exposure dependent on the amounts of mercury available in the soils and the biogeochemical
34 conditions. However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would
35 be expected to reduce the overall production of methylmercury, resulting in a net benefit to the
36 species. Implementation of CM12, which contains measures to assess the amount of mercury before
37 project development, followed by appropriate design and adaptation management, would minimize
38 the potential for increased methylmercury exposure, and would result in no adverse effect on the
39 species.

40 Tidal habitat restoration could result in increased exposure of western yellow-billed cuckoo to
41 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
42 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
43 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

1 Because of the species' minimal presence in the study area, and with the incorporation of AMM1–
2 AMM7, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed*
3 *Cuckoo*, and *AMM27 Selenium Management* into the BDCP, indirect effects would not have an adverse
4 effect on western yellow-billed cuckoo.

5 **CEQA Conclusion:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 4
6 implementation could have a significant impact on the species from modification of habitat.

7 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
8 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
9 the western yellow-billed cuckoo foodweb to methylmercury in these areas, with the level of
10 exposure dependent on the amounts of mercury available in the soils and the biogeochemical
11 conditions. However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would
12 be expected to reduce the overall production of methylmercury, resulting in a net benefit to the
13 species. Implementation of CM12, which contains measures to assess the amount of mercury before
14 project development, followed by appropriate design and adaptation management, would minimize
15 the potential for increased methylmercury exposure, and would result in no adverse effect on the
16 species.

17 Tidal habitat restoration could result in increased exposure of western yellow-billed cuckoo to
18 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
19 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
20 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

21 With the incorporation of AMM1–AMM7, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least*
22 *Bell's Vireo*, *Western Yellow-Billed Cuckoo*, and *AMM27 Selenium Management* into the BDCP, indirect
23 effects as a result of Alternative 4 implementation would have a less-than-significant impact on
24 western yellow-billed cuckoo.

25 **Impact BIO-99: Periodic Effects of Inundation of Western Yellow-Billed Cuckoo Habitat as a** 26 **Result of Implementation of Conservation Components**

27 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
28 duration of inundation of approximately 11-20 acres of modeled western yellow-billed cuckoo
29 breeding habitat and 37–64 acres of modeled migratory habitat. No adverse effects of increased
30 inundation frequency on western yellow-billed cuckoo or its habitat are expected because the
31 cuckoo breeding period is outside the period the weir would be operated. In addition, riparian
32 vegetation supporting habitat has persisted under the existing Yolo Bypass flooding regime, and
33 changes to frequency and inundation would be within the tolerance of these vegetation types.

34 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
35 inundation of up to 142 acres of modeled western yellow-billed cuckoo habitat (17 acres of breeding
36 habitat, 125 acres of migratory habitat). Inundation of restored floodplains is not expected to affect
37 western yellow-billed cuckoo or its habitat adversely because the cuckoo breeding period is outside
38 the period the floodplains would likely be inundated, and periodic inundation of floodplains is
39 expected to restore a more natural flood regime in support of riparian vegetation types that provide
40 nesting and migratory habitat for western yellow-billed cuckoo. The overall effect of seasonal
41 inundation in existing riparian natural communities is likely to be beneficial for western yellow-
42 billed cuckoo, because, historically, flooding was the main natural disturbance regulating ecological

1 processes in riparian areas, and flooding promotes the germination and establishment of many
2 native riparian plants.

3 **NEPA Effects:** Periodic effects of inundation would not have an adverse on yellow-billed cuckoo if
4 they were to establish as breeders in the study area, because flooding is expected to occur outside of
5 the breeding season.

6 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on
7 yellow-billed cuckoos if they were to establish as breeders in the study area, because flooding is
8 expected to occur outside of the breeding season.

9 **White-Tailed Kite**

10 This section describes the effects of Alternative 4, including water conveyance facilities construction
11 and implementation of other conservation components, on white-tailed kite. The habitat model used
12 to assess impacts on white-tailed kite includes nesting habitat and foraging habitat. Most white-
13 tailed kites in the Sacramento Valley are found in oak and cottonwood riparian forests, valley oak
14 woodlands, or other groups of trees and are usually associated with compatible foraging habitat for
15 the species in patches greater than 1,500 square meters (Erichsen et al. 1996). Modeled foraging
16 habitat for white-tailed kite consists of pasture and hay crops, compatible row and grain crops and
17 natural vegetation such as seasonal wetlands and annual grasslands (Erichsen et al. 1995).

18 Construction and restoration associated with Alternative 4 conservation measures would result in
19 both temporary and permanent losses of white-tailed kite modeled habitat as indicated in Table 12-
20 4-41. The majority of the losses would take place over an extended period of time as tidal marsh is
21 restored in the study area. Although restoration for the loss of nesting and foraging habitat would be
22 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)
23 for restored habitats to replace the functions of habitat lost. This time lag between impacts and
24 restoration of habitat function would be minimized by specific requirements of *AMM39 White-Tailed*
25 *Kite*, including the planting of mature trees in the near-term time period. Full implementation of
26 Alternative 4 would also include the following biological objectives over the term of the BDCP to
27 benefit the white-tailed kite (see Chapter 3, Section 3.3, *Biological Goals and Objectives*, of the BDCP).

- 28 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
29 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
30 associated with CM7).
- 31 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
32 10 (Objective VFRNC1.2, associated with CM3).
- 33 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
34 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
35 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 36 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 37 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
38 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 39 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
40 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).

- 1 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
2 VPNC2.5, and GNC2.4, associated with CM11).
- 3 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
4 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 5 • Plant and maintain native trees along roadsides and field borders within protected cultivated
6 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 7 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
8 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
9 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
10 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 11 • Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey
12 populations throughout protected cultivated lands (Objective SH2.2, associated with CM11)

13 As explained below, with the restoration or protection of these amounts of habitat, in addition to
14 management activities that would enhance these natural communities for the species and
15 implementation of AMM1–AMM7, *AMM10 Restoration of Temporarily Affected Natural Communities*,
16 and *AMM39 White-Tailed Kite*, impacts on white-tailed kite would not be adverse for NEPA purposes
17 and would be less than significant for CEQA purposes.

18 **Table 12-4-41. Changes in White-Tailed Kite Modeled Habitat Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT	NT	LLT	CM2	CM5
CM1	Nesting	25	25	16	16	NA	NA
	Foraging	3,244	3,244	1,054	1,054	NA	NA
Total Impacts CM1		3,269	3,269	1,070	1,070		
CM2–CM18	Nesting	312	507	88	121	48–82	230
	Foraging	8,723	52,675	516	1,484	3,030–6,651	7,402
Total Impacts CM2–CM18		9,035	53,182	604	1,605	3,078–6,733	7,632
Total Nesting		337	532	104	137		
Total Foraging		11,967	55,919	1,570	2,538		
TOTAL IMPACTS		12,304	56,451	1,674	2,675	3,078–6,733	7,632

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

19

Impact BIO-100: Loss or Conversion of Habitat for and Direct Mortality of White-Tailed Kite

Alternative 4 conservation measures would result in the combined permanent and temporary loss of up to 59,126 acres of modeled habitat (669 acres of nesting habitat and 59,126 acres of foraging habitat) for white-tailed kite (Table 12-4-41). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of reusable tunnel material areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration, (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could affect white-tailed kite modeled habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- *CM1 Water Facilities and Operation:* Construction of Alternative 4 water conveyance facilities would result in the combined permanent and temporary loss of up to 41 acres of white-tailed kite nesting habitat (25 acres of permanent loss and 16 acres of temporary loss). In addition, 4,298 acres of foraging habitat would be removed (3,244 acres of permanent loss, 1,054 acres of temporary loss). Activities that would impact modeled white-tailed kite habitat consist of tunnel, forebay, and intake construction, temporary access roads, and construction of transmission lines. Most of the permanent loss of nesting habitat would occur where Intakes 1-3 impact the Sacramento River's east bank between Freeport and Courtland. The riparian areas here are very small patches, some dominated by valley oak and others by nonnative trees. Some nesting habitat would be lost due to construction of a permanent access road from the new forebay west to a reusable tunnel material disposal area. Permanent losses would also occur along Lambert Road where permanent utility lines would be installed and from the construction of an operable barrier at the confluence of Old River and the San Joaquin River. Temporary losses of nesting habitat would occur from the construction of a barge unloading facility west of the intermediate forebay in Snodgrass Slough and where temporary work areas surround intake sites. The riparian habitat in these areas is also composed of very small patches or stringers bordering waterways, which are composed of valley oak and scrub vegetation. There are no occurrences of nesting white-tailed kite that overlap with the construction footprint of CM1. The implementation of *AMM39 White-Tailed Kite* would minimize the effects of construction on kites if they were to nest in the area (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Impacts on foraging habitat would occur throughout the central Delta in CZs 3- 6, and CZ 8. Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4 construction locations. Impacts from CM1 would occur within the first 10-14 years of Alternative 4 implementation.
- *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement would result in the combined permanent and temporary loss of up to 170 acres of nesting habitat (82 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2. In addition, 1,525 acres of foraging habitat would be removed (1,008 acres of permanent loss, 516 acres of temporary loss). Activities through CM2 could involve excavation and grading in valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the riparian losses would occur at the north end of Yolo Bypass where major fish passage

1 improvements are planned. Excavation to improve water movement in the Toe Drain and in the
 2 Sacramento Weir would also remove white-tailed kite habitat. The loss is expected to occur
 3 during the first 10 years of Alternative 4 implementation.

- 4 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 5 inundation would permanently remove an estimated 383 acres of white-tailed kite nesting
 6 habitat and 41,625 acres of foraging habitat. The majority of the acres lost would consist of
 7 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity
 8 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,
 9 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
 10 directly impact and fragment grassland just north of Rio Vista in and around French and
 11 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
 12 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
 13 the northern fringes of Suisun Marsh. The conversion of cultivated lands to tidal wetlands over
 14 fairly broad areas within the tidal restoration footprints could result in the removal or
 15 abandonment of nesting territories that occur within or adjacent to the restoration areas. Trees
 16 would not be actively removed but tree mortality would be expected over time as areas became
 17 tidally inundated. Depending on the extent and value of remaining habitat, this could reduce the
 18 local nesting population.
- 19 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 20 seasonally inundated floodplain and riparian restoration actions would remove approximately
 21 75 acres of white-tailed kite nesting habitat (42 acres of permanent loss, 33 acres of temporary
 22 loss) and 2,675 acres of foraging habitat (1,706 acres of permanent loss, 968 acres of temporary
 23 loss). These losses would be expected after the first 10 years of Alternative 4 implementation
 24 along the San Joaquin River and other major waterways in CZ 7.
- 25 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
 26 approximately 971 acres of white-tailed kite foraging habitat as part of tidal restoration and
 27 3,991 acres as part of seasonal floodplain restoration through CM7.
- 28 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
 29 implemented on agricultural lands and would result in the conversion of 1,849 acres of white-
 30 tailed kite agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8, and 11.
 31 If agricultural lands supporting higher value foraging habitat than the restored grassland were
 32 removed, there would be a loss of white-tailed kite foraging habitat value.
- 33 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would
 34 result in the permanent conversion of 1,440 acres of cultivated lands to nontidal marsh in CZ 2
 35 and CZ 4. This would not result in a loss of foraging habitat as both natural communities are
 36 foraging habitat for white-tailed kite. Small patches of riparian vegetation that support White-
 37 tailed kite nesting habitat may develop along the margins of restored nontidal marsh restoration
 38 would also provide foraging habitat for the species.
- 39 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
 40 enhancement-related activities could disturb white-tailed kite nests if they were present near
 41 work sites. A variety of habitat management actions that are designed to enhance wildlife values
 42 in BDCP-protected habitats may result in localized ground disturbances that could temporarily
 43 remove small amounts of white-tailed kite habitat and reduce the functions of habitat until
 44 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
 45 and road and other infrastructure maintenance, are expected to have minor effects on available

1 white-tailed kite habitat and are expected to result in overall improvements to and maintenance
2 of habitat values over the term of the BDCP. These effects cannot be quantified, but are expected
3 to be minimal and would be avoided and minimized by the AMMs listed below. BDCP Appendix
4 3.C describes the AMMs, which have since been updated and which are provided in Appendix
5 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. CM11 would also include
6 the construction of recreational-related facilities including trails, interpretive signs, and picnic
7 tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of
8 trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
9 disturbed areas when and where possible. However, approximately 50 acres of white-tailed kite
10 grassland foraging habitat would be lost from the construction of trails and facilities.

- 11 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
12 white-tailed kite foraging habitat for the development of a delta and longfin smelt conservation
13 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.

14 Permanent and temporary white-tailed kite nesting habitat losses from the above conservation
15 measures, would primarily consist of small, fragmented riparian stands. Temporarily affected
16 nesting habitat would be restored as riparian habitat within 1 year following completion of
17 construction activities as described in *AMM10 Restoration of Temporarily Affected Natural*
18 *Communities*. The restored riparian habitat would require 1 to several decades to functionally
19 replace habitat that has been affected and for trees to attain sufficient size and structure suitable
20 for nesting by white-tailed kite. *AMM39 White-Tailed Kite* contains actions described below to
21 reduce the effect of temporal loss of nesting habitat, including the transplanting of mature trees
22 and planting of trees near high-value foraging habitat. The functions of agricultural and
23 grassland communities that provide foraging habitat for white-tailed kite are expected to be
24 restored relatively quickly.

- 25 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
26 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
27 disturbances that could affect white-tailed kite use of the surrounding habitat. Maintenance
28 activities would include vegetation management, levee and structure repair, and re-grading of
29 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7
30 and *AMM39 White-Tailed Kite* in addition to conservation actions as described below.
- 31 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
32 direct mortality of adult or fledged white-tailed kite if they were present in the study area,
33 because they would be expected to avoid contact with construction and other equipment.
34 However, if white-tailed kite were to nest in the construction area, construction-related
35 activities, including equipment operation, noise and visual disturbances could affect nests or
36 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects
37 would be avoided and minimized with the incorporation of *AMM39 White-Tailed Kite* into the
38 BDCP.

39 The following paragraphs summarize the combined effects discussed above and describe other
40 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
41 included.

42 ***Near-Term Timeframe***

43 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
44 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
 2 the effect of construction would not be adverse under NEPA. Alternative 4 would remove 441 acres
 3 (337 acres of permanent loss, 104 acres of temporary loss) of white-tailed kite nesting habitat in the
 4 study area in the near-term. These effects would result from the construction of the water
 5 conveyance facilities (CM1, 41 acres), and implementing other conservation measures (CM2 *Yolo*
 6 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*
 7 *Inundated Floodplain Restoration*—400 acres). In addition, 13,537 acres (11,967 acres of permanent
 8 loss, 1,570 acres of temporary loss) of white-tailed kite foraging habitat would be removed or
 9 converted in the near-term (CM1, 4,298 acres; CM2 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal*
 10 *Natural Communities Restoration*, CM5 *Seasonally Inundated Floodplain Restoration*, CM7 *Riparian*
 11 *Natural Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and*
 12 *Alkali Seasonal Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and*
 13 *Management* and CM18 *Conservation Hatcheries*—9,239 acres).

14 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
 15 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3,
 16 *Conservation Strategy*, of the BDCP would be 1:1 for restoration/creation and 1:1 protection of
 17 valley/foothill riparian habitat for nesting habitat, and 1:1 protection for foraging habitat. Using
 18 these ratios would indicate that 41 acres of nesting habitat should be restored/created and 41 acres
 19 should be protected to mitigate the CM1 losses of white-tailed kite nesting habitat. In addition, 4,298
 20 acres should be protected to compensate for the CM1 losses of white-tailed kite foraging habitat.
 21 The near-term effects of other conservation actions would remove 400 acres of modeled nesting
 22 habitat, and therefore require 400 acres of restoration and 400 acres of protection of nesting
 23 habitat. Similarly, the near-term effects of other conservation actions would result in the loss or
 24 conversion of 9,239 acres of modeled foraging habitat, and therefore require 9,239 acres of
 25 protection of foraging habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and
 26 1:1 for protection of nesting habitat; 1:1 for restoration and 1:1 for protection of foraging habitat).

27 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
 28 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
 29 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
 30 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
 31 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
 32 habitat, and restoring 19,150 acres of tidal wetlands (see Table 3-4 in Chapter 3, *Description of*
 33 *Alternatives*). These conservation actions are associated with CM3, CM4, CM7, and CM8 and would
 34 occur in the same timeframe as the construction and early restoration losses.

35 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
 36 system with extensive wide bands or large patches of valley/foothill riparian natural community
 37 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
 38 restoration would expand the patches of existing riparian forest in order to support nesting habitat
 39 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
 40 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
 41 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
 42 would be increased by planting and maintaining native trees along roadsides and field borders
 43 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
 44 small but essential nesting habitat associated with cultivated lands would also be maintained and
 45 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
 46 farmyards or at rural residences (Objective CLNC1.3).

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 2 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
 3 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
 4 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
 5 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
 6 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
 7 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
 8 Foraging opportunities would also be improved by enhancing prey populations through the
 9 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
 10 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
 11 would also be protected and maintained as part of the cultivated lands reserve system which would
 12 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
 13 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
 14 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
 15 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres
 16 of tidal natural communities, including transitional uplands would provide high-value foraging
 17 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for
 18 covered and other native wildlife species would be protected in the near-term time period
 19 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection
 20 and restoration efforts and represent performance standards for considering the effectiveness of
 21 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
 22 and the additional detail in the biological objectives satisfy the typical mitigation that would be
 23 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate
 24 the near-term effects of the other conservation measures.

25 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
 26 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
 27 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian
 28 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
 29 require one to several decades to functionally replace habitat that has been affected and for trees to
 30 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between
 31 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite
 32 in the near-term time period. Nesting habitat is limited throughout much of the study area,
 33 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
 34 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
 35 habitat would further reduce this limited resource and could reduce or restrict the number of active
 36 white-tailed kite nests within the study area until restored riparian habitat is sufficiently developed.

37 *AMM39 White-Tailed Kite* would implement a program to plant large mature trees, including
 38 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson's hawk
 39 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
 40 within the 125-acre block are removed. These mature trees would be supplemented with additional
 41 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
 42 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
 43 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
 44 system for every tree 20 feet or taller removed by construction during the near-term period. A
 45 variety of native tree species would be planted to provide trees with differing growth rates,
 46 maturation, and life span. Trees would be planted within the BDCP reserve system in areas that

1 support high-value foraging habitat to increase nest sites, or within riparian plantings as a
 2 component of the riparian restoration (CM5, CM7) where they are in close proximity to suitable
 3 foraging habitat. Replacement trees that were incorporated into the riparian restoration would not
 4 be clustered in a single region of the study area, but would be distributed throughout the lands
 5 protected as foraging habitat for white-tailed kite. With this program in place, Alternative 4 would
 6 not have a substantial adverse effect on white-tailed kite in the near-term timeframe, either through
 7 direct mortality or through habitat modifications. Further details of AMM39 are provided in
 8 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
 10 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
 11 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 12 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
 13 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 14 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 15 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 16 of the Final EIR/EIS.

17 **Late Long-Term Timeframe**

18 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres
 19 of modeled foraging habitat for white-tailed kite. Alternative 4 as a whole would result in the
 20 permanent loss of and temporary effects on 669 acres of potential nesting habitat (5% of the
 21 potential nesting habitat in the study area) and the loss or conversion of 58,457 acres of foraging
 22 habitat (12% of the foraging habitat in the study area). The locations of these losses are described
 23 above in the analyses of individual conservation measures.

24 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 25 *Restoration, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*
 26 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Community*
 27 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
 28 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
 29 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
 30 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that
 31 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal
 32 wetlands (see Table 3-4 in Chapter 3, *Description of Alternatives*).

33 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
 34 system with extensive wide bands or large patches of valley/foothill riparian natural community
 35 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
 36 restoration would expand the patches of existing riparian forest in order to support nesting habitat
 37 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
 38 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
 39 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
 40 would be increased by planting and maintaining native trees along roadsides and field borders
 41 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
 42 small but essential nesting habitat associated with cultivated lands would also be maintained and
 43 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
 44 farmyards or at rural residences (Objective CLNC1.3).

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
2 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
3 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
4 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
5 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
6 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
7 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
8 Foraging opportunities would also be improved by enhancing prey populations through the
9 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
10 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
11 would also be protected and maintained as part of the cultivated lands reserve system which would
12 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
13 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
14 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
15 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least
16 65,000 acres of tidal natural communities, including transitional uplands would provide high-value
17 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide
18 foraging habitat for white-tailed kite would be protected by the late long-term time period
19 (Objective CLNC1.1).

20 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
21 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
22 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration
23 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

24 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
25 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
26 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
27 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
28 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
29 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
30 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
31 of the Final EIR/EIS.

32 **NEPA Effects:** The loss of white-tailed kite habitat and potential direct mortality of this special-
33 status species under Alternative 4 would represent an adverse effect in the absence of other
34 conservation actions. However, with habitat protection and restoration associated with CM3, CM5,
35 CM7, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, AMM10,
36 and *AMM39 White-Tailed Kite*, which would be in place throughout the construction period, the
37 effects of habitat loss and potential mortality on white-tailed kite under Alternative 4 would not be
38 adverse.

39 **CEQA Conclusion:**

40 **Near-Term Timeframe**

41 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
42 the near-term BDCP conservation strategy has been evaluated to determine whether it would
43 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
44 the effect of construction would be less than significant under CEQA. Alternative 4 would remove

1 441 acres (337 acres of permanent loss, 104 acres of temporary loss) of white-tailed kite nesting
 2 habitat in the study area in the near-term. These effects would result from the construction of the
 3 water conveyance facilities (CM1, 41 acres), and implementing other conservation measures (CM2
 4 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*
 5 *Inundated Floodplain Restoration*—400 acres). In addition, 13,537 acres (11,967 acres of permanent
 6 loss, 1,570 acres of temporary loss) of white-tailed kite foraging habitat would be removed or
 7 converted in the near-term (CM1, 4,298 acres; CM2 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal*
 8 *Natural Communities Restoration*, CM5 *Seasonally Inundated Floodplain Restoration*, CM7 *Riparian*
 9 *Natural Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and*
 10 *Alkali Seasonal Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and*
 11 *Management* and CM18 *Conservation Hatcheries*—9,239 acres).

12 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
 13 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3,
 14 *Conservation Strategy*, of the BDCP would be 1:1 for restoration/creation and 1:1 protection of
 15 valley/foothill riparian habitat for nesting habitat, and 1:1 protection for foraging habitat. Using
 16 these ratios would indicate that 41 acres of nesting habitat should be restored/created and 41 acres
 17 should be protected to mitigate the CM1 losses of white-tailed kite nesting habitat. In addition, 4,298
 18 acres should be protected to compensate for the CM1 losses of white-tailed kite foraging habitat.
 19 The near-term effects of other conservation actions would remove 400 acres of modeled nesting
 20 habitat, and therefore require 400 acres of restoration and 400 acres of protection of nesting
 21 habitat. Similarly, the near-term effects of other conservation actions would result in the loss or
 22 conversion of 9,239 acres of modeled foraging habitat, and therefore require 9,239 acres of
 23 protection of foraging habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and
 24 1:1 for protection of nesting habitat; 1:1 for restoration and 1:1 for protection of foraging habitat).

25 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
 26 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
 27 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
 28 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
 29 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
 30 habitat, and restoring 19,150 acres of tidal wetlands (see Table 3-4 in Chapter 3, *Description of*
 31 *Alternatives*). These conservation actions are associated with CM3, CM4, CM7, and CM8 and would
 32 occur in the same timeframe as the construction and early restoration losses.

33 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
 34 system with extensive wide bands or large patches of valley/foothill riparian natural community
 35 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
 36 restoration would expand the patches of existing riparian forest in order to support nesting habitat
 37 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
 38 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
 39 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
 40 would be increased by planting and maintaining native trees along roadsides and field borders
 41 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
 42 small but essential nesting habitat associated with cultivated lands would also be maintained and
 43 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
 44 farmyards or at rural residences (Objective CLNC1.3).

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
2 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
3 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
4 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
5 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
6 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
7 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
8 Foraging opportunities would also be improved by enhancing prey populations through the
9 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
10 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
11 would also be protected and maintained as part of the cultivated lands reserve system which would
12 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
13 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
14 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
15 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres
16 of tidal natural communities, including transitional uplands would provide high-value foraging
17 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for
18 covered and other native wildlife species would be protected in the near-term time period
19 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection
20 and restoration efforts and represent performance standards for considering the effectiveness of
21 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
22 and the additional detail in the biological objectives satisfy the typical mitigation that would be
23 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate
24 the near-term effects of the other conservation measures.

25 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
26 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
27 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian
28 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
29 require one to several decades to functionally replace habitat that has been affected and for trees to
30 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between
31 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite
32 in the near-term time period. Nesting habitat is limited throughout much of the study area,
33 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
34 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
35 habitat would further reduce this limited resource and could reduce or restrict the number of active
36 white-tailed kite nests within the study area until restored riparian habitat is sufficiently developed.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
38 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
39 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
40 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
41 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
42 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
43 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
44 of the Final EIR/EIS.

45 *AMM39 White-Tailed Kite* would implement a program to plant large mature trees, including
46 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson's hawk

1 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
2 within the 125-acre block are removed. These mature trees would be supplemented with additional
3 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
4 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
5 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
6 system for every tree 20 feet or taller removed by construction during the near-term period. A
7 variety of native tree species would be planted to provide trees with differing growth rates,
8 maturation, and life span. Trees would be planted within the BDCP reserve system in areas that
9 support high-value foraging habitat to increase nest sites, or within riparian plantings as a
10 component of the riparian restoration (CM5, CM7) where they are in close proximity to suitable
11 foraging habitat. Replacement trees that were incorporated into the riparian restoration would not
12 be clustered in a single region of the study area, but would be distributed throughout the lands
13 protected as foraging habitat for white-tailed kite. Further details of AMM39 are provided in
14 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

15 With this program in place, Alternative 4 would not have a substantial adverse effect on white-tailed
16 kite in the near-term timeframe, either through direct mortality or through habitat modifications.
17 Therefore, Alternative 4 would have a less-than-significant impact on white-tailed kite.

18 **Late Long-Term Timeframe**

19 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres
20 of modeled foraging habitat for white-tailed kite. Alternative 4 as a whole would result in the
21 permanent loss of and temporary effects on 669 acres of potential nesting habitat (5% of the
22 potential nesting habitat in the study area) and the loss or conversion of 58,457 acres of foraging
23 habitat (12% of the foraging habitat in the study area).

24 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
25 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
26 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*
27 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
28 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
29 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
30 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that
31 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal
32 wetlands (see Table 3-4 in Chapter 3, *Description of Alternatives*).

33 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
34 system with extensive wide bands or large patches of valley/foothill riparian natural community
35 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
36 restoration would expand the patches of existing riparian forest in order to support nesting habitat
37 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
38 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
39 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
40 would be increased by planting and maintaining native trees along roadsides and field borders
41 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
42 small but essential nesting habitat associated with cultivated lands would also be maintained and
43 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
44 farmyards or at rural residences (Objective CLNC1.3).

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
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4 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
5 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
6 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
7 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
8 Foraging opportunities would also be improved by enhancing prey populations through the
9 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
10 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
11 would also be protected and maintained as part of the cultivated lands reserve system which would
12 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
13 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
14 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
15 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least
16 65,000 acres of tidal natural communities, including transitional uplands would provide high-value
17 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide
18 foraging habitat for white-tailed kite would be protected by the late long-term time period
19 (Objective CLNC1.1).

20 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
21 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
22 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration
23 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

24 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
25 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
26 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
27 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
28 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
29 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
30 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
31 of the Final EIR/EIS.

32 In the absence of other conservation actions, the effects on white-tailed kite habitat from Alternative
33 4 would represent an adverse effect as a result of habitat modification and potential for direct
34 mortality of a special status species; however, considering Alternative 4's protection and restoration
35 provisions, which would provide acreages of new or enhanced habitat in amounts greater than
36 necessary to compensate for the time lag of restoring riparian and foraging habitats lost to
37 construction and restoration activities, and with implementation of AMM1-AMM7, AMM10, and
38 *AMM39 White-Tailed Kite*, the loss of habitat or direct mortality through implementation of
39 Alternative 4 would not result in a substantial adverse effect through habitat modifications and
40 would not substantially reduce the number or restrict the range of white-tailed kite. In particular,
41 95% of the loss of foraging habitat effects involve the conversion from one habitat type to another
42 form of suitable foraging habitat. Therefore, the loss of habitat or potential mortality under this
43 alternative would have a less-than-significant impact on white-tailed kite.

1 **Impact BIO-101: Effects on White-Tailed Kite Associated with Electrical Transmission**
2 **Facilities**

3 There are several known occurrences of nesting white-tailed kite within 5 miles of the proposed
4 transmission line alignment. While white-tailed kite flight behavior puts them regularly within the
5 range of heights proposed for the new transmission lines (50 to 110 feet), their keen vision and high
6 maneuverability substantially reduce powerline collision risk for the species. Like other diurnal
7 raptors, white-tailed kites have highly developed eyesight (Jones et al. 2007), allowing them to
8 detect small prey while hunting from relatively high altitudes. Keen eyesight also allows for
9 detection and avoidance of other aerial objects, including above-ground utility lines. Like many
10 other falcons, the white-tailed kite has long, narrow, tapered wings and body size that allow for
11 efficient soaring flight and highly developed aerial maneuverability. White-tailed kite are at low risk
12 of bird strike mortality from the construction of new transmission lines based on its general
13 maneuverability, its keen eyesight, and lack of flocking behavior (BDCP Appendix 5.J, Attachment
14 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).
15 Marking transmission lines with flight diverters that make the lines more visible to birds has been
16 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated
17 that marking devices in the Central Valley could reduce avian mortality by 60%. With the
18 implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines would be fitted with
19 flight diverters, which would substantially reduce any risk of collision with lines.

20 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
21 adverse effect because the risk of bird strike is considered to be minimal based on the species'
22 general maneuverability, keen eyesight, and lack of flocking behavior. In addition, *AMM20 Greater*
23 *Sandhill Crane* contains the commitment to place bird strike diverters on all new powerlines, which
24 would eliminate or nearly eliminate the risk of mortality from bird strike for white-tailed kite as a
25 result of the project. Therefore, the construction and operation of new transmission lines under
26 Alternative 4 would not result in an adverse effect on white-tailed kite.

27 **CEQA Conclusion:** The construction and presence of new transmission lines would not represent a
28 significant impact because the risk of bird strike is considered to be minimal based on the species'
29 general maneuverability, keen eyesight, and lack of flocking behavior. In addition, *AMM20 Greater*
30 *Sandhill Crane* contains the commitment to place bird strike diverters on all new powerlines, which
31 would eliminate or nearly eliminate the risk of mortality from bird strike for white-tailed kite as a
32 result of the project. Therefore, the construction and operation of new transmission lines under
33 Alternative 4 would result in a less-than-significant impact on white-tailed kite.

34 **Impact BIO-102: Indirect Effects of Plan Implementation on White-Tailed Kite**

35 White-tailed kite nesting habitat within the vicinity of proposed construction areas could be
36 indirectly affected by construction activities. Construction noise above background noise levels
37 (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP
38 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*
39 *Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP Revisions*, of the Final EIR/EIS),
40 although there are no available data to determine the extent to which these noise levels could affect
41 white-tailed kite. Indirect effects associated with construction include noise, dust, and visual
42 disturbance caused by grading, filling, contouring, and other ground-disturbing operations outside
43 the project footprint but within 1,300 feet from the construction edge. If white-tailed kite were to
44 nest in or adjacent to work areas, construction and subsequent maintenance-related noise and

1 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
 2 functions of suitable nesting habitat for these species. *AMM39 White-Tailed Kite* would require
 3 preconstruction surveys, and if detected, 200-yard no-disturbance buffers would be established
 4 around active nests. The use of mechanical equipment during water conveyance facilities
 5 construction could cause the accidental release of petroleum or other contaminants that could affect
 6 white-tailed kite in the surrounding habitat. The inadvertent discharge of sediment or excessive
 7 dust adjacent to white-tailed kite habitat could also affect the species. *AMM1–AMM7*, including
 8 *AMM2 Construction Best Management Practices and Monitoring*, would minimize the likelihood of
 9 such spills and ensure that measures are in place to prevent runoff from the construction area and
 10 negative effects of dust on active nests.

11 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
 12 mercury in avian species, including white-tailed kite. Marsh (tidal and nontidal) and floodplain
 13 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed
 14 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to
 15 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP
 16 restoration activities that create newly inundated areas could increase bioavailability of mercury
 17 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Increased methylmercury
 18 associated with natural community and floodplain restoration may indirectly affect white-tailed kite
 19 (see BDCP Appendix 5.D, *Contaminants*). However, the potential mobilization or creation of
 20 methylmercury within the study area varies with site-specific conditions and would need to be
 21 assessed at the project level. *CM12 Methylmercury Management* (as revised in Appendix 11F,
 22 *Substantive BDCP Revisions*) includes provisions for project-specific Mercury Management Plans.
 23 Site-specific restoration plans that address the creation and mobilization of mercury, as well as
 24 monitoring and adaptive management as described in *CM12* would be available to address the
 25 uncertainty of methylmercury levels in restored tidal marsh and potential impacts on white-tailed
 26 kite.

27 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 28 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 29 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 30 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 31 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 32 classes within a species. In addition, the effect of selenium on a species can be confounded by
 33 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 34 2009).

35 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 36 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 37 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 38 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 39 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 40 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 41 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 42 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 43 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 44 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
 45 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 46 levels of selenium have a higher risk of selenium toxicity.

1 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 2 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 3 exacerbate bioaccumulation of selenium in avian species, including white-tailed kite. Marsh (tidal
 4 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
 5 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP
 6 restoration activities that create newly inundated areas could increase bioavailability of selenium
 7 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
 8 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
 9 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
 10 increases in selenium concentrations in water in the Delta under any alternative. However, it is
 11 difficult to determine whether the effects of potential increases in selenium bioavailability
 12 associated with restoration-related conservation measures (CM4, CM5) would lead to adverse
 13 effects on white-tailed kite.

14 Because of the uncertainty that exists at this programmatic level of review, there could be a
 15 substantial effect on white-tailed kite from increases in selenium associated with restoration
 16 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
 17 *Management* which would provide specific tidal habitat restoration design elements to reduce the
 18 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
 19 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
 20 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
 21 separately for each restoration effort as part of design and implementation. This avoidance and
 22 minimization measure would be implemented as part of the tidal habitat restoration design
 23 schedule.

24 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
 25 could reduce white-tailed kite use of modeled habitat adjacent to work areas. Moreover, operation
 26 and maintenance of the water conveyance facilities, including the transmission facilities, could result
 27 in ongoing but periodic postconstruction disturbances that could affect white-tailed kite use of the
 28 surrounding habitat. Noise, potential spills of hazardous materials, increased dust and
 29 sedimentation, and operations and maintenance of the water conveyance facilities under Alternative
 30 4 would not have an adverse effect on white-tailed kite with the implementation of AMM1–AMM7,
 31 and *AMM39 White-Tailed Kite*. Tidal habitat restoration could result in increased exposure of white-
 32 tailed kite to selenium. This effect would be addressed through the implementation of *AMM27*
 33 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 34 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
 35 indirect effects associated with noise and visual disturbances, potential spills of hazardous material,
 36 and increased exposure to selenium from Alternative 4 implementation would not have an adverse
 37 effect on white-tailed kite. Tidal habitat restoration is unlikely to have an adverse effect on white-
 38 tailed kite through increased exposure to methylmercury, as kites currently forage in tidal marshes
 39 where elevated methylmercury levels exist. However, it is unknown what concentrations of
 40 methylmercury are harmful to the species and the potential for increased exposure varies
 41 substantially within the study area. Site-specific restoration plans in addition to monitoring and
 42 adaptive management, described in *CM12 Methylmercury Management* (as revised in Appendix 11F,
 43 *Substantive BDCP Revisions*), would address the uncertainty of methylmercury levels in restored
 44 tidal marsh. The site-specific planning phase of marsh restoration would be the appropriate place to
 45 assess the potential for risk of methylmercury exposure for white-tailed kite, once site specific
 46 sampling and other information could be developed.

1 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
2 operations and maintenance of the water conveyance facilities under Alternative 4 would have a
3 less-than-significant impact on white-tailed kite with the implementation of *AMM39 White-Tailed*
4 *Kite*, and *AMM1–AMM7*. Tidal habitat restoration could result in increased exposure of white-tailed
5 kite to selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
6 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
7 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
8 implementation of tidal natural communities restoration or floodplain restoration could result in
9 increased exposure of white-tailed kite to methylmercury. However, it is unknown what
10 concentrations of methylmercury are harmful to this species. *CM12 Methylmercury Management*
11 includes provisions for project-specific Mercury Management Plans. Site-specific restoration plans
12 that address the creation and mobilization of mercury, as well as monitoring and adaptive
13 management as described in *CM12*, would better inform potential impacts and address the
14 uncertainty of methylmercury levels in restored tidal marsh in the study area on white-tailed kite.
15 With these measures in place, the indirect effects associated with noise and visual disturbances,
16 potential spills of hazardous material, and increased exposure to selenium from Alternative 4
17 implementation would have a less-than-significant impact on white-tailed kite.

18 **Impact BIO-103: Periodic Effects of Inundation of White-Tailed Kite Habitat as a Result of**
19 **Implementation of Conservation Components**

20 Flooding of the Yolo Bypass from Fremont Weir operations (related to *CM2 Yolo Bypass Fisheries*
21 *Enhancement*) would increase the frequency and duration of inundation on approximately 48–82
22 acres of modeled white-tailed kite nesting habitat and 3,030–6,651 acres of modeled white-tailed
23 kite foraging habitat (Table 12-4-41). During inundation years, affected cultivated lands and
24 grassland would not be available as foraging habitat until prey populations have re-inhabited
25 inundated areas. This would result in temporary periodic reduction in availability of foraging
26 habitat. If late-season Fremont Weir operations were to preclude the planting of some crop types,
27 there could be a further loss of foraging habitat value if the crop type that would have been planted
28 would provide greater foraging habitat value than the fallowed fields. No known white-tailed kite
29 nest sites would be affected, and increased periodic flooding is not expected to cause any adverse
30 effect on nest sites that may be within the inundation area because existing trees already withstand
31 floods in the area, the increase in inundation frequency and duration is expected to remain within
32 the range of tolerance of riparian trees, and any nest sites would be located above floodwaters.

33 Based on hypothetical floodplain restoration, *CM5* implementation could result in periodic
34 inundation of up to approximately 230 acres of modeled white-tailed kite nesting habitat and 7,402
35 acres of modeled white-tailed kite foraging habitat (Table 12-4-41). Inundation of foraging habitat
36 could result in a periodic reduction of available foraging habitat due to the reduction in available
37 prey. Following draw-down, inundated habitats are expected to recover and provide suitable
38 foraging conditions until the following inundation period. Thus, this is considered a periodic impact
39 that is unlikely to affect white-tailed kite distribution and abundance, or foraging use of the study
40 area.

41 Periodic inundation of floodplains (through *CM2* and *CM5*) would be expected to restore a more
42 natural flood regime in support of riparian vegetation types that support white-tailed kite nesting
43 habitat. No adverse effects of inundation on white-tailed kite riparian habitat are expected because
44 valley/foothill riparian vegetation is expected to benefit from seasonal inundation.

1 **NEPA Effects:** Although foraging habitat would be periodically unavailable to white-tailed kite
2 because of CM2 and CM5 implementation, inundated habitats are expected to recover following
3 draw-down. Any effects are considered short-term and would not result in an adverse effect.

4 **CEQA Conclusion:** Although foraging habitat would be periodically unavailable to white-tailed kite
5 because of CM2 and CM5 implementation, inundated habitats are expected to recover following
6 draw-down. Any effects are considered short-term and would be expected to have a less-than-
7 significant impact on white-tailed kite.

8 **Yellow-Breasted Chat**

9 This section describes the effects of Alternative 4, including water conveyance facilities construction
10 and implementation of other conservation components, on yellow-breasted chat. Yellow-breasted
11 chat modeled habitat includes suitable nesting and migratory habitat as those plant alliances from
12 the valley/foothill riparian modeled habitat that contain a shrub component and an overstory
13 component. Primary nesting and migratory habitat is qualitatively distinguished from secondary
14 habitat in Delta areas as those plant associations that support a greater percentage of a suitable
15 shrub cover, particularly blackberry, and California wild rose, and have an open to moderately dense
16 overstory canopy, using data from Hickson and Keeler-Wolf (2007). No distinction is made between
17 primary and secondary habitat for Suisun Marsh/Yolo Basin habitats because supporting
18 information is lacking.

19 Construction and restoration associated with Alternative 4 conservation measures would result in
20 both temporary and permanent losses of yellow-breasted chat modeled habitat as indicated in Table
21 12-4-42. Full implementation of Alternative 4 would also include the following conservation actions
22 over the term of the BDCP to benefit the yellow-breasted chat (BDCP Chapter 3, Section 3.3,
23 *Biological Goals and Objectives*).

- 24 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
25 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
26 associated with CM7).
- 27 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
28 10 (Objective VFRNC1.2, associated with CM3).
- 29 ● Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal
30 overlap among vegetation components and over adjacent riverine channels, freshwater
31 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM7).
- 32 ● Maintain at least 1,000 acres of early- to mid-successional vegetation with a well-developed
33 understory of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2,
34 associated with CM7).

35 As explained below, with the restoration or protection of these amounts of habitat, in addition to
36 management activities that would enhance these natural communities for the species and
37 implementation of AMM1–AMM7, *AMM10 Restoration of Temporarily Affected Natural Communities*,
38 and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
39 *Cuckoo*, impacts on yellow-breasted chat would not be adverse for NEPA purposes and would be less
40 than significant for CEQA purposes.

1
2

Table 12-4-42. Changes in Yellow-Breasted Chat Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Nesting and Migratory Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	15	15	10	10	NA	NA
	Secondary	15	15	9	9	NA	NA
	Suisun Marsh/ Upper Yolo Bypass	0	0	0	0	NA	NA
Total Impacts CM1		30	30	19	19		
CM2-CM18	Primary	96	214	58	73	19-38	92
	Secondary	209	357	0	6	6-18	56
	Suisun Marsh/ Upper Yolo Bypass	76	85	29	29	23-32	0
Total Impacts CM2-CM18		381	656	87	108	48-88	148
Total Primary		111	229	68	83	19-38	92
Total Secondary		224	372	9	15	6-18	56
Total Suisun Marsh/Upper Yolo Bypass		76	85	29	29	23-32	0
TOTAL IMPACTS		411	686	106	127	48-88	148

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-104: Loss or Conversion of Habitat for and Direct Mortality of Yellow-Breasted**
5 **Chat**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up to 813 acres of modeled nesting and migratory habitat for yellow-breasted chat (686 acres of
8 permanent loss, 127 acres of temporary loss, Table 12-4-42). Conservation measures that would
9 result in these losses are conveyance facilities and transmission line construction, and establishment
10 and use of reusable tunnel material areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2),
11 tidal habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and
12 management activities (CM11) which include ground disturbance or removal of nonnative
13 vegetation, could result in local adverse habitat effects. In addition, maintenance activities
14 associated with the long-term operation of the water conveyance facilities and other BDCP physical

1 facilities could degrade or eliminate yellow-breasted chat habitat. Each of these individual activities
 2 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA
 3 conclusion follow the individual conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
 5 result in the combined permanent and temporary loss of up to 25 acres of primary habitat (15
 6 acres of permanent loss, 10 acres of temporary loss). In addition, 24 acres of secondary habitat
 7 would be removed (15 acres of permanent loss, 9 acres of temporary loss, Table 12-4-42).
 8 Activities that would impact modeled habitat consist of tunnel, forebay, and intake construction,
 9 permanent and temporary access roads, construction of transmission lines, barge unloading
 10 facilities and temporary work areas. Impacts from CM1 would occur in the central delta in CZs 3-
 11 6, and 8. Most of the permanent loss of habitat would occur where Intakes 2, 3, and 5 impact the
 12 Sacramento River's east bank between Freeport and Courtland. The riparian areas here are very
 13 small patches, some dominated by valley oak and others by nonnative trees. Some habitat would
 14 be lost due to construction of a permanent access road from the new forebay west to a reusable
 15 tunnel material disposal area. Permanent habitat loss would also occur along Lambert Road
 16 where permanent utility lines would be installed and from the construction of an operable
 17 barrier at the confluence of Old River and the San Joaquin River. Temporary loss of habitat
 18 would occur from the construction of a barge unloading facility west of the intermediate forebay
 19 in Snodgrass Slough and where temporary work areas surround intake sites. The riparian
 20 habitat in these areas is also composed of very small patches or stringers bordering waterways,
 21 which are composed of valley oak and scrub vegetation.

22 Habitat loss from CM1 activities would have the potential to displace individuals, if present, and
 23 remove the functions and value of modeled habitat for nesting, protection, or foraging. There are
 24 no occurrences of yellow-breasted chat that overlap with the CM1 construction footprint. The
 25 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
 26 *Yellow-Billed Cuckoo* (Appendix 3B, *Environmental Commitments, AMMs, and CMs*) would
 27 minimize the effects of construction on nesting yellow-breasted chats if they were to occur in
 28 the area. Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4
 29 construction locations. Impacts from CM1 would occur within the first 10-14 years of
 30 Alternative 4 implementation.

- 31 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 32 would permanently remove approximately 83 acres and temporarily remove 88 acres of yellow-
 33 breasted chat habitat in the Yolo Bypass in CZ 2. The loss is expected to occur during the first 10
 34 years of Alternative 4 implementation.
- 35 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 36 inundation would permanently remove an estimated 545 acres of modeled yellow-breasted chat
 37 habitat in CZ 1, 2, 6, and 11. This total is composed of an estimated 182 acres of primary nesting
 38 and migratory habitat, 349 acres of secondary nesting and migratory habitat, and 14 acres of
 39 nesting and migratory habitat in the Suisun Marsh and upper Yolo Bypass areas.
- 40 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 41 seasonally inundated floodplain would permanently and temporarily remove approximately 49
 42 acres of modeled yellow-breasted chat habitat in CZ 7. This total is comprised of 28 acres of
 43 primary nesting and migratory habitat and 21 acres of secondary nesting and migratory habitat.
 44 Based on the riparian habitat restoration assumptions, approximately 3,000 acres of
 45 valley/foothill riparian habitat would be restored as a component of seasonally inundated

1 floodplain restoration actions. The actual number of acres that would be restored may differ
2 from these estimates, depending on how closely the outcome of seasonally inundated floodplain
3 restoration approximates the assumed outcome. Once this restored riparian vegetation has
4 developed habitat functions, a portion of it would be suitable to support yellow-breasted chat
5 habitat.

- 6 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
7 activities that could be implemented in protected yellow-breasted chat habitats would be
8 expected to maintain and improve the functions of the habitat over the term of the BDCP.
9 Yellow-breasted chat would be expected to benefit from the increase in protected habitat, which
10 would maintain conditions favorable for the chat's use of the study area.

11 Habitat management- and enhancement-related activities could disturb yellow-breasted chat
12 nests if they are present near work sites. Equipment operation could destroy nests, and noise
13 and visual disturbances could lead to their abandonment, resulting in mortality of eggs and
14 nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*
15 *Billed Cuckoo* would ensure that these activities do not result in direct mortality of yellow-
16 breasted chat or other adverse effects.

17 Occupied habitat would be monitored to determine if there is a need to implement controls on
18 brood parasites (brown-headed cowbird) or nest predators. If implemented, these actions
19 would be expected to benefit the yellow-breasted chat by removing a potential stressor that
20 could, if not addressed, adversely affect the stability of newly established populations.

21 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*
22 *and Management* that are designed to enhance wildlife values in restored riparian habitats may
23 result in localized ground disturbances that could temporarily remove small amounts of yellow-
24 breasted chat habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
25 road and other infrastructure maintenance activities, are expected to have minor adverse effects
26 on available yellow-breasted chat habitat and are expected to result in overall improvements to
27 and maintenance of yellow-breasted chat habitat values over the term of the BDCP.

- 28 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
29 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
30 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding
31 habitat. Maintenance activities would include vegetation management, levee and structure
32 repair, and re-grading of roads and permanent work areas. These effects, however, would be
33 reduced by AMMs and conservation actions as described below.
- 34 • *Injury and Direct Mortality*: Construction is not expected to result in direct mortality of yellow-
35 breasted chat because adults and fledged young are expected to occur only in very small
36 numbers and, if present, would avoid contact with construction and other equipment. If yellow-
37 breasted chat were to nest in the vicinity of construction activities, equipment operation could
38 destroy nests and noise and visual disturbances could lead to nest abandonment. *AMM22 Suisun*
39 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would avoid
40 and minimize this effect.
- 41 • *Permanent and temporary habitat losses* from the above CMs, would primarily consist of small,
42 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.
43 Temporarily affected areas would be restored as riparian habitat within 1 year following
44 completion of construction activities as described in *AMM10 Restoration of Temporarily Affected*

1 *Natural Communities.* Although the effects are considered temporary, the restored riparian
2 habitat would require 5 years to several decades, for ecological succession to occur and for
3 restored riparian habitat to functionally replace habitat that has been affected. The majority of
4 the riparian vegetation to be temporarily removed is early- to mid-successional; therefore, the
5 replaced riparian vegetation would be expected to have structural components comparable to
6 the temporarily removed vegetation within the first 5 to 10 years after the initial restoration
7 activities are complete.

8 The following paragraphs summarize the combined effects discussed above and describe other
9 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
10 included.

11 ***Near-Term Timeframe***

12 Because the water conveyance facilities construction is being evaluated at the project level, the near-
13 term BDCP conservation strategy has been evaluated to determine whether it would provide
14 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
15 effects of construction would not be adverse under NEPA. Alternative 4 would remove 517 acres of
16 modeled habitat for yellow-breasted chat in the study area in the near-term. These effects would
17 result from the construction of the water conveyance facilities (CM1, 49 acres of modeled nesting
18 and migratory habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries*
19 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain*
20 *Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses would
21 primarily consist of small, fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value
22 habitat for the species.

23 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
24 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter
25 3, *Conservation Strategy*, of the BDCP would be 1:1 for restoration/creation and 1:1 protection of
26 valley/foothill riparian habitat. Using these ratios would indicate that 49 acres of valley/foothill
27 riparian habitat should be restored/created and 49 acres should be protected to compensate for the
28 CM1 losses of yellow-breasted chat habitat. The near-term effects of other conservation actions
29 would remove 468 acres of modeled habitat, and therefore require 468 acres of restoration and 468
30 acres of protection of valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for
31 restoration and 1:1 for protection).

32 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
33 valley/foothill riparian natural community in the study area (see Table 3-4 in Chapter 3, *Description*
34 *of Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in
35 the same timeframe as the construction and early restoration losses, thereby avoiding adverse
36 effects of habitat loss on yellow-breasted chat. The majority of the riparian restoration acres would
37 occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of
38 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3,
39 *Conservation Strategy*). Goals and objectives in the Plan for riparian restoration also include the
40 restoration, maintenance and enhancement of structural heterogeneity with adequate vertical and
41 horizontal overlap among vegetation components and over adjacent riverine channels, freshwater
42 emergent wetlands, and grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific
43 structural habitat requirements, so only the early- to mid-successional portions of the restored and
44 protected riparian natural would be expected to provide suitable habitat characteristics for the

1 species. These natural community biological goals and objectives would inform the near-term
2 protection and restoration efforts and represent performance standards for considering the
3 effectiveness of conservation actions for the species.

4 The acres of protection contained in the near-term Plan goals and the additional detail in the
5 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be
6 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other
7 conservation measures. The restored riparian habitat could require 5 years to several decades, for
8 ecological succession to occur and for restored riparian habitat to functionally replace habitat that
9 has been affected. However, because the modeled habitat impacted largely consists of small patches
10 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have an adverse
11 population-level effect on the species in the near-term time period.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
16 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
17 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
18 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
19 which have since been updated and which are provided in Appendix 3B, *Environmental*
20 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

21 **Late Long-Term Timeframe**

22 The habitat model indicates that the study area supports approximately 14,547 acres of modeled
23 nesting and migratory habitat for yellow-breasted chat. Alternative 4 as a whole would result in the
24 permanent loss of and temporary effects on 813 acres of modeled habitat (6% of the modeled
25 habitat in the study area). These losses would occur from the construction of the water conveyance
26 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
27 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
28 would be in fragmented riparian habitat throughout the study area.

29 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
30 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
31 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
32 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
33 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
34 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted
35 chat has specific structural habitat requirements, so only the early- to mid-successional portions of
36 the restored and protected riparian natural would be expected to provide suitable habitat
37 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to
38 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to
39 natural erosion and deposition, which would provide conditions conducive to the establishment of
40 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if
41 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted
42 population in the study area, a cowbird control program would be implemented through *CM11*
43 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian

1 restoration also include the maintenance and enhancement of structural heterogeneity (Objective
2 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

3 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
4 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above
5 could result in the restoration of 2,683 acres and the protection of 594 acres of habitat for the
6 yellow-breasted chat.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
11 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
12 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
13 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
14 which have since been updated and which are provided in Appendix 3B, *Environmental*
15 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

16 **NEPA Effects:** The loss of yellow-breasted chat habitat and potential direct mortality of this special-
17 status species would represent an adverse effect in the absence of other conservation actions. The
18 restored riparian habitat would require 5 years to several decades, for ecological succession to
19 occur and for restored riparian habitat to functionally replace habitat that has been affected.
20 However, the habitat that would be lost consists of small, fragmented riparian stands that would not
21 provide high-value habitat for the species. And because the nesting and migratory habitat that
22 would be lost is small relative to the species' range throughout California and North America,
23 Alternative 4 actions would not be expected to have an adverse population-level effect on the
24 species. With habitat protection and restoration associated with CM3, CM7, and CM11, guided by
25 biological goals and objectives and by *AMM1 Worker Awareness Training*, *AMM2 Construction Best*
26 *Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion*
27 *and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6*
28 *Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-*
29 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be in place during all
30 project activities, the effects of habitat loss and potential mortality on yellow-breasted chat under
31 Alternative 4 would not be adverse.

32 **CEQA Conclusion:**

33 **Near-Term Timeframe**

34 Because the water conveyance facilities construction is being evaluated at the project level, the near-
35 term BDCP conservation strategy has been evaluated to determine whether it would provide
36 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
37 impact of construction would be less than significant under CEQA. Alternative 4 would remove 517
38 acres of modeled habitat for yellow-breasted chat in the study area in the near-term. These effects
39 would result from the construction of the water conveyance facilities (CM1, 49 acres of modeled
40 nesting and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass*
41 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated*
42 *Floodplain Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses
43 would primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-
44 value habitat for the species.

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
2 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter
3 3, *Conservation Strategy*, of the BDCP would be 1:1 for restoration/creation and 1:1 protection of
4 valley/foothill riparian habitat. Using these ratios would indicate that 49 acres of valley/foothill
5 riparian habitat should be restored/created and 49 acres should be protected to mitigate the CM1
6 losses of yellow-breasted chat habitat. The near-term effects of other conservation actions would
7 remove 468 acres of modeled habitat, and therefore require 468 acres of restoration and 468 acres
8 of protection of valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for
9 restoration and 1:1 for protection).

10 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
11 valley/foothill riparian natural community in the study area (see Table 3-4 in Chapter 3, *Description*
12 *of Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in
13 the same timeframe as the construction and early restoration losses, thereby avoiding adverse
14 effects of habitat loss on yellow-breasted chat. The majority of the riparian restoration acres would
15 occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of
16 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3,
17 *Conservation Strategy*). Goals and objectives in the Plan for riparian restoration also include the
18 restoration, maintenance and enhancement of structural heterogeneity with adequate vertical and
19 horizontal overlap among vegetation components and over adjacent riverine channels, freshwater
20 emergent wetlands, and grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific
21 structural habitat requirements, so only the early- to mid-successional portions of the restored and
22 protected riparian natural would be expected to provide suitable habitat characteristics for the
23 species. These natural community biological goals and objectives would inform the near-term
24 protection and restoration efforts and represent performance standards for considering the
25 effectiveness of conservation actions for the species.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
30 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
31 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
32 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
33 which have since been updated and which are provided in Appendix 3B, *Environmental*
34 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

35 In the absence of other conservation actions, the effects on yellow-breasted chat habitat from
36 Alternative 4 would represent an adverse effect as a result of habitat modification and potential for
37 direct mortality of special-status species. The acres of protection contained in the near-term Plan
38 goals and the additional detail in the biological objectives for yellow-breasted chat satisfy the typical
39 mitigation ratios that would be applied to the project-level effects of CM1, as well as mitigate the
40 near-term effects of the other conservation measures. The restored riparian habitat could require 5
41 years to several decades, for ecological succession to occur and for restored riparian habitat to
42 functionally replace habitat that has been affected. However, because the modeled habitat impacted
43 largely consists of small patches of blackberry, willow, and riparian scrub, temporal losses of
44 potential habitat as a result of BDCP actions would be expected to have a less-than-significant
45 population-level impact on the species in the near-term time period.

1 Considering the conservation actions described above, and AMM1–AMM7 and AMM 22, Alternative
2 4 over the term of the BDCP would not result in a substantial adverse effect through habitat
3 modifications and would not substantially reduce the number or restrict the range of yellow-
4 breasted chat. Therefore, Alternative 4 would have a less-than-significant impact on yellow-breasted
5 chat.

6 **Late Long-Term Timeframe**

7 The habitat model indicates that the study area supports approximately 14,547 acres of modeled
8 nesting and migratory habitat for yellow-breasted chat. Alternative 4 as a whole would result in the
9 permanent loss of and temporary effects on 813 acres of modeled habitat (6% of the modeled
10 habitat in the study area). These losses would occur from the construction of the water conveyance
11 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
12 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
13 would be in fragmented riparian habitat throughout the study area.

14 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
15 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
16 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
17 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
18 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
19 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted
20 chat has specific structural habitat requirements, so only the early- to mid-successional portions of
21 the restored and protected riparian natural would be expected to provide suitable habitat
22 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to
23 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to
24 natural erosion and deposition, which would provide conditions conducive to the establishment of
25 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if
26 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted
27 population in the study area, a cowbird control program would be implemented through *CM11*
28 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian
29 restoration also include the maintenance and enhancement of structural heterogeneity (Objective
30 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

31 The BDCP's beneficial effects analysis (see Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
32 *Plant Species*, of the BDCP) estimates that the restoration and protection actions discussed above
33 could result in the restoration of 2,683 acres and the protection of 594 acres of habitat for the
34 yellow-breasted chat.

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
36 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
37 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
38 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
39 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
40 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
41 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
42 which have since been updated and which are provided in Appendix 3B, *Environmental*
43 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 In the absence of other conservation actions, the effects on yellow-breasted chat habitat from
2 Alternative 4 would represent an adverse effect as a result of habitat modification and potential for
3 direct mortality of special-status species. Considering Alternative 4's protection and restoration
4 provisions, which would provide acreages of new or enhanced habitat in amounts suitable to
5 compensate for habitats lost to construction and restoration activities, and with implementation of
6 AMM1-AMM7, AMM10, and AMM22 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*,
7 *Western Yellow-Billed Cuckoo*, the loss of habitat or direct mortality through implementation of
8 Alternative 4 would not result in a substantial adverse effect through habitat modifications and
9 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of
10 habitat or potential mortality under this alternative would have a less-than-significant impact on
11 yellow-breasted chat.

12 **Impact BIO-105: Fragmentation of Yellow-Breasted Chat Habitat as a Result of Constructing** 13 **the Water Conveyance Facilities**

14 Grading, filling, contouring, and other initial ground-disturbing activities for water conveyance
15 facilities construction may temporarily fragment modeled yellow-breasted chat habitat. This could
16 temporarily reduce the extent of and functions supported by the affected habitat. Because of the
17 current infrequent occurrence and small numbers of yellow-breasted chat in the Plan Area, and
18 because CM5 *Seasonally Inundated Floodplain Restoration* would restore and protect contiguous
19 high-value riparian habitat in CZ 7, any such habitat fragmentation is expected to have no or
20 minimal effect on the species.

21 **NEPA Effects:** Temporary fragmentation of habitat would not result in an adverse effect on yellow-
22 breasted chat. The habitat functions for the species would be significantly improved through the
23 implementation of CM5, which would restore and protect large contiguous patches of riparian
24 habitat.

25 **CEQA Conclusion:** Temporary fragmentation of habitat would have a less-than-significant impact on
26 yellow-breasted chat. The habitat functions for the species would be significantly improved through
27 the implementation of CM5, which would restore and protect large contiguous patches of riparian
28 habitat.

29 **Impact BIO-106: Effects on Yellow-Breasted Chat Associated with Electrical Transmission** 30 **Facilities**

31 Yellow-breasted chats are migratory and usually arrive at California breeding grounds in April from
32 their wintering grounds in Mexico and Guatemala. Departure for wintering grounds occurs from
33 August to September. These are periods of relative high visibility when the risk of powerline
34 collisions will be low. The species' small, relatively maneuverable body; its foraging behavior; and its
35 presence in the Plan Area during the summer contribute to a low risk of collision with the proposed
36 transmission lines (BDCP Appendix 5.J, Attachment 5.J-2, *Memorandum: Analysis of Potential Bird*
37 *Collisions at Proposed BDCP Transmission Lines*). Marking transmission lines with flight diverters
38 that make the lines more visible to birds has been shown to reduce the incidence of bird mortality
39 (Brown and Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could
40 reduce avian mortality by 60%. All new project transmission lines would be fitted with flight
41 diverters. Bird flight diverters would further reduce any potential for powerline collisions.

42 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
43 adverse effect on yellow-breasted chat because the risk of bird strike is considered to be minimal

1 based on the species' small, relatively maneuverable body; its foraging behavior; and its presence in
2 the Plan Area during the summer during periods of high visibility. Under *AMM20 Greater Sandhill*
3 *Crane*, all new project transmission lines would be fitted with bird diverters, which would further
4 reduce any potential for powerline collisions.

5 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
6 significant impact on yellow-breasted chat because the risk of bird strike is considered to be
7 minimal based on the species' small, relatively maneuverable body; its foraging behavior; and its
8 presence in the Plan Area during the summer during periods of high visibility. Under *AMM20 Greater*
9 *Sandhill Crane*, all new project transmission lines would be fitted with bird diverters, which would
10 further reduce any potential for powerline collisions.

11 **Impact BIO-107: Indirect Effects of Plan Implementation on Yellow-Breasted Chat**

12 **Construction- and Operation-Related Effects:** Noise and visual disturbances associated with
13 construction-related activities could result in temporary disturbances that affect yellow-breasted
14 chat use of modeled habitat adjacent to proposed construction areas. Construction noise above
15 background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of
16 construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*
17 *the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP*
18 *Revisions*, of the Final EIR/EIS), although there are no available data to determine the extent to
19 which these noise levels could affect yellow-breasted chat. Indirect effects associated with
20 construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and
21 other ground-disturbing operations outside the project footprint but within 1,300 feet from the
22 construction edge. If yellow-breasted chat were to nest in or adjacent to work areas, construction
23 and subsequent maintenance-related noise and visual disturbances could mask calls, disrupt
24 foraging and nesting behaviors, and reduce the functions of suitable nesting habitat for these
25 species. These potential effects would be minimized with incorporation of *AMM22 Suisun Song*
26 *Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* into the BDCP, which
27 would ensure 250 foot no-disturbance buffers were established around active nests. The use of
28 mechanical equipment during water conveyance facilities construction could cause the accidental
29 release of petroleum or other contaminants that could affect yellow-breasted chat in the
30 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to yellow-
31 breasted chat habitat could also affect the species. *AMM1-AMM7*, including *AMM2 Construction Best*
32 *Management Practices and Monitoring*, in addition to *AMM22 Suisun Song Sparrow*, *Yellow-Breasted*
33 *Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* would minimize the likelihood of such spills
34 from occurring and ensure that measures were in place to prevent runoff from the construction area
35 and any adverse effects of dust on active nests. If present, yellow-breasted chat individuals could be
36 temporarily affected by noise and visual disturbances adjacent to water conveyance construction
37 sites, reducing the use of an estimated 59 acres of modeled primary nesting and migratory habitat
38 and 119 acres of secondary nesting and migratory habitat. *AMM22 Suisun Song Sparrow*, *Yellow-*
39 *Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* would avoid and minimize this effect
40 on the species.

41 **Methylmercury Exposure:** Yellow-breasted chat modeled habitat includes primarily middle marsh
42 habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is also used if it is
43 of high value, and low marsh provides foraging habitat for the species. Chats are a top predator in
44 the benthic food chain; they forage by probing their beaks into the mud (Zemba and Fanher 1988)

1 and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects (Eddleman and
2 Conway 1998).

3 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
4 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
5 species would overestimate the effects on yellow-breasted chat. Organisms feeding within pelagic-
6 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
7 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
8 segregation (Grimaldo et al. 2009).

9 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
10 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
11 Thus, Alternative 4 restoration activities that create newly inundated areas could increase
12 bioavailability of mercury. Concentrations of methylmercury known to be toxic to bird embryos
13 have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003);
14 however, currently, it is unknown how much of the sediment-derived methylmercury enters the
15 food chain in Suisun Marsh or what tissue concentrations are actually harmful to the yellow-
16 breasted chat. In general, the highest methylation rates are associated with high tidal marshes that
17 experience intermittent wetting and drying and associated anoxic conditions (Alpers et al. 2008). In
18 Suisun Marsh, the conversion of managed wetlands to tidal wetlands is expected to result in an
19 overall reduction in mercury methylation. Because of the complex and very site-specific factors that
20 determine if mercury becomes mobilized into the foodweb, *CM12 Methylmercury Management* is
21 included to provide for site-specific evaluation for each restoration project. If a project is identified
22 where there is a high potential for methylmercury production that could not be fully addressed
23 through restoration design and adaptive management, alternate restoration areas would be
24 considered. CM12 would be implemented in coordination with other similar efforts to address
25 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
26 conservation measure would include the following actions.

- 27 • Assess pre-restoration conditions to determine the risk that the project could result in increased
28 mercury methylation and bioavailability
- 29 • Define design elements that minimize conditions conducive to generation of methylmercury in
30 restored areas.
- 31 • Define adaptive management strategies that can be implemented to monitor and minimize
32 actual postrestoration creation and mobilization of methylmercury.

33 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
34 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
35 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
36 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
37 2009). The effect of selenium toxicity differs widely between species and also between age and sex
38 classes within a species. In addition, the effect of selenium on a species can be confounded by
39 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
40 2009).

41 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
42 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
43 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
44 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six

1 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
 2 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
 3 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
 4 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
 5 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
 6 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
 7 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
 8 have a higher risk of selenium toxicity.

9 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 10 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 11 exacerbate bioaccumulation of selenium in avian species, including yellow-breasted chat. Marsh
 12 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
 13 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
 14 Alternative 4 restoration activities that create newly inundated areas could increase bioavailability
 15 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
 16 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
 17 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
 18 increases in selenium concentrations in water in the Delta under any alternative. However, it is
 19 difficult to determine whether the effects of potential increases in selenium bioavailability
 20 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
 21 effects on yellow-breasted chat.

22 Because of the uncertainty that exists at this programmatic level of review, there could be a
 23 substantial effect on yellow-breasted chat from increases in selenium associated with restoration
 24 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
 25 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
 26 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
 27 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
 28 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
 29 separately for each restoration effort as part of design and implementation. This avoidance and
 30 minimization measure would be implemented as part of the tidal habitat restoration design
 31 schedule.

32 **NEPA Effects:** The potential for noise and visual disturbance, hazardous spills, increased dust and
 33 sedimentation, and the potential impacts of operations and maintenance of the water conveyance
 34 facilities would not result in an adverse effect on yellow-breasted chat with the incorporation of
 35 AMM1–AMM7, and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
 36 *Yellow-Billed Cuckoo* into the BDCP.

37 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
 38 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
 39 the yellow-breasted chat foodweb to methylmercury in these areas, with the level of exposure
 40 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
 41 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
 42 to reduce the overall production of methylmercury, resulting in a net benefit to the species.
 43 Implementation of CM12, which contains measures to assess the amount of mercury before project
 44 development, followed by appropriate design and adaptation management, would minimize the

1 potential for increased methylmercury exposure, and would result in no adverse effect on the
2 species.

3 Tidal habitat restoration could result in increased exposure of yellow-breasted chat to selenium.
4 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
5 would provide specific tidal habitat restoration design elements to reduce the potential for
6 bioaccumulation of selenium and its bioavailability in tidal habitats.

7 **CEQA Conclusion:** The potential for noise and visual disturbance, hazardous spills, increased dust
8 and sedimentation, and the potential impacts of operations and maintenance of the water
9 conveyance facilities would have a less-than-significant impact on yellow-breasted chat with the
10 incorporation of AMM1–AMM7, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
11 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP.

12 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
13 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
14 the yellow-breasted chat foodweb to methylmercury in these areas, with the level of exposure
15 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
16 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
17 to reduce the overall production of methylmercury, resulting in a net benefit to the species.
18 Implementation of CM12, which contains measures to assess the amount of mercury before project
19 development, followed by appropriate design and adaptation management, would minimize the
20 potential for increased methylmercury exposure, and would result in no adverse effect on the
21 species.

22 Tidal habitat restoration could result in increased exposure of yellow-breasted chat to selenium.
23 With implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
24 restoration design elements to reduce the potential for bioaccumulation of selenium and its
25 bioavailability in tidal habitats, the impact of potential increased selenium exposure would be less
26 than significant.

27 **Impact BIO-108: Periodic Effects of Inundation of Yellow-Breasted Chat Habitat as a Result of** 28 **Implementation of Conservation Components**

29 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
30 duration of inundation of approximately 48–88 acres of modeled yellow-breasted chat nesting and
31 migratory habitat. No adverse effects of increased inundation frequency on yellow-breasted chat or
32 its habitat are expected because the chat breeding period is outside the period the weir would be
33 operated. Moreover, riparian vegetation supporting habitat has persisted under the existing Yolo
34 Bypass flooding regime, and changes to frequency and inundation would be within the tolerance of
35 these vegetation types.

36 Based on hypothetical floodplain restoration, CM5 could result in periodic inundation of up to 148
37 acres of modeled yellow-breasted chat habitat. Inundation of restored floodplains is not expected to
38 affect yellow-breasted chat or its habitat because the chat breeding period is outside the period the
39 floodplains would likely be inundated. In addition, providing for periodic inundation of floodplains
40 is expected to restore a more natural flood regime in support of riparian vegetation types that
41 provide nesting and migratory habitat for yellow-breasted chat. The overall effect of seasonal
42 inundation in existing riparian natural communities is likely to be beneficial because, historically,

1 flooding was the main natural disturbance regulating ecological processes in riparian areas, and
2 flooding promotes the germination and establishment of many native riparian plants.

3 **NEPA Effects:** Increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain
4 restoration would be expected to create more natural flood regimes that would support riparian
5 habitat, which would result in a beneficial effect on yellow breasted chat.

6 **CEQA Conclusion:** Periodic inundation would have a less-than-significant impact on yellow-breasted
7 chat because inundation would occur outside of the breeding season and would not be expected to
8 adversely modify habitat or result in direct mortality of the species. Flooding promotes the
9 germination and establishment of many native riparian plants. Therefore, the overall impact of
10 seasonal inundation would be beneficial for yellow-breasted chat.

11 **Cooper's Hawk and Osprey**

12 This section describes the effects of Alternative 4, including water conveyance facilities construction
13 and implementation of other conservation components, on Cooper's hawk and osprey. Although
14 osprey often nest on manmade structures such as telephone poles, and Cooper's hawk will nest in
15 more developed landscapes, modeled nesting habitat for these species is restricted to valley/foothill
16 riparian forest.

17 Construction and restoration associated with Alternative 4 conservation measures would result in
18 both temporary and permanent losses of Cooper's hawk and osprey modeled habitat as indicated in
19 Table 12-4-43. The majority of the losses would take place over an extended period of time as tidal
20 marsh is restored in the study area. Although restoration for the loss of nesting habitat would be
21 initiated in the same timeframe as the losses, it could take one or more decades for restored habitats
22 to replace the functions of habitat lost. This time lag between impacts and restoration of habitat
23 function would be minimized by specific requirements of *AMM18 Swainson's Hawk*, including the
24 planting of mature trees in the near-term time period. Full implementation of Alternative 4 would
25 include the following conservation actions over the term of the BDCP which would also benefit
26 Cooper's hawk and osprey (see Chapter 3, Section 3.3, *Biological Goals and Objectives*, of the BDCP).

- 27 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
28 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
29 associated with CM7)
- 30 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
31 10 (Objective VFRNC1.2, associated with CM3).
- 32 ● Plant and maintain native trees along roadsides and field borders within protected cultivated
33 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 34 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
35 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
36 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
37 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3 and CM11).

38 As explained below, with the acres of restoration or protection included in the Plan, in addition to
39 management activities to enhance natural communities for species and implementation of *AMM1-*
40 *AMM7*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM18 Swainson's Hawk*,
41 and Mitigation Measure BIO-75, impacts on Cooper's hawk and osprey would not be adverse for
42 NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-4-43. Changes in Cooper’s Hawk and Osprey Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	25	25	16	16	NA	NA
Total Impacts CM1		25	25	16	16		
CM2–CM18	Nesting	312	507	88	121	48-82	230
Total Impacts CM2–CM18		312	507	88	121	48-82	230
TOTAL IMPACTS		337	532	104	137	48-82	230

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-109: Loss or Conversion of Habitat for and Direct Mortality of Cooper’s Hawk and**
5 **Osprey**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up to 669 acres (532 acres of permanent loss, 137 acres of temporary loss) of modeled nesting
8 habitat for Cooper’s hawk and osprey (Table 12-4-43). Conservation measures that would result in
9 these losses are Water Facilities and Operation (CM1) (which would involve construction of
10 conveyance facilities and transmission lines and establishment and use of reusable tunnel material
11 areas), Yolo Bypass Fisheries Enhancement (CM2), Tidal Natural Communities Restoration (CM4),
12 and Seasonally Inundated Floodplain Restoration (CM5). Habitat enhancement and management
13 activities (CM11), which would include ground disturbance or removal of nonnative vegetation,
14 could result in local adverse habitat effects. In addition, maintenance activities associated with the
15 long-term operation of the water conveyance facilities and other BDCP physical facilities could affect
16 Cooper’s hawk and osprey modeled habitat. Each of these individual activities is described below. A
17 summary statement of the combined impacts and NEPA and CEQA conclusions follows the
18 individual conservation measure discussions.

- 19 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 water conveyance facilities
20 would result in the combined permanent and temporary loss of up to 41 acres of modeled
21 Cooper’s hawk and osprey habitat (Table 12-4-43). Of the 41 acres of modeled habitat that
22 would be removed for the construction of the conveyance facilities, 25 acres would be a
23 permanent loss and 16 acres would be a temporary loss of habitat. Activities that would impact
24 modeled habitat consist of tunnel, forebay, and intake construction, permanent and temporary
25 access roads, construction of transmission lines, barge unloading facilities and work areas. Most

1 of the permanent loss of nesting habitat would occur where Intakes 2, 3 and 5 impact the
 2 Sacramento River's east bank between Freeport and Courtland. The riparian areas here are very
 3 small patches, some dominated by valley oak and others by nonnative trees. Some nesting
 4 habitat would be lost due to construction of a permanent access road from the new forebay west
 5 to a reusable tunnel material disposal area. Permanent losses would also occur along Lambert
 6 Road where permanent utility lines would be installed and from the construction of an operable
 7 barrier at the confluence of Old River and the San Joaquin River. Temporary losses of nesting
 8 habitat would occur from the construction of a barge unloading facility west of the intermediate
 9 forebay in Snodgrass Slough and where temporary work areas surround intake sites. The
 10 riparian habitat in these areas is also composed of very small patches or stringers bordering
 11 waterways, which are composed of valley oak and scrub vegetation. Impacts from CM1 would
 12 occur in the central delta in CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8. These losses would have the
 13 potential to displace individuals, if present, and remove the functions and value of potentially
 14 suitable habitat. There are no occurrences of Cooper's hawk or osprey that overlap with the
 15 construction footprint for CM1; however, Mitigation Measure BIO-75, *Conduct Preconstruction*
 16 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize
 17 impacts on Cooper's hawk and osprey if they were to nest in the vicinity of construction
 18 activities. Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4
 19 construction locations. Impacts from CM1 would occur within the first 10-14 years of Plan
 20 implementation.

- 21 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries enhancement
 22 would result in the combined permanent and temporary loss of up to 170 acres of Cooper's
 23 hawk and osprey nesting habitat (82 acres of permanent loss, 88 acres of temporary loss) in the
 24 Yolo Bypass in CZ 2. Activities through CM2 could involve excavation and grading in
 25 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
 26 riparian losses would occur at the north end of Yolo Bypass where major fish passage
 27 improvements are planned. Excavation to improve water movement in the Toe Drain and in the
 28 Sacramento Weir would also remove potential Cooper's hawk and osprey habitat. The loss is
 29 expected to occur during the first 10 years of Alternative 4 implementation.
- 30 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration could permanently
 31 remove up to 383 acres of potential Cooper's hawk and osprey nesting habitat. Trees would not
 32 be actively removed but tree mortality would be expected over time as areas became tidally
 33 inundated.
- 34 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 35 seasonally inundated floodplain and riparian restoration actions would remove approximately
 36 75 acres of Cooper's hawk and osprey nesting habitat (42 acres of permanent loss, 33 acres of
 37 temporary loss). These losses would be expected after the first 10 years of Alternative 4
 38 implementation along the San Joaquin River and other major waterways in CZ 7.
- 39 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
 40 enhancement-related activities could disturb Cooper's hawk and osprey nests if they were
 41 present near work sites. A variety of habitat management actions included in CM11 that are
 42 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground
 43 disturbances that could temporarily remove small amounts of Cooper's hawk and osprey habitat
 44 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,
 45 such as removal of nonnative vegetation and road and other infrastructure maintenance, are
 46 expected to have minor effects on available Cooper's hawk and osprey habitat and are expected

1 to result in overall improvements to and maintenance of habitat values over the term of the
2 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
3 and minimized by the AMMs listed below. BDCP Appendix 3.C describes the AMMs, which have
4 since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
5 *AMMs, and CMs*, of the Final EIR/EIS. (

6 Permanent and temporary habitat losses from the above conservation measures would
7 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored
8 as riparian habitat within 1 year following completion of construction activities as described in
9 *AMM10 Restoration of Temporarily Affected Natural Communities*. Although the effects are
10 considered temporary, the restored riparian habitat would require 1 to several decades to
11 functionally replace habitat that has been affected and for trees to attain sufficient size and
12 structure suitable for nesting by Cooper's hawk or osprey. *AMM18 Swainson's Hawk* contains
13 actions described below to reduce the effect of temporal loss of nesting habitat, including the
14 transplanting of mature trees.

- 15 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
16 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
17 disturbances that could affect Cooper's hawk or osprey use of the surrounding habitat.
18 Maintenance activities would include vegetation management, levee and structure repair, and
19 re-grading of roads and permanent work areas. These effects, however, would be reduced by
20 AMM1–AMM7 and conservation actions as described below.
- 21 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in
22 direct mortality of adult or fledged Cooper's hawk or osprey if they were present in the Plan
23 Area, because they would be expected to avoid contact with construction and other equipment.
24 If Cooper's hawk or osprey were to nest in the construction area, construction-related activities,
25 including equipment operation, noise and visual disturbances could affect nests or lead to their
26 abandonment, potentially resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
27 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
28 be available to address these adverse effects on Cooper's hawk and osprey.

29 The following paragraphs summarize the combined effects discussed above and describe other
30 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
31 included.

32 ***Near-Term Timeframe***

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
36 effect of construction would not be adverse under NEPA. Alternative 4 would remove 441 acres
37 (337 acres of permanent loss, 104 acres of temporary loss) of Cooper's hawk and osprey nesting
38 habitat in the study area in the near-term. These effects would result from the construction of the
39 water conveyance facilities (CM1, 41 acres), and implementing other conservation measures (*CM2*
40 *Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
41 *Inundated Floodplain Restoration—400 acres of habitat*).

42 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
43 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.
44 Using these ratios would indicate that 41 acres of nesting habitat should be restored/created and 41

1 acres should be protected to compensate for the CM1 losses of modeled Cooper's hawk and osprey
2 habitat. In addition, the near-term effects of other conservation actions would remove 400 acres of
3 modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of
4 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios.

5 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
6 valley/foothill riparian natural community (see Table 3-4 in Chapter 3, *Description of Alternatives*).
7 These conservation actions are associated with CM3, and CM7 and would occur in the same
8 timeframe as the construction and early restoration losses. The majority of riparian protection and
9 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
10 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in
11 Chapter 3, *Conservation Strategy*, of the BDCP). Riparian restoration would expand the patches of
12 existing riparian forest in order to support nesting habitat for riparian species. The Plan's objectives
13 would also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur
14 within cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in
15 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of
16 potential nest trees would be increased by planting and maintaining native trees along roadsides
17 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective
18 SWHA2.1).

19 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
20 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
21 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored
22 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but
23 would require one to several decades to functionally replace habitat that has been affected and for
24 trees to attain sufficient size and structure suitable for nesting by these species. This time lag
25 between the removal and restoration of nesting habitat could have a substantial impact on nesting
26 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,
27 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
28 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
29 habitat would further reduce this limited resource and could reduce or restrict the number of active
30 nests within the study area until restored riparian habitat is sufficiently developed.

31 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
32 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
33 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
34 within the 125-acre block are removed. These mature trees would be supplemented with additional
35 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
36 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
37 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
38 system for every tree 20 feet or taller removed by construction during the near-term period. A
39 variety of native tree species would be planted to provide trees with differing growth rates,
40 maturation, and life span. Trees would be planted within the BDCP reserve system as a component
41 of the riparian restoration (CM5, CM7). Replacement trees that were incorporated into the riparian
42 restoration would not be clustered in a single region of the study area, but would be distributed
43 throughout the conserved lands. Further details of AMM18 are provided in Appendix 3B,
44 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
8 of the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. For
9 the BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
10 species would be required to ensure that active nests are detected and avoided. Mitigation Measure
11 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
12 be available to address this adverse effect.

13 **Late Long-Term Timeframe**

14 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk
15 and osprey. Alternative 4 as a whole would result in the permanent loss of and temporary effects on
16 669 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

17 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
18 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, and CM7 Riparian Natural Community*
19 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
20 riparian natural community (see Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of
21 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with
22 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives
23 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would
24 expand the patches of existing riparian forest in order to support nesting habitat for riparian
25 species. The Plan's objectives would also benefit Cooper's hawk and osprey by protecting small but
26 essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,
27 and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition, the
28 distribution and abundance of potential nest trees would be increased by planting and maintaining
29 native trees along roadsides and field borders within protected cultivated lands at a rate of one tree
30 per 10 acres (Objective SWHA2.1).

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
32 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
33 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
34 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
35 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
36 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
37 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
38 of the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. For
39 the BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
40 species would be required to ensure that active nests are detected and avoided. Mitigation Measure
41 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
42 be available to address this adverse effect.

43 **NEPA Effects:** The loss of Cooper's hawk and osprey habitat and potential direct mortality of these
44 special-status species under Alternative 4 would represent an adverse effect in the absence of other

1 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7,
2 guided by biological goals and objectives and by AMM1–AMM7, AMM10, and *AMM18 Swainson’s*
3 *Hawk*, which would be in place during all project activities, the effects of habitat loss on Cooper’s
4 hawk and osprey under Alternative 4 would not be adverse. Cooper’s hawk and osprey are not
5 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
6 preconstruction surveys for noncovered avian species would be required to ensure that nests are
7 detected and avoided. Mitigation Measure BIO-75 would be available to address this adverse effect.

8 ***CEQA Conclusion:***

9 ***Near-Term Timeframe***

10 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
11 the near-term BDCP conservation strategy has been evaluated to determine whether it would
12 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
13 effect of construction would be less-than-significant under CEQA. Alternative 4 would remove 441
14 acres (337 acres of permanent loss, 104 acres of temporary loss) of Cooper’s hawk and osprey
15 nesting habitat in the study area in the near-term. These effects would result from the construction
16 of the water conveyance facilities (CM1, 41 acres), and implementing other conservation measures
17 (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5*
18 *Seasonally Inundated Floodplain Restoration—400 acres of habitat*).

19 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
20 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.
21 Using these ratios would indicate that 41 acres of nesting habitat should be restored/created and 41
22 acres should be protected to mitigate the CM1 losses of modeled Cooper’s hawk and osprey habitat.
23 In addition, the near-term effects of other conservation actions would remove 400 acres of modeled
24 breeding habitat, and therefore require 400 acres of restoration and 400 acres of protection of
25 modeled Cooper’s hawk and osprey using the same typical NEPA and CEQA ratios. The BDCP has
26 committed to near-term goals of protecting 750 acres and restoring 800 acres of valley/foothill
27 riparian natural community (see Table 3-4 in Chapter 3, *Description of Alternatives*). These
28 conservation actions are associated with CM3, and CM7 and would occur in the same timeframe as
29 the construction and early restoration losses. The majority of riparian protection and restoration
30 acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of
31 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3,
32 *Conservation Strategy*). Riparian restoration would expand the patches of existing riparian forest in
33 order to support nesting habitat for riparian species. The Plan’s objectives would also benefit
34 Cooper’s hawk and osprey by protecting small but essential habitats that occur within cultivated
35 lands, such as tree rows along field borders or roads, and small clusters of trees in farmyards or
36 rural residences (Objective CLNC1.3). In addition, the distribution and abundance of potential nest
37 trees would be increased by planting and maintaining native trees along roadsides and field borders
38 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1).

39 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
40 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
41 other near-term impacts on Cooper’s hawk and osprey nesting habitat. The 800 acres of restored
42 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but
43 would require one to several decades to functionally replace habitat that has been affected and for
44 trees to attain sufficient size and structure suitable for nesting by these species. This time lag

1 between the removal and restoration of nesting habitat could have a substantial impact on nesting
2 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,
3 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
4 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
5 habitat would further reduce this limited resource and could reduce or restrict the number of active
6 nests within the study area until restored riparian habitat is sufficiently developed.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
11 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
12 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
13 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
14 of the Final EIR/EIS.

15 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
16 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
17 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
18 within the 125-acre block are removed. These mature trees would be supplemented with additional
19 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
20 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
21 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
22 system for every tree 20 feet or taller removed by construction during the near-term period. A
23 variety of native tree species would be planted to provide trees with differing growth rates,
24 maturation, and life span. Trees would be planted within the BDCP reserve system in areas that
25 support high-value Swainson's hawk foraging habitat to increase nest sites, or within riparian
26 plantings as a component of the riparian restoration (CM5, CM7). Replacement trees that were
27 incorporated into the riparian restoration would not be clustered in a single region of the study
28 area, but would be distributed throughout the conserved lands. Further details of AMM18 are
29 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

30 In the absence of other conservation actions, the effects on Cooper's hawk and osprey nesting
31 habitat would represent an adverse effect as a result of habitat modification and potential for direct
32 mortality of special-status species. Cooper's hawk and osprey are not species that are covered under
33 the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
34 noncovered avian species would be required to ensure that active nests are detected and avoided.
35 Implementation of Mitigation Measure BIO-75 would reduce the potential impact on nesting
36 Cooper's hawk and osprey to a less-than-significant level. Considering Alternative 4's protection
37 and restoration provisions, which would provide acreages of new or enhanced habitat in amounts
38 greater than necessary to compensate for the time lag of restoring riparian habitats lost to
39 construction and restoration activities, and with implementation of AMM1-AMM7, AMM10, *AMM18*
40 *Swainson's Hawk*, and Mitigation Measure BIO-75, the loss of habitat or direct mortality through
41 implementation of Alternative 4 would not result in a substantial adverse effect through habitat
42 modifications and would not substantially reduce the number or restrict the range of either species.
43 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-
44 significant impact on Cooper's hawk and osprey.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk
3 and osprey. Alternative 4 as a whole would result in the permanent loss of and temporary effects on
4 669 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

5 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
6 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*
7 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
8 riparian natural community (see Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of
9 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with
10 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives
11 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would
12 expand the patches of existing riparian forest in order to support nesting habitat for riparian
13 species. The Plan's objectives would also benefit Cooper's hawk and osprey by protecting small but
14 essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,
15 and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition, the
16 distribution and abundance of potential nest trees would be increased by planting and maintaining
17 native trees along roadsides and field borders within protected cultivated lands at a rate of one tree
18 per 10 acres (Objective SWHA2.1).

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
23 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
24 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
25 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
26 of the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. For
27 the BDCP to have a less-than-significant impact on individuals, preconstruction surveys for
28 noncovered avian species would be required to ensure that active nests are detected and avoided.
29 Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
30 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

31 Considering Alternative 4's protection and restoration provisions, which would provide acreages of
32 new or enhanced habitat in amounts greater than necessary to compensate for the time lag of
33 restoring riparian habitats lost to construction and restoration activities, and with implementation
34 of AMM1-AMM7, AMM10, *AMM18 Swainson's Hawk*, and Mitigation Measure BIO-75, the loss of
35 habitat or direct mortality through implementation of Alternative 4 would not result in a substantial
36 adverse effect through habitat modifications and would not substantially reduce the number or
37 restrict the range of either species. Therefore, the loss of habitat or potential mortality under this
38 alternative would have a less-than-significant impact on Cooper's hawk and osprey.

39 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
40 **Disturbance of Nesting Birds**

41 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-110: Effects on Cooper's Hawk and Osprey Associated with Electrical**
2 **Transmission Facilities**

3 New transmission lines would increase the risk for bird-power line strikes, which could result in
4 injury or mortality of Cooper's hawk and osprey. However, the flight behavior of these species, their
5 keen vision, and high maneuverability substantially reduce the risk of powerline collisions. The
6 existing network of transmission lines in the project area currently poses the same small risk for
7 Cooper's hawk and osprey, and any incremental risk associated with the new power line corridors
8 would also be expected to be low. Marking transmission lines with flight diverters that make the
9 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
10 Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian
11 mortality by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission
12 lines would be fitted with flight diverters, which would further reduce any risk of collision with
13 lines.

14 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
15 adverse effect because the risk of bird strike is considered to be minimal based on the flight
16 behavior, the general maneuverability, and keen eyesight of Cooper's hawk and osprey. In addition,
17 *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters on all new
18 powerlines, which would further reduce any risk of mortality from bird strike for Cooper's hawk
19 and osprey as a result of the project. Therefore, the construction and operation of new transmission
20 lines under Alternative 4 would not result in an adverse effect on Cooper's hawk and osprey.

21 **CEQA Conclusion:** The construction and presence of new transmission lines would not represent an
22 adverse effect because the risk of bird strike is considered to be minimal based on the flight
23 behavior, general maneuverability, and keen eyesight of Cooper's hawk and osprey. In addition,
24 *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters on all new
25 powerlines, which would further reduce any risk of mortality from bird strike for Cooper's hawk
26 and osprey as a result of the project. Therefore, the construction and operation of new transmission
27 lines under Alternative 4 would result in a less-than-significant impact on Cooper's hawk and
28 osprey.

29 **Impact BIO-111: Indirect Effects of Plan Implementation on Cooper's Hawk and Osprey**

30 **Indirect Construction- and Operation-Related Effects:** Construction noise above background
31 noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction
32 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
33 *Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP Revisions*, of
34 the Final EIR/EIS), although there are no available data to determine the extent to which these noise
35 levels could affect Cooper's hawk or osprey. If Cooper's hawk or osprey were to nest in or adjacent
36 to work areas, construction and subsequent maintenance-related noise and visual disturbances
37 could mask calls, disrupt foraging and nesting behaviors, and reduce the functions of suitable
38 nesting habitat for these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
39 *Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse effects of
40 construction-related activities on survival and productivity of nesting Cooper's hawk and osprey.
41 The use of mechanical equipment during water conveyance facilities construction could cause the
42 accidental release of petroleum or other contaminants that could affect Cooper's hawk and osprey in
43 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
44 suitable habitat could also have an adverse effect on these species. AMM1-AMM7, including *AMM2*

1 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such
2 spills and ensure that measures are in place to prevent runoff from the construction area and
3 negative effects of dust on active nests.

4 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
5 mercury in avian species, including Cooper's hawk and osprey. Future operational impacts under
6 CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury concentration
7 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to
8 estimate fish-tissue concentrations under these future operational conditions (evaluated starting
9 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues
10 due to ESO were insignificant (see BDCP Appendix 5.D, *Contaminants*, Tables 5D.4-3, 5D.4-4, and
11 5D.4-5).

12 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to
13 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
14 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
15 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas
16 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of
17 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of
18 uncertainty with respect to species-specific effects. Increased methylmercury associated with
19 natural community and floodplain restoration could indirectly affect cooper's hawk and osprey, via
20 uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

21 The potential mobilization or creation of methylmercury within the Plan Area varies with site-
22 specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
23 *Management* contains provisions for Project-specific Mercury Management Plans. Site-specific
24 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
25 adaptive management as described in CM12 would be available to address the uncertainty of
26 methylmercury levels in restored tidal marsh and potential impacts on cooper's hawk and osprey.

27 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
28 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
29 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
30 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
31 2009). The effect of selenium toxicity differs widely between species and also between age and sex
32 classes within a species. In addition, the effect of selenium on a species can be confounded by
33 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
34 2009).

35 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
36 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
37 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
38 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
39 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
40 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
41 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
42 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
43 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
44 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates

1 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
2 have a higher risk of selenium toxicity.

3 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
4 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
5 exacerbate bioaccumulation of selenium in avian species, including Cooper's hawk and osprey.
6 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
7 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
8 Alternative 4 restoration activities that create newly inundated areas could increase bioavailability
9 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
10 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
11 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
12 increases in selenium concentrations in water in the Delta under any alternative. However, it is
13 difficult to determine whether the effects of potential increases in selenium bioavailability
14 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
15 effects on Cooper's hawk and osprey.

16 Because of the uncertainty that exists at this programmatic level of review, there could be a
17 substantial effect on Cooper's hawk and osprey from increases in selenium associated with
18 restoration activities. This effect would be addressed through the implementation of *AMM27*
19 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
20 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
21 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
22 selenium management to reduce selenium concentrations and/or bioaccumulation would be
23 evaluated separately for each restoration effort as part of design and implementation. This
24 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
25 design schedule.

26 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
27 could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas. Moreover,
28 operation and maintenance of the water conveyance facilities, including the transmission facilities,
29 could result in ongoing but periodic postconstruction disturbances that could adversely affect
30 Cooper's hawk and osprey use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*
31 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, in addition to AMM1-
32 AMM7, would be available to address this adverse effect.

33 The implementation of tidal natural communities restoration or floodplain restoration could result
34 in increased exposure of Cooper's hawk or osprey to methylmercury, through the ingestion of fish or
35 small mammals in tidally restored areas. However, it is currently unknown what concentrations of
36 methylmercury are harmful to these species and the potential for increased exposure varies
37 substantially within the study area. Site-specific restoration plans that address the creation and
38 mobilization of mercury, as well as monitoring and adaptive management as described in CM12
39 would better inform potential impacts and address the uncertainty of methylmercury levels in
40 restored tidal marsh in the study area on cooper's hawk and osprey. The site-specific planning phase
41 of marsh restoration would be the appropriate place to assess the potential for risk of
42 methylmercury exposure for Cooper's hawk and osprey, once site specific sampling and other
43 information could be developed.

1 Tidal habitat restoration could result in increased exposure of Cooper's hawk and osprey to
2 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
3 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
4 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

5 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
6 facilities could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas.
7 Moreover, operation and maintenance of the water conveyance facilities, including the transmission
8 facilities, could result in ongoing but periodic postconstruction disturbances that could affect
9 Cooper's hawk and osprey use of the surrounding habitat. Noise, the potential for hazardous spills,
10 increased dust and sedimentation, and operations and maintenance of the water conveyance
11 facilities under Alternative 4 would have a less-than-significant impact on Cooper's hawk and osprey
12 with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
13 *Surveys and Avoid Disturbance of Nesting Birds*, and AMM1-AMM7.

14 The implementation of tidal natural communities restoration or floodplain restoration could result
15 in increased exposure of Cooper's hawk or osprey to methylmercury through the ingestion of fish or
16 small mammals in restored tidal areas. However, it is currently unknown what concentrations of
17 methylmercury are harmful to these species. Site-specific restoration plans that address the creation
18 and mobilization of mercury, as well as monitoring and adaptive management as described in CM12,
19 would address the uncertainty of methylmercury levels in restored tidal marsh in the study area and
20 better inform potential impacts on Cooper's hawk and osprey.

21 Tidal habitat restoration could result in increased exposure of Cooper's hawk and osprey to
22 selenium. With implementation of *AMM27 Selenium Management*, which would provide specific tidal
23 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its
24 bioavailability in tidal habitats, the impact of potential increased selenium exposure would be less
25 than significant.

26 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
27 **Disturbance of Nesting Birds**

28 See Mitigation Measure BIO-75 under Impact BIO-75.

29 **Impact BIO-112: Periodic Effects of Inundation of Cooper's Hawk and Osprey Nesting Habitat**
30 **as a Result of Implementation of Conservation Components**

31 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
32 duration of inundation of approximately 48-82 acres of modeled Cooper's hawk and osprey
33 breeding habitat. However, increased periodic flooding is not expected to cause any adverse effect on
34 breeding habitat because trees in which nest sites are situated already withstand floods, the
35 increase in inundation frequency and duration is expected to remain within the range of tolerance of
36 riparian trees, and nest sites are located above floodwaters.

37 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
38 inundation of up to 230 acres of breeding habitat for Cooper's hawk and osprey. The overall effect of
39 seasonal inundation in existing riparian natural communities is likely to be beneficial for these
40 species, because, historically, flooding was the main natural disturbance regulating ecological
41 processes in riparian areas, and flooding promotes the germination and establishment of many
42 native riparian plants.

1 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
2 sites because trees in which nest sites are situated already withstand floods, the increase in
3 inundation frequency and duration is expected to remain within the range of tolerance of riparian
4 trees, and nest sites are located above floodwaters. Therefore, increased duration and inundation
5 from CM2 and CM5 would not have an adverse effect on Cooper's hawk and osprey.

6 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
7 nest sites because trees in which nest sites are situated already withstand floods, the increase in
8 inundation frequency and duration is expected to remain within the range of tolerance of riparian
9 trees, and nest sites are located above floodwaters. Therefore, increased duration and inundation
10 from CM2 and CM5 would have a less-than-significant impact on Cooper's hawk and osprey.

11 **Golden Eagle and Ferruginous Hawk**

12 This section describes the effects of Alternative 4, including water conveyance facilities construction
13 and implementation of other conservation components, on golden eagle and ferruginous hawk.
14 Modeled foraging habitat for these species consists of grassland, alkali seasonal wetland, vernal pool
15 complex, alfalfa, grain and hay, pasture, and idle cropland throughout the study area.

16 Construction and restoration associated with Alternative 4 conservation measures would result in
17 both temporary and permanent losses of golden eagle and ferruginous hawk modeled foraging
18 habitat as indicated in Table 12-4-44. Full implementation of Alternative 4 would include the
19 following conservation actions over the term of the BDCP that would also benefit golden eagles or
20 ferruginous hawk (see Chapter 3, Section 3.3, *Biological Goals and Objectives*, of the BDCP).

- 21 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
22 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
23 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 24 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 25 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
26 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 27 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
28 VPNC2.5, and GNC2.4, associated with CM11).
- 29 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
30 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 31 • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
32 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value
33 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

34 As explained below, with the restoration or protection of these amounts of habitat, in addition to
35 management activities to enhance natural communities for species and implementation of AMM1-
36 AMM7, impacts on golden eagle and ferruginous hawk would not be adverse for NEPA purposes and
37 would be less than significant for CEQA purposes.

1 **Table 12-4-44. Changes in Golden Eagle and Ferruginous Hawk Habitat Associated with**
2 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Foraging	1,978	1,978	537	537	NA	NA
Total Impacts CM1		1,978	1,978	537	537		
CM2-CM18	Foraging	5,450	26,198	376	893	1,158-3,650	3,823
Total Impacts CM2-CM18		5,450	26,198	376	893	1,158-3,650	3,823
TOTAL IMPACTS		7,428	28,176	913	1,430	1,158-3,650	3,823

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-113: Loss or Conversion of Habitat for and Direct Mortality of Golden Eagle and**
5 **Ferruginous Hawk**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up 29,606 acres of modeled foraging habitat for golden eagle and ferruginous hawk (28,176 acres
8 of permanent loss and 1,430 of temporary loss, Table 12-4-44). Conservation measures that would
9 result in these losses are conveyance facilities and transmission line construction, and establishment
10 and use of reusable tunnel material areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal
11 habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland
12 restoration (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10),
13 and construction of conservation hatcheries (CM18). The majority of habitat loss (20,880 acres)
14 would result from CM4. Habitat enhancement and management activities (CM11), which include
15 ground disturbance or removal of nonnative vegetation, and the construction of recreational trails,
16 signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities
17 associated with the long-term operation of the water conveyance facilities and other BDCP physical
18 facilities could degrade or eliminate foraging habitat for both species. Each of these individual
19 activities is described below. A summary statement of the combined impacts and NEPA effects, and a
20 CEQA conclusion follows the individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
22 result in the combined permanent and temporary loss of up to 2,515 acres of modeled golden
23 eagle and ferruginous hawk habitat (1,978 acres of permanent loss, 537 acres of temporary
24 loss). Impacts would occur from the construction of Intakes 2, 3, and 5 and associated
25 temporary work areas and access roads in CZ 4 between Clarksburg and Courtland; construction

1 of the intermediate forebay; and from a reusable tunnel material storage area on Bouldin Island.
 2 The construction of the permanent and temporary transmission line corridors through CZs 4-6
 3 and 9 would also remove suitable foraging habitat for the species. Approximately 867 acres of
 4 impact would be from the placement of reusable tunnel material area west of the Clifton Court
 5 Forebay in CZ 8. In addition, permanent habitat loss would occur from the construction of the
 6 new forebay south of the existing Clifton court Forebay in CZ 8. Some of the grassland habitat
 7 lost at the sites of new canals south of Clifton Court Forebay is composed of larger stands of
 8 ruderal and herbaceous vegetation and California annual grassland, which is also suitable
 9 foraging habitat for the species. There are no occurrences of golden eagle or ferruginous hawk
 10 that intersect with the CM1 footprint. Refer to the Terrestrial Biology Mapbook for a detailed
 11 view of Alternative 4 construction locations. Impacts from CM1 would occur within the first 10-
 12 14 years of Plan implementation.

- 13 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 14 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
 15 golden eagle and ferruginous hawk foraging habitat (898 acres of permanent loss, 376 acres of
 16 temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of
 17 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass
 18 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.
 19 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland
 20 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10
 21 years of Alternative 4 implementation.
- 22 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 23 inundation would permanently remove an estimated 20,880 acres of modeled golden eagle and
 24 ferruginous hawk habitat. The majority of the acres lost would consist of cultivated lands in CZs
 25 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache Slough, on
 26 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
 27 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact
 28 and fragment grassland just north of Rio Vista in and around French and Prospect Islands, and in
 29 an area south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex
 30 habitat would likely occur in the south end of the Yolo Bypass and on the northern fringes of
 31 Suisun Marsh.
- 32 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 33 seasonally inundated floodplain would permanently and temporarily remove approximately
 34 1,450 acres of modeled golden eagle and ferruginous hawk foraging habitat (933 permanent,
 35 517 temporary). These losses would be expected after the first 10 years of Alternative 4
 36 implementation along the San Joaquin River and other major waterways in CZ 7.
- 37 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
 38 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
 39 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
 40 would be restored after the construction periods. Grassland restoration would be implemented
 41 on agricultural lands that also provide foraging habitat for golden eagle and ferruginous hawk
 42 and would result in the conversion of 837 acres of cultivated lands to grassland.
- 43 ● *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
 44 removal of 705 acres of golden eagle and ferruginous hawk foraging habitat.

- 1 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
2 actions included in CM11 that are designed to enhance wildlife values in restored or protected
3 habitats could result in localized ground disturbances that could temporarily remove small
4 amounts of golden eagle and ferruginous hawk foraging habitat. Ground-disturbing activities,
5 such as removal of nonnative vegetation and road and other infrastructure maintenance
6 activities, would be expected to have minor adverse effects on available habitat for these
7 species. CM11 would also include the construction of recreational-related facilities including
8 trails, interpretive signs, and picnic tables (see Chapter 4, *Covered Activities and Associated*
9 *Federal Actions*, of the BDCP). The construction of trailhead facilities, signs, staging areas, picnic
10 areas, bathrooms, etc. would be placed on existing, disturbed areas when and where possible.
11 However, approximately 50 acres of grassland habitat would be lost from the construction of
12 trails and facilities.
- 13 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
14 modeled golden eagle and ferruginous hawk foraging habitat for the development of a delta and
15 longfin smelt conservation hatchery in CZ 1.
- 16 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
17 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
18 disturbances that could affect golden eagle and ferruginous hawk use of the surrounding habitat.
19 Maintenance activities would include vegetation management, levee and structure repair, and
20 re-grading of roads and permanent work areas. These effects, however, would be reduced by
21 AMM1–AMM7 and conservation actions as described below.
- 22 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
23 golden eagle and ferruginous hawk because foraging individuals would be expected to
24 temporarily avoid the increased noise and activity associated with construction areas.

25 The following paragraphs summarize the combined effects discussed above and describe other
26 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
27 included.

28 ***Near-Term Timeframe***

29 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
30 the near-term BDCP conservation strategy has been evaluated to determine whether it would
31 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
32 effects of construction would not be adverse under NEPA. Alternative 4 would remove 8,341 acres
33 (7,428 permanent, 913 temporary) of modeled golden eagle and ferruginous hawk foraging habitat
34 in the study area in the near-term. These effects would result from the construction of the water
35 conveyance facilities (CM1, 2,515 acres), and implementing other conservation measures (*CM2 Yolo*
36 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*
37 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*
38 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*
39 *and CM18 Conservation Hatcheries*—5,826 acres).

40 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
41 would be 2:1 for protection of habitat. Using this ratio would indicate that 5,030 acres should be
42 protected to compensate for the CM1 losses of 2,515 acres of golden eagle and ferruginous hawk
43 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of

1 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous
2 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

3 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
4 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
5 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (see Table
6 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3,
7 CM8, and CM9 and would occur in the same timeframe as the construction and early restoration
8 losses thereby avoiding adverse effects of habitat loss on golden eagle and ferruginous hawk
9 foraging in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8,
10 and 11 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated
11 with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and
12 would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural
13 communities which would expand golden eagle and ferruginous hawk foraging habitat and reduce
14 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
15 *Enhancement and Management*, insect and mammal prey populations would be increased on
16 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
17 VPNC2.5, and GNC2.4). Burrow availability would be increased on protected natural communities by
18 encouraging ground squirrel occupancy and expansion through the creation of berms, mounds,
19 edges, and through the prohibition of ground squirrel control programs (i.e., poisoning).

20 Cultivated lands that provide habitat for covered and other native wildlife species would provide
21 approximately 15,400 acres of potential foraging habitat for golden eagle and ferruginous hawk
22 (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time
23 period would be in alfalfa and pasture crop types (very high- and high-value crop types) for
24 Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.
25 This biological objective provides an estimate for the high proportion of cultivated lands protected
26 in the near-term time period which would be suitable for golden eagle and ferruginous hawk.

27 The acres of restoration and protection contained in the near-term Plan goals and the additional
28 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
29 level effects of CM1 on golden eagle and ferruginous hawk, as well as mitigate the near-term effects
30 of the other conservation measures with the consideration that some portion of the 15,400 acres of
31 cultivated lands protected in the near-term timeframe would be managed in suitable crop types to
32 compensate for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-113, *Compensate for the*
33 *Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat* would be available to
34 address the adverse effect of habitat loss in the near-term.

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
36 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
37 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
38 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
39 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
40 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
41 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
42 of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,606
 3 acres of modeled golden eagle and ferruginous hawk foraging habitat during the term of the Plan.
 4 The locations of these losses are described above in the analyses of individual conservation
 5 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
 6 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
 7 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
 8 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
 9 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
 10 for native wildlife species (see Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland
 11 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and
 12 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali
 13 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
 14 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
 15 expand foraging habitat for golden eagle and ferruginous hawk and reduce the effects of current
 16 levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*,
 17 insect and small mammal prey populations would be increased on protected lands, enhancing the
 18 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow
 19 availability would be increased on protected natural communities by encouraging ground squirrel
 20 occupancy and expansion through the creation of berms, mounds, edges, and through the
 21 prohibition of ground squirrel control programs (i.e., poisoning). Cultivated lands that provide
 22 habitat for covered and other native wildlife species would provide approximately 15,400 acres of
 23 potential habitat for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 42,275
 24 acres of cultivated lands protected would be in alfalfa and pasture crop types (very high- and high-
 25 value crop types) for Swainson’s hawk (Objective SH1.2) which are also suitable for golden eagle
 26 and ferruginous hawk.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 31 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 32 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 33 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 34 of the Final EIR/EIS.

35 **NEPA Effects:** The loss of golden eagle and ferruginous hawk habitat and potential mortality of these
 36 special-status species under Alternative 4 would represent an adverse effect in the absence of other
 37 conservation actions. However, with habitat protection and restoration associated with CM3, CM8,
 38 CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in
 39 place during all project activities, and with implementation of Mitigation Measure BIO-113,
 40 *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the
 41 effects of habitat loss and potential for direct mortality on golden eagle and ferruginous hawk under
 42 Alternative 4 would not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
6 effects of construction would be less than significant under CEQA. Alternative 4 would remove 8,341
7 acres (7,428 permanent, 913 temporary) of modeled golden eagle and ferruginous hawk foraging
8 habitat in the study area in the near-term. These effects would result from the construction of the
9 water conveyance facilities (CM1, 2,515 acres), and implementing other conservation measures
10 (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian
11 Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and
12 Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and
13 Management and CM18 Conservation Hatcheries—5,826 acres).

14 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
15 would be 2:1 for protection of habitat. Using this ratio would indicate that 5,030 acres should be
16 protected to mitigate the CM1 losses of 2,515 acres of golden eagle and ferruginous hawk foraging
17 habitat. The near-term effects of other conservation actions would remove 5,826 acres of modeled
18 habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous hawk
19 habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

20 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
21 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
22 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (see Table
23 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3,
24 CM8, and CM9 and would occur in the same timeframe as the construction and early restoration
25 losses thereby avoiding significant impacts of habitat loss on golden eagle and ferruginous hawk
26 foraging in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8,
27 and 11. (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
28 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
29 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
30 pool natural communities which would expand golden eagle and ferruginous hawk foraging habitat
31 and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
32 *Enhancement and Management*, insect and mammal prey populations would be increased on
33 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
34 VPNC2.5, and GNC2.4). Burrow availability would be increased on protected natural communities by
35 encouraging ground squirrel occupancy and expansion through the creation of berms, mounds,
36 edges, and through the prohibition of ground squirrel control programs (i.e., poisoning). Cultivated
37 lands that provide habitat for covered and other native wildlife species would provide
38 approximately 15,400 acres of potential foraging habitat for golden eagle and ferruginous hawk
39 (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time
40 period would be in alfalfa and pasture crop types (very high- and high-value crop types) for
41 Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.
42 This biological objective provides an estimate for the high proportion of cultivated lands protected
43 in the near-term time period which would be suitable for golden eagle and ferruginous hawk. These
44 Plan objectives represent performance standards for considering the effectiveness of conservation
45 actions.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 8 of the Final EIR/EIS.

9 In the absence of other conservation actions, the effects on golden eagle and ferruginous hawk
 10 foraging habitat would represent an adverse effect as a result of habitat modification and potential
 11 for direct mortality of special-status species. However, the acres of restoration and protection
 12 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the
 13 typical mitigation that would be applied to the project-level effects of CM1 on golden eagle and
 14 ferruginous hawk, as well as mitigate the near-term effects of the other conservation measures with
 15 the consideration that some portion of the 15,400 acres of cultivated lands protected in the near-
 16 term timeframe would be managed in suitable crop types to compensate for the loss of habitat at a
 17 ratio of 2:1. The implementation of the conservation actions described above, in addition to AMMs2-
 18 AMM7, and Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden Eagle and*
 19 *Feruginous Hawk Foraging Habitat* would reduce the impact of habitat loss in the near-term to less
 20 than significant.

21 **Late Long-Term Timeframe**

22 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,606
 23 acres of modeled golden eagle and ferruginous hawk foraging habitat during the term of the Plan.
 24 The locations of these losses are described above in the analyses of individual conservation
 25 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
 26 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
 27 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
 28 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
 29 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
 30 for native wildlife species (see Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland
 31 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and
 32 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali
 33 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
 34 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
 35 expand foraging habitat for golden eagle and ferruginous hawk and reduce the effects of current
 36 levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*,
 37 insect and small mammal prey populations would be increased on protected lands, enhancing the
 38 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow
 39 availability would be increased on protected natural communities by encouraging ground squirrel
 40 occupancy and expansion through the creation of berms, mounds, edges, and through the
 41 prohibition of ground squirrel control programs (i.e., poisoning). Cultivated lands that provide
 42 habitat for covered and other native wildlife species would provide approximately 15,400 acres of
 43 potential habitat for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 42,275
 44 acres of cultivated lands protected would be in alfalfa and pasture crop types. These are very high-
 45 and high-value crop types for Swainson's hawk (Objective SH1.2) which are also suitable for golden
 46 eagle and ferruginous hawk.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
8 of the Final EIR/EIS.

9 In the absence of other conservation actions, the effects on golden eagle and ferruginous hawk
10 foraging habitat would represent an adverse effect as a result of habitat modification and potential
11 for direct mortality of special-status species; however, considering Alternative 4's protection and
12 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
13 suitable to compensate for habitats lost to construction and restoration activities, and with the
14 implementation of AMM1–AMM7, and Mitigation Measure BIO-113, *Compensate for the Near-Term*
15 *Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the loss of habitat or direct mortality
16 through implementation of Alternative 4 would not result in a substantial adverse effect through
17 habitat modifications and would not substantially reduce the number or restrict the range of either
18 species. Therefore, the loss of habitat or potential mortality under this alternative would have a less-
19 than-significant impact on golden eagle and ferruginous hawk.

20 **Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and** 21 **Ferruginous Hawk Foraging Habitat**

22 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
23 crops, or alfalfa to provide golden eagle and ferruginous hawk foraging habitat such that the
24 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of
25 2:1. Additional grassland protection, enhancement, and management may be substituted for the
26 protection of high-value cultivated lands.

27 **Impact BIO-114: Effects on Golden Eagle and Ferruginous Hawk Associated with Electrical** 28 **Transmission Facilities**

29 Golden eagle and ferruginous hawk would be at low risk of bird strike mortality from the
30 construction of new transmission lines based on their maneuverability, their keen eyesight, their
31 lack of flocking behavior, and other factors assessed in the bird strike vulnerability analysis (BDCP
32 Appendix 5.J, Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP*
33 *Transmission Lines*). Marking transmission lines with flight diverters that make the lines more
34 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
35 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
36 by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines
37 would be fitted with flight diverters, which would substantially reduce any potential for powerline
38 collisions.

39 **NEPA Effects:** Golden eagle and ferruginous hawk are already at a low risk of bird strike mortality
40 based on their general maneuverability, keen eyesight and lack of flocking behavior. All new
41 transmission lines constructed as a result of the project would be fitted with bird diverters, which
42 have been shown to reduce avian mortality by 60%. With implementation of *AMM20 Greater*

1 *Sandhill Crane*, the construction and operation of transmission lines would not result in an adverse
2 effect on golden eagle or ferruginous hawk.

3 **CEQA Conclusion:** Golden eagle and ferruginous hawk are already at a low risk of bird strike
4 mortality based on their general maneuverability, keen eyesight and lack of flocking behavior. All
5 new transmission lines constructed as a result of the project would be fitted with bird diverters,
6 which have been shown to reduce avian mortality by 60%. With implementation of *AMM20 Greater*
7 *Sandhill Crane*, the construction and operation of transmission lines would result in a less-than-
8 significant impact on golden eagle or ferruginous hawk.

9 **Impact BIO-115: Indirect Effects of Plan Implementation on Golden Eagle and Ferruginous**
10 **Hawk**

11 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt
12 foraging, and reduce the functions of suitable foraging habitat for golden eagle and ferruginous
13 hawk. Construction noise above background noise levels (greater than 50 dBA) could extend 500 to
14 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*
15 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and
16 Appendix 11F, *Substantive BDCP Revisions*, of the Final EIR/EIS), although there are no available data
17 to determine the extent to which these noise levels could affect golden eagle or ferruginous hawk.
18 Indirect effects associated with construction include noise, dust, and visual disturbance caused by
19 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical
20 equipment during water conveyance facilities construction could cause the accidental release of
21 petroleum or other contaminants that could affect these species or their prey in the surrounding
22 habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
23 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment
24 or excessive dust adjacent to golden eagle and ferruginous hawk grassland habitat could also have a
25 negative effect on the species. However, AMM1–AMM7 would also ensure that measures would be in
26 place to prevent runoff from the construction area and the negative effects of dust on wildlife
27 adjacent to work areas.

28 **NEPA Effects:** Indirect effects on golden eagle and ferruginous hawk as a result of Plan
29 implementation could have adverse effects on these species through the modification of habitat.
30 With the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 4
31 implementation would not have an adverse effect on golden eagle and ferruginous hawk.

32 **CEQA Conclusion:** Indirect effects on golden eagle and ferruginous hawk as a result of Plan
33 implementation could have a significant impact on the species from modification of habitat. With the
34 incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 4
35 implementation would have a less-than-significant impact on golden eagle and ferruginous hawk.

36 **Impact BIO-116: Periodic Effects of Inundation on Golden Eagle and Ferruginous Hawk**
37 **Habitat as a Result of Implementation of Conservation Components**

38 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
39 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–
40 3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat (Table 12-4-44). Based
41 on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain Restoration*
42 could result in the periodic inundation of up to approximately 3,823 acres of modeled habitat (Table
43 12-4-44).

1 Golden eagles and ferruginous hawks would not likely use inundated areas for foraging, and
2 increased frequency and duration of inundation of grassland habitats may affect prey populations
3 that have insufficient time to recover following inundation events. However, periodically inundated
4 habitat would not be expected to have an adverse effect on local or migratory golden eagles or the
5 wintering ferruginous hawk populations in the study area.

6 **NEPA Effects:** Implementation of CM2 would increase the frequency and duration of inundation on
7 approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat. In
8 addition, implementation of CM5 could result in the periodic inundation of up to 3,823 acres of
9 modeled habitat. However, periodic inundation would not be expected to have an adverse effect on
10 the wintering golden eagle or ferruginous hawk populations in the study area.

11 **CEQA Conclusion:** Implementation of CM2 would increase the frequency and duration of inundation
12 on approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging
13 habitat. In addition, implementation of CM5 could result in the periodic inundation of up to 3,823
14 acres of modeled habitat. However, periodic inundation would be expected to have a less-than-
15 significant impact on the golden eagle and ferruginous hawk populations in the study area.

16 **Cormorants, Herons and Egrets**

17 This section describes the effects of Alternative 4, including water conveyance facilities construction
18 and implementation of other conservation components, on double-crested cormorant, great blue
19 heron, great egret, snowy egret, and black-crowned night heron. Modeled breeding habitat for these
20 species consists of valley/foothill riparian forest.

21 Construction and restoration associated with Alternative 4 conservation measures would result in
22 both temporary and permanent losses of cormorant, heron, and egret modeled habitat as indicated
23 in Table 12-4-45. The majority of the losses would take place over an extended period of time as
24 tidal marsh is restored in the study area. Although restoration for the loss of nesting habitat would
25 be initiated in the same timeframe as the losses, it could take one or more decades for restored
26 habitats to replace the functions of habitat lost. This time lag between impacts and restoration of
27 habitat function would be minimized by specific requirements of *AMM18 Swainson's Hawk*, including
28 the planting of mature trees in the near-term time period. Full implementation of Alternative 4
29 would include the following conservation actions over the term of the BDCP which would also
30 benefit cormorants, herons, and egrets (see Chapter 3, Section 3.3, *Biological Goals and Objectives*, of
31 the BDCP).

- 32 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
33 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
34 associated with CM7).
- 35 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
36 10 (Objective VFRNC1.2, associated with CM3).
- 37 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
38 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
39 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
40 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

41 As explained below, with the restoration or protection of these amounts of habitat, in addition to
42 management activities to enhance natural communities for species and implementation of AMM1–

1 AMM7, AMM10 Restoration of Temporarily Affected Natural Communities, AMM18 Swainson’s Hawk,
2 and Mitigation Measures BIO-75 and BIO-117, impacts on cormorants, herons, and egrets would not
3 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

4 **Table 12-4-45. Changes in Cormorant, Heron and Egret Modeled Habitat Associated with**
5 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting (Rookeries)	37	37	24	24	NA	NA
Total Impacts CM1		37	37	24	24		
CM2–CM18	Nesting (Rookeries)	387	684	88	123	51–92	266
Total Impacts CM2–CM18		387	684	88	123	51–92	266
TOTAL IMPACTS		424	721	112	147	51–92	266

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

6

7 **Impact BIO-117: Loss or Conversion of Nesting Habitat for and Direct Mortality of**
8 **Cormorants, Herons and Egrets**

9 Alternative 4 conservation measures would result in the combined permanent and temporary loss
10 of up to 868 acres of modeled nesting habitat (721 acres of permanent loss, 147 acres of temporary
11 loss) for double-crested cormorant, great blue heron, great egret, snowy egret, and black-crowned
12 night heron (Table 12-4-45). Conservation measures that would result in these losses are
13 conveyance facilities and transmission line construction, and establishment and use of reusable
14 tunnel material areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2), tidal
15 natural communities restoration (CM4), and seasonally inundated floodplain restoration (CM5).
16 Habitat enhancement and management activities (CM11) which include ground disturbance or
17 removal of nonnative vegetation, could result in local adverse habitat effects. In addition,
18 maintenance activities associated with the long-term operation of the water conveyance facilities
19 and other BDCP physical facilities could degrade or eliminate cormorant, heron, and egret modeled
20 habitat. Each of these individual activities is described below. A summary statement of the combined
21 impacts, NEPA effects, and a CEQA conclusion follow the individual conservation measure
22 discussions.

- 1 ● *CM1 Water Facilities and Operation*: Construction of Alternative 4 water conveyance facilities
2 would result in the combined permanent and temporary loss of up to 61 acres of modeled
3 nesting habitat for cormorants, herons, and egrets. (Table 12-4-45). Of the 61 acres of modeled
4 habitat that would be removed for the construction of the conveyance facilities, 37 acres would
5 be a permanent loss and 24 acres would be a temporary loss of habitat. Activities that would
6 impact modeled nesting habitat consist of tunnel, forebay, and intake construction, permanent
7 and temporary access roads, construction of transmission lines, barge unloading facilities, and
8 temporary work areas. Most of the permanent loss of nesting habitat would occur where Intakes
9 2, 3, and 5 impact the Sacramento River's east bank between Freeport and Courtland. The
10 riparian areas here are very small patches, some dominated by valley oak and others by
11 nonnative trees. Some nesting habitat would be lost due to construction of a permanent access
12 road from the new forebay west to a reusable tunnel material disposal area. Permanent losses
13 would also occur along Lambert Road where permanent utility lines would be installed and
14 from the construction of an operable barrier at the confluence of Old River and the San Joaquin
15 River. Temporary losses of nesting habitat would occur from the construction of a barge
16 unloading facility west of the intermediate forebay in Snodgrass Slough and where temporary
17 work areas surround intake sites. The riparian habitat in these areas is also composed of very
18 small patches or stringers bordering waterways, which are composed of valley oak and scrub
19 vegetation. Impacts from CM1 would occur in the central delta in CZs 3- 6, and CZ 8. Habitat loss
20 from CM1 activities would have the potential to displace individuals, if present, and remove the
21 functions and value of potentially suitable habitat. There are no occurrences of nesting
22 cormorants, herons, or egrets that overlap with the construction footprint of CM1; however,
23 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
24 *of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries* would be available
25 to minimize impacts on cormorants, herons and egrets if they were to nest in the vicinity of
26 construction activities. Refer to the Terrestrial Biology Mapbook for a detailed view of
27 Alternative 4 construction locations. Impacts from CM1 would occur within the first 10-14 years
28 of Plan implementation.
- 29 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
30 would result in the combined permanent and temporary loss of up to 177 acres of nesting
31 habitat (89 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2.
32 Activities through CM2 could involve excavation and grading in valley/foothill riparian areas to
33 improve passage of fish through the bypasses. Most of the riparian losses would occur at the
34 north end of Yolo Bypass where major fish passage improvements are planned. Excavation to
35 improve water movement in the Toe Drain and in the Sacramento Weir would also remove
36 potential nesting habitat. The loss is expected to occur during the first 10 years of Alternative 4
37 implementation.
- 38 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
39 inundation would permanently remove an estimated 552 acre of nesting habitat for cormorants,
40 herons and egrets. Trees would not be actively removed but tree mortality would be expected
41 over time as areas became tidally inundated. Depending on the extent and value of remaining
42 habitat, this could reduce use of these habitats by these species. There is one CNDDDB occurrence
43 of a great blue heron rookery that overlaps with the hypothetical restoration footprint for tidal
44 restoration. The occurrence is on Decker Island and tidal restoration could potentially impact
45 the nest trees from inundation. This effect would need to be addressed within the project
46 specific analysis for tidal restoration projects.

- 1 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
2 seasonally inundated floodplain would permanently remove approximately 43 acres and
3 temporarily remove approximately 35 acres of potential cormorants, heron, and egret nesting
4 habitat. These losses would be expected after the first 10 years of Alternative 4 implementation
5 along the San Joaquin River and other major waterways in CZ 7.
- 6 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and
7 enhancement-related activities could disturb cormorant, heron, and egret nests if they were
8 present near work sites. A variety of habitat management actions included in CM11 that are
9 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground
10 disturbances that could temporarily remove small amounts of cormorant, heron, and egret
11 habitat and reduce the functions of habitat until restoration is complete. Ground-disturbing
12 activities, such as removal of nonnative vegetation and road and other infrastructure
13 maintenance, are expected to have minor effects on available habitat for these species and are
14 expected to result in overall improvements to and maintenance of habitat values over the term
15 of the BDCP. These effects cannot be quantified, but are expected to be minimal and would be
16 avoided and minimized by the AMMs listed below. BDCP Appendix 3.C describes the AMMs,
17 which have since been updated and which are provided in Appendix 3B, *Environmental*
18 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.
- 19 • Permanent and temporary habitat losses from the above conservation measures would
20 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored
21 as riparian habitat within 1 year following completion of construction activities as described in
22 *AMM10 Restoration of Temporarily Affected Natural Communities*. Although the effects are
23 considered temporary, the restored riparian habitat would require years to several decades to
24 functionally replace habitat that has been affected and for trees to attain sufficient size and
25 structure for established rookeries. *AMM18 Swainson's Hawk* contains actions described below
26 to reduce the effect of temporal loss of mature riparian habitat, including the transplanting of
27 mature trees.
- 28 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
29 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
30 disturbances that could affect use of the surrounding habitat by cormorants, herons or egrets.
31 Maintenance activities would include vegetation management, levee and structure repair, and
32 re-grading of roads and permanent work areas. These effects, however, would be reduced by
33 AMMs and conservation actions as described below.
- 34 • The primary impact of concern regarding double-crested cormorant, great blue heron, great
35 egret, snowy egret, and black-crowned night heron is the loss of existing known nest trees, and
36 other large trees associated with known nest sites. Because these species are highly traditional
37 in their use of rookeries, the establishment of new nest sites is unpredictable. To avoid adverse
38 effects on these species, existing known nest sites would have to be avoided. Mitigation Measure
39 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and
40 Mitigation Measure BIO-117, *Avoid Impacts on Rookeries* would be available to address these
41 adverse effects on cormorants, herons, and egrets.
- 42 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
43 direct mortality of adult or fledged double-crested cormorant, great blue heron, great egret,
44 snowy egret, and black-crowned night heron if they were present in the Plan Area, because they
45 would be expected to avoid contact with construction and other equipment. If birds were to nest

1 in the construction area, construction-related activities, including equipment operation, noise
2 and visual disturbances could affect nests including any nests that are built on the ground (e.g.
3 Cormorant nests that have been built on the ground after nest trees fall over or die from stress
4 and guano produced by a rookery) or lead to their abandonment, potentially resulting in
5 mortality of eggs and nestlings. Mitigation Measures BIO-75 and BIO-117 would be available to
6 address these effects on cormorants, herons, and egrets.

7 The following paragraphs summarize the combined effects discussed above and describe other
8 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
9 included.

10 ***Near-Term Timeframe***

11 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
12 the near-term BDCP conservation strategy has been evaluated to determine whether it would
13 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
14 effects of construction would not be adverse under NEPA. Alternative 4 would remove 536 acres of
15 nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These effects
16 would result from the construction of the water conveyance facilities (CM1, 61 acres of nesting
17 habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries Enhancement*,
18 CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain Restoration*—
19 475 acres of nesting habitat).

20 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
21 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for
22 breeding habitat. Using these ratios would indicate that 61 acres of breeding habitat should be
23 restored/created and 61 acres should be protected to compensate for the CM1 losses of modeled
24 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions
25 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of
26 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the
27 same typical NEPA and CEQA ratios.

28 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
29 system with extensive wide bands or large patches of valley/foothill riparian natural community
30 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
31 restoration would expand the patches of existing riparian forest in order to support nesting habitat
32 for these species. In addition, small but essential nesting habitat associated with cultivated lands
33 would also be maintained and protected such as isolated trees, tree rows along field borders or
34 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

35 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
36 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
37 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored
38 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but
39 would require years to several decades to functionally replace habitat that has been affected and for
40 trees to attain sufficient size and structure suitable for established rookeries. This time lag between
41 the removal and restoration of nesting habitat could have a substantial impact on cormorants,
42 herons and egrets in the near-term time period.

1 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
 2 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
 3 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
 4 within the 125-acre block are removed. These mature trees would be supplemented with additional
 5 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
 6 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
 7 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
 8 system for every tree 20 feet or taller removed by construction during the near-term period. A
 9 variety of native tree species would be planted to provide trees with differing growth rates,
 10 maturation, and life span. Replacement trees that were incorporated into the riparian restoration
 11 would not be clustered in a single region of the study area, but would be distributed throughout
 12 protected lands. Further details of AMM18 are provided in Appendix 3B, *Environmental*
 13 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 18 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 19 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 20 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 21 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
 22 black-crowned night heron are not species that are covered under the BDCP. For the BDCP to avoid
 23 adverse effects on individuals, existing nests and rookeries would have to be avoided. Mitigation
 24 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
 25 *Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries* would be available to address
 26 adverse effects on nesting cormorants, herons, and egrets.

27 ***Late Long-Term Timeframe***

28 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting
 29 habitat for cormorants, herons, and egrets. Alternative 4 as a whole would result in the permanent
 30 loss of and temporary effects on 868 acres of potential breeding habitat (5% of the potential
 31 breeding habitat in the Plan Area).

32 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 33 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*
 34 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
 35 riparian natural community (see Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of
 36 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with
 37 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives
 38 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would
 39 expand the patches of existing riparian forest in order to support nesting habitat for riparian
 40 species. The Plan's objectives would also benefit cormorants, herons, and egrets by protecting small
 41 but essential habitats that occur within cultivated lands, such as tree rows along field borders or
 42 roads, and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition,
 43 the distribution and abundance of potential nest trees would be increased by planting and
 44 maintaining native trees along roadsides and field borders within protected cultivated lands at a
 45 rate of one tree per 10 acres (Objective SWHA2.1).

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 8 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
 9 black-crowned night heron are not species that are covered under the BDCP. These species are
 10 highly traditional in their use of nest sites and for the BDCP to avoid an adverse effect on individuals,
 11 preconstruction surveys would be required to ensure that nests are detected and any direct and
 12 indirect impacts on rookeries are avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*
 13 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*
 14 *Impacts on Rookeries*, would be available to address adverse effects on nesting cormorants, herons,
 15 and egrets.

16 **NEPA Effects:** The loss of cormorant, heron, and egret habitat and potential direct mortality of these
 17 special-status species under Alternative 4 would represent an adverse effect in the absence of other
 18 conservation actions. However, with habitat protection and restoration associated with CM3, CM5,
 19 CM7, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7, AMM10,
 20 and *AMM18 Swainson’s Hawk*, which would be in place during all project activities, the effects of
 21 habitat loss on cormorants, herons and egrets under Alternative 4 would not be adverse. Double-
 22 crested cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron are
 23 not species that are covered under the BDCP. Mitigation Measure BIO-75, *Conduct Preconstruction*
 24 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*
 25 *Impacts on Rookeries* would be available to address adverse effects on nesting cormorants, herons,
 26 and egrets.

27 **CEQA Conclusion:**

28 **Near-Term Timeframe**

29 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 30 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 31 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 32 effects of construction would be less than significant under NEPA. Alternative 4 would remove 536
 33 acres of nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These
 34 effects would result from the construction of the water conveyance facilities (CM1, 61 acres of
 35 nesting habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
 36 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
 37 *Restoration—475 acres of nesting habitat*).

38 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
 39 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for
 40 breeding habitat. Using these ratios would indicate that 61 acres of breeding habitat should be
 41 restored/created and 61 acres should be protected to mitigate the CM1 losses of modeled
 42 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions
 43 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of

1 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the
2 same typical NEPA and CEQA ratios.

3 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
4 system with extensive wide bands or large patches of valley/foothill riparian natural community
5 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
6 restoration would expand the patches of existing riparian forest in order to support nesting habitat
7 for these species. In addition, small but essential nesting habitat associated with cultivated lands
8 would also be maintained and protected such as isolated trees, tree rows along field borders or
9 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

10 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
11 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
12 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored
13 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but
14 would require years to several decades to functionally replace habitat that has been affected and for
15 trees to attain sufficient size and structure suitable for established rookeries. This time lag between
16 the removal and restoration of nesting habitat could have a substantial impact on cormorants,
17 herons and egrets in the near-term time period.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
22 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
23 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
24 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
25 of the Final EIR/EIS.

26 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
27 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
28 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
29 within the 125-acre block are removed. These mature trees would be supplemented with additional
30 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
31 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
32 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
33 system for every tree 20 feet or taller removed by construction during the near-term period. A
34 variety of native tree species would be planted to provide trees with differing growth rates,
35 maturation, and life span. Replacement trees that were incorporated into the riparian restoration
36 would not be clustered in a single region of the study area, but would be distributed throughout
37 protected lands. Further details of AMM18 are provided in Appendix 3B, *Environmental*
38 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

39 Double-crested cormorant, great blue heron, great egret, snowy egret, and black-crowned night
40 heron are not species that are covered under the BDCP. For the BDCP to avoid an adverse effect on
41 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
42 nests are detected and avoided.

43 In the absence of other conservation actions, effects on nesting cormorants, herons, and egrets
44 would represent an adverse effect as a result of habitat modification and potential for direct

1 mortality of special-status species. This impact would be significant. However, the BDCP has
 2 committed to habitat protection, restoration, management and enhancement activities described
 3 above. As outlined in BDCP Chapter 3, Section 3.4, *Conservation Measures*, natural community
 4 restoration and protection are planned so that they keep pace with project impacts. Thus, there
 5 would be minimal lag time between impacts and implementation of those measures designed to
 6 offset those impacts on natural communities and the species that use them. In addition,
 7 implementation of AMM1–AMM7, AMM10, *AMM18 Swainson’s Hawk*, and Mitigation Measure BIO-
 8 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and
 9 Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would reduce this potential impact to a
 10 less-than-significant level.

11 **Late Long-Term Timeframe**

12 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting
 13 habitat for cormorants, herons, and egrets. Alternative 4 as a whole would result in the permanent
 14 loss of and temporary effects on 868 acres of potential breeding habitat (5% of the potential
 15 breeding habitat in the Plan Area).

16 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 17 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*
 18 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
 19 riparian natural community (see Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of
 20 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with
 21 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives
 22 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would
 23 expand the patches of existing riparian forest in order to support nesting habitat for riparian
 24 species. The Plan’s objectives would also benefit cormorants, herons, and egrets by protecting small
 25 but essential habitats that occur within cultivated lands, such as tree rows along field borders or
 26 roads, and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition,
 27 the distribution and abundance of potential nest trees would be increased by planting and
 28 maintaining native trees along roadsides and field borders within protected cultivated lands at a
 29 rate of one tree per 10 acres (Objective SWHA2.1).

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 34 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 35 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 36 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 37 of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
 38 black-crowned night heron are not species that are covered under the BDCP. These species are
 39 highly traditional in their use of nest sites and for the BDCP to avoid a significant impact on
 40 individuals, preconstruction surveys would be required to ensure that nests are detected and any
 41 direct and indirect impacts on rookeries are avoided. Implementation of Mitigation Measure BIO-75,
 42 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation
 43 Measure BIO-117, *Avoid Impacts on Rookeries*, would reduce this potential impact to a less-than-
 44 significant level.

1 In the absence of other conservation actions, effects on nesting cormorants, herons, and egrets
2 would represent an adverse effect as a result of habitat modification and potential for direct
3 mortality of special-status species. This impact would be considered significant. Considering
4 Alternative 4's protection and restoration provisions, which would provide acreages of new or
5 enhanced habitat in amounts sufficient to compensate for the loss of riparian habitats lost to
6 construction and restoration activities, and with implementation of AMM1–AMM7, AMM10, *AMM18*
7 *Swainson's Hawk* and Mitigation Measures BIO-75 and BIO-117, the loss of habitat or direct
8 mortality through implementation of Alternative 4 would not result in a substantial adverse effect
9 through habitat modifications and would not substantially reduce the number or restrict the range
10 of these species. Therefore, the loss of habitat or potential mortality under this alternative would
11 have a less-than-significant impact on cormorants, herons, and egrets.

12 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
13 **Disturbance of Nesting Birds**

14 See Mitigation Measure BIO-75 under Impact BIO-75.

15 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

16 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);
17 therefore, DWR will avoid all direct and indirect impacts on rookeries.

18 **Impact BIO-118: Effects Associated with Electrical Transmission Facilities on Cormorants,**
19 **Herons and Egrets**

20 New transmission lines would increase the risk for bird-power line strikes, which could result in
21 injury or mortality of cormorants, herons and egrets. New transmission lines would increase the
22 risk for bird-power line strikes. Waterbirds have a higher susceptibility to collisions than passerines,
23 raptors, and other birds. Marking transmission lines with flight diverters that make the lines more
24 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
25 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
26 by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines
27 constructed as a result of the project would be fitted with flight diverters, which would reduce bird
28 strike risk of cormorants, herons, and egrets.

29 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
30 could result in injury or mortality of cormorants, herons, and egrets. The implementation of *AMM20*
31 *Greater Sandhill Crane* would require the installation of bird flight diverters on all new transmission
32 lines, which could reduce bird strike risk of cormorants, herons, and egrets by 60%. With the
33 installation of bird flight diverters, the construction and operation of new transmission lines under
34 Alternative 4 would not result in an adverse effect on cormorants, herons, and egrets.

35 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
36 could result in injury or mortality of cormorants, herons, and egrets. The implementation of *AMM20*
37 *Greater Sandhill Crane* would require the installation of bird flight diverters on all new transmission
38 lines, which could reduce bird strike risk of cormorants, herons, and egrets by 60%. With the
39 installation of bird flight diverters, the construction and operation of new transmission lines under
40 Alternative 4 would result in a less-than-significant impact on cormorants, herons, and egrets.

1 **Impact BIO-119: Indirect Effects of Plan Implementation on Cormorants, Herons and Egrets**

2 **Indirect Construction- and Operation-Related Effects:** Construction noise above background
3 noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction
4 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
5 *Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP Revisions*, of
6 the Final EIR/EIS), although there are no available data to determine the extent to which these noise
7 levels could affect cormorants, herons, or egrets. If cormorants, herons or egrets were to nest in or
8 adjacent to work areas, construction and subsequent maintenance-related noise and visual
9 disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the functions of
10 suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct Preconstruction*
11 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse
12 effects of construction-related activities on survival and productivity of nesting cormorants, herons
13 or egrets. The use of mechanical equipment during water conveyance facilities construction could
14 cause the accidental release of petroleum or other contaminants that could affect cormorants,
15 herons or egrets in the surrounding habitat. The inadvertent discharge of sediment or excessive
16 dust adjacent to suitable habitat could also have an adverse effect on these species. AMM1-AMM7,
17 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the
18 likelihood of such spills and ensure that measures are in place to prevent runoff from the
19 construction area and negative effects of dust on active nests.

20 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
21 mercury in avian species, including cormorants, herons or egrets. A detailed review of the
22 methylmercury issues associated with implementation of the BDCP is contained in Appendix 11F,
23 *Substantive BDCP Revisions*. This review includes an overview of the BDCP-related mechanisms that
24 could result in increased mercury in the foodweb, and how exposure of individual species to
25 mercury may occur based on feeding habits and where species habitat overlaps with the areas
26 where mercury bioavailability could increase. Mercury is transformed into the more bioavailable
27 form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying
28 such as tidal marshes and flood plains (Alpers et al. 2008). Bioaccumulation of methylmercury varies
29 by species as there are taxonomic differences in rates of detoxification within the liver (Eagles-Smith
30 et al. 2009). Organisms feeding within pelagic-based (algal) foodwebs have been found to have
31 higher concentrations of methylmercury than those in benthic or epibenthic foodwebs; this has been
32 attributed to food chain length and dietary segregation (Grimaldo et al. 2009). That is, the pelagic
33 food chain tends to be longer than the benthic food chain, which allows for greater biomagnification
34 of methylmercury in top predators. Also, there is less prey diversity at the top of the pelagic food
35 chain than in the benthic food chain; pelagic top predators eat smaller fish and little else, while
36 benthic top predators consume a variety of organisms, many of which are lower in the food chain
37 than fishes and thus have less potential for methylmercury biomagnification.

38 Largemouth bass was used as a surrogate species for analysis (Appendix 11F, *Substantive BDCP*
39 *Revisions*) and the modeled effects of mercury concentrations from changes in water operations
40 under CM1 on largemouth bass did not differ substantially from existing conditions; therefore,
41 results also indicate that cormorant, heron, and egret tissue concentrations would not measurably
42 increase as a result of CM1 implementation.

43 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to
44 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
45 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and

1 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas
2 could increase bioavailability of mercury. Species sensitivity to methylmercury differs widely and
3 there is a large amount of uncertainty with respect to species-specific effects. Increased
4 methylmercury associated with natural community and floodplain restoration could indirectly affect
5 on cormorants, herons or egrets, via uptake in lower trophic levels (as described in BDCP Appendix
6 5.D, *Contaminants*). Mercury is generally elevated throughout the Delta, and restoration of the lower
7 potential areas in total may result in generalized, very low level increases of mercury. Given that
8 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in
9 some level of effects. Restoration in Suisun Marsh would convert managed wetlands to tidal
10 wetlands, which would be expected to result in an overall reduction in mercury methylation.

11 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
12 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
13 *Management* (as revised in Appendix 11F, *Substantive BDCP Revisions*) contains provisions for
14 project-specific Mercury Management Plans. Site-specific restoration plans that address the creation
15 and mobilization of mercury, as well as monitoring and adaptive management as described in CM12
16 would be available to address the uncertainty of methylmercury levels in restored tidal marsh and
17 potential impacts on cormorants, herons or egrets.

18 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
19 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
20 each restoration project. Where restoration design and adaptive management cannot fully address
21 the high potential for methylmercury production while also meeting restoration objectives,
22 alternate restoration areas would be considered on a project-specific basis. CM12 would be
23 implemented in coordination with other similar efforts to address mercury in the Delta, and
24 specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
25 would include the following actions.

- 26 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
27 mercury methylation and bioavailability.
- 28 ● Define design elements that minimize conditions conducive to generation of methylmercury in
29 restored areas.
- 30 ● Define adaptive management strategies that can be implemented to monitor and minimize
31 actual postrestoration creation and mobilization of methylmercury.

32 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
33 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
34 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
35 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
36 2009). The effect of selenium toxicity differs widely between species and also between age and sex
37 classes within a species. In addition, the effect of selenium on a species can be confounded by
38 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
39 2009).

40 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
41 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
42 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
43 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
44 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San

1 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
2 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
3 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
4 primarily herbivores (Paveglione and Kilbride 2007). Diving ducks in the San Francisco Bay (which
5 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
6 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
7 levels of selenium have a higher risk of selenium toxicity.

8 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
9 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
10 exacerbate bioaccumulation of selenium in avian species, including cormorants, herons, and egrets.
11 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
12 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
13 BDCP restoration activities that create newly inundated areas could increase bioavailability of
14 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
15 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
16 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
17 long-term increases in selenium concentrations in water in the Delta under any alternative.
18 However, it is difficult to determine whether the effects of potential increases in selenium
19 bioavailability associated with restoration-related conservation measures (CM4, CM5) would lead to
20 adverse effects on cormorants, herons, and egrets.

21 Because of the uncertainty that exists at this programmatic level of review, there could be a
22 substantial effect on cormorants, herons, and egrets from increases in selenium associated with
23 restoration activities. This effect would be addressed through the implementation of *AMM27*
24 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
25 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
26 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
27 selenium management to reduce selenium concentrations and/or bioaccumulation would be
28 evaluated separately for each restoration effort as part of design and implementation. This
29 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
30 design schedule.

31 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
32 could reduce cormorant, heron, and egret use of modeled habitat adjacent to work areas. Moreover,
33 operation and maintenance of the water conveyance facilities, including the transmission facilities,
34 could result in ongoing but periodic postconstruction disturbances that could affect cormorant,
35 heron, and egret use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
36 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*
37 *Impacts on Rookeries*, would be available to address adverse effects on nesting individuals in
38 addition to AMM1–AMM7.

39 Tidal habitat restoration could result in increased exposure of cormorants, herons, and egrets to
40 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
41 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
42 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

43 The implementation of tidal natural communities restoration or floodplain restoration could result
44 in increased exposure of cormorants, herons or egrets to methylmercury through the ingestion of

1 fish in restored tidal areas. However, it is unknown what concentrations of methylmercury are
2 harmful to these species and the potential for increased exposure varies substantially within the
3 study area. Implementation of CM12 which contains measures to assess the amount of mercury
4 before project development, followed by appropriate design and adaptation management, would
5 minimize the potential for increased methylmercury exposure, and would result in no adverse effect
6 on cormorants, herons, and egrets.

7 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
8 sedimentation, and operations and maintenance of the water conveyance facilities would represent
9 an adverse effect in the absence of other conservation actions. This impact would be significant.
10 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
11 *Nesting Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, and AMM1–AMM7,
12 would reduce this impact to a less-than-significant level.

13 Tidal habitat restoration could result in increased exposure of cormorants, herons, and egrets to
14 selenium which could result in mortality of special-status species. This effect would be addressed
15 through the implementation of *AMM27 Selenium Management*, which would provide specific tidal
16 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its
17 bioavailability in tidal habitats. With implementation of AMM27, potential for increased selenium
18 exposure would result in no adverse effect on the species.

19 The implementation of tidal natural communities restoration or floodplain restoration could result
20 in increased exposure of cormorants, herons or egrets to methylmercury, through the ingestion of
21 fish in tidally restored areas. However, it is unknown what concentrations of methylmercury are
22 harmful to these species. Implementation of CM12 which contains measures to assess the amount of
23 mercury before project development, followed by appropriate design and adaptation management,
24 would minimize the potential for increased methylmercury exposure, and would result in no
25 adverse effect on the species.

26 With AMM1–AMM7, AMM27, and CM12 in place, in addition to the implementation of Mitigation
27 Measure BIO-75 and BIO-117, indirect effects of plan implementation would not result in a
28 substantial adverse effect on cormorants, herons, and egrets through habitat modification or
29 potential mortality. Therefore, the indirect effects of Alternative 4 implementation would have a
30 less-than-significant impact on cormorants, herons, and egrets.

31 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
32 **Disturbance of Nesting Birds**

33 See Mitigation Measure BIO-75 under Impact BIO-75.

34 **Measure BIO-117: Avoid Impacts on Rookeries**

35 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries),
36 therefore all direct and indirect impacts on rookeries must be avoided.

37 **Impact BIO-120: Periodic Effects of Inundation on Cormorants, Herons and Egrets as a Result**
38 **of Implementation of Conservation Components**

39 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
40 duration of inundation of approximately 51–92 acres of modeled breeding habitat for cormorants,
41 herons and egrets. However, increased periodic flooding is not expected to cause any adverse effect

1 on breeding habitat because trees in which nest sites are situated already withstand floods, the
2 increase in inundation frequency and duration is expected to remain within the range of tolerance of
3 riparian trees, and nest sites are located above floodwaters.

4 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
5 inundation of up to 266 acres of breeding habitat for cormorants, herons and egrets. The overall
6 effect of seasonal inundation in existing riparian natural communities is likely to be beneficial for
7 these species, because, historically, flooding was the main natural disturbance regulating ecological
8 processes in riparian areas, and flooding promotes the germination and establishment of many
9 native riparian plants.

10 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
11 sites because trees in which nest sites are situated already withstand floods, the increase in
12 inundation frequency and duration is expected to remain within the range of tolerance of riparian
13 trees, and nest sites are located above floodwaters. Therefore, increased duration and inundation
14 from CM2 and CM5 would not result in an adverse effect on cormorants, herons and egrets.

15 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
16 nest sites because trees in which nest sites are situated already withstand floods, the increase in
17 inundation frequency and duration is expected to remain within the range of tolerance of riparian
18 trees, and nest sites are located above floodwaters. Therefore, increased duration and inundation
19 from CM2 and CM5 would have a less-than-significant impact on cormorants, herons and egrets.

20 **Short-Eared Owl and Northern Harrier**

21 This section describes the effects of Alternative 4, including water conveyance facilities construction
22 and implementation of other conservation components, on short-eared owl and northern harrier.
23 Modeled habitat for short-eared owl and northern harrier include tidal brackish and freshwater
24 emergent wetland, nontidal freshwater perennial emergent wetland, managed wetland, other
25 natural seasonal wetland, grassland, alkali seasonal wetland, vernal pool complex, and selected
26 cultivated lands (grain and hay crops, pasture [including alfalfa], rice, truck, nursery, and berry
27 crops [including tomatoes and melons], beets, and idle lands).

28 Construction and restoration associated with Alternative 4 conservation measures would result in
29 both temporary and permanent losses of modeled habitat for short-eared owl and northern harrier
30 as indicated in Table 12-4-46. Full implementation of Alternative 4 would include the following
31 conservation actions over the term of the BDCP which would also benefit short-eared owl and
32 northern harrier (see Chapter 3, Section 3.3, *Biological Goals and Objectives*, of the BDCP).

- 33 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at
34 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
35 with CM4).
- 36 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,
37 and/or 7 (Objective TFEWNC1.2, associated with CM4).
- 38 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
39 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
40 associated with CM10).

- 1 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
- 2 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
- 3 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 4 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 5 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
- 6 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 7 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
- 8 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 9 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
- 10 VPNC2.5, and GNC2.4, associated with CM11).

11 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 12 management activities that would enhance habitat for these species, AMM1-AMM7, AMM27
 13 *Selenium Management* and Mitigation Measure BIO-75, impacts on short-eared owl and northern
 14 harrier would not be adverse for NEPA purposes and would be less than significant for CEQA
 15 purposes.

16 **Table 12-4-46. Changes in Short-Eared Owl and Northern Harrier Modeled Habitat Associated with**
 17 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting and Foraging	2,231	2,231	724	724	NA	NA
Total Impacts CM1		2,231	2,231	724	724		
CM2-CM18	Nesting and Foraging	12,281	46,700	471	1,224	2,926-8,060	5,978
Total Impacts CM2-CM18		12,281	46,700	471	1,224	2,926-8,060	5,978
TOTAL IMPACTS		14,512	48,931	1,195	1,948	2,926-8,060	5,978

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-121: Loss or Conversion of Habitat for and Direct Mortality of Short-Eared Owl and Northern Harrier

Alternative 4 conservation measures would result in the combined permanent and temporary loss of up to 50,879 acres of modeled habitat for short-eared owl and northern harrier (of which 48,931 acres would be a permanent loss and 1,948 acres would be a temporary loss of habitat, Table 12-4-46). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of reusable tunnel material areas (CM1), Yolo Bypass Fisheries Enhancement (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), grassland restoration (CM8), vernal pool and wetland restoration (CM9), marsh restoration (CM10) and construction of conservation hatcheries (CM18). The majority of habitat loss would result from CM4. Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate short-eared owl and northern harrier modeled habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- *CM1 Water Facilities and Operation:* Construction of Alternative 4 conveyance facilities would result in the combined permanent and temporary loss of up to 2,955 acres of modeled short-eared owl and northern harrier habitat (2,231 acres of permanent loss, 724 acres of temporary loss) from CZs 3–6 and CZ 8. Activities that would impact modeled habitat include tunnel, forebay, and intake construction, permanent and temporary access roads, construction of transmission lines, and temporary work areas. The majority of habitat removed would consist of grassland and alfalfa fields. There are no CNDDB or DHCCP surveys records of occurrences of nesting short-eared owl that overlap with the construction footprint of CM1. However, there are two DHCCP occurrences of northern harrier that overlap with the footprint of a shaft associated with the pumps at Clifton Court Forebay and a permanent transmission line north of the forebay. Two DHCCP occurrences also overlap with the temporary impact footprint from geotechnical explorations. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize impacts on short-eared owl and northern harrier if they were to nest in the vicinity of construction activities. Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4 construction locations. Impacts from CM1 would occur within the first 10-14 years of Plan implementation.
- *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement (CM2) would permanently remove 1,021 acres of modeled short-eared owl and northern harrier habitat in the Yolo Bypass in CZ 2. In addition, 471 acres of habitat would be temporarily removed. The impact would primarily consist of loss of acreages of pastures. The conversion is expected to occur during the first 10 years of Alternative 4 implementation.
- *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and inundation would permanently remove an estimated 39,017 acres of modeled short-eared owl and northern harrier habitat. The majority of the losses would be managed wetlands and cultivated lands in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. Tidal restoration actions through CM4 would restore an estimated 55,000 acres of tidal natural communities. These restored wetland areas could provide suitable nesting habitat for short-eared owl and northern harrier. Consequently, although existing nesting habitat for short-eared owl and northern harrier would be removed, restoration of wetland habitats is expected to benefit marsh associated ground nesting birds by

1 increasing the extent and value of their nesting habitat. Grizzley Island supports the only known
 2 resident population of short-eared owls in the Suisun Marsh and Sacramento-San Joaquin River
 3 Delta (Roberson 2008). Grizzley Island does not overlap with the hypothetical footprint for *CM4*
 4 *Tidal Natural Communities Restoration*. However, this is an important breeding area for short-
 5 eared owl and if restoration footprints were changed during the implementation process of
 6 BDCP to overlap with this area, the effects on breeding short-eared owls could likely be adverse.
 7 Future NEPA and CEQA analysis would be conducted for restoration projects under BDCP and if
 8 restoration was proposed to occur outside of the hypothetical footprints used for this
 9 programmatic analysis, potential impacts on these species would be captured in the project-
 10 level analysis (see BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*).

- 11 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 12 seasonally inundated floodplain would permanently and temporarily remove approximately
 13 2,086 acres of modeled short-eared owl and northern harrier habitat (1,332 permanent, 754
 14 temporary). These losses would be expected to occur along the San Joaquin River and other
 15 major waterways in CZ 7.
- 16 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
 17 approximately 623 acres of short-eared owl and northern harrier habitat as part of tidal
 18 restoration and 2,479 acres of habitat as part of seasonal floodplain restoration.
- 19 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
 20 implemented on agricultural lands and would result in the conversion of 1,066 acres of
 21 cultivated lands to grassland in CZs 1, 2, 4, 5, 7, 8, and 11. The resulting 2,000 acres of grassland
 22 would provide habitat for short-eared owl and northern harrier.
- 23 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
 24 actions included in CM11 that are designed to enhance wildlife values in restored or protected
 25 habitats could result in localized ground disturbances that could temporarily remove small
 26 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
 27 vegetation and road and other infrastructure maintenance activities, would be expected to have
 28 adverse effects on available habitat and would be expected to result in overall improvements to
 29 and maintenance of habitat values over the term of the BDCP. Habitat management- and
 30 enhancement-related activities could short-eared owl and northern harrier nests. If either
 31 species were to nest in the vicinity of a worksite, equipment operation could destroy nests, and
 32 noise and visual disturbances could lead to their abandonment, resulting in mortality of eggs
 33 and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
 34 *Avoid Disturbance of Nesting Birds*, would be available to minimize these adverse effects.
- 35 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of short-
 36 eared owl and northern harrier habitat for the development of a delta and longfin smelt
 37 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan
 38 implementation.
- 39 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
 40 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
 41 disturbances that could affect short-eared owl and northern harrier use of the surrounding
 42 habitat. Maintenance activities would include vegetation management, levee and structure
 43 repair, and re-grading of roads and permanent work areas. These effects, however, would be
 44 reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as described
 45 below.

- Injury and Direct Mortality: Construction-related activities would not be expected to result in direct mortality of adult or fledged short-eared owl and northern harrier if they were present in the Plan Area, because they would be expected to avoid contact with construction and other equipment. If either species were to nest in the construction area, construction-related activities, including equipment operation, noise and visual disturbances could destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be available to minimize these adverse effects.

The following paragraphs summarize the combined effects discussed above and describe other BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also included.

Near-Term Timeframe

Because the water conveyance facilities construction is being evaluated at the project level, the near-term BDCP conservation strategy has been evaluated to determine whether it would provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of construction would not be adverse under NEPA. Alternative 4 would remove 15,707 acres of modeled habitat (14,512 permanent, 1,195 temporary) for short-eared owl and northern harrier in the study area in the near-term. These effects would result from the construction of the water conveyance facilities (CM1, 2,955 acres), and implementing other conservation measures (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7, Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation Hatcheries—12,752 acres).

Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios would indicate that 2,955 acres of habitat should be restored and 2,955 acres should be protected to compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent habitat, and restoring 19,150 acres of tidal wetlands (see Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the construction and early restoration losses. The acres of protection and restoration contained in the near-term Plan goals satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the effects from other near-term restoration actions.

Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects

1 of current levels of habitat fragmentation. Small mammal populations would also be increased on
 2 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
 3 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
 4 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
 5 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
 6 other uncultivated areas would also be protected and maintained as part of the cultivated lands
 7 reserve system which would provide additional foraging habitat and a source of rodent prey that
 8 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
 9 (including upland grassland components) would preserve habitat for short-eared owl and northern
 10 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
 11 objective would focus on highly degraded areas in order to provide the greatest possible level of
 12 enhancement benefit to the managed wetland natural community and associated species. Managed
 13 wetland protection and enhancement would be concentrated in Suisun Marsh, which currently
 14 supports a high concentration of nesting short-eared owls on Grizzley Island.

15 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would
 16 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and
 17 northern harrier nest in tidal brackish and freshwater emergent wetland, nontidal freshwater
 18 perennial emergent wetland, managed wetland, other natural seasonal wetland, grassland, alkali
 19 seasonal wetland, vernal pool complex, and selected cultivated lands, which includes alfalfa,
 20 irrigated pasture, and other grain fields. At least 15,400 acres of cultivated lands that provide
 21 habitat for covered and other native wildlife species would be protected in the near-term time
 22 period (Objective CLNC1.1). A minimum of 87% of cultivated lands protected by the late long-term
 23 time period would be in alfalfa, irrigated pasture, and other hay crops (Objective SH1.2). This
 24 biological objective provides an estimate for the proportion of cultivated lands protected in the
 25 near-term time period which would provide suitable nesting and foraging habitat for short-eared
 26 owl and northern harrier. These biological goals and objectives would inform the near-term
 27 protection and restoration efforts and represent performance standards for considering the
 28 effectiveness of restoration actions.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 33 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 34 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 35 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 36 of the Final EIR/EIS.

37 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP
 38 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would
 39 be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
 40 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
 41 address this adverse effect.

42 **Late Long-Term Timeframe**

43 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting
 44 and foraging habitat for short-eared owl and northern harrier. Alternative 4 as a whole would result

1 in the permanent loss of and temporary effects on 50,879 acres of modeled short-eared owl and
2 northern harrier habitat during the term of the Plan (12% of the modeled habitat in the study area).
3 The locations of these losses are described above in the analyses of individual conservation
4 measures.

5 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
6 *Restoration, CM4 Tidal Natural Communities Restoration, and CM8 Grassland Natural Community*
7 *Restoration*, to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
8 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect
9 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable
10 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (see Table 3-4
11 in Chapter 3, *Description of Alternatives*).

12 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
13 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
14 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
15 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
16 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
17 of current levels of habitat fragmentation. Small mammal populations would also be increased on
18 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
19 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
20 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
21 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
22 other uncultivated areas would also be protected and maintained as part of the cultivated lands
23 reserve system which would provide additional foraging habitat and a source of rodent prey that
24 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
25 (including upland grassland components) would preserve habitat for short-eared owl and northern
26 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
27 objective would focus on highly degraded areas in order to provide the greatest possible level of
28 enhancement benefit to the managed wetland natural community and associated species. Managed
29 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
30 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the
31 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time
32 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands
33 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared
34 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated
35 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected
36 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated
37 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
39 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
40 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
41 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
42 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
43 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
44 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
45 of the Final EIR/EIS. Short-eared owl and northern harrier are not species that are covered under
46 the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for

1 noncovered avian species would be required to ensure that active nests are detected and avoided.
2 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
3 *Nesting Birds*, would be available to address this effect.

4 **NEPA Effects:** The loss of short-eared owl and northern harrier habitat and potential direct
5 mortality of these special-status species under Alternative 4 would represent an adverse effect in
6 the absence of other conservation actions. However, with habitat protection and restoration
7 associated with CM3, CM8, and CM11, guided by biological goals and objectives and by AMM1–
8 AMM7, which would be in place during all project activities, the effects of habitat loss from
9 Alternative 4 would not be adverse. Short-eared owl and northern harrier are not covered species
10 under the BDCP, and preconstruction surveys for noncovered avian species would be required to
11 ensure that nests are detected and avoided. Mitigation Measure BIO-75 would be available to
12 address the adverse effect of direct mortality on short-eared owl and northern harrier.

13 **CEQA Conclusion:**

14 **Near-Term Timeframe**

15 Because the water conveyance facilities construction is being evaluated at the project level, the near-
16 term BDCP conservation strategy has been evaluated to determine whether it would provide
17 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
18 construction would be less than significant under CEQA. Alternative 4 would remove 15,707 acres of
19 modeled habitat (14,512 permanent, 1,195 temporary) for short-eared owl and northern harrier in
20 the study area in the near-term. These effects would result from the construction of the water
21 conveyance facilities (CM1, 2,955 acres), and implementing other conservation measures (*CM2 Yolo*
22 *Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally*
23 *Inundated Floodplain Restoration, CM7, Riparian Natural Community Restoration, CM8 Grassland*
24 *Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation*
25 *Hatcheries—12,752 acres).*

26 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
27 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios
28 would indicate that 2,955 acres of habitat should be restored and 2,955 acres should be protected to
29 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term
30 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore
31 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern
32 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
33 protection).

34 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
35 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
36 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
37 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
38 habitat, and restoring 19,150 acres of tidal wetlands (see Table 3-4 in Chapter 3, *Description of*
39 *Alternatives*). These conservation actions are associated with CM3, CM4, and CM8 and would occur
40 in the same timeframe as the construction and early restoration losses. The acres of protection and
41 restoration contained in the near-term Plan goals satisfy the typical mitigation ratios that would be
42 applied to the project-level effects of CM1 and the effects from other near-term restoration actions.

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
2 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
3 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
4 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
5 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
6 of current levels of habitat fragmentation. Small mammal populations would also be increased on
7 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
8 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
9 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
10 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
11 other uncultivated areas would also be protected and maintained as part of the cultivated lands
12 reserve system which would provide additional foraging habitat and a source of rodent prey that
13 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
14 (including upland grassland components) would preserve habitat for short-eared owl and northern
15 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
16 objective would focus on highly degraded areas in order to provide the greatest possible level of
17 enhancement benefit to the managed wetland natural community and associated species. Managed
18 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
19 high concentration of nesting short-eared owls on Grizzley Island.

20 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would
21 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and
22 northern harrier nest in tidal brackish and freshwater emergent wetland, nontidal freshwater
23 perennial emergent wetland, managed wetland, other natural seasonal wetland, grassland, alkali
24 seasonal wetland, vernal pool complex, and selected cultivated lands, which includes alfalfa,
25 irrigated pasture, and other grain fields. At least 15,400 acres of cultivated lands that provide
26 habitat for covered and other native wildlife species would be protected in the near-term time
27 period (Objective CLNC1.1). A minimum of 87% of cultivated lands protected by the late long-term
28 time period would be in alfalfa, irrigated pasture, and other hay crops (Objective SH1.2). This
29 biological objective provides an estimate for the proportion of cultivated lands protected in the
30 near-term time period which would provide suitable nesting and foraging habitat for short-eared
31 owl and northern harrier. These biological goals and objectives would inform the near-term
32 protection and restoration efforts and represent performance standards for considering the
33 effectiveness of restoration actions.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
38 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
39 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
40 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
41 of the Final EIR/EIS.

42 The short-eared owl and the northern harrier are not covered species under the BDCP. In order for
43 the BDCP to avoid adverse effects on individuals, preconstruction surveys for noncovered avian
44 species would be required to ensure that nests are detected and avoided.

1 In the absence of other conservation actions, effects on short-eared owl and northern harrier would
2 represent an adverse effect as a result of habitat modification and potential for direct mortality of
3 special-status species. This impact would be significant. However, the BDCP has committed to
4 habitat protection, restoration, management and enhancement activities described above. As
5 outlined in BDCP Chapter 3, Section 3.4, *Conservation Measures*, natural community restoration and
6 protection are planned so that they keep pace with project impacts. Thus, there would be minimal
7 lag time between impacts and implementation of those measures designed to offset those impacts
8 on natural communities and the species that use them. In addition, implementation of AMM1-AMM7
9 and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
10 *of Nesting Birds*, would reduce this potential impact to a less-than-significant level.

11 **Late Long-Term Timeframe**

12 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting
13 and foraging habitat for short-eared owl and northern harrier. Alternative 4 as a whole would result
14 in the permanent loss of and temporary effects on 50,879 acres of modeled short-eared owl and
15 northern harrier habitat during the term of the Plan (12% of the modeled habitat in the study area).
16 The locations of these losses are described above in the analyses of individual conservation
17 measures.

18 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
19 *Restoration*, *CM4 Tidal Natural Communities Restoration*, and *CM8 Grassland Natural Community*
20 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
21 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect
22 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable
23 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (see Table 3-4
24 in Chapter 3, *Description of Alternatives*).

25 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
26 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
27 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
28 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
29 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
30 of current levels of habitat fragmentation. Small mammal populations would also be increased on
31 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
32 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
33 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
34 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
35 other uncultivated areas would also be protected and maintained as part of the cultivated lands
36 reserve system which would provide additional foraging habitat and a source of rodent prey that
37 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
38 (including upland grassland components) would preserve habitat for short-eared owl and northern
39 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
40 objective would focus on highly degraded areas in order to provide the greatest possible level of
41 enhancement benefit to the managed wetland natural community and associated species. Managed
42 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
43 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the
44 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time
45 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands

1 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared
2 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated
3 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected
4 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated
5 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
10 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
11 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
12 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
13 of the Final EIR/EIS. Short-eared owl and northern harrier are not species that are covered under
14 the BDCP. For the BDCP to have a less-than-significant impact on individuals, preconstruction
15 surveys for noncovered avian species would be required to ensure that active nests are detected and
16 avoided. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
17 *Surveys and Avoid Disturbance of Nesting Birds*, would be reduce the impact to a less-than-significant
18 level.

19 In the absence of other conservation actions, effects on short-eared owl and northern harrier would
20 represent an adverse effect as a result of habitat modification and potential for direct mortality of
21 special-status species. This impact would be considered significant. Considering Alternative 4's
22 protection and restoration provisions, which would provide acreages of new high-value or enhanced
23 habitat in amounts suitable to compensate for habitats lost to construction and restoration
24 activities, and with the implementation of AMM1–AMM7 and Mitigation Measure BIO-75, the loss of
25 habitat or direct mortality through implementation of Alternative 4 would not result in a substantial
26 adverse effect through habitat modifications and would not substantially reduce the number or
27 restrict the range of either species. Therefore, the loss of habitat or potential mortality under this
28 alternative would have a less-than-significant impact on short-eared owl and northern harrier.

29 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
30 **Disturbance of Nesting Birds**

31 See Mitigation Measure BIO-75 under Impact BIO-75.

32 **Impact BIO-122: Effects on Short-Eared Owl and Northern Harrier Associated with Electrical**
33 **Transmission Facilities**

34 New transmission lines would increase the risk that short-eared owl and northern harrier could be
35 subject to power line strikes, which could result in injury or mortality of these species. Short-eared
36 owl and northern harrier would be at low risk of bird strike mortality based on their keen eyesight
37 and largely ground-based foraging behavior (BDCP Appendix 5.J, Attachment 5.J-2, *Memorandum:*
38 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). The existing network of
39 transmission lines in the project area currently poses the same small risk for these species, and any
40 incremental risk associated with the new power line corridors would also be expected to be low.
41 Marking transmission lines with flight diverters that make the lines more visible to birds has been
42 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated
43 that marking devices in the Central Valley could reduce avian mortality by 60%. With the

1 implementation of *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted
2 with flight diverters, which would further reduce any bird strike risk of short-eared owl and
3 northern harrier.

4 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
5 adverse effect on short-eared owl or northern harrier because the risk of bird strike is considered to
6 be low for both species based on their keen eyesight and behavioral characteristics. New
7 transmission lines would minimally increase the risk for short-eared owl and northern harrier
8 power line strikes. All new transmission lines constructed as a result of the project would be fitted
9 with bird diverters (*AMM20 Greater Sandhill Crane*), which have been shown to reduce avian
10 mortality by 60% and which would further reduce any potential for powerline collisions. Therefore,
11 the construction and operation of transmission lines under Alternative 4 would not result in an
12 adverse effect on short-eared owl or northern harrier.

13 **CEQA Conclusion:** The construction and presence of new transmission lines would not result in a
14 significant impact on short-eared owl or northern harrier because the risk of bird strike is
15 considered to be low for both species based on their keen eyesight and behavioral characteristics.
16 New transmission lines would minimally increase the risk for short-eared owl and northern harrier
17 power line strikes. All new transmission lines constructed as a result of the project would be fitted
18 with bird diverters (*AMM20 Greater Sandhill Crane*), which have been shown to reduce avian
19 mortality by 60% and which would further reduce any potential for powerline collisions. Therefore,
20 the construction and operation of transmission lines under Alternative 4 would result in a less-than-
21 significant impact on short-eared owl or northern harrier.

22 **Impact BIO-123: Indirect Effects of Plan Implementation on Short-Eared Owl and Northern** 23 **Harrier**

24 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
25 with construction-related activities could result in temporary disturbances that affect short-eared
26 owl and northern harrier use of modeled habitat. Construction noise above background noise levels
27 (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP
28 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*
29 *Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP Revisions*, of the Final EIR/EIS),
30 although there are no available data to determine the extent to which these noise levels could affect
31 short-eared owl or northern harrier. Indirect effects associated with construction include noise,
32 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
33 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
34 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
35 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
36 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use
37 of mechanical equipment during water conveyance construction could cause the accidental release
38 of petroleum or other contaminants that could affect these species or their prey in the surrounding
39 habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
40 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment
41 or excessive dust adjacent to short-eared owl and northern harrier could also have a negative effect
42 on these species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the
43 construction area and the negative effects of dust on wildlife adjacent to work areas.

1 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
2 mercury in avian species, including short-eared owl and northern harrier. Marsh (tidal and nontidal)
3 and floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
4 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
5 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
6 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
7 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity
8 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-
9 specific effects. Increased methylmercury associated with natural community and floodplain
10 restoration could indirectly affect short-eared owl and northern harrier, via uptake in lower trophic
11 levels (as described in the BDCP Appendix 5.D, *Contaminants*).

12 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
13 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
14 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
15 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
16 adaptive management as described in CM12 would be available to address the uncertainty of
17 methylmercury levels in restored tidal marsh and potential impacts on short-eared owl and
18 northern harrier.

19 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
20 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
21 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
22 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
23 2009). The effect of selenium toxicity differs widely between species and also between age and sex
24 classes within a species. In addition, the effect of selenium on a species can be confounded by
25 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
26 2009).

27 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
28 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
29 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
30 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
31 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
32 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
33 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
34 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
35 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
36 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
37 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
38 levels of selenium have a higher risk of selenium toxicity.

39 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
40 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
41 exacerbate bioaccumulation of selenium in avian species, including short-eared owl and northern
42 harrier. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
43 selenium, and therefore increase avian exposure from ingestion of prey items with elevated
44 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase
45 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).

1 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was
2 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
3 in substantial, long-term increases in selenium concentrations in water in the Delta under any
4 alternative. However, it is difficult to determine whether the effects of potential increases in
5 selenium bioavailability associated with restoration-related conservation measures (CM4, CM5)
6 would lead to adverse effects on short-eared owl and northern harrier.

7 Because of the uncertainty that exists at this programmatic level of review, there could be a
8 substantial effect on short-eared owl and northern harrier from increases in selenium associated
9 with restoration activities. This effect would be addressed through the implementation of *AMM27*
10 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
11 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
12 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
13 selenium management to reduce selenium concentrations and/or bioaccumulation would be
14 evaluated separately for each restoration effort as part of design and implementation. This
15 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
16 design schedule.

17 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
18 could reduce short-eared owl and northern harrier use of modeled habitat adjacent to work areas.
19 Moreover, operation and maintenance of the water conveyance facilities, including the transmission
20 facilities, could result in ongoing but periodic postconstruction disturbances that could affect short-
21 eared owl and northern harrier use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*
22 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
23 address adverse effects on nesting individuals in addition to AMM1–AMM7. Tidal habitat restoration
24 could result in increased exposure of short-eared owl and northern harrier to selenium. This effect
25 would be addressed through the implementation of *AMM27 Selenium Management*, which would
26 provide specific tidal habitat restoration design elements to reduce the potential for
27 bioaccumulation of selenium and its bioavailability in tidal habitats.

28 Tidal habitat restoration is unlikely to have an adverse effect on short-eared owl and northern
29 harrier through increased exposure to methylmercury, as these species currently nest and forage in
30 tidal marshes where elevated methylmercury levels exist. However, it is unknown what
31 concentrations of methylmercury are harmful to the species and the potential for increased
32 exposure varies substantially within the study area. Site-specific restoration plans in addition to
33 monitoring and adaptive management, described in CM12 *Methylmercury Management*, would
34 address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning
35 phase of marsh restoration would be the appropriate place to assess the potential for risk of
36 methylmercury exposure for short-eared owl and northern harrier, once site specific sampling and
37 other information could be developed.

38 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
39 operations and maintenance of the water conveyance facilities would have a less-than-significant
40 impact on short-eared owl and northern harrier with the implementation of Mitigation Measure
41 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and
42 AMM1–AMM7. Tidal habitat restoration is unlikely to have a significant impact on short-eared owl
43 and northern harrier through increased exposure to methylmercury, as these species currently nest
44 and forage in tidal marshes where elevated methylmercury levels exist. However, it is unknown
45 what concentrations of methylmercury are harmful to these species. Site-specific restoration plans

1 that address the creation and mobilization of mercury, as well as monitoring and adaptive
2 management as described in CM12 would better inform potential impacts and address the
3 uncertainty of methylmercury levels in restored tidal marsh in the study area. Tidal habitat
4 restoration could result in increased exposure of short-eared owl and northern harrier to selenium.
5 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
6 would provide specific tidal habitat restoration design elements to reduce the potential for
7 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of
8 Alternative 4 implementation would result in a less-than-significant impact on short-eared
9 owl and northern harrier.

10 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
11 **Disturbance of Nesting Birds**

12 See Mitigation Measure BIO-75 under Impact BIO-75.

13 **Impact BIO-124: Periodic Effects of Inundation on Short-Eared Owl and Northern Harrier as a**
14 **Result of Implementation of Conservation Components**

15 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
16 *Enhancement*) would increase the frequency and duration of inundation on approximately 2,926–
17 8,060 acres of modeled short-eared owl and northern harrier habitat (Table 12-4-46).

18 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
19 *Restoration* could result in the periodic inundation of up to approximately 5,978 acres of modeled
20 habitat (Table 12-4-46), the majority of which would be pasture and other cultivated lands.

21 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
22 season due to periodic inundation. However, inundation would occur during the nonbreeding
23 season and would not be expected to have an adverse effect on either species.

24 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on short-
25 eared owl and northern harrier because inundation is expected to occur prior to the breeding
26 season.

27 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on short-
28 eared owl and northern harrier because inundation is expected to occur prior to the breeding
29 season.

30 **Redhead and Tule Greater White-Fronted Goose**

31 Impacts, relevant protection and restoration actions, and mitigation requirements under CEQA are
32 discussed for these species in the *General Terrestrial Biology Effects* section under Impacts BIO-178
33 through BIO-183. Further details of the methods of analysis for waterfowl and shorebirds can be
34 found in the *BDCP Waterfowl and Shorebird Effects Analysis* (Ducks Unlimited 2013).

35 **Mountain Plover**

36 This section describes the effects of Alternative 4, including water conveyance facilities construction
37 and implementation of other conservation components, on mountain plover. Modeled habitat for
38 mountain plover include grassland, alkali seasonal wetland, vernal pool complex, alfalfa, grain and
39 hay, pasture, and idle cropland throughout the study area.

1 Construction and restoration associated with Alternative 4 conservation measures would result in
2 both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table
3 12-4-47. Full implementation of Alternative 4 would include the following biological objectives over
4 the term of the BDCP which would also benefit the mountain plover (see Chapter 3, Section 3.3,
5 *Biological Goals and Objectives*, of the BDCP).

- 6 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
7 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
8 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 9 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 10 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
11 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 12 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
13 VPNC2.5, GNC2.4, associated with CM11).
- 14 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
15 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 16 • Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
17 cultivated lands as Swainson’s hawk foraging habitat with at least 50% in very high-value
18 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

19 As explained below, with the restoration or protection of these amounts of habitat, in addition to
20 management activities that would enhance these natural communities for the species, impacts on
21 mountain plover would not be adverse for NEPA purposes and would be less than significant for
22 CEQA purposes.

23 **Table 12-4-47. Changes in Mountain Plover Modeled Habitat Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Wintering	1,978	1,978	537	537	NA	NA
Total Impacts CM1		1,978	1,978	537	537		
CM2–CM18	Wintering	5,450	26,198	376	893	1,158–3,650	3,823
Total Impacts CM2–CM18		5,450	26,198	376	893	1,158–3,650	3,823
TOTAL IMPACTS		7,428	28,176	913	1,430	1,158–3,650	3,823

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-125: Loss or Conversion of Habitat for and Direct Mortality of Mountain Plover**

2 Alternative 4 conservation measures would result in the combined permanent and temporary loss
 3 of up to 29,606 acres of modeled wintering habitat for mountain plover (28,176 acres of permanent
 4 loss and 1,430 of temporary loss, Table 12-4-47). Conservation measures that would result in these
 5 losses are conveyance facilities and transmission line construction, and establishment and use of
 6 reusable tunnel material areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat
 7 restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration
 8 (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and
 9 construction of conservation hatcheries (CM18). The majority of habitat loss (20,880 acres) would
 10 result from CM4. Habitat enhancement and management activities (CM11), which include ground
 11 disturbance or removal of nonnative vegetation, and the construction of recreational trails, signs,
 12 and facilities, could result in local adverse habitat effects. In addition, maintenance activities
 13 associated with the long-term operation of the water conveyance facilities and other BDCP physical
 14 facilities could degrade or eliminate mountain plover modeled wintering habitat. Each of these
 15 individual activities is described below. A summary statement of the combined impacts and NEPA
 16 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 17 • *CM1 Water Facilities and Operation:* Construction of Alternative 4 conveyance facilities would
 18 result in the combined permanent and temporary loss of up to 2,515 acres of modeled mountain
 19 plover habitat (1,978 acres of permanent loss, 537 acres of temporary loss). Impacts would
 20 occur from the construction of Intakes 2, 3, and 5 and associated temporary work areas and
 21 access roads in CZ 4 between Clarksburg and Courtland; t construction of the intermediate
 22 forebay; and from a reusable tunnel material storage area on Bouldin Island. The construction of
 23 the permanent and temporary transmission line corridors through CZs 4-6 and 9 would also
 24 remove suitable habitat for the species. Approximately 867 acres of impact would be from the
 25 placement of reusable tunnel material area west of the Clifton Court Forebay in CZ 8. In addition,
 26 permanent habitat loss would occur from the construction of the new forebay south of the
 27 existing Clifton court Forebay in CZ 8. There are no CNDDDB occurrences of mountain plover that
 28 intersect with the CM1 footprint. However, the study area does overlap with the wintering range
 29 for the species. Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4
 30 construction locations. Impacts from CM1 would occur within the first 10-14years of Plan
 31 implementation.
- 32 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
 33 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
 34 mountain plover wintering habitat (898 acres of permanent loss, 376 acres of temporary loss) in
 35 the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of grassland and pasture.
 36 Most of the grassland losses would occur at the north end of the bypass below Fremont Weir,
 37 along the Toe Drain/Tule Canal, and along the west side channels. Realignment of Putah Creek
 38 could also involve excavation and grading in alkali seasonal wetland complex habitat as a new
 39 channel is constructed. The loss is expected to occur during the first 10 years of Alternative 4
 40 implementation.
- 41 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and
 42 inundation would permanently remove an estimated 20,880 acres of modeled mountain plover
 43 habitat. The majority of the acres lost would consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or
 44 7. Grassland losses would likely occur in the vicinity of Cache Slough, on Decker Island in the
 45 West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow bands adjacent to
 46 waterways in the South Delta ROA. Tidal restoration would directly impact and fragment

1 grassland just north of Rio Vista in and around French and Prospect Islands, and in an area
2 south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex habitat
3 would likely occur in the south end of the Yolo Bypass and on the northern fringes of Suisun
4 Marsh.

- 5 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
6 seasonally inundated floodplain would permanently and temporarily remove approximately
7 1,450 acres of modeled mountain plover habitat (933 permanent, 517 temporary). These losses
8 would be expected after the first 10 years of Alternative 4 implementation along the San Joaquin
9 River and other major waterways in CZ 7.
- 10 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
11 approximately 370 acres of mountain plover wintering habitat as part of tidal restoration and
12 1,489 acres of habitat as part of seasonal floodplain restoration.
- 13 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
14 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
15 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
16 would be restored after the construction periods. Grassland restoration would be implemented
17 on agricultural lands that also provide wintering habitat for mountain plover and would result
18 in the conversion of 837 acres of cultivated lands to grassland.
- 19 ● *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
20 removal of 705 acres of mountain plover habitat.
- 21 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
22 actions included in CM11 that are designed to enhance wildlife values in restored or protected
23 habitats could result in localized ground disturbances that could temporarily remove small
24 amounts of mountain plover habitat. Ground-disturbing activities, such as removal of nonnative
25 vegetation and road and other infrastructure maintenance activities, would be expected to have
26 minor adverse effects on available mountain plover habitat. Management of grasslands and
27 cultivated lands for mountain plover such as grazing or mowing would make habitat
28 temporarily unavailable for the species but would ultimately make the habitat more suitable for
29 mountain plover. CM11 would also include the construction of recreational-related facilities
30 including trails, interpretive signs, and picnic tables (see Chapter 4, *Covered Activities and*
31 *Associated Federal Actions*, of the BDCP). The construction of trailhead facilities, signs, staging
32 areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when and
33 where possible. However, approximately 50 acres of grassland habitat would be lost from the
34 construction of trails and facilities.
- 35 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
36 modeled mountain plover habitat for the development of a delta and longfin smelt conservation
37 hatchery in CZ 1.
- 38 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
39 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
40 disturbances that could affect mountain plover use of the surrounding habitat. Maintenance
41 activities would include vegetation management, levee and structure repair, and re-grading of
42 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7
43 and conservation actions as described below.

- Injury and Direct Mortality: Construction would not be expected to result in direct mortality of mountain plover because foraging individuals would be expected to temporarily avoid the increased noise and activity associated with construction areas.

The following paragraphs summarize the combined effects discussed above and describe other BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also included.

Near-Term Timeframe

Because the water conveyance facilities construction (CM1) is being evaluated at the project level, the near-term BDCP conservation strategy has been evaluated to determine whether it would provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of construction would not be adverse under NEPA. Alternative 4 would remove 8,341 acres (7,428 permanent, 913 temporary) of modeled mountain plover wintering habitat in the study area in the near-term. These effects would result from the construction of the water conveyance facilities (CM1, 2,515 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and Management and CM18 Conservation Hatcheries*—5,826 acres).

The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected would be 2:1 for protection of habitat. Using this ratio would indicate that 5,030 acres should be protected to compensate for the CM1 losses of 2,515 acres of mountain plover wintering habitat. The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of mountain plover habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (see Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8, and CM9 and would occur in the same timeframe as the construction and early restoration losses thereby avoiding adverse effects of habitat loss on mountain plover wintering in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would expand mountain plover wintering habitat and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey populations would be increased on protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would provide approximately 15,400 acres of potential wintering habitat for mountain plover (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time period would be in alfalfa and pasture crop types (very high- and high-value crop types) for Swainson's hawk (Objective SH1.2) which are also modeled habitat for wintering mountain plover. This biological objective provides an estimate for the high

1 proportion of cultivated lands protected in the near-term time period which would be suitable for
2 mountain plover.

3 The acres of restoration and protection contained in the near-term Plan goals and the additional
4 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
5 level effects of CM1 on mountain plover, as well as mitigate the near-term effects of the other
6 conservation measures with the consideration that some portion of the 15,400 acres of cultivated
7 lands protected in the near-term timeframe would be managed in suitable crop types to compensate
8 for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-125, *Compensate for the Near-Term*
9 *Loss of Mountain Plover Wintering Habitat*, would be available to address the adverse effect of
10 habitat loss in the near-term.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
15 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
16 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
17 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
18 of the Final EIR/EIS.

19 ***Late Long-Term Timeframe***

20 Based on the habitat model, the study area supports approximately 269,411 acres of potential
21 habitat for mountain plover. Alternative 4 as a whole would result in the permanent loss of and
22 temporary effects on 29,606 acres of modeled mountain plover wintering habitat during the term of
23 the Plan. The locations of these losses are described above in the analyses of individual conservation
24 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
25 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
26 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
27 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
28 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
29 for native wildlife species (see Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland
30 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and
31 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali
32 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
33 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
34 expand habitat for mountain plover and reduce the effects of current levels of habitat fragmentation.
35 Under *CM11 Natural Communities Enhancement and Management*, insect prey populations would be
36 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
37 ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other
38 native wildlife species would provide approximately 15,400 acres of potential wintering habitat for
39 mountain plover (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected
40 would be in alfalfa and pasture crop types (very high- and high-value crop types) for Swainson's
41 hawk (Objective SH1.2) which would also provide potential wintering habitat for mountain plover.
42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
45 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of

1 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
2 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
3 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
4 of the Final EIR/EIS.

5 **NEPA Effects:** The loss of mountain plover habitat and potential mortality of this special-status
6 species under Alternative 4 would represent an adverse effect in the absence of other conservation
7 actions. However, with habitat protection and restoration associated with CM3, CM8, CM9, and
8 CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in place
9 during all project activities, and with implementation of Mitigation Measure BIO-125, *Compensate*
10 *for the Near-Term Loss of Mountain Plover Wintering Habitat*, the effects of habitat loss and potential
11 direct mortality on mountain plover under Alternative 4 would not be adverse.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
15 the near-term BDCP conservation strategy has been evaluated to determine whether it would
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
17 effects of construction would be less than significant under CEQA. Alternative 4 would remove 8,341
18 acres (7,428 permanent, 913 temporary) of modeled wintering habitat for mountain plover in the
19 study area in the near-term. These effects would result from the construction of the water
20 conveyance facilities (CM1, 2,515 acres), and implementing other conservation measures (*CM2 Yolo*
21 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*
22 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*
23 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*
24 and *CM18 Conservation Hatcheries*—5,826 acres).

25 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
26 would be 2:1 for protection of habitat. Using this ratio would indicate that 5,030 acres should be
27 protected to mitigate the CM1 losses of 2,515 acres of mountain plover habitat. The near-term
28 effects of other conservation actions would remove 5,826 acres of modeled habitat, and therefore
29 require 11,652 acres of protection of mountain plover wintering habitat using the same typical
30 NEPA and CEQA ratio (2:1 for protection).

31 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
32 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
33 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (see Table
34 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3,
35 CM8, and CM9 and would occur in the same timeframe as the construction and early restoration
36 losses thereby avoiding significant impacts of habitat loss on mountain plover. Grassland restoration
37 and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland
38 protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland
39 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
40 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand
41 wintering habitat for mountain plover and reduce the effects of current levels of habitat
42 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
43 populations would be increased on protected lands, enhancing the foraging value of these natural
44 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat

1 for covered and other native wildlife species would provide approximately 15,400 acres of potential
 2 wintering habitat for mountain plover (Objective CLNC1.1). Approximately 87% of cultivated lands
 3 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-
 4 and high-value crop types) for Swainson’s hawk (Objective SH1.2) which would also provide
 5 potential habitat for mountain plover wintering in the study area. This biological objective provides
 6 an estimate for the high proportion of cultivated lands protected in the near-term time period which
 7 would provide habitat for mountain plover.

8 These Plan objectives represent performance standards for considering the effectiveness of
 9 conservation actions. The acres of restoration and protection contained in the near-term Plan goals
 10 and the additional detail in the biological objectives satisfy the typical mitigation that would be
 11 applied to the project-level effects of CM1 on mountain plover, as well as mitigate the near-term
 12 effects of the other conservation measures with the consideration that some portion of the 15,400
 13 acres of cultivated lands protected in the near-term timeframe would be managed in suitable crop
 14 types to compensate for the loss of habitat at a ratio of 2:1.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 19 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 20 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 21 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 22 of the Final EIR/EIS.

23 In the absence of other conservation actions, effects on mountain plover would represent an adverse
 24 effect as a result of habitat modification and potential for direct mortality of special-status species.
 25 This impact would be significant. However, the BDCP has committed to habitat protection,
 26 restoration, management and enhancement activities described above. As outlined in BDCP Chapter
 27 3, Section 3.4, *Conservation Measures*, natural community restoration and protection are planned so
 28 that they keep pace with project impacts and thus there would be minimal lag time between impacts
 29 and those measures designed to offset those impacts to natural communities and the species that
 30 use them. In addition, implementation of *AMM1-AMM7*, *AMM18 Swainson’s Hawk*, and Mitigation
 31 Measure BIO-125, *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat* would
 32 reduce this potential impact in the near-term to a less-than-significant level.

33 ***Late Long-Term Timeframe***

34 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,606
 35 acres of mountain plover habitat during the term of the Plan (11% of the total habitat in the study
 36 area). The locations of these losses are described above in the analyses of individual conservation
 37 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
 38 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
 39 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
 40 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
 41 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
 42 for native wildlife species (see Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland
 43 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and
 44 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali

1 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
2 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
3 expand wintering habitat for mountain plover and reduce the effects of current levels of habitat
4 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
5 populations would be increased on protected lands, enhancing the foraging value of these natural
6 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat
7 for covered and other native wildlife species would provide approximately 15,400 acres of potential
8 habitat for mountain plover (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands
9 protected would be in alfalfa and pasture crop types (very high- and high-value crop types) for
10 Swainson's hawk (Objective SH1.2) which would also provide habitat for mountain plover.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
15 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
16 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
17 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
18 of the Final EIR/EIS.

19 In the absence of other conservation actions, effects on mountain plover would represent an adverse
20 effect as a result of habitat modification and potential for direct mortality of special-status species.
21 This impact would be considered significant. Considering Alternative 4's protection and restoration
22 provisions, which would provide acreages of new or enhanced habitat in amounts suitable to
23 compensate for habitats lost to construction and restoration activities, and with the implementation
24 of AMM1-AMM7, and Mitigation Measure BIO-125, *Compensate for the Near-Term Loss of Mountain*
25 *Plover Wintering Habitat*, the loss of habitat or direct mortality through implementation of
26 Alternative 4 would not result in a substantial adverse effect through habitat modifications and
27 would not substantially reduce the number or restrict the range of mountain plover. Therefore, the
28 loss of habitat or potential mortality under this alternative would have a less-than-significant impact
29 on mountain plover.

30 **Mitigation Measure BIO-125: Compensate for the Near-term Loss of Mountain Plover** 31 **Wintering Habitat**

32 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
33 crops, or alfalfa to provide habitat for mountain plover such that the total acres of high-value
34 habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1. Additional grassland
35 protection, enhancement, and management may be substituted for the protection of high-value
36 cultivated lands.

37 **Impact BIO-126: Effects on Mountain Plover Associated with Electrical Transmission** 38 **Facilities**

39 Mountain plovers congregate in flocks during the winter and travel between grasslands and
40 cultivated lands that provide foraging habitat for the species. This flocking behavior puts them at
41 risk of collisions with powerlines. However, plovers exhibit low wing loading and high aspect-ratio
42 wings and as a result can maneuver relatively quickly around an obstacle such as a transmission
43 line. Their wing structure and design allows for rapid flight and quick, evasive actions. Marking

1 transmission lines with flight diverters that make the lines more visible to birds has been shown to
2 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
3 marking devices in the Central Valley could reduce avian mortality by 60%. Plovers are primarily
4 visual foragers and therefore, the risk for collision would be further reduced by *AMM20 Greater*
5 *Sandhill Crane*, which would require the installation of bird flight diverters on all new transmission
6 lines in the study area.

7 **NEPA Effects:** New transmission lines are not expected to have an adverse effect on mountain plover
8 because the probability of bird-powerline strikes is highly unlikely due to their flight behaviors. The
9 implementation of *AMM20 Greater Sandhill Crane* would require the installation of bird flight
10 diverters on all new transmission lines, which would further reduce any potential for mortality.
11 Therefore, the construction and operation of new transmission lines under Alternative 4 would not
12 result in an adverse effect on mountain plover.

13 **CEQA Conclusion:** New transmission lines would have a less-than-significant impact on mountain
14 plover because the probability of bird-powerline strikes is highly unlikely because of plover flight
15 behaviors. The implementation of *AMM20 Greater Sandhill Crane* would require the installation of
16 bird flight diverters on all new transmission lines, which would further reduce any potential for
17 mortality. Therefore, the construction and operation of new transmission lines under Alternative
18 4 would result in a less-than-significant impact on mountain plover.

19 **Impact BIO-127: Indirect Effects of Plan Implementation on Mountain Plover**

20 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt
21 foraging, and reduce the functions of suitable foraging habitat for mountain plover. Construction
22 noise above background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the
23 edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*
24 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and Appendix 11F,
25 *Substantive BDCP Revisions*, of the Final EIR/EIS), although there are no available data to determine
26 the extent to which these noise levels could affect mountain plover. Indirect effects associated with
27 construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and
28 other ground-disturbing operations. The use of mechanical equipment during water conveyance
29 facilities construction could cause the accidental release of petroleum or other contaminants that
30 could affect these species or their prey in the surrounding habitat. AMM1–AMM7 would minimize
31 the likelihood of such spills from occurring. The inadvertent discharge of sediment or excessive dust
32 adjacent to mountain plover wintering habitat could also have a negative effect on the species.
33 However, AMM1–AMM7 would also ensure that measures would be in place to prevent runoff from
34 the construction area and the negative effects of dust on wildlife adjacent to work areas.

35 **NEPA Effects:** Indirect effects on mountain plover as a result of Plan implementation could have
36 adverse effects on the species through the modification of habitat. With the With the
37 implementation of AMM1–AMM7, indirect effects as a result of Alternative 4 implementation would
38 not have an adverse effect mountain plover.

39 **CEQA Conclusion:** Indirect effects on mountain plover as a result of Plan implementation could have
40 a significant impact on the species from modification of habitat. With the implementation of AMM1–
41 AMM7, indirect effects as a result of Alternative 4 implementation would have a less-than-significant
42 impact on mountain plover.

1 **Impact BIO-128: Periodic Effects of Inundation on Mountain Plover as a Result of**
2 **Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
4 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–
5 3,650 acres of modeled mountain plover wintering habitat (Table 12-4-47). Based on hypothetical
6 footprints, implementation of *CM5 Seasonally Inundated Floodplain Restoration* could result in the
7 periodic inundation of up to approximately 3,823 acres of modeled mountain plover habitat (Table
8 12-4-47).

9 **NEPA Effects:** Implementation of CM2 and CM5 would periodically inundate suitable mountain
10 plover foraging habitat. However, effects of periodic inundation would not have an adverse effect on
11 mountain plover because birds would be expected to move to adjacent foraging habitat.

12 **CEQA Conclusion:** Implementation of CM2 and CM5 would periodically inundate suitable mountain
13 plover foraging habitat. However, effects of periodic inundation would have a less-than-significant
14 impact on mountain plover because birds would be expected to move to adjacent foraging habitat.

15 **Black Tern**

16 This section describes the effects of Alternative 4, including water conveyance facilities construction
17 and implementation of other conservation components, on black tern. Modeled nesting habitat for
18 black tern in the study area is currently limited to freshwater wetland and rice in CZ 2.

19 Construction and restoration associated with Alternative 4 conservation measures would result in
20 both temporary and permanent losses of modeled habitat for black tern as indicated in Table 12-4-
21 48. Full implementation of Alternative 4 would include the following biological objectives over the
22 term of the BDCP which would also benefit the black tern (see Chapter 3, Section 3.3, *Biological*
23 *Goals and Objectives*, of the BDCP).

- 24 ● Protect 700 acres of cultivated lands, with at least 500 acres consisting of rice land, to expand
25 upon and buffer newly restored/created nontidal perennial habitat in CZ 2, (Objective GGS2.3,
26 associated with CM3).
- 27 ● Protect up to 1,700 acres of rice land or equivalent habitat (e.g. perennial wetland) in the Yolo
28 Bypass if this portion meets the criteria specified in CM3, *Reserve Design Requirements by Species*
29 for giant garter snake. Any remaining acreage (from a total 2,740 acre commitment) will consist
30 of rice land or equivalent-value habitat outside the Yolo Bypass in CZs 1, 2, 4, or 5 (Objective
31 GGS3.1, associated with CM3).
- 32 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
33 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 34 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
35 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
36 associated with CM10).

37 As explained below, with the restoration and protection of these amounts of habitat, in addition to
38 management activities that would enhance this habitat for the species and implementation of
39 AMM1–AMM7 and Mitigation Measure BIO-75, impacts on black tern would not be adverse for NEPA
40 purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-48. Changes in Black Tern Modeled Habitat Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
CM2–CM18	Nesting	306	490	1	1	791–1,582	0
Total Impacts CM2–CM18		306	490	1	1	791–1,582	0
TOTAL IMPACTS		306	490	1	1	791-1,582	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-129a: Loss or Conversion of Habitat for and Direct Mortality of Black Tern**

4 Alternative 4 conservation measures would result in the permanent loss of up to 491 acres of
 5 modeled nesting habitat for black tern, consisting of freshwater wetlands and rice in CZ 2 (Table 12-
 6 4-48). Conservation measures that would result in these losses are Yolo Bypass fisheries
 7 improvements (CM2), tidal habitat restoration (CM4), grassland restoration (CM8) and nontidal
 8 marsh restoration (CM10). Each of these individual activities is described below. A summary
 9 statement of the combined impacts and NEPA effects, and a CEQA conclusion follows the individual
 10 conservation measure discussions.

- 11 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 12 would permanently remove 31 acres of modeled black tern habitat in the Yolo Bypass in CZ 2. In
 13 addition, 1 acre of habitat would be temporarily removed. The loss is expected to occur during
 14 the first 10 years of Alternative 4 implementation.
- 15 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 16 inundation would permanently remove an estimated 199 acres of modeled black tern habitat in
 17 CZ 2.
- 18 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
 19 implemented on agricultural lands and would result in the conversion of 52 acres of rice lands
 20 to grassland in CZ 2 by the late-long time period. An estimated 30 acres of impact would occur in
 21 the first 10 years.
- 22 • *CM10 Nontidal Marsh Restoration*: Implementation of *CM10* would result in the permanent
 23 removal of 208 acres of black tern nesting habitat in in CZ 2. An estimated 46 acres would be
 24 removed in the first 10 years.

- 1 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
2 actions that are designed to enhance wildlife values in restored or protected habitats could
3 result in localized ground disturbances that could temporarily remove small amounts of
4 modeled habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road
5 and other infrastructure maintenance activities, would be expected to have minor adverse
6 effects on available habitat and would be expected to result in overall improvements to and
7 maintenance of habitat values over the term of the BDCP. Habitat management- and
8 enhancement-related activities could disturb nesting black terns if they were to nest in the
9 vicinity of a worksite. Equipment operation could destroy nests, and noise and visual
10 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings. The
11 potential for these activities to result in direct mortality of black tern would be minimized with
12 the implementation of and Mitigation Measure BIO-75, Conduct Preconstruction Nesting Bird
13 Surveys and Avoid Disturbance of Nesting Birds.
- 14 • *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration
15 infrastructure could result in ongoing but periodic disturbances that could affect black tern
16 nesting adjacent to maintenance areas. Maintenance activities would include vegetation
17 management, levee and structure repair, and re-grading of roads and permanent work areas.
18 These effects, however, would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and
19 conservation actions as described below.
- 20 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
21 direct mortality of adult or fledged black tern individuals if they were present in the study area,
22 because they would be expected to avoid contact with construction and other equipment. If
23 black tern were to nest in the construction area, construction-related activities, including
24 equipment operation, noise and visual disturbances could destroy nests or lead to their
25 abandonment, resulting in mortality of eggs and nestlings. These effects would be avoided and
26 minimized with the implementation of Mitigation Measure BIO-75.
- 27 • *Late season flooding in the Yolo Bypass* could result in the loss of rice (nesting habitat for black
28 tern) by precluding the preparation and planting of rice fields. The methods for estimating loss
29 of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation*
30 *of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo Bypass*. This analysis
31 concludes that the estimated loss of rice could be up to 1,662 acres by the late long-term
32 timeframe. This potential impact is further described under Impact BIO-129c below.

33 The following paragraphs summarize the combined effects discussed above and describe other
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
35 included.

36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would
39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
40 effects of construction would not be adverse under NEPA. There would be no impacts on black tern
41 nesting habitat resulting from the construction of the water conveyance facilities (CM1). However,
42 there would be a loss of 307 acres of modeled nesting habitat for black tern in the study area in the
43 near-term. These effects would result from implementing *CM2 Yolo Bypass Fisheries Enhancements*,

1 *CM4 Tidal Natural Communities Restoration, CM8 Grassland Natural Community Restoration and*
2 *CM10 Nontidal Marsh Restoration.*

3 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection and 1:1
4 restoration for the loss of black tern nesting habitat. Using this ratio would indicate that 307 acres of
5 rice lands and/or freshwater wetlands should be protected and 307 acres should be restored in CZ 2
6 to compensate for the losses of black tern nesting habitat.

7 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or
8 equivalent habitat and restoring 8,850 acres of tidal freshwater emergent wetland (see Table 3-4 in
9 Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3 and CM4
10 and would occur in the same timeframe as the early restoration losses. The BDCP also contains
11 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to
12 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria
13 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3
14 and GGS 3.1) by the late long-term time period. The tidal freshwater emergent wetland would be
15 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*
16 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that
17 increase connectivity among protected lands (Objective TFEWNC2.2).

18 These objectives would inform the near-term protection actions, and therefore some portion of the
19 200 acres of rice and 700 acres of rice or equivalent habitat and the 8,850 acres of tidal freshwater
20 emergent wetland would be expected to be restored in CZ 2. However, there is no near-term acreage
21 commitment in the plan that is specific to CZ 2. In order to avoid an adverse effect on black tern from
22 habitat loss, protection and restoration of 307 acres of rice and/or freshwater wetlands would need
23 to occur in CZ 2 in the near-term timeframe. Mitigation Measure BIO-129a, *Compensate for Loss of*
24 *Black Tern Nesting Habitat*, would be available to address this adverse effect.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
26 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
27 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
28 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
29 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
30 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
31 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
32 of the Final EIR/EIS. Black tern is not a covered species under the BDCP. For the BDCP to avoid an
33 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
34 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
35 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
36 address this adverse effect.

37 **Late Long-Term Timeframe**

38 Alternative 4 as a whole would result in the permanent loss of 491 acres of modeled black tern
39 nesting habitat during the term of the Plan. This impact would result from the removal or
40 conversion of rice and freshwater wetlands in CZ 2. The Plan includes conservation commitments
41 through *CM3 Natural Communities Protection and Restoration* to protect 500 acres of rice lands (see
42 Table 3-4 in Chapter 3 *Description of Alternatives*) and up to 1,700 acres of rice lands or equivalent
43 habitat for the giant garter snake (Objective GGS3.1) in CZ 2. The nesting habitat for black tern in the
44 northern part of the study area has largely been reduced to rice lands, and these acres would

1 provide protected nesting habitat for the species. The Plan also includes conservation commitments
2 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
3 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1).

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
8 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
9 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
10 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
11 of the Final EIR/EIS. Black tern is not a covered species under the BDCP. For the BDCP to avoid an
12 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
13 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
14 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
15 address this adverse effect.

16 **NEPA Effects:** The loss of black tern nesting habitat and potential mortality of this special-status
17 species under Alternative 4 would represent an adverse effect in the absence of other conservation
18 actions. However, with habitat protection associated with CM3, guided by biological goals and
19 objectives and by AMM1–AMM7, which would be in place during all project activities, the effects of
20 habitat loss under Alternative 4 would not be adverse. Black tern is not a covered species under the
21 BDCP, and potential mortality would be an adverse effect without preconstruction surveys to ensure
22 that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
23 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this effect.

24 **CEQA Conclusion:**

25 **Near-Term Timeframe**

26 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
27 the near-term BDCP conservation strategy has been evaluated to determine whether it would
28 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
29 effects of construction would be less than significant under CEQA. There would be no impacts on
30 black tern nesting habitat resulting from the construction of the water conveyance facilities (CM1).
31 However, there would be a loss of 307 acres of modeled nesting habitat for black tern in the study
32 area in the near-term. These effects would result from implementing *CM2 Yolo Bypass Fisheries*
33 *Enhancements*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*
34 *Restoration* and *CM10 Nontidal Marsh Restoration*.

35 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection and 1:1
36 restoration for the loss of black tern nesting habitat. Using this ratio would indicate that 307 acres of
37 rice lands and/or freshwater wetlands should be protected and 307 acres should be restored in CZ 2
38 to mitigate the losses of black tern nesting habitat.

39 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or
40 equivalent habitat and restoring 8,850 acres of tidal freshwater emergent wetland (see Table 3-4 in
41 Chapter 3 *Description of Alternatives*). These conservation actions are associated with CM3 and CM4
42 and would occur in the same timeframe as the early restoration losses. The BDCP also contains
43 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to

1 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria
2 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3
3 and GGS 3.1) by the late long-term time period. The tidal freshwater emergent wetland would be
4 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*
5 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that
6 increase connectivity among protected lands (Objective TFEWNC2.2). These objectives would
7 inform the near-term protection actions, and therefore some portion of the 200 acres of rice and
8 700 acres of rice or equivalent habitat and the 8,850 acres of tidal freshwater emergent wetland
9 would be expected to be restored and protected in CZ 2. However, there is no near-term acreage
10 commitment in the plan that is specific to CZ 2. In order to compensate for black tern habitat loss,
11 the protection and restoration of 307 acres of rice or freshwater wetlands would need to occur in CZ
12 2 in the near-term timeframe. Mitigation Measure BIO-129a, *Compensate for Loss of Black Tern*
13 *Nesting Habitat*, would reduce this potential impact to a less-than-significant level.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
18 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
19 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
20 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
21 of the Final EIR/EIS.

22 Black tern is not a covered species under the BDCP. For the BDCP to have a less-than-significant
23 impact on individuals, preconstruction would be required to ensure that nests are detected and
24 avoided. In the absence of other conservation actions, effects on black tern would represent an
25 adverse effect as a result of habitat modification and potential for direct mortality of a special-status
26 species. This impact would be significant. However, the BDCP has committed to habitat protection,
27 restoration, management and enhancement activities described above. As outlined in BDCP Chapter
28 3, Section 3.4, *Conservation Measures*, natural community restoration and protection are planned so
29 that they keep pace with project impacts. Thus, there would be minimal lag time between impacts
30 and those measures designed to offset those impacts on natural communities and the species that
31 use them. In addition, implementation of AMM1-AMM7, Mitigation Measure BIO-75, *Conduct*
32 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure
33 BIO-129a, *Compensate for Loss of Black Tern Nesting Habitat*, which would require 1:1 protection of
34 habitat in CZ 2 in the near-term time frame, would reduce this potential impact to a less-than-
35 significant level.

36 **Late Long-Term Timeframe**

37 Alternative 4 as a whole would result in the permanent loss of 491 acres of modeled black tern
38 nesting habitat during the term of the Plan. This impact would result from the removal or
39 conversion of rice and freshwater wetlands in CZ 2. The Plan includes conservation commitments
40 through *CM3 Natural Communities Protection and Restoration* to protect 500 acres of rice lands (see
41 Table 3-4 in Chapter 3 *Description of Alternatives*) and up to 1,700 acres of rice lands or equivalent
42 habitat for the giant garter snake (Objective GGS3.1) in CZ 2. The nesting habitat for black tern in the
43 northern part of the study area has largely been reduced to rice lands, and these acres would
44 provide protected nesting habitat for the species. The Plan also includes conservation commitments

1 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
2 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1).

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils*. All of these AMMs include elements
7 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
8 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
9 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. Black
10 tern is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
11 preconstruction surveys for noncovered avian species would be required to ensure that nests are
12 detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*
13 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would identify any nesting terns during
14 preconstruction surveys and ensure that active nests are avoided which would reduce the potential
15 impact on nesting black tern to a less-than-significant level. In the absence of other conservation
16 actions, effects on black tern would represent an adverse effect as a result of habitat modification
17 and potential for direct mortality of special-status species. This impact would be considered
18 significant. Considering Alternative 4's habitat protection provisions, which would provide acreages
19 of new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to
20 construction and restoration activities, loss of habitat or direct mortality through implementation of
21 Alternative 4 would not result in a substantial adverse effect through habitat modifications and
22 would not substantially reduce the number or restrict the range of the species. Therefore, the
23 alternative would have a less-than-significant impact on black tern.

24 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
25 **Disturbance of Nesting Birds**

26 See Mitigation Measure BIO-75 under Impact BIO-75.

27 **Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat**

28 Because there is no near-term acreage commitment associated with the protection of rice and
29 the restoration of freshwater wetlands in CZ 2, BDCP proponents must protect and restore rice
30 and/or freshwater wetlands at a 1:1 ratio for each acre of habitat impacted in CZ 2.

31 **Impact BIO-129b: Indirect Effects of Plan Implementation on Black Tern**

32 If black terns were to nest in or adjacent to work areas, construction and subsequent maintenance-
33 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and
34 reduce the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75,
35 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid
36 the potential for adverse effects of construction-related activities on survival and productivity of
37 nesting black terns. The use of mechanical equipment during restoration activities could cause the
38 accidental release of petroleum or other contaminants that could affect black terns in the
39 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable
40 habitat could also have an adverse effect on these species. *AMM1-AMM7*, including *AMM2*
41 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such
42 spills and ensure that measures are in place to prevent runoff from the construction area and
43 negative effects of dust on active nests.

1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 5 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 6 classes within a species. In addition, the effect of selenium on a species can be confounded by
 7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 8 2009).

9 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 10 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 11 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 12 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 13 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 14 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 15 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 16 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 17 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 18 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
 19 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 20 levels of selenium have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 22 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 23 exacerbate bioaccumulation of selenium in avian species, including black tern. Marsh (tidal and
 24 nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore increase
 25 avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP restoration
 26 activities that create newly inundated areas could increase bioavailability of selenium (see BDCP
 27 Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium concentrations
 28 were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to Existing
 29 Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases
 30 in selenium concentrations in water in the Delta under any alternative. However, it is difficult to
 31 determine whether the effects of potential increases in selenium bioavailability associated with
 32 restoration-related conservation measures (CM4, CM5) would lead to adverse effects on black tern.

33 Because of the uncertainty that exists at this programmatic level of review, there could be an effect
 34 on black tern from increases in selenium associated with restoration activities. This effect would be
 35 addressed through the implementation of *AMM27 Selenium Management*, which would provide
 36 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
 37 selenium and its bioavailability in tidal habitats (see Appendix 3B, *Environmental Commitments*,
 38 *AMMs, and CMs*). Furthermore, the effectiveness of selenium management to reduce selenium
 39 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as
 40 part of design and implementation. This avoidance and minimization measure would be
 41 implemented as part of the tidal habitat restoration design schedule.

42 **NEPA Effects:** Noise and visual disturbances from the construction of conservation components
 43 could affect black tern use of modeled habitat adjacent to work areas. Moreover, the use of
 44 mechanical equipment for the construction of conservation components could cause the accidental
 45 release of petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust

1 adjacent to suitable habitat. AMM1–AMM7 and Mitigation Measure BIO-75, *Conduct Preconstruction*
2 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse
3 effects on nesting individuals.

4 Tidal habitat restoration could result in increased exposure of black tern to selenium. This effect
5 would be addressed through the implementation of *AMM27 Selenium Management*, which would
6 provide specific tidal habitat restoration design elements to reduce the potential for
7 bioaccumulation of selenium and its bioavailability in tidal habitats.

8 **CEQA Conclusion:** Noise and visual disturbances from the construction of conservation components
9 could affect black tern use of modeled habitat adjacent to work areas. Moreover, the use of
10 mechanical equipment for the construction of conservation components could cause the accidental
11 release of petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust
12 adjacent to suitable habitat which could result in potential mortality of a special-status species.
13 These impacts would be significant. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct*
14 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce these
15 impacts to a less-than-significant level.

16 Tidal habitat restoration could result in increased exposure of black tern to selenium, which could
17 result in the mortality of a special-status species. This impact would be significant. This effect would
18 be addressed through the implementation of *AMM27 Selenium Management*, which would provide
19 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
20 selenium and its bioavailability in tidal habitats. With AMM27 in place, potential effects of increased
21 exposure of black tern to selenium would be reduced to a less-than-significant impact.

22 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
23 **Disturbance of Nesting Birds**

24 See Mitigation Measure BIO-75 under Impact BIO-75.

25 **Impact BIO-129c: Periodic Effects of Inundation on Black Tern Nesting Habitat as a Result of**
26 **Implementation of Conservation Components**

27 Flooding of the Yolo Bypass would inundate 791–1,582 acres of suitable black tern nesting habitat
28 (land currently managed as rice in CZ 2). Inundation would occur during the nonbreeding season
29 but could reduce the availability of nesting habitat during years that flooding extends into the
30 nesting season (past March). Extended inundation of the Yolo Bypass would not be expected to
31 affect black tern nesting habitat. However, if periodic inundation took land out of rice production,
32 this could have an adverse effect on black tern nesting habitat. Late season flooding in the Yolo
33 Bypass could result in the loss of rice (nesting habitat for black tern) by precluding the preparation
34 and planting of rice fields. The methods for estimating loss of rice in the bypass and results are
35 provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter Snake*
36 *Summer Foraging Habitat in the Yolo Bypass*. This analysis concludes that the estimated loss of rice
37 could be up to 1,662 acres by the late long-term timeframe. The BDCP has committed to protect,
38 restore and/or create up to 1,700 acres of rice in the Yolo Bypass (Objective GGS3.1). These acres of
39 rice would be protected in areas that are less susceptible to inundation, which would benefit the
40 black tern during years in which the magnitude and duration of inundation were increased.

1 **NEPA Effects:** Flooding of the Yolo Bypass is not expected to adversely affect nesting habitat for
2 black tern. However, if flooding were to extend into the nesting season or were to significantly
3 reduce rice production it could also reduce suitable black tern nesting habitat. This potential effect
4 would not be adverse with the creation and/or protection of 1,700 acres of rice in CZ 2 under
5 Objective GGS3.1 in the BDCP.

6 **CEQA Conclusion:** Flooding of the Yolo Bypass is not expected to have a significant impact on
7 nesting habitat for black tern. However, if flooding were to extend into the nesting season or were to
8 significantly reduce rice production it could also reduce suitable black tern nesting habitat. This
9 potential impact would be reduced to less than significant by the creation and/or protection of
10 1,700 acres of rice in CZ 2 under Objective GGS3.1 in the BDCP.

11 **California Horned Lark and Grasshopper Sparrow**

12 This section describes the effects of Alternative 4, including water conveyance facilities construction
13 and implementation of other conservation components, on California horned lark and grasshopper
14 sparrow. The primary impact of concern for grasshopper sparrow and California horned lark would
15 be the loss of breeding habitat in the Plan Area, which includes grassland vernal pool complex, and
16 alkali seasonal wetland natural communities and selected cultivated lands including grain and hay
17 crops and pasture. Construction and restoration associated with Alternative 4 conservation
18 measures would result in both temporary and permanent losses of modeled breeding habitat for
19 California horned lark and grasshopper sparrow as indicated in Table 12-4-49. Full implementation
20 of Alternative 4 would include the following biological objectives over the term of the BDCP which
21 would also benefit the California horned lark and the grasshopper sparrow (BDCP Chapter 3, Section
22 3.3, *Biological Goals and Objectives*).

- 23 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
24 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
25 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 26 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 27 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
28 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 29 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
30 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 31 ● Within the at least 48,625 acres of protected cultivated lands, protect at least 42,275 acres of
32 cultivated lands as Swainson's hawk foraging habitat with at least 50% in very high-value
33 habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 34 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
35 VPNC2.5, and GNC2.4, associated with CM11).

36 As explained below, with the restoration or protection of these amounts of habitat, in addition to
37 management activities that would enhance habitat for these species and implementation of AMM1-
38 AMM7 and Mitigation Measure BIO-75, impacts on California horned lark and grasshopper sparrow
39 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-49. Changes in California Horned Lark and Grasshopper Sparrow Modeled Habitat**
2 **Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Breeding	1,978	1,978	537	537	NA	NA
Total Impacts CM1		1,978	1,978	537	537	NA	NA
CM2–CM18	Breeding	5,450	26,198	376	893	1,158–3,650	3,823
Total Impacts CM2–CM18		5,450	26,198	376	893	1,158–3,650	3,823
TOTAL IMPACTS		7,428	28,176	913	1,430	1,158–3,650	3,823

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-130: Loss or Conversion of Habitat for and Direct Mortality of California Horned**
5 **Lark and Grasshopper Sparrow**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up to 29,606 acres of modeled nesting habitat for California horned lark and grasshopper sparrow
8 (of which 28,176 acres would be a permanent loss and 1,430 acres would be a temporary loss of
9 habitat, Table 12-4-49). Conservation measures that would result in these losses are conveyance
10 facilities and transmission line construction, and establishment and use of reusable tunnel material
11 areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4), floodplain
12 restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), vernal pool and wetland
13 restoration (CM9), nontidal marsh restoration (CM10), and construction of conservation hatcheries
14 (CM18). The majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement
15 and management activities (CM11), which include ground disturbance or removal of nonnative
16 vegetation, and the construction of recreational trails, signs, and facilities, could result in local
17 adverse habitat effects. In addition, maintenance activities associated with the long-term operation
18 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate
19 California horned lark and grasshopper sparrow modeled habitat. Each of these individual activities
20 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA
21 conclusion follow the individual conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
23 result in the combined permanent and temporary loss of up to 2,515 acres of modeled California
24 horned lark and grasshopper sparrow habitat (1,978 acres of permanent loss, 537 acres of
25 temporary loss). Impacts would occur from the construction of Intakes 2, 3, and 5 and

1 associated temporary work areas and access roads in CZ 4 between Clarksburg and Courtland;
2 construction of the intermediate forebay; and from a reusable tunnel material storage area on
3 Bouldin Island. The construction of the permanent and temporary transmission line corridors
4 through CZs 4-6 and 9 would also remove suitable foraging habitat for the species.

5 Approximately 867 acres of impact would be from the placement of reusable tunnel material
6 area west of the Clifton Court Forebay in CZ 8. In addition, permanent habitat loss would occur
7 from the construction of the new forebay south of the existing Clifton court Forebay in CZ 8.
8 Grasshopper sparrows were detected in DHCCP surveys south of Byron Highway in CZ 8 (1
9 occurrence) and east of Intakes 2 and 3 (6 occurrences), in the Stone Lakes NWR. However, the
10 CM1 footprint does not overlap with any grasshopper sparrow or California horned lark
11 occurrences. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
12 *Disturbance of Nesting Birds*, would require preconstruction surveys and the establishment of
13 no-disturbance buffers and would be available to address adverse effects on nesting California
14 horned larks or grasshopper sparrows. Refer to the Terrestrial Biology Mapbook for a detailed
15 view of Alternative 4 construction locations. Impacts from CM1 would occur within the first 10-
16 14 years of Plan implementation.

- 17 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
18 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
19 California horned lark and grasshopper sparrow habitat (898 acres of permanent loss, 376 acres
20 of temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of
21 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass
22 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.
23 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland
24 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10
25 years of Alternative 4 implementation.
- 26 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
27 inundation would permanently remove an estimated 20,880 acres of modeled California horned
28 lark and grasshopper sparrow habitat. The majority of the acres lost would consist of cultivated
29 lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache
30 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and
31 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
32 directly impact and fragment grassland just north of Rio Vista in and around French and
33 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
34 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
35 the northern fringes of Suisun Marsh.
- 36 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
37 seasonally inundated floodplain would permanently and temporarily remove approximately
38 1,450 acres of modeled California horned lark and grasshopper sparrow nesting habitat (933
39 permanent, 517 temporary). These losses would be expected after the first 10 years of
40 Alternative 4 implementation along the San Joaquin River and other major waterways in CZ 7.
- 41 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
42 approximately 370 acres of California horned lark and grasshopper sparrow nesting habitat as
43 part of tidal restoration and 1,489 acres as part of seasonal floodplain restoration.
- 44 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
45 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would

1 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
2 would be restored after the construction periods. Grassland restoration would be implemented
3 on agricultural lands that also provide nesting habitat for California horned lark and
4 grasshopper sparrow and would result in the conversion of 837 acres of cultivated lands to
5 grassland.

- 6 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
7 removal of 705 acres of California horned lark and grasshopper sparrow nesting habitat.
- 8 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
9 actions included in CM11 that are designed to enhance wildlife values in restored or protected
10 habitats could result in localized ground disturbances that could temporarily remove small
11 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
12 vegetation and road and other infrastructure maintenance activities, would be expected to have
13 minor adverse effects on available habitat and would be expected to result in overall
14 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would
15 also include the construction of recreational-related facilities including trails, interpretive signs,
16 and picnic tables (see Chapter 4, *Covered Activities and Associated Federal Actions*, of the BDCP).
17 The construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would
18 be placed on existing, disturbed areas when and where possible. However, approximately 50
19 acres of grassland habitat would be lost from the construction of trails and facilities.

20 Habitat management- and enhancement-related activities could disturb California horned lark
21 and grasshopper sparrow nests. If either species were to nest in the vicinity of a worksite,
22 equipment operation could destroy nests, and noise and visual disturbances could lead to their
23 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct*
24 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available
25 to address these adverse effects.

- 26 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
27 modeled California horned lark and grasshopper sparrow habitat for the development of a delta
28 and longfin smelt conservation hatchery in CZ 1.
- 29 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
30 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
31 disturbances that could affect California horned lark and grasshopper sparrow use of the
32 surrounding habitat. Maintenance activities would include vegetation management, levee and
33 structure repair, and re-grading of roads and permanent work areas. These effects, however,
34 would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as
35 described below.
- 36 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
37 direct mortality of adult or fledged California horned lark and grasshopper sparrow if they were
38 present in the Plan Area, because they would be expected to avoid contact with construction and
39 other equipment. If either species were to nest in the construction area, construction-related
40 activities, including equipment operation, noise and visual disturbances could destroy nests or
41 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
42 75 would be available to address these adverse effects.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
3 included.

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
8 effects of construction would not be adverse under NEPA. Alternative 4 would remove 8,341 acres
9 (7,428 permanent, 913 temporary) of modeled breeding habitat for California horned lark and
10 grasshopper sparrow in the study area in the near-term. These effects would result from the
11 construction of the water conveyance facilities (CM1, 2,515 acres), and implementing other
12 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
13 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*
14 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*
15 *Communities Enhancement and Management, and CM18 Conservation Hatcheries—5,826 acres).*

16 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
17 would be 2:1 for protection of habitat. Using this ratio would indicate that 5,030 acres should be
18 protected to compensate for the CM1 losses of 2,515 acres of California horned lark and
19 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove
20 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California
21 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio
22 (2:1 for protection).

23 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
24 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
25 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (see Table
26 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3,
27 CM8, and CM9 and would occur in the same timeframe as the construction and early restoration
28 losses thereby avoiding adverse effects of habitat loss on California horned lark and grasshopper
29 sparrow. Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives
30 GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool
31 and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
32 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
33 would expand breeding habitat for California horned lark and grasshopper sparrow and reduce the
34 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*
35 *and Management*, insect prey populations would be increased on protected lands, enhancing the
36 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
37 Cultivated lands that provide habitat for covered and other native wildlife species would provide
38 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper
39 sparrow (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-
40 term time period would be in alfalfa and pasture crop types (very high- and high-value crop types)
41 for Swainson's hawk (Objective SH1.2) which would also provide potential nesting habitat for
42 California horned lark and grasshopper sparrow. This biological objective provides an estimate for
43 the high proportion of cultivated lands protected in the near-term time period which would provide
44 nesting habitat for California horned lark and grasshopper sparrow.

1 The acres of restoration and protection contained in the near-term Plan goals and the additional
 2 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
 3 level effects of CM1 on California horned lark and grasshopper sparrow, as well as mitigate the near-
 4 term effects of the other conservation measures with the consideration that some portion of the
 5 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in suitable
 6 crop types to compensate for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-130,
 7 *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper Sparrow Habitat*
 8 would be available to address the adverse effect of habitat loss in the near-term.

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 13 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 14 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 15 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 16 of the Final EIR/EIS.

17 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the
 18 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
 19 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-
 20 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
 21 available to address this adverse effect.

22 **Late Long-Term Timeframe**

23 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,606
 24 acres of modeled California horned lark and grasshopper sparrow habitat during the term of the
 25 Plan. The locations of these losses are described above in the analyses of individual conservation
 26 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
 27 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
 28 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
 29 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
 30 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
 31 for native wildlife species (see Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland
 32 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and
 33 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali
 34 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
 35 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
 36 expand breeding habitat for California horned lark and grasshopper sparrow and reduce the effects
 37 of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and*
 38 *Management*, insect prey populations would be increased on protected lands, enhancing the
 39 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
 40 Cultivated lands that provide habitat for covered and other native wildlife species would provide
 41 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper
 42 sparrow (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in
 43 alfalfa and pasture crop types. These are very high- and high-value crop types for Swainson's hawk
 44 (Objective SH1.2) and would provide potential nesting habitat for California horned lark and
 45 grasshopper sparrow.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
 2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
 3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
 5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 8 of the Final EIR/EIS. California horned lark and grasshopper sparrow are not covered species under
 9 the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
 10 noncovered avian species would be required to ensure that nests are detected and avoided.
 11 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
 12 *Nesting Birds*, would be available to address this adverse effect.

13 **NEPA Effects:** The loss of California horned lark and grasshopper sparrow habitat and potential
 14 mortality of these special-status species under Alternative 4 would represent an adverse effect in
 15 the absence of other conservation actions. However, with habitat protection and restoration
 16 associated with CM3, CM8, CM9, and CM11, guided by biological goals and objectives and by AMM1–
 17 AMM7, which would be in place during all project activities, and with implementation of Mitigation
 18 Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper*
 19 *Sparrow Habitat*, the effects of habitat loss on California horned lark and grasshopper sparrow
 20 under Alternative 4 would not be adverse. California horned lark and grasshopper sparrow are not
 21 covered species under the BDCP, and potential mortality would be an adverse effect without
 22 preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75
 23 would be available to address this effect.

24 **CEQA Conclusion:**

25 **Near-Term Timeframe**

26 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 27 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 28 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 29 effects of construction would be less than significant under CEQA. Alternative 4 would remove 8,341
 30 acres (7,428 permanent, 913 temporary) of modeled breeding habitat for California horned lark and
 31 grasshopper sparrow in the study area in the near-term. These effects would result from the
 32 construction of the water conveyance facilities (CM1, 2,515 acres), and implementing other
 33 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
 34 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*
 35 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*
 36 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

37 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
 38 would be 2:1 for protection of habitat. Using this ratio would indicate that 5,030 acres should be
 39 protected to mitigate the CM1 losses of 2,515 acres of California horned lark and grasshopper
 40 sparrow habitat. The near-term effects of other conservation actions would remove 5,826 acres of
 41 modeled habitat, and therefore require 11,652 acres of protection of California horned lark and
 42 grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio (2:1 for
 43 protection).

1 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
2 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
3 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (see Table
4 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3,
5 CM8, and CM9 and would occur in the same timeframe as the construction and early restoration
6 losses thereby avoiding significant impacts on California horned lark and grasshopper sparrow.
7 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
8 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
9 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
10 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
11 would expand breeding habitat for California horned lark and grasshopper sparrow and reduce the
12 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*
13 *and Management*, insect prey populations would be increased on protected lands, enhancing the
14 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
15 Cultivated lands that provide habitat for covered and other native wildlife species would provide
16 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper
17 sparrow (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-
18 term time period would be in alfalfa and pasture crop types (very high- and high-value crop types)
19 for Swainson's hawk (Objective SH1.2) which would also provide potential nesting habitat for
20 California horned lark and grasshopper sparrow. This biological objective provides an estimate for
21 the high proportion of cultivated lands protected in the near-term time period which would provide
22 nesting habitat for California horned lark and grasshopper sparrow.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
26 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
27 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
28 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
29 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
30 of the Final EIR/EIS.

31 In the absence of other conservation actions, the effects on California horned lark and grasshopper
32 sparrow habitat would represent an adverse effect as a result of habitat modification and potential
33 direct mortality of special-status species. This impact would be significant. California horned lark
34 and grasshopper sparrow are not covered species under the BDCP. For the BDCP to avoid an
35 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
36 required to ensure that nests are detected and avoided. The acres of restoration and protection
37 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the
38 typical mitigation that would be applied to the project-level effects of CM1 on California horned lark
39 and grasshopper sparrow, as well as mitigate the near-term effects of the other conservation
40 measures with the consideration that some portion of the 15,400 acres of cultivated lands protected
41 in the near-term timeframe would be managed in suitable crop types to compensate for the loss of
42 habitat at a ratio of 2:1. With the acres of habitat protection and restoration described above, in
43 addition to AMM1-AMM7, and implementation of Mitigation Measure BIO-75, *Conduct*
44 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure
45 BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper Sparrow*
46 *Habitat*, Alternative 4 would not result in a substantial adverse effect through habitat modification

1 and would not substantially reduce the number or restrict the range of either species. Therefore,
2 Alternative 4 would have a less-than-significant impact on California horned lark and grasshopper
3 sparrow.

4 **Late Long-Term Timeframe**

5 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,606
6 acres of modeled California horned lark and grasshopper sparrow habitat during the term of the
7 Plan. The locations of these losses are described above in the analyses of individual conservation
8 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
9 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
10 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
11 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
12 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
13 for native wildlife species (see Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland
14 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and
15 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali
16 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
17 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
18 expand breeding habitat for California horned lark and grasshopper sparrow and reduce the effects
19 of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement and*
20 *Management*, insect prey populations would be increased on protected lands, enhancing the
21 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).

22 Cultivated lands that provide habitat for covered and other native wildlife species would provide
23 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper
24 sparrow (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in
25 alfalfa and pasture crop types (very high- and high-value crop types) for Swainson's hawk (Objective
26 SH1.2) which would also provide potential nesting habitat for California horned lark and
27 grasshopper sparrow. The Plan also includes commitments to implement *AMM1 Worker Awareness*
28 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater*
29 *Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention,*
30 *Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge*
31 *Operations Plan*. All of these AMMs include elements that would avoid or minimize the risk of
32 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
33 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
34 *Commitments, AMMs, and CMs*, of the Final EIR/EIS. California horned lark and grasshopper sparrow
35 are not covered species under the BDCP. For the BDCP to avoid impacts on individuals,
36 preconstruction surveys for noncovered avian species would be required to ensure that nests are
37 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
38 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

39 In the absence of other conservation actions, the effects on California horned lark and grasshopper
40 sparrow habitat would represent an adverse effect as a result of habitat modification and potential
41 direct mortality of special-status species. This impact would be significant. Considering Alternative
42 4's protection and restoration provisions, which would provide acreages of new high-value or
43 enhanced habitat in amounts suitable to compensate for habitats lost to construction and
44 restoration activities, and with the implementation of AMM1-AMM7, Mitigation Measure BIO-75,
45 and Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and*

1 *Grasshopper Sparrow Habitat*, the loss of habitat or direct mortality through implementation of
2 Alternative 4 would not result in a substantial adverse effect through habitat modifications and
3 would not substantially reduce the number or restrict the range of either species. Therefore, the loss
4 of habitat or potential mortality under this alternative would have a less-than-significant impact on
5 California horned lark and grasshopper sparrow.

6 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
7 **Disturbance of Nesting Birds**

8 See Mitigation Measure BIO-75 under Impact BIO-75.

9 **Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned**
10 **Lark and Grasshopper Sparrow Habitat**

11 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
12 crops, or alfalfa to provide California horned lark and grasshopper sparrow habitat such that the
13 total acres of habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1
14 protection. Additional grassland protection, enhancement, and management may be substituted
15 for the protection of cultivated lands.

16 **Impact BIO-131: Effects on California Horned Lark and Grasshopper Sparrow and Associated**
17 **with Electrical Transmission Facilities**

18 New transmission lines would increase the risk for bird-power line strikes, which could result in
19 injury or mortality of grasshopper sparrow and California horned lark. *AMM20 Greater Sandhill*
20 *Crane* would minimize the risk of bird strikes by installing flight diverters on new and selected
21 existing powerlines.

22 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
23 could result in injury or mortality of grasshopper sparrow and California horned lark. With the
24 implementation of *AMM20 Greater Sandhill Crane*, the effect of new transmission lines on California
25 horned lark and grasshopper sparrow would not be adverse.

26 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
27 could result in injury or mortality of grasshopper sparrow and California horned lark. With the
28 incorporation of *AMM20 Greater Sandhill Crane*, new transmission lines would have a less-than-
29 significant impact on grasshopper sparrow and California horned lark.

30 **Impact BIO-132: Indirect Effects of Plan Implementation on California Horned Lark and**
31 **Grasshopper Sparrow**

32 Noise and visual disturbances associated with construction-related activities could result in
33 temporary disturbances that affect California horned lark and grasshopper sparrow use of modeled
34 habitat. Construction noise above background noise levels (greater than 50 dBA) could extend 500
35 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*
36 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and
37 Appendix 11F, *Substantive BDCP Revisions*, of the Final EIR/EIS), although there are no available data
38 to determine the extent to which these noise levels could affect California horned lark or
39 grasshopper sparrow. Indirect effects associated with construction include noise, dust, and visual
40 disturbance caused by grading, filling, contouring, and other ground-disturbing operations.

1 Construction-related noise and visual disturbances could disrupt nesting and foraging behaviors,
2 and reduce the functions of suitable habitat which could result in an adverse effect on these species.
3 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
4 *Nesting Birds*, would be available to minimize adverse effects on active nests. The use of mechanical
5 equipment during water conveyance construction could cause the accidental release of petroleum or
6 other contaminants that could affect these species or their prey in the surrounding habitat. AMM1–
7 AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would minimize
8 the likelihood of such spills. The inadvertent discharge of sediment or excessive dust adjacent to
9 California horned lark and grasshopper sparrow nesting habitat could also have a negative effect on
10 these species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the
11 construction area and the negative effects of dust on wildlife adjacent to work areas.

12 **NEPA Effects:** Indirect effects on California horned lark and grasshopper sparrow as a result of
13 Alternative 4 implementation could have adverse effects on these species through the modification
14 of habitat and potential for direct mortality. California horned lark and grasshopper sparrow are not
15 covered species under the BDCP, and potential mortality would be an adverse effect without
16 preconstruction surveys to ensure that nests are detected and avoided. In conjunction with AMM1–
17 AMM7, Mitigation Measure BIO-75 *Conduct Preconstruction Nesting Bird Surveys and Avoid*
18 *Disturbance of Nesting Birds*, would be available to address this effect.

19 **CEQA Conclusion:** Indirect effects on California horned lark and grasshopper sparrow as a result of
20 Alternative 4 implementation could have a significant impact on these species. The incorporation of
21 AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*
22 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this
23 impact to a less-than-significant level.

24 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
25 **Disturbance of Nesting Birds**

26 See Mitigation Measure BIO-75 under Impact BIO-75.

27 **Impact BIO-133: Periodic Effects of Inundation on California Horned Lark and Grasshopper**
28 **Sparrow as a Result of Implementation of Conservation Components**

29 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
30 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158-
31 3,650 acres of modeled California horned lark and grasshopper sparrow habitat (Table 12-4-49).

32 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
33 *Restoration* could result in the periodic inundation of up to approximately 3,823 acres of modeled
34 habitat (Table 12-4-49).

35 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
36 season due to periodic inundation. However, inundation would occur during the nonbreeding
37 season and would not be expected to have an adverse effect on either species.

38 **NEPA Effects:** Periodic inundation of floodplains would not have adverse effects on grasshopper
39 sparrow or California horned lark because inundation is expected to occur prior to the breeding
40 season and inundation.

1 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on
2 grasshopper sparrow or California horned lark because inundation is expected to occur prior to the
3 breeding season.

4 **Least Bittern and White-Faced Ibis**

5 This section describes the effects of Alternative 4, including water conveyance facilities construction
6 and implementation of other conservation components, on least bittern and white-faced ibis.
7 Modeled breeding habitat for least bittern and white-faced ibis includes tidal freshwater, nontidal
8 freshwater emergent wetlands, managed wetlands, and other natural seasonal wetlands in CZ 2, 4,
9 and 11. Construction and restoration associated with Alternative 4 conservation measures would
10 result in both temporary and permanent losses of modeled habitat for mountain plover as indicated
11 in Table 12-4-50. Full implementation of Alternative 4 would include the following biological
12 objectives over the term of the BDCP which would also benefit least bittern and white-faced ibis (see
13 Chapter 3, Section 3.3, *Biological Goals and Objectives*, of the BDCP).

- 14 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
15 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 16 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
17 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
18 associated with CM10).
- 19 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
20 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).

21 As explained below, with the restoration or protection of these amounts of habitat, in addition to
22 management activities that would enhance habitat for these species and implementation of AMM1–
23 AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on least bittern and
24 white-faced ibis would not be adverse for NEPA purposes and would be less than significant for
25 CEQA purposes.

1 **Table 12-4-50. Changes in Least Bittern and White-Faced Ibis Modeled Habitat Associated with**
 2 **Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	Yolo	Floodplain
CM1	Nesting	1	1	3	3	NA	NA
Total Impacts CM1		1	1	3	3	NA	NA
CM2–CM18	Nesting	5,134	13,063	45	45	961–2,672	NA
Total Impacts CM2–CM18		5,134	13,063	45	45	961–2,672	NA
TOTAL IMPACTS		5,135	13,064	48	48	961–2,672	NA

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. Yolo periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-134: Loss or Conversion of Habitat for and Direct Mortality of Least Bittern and**
 5 **White-Faced Ibis**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
 7 of up to 13,112 acres of modeled habitat for least bittern and white-faced ibis (13,064 acres of
 8 permanent loss and 48 of temporary loss, Table 12-4-50). Conservation measures that would result
 9 in these losses are conveyance facilities and transmission line construction, and establishment and
 10 use of reusable tunnel material areas (CM1), Yolo Bypass fisheries improvements (CM2), and tidal
 11 habitat restoration (CM4). Habitat enhancement and management activities (CM11), which include
 12 ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.
 13 In addition, maintenance activities associated with the long-term operation of the water conveyance
 14 facilities and other BDCP physical facilities could degrade or eliminate least bittern and white-faced
 15 ibis habitat. Each of these individual activities is described below. A summary statement of the
 16 combined impacts, NEPA effects, and a CEQA conclusion follow the individual conservation measure
 17 discussions.

- 18 • *CM1 Water Facilities and Operation:* Construction of Alternative 4 conveyance facilities would
 19 result in the combined permanent and temporary loss of up to 4 acres of modeled least bittern
 20 and white-faced ibis habitat (1 acre of permanent loss, 3 acres of temporary loss) from CZ 4.
 21 Permanent impacts on habitat would occur from a reusable tunnel material storage site north of
 22 Twin Cities Road and east of the Intermediate Forebay. Temporary impacts would occur from
 23 the construction of two temporary transmission lines one extending east along Lambert Road
 24 from the Lambert Road Vent Shaft, and one extending south from the Lambert Road Vent Shaft
 25 to the Intermediate Forebay. The construction footprint for CM1 does not overlap with any

1 occurrences of least bittern or white-faced ibis. However, Mitigation Measure BIO-75, *Conduct*
2 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available
3 to minimize effects on least bittern and white-faced ibis if they were to nest in the vicinity of the
4 construction footprint. Refer to the Terrestrial Biology Mapbook for a detailed view of
5 Alternative 4 construction locations. Impacts from CM1 would occur within the first 10-14 years
6 of Plan implementation.

- 7 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
8 would permanently remove 55 acres of modeled least bittern and white-faced ibis habitat in the
9 Yolo Bypass in CZ 2. In addition, 45 acres of habitat would be temporarily removed. The loss is
10 expected to occur during the first 10 years of Alternative 4 implementation.
- 11 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
12 inundation would permanently remove an estimated 13,008 acres of modeled least bittern and
13 white-faced ibis habitat in CZ 2, 4, and 11 by the late long-term time period.
- 14 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
15 actions included in *CM11 Natural Communities Enhancement and Management* that are designed
16 to enhance wildlife values in restored or protected habitats could result in localized ground
17 disturbances that could temporarily remove small amounts of least bittern and white-faced ibis
18 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and
19 other infrastructure maintenance activities, would be expected to have minor adverse effects on
20 available least bittern and white-faced ibis habitat.
- 21 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
22 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
23 disturbances that could affect least bittern and white-faced ibis use of the surrounding habitat.
24 Maintenance activities would include vegetation management, levee and structure repair, and
25 re-grading of roads and permanent work areas. These effects, however, would be reduced by
26 AMM1–AMM7. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
27 *Avoid Disturbance of Nesting Birds*, would be available to further reduce effects.
- 28 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
29 direct mortality of least bittern and white-faced ibis because adults and fledged young would be
30 expected to avoid contact with construction and other equipment. However, if either species
31 were to nest in the construction area, equipment operation, noise and visual disturbances could
32 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings.
33 Construction-related activities could also flush least bittern adults from nests and lead to
34 collision with man-made objects (Sterling 2008). Mitigation Measure BIO-75 would require
35 preconstruction surveys in and adjacent to work areas and, if nests were present, no
36 disturbance buffers would be implemented.

37 The following paragraphs summarize the combined effects discussed above and describe other
38 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
39 included.

40 ***Near-Term Timeframe***

41 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
42 the near-term BDCP conservation strategy has been evaluated to determine whether it would
43 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the

1 effects of construction would not be adverse under NEPA. Alternative 4 would remove 5,183 acres
2 of modeled habitat for least bittern and white-faced ibis in the study area in the near-term (5,135
3 acres of permanent loss, and 48 acres of temporary loss). These effects would result from the
4 construction of the water conveyance facilities (CM1, 4 acres), and the implementation of other
5 conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration [CM4]
6 5,179 acres).

7 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
8 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using
9 these ratios would indicate that 4 acres of habitat should be restored and 4 acres of habitat should
10 be protected to compensate for the CM1 losses of 5 acres of least bittern and white-faced ibis
11 habitat. The near-term effects of other conservation actions would remove 5,179 acres of modeled
12 habitat, and therefore require 5,179 acres of restoration and 5,179 acres of protection of least
13 bittern and white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for
14 restoration and 1:1 for protection).

15 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
16 wetland and protecting and enhancing 4,800 acres of managed wetland in the Plan Area (see Table
17 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM4
18 and CM3 and would occur in the same timeframe as the construction and early restoration losses,
19 thereby avoiding adverse effects of habitat loss on least bittern and white-faced ibis. The tidal
20 freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1
21 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates topographic
22 heterogeneity and in areas that increase connectivity among protected lands (Objective
23 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and
24 would benefit these species through the enhancement of degraded areas (such as areas of bare
25 ground or marsh where the predominant vegetation consists of invasive species such as perennial
26 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
27 (Objective MWNC1.1). In addition, at least 400 acres of nontidal marsh would be created, some of
28 which would provide nesting habitat for least bittern and white-faced ibis. These Plan objectives
29 represent performance standards for considering the effectiveness of restoration and protection
30 actions. The acres of restoration and protection contained in the near-term Plan goals satisfy the
31 typical mitigation that would be applied to the project-level effects of CM1, as well as mitigate the
32 near-term effects of the other conservation measures.

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
37 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
38 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
39 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
40 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
41 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
42 noncovered avian species would be required to ensure that nests are detected and avoided.

1 **Late Long-Term Timeframe**

2 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 13,112
3 acres (13,064 acres of permanent loss, 48 acres of temporary loss) of least bittern and white-faced
4 ibis habitat during the term of the Plan. The locations of these losses are described above in the
5 analyses of individual conservation measures. The Plan includes conservation commitments
6 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
7 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200
8 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres
9 of managed wetland would be protected and enhanced in CZ 11.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
14 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
15 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
16 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
17 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
18 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
19 noncovered avian species would be required to ensure that nests are detected and avoided.

20 **NEPA Effects:** The loss of least bittern and white-faced ibis habitat and potential mortality of these
21 special-status species under Alternative 4 would represent an adverse effect in the absence of other
22 conservation actions. However, with the habitat protection and restoration associated with CM3,
23 CM4, CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which
24 would be in place during all project activities, the effects of habitat loss under Alternative 4 on least
25 bittern and white-faced ibis would not be adverse. Least bittern and white-faced ibis are not covered
26 species under the BDCP, and the potential for mortality would be an adverse effect without
27 preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75
28 would be available to address this effect.

29 **CEQA Conclusion:**

30 **Near-Term Timeframe**

31 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
32 the near-term BDCP conservation strategy has been evaluated to determine whether it would
33 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
34 impacts of construction would be less than significant under CEQA. Alternative 4 would remove
35 5,183 acres of modeled habitat for least bittern and white-faced ibis in the study area in the near-
36 term (5,135 acres of permanent loss, and 48 acres of temporary loss). These effects would result
37 from the construction of the water conveyance facilities (CM1, 4 acres), and the implementation of
38 other conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration
39 [CM4] 5,179 acres).

40 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
41 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using
42 these ratios would indicate that 4 acres of habitat should be restored and 4 acres of habitat should
43 be protected to mitigate the CM1 losses of 4 acres of least bittern and white-faced ibis habitat. The

1 near-term effects of other conservation actions would remove 5,179 acres of modeled habitat, and
 2 therefore require 5,179 acres of restoration and 5,179 acres of protection of least bittern and white-
 3 faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
 4 protection).

5 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal freshwater emergent
 6 wetland and 4,800 acres of managed wetland in the Plan Area (see Table 3-4 in Chapter 3,
 7 *Description of Alternatives*). These conservation actions are associated with CM4 and CM3 and would
 8 occur in the same timeframe as the construction and early restoration losses, thereby avoiding
 9 adverse effects of habitat loss on least bittern and white-faced ibis. The tidal freshwater emergent
 10 wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3,
 11 *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and
 12 in areas that increase connectivity among protected lands (Objective TFEWNC2.2). The 4,800 acres
 13 of managed wetland would be protected and enhanced in CZ 11 and would benefit these species
 14 through the enhancement of degraded areas (such as areas of bare ground or marsh where the
 15 predominant vegetation consists of invasive species such as perennial pepperweed) to vegetation
 16 such as pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). In
 17 addition, at least 400 acres of nontidal marsh would be created, some of which would provide
 18 nesting habitat for least bittern and white-faced ibis. These Plan objectives represent performance
 19 standards for considering the effectiveness of restoration and protection actions.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 24 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
 25 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
 26 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
 27 *AMMs, and CMs*, of the Final EIR/EIS.

28 In the absence of other conservation actions, the effects on least bittern and white-faced ibis habitat
 29 would represent an adverse effect as a result of habitat modification and potential direct mortality
 30 of special-status species. This impact would be significant. Least bittern and white-faced ibis are not
 31 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
 32 preconstruction surveys for noncovered avian species would be required to ensure that nests are
 33 detected and avoided. The acres of restoration and protection contained in the near-term Plan goals
 34 satisfy the typical mitigation that would be applied to the project-level effects of CM1, as well as
 35 mitigate the near-term effects of the other conservation measures. With the acres of habitat
 36 protection and restoration described above, in addition to AMM1–AMM7, and implementation of
 37 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
 38 *Nesting Birds*, Alternative 4 would not result in a substantial adverse effect through habitat
 39 modification and would not substantially reduce the number or restrict the range of either species.
 40 Therefore, Alternative 4 would have a less-than-significant impact on least bittern and white-faced
 41 ibis.

42 **Late Long-Term Timeframe**

43 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 13,112
 44 acres (13,064 acres of permanent loss, 48 acres of temporary loss) of least bittern and white-faced

1 ibis habitat during the term of the Plan. The locations of these losses are described above in the
2 analyses of individual conservation measures. The Plan includes conservation commitments
3 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
4 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200
5 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres
6 of managed wetland would be protected and enhanced in CZ 11.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
11 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
12 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
13 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
14 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
15 under the BDCP. For the BDCP to have a less than adverse effect on individuals, preconstruction
16 surveys for noncovered avian species would be required to ensure that nests were detected and
17 avoided. Implementation of Mitigation Measure BIO-75 would reduce the potential impact on
18 nesting least bittern and white-faced ibis and to a less-than-significant level.

19 In the absence of other conservation actions, the effects on least bittern and white-faced ibis habitat
20 would represent an adverse effect as a result of habitat modification and potential direct mortality
21 of special-status species. This impact would be significant. Least bittern and white-faced ibis are not
22 covered species under the BDCP. Considering Alternative 4's protection and restoration provisions,
23 which would provide acreages of new high-value or enhanced habitat in amounts suitable to
24 compensate for habitats lost to construction and restoration activities, and with the implementation
25 of AMM1–AMM7 and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
26 *Avoid Disturbance of Nesting Birds*, the loss of habitat or direct mortality through implementation of
27 Alternative 4 would not result in a substantial adverse effect through habitat modifications and
28 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of
29 habitat or potential mortality under this alternative would have a less-than-significant impact on
30 least bittern and white-faced ibis.

31 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
32 **Disturbance of Nesting Birds**

33 See Mitigation Measure BIO-75 under Impact BIO-75.

34 **Impact BIO-135: Effects on Least Bittern and White-Faced Ibis Associated with Electrical**
35 **Transmission Facilities**

36 New transmission lines would increase the risk for bird-power line strikes, which could result in
37 injury or mortality of least bittern and white-faced ibis. Waterbirds have a higher susceptibility to
38 collisions than passerines, raptors, and other birds. Bitterns and ibises have a high wing loading/low
39 aspect ratio which limits their maneuverability and make them more vulnerable to collisions rather
40 than more agile species (see BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions*
41 *at Proposed BDCP Powerlines*). Marking transmission lines with flight diverters that make the lines
42 more visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
43 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality

1 by 60%. All new project transmission lines would be fitted with flight diverters which would reduce
2 bird strike risk of least bittern and white-faced ibis.

3 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
4 could result in injury or mortality of least bittern and white-faced ibis. Bitterns and ibises have a
5 high wing loading/low aspect ratio which limits their maneuverability and make them more
6 vulnerable to collisions rather than more agile species. The implementation of *AMM20 Greater*
7 *Sandhill Crane* would require the installation of bird flight diverters on all new transmission lines,
8 which could reduce bird strike risk of least bittern and white-faced ibis by 60%. With the installation
9 of bird flight diverters, the construction and operation of new transmission lines under Alternative 4
10 would not result in an adverse effect on least bittern and white-faced ibis.

11 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
12 could result in injury or mortality of least bittern and white-faced ibis. Bitterns and ibises have a
13 high wing loading/low aspect ratio which limits their maneuverability and make them more
14 vulnerable to collisions rather than more agile species. The implementation of *AMM20 Greater*
15 *Sandhill Crane* would require the installation of bird flight diverters on all new transmission lines,
16 which could reduce bird strike risk of least bittern and white-faced ibis by 60%. With the installation
17 of bird flight diverters, the construction and operation of new transmission lines under Alternative 4
18 would result in a less-than-significant impact on least bittern and white-faced ibis.

19 **Impact BIO-136: Indirect Effects of Plan Implementation on Least Bittern and White-Faced** 20 **Ibis**

21 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
22 with construction-related activities could result in temporary disturbances that affect least bittern
23 and white-faced ibis use of modeled habitat. Construction noise above background noise levels
24 (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP
25 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*
26 *Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP Revisions*, of the Final EIR/EIS),
27 although there are no available data to determine the extent to which these noise levels could affect
28 least bittern or white-faced ibis. Indirect effects associated with construction include noise, dust,
29 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
30 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
31 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
32 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
33 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use
34 of mechanical equipment during water conveyance construction could cause the accidental release
35 of petroleum or other contaminants that could adversely affect these species or their prey in the
36 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
37 *Monitoring*, would minimize the likelihood of such spills from occurring and would ensure that
38 measures were in place to prevent runoff from the construction area and the negative effects of dust
39 on wildlife adjacent to work areas.

40 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
41 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
42 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
43 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
44 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*

1 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is
2 a large amount of uncertainty with respect to species-specific effects. A detailed review of the
3 methylmercury issues associated with implementation of the BDCP is contained in Appendix 11F,
4 *Substantive BDCP Revisions*. The review includes an overview of the BDCP-related mechanisms that
5 could result in increased mercury in the foodweb, and how exposure of individual species to
6 mercury may occur based on feeding habits and where species habitat overlaps with the areas
7 where mercury bioavailability could increase. Increased methylmercury associated with natural
8 community and floodplain restoration could indirectly affect least bittern and white-faced ibis, via
9 uptake in lower trophic levels (as described in Appendix 11F, *Substantive BDCP Revisions*).

10 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
11 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
12 *Revisions*) is included to provide for site-specific evaluation for each restoration project. Where
13 restoration design and adaptive management cannot fully address the high potential for
14 methylmercury production while also meeting restoration objectives, alternate restoration areas
15 would be considered on a project-specific basis. CM12 would be implemented in coordination with
16 other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury
17 Monitoring and Analysis Section. This conservation measure would include the following actions.

- 18 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
19 mercury methylation and bioavailability.
- 20 ● Define design elements that minimize conditions conducive to generation of methylmercury in
21 restored areas.
- 22 ● Define adaptive management strategies that can be implemented to monitor and minimize
23 actual postrestoration creation and mobilization of methylmercury.

24 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
25 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
26 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
27 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
28 2009). The effect of selenium toxicity differs widely between species and also between age and sex
29 classes within a species. In addition, the effect of selenium on a species can be confounded by
30 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
31 2009).

32 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
33 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
34 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
35 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
36 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
37 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
38 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
39 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
40 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
41 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
42 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
43 levels of selenium have a higher risk of selenium toxicity.

1 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 2 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 3 exacerbate bioaccumulation of selenium in avian species, including least bittern and white-faced
 4 ibis. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium,
 5 and therefore increase avian exposure from ingestion of prey items with elevated selenium levels.
 6 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
 7 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
 8 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
 9 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
 10 long-term increases in selenium concentrations in water in the Delta under any alternative.
 11 However, it is difficult to determine whether the effects of potential increases in selenium
 12 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
 13 lead to adverse effects on least bittern and white-faced ibis.

14 Because of the uncertainty that exists at this programmatic level of review, there could be a
 15 substantial effect on least bittern and white-faced ibis from increases in selenium associated with
 16 restoration activities. This effect would be addressed through the implementation of *AMM27*
 17 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 18 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
 19 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
 20 selenium management to reduce selenium concentrations and/or bioaccumulation would be
 21 evaluated separately for each restoration effort as part of design and implementation. This
 22 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
 23 design schedule.

24 **NEPA Effects:** Indirect effects on least bittern and white-faced ibis as a result of constructing the
 25 water conveyance facilities could have adverse effects on these species in the absence of other
 26 conservation actions. However, the implementation of AMM1–AMM7 would help to reduce this
 27 effect. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
 28 *Disturbance of Nesting Birds*, would also be available to address the adverse indirect effects of
 29 construction on active nests. Tidal habitat restoration could result in increased exposure of least
 30 bittern and white-faced ibis to selenium. This effect would be addressed through the
 31 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
 32 restoration design elements to reduce the potential for bioaccumulation of selenium and its
 33 bioavailability in tidal habitats.

34 Increased methylmercury associated with natural community and floodplain restoration could
 35 indirectly affect least bittern and white-faced ibis, via uptake in lower trophic levels (as described in
 36 the BDCP, Appendix 5.D, *Contaminants*). However, it is unknown what concentrations of
 37 methylmercury are harmful to the species, and the potential for increased exposure varies
 38 substantially within the study area. Implementation of CM12 which contains measures to assess the
 39 amount of mercury before project development, followed by appropriate design and adaptation
 40 management, would minimize the potential for increased methylmercury exposure, and would
 41 result in no adverse effect on least bittern and white-faced ibis.

42 **CEQA Conclusion:** Indirect effects of noise and visual disturbance, in addition to the potential for
 43 hazardous spills or increased dust on least bittern and white-faced ibis and their habitat as a result
 44 of plan implementation would represent a substantial adverse effect in the absence of other
 45 conservation actions. This impact would be significant. The incorporation of AMM1–AMM7 into the

1 BDCP and the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
2 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant
3 level. Tidal habitat restoration could result in increased exposure of least bittern and white-faced
4 ibis to selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
5 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
6 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
7 implementation of tidal natural communities restoration or floodplain restoration could result in
8 increased exposure of least bittern and white-faced ibis to methylmercury in restored tidal areas.
9 However, it is unknown what concentrations of methylmercury are harmful to these species and the
10 potential for increased exposure varies substantially within the study area. Implementation of CM12
11 which contains measures to assess the amount of mercury before project development, followed by
12 appropriate design and adaptation management, would minimize the potential for increased
13 methylmercury exposure, and would result in no adverse effect on least bittern and white-faced ibis.

14 Indirect effects of plan implementation would represent an adverse effect on least bittern and
15 white-faced ibis in the absence of other conservation measures. This would be a significant impact.
16 With AMM1-AMM7, *AMM27 Selenium Management*, and CM12 in place, and with the implementation
17 of Mitigation Measure BIO-75, indirect effects of plan implementation would not result in a
18 substantial adverse effect through habitat modifications and would not substantially reduce the
19 number or restrict the range of either species. Therefore, the indirect effects of Alternative 4 plan
20 implementation would have a less-than-significant impact on least bittern and white-faced ibis.

21 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
22 **Disturbance of Nesting Birds**

23 See Mitigation Measure BIO-75 under Impact BIO-75.

24 **Impact BIO-137: Periodic Effects of Inundation on Least Bittern and White-Faced Ibis as a**
25 **Result of Implementation of Conservation Components**

26 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
27 *Enhancement*) would increase the frequency and duration of inundation on approximately 961-
28 2,672 acres of modeled least bittern and white-faced ibis habitat (Table 12-4-50). However, no
29 adverse effects of increased inundation frequency on nesting habitat would be expected because
30 wetland vegetation has persisted under the existing Yolo Bypass flooding regime, and changes to
31 frequency and inundation are within the tolerance of these vegetation types. Inundation would
32 occur in the nonbreeding season and wetlands supporting habitat would not be expected to be
33 affected by flood flows.

34 **NEPA Effects:** Periodic inundation of Yolo Bypass would not be expected to have adverse effects on
35 least bittern or white-faced ibis because wetland vegetation has persisted under the existing Yolo
36 Bypass flooding regime, and changes to frequency and inundation are within the tolerance of these
37 vegetation types.

38 **CEQA Conclusion:** Periodic inundation of Yolo Bypass would not be expected to have a significant
39 impact on least bittern or white-faced ibis because wetland vegetation has persisted under the
40 existing Yolo Bypass flooding regime, and changes to frequency and inundation are within the
41 tolerance of these vegetation types.

1 **Loggerhead Shrike**

2 This section describes the effects of Alternative 4, including water conveyance facilities construction
3 and implementation of other conservation components, on loggerhead shrike. Modeled habitat for
4 loggerhead shrike includes both high-value and low-value modeled habitat. High-value habitat
5 includes grassland, vernal pool complex and alkali seasonal wetland natural communities in
6 addition to cultivated lands, including pasture and grain and hay crops. Breeding shrikes require
7 shrubs and tall trees for perching and nest placement, and are generally associated with riparian
8 edge grasslands (Humble 2008) or cultivated lands with associated trees and shrubs. Loggerhead
9 shrike modeled habitat is overestimated as it does not differentiate between lands with or without
10 associated nesting vegetation. Low-value habitat includes row crops such as truck and berry crops
11 and field crops which are not considered to be valuable habitat for the species but were included in
12 the model as they may provide foraging opportunities.

13 Construction and restoration associated with Alternative 4 conservation measures would result in
14 both temporary and permanent losses of modeled habitat for loggerhead shrike as indicated in
15 Table 12-4-51. Full implementation of Alternative 4 would include the following biological
16 objectives over the term of the BDCP which would also benefit loggerhead shrike (see Chapter 3,
17 Section 3.3, *Biological Goals and Objectives*, of the BDCP).

- 18 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
19 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
20 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 21 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 22 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
23 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 24 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
25 VPNC2.5, and GNC2.4, associated with CM11).
- 26 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
27 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 28 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
29 lands that occur in cultivated lands within the reserve system, including isolated valley oak
30 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
31 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
32 with CM3 and CM11).
- 33 • Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
34 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated
35 with CM11).

36 As explained below, with the restoration or protection of these amounts of habitat, in addition to
37 management activities that would enhance habitat for the species and implementation of AMM1–
38 AMM7, and Mitigation Measure BIO-75, impacts on loggerhead shrike would not be adverse for
39 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4-51. Changes in Loggerhead Shrike Modeled Habitat Associated with Alternative 4**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	1,978	1,978	537	537	NA	NA
	Low-value	1,269	1,269	441	441	NA	NA
Total Impacts CM1		3,247	3,247	978	978	NA	NA
CM2-CM18	High-value	5,450	26,198	376	893	777-2,423	3,823
	Low-value	1,801	17,575	97	624	672-1,996	4,315
Total Impacts CM2-CM18		7,251	43,773	474	1,517	1,830-5,646	8,138
Total High-value		7,428	28,176	913	1,430		
Total Low-value		3,070	18,844	538	1,065		
TOTAL IMPACTS		10,498	47,020	1,451	2,495	1,830-5,646	8,138

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. Yolo periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-138: Loss or Conversion of Modeled Habitat for and Direct Mortality of**
5 **Loggerhead Shrike**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up to 49,515 acres of modeled habitat for loggerhead shrike (of which 29,606 acres is of high-
8 value and 19,909 acres is of low value, Table 12-4-51). Conservation measures that would result in
9 these losses are conveyance facilities and transmission line construction, and establishment and use
10 of reusable tunnel material areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat
11 restoration (CM4), floodplain restoration (CM5), channel margin enhancement (CM6), riparian
12 restoration, (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9),
13 nontidal marsh restoration (CM10), natural communities enhancement and management (CM11)
14 and construction of conservation hatcheries (CM18). The majority of habitat loss (33,244 acres)
15 would result from CM4. Habitat enhancement and management activities (CM11), which include
16 ground disturbance or removal of nonnative vegetation, and the construction of recreational trails,
17 signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities
18 associated with the long-term operation of the water conveyance facilities and other BDCP physical
19 facilities could degrade or eliminate loggerhead shrike modeled habitat. Each of these individual
20 activities is described below. A summary statement of the combined impacts and NEPA effects, and a
21 CEQA conclusion follow the individual conservation measure discussions.

1 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
2 result in the combined permanent and temporary loss of up to 2,515 acres of high-value
3 loggerhead shrike habitat (1,978 acres of permanent loss, 537 acres of temporary loss). In
4 addition, 1,710 acres of low-value habitat would be removed (1,269 acres of permanent loss,
5 441 acres of temporary loss). Impacts would occur from the construction of Intakes 2, 3, and 5
6 and associated temporary work areas and access roads in CZ 4 between Clarksburg and
7 Courtland; construction of the intermediate forebay; and from a reusable tunnel material
8 storage area on Bouldin Island. The construction of the permanent and temporary transmission
9 line corridors through CZs 4-6 and 9 would also remove suitable foraging habitat for the species.
10 Approximately 796 acres of impact would be from the placement of reusable tunnel material
11 area west of the Clifton Court Forebay in CZ 8. In addition, permanent habitat loss would occur
12 from the construction of the new forebay south of the existing Clifton court Forebay in CZ 8.
13 Temporarily affected areas (grassland, cultivated lands, and associated shrubs or trees) would
14 be restored within 1 year following completion of construction activities as described in *AMM10*
15 *Restoration of Temporarily Affected Natural Communities*.

16 Loggerhead shrikes nest in high abundance in shrubs associated with the grasslands to the
17 south and to the west of Clifton Court Forebay. Shrikes were detected using this area at a much
18 higher rate than other grasslands and areas in the Delta during DHCCP surveys (Appendix 12C,
19 *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). Impacts from
20 CM1 that overlap with recorded loggerhead shrike nest occurrences (from CNDDDB and DHCCP
21 surveys) include the construction of the new forebay (5 occurrences), the Reusable Tunnel
22 Material storage area north-west of the existing forebay (2 occurrences), permanent
23 transmission line south of Clifton Court Road and west of the existing Clifton Court Forebay (1
24 occurrence), a permanent transmission line that extends along the northern extent of the
25 Reusable Tunnel Material storage areas west of the existing forebay (1 occurrence). Mitigation
26 Measure BIO-75 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
27 *Birds*, would require preconstruction surveys and the establishment of no-disturbance buffers
28 and would be available to address adverse effects on nesting loggerhead shrikes. Refer to the
29 Terrestrial Biology Mapbook for a detailed view of Alternative 4 construction locations. Impacts
30 from CM1 would occur within the first 10-14 years of Plan implementation.

31 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
32 would result in the combined permanent and temporary loss of up to 1,274 acres of high-value
33 loggerhead shrike habitat (898 acres of permanent loss, 376 acres of temporary loss) in the Yolo
34 Bypass in CZ 2. In addition, 182 acres of low-value habitat would be removed (85 acres of
35 permanent loss, 97 acres of temporary loss). The loss is expected to occur during the first 10
36 years of Alternative 4 implementation.

37 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
38 inundation would permanently remove an estimated 20,880 acres of high-value loggerhead
39 shrike habitat and 12,364 acres of low-value habitat. The majority of the acres lost would
40 consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the
41 vicinity of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of
42 Suisun Marsh, and along narrow bands adjacent to waterways in the South Delta ROA. Tidal
43 restoration would directly impact and fragment grassland just north of Rio Vista in and around
44 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses
45 of alkali seasonal wetland complex habitat would likely occur in the south end of the Yolo
46 Bypass and on the northern fringes of Suisun Marsh.

- 1 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
2 seasonally inundated floodplain would permanently and temporarily remove approximately
3 1,450 acres of high-value loggerhead shrike habitat (933 permanent, 517 temporary). These
4 losses would be expected after the first 10 years of Alternative 4 implementation along the San
5 Joaquin River and other major waterways in CZ 7.
- 6 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
7 approximately 370 acres of high-value loggerhead shrike habitat as part of tidal restoration and
8 1,489 acres as part of seasonal floodplain restoration. In addition, 503 acres of low-value habitat
9 would be removed as a part of tidal restoration and 1,971 acres would be removed as part of
10 seasonal floodplain restoration through CM7.
- 11 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
12 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
13 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
14 would be restored after the construction periods. Grassland restoration would be implemented
15 on agricultural lands that also provide habitat for loggerhead shrike and would result in the
16 conversion of 1,849 acres of cultivated lands to high-value grassland.
- 17 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
18 removal of 705 acres of high-value loggerhead shrike habitat and 735 acres of low-value
19 loggerhead shrike habitat.
- 20 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
21 actions included in CM11 that are designed to enhance wildlife values in restored or protected
22 habitats could result in localized ground disturbances that could temporarily remove small
23 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
24 vegetation and road and other infrastructure maintenance activities, would be expected to have
25 minor adverse effects on available habitat and would be expected to result in overall
26 improvements to and maintenance of habitat values over the term of the BDCP. Fences (e.g.
27 barbed wire) installed as part of CM11 in or adjacent to protected grasslands and cultivated
28 lands could benefit loggerhead shrike by providing hunting perches and impalement
29 opportunities. CM11 would also include the construction of recreational-related facilities
30 including trails, interpretive signs, and picnic tables (Chapter 4, *Covered Activities and Associated*
31 *Federal Actions*, of the BDCP). The construction of trailhead facilities, signs, staging areas, picnic
32 areas, bathrooms, etc. would be placed on existing, disturbed areas when and where possible.
33 However, approximately 50 acres of grassland habitat would be lost from the construction of
34 trails and facilities.
- 35 Habitat management- and enhancement-related activities could disturb loggerhead shrike nests.
36 If the species were to nest in the vicinity of a worksite, equipment operation could destroy nests
37 if shrubs and trees in grasslands or cultivated lands were removed, and noise and visual
38 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings.
39 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
40 *of Nesting Birds*, would be available to address these adverse effects.
- 41 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
42 value loggerhead shrike habitat for the development of a delta and longfin smelt conservation
43 hatchery in CZ 1. Hatchery construction is expected to occur within the first 10 years of Plan
44 implementation.

- 1 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
2 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
3 disturbances that could affect loggerhead shrike use of the surrounding habitat. Maintenance
4 activities would include vegetation management, levee and structure repair, and re-grading of
5 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7,
6 Mitigation Measure BIO-75, and conservation actions as described below.
- 7 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
8 direct mortality of adult or fledged loggerhead shrike if they were present in the Plan Area,
9 because they would be expected to avoid contact with construction and other equipment. If
10 either species were to nest in the construction area, construction-related activities, including
11 equipment operation, noise and visual disturbances could destroy nests or lead to their
12 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be
13 available to address these potential effects.

14 The following paragraphs summarize the combined effects discussed above and describe other
15 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
16 included.

17 **Near-Term Timeframe**

18 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
19 the near-term BDCP conservation strategy has been evaluated to determine whether it would
20 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
21 effects of construction would not be adverse under NEPA. Alternative 4 would remove 8,341 acres
22 (7,428 permanent, 913 temporary) of high-value habitat for loggerhead shrike in the study area in
23 the near-term. These effects would result from the construction of the water conveyance facilities
24 (CM1, 2,515 acres), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries*
25 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM5 *Seasonally Inundated Floodplain*
26 *Restoration*, CM7 *Riparian Natural Community Restoration*, CM8 *Grassland Natural Community*
27 *Restoration*, CM9 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, CM11 *Natural*
28 *Communities Enhancement and Management* and CM18 *Conservation Hatcheries*—5,826 acres). In
29 addition, 3,608 acres of low-value habitat would be removed or converted in the near-term (CM1,
30 1,710 acres; CM2 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*,
31 CM7 *Riparian Natural Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM9
32 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, CM11 *Natural Communities*
33 *Enhancement and Management* and CM18 *Conservation Hatcheries*—1,898 acres).

34 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
35 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 5,030 acres
36 should be protected to compensate for the loss of high-value habitat from CM1. The near-term
37 effects of other conservation actions would require 11,652 acres of protection to compensate for the
38 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the
39 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a
40 large proportion of the low-value habitat would result from the conversion and enhancement to
41 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively
42 quickly after completion of construction.

43 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
44 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of

1 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (see Table
2 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3,
3 CM8, and CM9 and would occur in the same timeframe as the construction and early restoration
4 losses.

5 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
6 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
7 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
8 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
9 create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce the
10 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*
11 *and Management*, insect prey populations would be increased on protected lands, enhancing the
12 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
13 Cultivated lands that provide habitat for covered and other native wildlife species would provide
14 approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective
15 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and
16 protect small patches of trees and shrubs within cultivated lands that would maintain foraging
17 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows
18 along field borders and roadsides within protected cultivated lands would also provide high-value
19 nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to near-term goals
20 of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural community.
21 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
22 late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
23 *Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
24 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
25 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
26 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
27 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
28 nesting habitat for loggerhead shrike. These Plan objectives represent performance standards for
29 considering the effectiveness of conservation actions.

30 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
31 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
32 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
33 CM1 and other near-term effects on loggerhead shrike high-value habitat with the consideration
34 that some portion of the 15,400 acres of cultivated lands protected in the near-term timeframe
35 would include suitable high-value crop types for loggerhead shrike. Sufficient acreage of the
36 protected cultivated lands would need to be managed in pasture, alfalfa, or grain and hay crops such
37 that the near-term impacts on high-value habitat were compensated for at a ratio of 2:1. Mitigation
38 Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*
39 would be available to address the adverse effect of near-term high-value habitat loss. With the
40 management and enhancement of cultivated lands including insect prey enhancement through CM3
41 and CM11, the protection of shrubs and establishment of hedgerows within protected cultivated
42 lands would compensate for any potential effect from the loss of low-value loggerhead shrike
43 foraging habitat.

44 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
45 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
46 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
2 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
3 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
4 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
5 of the Final EIR/EIS.

6 The loggerhead shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse
7 effect on individuals, preconstruction surveys for noncovered avian species would be required to
8 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*
9 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this
10 adverse effect.

11 **Late Long-Term Timeframe**

12 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,606
13 acres of high-value loggerhead shrike habitat during the term of the Plan. In addition, 19,909 acres
14 of low-value loggerhead shrike habitat would be impacted. The locations of these losses are
15 described above in the analyses of individual conservation measures. The Plan includes
16 conservation commitments through *CM3 Natural Communities Protection and Restoration, CM7*
17 *Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, and CM9*
18 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore
19 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex, protect 150
20 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands that provide
21 suitable habitat for native wildlife species (see Table 3-4 in Chapter 3 *Description of Alternatives*).
22 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
23 and GNC1.2). Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
24 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
25 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
26 create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce the
27 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*
28 *and Management*, insect prey populations would be increased on protected lands, enhancing the
29 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
30 Cultivated lands that provide habitat for covered and other native wildlife species would provide
31 approximately 48,625 acres of potential high-value habitat for loggerhead shrike (Objective
32 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and
33 protect small patches of trees and shrubs within cultivated lands that would maintain foraging
34 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows
35 along field borders and roadsides within protected cultivated lands would also provide high-value
36 nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to near-term goals
37 of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural community.
38 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
39 late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
40 *Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
41 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
42 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
43 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
44 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
45 nesting habitat for loggerhead shrike.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
 5 *Affected Natural Communities*. All of these AMMs include elements that would avoid or minimize the
 6 risk of affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C
 7 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
 8 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. The loggerhead shrike is not a
 9 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
 10 preconstruction surveys for noncovered avian species would be required to ensure that nests are
 11 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
 12 *Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

13 **NEPA Effects:** The loss of loggerhead shrike habitat and potential mortality of this special-status
 14 species under Alternative 4 would represent an adverse effect in the absence of other conservation
 15 actions. However, with habitat protection and restoration associated with CM3, CM8, CM9, and
 16 CM11, guided by biological goals and objectives and by AMM1–AMM6, *AMM10 Restoration of*
 17 *Temporarily Affected Natural Communities*, and *AMM18 Swainson’s Hawk*, and with implementation
 18 of Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike*
 19 *Habitat*, which would be available to guide the near-term protection and management of cultivated
 20 lands, the effects of habitat loss on loggerhead shrike under Alternative 4 would not be adverse.
 21 Loggerhead shrike is not a covered species under the BDCP, and potential mortality would be an
 22 adverse effect without preconstruction surveys to ensure that nests are detected and avoided.
 23 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
 24 *Nesting Birds*, would be available to address this effect.

25 **CEQA Conclusion:**

26 **Near-Term Timeframe**

27 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 28 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 29 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 30 effects of construction would be less than significant under CEQA. Alternative 4 would remove 8,341
 31 acres (7,428 permanent, 913 temporary) of high-value habitat for loggerhead shrike in the study
 32 area in the near-term. These effects would result from the construction of the water conveyance
 33 facilities (CM1, 2,515 acres), and implementing other conservation measures (*CM2 Yolo Bypass*
 34 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*
 35 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*
 36 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*
 37 and *CM18 Conservation Hatcheries*—5,826 acres). In addition, 3,606 acres of low-value habitat
 38 would be removed or converted in the near-term (CM1, 1,710 acres; *CM2 Yolo Bypass Fisheries*
 39 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community*
 40 *Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*
 41 *Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18*
 42 *Conservation Hatcheries*—1,898 acres).

43 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
 44 would be 2:1 protection of high-value habitat. Using these typical ratios would indicate that 5,030

1 acres should be protected to compensate for the loss of high-value habitat from CM1. The near-term
2 effects of other conservation actions would require 11,652 acres of protection to compensate for the
3 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the
4 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a
5 large proportion of the low-value habitat would result from the conversion and enhancement to
6 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively
7 quickly after completion of construction.

8 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
9 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
10 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (see Table
11 3-4 in Chapter 3 *Description of Alternatives*). These conservation actions are associated with CM3,
12 CM8, and CM9 and would occur in the same timeframe as the construction and early restoration
13 losses.

14 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
15 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
16 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
17 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
18 would create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce
19 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
20 *Enhancement and Management*, insect prey populations would be increased on protected lands,
21 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
22 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would
23 provide approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective
24 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and
25 protect small patches of trees and shrubs within cultivated lands that would maintain foraging
26 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows
27 along field borders and roadsides within protected cultivated lands would also provide high-value
28 nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to near-term goals
29 of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural community.
30 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
31 late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
32 *Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
33 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
34 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
35 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
36 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
37 nesting habitat for loggerhead shrike. These Plan objectives represent performance standards for
38 considering the effectiveness of conservation actions.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
43 *Affected Natural Communities*. All of these AMMs include elements that would avoid or minimize the
44 risk of affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C
45 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
46 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 In the absence of other conservation actions, the effects on loggerhead shrike habitat would
 2 represent an adverse effect as a result of habitat modification and potential direct mortality of a
 3 special-status species. This impact would be significant. Loggerhead shrike is not a covered species
 4 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
 5 noncovered avian species would be required to ensure that nests are detected and avoided. The
 6 combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex, and
 7 alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
 8 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
 9 CM1 and other near-term effects on loggerhead shrike high-value habitat with the consideration
 10 that some portion of the 15,400 acres of cultivated lands protected in the near-term timeframe
 11 would include suitable high-value crop types for loggerhead shrike. Sufficient acreage of the
 12 protected cultivated lands would need to be managed in pasture, alfalfa, or grain and hay crops such
 13 that the near-term impacts on high-value habitat were compensated for at a ratio of 2:1. With the
 14 acres of habitat protection and restoration described above, in addition to Mitigation Measure BIO-
 15 138, *Compensate for the Near-term Loss of High-Value Loggerhead Shrike Habitat*, Alternative 4
 16 would not result in a substantial adverse effect through loss of high-value habitat. The management
 17 and enhancement of cultivated lands including insect prey enhancement through CM3 and CM11,
 18 the protection of shrubs and establishment of hedgerows within protected cultivated lands would
 19 compensate for any potential substantial impact from the loss of low-value loggerhead shrike
 20 foraging habitat. In addition, AMM1-AMM7, and implementation of Mitigation Measure BIO-75,
 21 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid
 22 potentially significant impacts on nesting individuals. With these measures in place, Alternative 4
 23 would not result in a substantial adverse effect through habitat modification and would not
 24 substantially reduce the number or restrict the range of either species. Therefore, Alternative 4
 25 would have a less-than-significant impact on loggerhead shrike.

26 ***Late Long-Term Timeframe***

27 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 29,606
 28 acres of high-value loggerhead shrike habitat during the term of the Plan. In addition, 19,909 acres
 29 of low-value loggerhead shrike habitat would be impacted. The locations of these losses are
 30 described above in the analyses of individual conservation measures. The Plan includes
 31 conservation commitments through *CM3 Natural Communities Protection and Restoration*, *CM7*,
 32 *Riparian Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9*
 33 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore
 34 2,000 acres of grassland natural community, protect 600 acres of vernal pool complex, protect 150
 35 acres of alkali seasonal wetland complex and protect 48,625 acres of cultivated lands that provide
 36 suitable habitat for native wildlife species (see Table 3-4 in Chapter 3 *Description of Alternatives*).
 37 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 38 and GNC1.2). Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
 39 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
 40 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
 41 create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce the
 42 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*
 43 *and Management*, insect prey populations would be increased on protected lands, enhancing the
 44 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
 45 Cultivated lands that provide habitat for covered and other native wildlife species would provide
 46 approximately 48,625 acres of potential high-value habitat for loggerhead shrike (Objective

1 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and
2 protect small patches of trees and shrubs within cultivated lands that would maintain foraging
3 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows
4 along field borders and roadsides within protected cultivated lands would also provide high-value
5 nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to near-term goals
6 of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural community.
7 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
8 late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
9 *Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
10 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
11 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
12 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
13 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
14 nesting habitat for loggerhead shrike.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
19 *Affected Natural Communities*. All of these AMMs include elements that would avoid or minimize the
20 risk of affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C
21 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
22 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. The loggerhead shrike is not a
23 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
24 preconstruction surveys for noncovered avian species would be required to ensure that nests are
25 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
26 *Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a less-than-significant
27 level.

28 In the absence of other conservation actions, the effects on loggerhead shrike habitat would
29 represent an adverse effect as a result of habitat modification and potential direct mortality of a
30 special-status species. This impact would be significant. Considering Alternative 4's protection and
31 restoration provisions, which would provide acreages of new high-value or enhanced habitat in
32 amounts suitable to compensate for habitats lost to construction and restoration activities, and with
33 the implementation of AMM1-AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
34 *Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-138, *Compensate*
35 *for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*, the loss of habitat or direct
36 mortality through implementation of Alternative 4 would not result in a substantial adverse effect
37 through habitat modifications and would not substantially reduce the number or restrict the range
38 of the species. Therefore, the loss of habitat or potential mortality under this alternative would have
39 a less-than-significant impact on loggerhead shrike.

40 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
41 **Disturbance of Nesting Birds**

42 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value**
2 **Loggerhead Shrike Habitat**

3 Because the BDCP does not include acreage commitments for the protection of crop types in the
4 near-term time period, DWR will manage and protect sufficient acres of cultivated lands such as
5 pasture, grain and hay crops, or alfalfa as high-value loggerhead shrike habitat such that the
6 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of
7 2:1. Additional grassland protection, enhancement, and management may be substituted for the
8 protection of high-value cultivated lands.

9 **Impact BIO-139: Effects on Loggerhead Shrike Associated with Electrical Transmission**
10 **Facilities**

11 Loggerhead shrike's small, relatively maneuverable body, its lack of flocking behavior, and its
12 diurnal foraging behavior contribute to a low risk of collision with the proposed transmission lines.
13 Marking transmission lines with flight diverters that make the lines more visible to birds has been
14 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). For example, Yee
15 (2008) estimated that marking devices in the Central Valley could reduce avian mortality by 60%.
16 As described in *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted
17 with flight diverters, which would substantially reduce any potential for mortality of loggerhead
18 shrike individuals from powerline collisions.

19 **NEPA Effects:** Loggerhead shrike's small, relatively maneuverable body, its lack of flocking behavior,
20 and its diurnal foraging behavior contribute to a low risk of collision with the proposed
21 transmission lines In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird
22 strike diverters on all new transmission lines, which would substantially reduce the risk of bird
23 strike for loggerhead shrike as a result of the project. Therefore, the construction and operation of
24 new transmission lines under Alternative 4 would not result in an adverse effect on loggerhead
25 shrike.

26 **CEQA Conclusion:** Loggerhead shrike's small, relatively maneuverable body, its lack of flocking
27 behavior, and its diurnal foraging behavior contribute to a low risk of collision with the proposed
28 transmission lines In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird
29 strike diverters on all new transmission lines, which would substantially reduce the risk of bird
30 strike for loggerhead shrike as a result of the project. Therefore, the construction and operation of
31 new transmission lines under Alternative 4 would result in a less-than-significant impact on
32 loggerhead shrike.

33 **Impact BIO-140: Indirect Effects of Plan Implementation on Loggerhead Shrike**

34 Noise and visual disturbances associated with construction-related activities could result in
35 temporary disturbances that affect loggerhead shrike use of modeled habitat. Construction noise
36 above background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge
37 of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*
38 *the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP*
39 *Revisions*, of the Final EIR/EIS), although there are no available data to determine the extent to
40 which these noise levels could affect loggerhead shrike. Indirect effects associated with construction
41 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
42 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and
43 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse

1 effect on these species. Indirect effects from construction of the new forebay in CZ 8 could result in
2 substantial effects on active loggerhead shrike nests. DHCCP surveys in 2009 detected 10 nest sites
3 south-west of the Clifton Court Forebay (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
4 *EIR/EIS Environmental Data Report*) and the large expanses of grassland in CZ 8 provide high-value
5 nesting habitat for the species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
6 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on
7 active nests. The use of mechanical equipment during water conveyance facilities construction could
8 cause the accidental release of petroleum or other contaminants that could affect these species or
9 their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best*
10 *Management Practices and Monitoring*, would minimize the likelihood of such spills. The inadvertent
11 discharge of sediment or excessive dust adjacent to loggerhead shrike nesting habitat could also
12 have a negative effect on these species. AMM1–AMM7 would ensure that measures are in place to
13 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to
14 work areas.

15 **NEPA Effects:** Indirect effects on loggerhead shrike as a result of Alternative 4 implementation could
16 have adverse effects on these species through the modification of habitat and potential for direct
17 mortality. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting
18 loggerhead shrikes in the highly suitable habitat surrounding Clifton Court Forebay and adjacent to
19 work areas. The loggerhead shrike is not a covered species under the BDCP, and the potential for
20 mortality would be an adverse effect without preconstruction surveys to ensure that nests are
21 detected and avoided. In conjunction with AMM1–AMM7, Mitigation Measure BIO-75, *Conduct*
22 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
23 address this adverse effect.

24 **CEQA Conclusion:** Indirect effects on loggerhead shrike as a result of Alternative 4 implementation
25 could have a significant impact on these species. Construction of the new forebay in CZ 8 would have
26 the potential to disrupt nesting loggerhead shrikes in the highly suitable habitat surrounding Clifton
27 Court Forebay and adjacent to work areas. The incorporation of AMM1–AMM7 into the BDCP and
28 the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
29 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

30 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
31 **Disturbance of Nesting Birds**

32 See Mitigation Measure BIO-75 under Impact BIO-75.

33 **Impact BIO-141: Periodic Effects of Inundation on Loggerhead Shrike as a Result of**
34 **Implementation of Conservation Components**

35 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
36 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,830–
37 5,646 acres of modeled loggerhead shrike habitat (consisting of approximately 777–2,423 acres of
38 high-value habitat; Table 12-4-51). Based on hypothetical footprints, implementation of *CM5*
39 *Seasonally Inundated Floodplain Restoration* could result in the periodic inundation of up to
40 approximately 8,138 acres of modeled habitat (Table 12-4-51), consisting of 3,823 acres of high-
41 value and 4,315 acres of low-value habitat.

1 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
2 season due to periodic inundation. However, increased frequency and duration of inundation would
3 occur during the nonbreeding season.

4 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on loggerhead
5 shrike from the modification of habitat. Reduced foraging habitat availability may be expected
6 during the fledgling period of the nesting season due to periodic inundation. However, increased
7 frequency and duration of inundation would occur during the nonbreeding season.

8 **CEQA Conclusion:** Periodic inundation of floodplains would result in a less-than-significant impact
9 on loggerhead shrike from the modification of habitat. Reduced foraging habitat availability may be
10 expected during the fledgling period of the nesting season due to periodic inundation. However,
11 increased frequency and duration of inundation would occur during the nonbreeding season.

12 **Song Sparrow “Modesto” Population**

13 This section describes the effects of Alternative 4, including water conveyance facilities construction
14 and implementation of other conservation components, on Modesto song sparrow. The Modesto
15 song sparrow is common and ubiquitous throughout the Plan area, excluding CZ 11, and modeled
16 habitat for the species includes managed wetlands, tidal freshwater emergent, nontidal freshwater
17 emergent, and valley/foothill riparian vegetation communities.

18 Construction and restoration associated with Alternative 4 conservation measures would result in
19 both temporary and permanent removal of Modesto song sparrow habitat in the quantities
20 indicated in Table 12-4-52. Full implementation of Alternative 4 would include the following
21 biological objectives over the term of the BDCP which would also benefit Modesto song sparrow (see
22 Chapter 3, Section 3.3, *Biological Goals and Objectives*, of the BDCP).

- 23 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
24 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
25 associated with CM7).
- 26 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
27 10 (Objective VFRNC1.2, associated with CM3).
- 28 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZ 1, 2, 4, 5, 6,
29 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 30 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
31 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
32 associated with CM10)
- 33 ● Create 500 acres of managed wetlands in CZ 3, 4, 5, or 6 (Objectives GSHC1.3 and GSHC1.4,
34 associated with CM10).
- 35 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
36 VPNC2.5, and GNC2.4, associated with CM11).
- 37 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
38 lands that occur in cultivated lands within the reserve system, including isolated valley oak
39 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
40 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
41 with CM3).

- Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated with CM3).

As explained below, with the restoration or protection of these amounts of habitat, in addition to implementation of AMM1–AMM7, *AMM10 Restoration of Temporarily Affected Natural Communities*, and Mitigation Measure BIO-75, impacts on Modesto song sparrow would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-4-52. Changes in Modesto Song Sparrow Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	40	40	24	24	NA	NA
Total Impacts CM1		40	40	24	24	NA	NA
CM2–CM18	Nesting	2,444	3,253	133	169	81-158	284
Total Impacts CM2–CM18		2,444	3,253	133	169	81-158	284
TOTAL IMPACTS		2,484	3,293	157	193	81-158	284

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-142: Loss or Conversion of Habitat for and Direct Mortality of Modesto Song Sparrow

Alternative 4 conservation measures would result in the combined permanent and temporary loss of up to 3,486 acres of modeled habitat for Modesto song sparrow (3,293 acres of permanent loss and 232 acres of temporary loss, Table 12-4-52). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of reusable tunnel material areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate Modesto song sparrow modeled habitat. Temporarily affected areas would be restored as riparian habitat within 1 year following completion of construction activities as described in *AMM10 Restoration of Temporarily Affected Natural Communities*. Although the effects are

1 considered temporary, the restored riparian habitat would require a period of time for ecological
2 succession to occur and for restored riparian habitat to functionally replace habitat that has been
3 affected. Each of these individual activities is described below. A summary statement of the
4 combined impacts and NEPA effects, and a CEQA conclusion follows the individual conservation
5 measure discussions.

- 6 • *CM1 Water Facilities and Operation:* Construction of Alternative 4 conveyance facilities would
7 result in the combined permanent and temporary loss of up to 64 acres of modeled Modesto
8 song sparrow habitat (40 acres of permanent loss, 24 acres of temporary loss) from CZs 3-6 and
9 CZ 8. The CM1 construction footprint overlaps with 77 Modesto song sparrow occurrences and
10 the species is ubiquitous throughout the Delta. The Reusable Tunnel Material storage areas
11 throughout the central Delta overlaps with 24 occurrences, shaft locations along the tunnel
12 alignment overlap with 9 occurrences, the permanent transmission line overlaps with 6
13 occurrences, and 1 occurrence overlaps with the construction of the new forebay in CZ 8. In
14 addition, temporary impacts overlap with species occurrences including the construction of a
15 transmission line (1 occurrence) and geotechnical exploration zones along the tunnel alignment
16 (17 occurrences). Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
17 *Avoid Disturbance of Nesting Birds*, would require preconstruction surveys and the
18 establishment of no-disturbance buffers and would be available to address adverse effects on
19 nesting Modesto song sparrows. Refer to the Terrestrial Biology Mapbook for a detailed view of
20 Alternative 4 construction locations. Construction of the water conveyance facilities and the
21 resultant impacts would occur within the first 10-14 years of Plan implementation.
- 22 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
23 would permanently remove 143 acres of modeled Modesto song sparrow habitat in the Yolo
24 Bypass in CZ 2. In addition, 133 acres of habitat would be temporarily removed. These losses
25 would occur in the near-term timeframe and primarily consist of valley/foothill riparian natural
26 community and managed wetland. The loss is expected to occur during the first 10 years of
27 Alternative 4 implementation.
- 28 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and
29 inundation would result in the conversion of an estimated loss of 3,066 acres of modeled
30 Modesto song sparrow habitat by the late long-term timeframe.
- 31 • *CM5 Seasonally Inundated Floodplain Restoration:* Construction of setback levees to restore
32 seasonally inundated floodplain would permanently and temporarily remove approximately 80
33 acres of modeled Modesto song sparrow habitat (44 permanent, 36 temporary). These losses
34 would be expected to occur along the San Joaquin River and other major waterways in CZ 7. The
35 BDCP is expected to restore approximately 5,000 acres of valley/foothill riparian natural
36 community. These lands would be managed as a mosaic of seral stages, age classes, and plant
37 heights, some of which would provide suitable nesting habitat for Modesto song sparrow.
- 38 • *CM6 Channel Margin Enhancement:* Channel margin habitat enhancement could result in
39 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
40 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
41 activity would occur along waterway margins where riparian habitat stringers exist, including
42 levees and channel banks. The improvements would occur within the study area on sections of
43 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
44 Some of the restored riparian habitat in the channel margin would be expected to support
45 nesting habitat for Modesto song sparrow.

- 1 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
2 actions included in CM11 that are designed to enhance wildlife values in restored or protected
3 habitats could result in localized ground disturbances that could temporarily remove small
4 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
5 vegetation and road and other infrastructure maintenance activities, would be expected to have
6 minor adverse effects on available habitat and would be expected to result in overall
7 improvements to and maintenance of habitat values over the term of the BDCP.

8 Habitat management- and enhancement-related activities could affect Modesto song sparrow
9 nests. If the individuals were to nest in the vicinity of a worksite, equipment operation could
10 destroy nests, and noise and visual disturbances could lead to their abandonment, resulting in
11 mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
12 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address these adverse
13 effects.

- 14 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
15 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
16 disturbances that could affect Modesto song sparrow use of the surrounding habitat.
17 Maintenance activities would include vegetation management, levee and structure repair, and
18 re-grading of roads and permanent work areas. These effects, however, would be reduced by
19 AMMs and conservation actions as described below.

- 20 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
21 direct mortality of adult or fledged Modesto song sparrow if they were present in the Plan Area,
22 because they would be expected to avoid contact with construction and other equipment. If the
23 species were to nest in the construction area, construction-related activities, including
24 equipment operation, noise and visual disturbances could destroy nests or lead to their
25 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be
26 available to address these effects.

27 The following paragraphs summarize the combined effects discussed above and describe other
28 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
29 included.

30 ***Near-Term Timeframe***

31 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
32 the near-term BDCP conservation strategy has been evaluated to determine whether it would
33 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
34 effects of construction would not be adverse under NEPA. Alternative 4 would remove 2,641 acres
35 of modeled habitat (2,484 permanent, 157 temporary) for Modesto song sparrow in the study area
36 in the near-term. These effects would result from the construction of the water conveyance facilities
37 (CM1, 64 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
38 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
39 *Restoration—2,577 acres*).

40 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
41 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios
42 would indicate that 64 acres of suitable habitat should be restored/created and 64 acres should be
43 protected to compensate for the CM1 losses of 64 acres of Modesto song sparrow habitat. The near-
44 term effects of other conservation actions would remove 2,577 acres of modeled habitat, and

1 therefore require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song
2 sparrow habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1
3 for protection).

4 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
5 valley/foothill riparian natural community, restoring 2,000 acres of tidal freshwater emergent
6 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the
7 Plan Area (see Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are
8 associated with CM3, CM4, CM7, and CM10 and would occur in the same timeframe as the
9 construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
10 Modesto song sparrow. The majority of the riparian restoration acres would occur in CZ 7 as part of
11 a reserve system with extensive wide bands or large patches of valley/foothill riparian natural
12 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and
13 would provide suitable Modesto song sparrow nesting habitat. The tidal freshwater emergent
14 wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be
15 restored in a way that creates topographic heterogeneity and in areas that increase connectivity
16 among protected lands (Objective TFEWNC2.2). The nontidal marsh restoration would occur in CZs
17 2, 4, and/or 5, and the managed wetland restoration would occur in CZs 3, 4, 5, or 6. Both the
18 nontidal marsh and managed wetland restoration are associated with CM10 and would provide
19 nesting habitat for Modesto song sparrow.

20 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated
21 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands
22 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field
23 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).
24 The management of protected grasslands to increase insect prey through techniques such as the
25 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
26 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
27 standards for considering the effectiveness of conservation actions. The acres of restoration and
28 protection contained in the near-term Plan goals and the additional detail in the biological objectives
29 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
30 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
35 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
36 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
37 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
38 of the Final EIR/EIS.

39 Modesto song sparrow is not a covered species under the BDCP. For the BDCP to avoid an adverse
40 effect on individuals, preconstruction surveys for avian species would be required to ensure that
41 nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
42 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

1 **Late Long-Term Timeframe**

2 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 3,486 acres
 3 (3,293 acres of permanent loss, 193 acres of temporary loss) of modeled Modesto song sparrow
 4 habitat during the term of the Plan. The locations of these losses are described above in the analyses
 5 of individual conservation measures. The Plan includes conservation commitments through *CM3*
 6 *Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities Restoration*, and
 7 *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of the valley/foothill
 8 riparian natural community, restore 24,000 acres of tidal freshwater emergent wetland, restore 500
 9 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the Plan Area (see Table 3-4
 10 in Chapter 3, *Description of Alternatives*). Additional acres of valley/foothill riparian habitat would
 11 be restored as a component of channel margin enhancement actions (CM6) along 20 miles of river
 12 and slough channels in the Delta, some of which would be expected to support nesting habitat for
 13 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of
 14 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,
 15 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives
 16 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the
 17 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would
 18 provide suitable nesting habitat for Modesto song sparrow.

19 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
 20 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas
 21 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh
 22 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in
 23 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with
 24 CM10 and would provide nesting habitat for Modesto song sparrow.

25 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands
 26 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective
 27 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and
 28 roadsides, which would provide additional habitat for the species (Objective SH2.2). The
 29 management of protected grasslands to increase insect prey through techniques such as the
 30 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
 31 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
 32 standards for considering the effectiveness of conservation actions. The acres of restoration and
 33 protection contained in the near-term Plan goals and the additional detail in the biological objectives
 34 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
 35 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 40 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 41 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 42 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 43 of the Final EIR/EIS. Modesto song sparrow is not a covered species under the BDCP. For the BDCP
 44 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species
 45 would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75,

1 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
2 available to address this effect.

3 **NEPA Effects:** The loss of Modesto song sparrow habitat and potential mortality of this special-
4 status species under Alternative 4 would represent an adverse effect in the absence of other
5 conservation actions. However, with habitat protection and restoration associated with CM3, CM4,
6 CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would
7 be in place during all project activities, the effects of habitat loss on Modesto song sparrow under
8 Alternative 4 would not be adverse. The Modesto song sparrow is not a covered species under the
9 BDCP, and potential mortality would be an adverse effect without preconstruction surveys to ensure
10 that nests are detected and avoided. Mitigation Measure BIO-75 would be available to address this
11 effect.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
15 the near-term BDCP conservation strategy has been evaluated to determine whether it would
16 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
17 effects of construction would be less than significant under CEQA. Alternative 4 would remove 2,641
18 acres of modeled habitat (2,484 permanent, 157 temporary) for Modesto song sparrow in the study
19 area in the near-term. These effects would result from the construction of the water conveyance
20 facilities (CM1, 64 acres), and implementing other conservation measures (CM2 *Yolo Bypass*
21 *Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated*
22 *Floodplain Restoration*—2,577 acres).

23 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
24 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios
25 would indicate that 64 acres of suitable habitat should be restored/created and 64 acres should be
26 protected to mitigate the CM1 losses of 64 acres of Modesto song sparrow habitat. The near-term
27 effects of other conservation actions would remove 2,577 acres of modeled habitat, and therefore
28 require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song sparrow
29 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1 for
30 protection).

31 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
32 valley/foothill riparian natural community, restoring 2,000 acres of tidal freshwater emergent
33 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the
34 Plan Area (see Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are
35 associated with CM3, CM4, CM7, and CM10 and would occur in the same timeframe as the
36 construction and early restoration losses, thereby avoiding a significant impact of habitat loss on
37 Modesto song sparrow. The majority of the riparian restoration acres would occur in CZ 7 as part of
38 a reserve system with extensive wide bands or large patches of valley/foothill riparian natural
39 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and
40 would provide suitable Modesto song sparrow nesting habitat. The tidal freshwater emergent
41 wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be
42 restored in a way that creates topographic heterogeneity and in areas that increase connectivity
43 among protected lands (Objective TFEWNC2.2). The nontidal marsh restoration would occur in CZs
44 2, 4, and/or 5, and the managed wetland restoration would occur in CZs 3, 4, 5, or 6. Both the

1 nontidal marsh and managed wetland restoration are associated with CM10 and would provide
2 nesting habitat for Modesto song sparrow.

3 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated
4 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands
5 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field
6 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).
7 The management of protected grasslands to increase insect prey through techniques such as the
8 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
9 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
10 standards for considering the effectiveness of conservation actions.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
12 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
13 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
14 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
15 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
16 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
17 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs,*
18 *of the Final EIR/EIS.*

19 In the absence of other conservation actions, the effects on Modesto song sparrow habitat would
20 represent an adverse effect as a result of habitat modification and potential direct mortality of a
21 special-status species. This impact would be significant. Modesto song sparrow is not a covered
22 species under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction
23 surveys for noncovered avian species would be required to ensure that nests are detected and
24 avoided. The acres of restoration and protection contained in the near-term Plan goals and the
25 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
26 the project-level effects of CM1 on Modesto song sparrow, as well as mitigate the near-term effects
27 of the other conservation measures. With the acres of habitat protection and restoration described
28 above, in addition to AMM1-AMM7, and implementation of Mitigation Measure BIO-75, *Conduct*
29 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds,* Alternative 4 would not
30 result in a substantial adverse effect through habitat modification and would not substantially
31 reduce the number or restrict the range of the species. Therefore, Alternative 4 would have a less-
32 than-significant impact on Modesto song sparrow.

33 ***Late Long-Term Timeframe***

34 Alternative 4 as a whole would result in the permanent loss of and temporary effects on 3,486 acres
35 (3,293 acres of permanent loss, 193 acres of temporary loss) of modeled Modesto song sparrow
36 habitat during the term of the Plan. The locations of these losses are described above in the analyses
37 of individual conservation measures. The Plan includes conservation commitments through *CM3*
38 *Natural Communities Protection and Restoration, CM4 Tidal Natural Communities Restoration,* and
39 *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of the valley/foothill
40 riparian natural community, restore 24,000 acres of tidal freshwater emergent wetland, restore 500
41 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the Plan Area (see Table 3-4
42 in Chapter 3, *Description of Alternatives*). Additional acres of valley/foothill riparian habitat would
43 be restored as a component of channel margin enhancement actions (CM6) along 20 miles of river
44 and slough channels in the Delta, some of which would be expected to support nesting habitat for

1 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of
2 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,
3 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives
4 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the
5 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would
6 provide suitable nesting habitat for Modesto song sparrow.

7 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
8 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas
9 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh
10 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in
11 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with
12 CM10 and would provide nesting habitat for Modesto song sparrow.

13 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands
14 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective
15 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and
16 roadsides, which would provide additional habitat for the species (Objective SH2.2). The
17 management of protected grasslands to increase insect prey through techniques such as the
18 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
19 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
20 standards for considering the effectiveness of conservation actions. The acres of restoration and
21 protection contained in the near-term Plan goals and the additional detail in the biological objectives
22 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
23 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

24 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
25 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
26 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
27 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
28 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
29 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
30 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
31 of the Final EIR/EIS.

32 In the absence of other conservation actions, the effects on Modesto song sparrow habitat would
33 represent an adverse effect as a result of habitat modification and potential direct mortality of a
34 special-status species. This impact would be significant. Considering Alternative 4's protection and
35 restoration provisions, which would provide acreages of new high-value or enhanced habitat in
36 amounts suitable to compensate for habitats lost to construction and restoration activities, and with
37 the implementation of AMM1-AMM7, and Mitigation Measure BIO-75, the loss of habitat or direct
38 mortality through implementation of Alternative 4 would not result in a substantial adverse effect
39 through habitat modifications and would not substantially reduce the number or restrict the range
40 of either species. Therefore, the loss of habitat or potential mortality under this alternative would
41 have a less-than-significant impact on Modesto song sparrow.

42 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
43 **Disturbance of Nesting Birds**

44 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-143: Effects on Modesto Song Sparrow Associated with Electrical Transmission**
2 **Facilities**

3 New transmission lines would increase the risk for bird-power line strikes, which could result in
4 injury or mortality of Modesto song sparrow. Existing lines currently pose this risk for Modesto song
5 sparrow and the incremental increased risk from the construction of new transmission lines is not
6 expected to adversely affect the population.

7 **NEPA Effects:** The incremental increased risk of bird-powerline strikes from the construction of new
8 transmission lines would not adversely affect the Modesto song sparrow population.

9 **CEQA Conclusion:** The incremental increased risk of bird-powerline strikes from the construction of
10 new transmission lines would have a less-than-significant impact on the Modesto song sparrow
11 population.

12 **Impact BIO-144: Indirect Effects of Plan Implementation on Modesto Song Sparrow**

13 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
14 with construction-related activities could result in temporary disturbances that affect Modesto song
15 sparrow use of modeled habitat. Construction noise above background noise levels (greater than 50
16 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,
17 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
18 *Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP Revisions*, of the Final EIR/EIS), although
19 there are no available data to determine the extent to which these noise levels could affect Modesto
20 song sparrow. Indirect effects associated with construction include noise, dust, and visual
21 disturbance caused by grading, filling, contouring, and other ground-disturbing operations.
22 Construction-related noise and visual disturbances could disrupt nesting and foraging behaviors,
23 and reduce the functions of suitable habitat which could result in an adverse effect on these species.
24 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
25 *Nesting Birds*, would be available to minimize adverse effects on active nests. The use of mechanical
26 equipment during water conveyance construction could cause the accidental release of petroleum or
27 other contaminants that could affect these species or their prey in the surrounding habitat. AMM1-
28 AMM7 including *AMM2 Construction Best Management Practices and Monitoring* would minimize the
29 likelihood of such spills from occurring. The inadvertent discharge of sediment or excessive dust
30 adjacent to Modesto song sparrow could also have a negative effect on these species. AMM1-AMM7
31 would ensure that measures are in place to prevent runoff from the construction area and the
32 negative effects of dust on wildlife adjacent to work areas.

33 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
34 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
35 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
36 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
37 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*
38 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is
39 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury
40 associated with natural community and floodplain restoration could indirectly affect Modesto song
41 sparrow, via uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

42 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
43 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*

1 *Management* (as revised in Appendix 11F, *Substantive BDCP Revisions*) contains provisions for
 2 project-specific Mercury Management Plans. Site-specific restoration plans that address the creation
 3 and mobilization of mercury, as well as monitoring and adaptive management as described in CM12
 4 would be available to address the uncertainty of methylmercury levels in restored tidal marsh and
 5 potential impacts on Modesto song sparrow.

6 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 7 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 8 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 9 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 10 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 11 classes within a species. In addition, the effect of selenium on a species can be confounded by
 12 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 13 2009).

14 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
 15 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
 16 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
 17 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
 18 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
 19 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
 20 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
 21 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
 22 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
 23 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
 24 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
 25 have a higher risk of selenium toxicity.

26 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 27 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 28 exacerbate bioaccumulation of selenium in avian species, including Modesto song sparrow. Marsh
 29 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
 30 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
 31 Alternative 4 restoration activities that create newly inundated areas could increase bioavailability
 32 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
 33 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
 34 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
 35 increases in selenium concentrations in water in the Delta under any alternative. However, it is
 36 difficult to determine whether the effects of potential increases in selenium bioavailability
 37 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
 38 effects on Modesto song sparrow.

39 Because of the uncertainty that exists at this programmatic level of review, there could be a
 40 substantial effect on Modesto song sparrow from increases in selenium associated with restoration
 41 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
 42 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
 43 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
 44 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
 45 management to reduce selenium concentrations and/or bioaccumulation would be evaluated

1 separately for each restoration effort as part of design and implementation. This avoidance and
2 minimization measure would be implemented as part of the tidal habitat restoration design
3 schedule.

4 **NEPA Effects:** Indirect effects on Modesto song sparrow as a result of constructing the Alternative 4
5 water conveyance facilities could adversely affect individuals in the absence of other conservation
6 actions. The incorporation of AMM1–AMM7 into the BDCP and the implementation of Mitigation
7 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
8 *Birds*, would minimize this adverse effect.

9 The implementation of tidal natural communities restoration or floodplain restoration could result
10 in increased exposure of Modesto song sparrow to methylmercury. However, it is unknown what
11 concentrations of methylmercury are harmful to the species and the potential for increased
12 exposure varies substantially within the study area. Site-specific restoration plans that address the
13 creation and mobilization of mercury, as well as monitoring and adaptive management as described
14 in *CM12 Methylmercury Management* would address the potential impacts of methylmercury levels
15 in restored tidal marsh in the study area. The site-specific planning phase of marsh restoration
16 would be the appropriate place to assess the potential for risk of methylmercury exposure for
17 Modesto song sparrow, once site specific sampling and other information could be developed.

18 Tidal habitat restoration could result in increased exposure of Modesto song sparrow to selenium.
19 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
20 would provide specific tidal habitat restoration design elements to reduce the potential for
21 bioaccumulation of selenium and its bioavailability in tidal habitats.

22 **CEQA Conclusion:** Indirect effects on Modesto song sparrow as a result of constructing the
23 Alternative 4 water conveyance facilities could have a significant impact on the species. The
24 incorporation of AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-
25 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
26 reduce this impact to a less-than-significant level.

27 The implementation of tidal natural communities restoration or floodplain restoration could result
28 in increased exposure of Modesto song sparrow to methylmercury. However, it is unknown what
29 concentrations of methylmercury are harmful to the species. Site-specific restoration plans that
30 address the creation and mobilization of mercury, as well as monitoring and adaptive management
31 as described in *CM12 Methylmercury Management*, would address the potential impacts of
32 methylmercury levels in restored tidal marsh in the study area.

33 Tidal habitat restoration could result in increased exposure of Modesto song sparrow to selenium.
34 With implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
35 restoration design elements to reduce the potential for bioaccumulation of selenium and its
36 bioavailability in tidal habitats, the impact of potential increased selenium exposure would be less
37 than significant.

38 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
39 **Disturbance of Nesting Birds**

40 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-145: Periodic Effects of Inundation on Modesto Song Sparrow as a Result of**
2 **Implementation of Conservation Components**

3 Flooding of the Yolo Bypass (CM2) would inundate 81–158 acres of modeled Modesto song sparrow
4 habitat. However, inundation would occur during the nonbreeding season. Reduced foraging habitat
5 availability would be expected during the fledgling period of the nesting season due to periodic
6 inundation.

7 Based on hypothetical floodplain restoration, construction of setback levees from seasonally
8 inundated floodplain restoration (CM5) could result in periodic inundation of up to approximately
9 284 acres of Modesto song sparrow modeled habitat (Table 12-4-52).

10 The periodic inundation of the Yolo Bypass (CM2) and of seasonal floodplains (CM5) is expected to
11 restore a more natural flood regime in support of wetland and riparian vegetation types that
12 support Modesto song sparrow habitat, but may reduce the availability of nesting habitat during
13 years when flooding extends into the nesting season (past March).

14 **NEPA Effects:** Periodic effects of inundation would not result in an adverse effect on Modesto song
15 sparrow because increased frequency and duration of inundation would be expected to restore a
16 more natural flood regime in support of wetland and riparian vegetation types that support Modesto
17 song sparrow habitat.

18 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on
19 Modesto song sparrow because increased frequency and duration of inundation would be expected
20 to restore a more natural flood regime in support of wetland and riparian vegetation types that
21 support Modesto song sparrow habitat.

22 **Bank Swallow**

23 This section describes the effects of Alternative 4, including construction and implementation of
24 other conservation components, on bank swallow. Bank swallows nest in colonies along rivers,
25 streams, or other water and require fine textured sandy soils in vertical banks to create their
26 burrows. There is little suitable habitat for bank swallow in the study area because most of the
27 erodible banks have been stabilized with of levee revetment. The placement of rock revetment
28 prevents the lateral migration of rivers, removing the natural river process that creates vertical
29 banks through erosion (Bank Swallow Technical Advisory Committee 2013, Stillwater Sciences
30 2007). An estimated 70-90% of the bank swallow population in California nests along the
31 Sacramento and Feather Rivers (Bank Swallow Technical Advisory Committee 2013) upstream of
32 the study area. However, there are three CNDDDB records of bank swallow colonies in the study area:
33 two in CZ 2 north of Fremont Weir, and one in CZ 5 on Brannan Island, just west of Twitchell Island.

34 The closest natural community to represent modeled habitat for bank swallow is valley foothill
35 riparian. Although there are impacts to the valley foothill riparian natural community along the
36 northeast corner of Clifton Court Forebay, at the intermediate forebay, and on Bouldin Island, it is
37 highly unlikely that the habitat in these locations is suitable for bank swallow (alluvial soils that
38 form steep, eroded banks that have not been stabilized with levee revetment). Reusable tunnel
39 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that the
40 substrate would provide suitable nesting habitat for the species. However, if reusable tunnel
41 material areas were to become suitable for swallows over time, Mitigation Measure BIO-146 *Active*
42 *Bank Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized,*
43 would avoid impacts on nesting bank swallows by requiring surveys to be conducted prior to the

1 removal of reusable tunnel material. Construction and restoration associated with Alternative 4
2 conservation measures would not result in the direct loss of modeled habitat for bank swallow.
3 However, indirect effects of noise and visual disturbance from CM2 Yolo Bypass Fisheries
4 Enhancements and *CM4 Tidal Natural Communities Restoration* could impact bank swallow colonies
5 if they were present near work areas. In addition, there is uncertainty with respect to how water
6 flows upstream of the study area would affect bank swallow habitat.

7 As explained below, impacts on bank swallow under Alternative 4 would not be adverse for NEPA
8 purposes and would be less than significant for CEQA purposes with the implementation of
9 mitigation measures to monitor colonies and address the uncertainty of upstream operations on the
10 species.

11 **Table 12-4-53. Changes in Bank Swallow Modeled Habitat Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	Yolo	Floodplain
CM1	Nesting	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2-CM18	Nesting	0	0	0	0	0	0
Total Impacts CM2-CM18		0	0	0	0	0	0
TOTAL IMPACTS		0	0	0	0	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

12
13 **Impact BIO-146: Indirect Effects of Implementation of Conservation Components on Bank**
14 **Swallow**

15 Noise and visual disturbances during restoration activities from *CM2 Yolo Bypass Fisheries*
16 *Enhancement*, and *CM4 Tidal Natural Communities Restoration* including operation of earthmoving
17 equipment and human activities at work sites, could result in temporary disturbances that cause
18 bank swallow to abandon active nest burrows adjacent to construction areas. Bank swallow colonies
19 with occupied burrows have been recorded in CZ 2 and CZ 5 and construction-related disturbances
20 could result in an adverse effect on individuals. Various activities related to *CM11 Natural*
21 *Communities Enhancement and Management* could also have indirect impacts on bank swallow.

22 **NEPA Effects:** Construction activities associated with habitat restoration could adversely affect bank
23 swallow colonies in the absence of other measures. Noise and visual disturbances could result in
24 adverse effects on bank swallows if active colonies were present within 500 feet of work areas.

1 Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and Indirect Effects on*
2 *Bank Swallow Will Be Minimized*, would be available to address this effect.

3 **CEQA Conclusion:** Construction activities associated with habitat restoration could result in a
4 significant impact on bank swallow colonies in the absence of other measures. Noise and visual
5 disturbances could result in significant impacts on bank swallows if active colonies were present
6 within 500 feet of work areas. Implementation of Mitigation Measure BIO-146, *Active Bank Swallow*
7 *Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would reduce this
8 impact to a less-than-significant level.

9 **Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect**
10 **Effects on Bank Swallow Will Be Minimized**

11 To the extent practicable, BDCP proponents will not construct conservation components during
12 the bank swallow nesting season (April 1 through August 31). If restoration activities cannot be
13 avoided during nesting season, a qualified biologist will conduct preconstruction surveys to
14 determine if active bank swallow nesting colonies are present within 500 feet of work areas. If
15 no active nesting colonies are present, no further mitigation is required. Reusable tunnel
16 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that
17 the substrate would provide suitable nesting habitat for the species. However, reusable tunnel
18 material sites could become suitable for swallows over time. Surveys of reusable tunnel material
19 areas that have been present for at least 1 year, allowing the substrate to stabilize, will be
20 conducted prior to the removal of reusable tunnel material.

21 If active colonies are detected, DWR will establish a nondisturbance buffer (determined by DWR
22 in consultation with CDFW and the Bank Swallow Technical Advisory Committee) around the
23 colony during the breeding season. In addition, a qualified biologist will monitor any active
24 colony within 500 feet of construction to ensure that construction activities do not affect nest
25 success.

26 **Impact BIO-147: Effects of Upstream Reservoir and Water Conveyance Facilities Operations**
27 **on Bank Swallow**

28 Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes
29 with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the
30 species is loss of nesting habitat from the placement of rock revetment for levee stabilization.
31 Because of this limited available habitat, and the reduction of natural river process, the species is
32 highly sensitive to 1) reductions in winter flows which are necessary to erode banks for habitat
33 creation, and 2) high flows during the breeding season. The potential impacts of changes in
34 upstream flows during the breeding season on bank swallows are the flooding of active burrows and
35 destruction of burrows from increased bank sloughing. Bank swallows arrive in California and begin
36 to excavate their burrows in March, and the peak egg-laying occurs during April and May (Bank
37 Swallow Technical Advisory Committee 2013). Therefore, increases in flows after the March when
38 the swallows have nested and laid eggs in the burrows could result in the loss of nests. On the
39 Sacramento River, breeding season flows between 14,000 and 30,000 cfs have been associated with
40 localized bank collapses that resulted in partial or complete colony failure (Stillwater Sciences
41 2007).

1 The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations
 2 on the Sacramento River (Sacramento River at Keswick, Sacramento River upstream of Red Bluff,
 3 Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-
 4 flow channel at Thermalito Dam, and Feather River at the confluence with the Sacramento River).
 5 Flows were estimated for wet years, above normal years, below normal years, dry years, and critical
 6 years. An average also was estimated (see Chapter 5, Section 5.3.1, *Methods for Analysis*, for a
 7 description of the model).

8 On the Sacramento River at the Keswick and Red Bluff gauges, mean monthly flows under
 9 Alternative 4 could increase between April and August in below normal, dry, and critical years based
 10 on modeling assumptions and output (Table 1 in Section 11C.4.1.1 and Table 3 in Section 11C.4.1.2
 11 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*) which could lead to
 12 inundation of active colonies. However, model outputs indicate that flows under Existing Conditions
 13 and the predicted flows in the late long-term without the project (NAA) also show increases in flows
 14 during the breeding season (April through August) in these water year types. Similar trends are
 15 shown for the Feather River (Table 15 in Section 11C.4.1.8 and Table 17 in Section 11C.4.1.9 of
 16 Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*). In addition, at the Verona flow
 17 gauge on the Sacramento River in average water years (Table 7 in Section 11C.4.1.4 of Appendix
 18 11C, *CALSIM II Model Results Utilized in the Fish Analysis*) flows are predicted to be greater than
 19 14,000 cfs during the breeding season (April through August,) which could lead to bank collapse.
 20 However, flows of this height are recorded under Existing Conditions at this flow gague and are also
 21 predicted for the late long-term without the project (NAA).

22 **NEPA Effects:** High spring flows on the Sacramento and Feather Rivers may already be impacting
 23 bank swallow colonies during the breeding season, and predicted flows under Alternative 4 would
 24 not differ substantially from those under the No Action Alternative. However, because of the
 25 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding
 26 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.
 27 Soil type, high winter flows, and low spring flows all contribute to successful nesting of bank
 28 swallow, and even moderate changes in seasonal flows could have an adverse effect on breeding
 29 success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate*
 30 *Winter and Spring Flows Upstream of the Study Area*, would be available to address the uncertainty of
 31 potential adverse effects of upstream operations on bank swallow.

32 **CEQA Conclusion:** High spring flows on the Sacramento and Feather Rivers may already be
 33 impacting bank swallow colonies during the breeding season, and predicted flows under Alternative
 34 4 would not differ substantially from those under Existing Conditions. However, because of the
 35 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding
 36 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.
 37 There are many variables that dictate suitable habitat for the species that cannot be clearly
 38 quantified, and seasonal changes in flow could increase or decrease suitable habitat for bank
 39 swallow depending on soil type and location of current colonies. Implementation of Mitigation
 40 Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of*
 41 *the Study Area*, would address this potential significant impact and further determine if additional
 42 mitigation is required for bank swallow.

1 **Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and**
2 **Spring Flows Upstream of the Study Area**

3 To address the uncertainty of the impact of upstream spring flows on existing bank swallow
4 habitat, DWR will continue to support annual monitoring² of existing colonies upstream of the
5 study area. DWR will collect data to be used for quantifying the magnitude of flows that would
6 result in loss of active nest sites or degradation of available nesting habitat, and the extent to
7 which changes in SWP operations attributable solely to the California WaterFix are the cause of
8 such impacts. If DWR determines that changes in SWP operations attributable solely to the
9 California WaterFix have caused loss of active nest sites or degradation of available nesting
10 habitat, replacement habitat will be established at a minimum of 2:1 for the length of bank
11 habitat affected. Replacement habitat will consist of removing bank revetment to create habitat
12 for bank swallow at a location subject to CDFW approval (Bank Swallow Technical Advisory
13 Committee 2013).

14 **Yellow-Headed Blackbird**

15 This section describes the effects of Alternative 4, including water conveyance facilities construction
16 and implementation of other conservation components, on yellow-headed blackbird. The habitat
17 model used to assess impacts on yellow-headed blackbird includes nesting habitat and foraging
18 habitat. Modeled nesting habitat includes tidal freshwater emergent wetland, other natural seasonal
19 wetland, nontidal freshwater perennial emergent wetland, and managed wetland. These natural
20 communities support aquatic insects which are important prey items for yellow-headed blackbird
21 young (Beedy 2008). Modeled foraging habitat for yellow-headed blackbird consists of cultivated
22 lands and noncultivated land cover types known to support abundant insect populations, including
23 corn, pasture, and feedlots.

24 Construction and restoration associated with Alternative 4 conservation measures would result in
25 both temporary and permanent losses of yellow-headed blackbird modeled habitat as indicated in
26 Table 12-4-54. Full implementation of Alternative 4 would include the following biological
27 objectives over the term of the BDCP which would also benefit yellow-headed blackbird (see
28 Chapter 3, Section 3.3, *Biological Goals and Objectives*, of the BDCP).

- 29 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
30 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 31 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
32 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
33 associated with CM10).
- 34 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
35 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 36 ● Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
37 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
38 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).

² Bank swallow colonies have historically been and are currently monitored by DWR, USFWS, and CDFW in association with the Bank Swallow Technical Advisory Committee, which is a diverse coalition of state and federal agency and nongovernmental organization personnel, created in response to the continued decline of bank swallow populations on the Sacramento River.

- 1 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 2 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
- 3 complex in CZs 1, 8, and/or 11 (Objective ASWNC1.1, Objective VPNC1.1, associated with CM3).
- 4 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
- 5 lands that occur in cultivated lands within the reserve system, including isolated valley oak
- 6 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
- 7 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
- 8 with CM3).
- 9 • Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat (Table 12-4-
- 10 54) in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.3, associated with CM3).
- 11 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
- 12 lands that occur in cultivated lands within the reserve system, including isolated valley oak
- 13 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
- 14 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
- 15 with CM3).
- 16 • Increase prey abundance and accessibility for grassland-foraging species (Objective GNC2.4,
- 17 associated with CM11)

18 As explained below, with the restoration or protection of these amounts of habitat, in addition to
19 management activities to enhance habitats for the species and implementation of AMM1–AMM7,
20 *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on yellow-headed blackbird
21 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-4-54. Changes in Yellow-Headed Blackbird Modeled Habitat Associated with Alternative 4

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	19	19	39	39	NA	NA
	Foraging	2,652	2,652	656	656	NA	NA
Total Impacts CM1		2,671	2,671	695	695	NA	NA
CM2-CM18	Nesting	5,814	13,902	45	46	961-2,678	18
	Foraging	5,612	26,673	376	905	368-1,476	2,701
Total Impacts CM2-CM18		11,426	40,575	421	951	1,495-4,394	2,719
Total Nesting		5,833	13,921	84	85	961-2,678	18
Total Foraging		8,264	29,325	1,032	1,561	368-1,476	2,701
TOTAL IMPACTS		14,097	43,246	1,116	1,646	1,495-4,394	2,719

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4

Impact BIO-148: Loss of Habitat for and Direct Mortality of Yellow-Headed Blackbird

5

Alternative 4 conservation measures would result in the combined permanent and temporary loss

6

of up to 44,892 acres of modeled habitat (14,006 acres of nesting habitat and 30,886 acres of

7

foraging habitat) for yellow-headed blackbird (Table 12-4-54). Conservation measures that would

8

result in these losses are conveyance facilities and transmission line construction, and establishment

9

and use of reusable tunnel material areas (CM1), Yolo Bypass improvements (CM2), tidal habitat

10

restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration

11

(CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat

12

enhancement and management activities (CM11) which include ground disturbance or removal of

13

nonnative vegetation could result in local adverse habitat effects. In addition, maintenance activities

14

associated with the long-term operation of the water conveyance facilities and other BDCP physical

15

facilities could degrade or eliminate yellow-headed blackbird suitable habitat. Each of these

16

individual activities is described below. A summary statement of the combined impacts and NEPA

17

effects, and a CEQA conclusion follow the individual conservation measure discussions.

18

- *CM1 Water Facilities and Operation*: Construction of Alternative 4 water conveyance facilities

19

would result in the combined permanent and temporary loss of up to 58 acres of yellow-headed

20

blackbird nesting habitat (19 acres of permanent loss and 39 acres of temporary loss). In

21

addition, 3,308 acres of foraging habitat would be removed (2,652 acres of permanent loss, 656

1 acres of temporary loss). Activities that would impact suitable yellow-headed blackbird habitat
 2 consist of tunnel, forebay, and intake construction, temporary access roads, and construction of
 3 transmission lines. The largest losses of foraging habitat would occur from loss of corn. There
 4 are no occurrences of yellow-headed blackbird that overlap with the construction footprint for
 5 CM1. However, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
 6 *Avoid Disturbance of Nesting Birds*, would be available to address adverse effects on nesting
 7 yellow-headed blackbirds. Impacts from CM1 would occur in the central delta in CZs 3–6, and CZ
 8 8. Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4 construction
 9 locations. Impacts from CM1 would occur within the first 10-14 years of Plan implementation.

- 10 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries enhancement
 11 would result in the combined permanent and temporary loss of up to 100 acres of nesting
 12 habitat (55 acres of permanent loss, 45 acres of temporary loss) in the Yolo Bypass in CZ 2. In
 13 addition, 1,144 acres of foraging habitat would be removed (879 acres of permanent loss, 265
 14 acres of temporary loss). The loss is expected to occur during the first 10 years of Alternative 4
 15 implementation.
- 16 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation from CM4 would
 17 permanently remove or convert an estimated 13,847 acres of nesting habitat, which would
 18 consist primarily of managed wetland. In addition, 20,029 acres of foraging habitat would be
 19 lost or converted as a result of tidal restoration, over half of which would be from the loss or
 20 conversion of alfalfa. However, the resulting 65,000 acres of tidal natural communities would
 21 also provide habitat for the species, 24,000 acres of which would be tidal freshwater natural
 22 communities providing breeding habitat for yellow-headed blackbird.
- 23 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 24 seasonally inundated floodplain and riparian restoration actions would remove approximately 2
 25 acres of yellow-headed blackbird nesting habitat (1 acres of permanent loss, 1 acres of
 26 temporary loss) and 1,641 acres of foraging habitat (1,051 acres of permanent loss, 590 acres of
 27 temporary loss). These losses would be expected after the first 10 years of Alternative 4
 28 implementation along the San Joaquin River and other major waterways in CZ 7.
- 29 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
 30 approximately 509 acres of yellow-headed blackbird foraging habitat as part of tidal restoration
 31 and 2,033 acres as part of seasonal floodplain restoration through CM7.
- 32 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
 33 implemented on agricultural lands and would result in the conversion of 926 acres of yellow-
 34 headed blackbird agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,
 35 and 11. If agricultural lands supporting higher value foraging habitat than the restored
 36 grassland were removed, there would be a loss of white-tailed kite foraging habitat value. CM8
 37 would result in the restoration of 2,000 acres of grassland foraging habitat in the study area.
- 38 • *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would
 39 result in the permanent conversion of 988 acres of cultivated lands foraging habitat to nontidal
 40 marsh in CZ 2 and CZ 4. Yellow-headed blackbird nesting habitat may develop along the margins
 41 of restored nontidal marsh and restoration would also provide foraging habitat for the species.
- 42 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and
 43 enhancement-related activities could disturb yellow-headed blackbird nests if they were
 44 present near work sites. A variety of habitat management actions included in CM11 that are

1 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground
2 disturbances that could temporarily remove small amounts of yellow-headed blackbird habitat
3 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,
4 such as removal of nonnative vegetation and road and other infrastructure maintenance, would
5 be expected to have minor effects on available yellow-headed blackbird habitat. These effects
6 cannot be quantified, but are expected to be minimal and would be avoided and minimized by
7 the AMMs listed below. BDCP Appendix 3.C describes the AMMs, which have since been updated
8 and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the
9 Final EIR/EIS. CM11 would also include the construction of recreational-related facilities,
10 including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and*
11 *Associated Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic
12 areas, bathrooms, etc. would be placed on existing, disturbed areas when and where possible.
13 However, approximately 50 acres of grassland foraging habitat would be lost from the
14 construction of trails and facilities.

- 15 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
16 yellow-headed blackbird foraging habitat for the development of a delta and longfin smelt
17 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan
18 implementation.
- 19 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
20 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
21 disturbances that could affect yellow-headed blackbird use of the surrounding habitat.
22 Maintenance activities would include vegetation management, levee and structure repair, and
23 re-grading of roads and permanent work areas. These effects, however, would be reduced by
24 AMMs and conservation actions as described below.
- 25 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
26 direct mortality of adult or fledged yellow-headed blackbird if they were present in the study
27 area, because they would be expected to avoid contact with construction and other equipment. If
28 yellow-headed blackbird were to nest in the construction area, construction-related activities,
29 including equipment operation, noise and visual disturbances could destroy nests or lead to
30 their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75,
31 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
32 available to address these adverse effects on yellow-headed blackbird.

33 The following paragraphs summarize the combined effects discussed above and describe other
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
35 included.

36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would
39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
40 effects of construction would not be adverse under NEPA. Alternative 4 would remove 5,917 acres
41 (5,833 acres of permanent loss, 84 acres of temporary loss) of yellow-headed blackbird nesting
42 habitat in the study area in the near-term. These effects would result from the construction of the
43 water conveyance facilities (CM1, 58 acres), and implementing other conservation measures (*CM2*
44 *Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*

1 *Inundated Floodplain Restoration*—5,859 acres). In addition, 9,296 acres of yellow-headed blackbird
2 foraging habitat would be removed or converted in the near-term (CM1, 3,308 acres; *CM2 Yolo*
3 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally*
4 *Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland*
5 *Natural Community Restoration*, *CM10 Nontidal Marsh Restoration*, and *CM18 Conservation*
6 *Hatcheries*—5,988 acres).

7 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
8 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection
9 of foraging habitat. Using these ratios would indicate that 58 acres of nesting habitat should be
10 restored/created and 58 acres should be protected to compensate for the CM1 losses of 58 acres of
11 yellow-headed blackbird nesting habitat. In addition, 3,308 acres of foraging habitat should be
12 protected to compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-
13 term effects of other conservation actions would require 5,859 acres each of restoration and
14 protection of breeding habitat and 5,988 acres of protection of foraging habitat using the same
15 typical NEPA and CEQA ratios (1:1 restoration and 1:1 protection of nesting habitat; 1:1 protection
16 of foraging habitat).

17 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
18 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of
19 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,
20 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland
21 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (see Table 3-4 in Chapter
22 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM8, and
23 CM10 and would occur in the same timeframe as the construction and early restoration losses.

24 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
25 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
26 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
27 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and
28 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas
29 of bare ground or marsh where the predominant vegetation consists of invasive species such as
30 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant
31 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be
32 created, some of which would provide nesting habitat for the species.

33 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
34 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
35 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
36 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
37 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
38 abundance would also be increased on protected lands, enhancing the foraging value of these
39 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
40 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
41 hedgerows along field borders and roadsides within protected cultivated lands (Objective
42 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
43 wetlands would also be protected and maintained as part of the cultivated lands reserve system
44 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

1 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
2 species would be protected in the near-term time period (Objective CLNC1.1), much of which would
3 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection
4 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the
5 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed
6 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

7 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
11 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
12 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
13 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
14 of the Final EIR/EIS.

15 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
16 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
17 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
18 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
19 address this adverse effect.

20 **Late Long-Term Timeframe**

21 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres
22 of modeled foraging habitat for yellow-headed blackbird. Alternative 4 as a whole would result in
23 the permanent loss of and temporary effects on 14,006 acres of potential nesting habitat (17% of the
24 potential nesting habitat in the study area) and the loss or conversion of 30,886 acres of foraging
25 habitat (9% of the foraging habitat in the study area). The locations of these losses are described
26 above in the analyses of individual conservation measures.

27 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
28 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*
29 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of
30 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,
31 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres
32 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of
33 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable
34 habitat for native wildlife species (see Table 3-4 in Chapter 3, *Description of Alternatives*).

35 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
36 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
37 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
38 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit
39 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground
40 or marsh where the predominant vegetation consists of invasive species such as perennial
41 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
42 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of
43 which would provide nesting habitat for the species.

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
2 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
3 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
4 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
5 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
6 abundance would also be increased on protected lands, enhancing the foraging value of these
7 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
8 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
9 hedgerows along field borders and roadsides within protected cultivated lands (Objective
10 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
11 wetlands would also be protected and maintained as part of the cultivated lands reserve system
12 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the
13 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time
14 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types
15 for tricolored blackbird (Table 3.3-6 in BDCP Chapter 3, *Conservation Strategy*). These crop types
16 include pasture, sunflower, alfalfa, and other crop types that would provide high-value foraging
17 habitat for yellow-headed blackbird.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
19 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
20 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
21 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
22 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
23 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
24 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
25 of the Final EIR/EIS.

26 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
27 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
28 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
29 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
30 address this effect.

31 **NEPA Effects:** The loss of yellow-headed blackbird habitat and potential direct mortality of this
32 special-status species associated with Alternative 4 would represent an adverse effect in the
33 absence of other conservation actions. However, with habitat protection and restoration associated
34 with CM3, CM4, CM8, CM10, and CM11, guided by biological goals and objectives and by AMM1–
35 AMM7, which would be in place during all project activities, the effects of habitat loss would not be
36 adverse under Alternative 4. The yellow-headed blackbird is not a covered species under the BDCP.
37 For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered
38 avian species would be required to ensure that nests are detected and avoided. Mitigation Measure
39 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
40 be available to address this adverse effect.

41 **CEQA Conclusion:**

42 **Near-Term Timeframe**

43 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
44 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
2 effects of construction would be less than significant under CEQA. Alternative 4 would remove 5,917
3 acres (5,833 acres of permanent loss, 84 acres of temporary loss) of yellow-headed blackbird
4 nesting habitat in the study area in the near-term. These effects would result from the construction
5 of the water conveyance facilities (CM1, 58 acres), and implementing other conservation measures
6 (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5
7 Seasonally Inundated Floodplain Restoration—5,859 acres). In addition, 9,296 acres of yellow-
8 headed blackbird foraging habitat would be removed or converted in the near-term (CM1, 3,308
9 acres; CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5
10 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8
11 Grassland Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation
12 Hatcheries—5,988 acres).

13 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
14 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection
15 of foraging habitat. Using these ratios would indicate that 58 acres of nesting habitat should be
16 restored/created and 58 acres should be protected to compensate for the CM1 losses of yellow-
17 headed blackbird nesting habitat. In addition, 3,308 acres of foraging habitat should be protected to
18 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of
19 other conservation actions would require 5,859 acres each of restoration and protection of breeding
20 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA
21 ratios (1:1 restoration and 1:1 for protection of nesting habitat; 1:1 protection of foraging habitat).

22 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
23 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of
24 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,
25 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland
26 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (see Table 3-4 in Chapter
27 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM8, and
28 CM10 and would occur in the same timeframe as the construction and early restoration losses.

29 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
30 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
31 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
32 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and
33 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas
34 of bare ground or marsh where the predominant vegetation consists of invasive species such as
35 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant
36 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be
37 created, some of which would provide nesting habitat for the species.

38 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
39 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
40 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
41 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
42 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
43 abundance would also be increased on protected lands, enhancing the foraging value of these
44 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
45 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide

1 hedgerows along field borders and roadsides within protected cultivated lands (Objective
2 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
3 wetlands would also be protected and maintained as part of the cultivated lands reserve system
4 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

5 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife
6 species would be protected in the near-term time period (Objective CLNC1.1), much of which would
7 provide foraging habitat for yellow-headed blackbird.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
12 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
13 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
14 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
15 of the Final EIR/EIS.

16 In the absence of other conservation actions, the effects on yellow-headed blackbird habitat would
17 represent an adverse effect as a result of habitat modification and potential direct mortality of a
18 special-status species. This impact would be significant. Yellow-headed blackbird is not a covered
19 species under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction
20 surveys for noncovered avian species would be required to ensure that nests are detected and
21 avoided. The acres of restoration and protection contained in the near-term Plan goals and the
22 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
23 the project-level effects of CM1 on yellow-headed blackbird habitat, as well as mitigate the near-
24 term effects of the other conservation measures. With the acres of habitat protection and restoration
25 described above, in addition to AMM1-AMM7, and implementation of Mitigation Measure BIO-75,
26 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, Alternative 4
27 would not result in a substantial adverse effect through habitat modification and would not
28 substantially reduce the number or restrict the range of the species. Therefore, Alternative 4 would
29 have a less-than-significant impact on yellow-headed blackbird.

30 ***Late Long-Term Timeframe***

31 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres
32 of modeled foraging habitat for yellow-headed blackbird. Alternative 4 as a whole would result in
33 the permanent loss of and temporary effects on 14,006 acres of potential nesting habitat (17% of the
34 potential nesting habitat in the study area) and the loss or conversion of 30,886 acres of foraging
35 habitat (9% of the foraging habitat in the study area). The locations of these losses are described
36 above in the analyses of individual conservation measures.

37 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
38 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*
39 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of
40 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,
41 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres
42 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of
43 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable
44 habitat for native wildlife species (see Table 3-4 in Chapter 3, *Description of Alternatives*).

1 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
2 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
3 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
4 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit
5 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground
6 or marsh where the predominant vegetation consists of invasive species such as perennial
7 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
8 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of
9 which would provide nesting habitat for the species.

10 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
11 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
12 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
13 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
14 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
15 abundance would also be increased on protected lands, enhancing the foraging value of these
16 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
17 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
18 hedgerows along field borders and roadsides within protected cultivated lands (Objective
19 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
20 wetlands would also be protected and maintained as part of the cultivated lands reserve system
21 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the
22 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time
23 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types
24 for tricolored blackbird (see Table 3.3-6 in Chapter 3, *Conservation Strategy*, of the BDCP). These
25 crop types include pasture, sunflower, alfalfa, and other crop types that would provide high-value
26 foraging habitat for yellow-headed blackbird.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
31 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
32 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
33 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
34 of the Final EIR/EIS.

35 In the absence of other conservation actions, the effects on yellow-headed blackbird habitat would
36 represent an adverse effect as a result of habitat modification and potential direct mortality of a
37 special-status species. This impact would be significant. Considering Alternative 4's protection and
38 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
39 necessary to compensate for habitat lost to construction and restoration activities, and with the
40 implementation of AMM1-AMM7 and Mitigation Measure BIO-75, the loss of habitat or direct
41 mortality through implementation of Alternative 4 would not result in a substantial adverse effect
42 through habitat modifications and would not substantially reduce the number or restrict the range
43 of yellow-headed blackbird. Therefore, the loss of habitat or potential mortality under this
44 alternative would have a less-than-significant impact on yellow-headed blackbird.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 See Mitigation Measure BIO-75 under Impact BIO-75.

4 **Impact BIO-149: Effects on Yellow-Headed Blackbird Associated with Electrical Transmission**
5 **Facilities**

6 Yellow-headed blackbirds are colonial and have the potential to collide with the proposed
7 transmission lines when migrating in large flocks. However, similar to tricolored blackbird behavior,
8 daily flights associated with foraging likely occur in smaller flocks at heights that are lower than the
9 transmission lines (BDCP Appendix 5.J, Attachment 5.J-2, *Memorandum: Analysis of Potential Bird*
10 *Collisions at Proposed BDCP Transmission Lines*). Marking transmission lines with flight diverters
11 that make the lines more visible to birds has been shown to reduce the incidence of bird mortality
12 (Brown and Drewien 1995). For example, Yee (2008) estimated that marking devices in the Central
13 Valley could reduce avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new
14 project transmission lines would be fitted with flight diverters, which would reduce the potential for
15 yellow-headed blackbird collision with transmission lines. Transmission line poles and towers also
16 provide perching substrate for raptors, which are predators on yellow-headed blackbird. Although
17 there is potential for transmission lines to result in increased perching opportunities for raptors and
18 result in increased predation pressure on yellow-headed blackbirds, the existing network of
19 transmission lines in the study area currently poses this risk for yellow-headed blackbirds, and any
20 incremental risk associated with the new transmission line corridors would not be expected to
21 affect the study area population. Therefore, it is assumed that the increase in predation risk on
22 yellow-headed blackbird from an increase in raptor perching opportunities would be minimal.

23 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
24 could result in injury or mortality of yellow-headed blackbird. *AMM20 Greater Sandhill Crane*
25 contains the commitment to place bird strike diverters on all new powerlines, which would reduce
26 the potential impact of the construction of new transmission lines on yellow-headed blackbird. The
27 increase in predation risk on yellow-headed blackbird from an increase in raptor perching
28 opportunities would be minimal. Therefore, the construction and operation of new transmission
29 lines under Alternative 4 would not result in an adverse effect on yellow-headed blackbird.

30 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
31 could result in injury or mortality of yellow-headed blackbird. *AMM20 Greater Sandhill Crane*
32 contains the commitment to place bird strike diverters on all new powerlines, which would reduce
33 the potential impact of the construction of new transmission lines on yellow-headed blackbird. The
34 increase in predation risk on yellow-headed blackbird from an increase in raptor perching
35 opportunities would be minimal. The construction and operation of new transmission lines under
36 Alternative 4 would not substantially reduce the number or restrict the range of the species and
37 would therefore result in a less-than-significant impact on yellow-headed blackbird.

38 **Impact BIO-150: Indirect Effects of Plan Implementation on Yellow-Headed Blackbird**

39 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
40 with construction-related activities could result in temporary disturbances that affect yellow-
41 headed blackbird use of suitable habitat. Construction noise above background noise levels (greater
42 than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (BDCP
43 Appendix 5.J, Attachment 5.J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*

1 *Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP Revisions*), although there are no
 2 available data to determine the extent to which these noise levels could affect yellow-headed
 3 blackbird. Indirect effects associated with construction include noise, dust, and visual disturbance
 4 caused by grading, filling, contouring, and other ground-disturbing operations. Construction-related
 5 noise and visual disturbances could disrupt nesting and foraging behaviors, and reduce the
 6 functions of suitable habitat which could result in an adverse effect on these species. Mitigation
 7 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
 8 *Birds*, would be available to minimize adverse effects on active nests. The use of mechanical
 9 equipment during water conveyance construction could cause the accidental release of petroleum or
 10 other contaminants that could affect the species in the surrounding habitat. The inadvertent
 11 discharge of sediment or excessive dust adjacent to yellow-headed blackbird habitat could also have
 12 a negative effect on the species. Where nests are located above open water, impacts of
 13 contamination, dust, and sediment in water could impact fledglings directly, or affect aquatic insect
 14 prey, which is important for feeding young. AMM1–AMM7 would minimize the likelihood of spills
 15 from occurring and ensure that measures are in place to prevent runoff from the construction area
 16 and the negative effects of dust on wildlife adjacent to work areas.

17 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
 18 mercury in avian species, including yellow-headed blackbird. Marsh (tidal and nontidal) and
 19 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
 20 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
 21 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
 22 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
 23 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity
 24 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-
 25 specific effects. A detailed review of the methylmercury issues associated with implementation of
 26 the BDCP is contained in Appendix 11F, *Substantive BDCP Revisions*. The review includes an
 27 overview of the BDCP-related mechanisms that could result in increased mercury in the foodweb,
 28 and how exposure of individual species to mercury may occur based on feeding habits and where
 29 species habitat overlaps with the areas where mercury bioavailability could increase. Increased
 30 methylmercury associated with natural community and floodplain restoration could indirectly affect
 31 yellow-headed blackbird, via uptake in lower trophic levels (as described in the BDCP, Appendix 5.D,
 32 *Contaminants*).

33 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
 34 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
 35 *Revisions*) is included to provide for site-specific evaluation for each restoration project. Where
 36 restoration design and adaptive management cannot fully address the high potential for
 37 methylmercury production while also meeting restoration objectives, alternate restoration areas
 38 would be considered on a project-specific basis. CM12 would be implemented in coordination with
 39 other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury
 40 Monitoring and Analysis Section. This conservation measure would include the following actions.

- 41 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
 42 mercury methylation and bioavailability.
- 43 ● Define design elements that minimize conditions conducive to generation of methylmercury in
 44 restored areas.

- 1 • Define adaptive management strategies that can be implemented to monitor and minimize
2 actual postrestoration creation and mobilization of methylmercury.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex
8 classes within a species. In addition, the effect of selenium on a species can be confounded by
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
10 2009).

11 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
12 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
13 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
14 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
15 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
16 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
17 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
18 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
19 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
20 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
21 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
22 have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
24 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
25 exacerbate bioaccumulation of selenium in avian species, including yellow-headed blackbird. Marsh
26 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
27 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
28 Alternative 4 restoration activities that create newly inundated areas could increase bioavailability
29 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
30 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
31 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
32 increases in selenium concentrations in water in the Delta under any alternative. However, it is
33 difficult to determine whether the effects of potential increases in selenium bioavailability
34 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
35 effects on yellow-headed blackbird.

36 Because of the uncertainty that exists at this programmatic level of review, there could be a
37 substantial effect on yellow-headed blackbird from increases in selenium associated with
38 restoration activities. This effect would be addressed through the implementation of *AMM27*
39 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
40 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
41 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
42 selenium management to reduce selenium concentrations and/or bioaccumulation would be
43 evaluated separately for each restoration effort as part of design and implementation. This
44 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
45 design schedule.

1 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
2 could reduce yellow-headed blackbird use of modeled habitat adjacent to work areas. Moreover,
3 operation and maintenance of the water conveyance facilities, including the transmission facilities,
4 could result in ongoing but periodic postconstruction disturbances that could affect yellow-headed
5 blackbird use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
6 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse
7 effects on nesting individuals in addition to AMM1–AMM7.

8 The implementation of tidal natural communities restoration or floodplain restoration could result
9 in increased exposure of yellow-headed blackbird to methylmercury in restored tidal areas.
10 However, it is unknown what concentrations of methylmercury are harmful to these species and the
11 potential for increased exposure varies substantially within the study area. Implementation of CM12
12 which contains measures to assess the amount of mercury before project development, followed by
13 appropriate design and adaptation management, would minimize the potential for increased
14 methylmercury exposure, and would result in no adverse effect on yellow-headed blackbird.

15 Tidal habitat restoration could result in increased exposure of yellow-headed blackbird to selenium.
16 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
17 would provide specific tidal habitat restoration design elements to reduce the potential for
18 bioaccumulation of selenium and its bioavailability in tidal habitats.

19 **CEQA Conclusion:** In the absence of other conservation actions, noise and visual disturbance, the
20 potential for hazardous spills, increased dust and sedimentation, and operations and maintenance of
21 the water conveyance facilities under Alternative 4 would represent an adverse effect. This impact
22 would be significant. The implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*
23 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and AMM1–AMM7, would reduce this
24 impact to a less-than-significant level.

25 The implementation of tidal natural communities restoration or floodplain restoration could result
26 in increased exposure of yellow-headed blackbird to methylmercury in restored tidal areas.
27 However, it is unknown what concentrations of methylmercury are harmful to these species and the
28 potential for increased exposure varies substantially within the study area. Implementation of CM12
29 which contains measures to assess the amount of mercury before project development, followed by
30 appropriate design and adaptation management, would minimize the potential for increased
31 methylmercury exposure, and would result in no adverse effect on yellow-headed blackbird.

32 Tidal habitat restoration could result in increased exposure of yellow-headed blackbird to selenium.
33 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
34 would provide specific tidal habitat restoration design elements to reduce the potential for
35 bioaccumulation of selenium and its bioavailability in tidal habitats.

36 Indirect effects of plan implementation would represent an adverse effect on yellow-headed
37 blackbird in the absence of other conservation measures. This would be a significant impact. With
38 AMM1–AMM7, AMM27, and CM12 in place, and with the implementation of Mitigation Measure BIO-
39 75, indirect effects of plan implementation would not result in a substantial adverse effect through
40 habitat modifications and would not substantially reduce the number or restrict the range of the
41 species. Therefore, indirect effects of plan implementation would have a less-than-significant impact
42 on yellow-headed blackbird.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 See Mitigation Measure BIO-75 under Impact BIO-75.

4 **Impact BIO-151: Periodic Effects of Inundation of Yellow-Headed Blackbird Nesting Habitat**
5 **as a Result of Implementation of Conservation Components**

6 Flooding of the Yolo Bypass (CM2) would inundate 961–2,678 acres of nesting habitat and 368–
7 2,678 acres of foraging habitat (Table 12-4-54). Based on hypothetical floodplain restoration,
8 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in
9 periodic inundation of approximately 18 acres of nesting habitat and 2,701 acres of nonbreeding
10 habitat (Table 12-4-54) resulting in the temporary loss of these habitats. Foraging yellow-headed
11 blackbirds would be expected to move to adjacent suitable foraging habitat when the bypass is
12 inundated, as they do under the current flooding regime. However, this inundation could reduce the
13 availability of nesting habitat during years when flooding extends into the nesting season (past
14 March). The periodic inundation of the Yolo Bypass (CM2) and of other floodplains (CM5) is
15 expected to restore a more natural flood regime in support of wetland and riparian vegetation types
16 that support nesting habitat.

17 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and
18 foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-significant
19 impact on yellow-headed blackbird because inundation is expected to take place outside of the
20 breeding season, and although foraging habitat may be temporarily unavailable, birds would be
21 expected to move to adjacent foraging habitat.

22 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting
23 and foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-
24 significant impact on yellow-headed blackbird because inundation is expected to take place outside
25 of the breeding season, and although foraging habitat would be temporarily unavailable, birds
26 would be expected to move to adjacent foraging habitat.

27 **Riparian Brush Rabbit**

28 The habitat model used to assess effects on the riparian brush rabbit consists of 38 vegetation
29 associations within the valley/foothill riparian natural community and adjacent grasslands. The
30 vegetation associations were selected based on a review of understory and overstory composition
31 from Hickson and Keeler-Wolf (2007) and species habitat requirements.

32 Just until recently, the only known naturally occurring populations of riparian brush rabbits were
33 confined to Caswell Memorial State Park (MSP), a 258-acre park supporting riparian oak woodland
34 on the Stanislaus River immediately southeast of the study area, and in the south Delta southwest of
35 Lathrop, which is within the study area (Williams and Basey 1986; Williams et al. 2002) (Figure 12-
36 46). On October 11, 2012 a single female riparian brush rabbit was captured near Durham Ferry
37 Road in riparian habitat along the San Joaquin River between Caswell MSP and Lathrop (Bradbury
38 pers. comm.). This is only the 2nd naturally occurring population documented outside of Caswell
39 MSP. Factors considered in assessing the value of adversely affected habitat for riparian brush
40 rabbit, to the extent information was available, included size and degree of isolation of habitat
41 patches, proximity to recorded species occurrences, and adjacency to conserved lands.

1 Construction and restoration associated with Alternative 4 conservation measures would result in
2 both temporary and permanent losses of riparian brush rabbit modeled habitat as indicated in Table
3 12-4-55. Full implementation of Alternative 4 would also include biological objectives over the term
4 of the BDCP to benefit the riparian brush rabbit (BDCP Chapter 3, *Conservation Strategy*). The
5 conservation strategy for the riparian brush rabbit involves protecting, restoring or creating, and
6 maintaining habitat and corridors near the largest remaining fragments of habitat and extant
7 populations; providing high-water refugia from flooding; and managing feral predators (dogs and
8 cats) in areas occupied by the species. The conservation measures that would be implemented to
9 achieve the biological goals and objectives are summarized below.

- 10 • Provide a range of elevations in restored floodplains that transition from frequently flooded
11 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a
12 range of habitat conditions, upland habitat values, and refugia from flooding during most flood
13 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 14 • Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
15 between existing conservation lands (Objective L1.6, associated with CM3).
- 16 • Allow floods to promote fluvial processes, such that bare mineral soils are available for natural
17 recolonization of vegetation, desirable natural community vegetation is regenerated, and
18 structural diversity is promoted, or implement management actions that mimic those natural
19 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 20 • Protect and improve habitat linkages that allow terrestrial covered and other native species to
21 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
22 associated with CM3–CM8, and CM11).
- 23 • Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000
24 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated
25 with CM3 and CM7).
- 26 • Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
27 (Objective VFRNC1.2, associated with CM3).
- 28 • Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory
29 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated
30 with CM5, CM7, and CM11).
- 31 • Of the 750 acres of protected valley/foothill riparian natural community protected under
32 Objective VFRNC1.2, protect at least 200 acres of suitable riparian brush rabbit habitat (defined
33 in CM7 Riparian Natural Community Restoration) that is occupied by the species or contiguous
34 with occupied habitat (Objective RBR1.1, associated with 3).
- 35 • Of the 1,000 acres of early- to midsuccessional riparian habitat maintained under VFRNC2.2,
36 maintain at least 800 acres within the range of the riparian brush rabbit (CZ 7), in areas that are
37 adjacent to or that facilitate connectivity with occupied or potentially occupied habitat
38 (Objective RBR1.2, associated with CM3, CM7, and CM11).
- 39 • Of the 5,000 acres of valley/foothill riparian natural community restored under Objective
40 VFRNC1.1, restore/create and maintain at least 300 acres of early- to mid-successional riparian
41 habitat that meets the ecological requirements of the riparian brush rabbit and that is within or
42 adjacent to or that facilitates connectivity with existing occupied or potentially occupied habitat
43 (Objective 1.3, associated with CM3, CM7, and CM11).

- 1 • Create and maintain high-water refugia in the 300 acres of restored riparian brush rabbit
2 habitat and the 200 acres of protected riparian brush rabbit habitat, through the retention,
3 construction and/or restoration of high-ground habitat on mounds, berms, or levees, so that
4 refugia are no further apart than 66 feet (Objective RBR1.4, associated with CM7 and CM11).
- 5 • In protected riparian areas that are occupied by riparian brush rabbit, monitor for and control
6 nonnative predators that are known to prey on riparian brush rabbit (Objective RBR1.5,
7 associated with CM11).
- 8 • Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres of
9 grasslands restored under Objective GNC1.2, protect or restore grasslands on the landward side
10 of levees adjacent to restored floodplain to provide flood refugia and foraging habitat for
11 riparian brush rabbit (Objective RBR1.6m associated with CM3 and CM8).

12 As explained below, with the restoration and protection of these amounts of habitat, in addition to
13 the AMMs to reduce potential effects, impacts on riparian brush rabbit would not be adverse for
14 NEPA purposes and would be less than significant for CEQA purposes.

15 **Table 12-4-55. Changes in Riparian Brush Rabbit Modeled Habitat Associated with Alternative 4**
16 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	14	14	3	3	NA	NA
	Grassland	164	164	68	68	NA	NA
Total Impacts CM1		178	178	71	71	NA	NA
CM2–CM18	Riparian	0	62	0	35	0	264
	Grassland	0	44	0	20	0	423
Total Impacts CM2–CM18		0	106	0	55	0	687
TOTAL IMPACTS		178	284	71	126	0	687

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

17

18 **Impact BIO-152: Loss or Conversion of Habitat for and Direct Mortality of Riparian Brush**
19 **Rabbit**

20 Alternative 4 conservation measures would result in the permanent and temporary loss of up to 114
21 acres of riparian habitat and 296 acres of associated grassland habitat for the riparian brush rabbit
22 in the study area (Table 12-4-55). Conservation measures resulting in permanent habitat loss include

1 conveyance facilities construction (CM1), tidal natural communities restoration (CM4), and
 2 floodplain restoration (CM5). Each of these individual activities is described below. A summary
 3 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual
 4 conservation measure discussions.

- 5 • *CM1 Water Facilities and Operation*: Development of Alternative 4 water conveyance facilities
 6 would result in the permanent removal of approximately 14 acres of riparian habitat and
 7 164 acres of associated grassland habitat and in the temporary removal of 3 acres of riparian
 8 habitat and 68 acres of grassland habitat for riparian brush rabbit in CZ 8 (Table 12-4-55). The
 9 riparian habitat that would be removed is of low value for the riparian brush rabbit as it consists
 10 of several small, isolated patches surrounded by agricultural lands northeast of Clifton Court
 11 Forebay. The associated grasslands are also of low value for the species: They consist of long,
 12 linear strips that abut riparian habitat, but extend several miles from the riparian habitat and,
 13 therefore, provide few if any opportunities for adjacent cover. Trapping efforts conducted for
 14 the riparian brush rabbit in this area were negative (BDCP Appendix 3.E, *Conservation Principles*
 15 *for the Riparian Brush Rabbit and Riparian Woodrat*). Refer to the Terrestrial Biology Mapbook
 16 for a detailed view of Alternative 4 construction locations.
- 17 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 18 inundation would permanently remove approximately 19 acres of riparian habitat and 18 acres
 19 of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late long-term. The
 20 riparian habitat that would be removed consists of relatively small and isolated patches along
 21 canals and irrigation ditches surrounded by agricultural lands in the Union Island and Roberts
 22 Island areas, and several small patches along the San Joaquin River. The habitat that would be
 23 removed is not adjacent to any existing conserved lands, and is several miles north and
 24 northeast of the northernmost riparian brush rabbit record located northeast of Paradise Cut
 25 (Williams et al. 2002). Although the final footprint for tidal natural communities restoration
 26 would differ from the hypothetical footprint, compliance monitoring would be implemented to
 27 ensure that acreage limits are not exceeded and the measures described in *AMM25 Riparian*
 28 *Woodrat and Riparian Brush Rabbit* require that tidal natural communities restoration avoid
 29 removal of any habitat occupied by the riparian brush rabbit.
- 30 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
 31 restoration would result in the permanent removal of approximately 43 acres of riparian habitat
 32 and 26 acres of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late
 33 longterm. Levee construction would also result in the temporary removal of 35 acre riparian
 34 habitat and 20 acres of grassland habitat for the riparian brush rabbit. Although the effects are
 35 considered temporary, five years to several decades may be required for ecological succession
 36 to occur and for restored riparian habitat to replace the function of habitat that has been
 37 affected. The value of this habitat for riparian brush rabbit is high: although it consists of small
 38 patches and narrow bands of riparian vegetation, these areas are in proximity to, or contiguous
 39 with, habitat with recorded occurrences of riparian brush rabbit. The hypothetical footprint for
 40 levee construction overlaps with one occurrence record for riparian brush rabbit, south of the
 41 Interstate 5/Interstate 205 interchange.

42 Although the final floodplain restoration design would differ from the hypothetical footprint
 43 used for this effects analysis, restoration of the river floodplain in CZ 7 would be targeted in the
 44 general area of the riparian brush rabbit population. Implementation of adaptive management
 45 described in *AMM25* would ensure that riparian brush rabbit habitat permanently removed as a

1 result of floodplain restoration does not exceed the maximum allowable habitat loss for this
2 species.

- 3 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
4 actions included in CM11 that are designed to enhance wildlife values in BDCP protected
5 habitats may result in localized ground disturbances that could temporarily remove small
6 amounts of riparian brush rabbit habitat. Enhancement and management actions in riparian
7 brush rabbit habitat within the reserve system may include invasive plant removal, planting and
8 maintaining vegetation to improve and sustain habitat characteristics for the species, and
9 creating and maintaining flood refugia. These activities are expected to have minor adverse
10 effects on available riparian brush rabbit habitat and are expected to result in overall
11 improvements to and maintenance of riparian brush rabbit habitat values over the term of the
12 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
13 and minimized through the AMMs listed below.

14 Passive recreation in the reserve system could result in disturbance of individual riparian brush
15 rabbits foraging in the ecotone between riparian and adjacent open habitats. However, *AMM37*
16 *Recreation* limits trail development adjacent to riparian corridors within the range of the
17 riparian brush rabbit. With this minimization measure in place, recreation related effects on the
18 riparian brush rabbit are expected to be minimal.

- 19 • Operations and maintenance: Ongoing maintenance of BDCP facilities are not expected to
20 adversely affect the riparian brush rabbit because the species is not expected to occur in the
21 vicinity of proposed facilities.
- 22 • Injury and direct mortality: Water conveyance facility construction is not is not likely to result in
23 injury or mortality of individual riparian brush rabbit because the species is not likely to be
24 present in the areas that would be affected by this activity, based on live trapping results (BDCP
25 Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal
26 natural communities restoration would not result in injury or mortality of the riparian brush
27 rabbit because tidal natural communities restoration projects would be designed to avoid
28 occupied riparian brush rabbit habitat and, if that is not possible, rabbits would be trapped and
29 relocated as described in AMM25 (see Appendix 3B, *Environmental Commitments, AMMs, and*
30 *CMs*). Activities associated with construction of setback levees for floodplain restoration could
31 result in injury or mortality of riparian brush rabbits: however, preconstruction surveys,
32 construction monitoring, and other measures would be implemented to avoid and minimize
33 injury or mortality of this species during construction (AMM25).

34 The following paragraphs summarize the combined effects discussed above and describe other
35 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
36 also included.

37 ***Near-Term Timeframe***

38 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
39 the near-term BDCP conservation strategy has been evaluated to determine whether it would
40 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
41 effects of construction would not be adverse under NEPA.

42 Alternative 4 would result in permanent and temporary effects combined on 17 acres of riparian
43 habitat and 232 acres of grassland habitat for riparian brush rabbit in the near-term as a result of

1 construction of the water conveyance facilities (CM1). The habitat would be lost in the
2 valley/foothill riparian and grassland natural communities. Most of the near-term loss of riparian
3 brush rabbit habitat would be in an area unlikely to be occupied by the species in CZ 8. Habitat loss
4 in CZ 7, in areas known or likely to be occupied, would occur during the early long-term and late
5 long-term timeframes. Riparian restoration would be phased to minimize temporal habitat loss.
6 There would be no near-term losses resulting from CM2–CM18.

7 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
8 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3,
9 *Conservation Strategy*, of the BDCP would be 1:1 for restoration and protection of the valley/foothill
10 riparian natural community, and 2:1 for protection of grassland. Using these ratios would indicate
11 that 17 acres of riparian habitat should be restored, 17 acres of riparian habitat should be protected,
12 and 464 acres of grassland should be protected for riparian brush rabbit to mitigate near-term
13 losses.

14 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
15 and an unknown number of associated acres of grassland and protection of 750 acres of riparian
16 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (see Table 3-4 in
17 Chapter 3, *Description of Alternatives*). In addition, the species-specific biological goals and
18 objectives (RBR1.1–RBR1.6) would inform the near-term protection and restoration efforts. The
19 natural community restoration and protection activities are expected to be concluded during the
20 first 10 years of plan implementation, which is close enough in time to the occurrence of impacts to
21 constitute adequate mitigation for NEPA purposes. These commitments are more than sufficient to
22 support the conclusion that the near-term effects of Alternative 4 would be not be adverse under
23 NEPA, because the number of acres required to meet the typical ratios described above would be
24 only 17 acres of riparian habitat restored, 17 acres protected, and 464 acres of grassland protected.

25 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
26 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
27 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
28 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
29 *Restoration of Temporarily Affected Natural Communities*, *AMM25 Riparian Woodrat and Riparian*
30 *Brush Rabbit*, and *AMM37 Recreation*. These AMMs contain elements that avoid or minimize the risk
31 of BDCP activities affecting habitats and species adjacent to work areas and storage sites. BDCP
32 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
33 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

34 **Late Long-Term Timeframe**

35 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of
36 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 4 would
37 result in permanent and temporary effects combined on 114 acres of modeled riparian habitat and
38 296 acres of modeled grassland habitat for riparian brush rabbit, representing 4% and 10% of the
39 riparian and grassland modeled habitat in CZ 6, CZ 7, and CZ 8. Habitat lost in CZ 6 and CZ 8 is
40 fragmented, isolated, and unlikely to support the species. Habitat would also be lost in areas in CZ 7
41 that provide high-value habitat for the species.

42 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
43 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
44 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to

1 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or
2 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist
3 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800
4 acres to be conserved would consist of early successional riparian vegetation suitable for riparian
5 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy
6 area of protected and restored riparian natural community than what currently exists in CZ 7 and
7 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific
8 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at
9 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological
10 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal
11 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines
12 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from
13 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators
14 that are known to prey on riparian brush rabbit would be monitored and controlled (RBR1.5).

15 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the Plan
16 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation
17 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide
18 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood
19 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would
20 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands
21 on the landward side of levees adjacent to restored floodplain will be restored or protected as
22 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

23 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as
24 needed, the floodplains will transition from areas that flood frequently (e.g., every 1 to 2 years) to
25 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently
26 flooded areas will provide refuge for the riparian brush rabbit during most years. The Plan would
27 also create and maintain mounds, levee sections, or other high areas in restored and protected
28 riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia for the
29 riparian brush rabbit (BDCP Appendix 3.F, *Conservation Principles for the Riparian Brush Rabbit and*
30 *Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian brush
31 rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas that
32 are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

33 The BDCP's beneficial effects analysis (Chapter 5, Section 5.6, *Effects on Covered Wildlife and Plant*
34 *Species*, of the BDCP) estimates that the restoration and protection actions discussed above, as well
35 as the restoration of valley/foothill riparian and grassland that could overlap with the species
36 model, would result in the restoration of 800 acres of riparian and 79 acres of grassland modeled
37 habitat for riparian brush rabbit. In addition, protection of valley/foothill riparian and grassland
38 could overlap with the species model and would result in the protection of 200 acres of riparian and
39 317 acres of grassland riparian brush rabbit modeled habitat.

40 **NEPA Effects:** In the near-term, the loss of riparian brush rabbit habitat and potential mortality
41 under Alternative 4 would not be an adverse effect because there is little likelihood of riparian brush
42 rabbits being present and because the BDCP has committed to protecting and restoring the acreage
43 required to meet the typical mitigation ratios described above. In the late long-term, the losses of
44 riparian brush rabbit riparian and grassland habitat associated with Alternative 4, in the absence of
45 other conservation actions, would represent an adverse effect as a result of habitat modification and

1 potential direct mortality of a special-status species. However, with habitat protection and
2 restoration associated with the conservation components, guided by landscape-scale goals and
3 objectives and by AMM1–AMM6, AMM10, AMM25, and AMM37, the effects of Alternative 4 as a
4 whole on riparian brush rabbit would not be adverse.

5 ***CEQA Conclusion:***

6 ***Near-Term Timeframe***

7 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
8 the near-term BDCP conservation strategy has been evaluated to determine whether it would
9 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
10 effects of construction would not be significant under CEQA.

11 Alternative 4 would result in permanent and temporary effects combined on 17 acres of riparian
12 habitat and 232 acres of grassland habitat for riparian brush rabbit in the near-term as a result of
13 construction of the water conveyance facilities (CM1). The habitat would be lost in the
14 valley/foothill riparian and grassland natural communities. Most of the near-term loss of riparian
15 brush rabbit habitat would be in an area unlikely to be occupied by the species in CZ 8. Habitat loss
16 in CZ 7, in areas known or likely to be occupied, would occur during the early long-term and late
17 long-term timeframes. Riparian restoration would be phased to minimize temporal habitat loss.
18 There would be no near-term losses resulting from CM2–CM18.

19 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
20 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3,
21 *Conservation Strategy*, of the BDCP would be 1:1 for restoration and protection of the valley/foothill
22 riparian natural community, and 2:1 for protection of grassland. Using these ratios would indicate
23 that 17 acres of riparian habitat should be restored, 17 acres of riparian habitat should be protected,
24 and 464 acres of grassland should be protected for riparian brush rabbit to mitigate CM1 losses.

25 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
26 and an unknown number of associated acres of grassland and protection of 750 acres of riparian
27 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (see Table 3-4 in
28 Chapter 3, *Description of Alternatives*). In addition, the species-specific biological goals and
29 objectives (RBR1.1–RBR1.6) would inform the near-term protection and restoration efforts. The
30 natural community restoration and protection activities are expected to be concluded during the
31 first 10 years of plan implementation, which is close enough in time to the occurrence of impacts to
32 constitute adequate mitigation for CEQA purposes. These commitments are more than sufficient to
33 support the conclusion that the near-term effects of Alternative 4 would be less than significant
34 under CEQA, because the number of acres required to meet the typical ratios described above would
35 be only 17 acres of riparian habitat restored, 17 acres protected, and 464 acres of grassland
36 protected.

37 The plan also contains commitments to implement AMM1–AMM7, AMM10, AMM25, and AMM37.
38 These AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats
39 and species adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since been
40 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
41 the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of
3 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 4 would
4 result in permanent and temporary effects combined on 114 acres of modeled riparian habitat and
5 296 acres of modeled grassland habitat for riparian brush rabbit, representing 4% and 10% of the
6 riparian and grassland modeled habitat.

7 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
8 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
9 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to
10 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or
11 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist
12 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800
13 acres to be conserved would consist of early successional riparian vegetation suitable for riparian
14 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy
15 area of protected and restored riparian natural community than what currently exists in CZ 7 and
16 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific
17 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at
18 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological
19 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal
20 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines
21 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from
22 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators
23 that are known to prey on riparian brush rabbit would be monitored and controlled (RBR1.5).

24 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the Plan
25 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation
26 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide
27 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood
28 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would
29 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands
30 on the landward side of levees adjacent to restored floodplain would be restored or protected as
31 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

32 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as
33 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to
34 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently
35 flooded areas would provide refuge for the riparian brush rabbit during most years. The Plan would
36 also create and maintain mounds, levee sections, or other high areas in restored and protected
37 riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia for the
38 riparian brush rabbit (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and*
39 *Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian brush
40 rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas that
41 are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

42 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
43 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
44 restoration of valley/foothill riparian and grassland that could overlap with the species model,
45 would result in the restoration of 800 acres of riparian and 79 acres of grassland modeled habitat

1 for riparian brush rabbit. In addition, protection of valley/foothill riparian and grassland could
2 overlap with the species model and would result in the protection of 200 acres of riparian and 317
3 acres of grassland riparian brush rabbit modeled habitat.

4 Only a small proportion of the habitat losses would be considered occupied and of high-value.
5 Alternative 4 conservation measures provide for large acreages of riparian brush rabbit riparian and
6 grassland habitat to be protected and restored, and the BDCP includes AMM1–AMM7, AMM10,
7 AMM25, and AMM37, which are directed at minimizing or avoiding potential effects during
8 construction and operation of the conservation measures. Overall, the BDCP would provide a
9 substantial net benefit to the riparian brush rabbit through the increase in available habitat and
10 habitat in protected status.

11 Considering the habitat restoration and protection associated with CM3,-CM7, CM8, and CM11,
12 guided by species-specific goals and objectives and by AMM1–AMM7, AMM10, AMM25, and AMM37,
13 the temporary and permanent losses of riparian and grassland habitat and potential direct mortality
14 of riparian brush rabbit as a result of implementing Alternative 4 would not represent a significant
15 impact through habitat modifications and would not substantially reduce the number or restrict the
16 range of the species. The loss of habitat and potential mortality of riparian brush rabbits would be a
17 less-than-significant impact under CEQA.

18 **Impact BIO-153: Indirect Effects of Plan Implementation on Riparian Brush Rabbit**

19 Noise, lighting, and visual disturbance adjacent to construction activities could indirectly affect the
20 use of modeled riparian brush rabbit riparian habitat and of associated grassland habitat in the
21 study area. These construction activities would include water conveyance (including transmission
22 line) construction in CZ 8, tidal natural communities restoration construction, and construction of
23 setback levees. Water conveyance construction would potentially affect acres of adjacent riparian
24 habitat and of associated grassland habitat: this construction would occur in CZ 8 where there is
25 suitable habitat for the species but surveys by ESRP did not indicate the species is present in this
26 area; therefore, the potential for adverse noise and visual effects from conveyance facility
27 construction would be minimal. Tidal natural communities restoration construction would also
28 potentially affect adjacent riparian habitat and associated grassland habitat for this species:
29 however, adverse effects on the species are unlikely because tidal natural communities restoration
30 projects would be sited to avoid areas occupied by riparian brush rabbit. The activity most likely to
31 result in noise, lighting, and visual disturbance to riparian brush rabbit is the construction of setback
32 levees for floodplain restoration, which would take place in CZ 7, where the species is known to
33 occur. The use of mechanical equipment during construction might cause the accidental release of
34 petroleum or other contaminants that would affect the riparian brush rabbit in adjacent habitat, if
35 the species is present.

36 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 4
37 would avoid the potential for substantial adverse effects on riparian brush rabbits, either indirectly
38 or through habitat modifications or result in a substantial reduction in numbers or a restriction in
39 the range of riparian brush rabbits. Therefore, indirect effects of Alternative 4 would not have an
40 adverse effect on riparian brush rabbit.

41 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
42 as construction-related noise, lighting, and visual disturbances could affect riparian brush rabbit in
43 riparian and grassland habitats. The use of mechanical equipment during construction could cause
44 the accidental release of petroleum or other contaminants that could affect riparian brush rabbit.

1 The inadvertent discharge of sediment or excessive dust adjacent to riparian brush rabbit habitat
2 could also have a negative effect on the species. With implementation of AMM1–AMM7, AMM10,
3 AMM25, and AMM37 as part of Alternative 4, the BDCP would avoid and minimize the potential for
4 significant impacts on riparian brush rabbits, either indirectly or through habitat modifications and
5 would not result in a substantial reduction in numbers or a restriction in the range of riparian brush
6 rabbits. Indirect effects of Alternative 4 would have a less-than-significant impact on riparian brush
7 rabbit.

8 **Impact BIO-154: Periodic Effects of Inundation of Riparian Brush Rabbit Habitat as a Result of**
9 **Implementation of Conservation Components**

10 *CM5 Seasonally inundated floodplain restoration* is the only covered activity expected to result in
11 periodic inundation of riparian brush rabbit habitat. This activity would periodically inundate
12 approximately 264 acres of riparian habitat (9% of riparian habitat in the Plan Area) and 423 acres
13 of associated grassland habitat (14% of associated grassland habitat in the Plan Area) for the
14 riparian brush rabbit. The area between existing levees that would be breached and the newly
15 constructed setback levees would be inundated through seasonal flooding. The potentially
16 inundated areas consist of high-value habitat for the species: although they consist of small patches
17 and narrow bands of riparian vegetation, many of these areas are in proximity to, or contiguous
18 with, habitat with recorded occurrences of riparian brush rabbit. The restored floodplain would
19 include a range of elevations from lower lying areas that flood frequently (e.g., every 1 to 2 years) to
20 higher elevation areas that flood infrequently (e.g., every 10 years or more).

21 Seasonal flooding in restored floodplains can result in injury or mortality of individuals if riparian
22 brush rabbits occupy these areas and cannot escape flood waters. One recorded occurrence of
23 riparian brush rabbit (Williams et al. 2002), just west of Stewart Road in Mossdale, is in the area that
24 would be seasonally flooded based on the hypothetical restoration footprint.

25 **NEPA Effects:** Floodplain restoration under CM5 would periodically affect only a small proportion of
26 the modeled riparian brush rabbit habitat in the study area. The adverse effects of periodic
27 inundation on the riparian brush rabbit would be minimized through construction and maintenance
28 of flood refugia to allow riparian brush rabbits to escape inundation. Therefore, implementing
29 Alternative 4, including AMM1–AMM7, AMM10, AMM25, and AMM37, would not be expected to
30 result in substantial adverse effects on riparian brush rabbit, either directly or through habitat
31 modifications and would not result in a substantial reduction in numbers or a restriction in the
32 range of riparian brush rabbits. Therefore, Alternative 4 would not adversely affect the species.

33 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect only a small
34 proportion of the modeled riparian brush rabbit habitat in the study area. The overall effect of
35 seasonal inundation on existing riparian natural communities may instead be beneficial. Historically,
36 flooding was the main natural disturbance regulating ecological processes in riparian areas, and
37 flooding promotes the germination and establishment of many native riparian plants. In the late
38 long-term, seasonal inundation in areas currently occupied by riparian vegetation may contribute to
39 the establishment of high-value habitat for covered riparian species, such as the riparian brush
40 rabbit. Long-term management of riparian areas would ensure that refugia also exist along the
41 edges of seasonally inundated habitat.

42 The significant impacts of periodic inundation on the riparian brush rabbit would be minimized
43 through construction and maintenance of flood refugia to allow riparian brush rabbits to escape
44 inundation. Therefore, implementing Alternative 4, including AMM1–AMM7, AMM10, AMM25, and

1 AMM37, would not be expected to result in significant impacts on riparian brush rabbit, either
2 directly or through habitat modifications and would not result in a substantial reduction in numbers
3 or a restriction in the range of riparian brush rabbits. Periodic inundation of riparian and grassland
4 habitat for riparian brush rabbit under Alternative 4 would have a less-than-significant impact on
5 the species.

6 **Riparian Woodrat**

7 The habitat model used to assess effects for the riparian woodrat consists of selected plant alliances
8 from the valley/foothill riparian natural community, geographically constrained to the south Delta
9 portion of the BDCP area in CZ 7, south of State Route 4 and Old River Pipeline along the Stanislaus,
10 San Joaquin, Old, and Middle Rivers. Valley/foothill riparian areas along smaller drainages (Paradise
11 Cut, Tom Paine Slough), and some larger streams in the northern portion of CZ 7 were excluded
12 from the riparian woodrat habitat model due to a lack of trees or riparian corridors that were too
13 narrow. Factors considered in assessing the value of affected habitat for the riparian woodrat, to the
14 extent that information is available, include habitat patch size and connectivity.

15 The riparian woodrat is not known to occur in the study area. The only verified extant population of
16 riparian woodrats rangewide is 2 miles east of the southern end of the study area in Caswell
17 Memorial State Park along the Stanislaus River (Williams 1986:1–112; Williams 1993). Riparian
18 woodrat may occur in small patches of valley oak riparian forest along the San Joaquin River from
19 the southern tip of the study area north to approximately the Interstate 5 overcrossing near Lathrop
20 (Figure 12-47).

21 Construction and restoration associated with Alternative 4 conservation measures would result in
22 both temporary and permanent losses of riparian woodrat modeled habitat as indicated in Table 12-
23 4-56. Tidal habitat restoration, floodplain restoration, and protection and management of natural
24 communities could affect modeled riparian woodrat habitat. However, because the species is not
25 known to occur in the study area it is not expected to be affected by BDCP actions unless the species
26 were to establish in the study area over the term of the BDCP. Full implementation of Alternative 4
27 would also include biological objectives over the term of the BDCP to benefit the riparian woodrat
28 (BDCP Chapter 3, *Conservation Strategy*). The conservation strategy for the riparian woodrat
29 involves providing opportunities for population expansion into the Plan Area from adjacent lands to
30 the south and southeast. The strategy focuses on restoring and maintaining suitable habitat at the
31 southernmost end of CZ 7, providing connectivity with existing populations to the south and
32 southeast, and creating and maintaining flood refugia. This conservation approach is consistent with
33 the recovery plan (U.S. Fish and Wildlife Service 1998) and conservation principles (see Appendix
34 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*, of the BDCP). The
35 conservation measures that would be implemented to achieve the biological goals and objectives are
36 summarized below.

- 37 ● Provide a range of elevations in restored floodplains that transition from frequently flooded
38 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a
39 range of habitat conditions, upland habitat values, and refugia from flooding during most flood
40 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 41 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
42 between existing conservation lands (Objective L1.6, associated with CM3).

- 1 • Protect and improve habitat linkages that allow terrestrial covered and other native species to
2 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
3 associated with CM3-CM8, and CM11).
- 4 • Restore or create 5,000 acres of valley/foothill riparian natural community, with 3,000 acres
5 occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated with
6 CM3 and CM7).
- 7 • Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
8 (Objective VFRNC1.2, associated with CM3).
- 9 • Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal
10 overlap among vegetation components and over adjacent riverine channels, freshwater
11 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM5, CM7, and CM11).
- 12 • Of the 5,000 acres of valley/foothill riparian natural community restored under Objective
13 VFRNC1.1, restore/create and maintain 300 acres riparian habitat in CZ 7 that meets the
14 ecological requirements of the riparian woodrat (i.e., dense willow understory and oak
15 overstory) and that is adjacent to or facilitates connectivity with existing occupied or potentially
16 occupied habitat (Objective RW1.1, associated with CM3, CM7, CM11).
- 17 • Provide and maintain high-water refugia in the 300 acres of riparian woodrat habitat restored
18 under Objective RW1.1 through the retention, construction, and/or restoration of high-ground
19 habitat on mounds, berms, or levees, so that refugia are no further apart than 67 feet (Objective
20 RW1.2, associated with CM7 and CM11).

21 As explained below, with the restoration and protection of these amounts of habitat, in addition to
22 implementation of the AMMs to reduce potential effects, impacts on riparian woodrat would not be
23 adverse for NEPA purposes and would be less than significant for CEQA purposes.

24 **Table 12-4-56. Changes in Riparian Woodrat Modeled Habitat Associated with Alternative 4**
25 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2-CM18	Riparian	0	51	0	33	0	203
Total Impacts CM2-CM18		0	51	0	33	0	203
TOTAL IMPACTS		0	51	0	33	0	203

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-155: Loss or Conversion of Habitat for and Direct Mortality of Riparian Woodrat**

2 Alternative 4 conservation measures would result in the permanent loss of up to 51 acres of habitat
3 and temporary loss of up to 33 acres of modeled habitat for riparian woodrat (Table 12-4-56).
4 Construction of Alternative 4 water conveyance facilities (CM1) would not affect modeled habitat;
5 however, tidal natural communities restoration (CM4) and seasonally inundated floodplain
6 restoration (CM5) would remove habitat. Each of these individual activities is described below. A
7 summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the
8 individual conservation measure discussions.

- 9
- 10 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and
11 inundation would permanently remove approximately 10 acres of modeled habitat for the
12 riparian woodrat in CZ 7. This habitat is of low value, consisting of a small, isolated patch
13 surrounded by agricultural lands, and the species has a relatively low likelihood of being present
14 in these areas. The measures described in *AMM25 Riparian Woodrat and Riparian Brush Rabbit*
15 require that tidal natural communities restoration avoid removal of any habitat occupied by the
16 riparian woodrat as determined by presence/absence surveys. Because the estimates of habitat
17 loss due to tidal inundation are based on projections of where restoration may occur, actual
18 habitat loss is expected to be lower because sites would be selected to minimize effects on
19 riparian woodrat.
 - 20 • *CM5 Seasonally Inundated Floodplain Restoration:* Levee construction associated with floodplain
21 restoration would result in the permanent removal of approximately 41 acres of modeled
22 habitat for the riparian woodrat in CZ 7. The value of this habitat for riparian woodrat is
23 moderate. Although the habitat consists of small patches and narrow bands of riparian
24 vegetation and no riparian woodrats have been detected in CZ 7, the riparian patches are in
25 proximity to each other along the San Joaquin River. There are two species occurrences
26 immediately south of CZ 7, one of which is less than 1.5 mile from the southernmost patch of
27 riparian habitat potentially affected by levee construction.

27 The final floodplain restoration design would differ from the hypothetical footprint used for this
28 effects analysis. However, monitoring and adaptive management described in *CM11 Natural*
29 *Communities Enhancement and Management*. And AMM25 would ensure that riparian woodrat
30 habitat permanently removed does not exceed the amount estimated based on the hypothetical
31 footprint. Habitat loss is expected to be lower than 41 acres because sites would be selected and
32 restoration designed to minimize effects on the riparian woodrat. If natural flooding is
33 insufficient to maintain appropriate riparian woodrat vegetation structure, the vegetation
34 would be actively managed to provide suitable habitat structure as described in *CM11 Natural*
35 *Communities Enhancement and Management*.

36 Levee construction would also result in the temporary removal of 33 acres of modeled habitat
37 for the riparian woodrat. Although the effects are considered temporary, 5 years to several
38 decades may be required for ecological succession to occur and for restored riparian habitat to
39 replace the function of habitat that has been affected.

- 40
- 41 • *CM11 Natural Communities Enhancement and Management:* A variety of habitat management
42 actions included in CM11 that are designed to enhance wildlife values in BDCP protected
43 habitats may result in localized ground disturbances that could temporarily remove small
44 amounts of riparian woodrat habitat. Enhancement and management actions in riparian
45 woodrat habitat within the reserve system may include invasive plant removal, planting and
maintaining vegetation to improve and sustain habitat characteristics for the species, and

1 creating and maintaining flood refugia. These activities are expected to have minor adverse
2 effects on available riparian woodrat habitat and are expected to result in overall improvements
3 to and maintenance of riparian woodrat habitat values over the term of the BDCP. These effects
4 cannot be quantified, but are expected to be minimal and would be avoided and minimized
5 through the AMMs listed below.

- 6 ● Operations and maintenance: The only ongoing effects on the riparian woodrat are those
7 potentially resulting from habitat enhancement and management activities. Enhancement and
8 management actions in riparian woodrat habitat within the reserve system may include invasive
9 plant removal, planting and maintaining vegetation to improve and sustain habitat
10 characteristics for the species, and creating and maintaining flood refugia. These activities may
11 result in harassment of riparian woodrats through noise and visual disturbance which would be
12 minimized with implementation of AMM1–AMM7, AMM10, and AMM25.
- 13 ● Injury and direct mortality: Water conveyance facility construction is not likely to result in
14 injury or mortality of individual riparian woodrats because the species is not likely to be present
15 in the areas that would be affected by this activity, based on live trapping results (BDCP
16 *Appendix 3.E, Conservation Principles for the Riparian Woodrat and Riparian Brush Rabbit*). Tidal
17 natural communities restoration would not result in injury or mortality of riparian woodrats
18 because, under AMM25, tidal natural communities restoration projects would be designed to
19 avoid occupied riparian woodrat habitat and if that is not possible to trap and relocate the
20 species. Activities associated with construction of setback levees for floodplain restoration could
21 result in injury or mortality of riparian woodrats; however, preconstruction surveys,
22 construction monitoring, and other measures would be implemented under AMM25 to avoid
23 and minimize injury or mortality of this species during construction, as described in Appendix
24 3B, *Environmental Commitments, AMMs, and CMs*. If occupied riparian woodrat habitat cannot be
25 avoided, mortality would be avoided through implementation of a trapping and relocation
26 program. The program would be developed in coordination with USFWS, and relocation would
27 be to a site approved by USFWS prior to construction activities.

28 The following paragraphs summarize the combined effects discussed above and describe other
29 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
30 also included.

31 ***Near-Term Timeframe***

32 Because water conveyance facilities construction is being evaluated at the project level, the near-
33 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
34 protection or restoration in an appropriate timeframe to ensure that the construction effects would
35 not be adverse under NEPA.

36 No riparian woodrat habitat would be lost in the near-term timeframe. Implementation of CM11
37 could have minor adverse effects on available riparian woodrat habitat, and activities associated
38 with construction of setback levees for floodplain restoration could result in injury or mortality of
39 riparian woodrats.

40 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
41 and protection of 750 acres of riparian (Objective VFRNC1.2) (see Table 3-4 in Chapter 3,
42 *Description of Alternatives*). In addition, the species-specific biological goals and objectives (RW1.1
43 and RW1.2) would inform the near-term protection and restoration efforts. The natural community
44 restoration and protection activities are expected to be concluded during the first 10 years of plan

1 implementation, which is close enough in time to the occurrence of impacts to constitute adequate
2 mitigation for NEPA purposes. These commitments are more than sufficient to support the
3 conclusion that the near-term effects of Alternative 4 would be not be adverse under NEPA, because
4 no riparian woodrat habitat would be lost and there is only limited potential for minor adverse
5 effects on woodrats or its habitat from implementation of CM11.

6 These effects cannot be quantified, but are expected to be minimal and would be avoided and
7 minimized through the BDCP's commitment to *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
11 *Restoration of Temporarily Affected Natural Communities*, and *AMM25 Riparian Woodrat and*
12 *Riparian Brush Rabbit*. BDCP Appendix 3.C describes the AMMs, which have since been updated and
13 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
14 EIR/EIS.

15 **Late Long-Term Timeframe**

16 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.
17 Alternative 4 as a whole would result in the permanent loss and temporary removal of 84 acres of
18 modeled habitat for riparian woodrat habitat during the late long-term. None of this habitat is
19 considered occupied.

20 Objective RW1.1 requires at least 300 acres of riparian habitat that meets the ecological
21 requirements of the riparian woodrat (e.g., dense willow understory and oak overstory) and that is
22 adjacent to or facilitates connectivity with existing occupied or potentially occupied habitat to be
23 restored in CZ 7. The conserved habitat would also be part of a larger, more contiguous, and less
24 patchy area of protected and restored riparian natural community than what currently exists in CZ 7
25 and would be contiguous with existing modeled riparian woodrat habitat. The species-specific
26 objective further requires that the 300 acres of restored riparian habitat meet more specific
27 ecological requirements of riparian woodrat (e.g., dense willow understory and oak overstory).
28 Additionally, assuming the protected riparian natural community would provide riparian woodrat
29 habitat proportional to the amount of modeled habitat in this natural community in the Plan Area
30 (12% of the riparian natural community in the Plan Area is modeled riparian woodrat habitat), the
31 protection of 750 acres of riparian natural community (CM3) would provide an estimated 90 acres
32 of protected riparian woodrat habitat that is comparable to or of higher value than existing modeled
33 grassland habitat. All riparian protection would occur during the near-term period to offset early
34 riparian losses.

35 The Plan would also create and maintain mounds, levee sections, or other high areas in restored and
36 protected riparian areas (Objective RW1.2) that are designed specifically to provide flood refugia for
37 the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and*
38 *Riparian Woodrat*). In addition, the restored floodplains would transition from areas that flood
39 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more)
40 (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian woodrat
41 during most years.

42 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
43 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
44 restoration of valley/foothill riparian that could overlap with the species model, would result in the

1 restoration of 300 acres of modeled habitat for riparian woodrat. In addition, protection of
2 valley/foothill riparian could overlap with the species model and would result in the protection of
3 90 acres riparian woodrat modeled habitat.

4 Although there are no records of occurrences of the riparian woodrat in the study area, habitat
5 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase
6 opportunities for northward expansion of the species into the study area. Implementation of
7 Alternative 4 conservation measures is not expected to adversely affect the riparian woodrat for the
8 following reasons.

- 9 ● There are no riparian woodrat occurrences in the Plan Area.
- 10 ● The habitat that would be removed consists of small patches that are of moderate value for the
11 species.
- 12 ● The habitat that would be removed permanently is a small proportion of the total habitat in the
13 Plan Area (2%).
- 14 ● Avoidance and minimization measures would be implemented to avoid injury or mortality of
15 riparian woodrats, and to minimize loss of occupied habitat.
- 16 ● Floodplain restoration would be designed to provide flood refugia so that flooding would not
17 adversely affect any riparian woodrats that occupy restored floodplains.

18 **NEPA Effects:** Alternative 4 would provide a substantial benefit to the riparian woodrat through the
19 net increase in available habitat and a net increase of habitat in protected status. These protected
20 areas would be managed and monitored to support the species. The affected habitat is currently
21 unoccupied and habitat removal is not expected to result in a discernible change in the abundance
22 or distribution of riparian woodrat should they occupy study area habitats. Should the species be
23 detected in the study area, implementation of AMM1–AMM7, AMM10, and AMM25 would avoid and
24 minimize the effects of conservation component construction and implementation. Therefore, the
25 loss of habitat and potential mortality of individuals would not have an adverse effect on riparian
26 woodrat under Alternative 4.

27 **CEQA Conclusion:**

28 **Near-Term Timeframe**

29 Because water conveyance facilities construction is being evaluated at the project level, the near-
30 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
31 protection or restoration in an appropriate timeframe to ensure that the construction effects would
32 be less than significant for CEQA purposes.

33 No riparian woodrat habitat would be lost in the near-term timeframe. Implementation of CM11
34 could have minor significant impacts on available riparian woodrat habitat, and activities associated
35 with construction of setback levees for floodplain restoration could result in injury or mortality of
36 riparian woodrats.

37 The BDCP has committed to near-term restoration of 800 acres of riparian habitat (Objective
38 VFRNC1.1) and protection of 750 acres of riparian habitat (Objective VFRNC1.2) (see Table 3-4 in
39 Chapter 3, *Description of Alternatives*). In addition, the species-specific biological goals and
40 objectives (RW1.1 and RW1.2) would inform the near-term protection and restoration efforts. The
41 natural community restoration and protection activities are expected to be concluded during the

1 first 10 years of plan implementation, which is close enough in time to the occurrence of impacts to
2 constitute adequate mitigation for CEQA purposes. The Plan also contains commitments to
3 implement AMM1–AMM7, AMM10, and AMM25, which include elements that avoid or minimize the
4 risk of affected habitats and species adjacent to work areas. BDCP Appendix 3.C describes the AMMs,
5 which have since been updated and which are provided in Appendix 3B, *Environmental*
6 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

7 These commitments are more than sufficient to support the conclusion that the near-term effects of
8 Alternative 4 would be less than significant under CEQA, because no riparian woodrat habitat would
9 be lost and there is only limited potential for minor significant impacts on woodrats or its habitat
10 from implementation of CM11. No mitigation would be required.

11 **Late Long-Term Timeframe**

12 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.
13 Alternative 4 as a whole would result in the permanent loss and temporary removal of 84 acres of
14 modeled habitat for riparian woodrat habitat during the late long-term. None of this habitat is
15 considered occupied.

16 Objective RW1.1 requires at least 300 acres of riparian habitat that meets the ecological
17 requirements of the riparian woodrat (e.g., dense willow understory and oak overstory) and that is
18 adjacent to or facilitates connectivity with existing occupied or potentially occupied habitat to be
19 restored in CZ 7. The conserved habitat would also be part of a larger, more contiguous, and less
20 patchy area of protected and restored riparian natural community than what currently exists in CZ 7
21 and would be contiguous with existing modeled riparian woodrat habitat. The species-specific
22 objective further requires that the 300 acres of restored riparian habitat meet more specific
23 ecological requirements of riparian woodrat (e.g., dense willow understory and oak overstory).
24 Additionally, assuming the protected riparian natural community would provide riparian woodrat
25 habitat proportional to the amount of modeled habitat in this natural community in the Plan Area
26 (12% of the riparian natural community in the Plan Area is modeled riparian woodrat habitat), the
27 protection of 750 acres of riparian natural community (CM3) would provide an estimated 90 acres
28 of protected riparian woodrat habitat that is comparable to or of higher value than existing modeled
29 grassland habitat. All riparian protection would occur during the near-term period, to offset early
30 riparian losses.

31 The Plan would also create and maintain mounds, levee sections, or other high areas in restored and
32 protected riparian areas (Objective RW1.2) that are designed specifically to provide flood refugia for
33 the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and*
34 *Riparian Woodrat*). In addition, the restored floodplains would transition from areas that flood
35 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more)
36 (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian woodrat
37 during most years.

38 The BDCP's beneficial effects analysis (Chapter 5, Section 5.6, *Effects on Covered Wildlife and Plant*
39 *Species*, of the BDCP) estimates that the restoration and protection actions discussed above, as well
40 as the restoration of valley/foothill riparian that could overlap with the species model, would result
41 in the restoration of 300 acres of modeled habitat for riparian woodrat. In addition, protection of
42 valley/foothill riparian could overlap with the species model and would result in the protection of
43 90 acres riparian woodrat modeled habitat.

1 Although there are no records of occurrences of the riparian woodrat in the study area, habitat
2 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase
3 opportunities for northward expansion of the species into the study area. Implementation of
4 Alternative 4 conservation measures is not expected to significantly impact the riparian woodrat for
5 the following reasons.

- 6 • There are no riparian woodrat occurrences in the Plan Area.
- 7 • The habitat that would be removed consists of small patches that are of moderate value for the
8 species.
- 9 • The habitat that would be removed permanently is a small proportion of the total habitat in the
10 Plan Area (2%).
- 11 • Avoidance and minimization measures would be implemented to avoid injury or mortality of
12 riparian woodrats, and to minimize loss of occupied habitat.
- 13 • Floodplain restoration would be designed to provide flood refugia so that flooding would not
14 adversely affect any riparian woodrats that occupy restored floodplains.

15 Alternative 4 would provide a substantial benefit to the riparian woodrat through the net increase in
16 available habitat and a net increase of habitat in protected status. These protected areas would be
17 managed and monitored to support the species. The affected habitat is currently unoccupied and
18 habitat removal is not expected to result in a discernible change in the abundance or distribution of
19 riparian woodrat should they occupy study area habitats. Should the species be detected in the
20 study area, implementation of AMM1–AMM7, AMM10, and AMM25 would avoid and minimize the
21 effects of conservation component construction and implementation. Therefore, the loss of habitat
22 and potential mortality of individuals under Alternative 4 would not have a significant impact on
23 riparian woodrat. No mitigation would be required.

24 **Impact BIO-156: Indirect Effects of Plan Implementation on Riparian Woodrat**

25 Noise, lighting, and visual disturbance adjacent to construction activities could indirectly affect the
26 use of modeled habitat for riparian woodrat. These effects are related construction activities
27 associated with tidal natural communities restoration construction and construction of setback
28 levees. Indirect effects on the species from construction associated with tidal natural communities
29 restoration are unlikely because, under AMM25, tidal natural communities restoration projects
30 would be sited to avoid areas occupied by riparian woodrat. The activity most likely to result in
31 noise, lighting, and visual disturbance to riparian woodrat would be the construction of setback
32 levees. These adverse effects would be minimized through implementation of AMM1–AMM7,
33 AMM10, and AMM25.

34 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 4
35 would avoid the potential for substantial adverse effects on riparian woodrats, either indirectly or
36 through habitat modifications or result in a substantial reduction in numbers or a restriction in the
37 range of riparian woodrats. Therefore, indirect effects of Alternative 4 would not have an adverse
38 effect on riparian woodrat.

39 **CEQA Conclusion:** Should the species be detected in the study area, indirect effects of conservation
40 measure construction and implementation could impact riparian woodrat and its habitat. AMM1–
41 AMM7, AMM10, and AMM25 implemented under Alternative 14 would avoid and minimize the
42 impact and result in a less-than-significant impact. No mitigation would be required.

1 **Impact BIO-157: Periodic Effects of Inundation of Riparian Woodrat Habitat as a Result of**
2 **Implementation of Conservation Components**

3 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in
4 periodic inundation of riparian woodrat habitat. Floodplain restoration would result in periodic
5 inundation of up to 203 acres of riparian woodrat habitat (9% of the riparian woodrat habitat in the
6 Plan Area). The area between existing levees that would be breached and the newly constructed
7 setback levees would be inundated through seasonal flooding. The potentially inundated areas
8 consist of moderate-value habitat for the species. Although the habitat consists of small patches and
9 narrow bands of riparian vegetation and no riparian woodrats have been detected in CZ 7, the riparian
10 patches are in proximity to each other along the San Joaquin River and there are two species
11 occurrences immediately south of CZ 7, one of which is less than 1 mile from the southernmost
12 patch of riparian habitat potentially affected by levee construction. The restored floodplains would
13 transition from areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently
14 (e.g., every 10 years or more).

15 **NEPA Effects:** Alternative 4's periodic inundation of 203 acres of riparian habitat for riparian woodrat
16 is Alternative 4 not expected to result in substantial adverse effects on riparian woodrat, either
17 directly or through habitat modifications and would not result in a substantial reduction in numbers
18 or a restriction in the range of riparian woodrat. The effects of periodic inundation on the riparian
19 woodrat would be minimized through construction and maintenance of flood refugia to allow
20 riparian woodrats to escape inundation. Therefore, the periodic inundation of riparian woodrat
21 habitat would not adversely affect the species under Alternative 4.

22 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect a total of 203 acres of
23 riparian habitat for riparian woodrat, representing 9% of the 2,166 acres of modeled riparian
24 woodrat habitat in the study area. The impact of periodic inundation on the riparian woodrat would
25 be minimized through construction and maintenance of flood refugia to allow riparian woodrats to
26 escape inundation, as described in AMM25. Implementation of CM5 would not be expected to result
27 in significant impacts on riparian woodrat, either directly or through habitat modifications, and
28 would not result in a substantial reduction in numbers or a restriction in the range of riparian
29 woodrats. Periodic inundation of riparian woodrat habitat under Alternative 4 would have a less-
30 than-significant impact. No mitigation would be required.

31 **Salt Marsh Harvest Mouse**

32 The habitat model used to assess effects for the salt marsh harvest mouse includes six habitat types:
33 primary tidal marsh habitat, secondary tidal marsh habitat (low marsh), secondary upland habitat
34 adjacent to tidal marsh habitat, primary habitat within managed wetlands, secondary habitat within
35 managed wetlands (dominated by plants characteristic of low marsh), and upland habitats within
36 managed wetland boundaries. The tidal and managed wetland habitats were discriminated
37 recognizing that regardless of habitat value, managed wetlands are at high risk of catastrophic
38 flooding and have lower long-term conservation value than tidal wetlands.

39 Construction and restoration associated with Alternative 4 conservation measures would result in
40 effects on modeled salt marsh harvest mouse habitat, which would include permanent losses and
41 habitat conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species
42 post-restoration) as indicated in Table 12-4-57. All of the effects on the species would take place
43 over an extended period of time as tidal marsh is restored in the Plan Area. Full implementation of

1 Alternative 4 would also include the following conservation actions over the term of the BDCP to
2 benefit salt marsh harvest mouse (BDCP Chapter 3, *Conservation Strategy*).

- 3 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with
4 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California
5 (Objective TBEWNC1.1, associated with CM4).
- 6 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500
7 acres of middle and high marsh (primary salt marsh harvest mouse habitat) to contribute to
8 total (existing and restored) acreage targets for each complex as specified in the final Recovery
9 Plan for Tidal Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2,
10 associated with CM4).
- 11 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
12 natural community within the reserve system (Objective TBEWNC2.1).
- 13 ● Protect and enhance at least 1,500 acres of managed wetland in Grizzly Island Marsh Complex
14 for the benefit of salt marsh harvest mouse (Objective MWNC1.1, associated with CM3).
- 15 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide
16 at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective
17 GNC1.4, associated with CM3 and CM8).
- 18 ● Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of restored or
19 created middle and high marsh as defined in the final Recovery Plan for Tidal Marsh Ecosystems
20 of Northern and Central California (Objective SMHM1.1).
- 21 ● Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of managed
22 wetland protected and enhanced in the Grizzly Island Marsh Complex as defined in the final
23 Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California, and increase
24 population levels above the current baseline (Objective SMHM1.2).

25 As explained below, with the restoration and protection of these amounts of habitat, in addition to
26 implementation of AMMs to minimize potential effects, impacts on the salt marsh harvest mouse
27 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-4-57. Changes in Salt Marsh Harvest Mouse Modeled Habitat Associated with Alternative 4 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
CM2-CM18	TBEW Primary	64	67	0	0	0	0
	TBEW Secondary	0	0	0	0	0	0
	Upland Secondary	8	9	0	0	0	0
	MW Wetland Primary	1,913	5,323	0	0	0	0
	MW Wetland Secondary	315	807	0	0	0	0
	MW Upland	165	762	0	0	0	0
Total Impacts CM2-CM18		2,465	6,968	0	0	0	0
TOTAL IMPACTS		2,645	6,968	0	0	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. Yolo periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

TBEW = tidal brackish emergent wetland

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-158: Loss or Conversion of Habitat for and Direct Mortality of Salt Marsh Harvest**
5 **Mouse**

6 BDCP tidal restoration (CM4) would be the only conservation measure resulting in effects on salt
7 marsh harvest mouse habitat. Habitat enhancement and management activities (CM11), which
8 include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat
9 effects. Each of these activities is described in detail below. A summary statement of the combined
10 impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 11 • *CM4 Tidal Natural Communities Restoration* would result in effects on 6,968 acres of salt marsh
12 harvest mouse modeled habitat, which would include 5,376 acres of permanent losses and 1,592
13 acres of habitat conversions. Salt marsh harvest mouse may be displaced temporarily from areas
14 of converted habitat but these areas would ultimately provide suitable habitat for the species.
15 However, 1,058 of these acres would be downgraded from primary habitat (67 acres of primary
16 tidal brackish emergent wetland and 991 acres of primary managed wetland) to secondary tidal
17 brackish emergent wetland. The hypothetical restoration footprints in Suisun Marsh overlap
18 with 13 CNDDDB records for salt marsh harvest mouse (California Department of Fish and

1 Wildlife 2013); however, the BDCP's conservation actions assume that all suitable habitat in
2 Suisun Marsh is occupied by the species.

- 3 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the
4 restoration of at least 1,500 acres of tidal brackish emergent wetland would be managed to
5 provide viable habitat for salt marsh harvest mouse and the protection of 1,500 acres of
6 managed wetland specifically to be managed for salt marsh harvest mouse. A variety of habitat
7 management actions included in *CM11 Natural Communities Enhancement and Management* that
8 are designed to enhance and manage these areas for salt marsh harvest mouse and may result in
9 localized ground disturbances that could temporarily remove small amounts of salt marsh
10 harvest mouse habitat. The restoration of tidal brackish emergent wetlands, the protection
11 managed wetlands, and the protection and/or restoration of grasslands within 200 feet of
12 restored salt marsh harvest mouse habitat would also have enhancement and management
13 actions that would include invasive species control, nonnative wildlife control, and vegetation
14 management. Ground-disturbing activities, such as removal of nonnative vegetation are
15 expected to have minor effects on habitat and are expected to result in overall improvements to
16 and maintenance of salt marsh harvest mouse habitat values over the term of the BDCP. These
17 effects cannot be quantified, but are expected to be minimal and would be avoided and
18 minimized by the AMMs listed below.
- 19 • *Injury and Direct Mortality*: The use of heavy equipment and handtools may result in injury or
20 mortality to salt marsh harvest mouse during restoration, enhancement, and management
21 activities. However, preconstruction surveys, construction monitoring, and other measures
22 would be implemented to avoid and minimize injury or mortality of this species during these
23 activities, as required by the AMM listed below.

24 The following paragraphs summarize the combined effects discussed above and describe other
25 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
26 also included.

27 ***Near-Term Timeframe***

28 The near-term BDCP conservation strategy has been evaluated to determine whether it would
29 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
30 the effects of near-term covered activities would not be adverse under NEPA. The Plan would affect
31 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the near-term. These
32 effects include 1,517 acres of permanent loss and 948 acres of converted habitat. Most of the habitat
33 converted would be from primary habitats (599 acres consisting of 64 acres of tidal brackish
34 emergent wetland and 534 acres of managed wetland) to secondary tidal brackish emergent
35 wetland.

36 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
37 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,
38 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest
39 mouse. Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to
40 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of
41 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation
42 value than tidal wetlands. The species-specific biological goals and objectives would inform the
43 near-term protection and restoration efforts. These Plan goals represent performance standards for
44 considering the effectiveness of restoration actions. The acres of protection and restoration

1 contained in the near-term Plan goals would keep pace with the loss of habitat and effects on salt
2 marsh harvest mouse.

3 Other factors relevant to effects on salt marsh harvest mouse are listed below.

- 4 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
5 wetlands, as noted in the specie's draft recovery plan, because the conversion of managed
6 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by
7 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest
8 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided
9 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a
10 prolonged period (sometimes a decade or more) in which resident mice populations are
11 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these
12 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for
13 restoration of tidal wetlands through the conversion of managed wetlands. These plans are
14 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse
15 habitat from a variety of factors, including flooding from levee failure and cessation of active
16 management (which is often necessary to maintain habitat values in managed wetlands).
17 Therefore, the temporary effects under Alternative 4 would be consistent with those deemed
18 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 19 • Restoration in Suisun Marsh would be carefully phased over time to offset adverse effects of
20 restoration as it occurs. This phasing would ensure that temporal loss as a result of tidal natural
21 communities restoration does not adversely affect the salt marsh harvest mouse population,
22 ensure that short-term population loss is relatively small and incremental, and maintain local
23 source populations to recolonize newly restored areas. The tidal restoration projects in Suisun
24 Marsh would be implemented in 150-acre or greater patches that provide viable habitat areas
25 for the salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan
26 (U.S. Fish and Wildlife Service 2010).
- 27 • The salt marsh harvest mouse population would be monitored during the phasing process, and
28 adaptive management would be applied to ensure maintenance of the population as described
29 in the BDCP (see Chapter 3, Section 3.3.7.13, *Salt Marsh Harvest Mouse*, and Section 3.6, *Adaptive*
30 *Management and Monitoring Program*, of the BDCP).
- 31 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
32 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
33 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
34 forage and cover.

35 Because there would be no project-level effects on salt marsh harvest mouse resulting from CM1,
36 the analysis of the effects of conservation actions does not include a comparison with standard
37 ratios used for NEPA analyses.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
41 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
42 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
43 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
44 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 The study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat.
3 Alternative 4 as a whole would result in effects on 6,968 acres of saltmarsh harvest mouse modeled
4 habitat over the term of the Plan, which would include 5,376 acres of permanent losses and 1,592
5 acres of habitat conversions. This loss and conversion would affect 20% of the modeled habitat in
6 the study area. Most of these effects (99%) would be on managed wetlands, which, though are
7 known to be occupied by salt marsh harvest mouse, are at high risk of catastrophic flooding and
8 have a lower long-term conservation value than tidal wetlands (U.S. Fish and Wildlife Service 2010).
9 Effects on up to 20% of the species' habitat in the Plan Area may diminish the salt marsh harvest
10 mouse population in the Plan Area and result in reduced genetic diversity, thereby putting the local
11 population at risk of local extirpation due to random environmental fluctuations or catastrophic
12 events. This effect is expected to be greatest if large amounts of habitat are removed at one time in
13 Suisun Marsh and are not effectively restored for many years, and if there are no adjacent lands with
14 salt marsh harvest mouse populations to recolonize restored areas.

15 The Plan includes a commitment to restore or create 6,000 acres of tidal brackish emergent wetland,
16 1,500 acres of which would target middle and high marsh habitat (primary habitat for salt marsh
17 harvest mouse) (TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4); the protection of 6,500
18 acres of managed wetlands, 1,500 acres of which would be specifically managed for salt marsh
19 harvest mouse (SMHM1.2 and MWNC1.1, associated with CM3), and the protection and/or
20 restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration) to
21 provide upland refugia for salt marsh harvest mouse (GNC1.4, associated with CM3 and CM8). Other
22 factors relevant to effects on salt marsh harvest mouse include:

- 23 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
24 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the
25 conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is
26 often accomplished by breaching levees and converting diked nontidal marsh currently
27 occupied by salt marsh harvest mouse to tidal wetlands, their historic condition. Conversion of
28 these subsided areas requires sedimentation and accretion over time to restore marsh plains,
29 resulting in a prolonged period (sometimes a decade or more) in which resident mice
30 populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010).
31 Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan
32 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.
33 These plans are based on the premise that managed wetlands are at high risk of loss of salt
34 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and
35 cessation of active management (which is often necessary to maintain habitat values in managed
36 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed
37 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 38 • In order to ensure that temporal loss as a result of tidal natural communities restoration does
39 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh
40 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure
41 that short-term population loss is relatively small and incremental, and maintain local source
42 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh
43 would be implemented in 150-acre or greater patches that provide viable habitat areas for the
44 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish
45 and Wildlife Service 2010).

- 1 • The salt marsh harvest mouse population would be monitored during the phasing process, and
2 adaptive management would be applied to ensure maintenance of the population as described
3 in the BDCP (see Chapter 3, Section 3.3.7.13, *Salt Marsh Harvest Mouse*, and Section 3.6, *Adaptive*
4 *Management and Monitoring Program*, of the BDCP).
- 5 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
6 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
7 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
8 forage and cover.
- 9 • The habitat that would be restored and protected would consist of large blocks of contiguous
10 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
11 vegetation suitable for the species. This would provide greater habitat connectivity and greater
12 habitat value, which is expected to accommodate larger populations and to therefore increase
13 population resilience to random environmental events and climate change.

14 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6) estimates that the restoration
15 and protection actions discussed above could result in the restoration of 6,046 acres and the
16 protection of 1,550 acres of modeled habitat for salt marsh harvest mouse.

17 ***NEPA Effects:*** In the absence of other conservation actions, the effects on salt marsh harvest mouse
18 habitat from Alternative 4 would represent an adverse effect as a result of habitat modification and
19 potential direct mortality of a special-status species. However, the BDCP has committed to habitat
20 protection, restoration, management, and enhancement associated with CM3, CM4, CM8, and CM11.
21 This habitat protection, restoration, management, and enhancement would be guided by species-
22 specific goals and objectives and by AMM1–AMM5 and AMM26, which would be in place during
23 construction activity. Considering these commitments, losses and conversions of salt marsh harvest
24 mouse habitat and potential mortality of individuals in the near-term and late long-term under
25 Alternative 4 would not be an adverse effect.

26 ***CEQA Conclusion:***

27 ***Near-Term Timeframe***

28 The near-term BDCP conservation strategy has been evaluated to determine whether it would
29 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
30 the effects of near-term covered activities would be less than significant under CEQA. The Plan
31 would affect 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the near-
32 term. These effects include 1,517 acres of permanent loss and 948 acres of converted habitat. Most
33 of the habitat converted would be to primary habitats (599 acres consisting of 64 acres of tidal
34 brackish emergent wetland and 534 acres of managed wetland) to secondary tidal brackish
35 emergent wetland.

36 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
37 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,
38 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest
39 mouse). Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to
40 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of
41 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation
42 value than tidal wetlands. The species-specific biological goals and objectives would inform the
43 near-term protection and restoration efforts. These Plan goals represent performance standards for

1 considering the effectiveness of restoration actions. The acres of protection and restoration
2 contained in the near-term Plan goals would keep pace with the loss of habitat and effects on salt
3 marsh harvest mouse habitat.

4 Other factors relevant to effects on salt marsh harvest mouse are listed below.

- 5 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
6 wetlands as noted in the specie's draft recovery plan because the conversion of managed
7 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by
8 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest
9 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided
10 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a
11 prolonged period (sometimes a decade or more) in which resident mice populations are
12 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these
13 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for
14 restoration of tidal wetlands through the conversion of managed wetlands. These plans are
15 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse
16 habitat from a variety of factors, including flooding from levee failure and cessation of active
17 management (which is often necessary to maintain habitat values in managed wetlands).
18 Therefore, the temporary impacts under Alternative 4 would be consistent with those deemed
19 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 20 • To ensure that temporal loss as a result of tidal natural communities restoration does not
21 adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh would be
22 carefully phased over time to offset adverse effects of restoration as it occurs, ensure that short-
23 term population loss is relatively small and incremental, and maintain local source populations
24 to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh would be
25 implemented in 150-acre or greater patches that provide viable habitat areas for the salt marsh
26 harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish and Wildlife
27 Service 2010).
- 28 • The salt marsh harvest mouse population would be monitored during the phasing process, and
29 adaptive management would be applied to ensure maintenance of the population as described
30 in the BDCP (see Chapter 3, Section 3.3.7.13, *Salt Marsh Harvest Mouse*, and Section 3.6, *Adaptive*
31 *Management and Monitoring Program*, of the BDCP).
- 32 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
33 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
34 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
35 forage and cover.

36 Because there would be no project-level impacts on salt marsh harvest mouse resulting from CM1,
37 the analysis of the impacts of conservation actions does not include a comparison with standard
38 ratios used for project-level CEQA analyses.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
42 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
43 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work

1 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
2 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

3 These commitments are more than sufficient to support the conclusion that the near-term effects of
4 Alternative 4 would be less than significant under CEQA.

5 ***Late Long-Term Timeframe***

6 The study area supports approximately 35,588 acres of salt marsh harvest mouse modeled habitat.
7 Alternative 4 as a whole would result in effects on 6,968 acres of saltmarsh harvest mouse modeled
8 habitat over the term of the Plan, which would include 5,376 acres of permanent losses and 1,592
9 acres of habitat conversions. The Plan includes a commitment to restore or create 6,000 acres of
10 tidal brackish emergent wetland, 1,500 acres of which would target middle and high marsh habitat
11 (primary habitat for salt marsh harvest mouse) (Objectives TBEWNC1.1, TBEWNC1.2, SMHM1.1,
12 associated with CM4); the protection of 6,500 acres of managed wetlands, 1,500 acres of which
13 would be specifically managed for salt marsh harvest mouse (Objectives SMHM1.2 and MWNC1.1,
14 associated with CM3), and the protection and/or restoration of grassland adjacent to tidal
15 restoration (areas within 200 feet of tidal restoration) to provide upland refugia for salt marsh
16 harvest mouse (Objective GNC1.4, associated with CM3 and CM8). Other factors relevant to effects
17 on salt marsh harvest mouse include:

- 18 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
19 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the
20 conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is
21 often accomplished by breaching levees and converting diked nontidal marsh currently
22 occupied by salt marsh harvest mouse populations to tidal wetlands, their historic condition.
23 Conversion of these subsided areas requires sedimentation and accretion over time to restore
24 marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident
25 mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service
26 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan
27 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.
28 These plans are based on the premise that managed wetlands are at high risk of loss of salt
29 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and
30 cessation of active management (which is often necessary to maintain habitat values in managed
31 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed
32 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 33 • In order to ensure that temporal loss as a result of tidal natural communities restoration does
34 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh
35 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure
36 that short-term population loss is relatively small and incremental, and maintain local source
37 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh
38 would be implemented in 150-acre or greater patches that provide viable habitat areas for the
39 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish
40 and Wildlife Service 2010).
- 41 • The salt marsh harvest mouse population would be monitored during the phasing process, and
42 adaptive management would be applied to ensure maintenance of the population as described
43 in the BDCP (see Chapter 3, Section 3.3.7.13, *Salt Marsh Harvest Mouse*, and Section 3.6, *Adaptive*
44 *Management and Monitoring Program*, of the BDCP).

- 1 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
2 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
3 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
4 forage and cover.
- 5 • The habitat that would be restored and protected would consist of large blocks of contiguous
6 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
7 vegetation suitable for the species. This would provide greater habitat connectivity and greater
8 habitat value, which is expected to accommodate larger populations and to therefore increase
9 population resilience to random environmental events and climate change.

10 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
11 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
12 the restoration of 6,046 acres and the protection of 1,550 acres of modeled habitat for salt marsh
13 harvest mouse.

14 Alternative 4 would result in substantial modifications to salt marsh harvest mouse habitat in the
15 absence of other conservation actions. However, with habitat protection, restoration, management,
16 and enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and
17 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the construction
18 period, Alternative 4 over the term of the BDCP would not result in a substantial adverse effect
19 through habitat modifications and would not substantially reduce the number or restrict the range
20 of the species. Therefore, the alternative would have a less-than-significant impact on salt marsh
21 harvest mouse.

22 **Impact BIO-159: Indirect Effects of Plan Implementation on Salt Marsh Harvest Mouse**

23 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),
24 and management and enhancement activities (CM11) could result in temporary noise and visual
25 disturbances to salt marsh harvest mouse occurring within 100 feet of these areas over the term of
26 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM5, and
27 AMM26, which would be in effect throughout the term of the Plan.

28 The use of mechanical equipment during the implementation of the conservation measures could
29 cause the accidental release of petroleum or other contaminants that could affect salt marsh harvest
30 mouse and its habitat. The inadvertent discharge of sediment could also have a negative effect on
31 the species and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would
32 ensure measures are in place to prevent runoff from the construction area and potential effects of
33 sediment on salt marsh harvest mouse.

34 Tidal marsh restoration has the potential to increase salt marsh harvest mouse's exposure to
35 mercury. Mercury is transformed into the more bioavailable form of methylmercury under
36 anaerobic conditions, which in the environment typically occurs in sediments subjected to regular
37 wetting and drying such as tidal marshes and flood plains. Thus, BDCP restoration activities that
38 create newly inundated areas could increase bioavailability of mercury. In general, the highest
39 methylation rates are associated with high tidal marshes that experience intermittent wetting and
40 drying and associated anoxic conditions (Alpers et al. 2008). High tidal marsh is considered to be
41 primary habitat for salt marsh harvest mouse and thus the species could be exposed to methyl
42 mercury in tidal restoration areas. Salt marsh harvest mouse may be exposed to elemental mercury
43 by feeding on pickleweed, which is found concentrated in the distal tips of pickleweed leaves (Yee et.

1 al., 2008). Though elemental mercury is less bioavailable than methylmercury, studies have shown
 2 that mercury can become methylated in the anaerobic portions of the intestinal tract (Rudd et al.
 3 1980, Rieder et al. 2013) and could thus become a pathway for salt marsh harvest exposure to
 4 methylmercury. A study of small mammals residing in pickleweed around the San Francisco Bay
 5 showed an absence of salt marsh harvest mouse where mercury concentrations measured in house
 6 mice (*Mus musculus*) livers were ≥ 0.19 $\mu\text{g/g}$ (dry weight) (Clark et al. 1992). Clark et al (1992) also
 7 report that the lack of salt marsh harvest mouse at these locations are not the result of undetected
 8 habitat differences or are by chance. Clarke et al (1992) suggest that the absence of salt marsh
 9 harvest mouse at certain locations may be associated with higher amounts of mercury and
 10 polychlorinated biphenyls (PCBs); however, because their study didn't analyze contaminants in salt
 11 marsh harvest mouse and because (at that time) there was no data in the literature on contaminants
 12 in harvest mice, they could not make conclusions on these associations. Currently, it is unknown
 13 what the exact exposure pathways are or what tissue concentrations are harmful to the salt marsh
 14 harvest mouse.

15 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
 16 under the plan would generate less methylmercury than the existing managed wetlands. As
 17 discussed in Appendix 11F *Substantive BDCP Revisions*, managed wetlands provide for the highest
 18 rates of methylation (Windham-Myers et al. 2010). Thus, restoration actions in Suisun Marsh that
 19 convert managed to unmanaged tidal wetlands are expected to decrease mercury methylation on a
 20 local scale, and total bioavailable methylmercury on a broader scale in the Suisun Marsh system.
 21 Overall, BDCP restoration actions should result in a net benefit to Suisun Marsh in terms of mercury.
 22 The potential for salt marsh harvest mouse exposure to methyl mercury in Suisun Marsh may
 23 decrease in the long term because the creation of tidal brackish emergent wetland would
 24 predominantly result from the conversion of managed wetlands. *CM12 Methylmercury Management*
 25 (as revised in Appendix 11F) includes provisions for project-specific Mercury Management Plans.
 26 Along with avoidance and minimization measures and adaptive management and monitoring, CM12
 27 could reduce the effects of methylmercury on salt marsh harvest mouse resulting from BDCP tidal
 28 restoration.

29 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 4
 30 would avoid and minimize indirect effects on salt marsh harvest mouse. These AMMs would also
 31 avoid and minimize effects that could substantially reduce the number of salt marsh harvest mouse,
 32 or restrict the species' range. Therefore, the indirect effects of Alternative 4 would not have an
 33 adverse effect on salt marsh harvest mouse.

34 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could
 35 impact salt marsh harvest mouse within 100 feet of these disturbances. The use of mechanical
 36 equipment during construction could cause the accidental release of petroleum or other
 37 contaminants that could impact salt marsh harvest mouse and its habitat. The inadvertent discharge
 38 of sediment adjacent to salt marsh harvest mouse habitat could also impact the species. With
 39 implementation of AMM1–AMM5 and AMM26 as part of Alternative 4 construction, operation and
 40 maintenance, the BDCP would avoid the potential for substantial adverse effects on salt marsh
 41 harvest mouse, either indirectly or through habitat modifications, in that the BDCP would not result
 42 in a substantial reduction in numbers or a restriction in the range of salt marsh harvest mouse. The
 43 indirect effects of Alternative 4 would have a less-than-significant impact on salt marsh harvest
 44 mouse.

1 Salt marsh harvest mouse could experience indirect effects from increased exposure to
2 methylmercury as a result of tidal habitat restoration (CM4). With implementation of CM12, the
3 potential indirect effects of methylmercury would not result in a substantial reduction in numbers
4 or a restriction in the range of salt marsh harvest mouse, and, therefore, would have a less-than-
5 significant impact on the species.

6 **Suisun Shrew**

7 This section describes the effects of Alternative 4, including water conveyance facilities construction
8 and implementation of other conservation components, on the Suisun shrew. Primary Suisun shrew
9 habitat consists of all *Salicornia*-dominated natural seasonal wetlands and certain *Scirpus* and *Typha*
10 communities found within Suisun Marsh only. Low marsh dominated by *Schoenoplectus acutus* and
11 *S. californicus* and upland transitional zones within 150 feet of the tidal wetland edge were classified
12 separately as secondary habitat because they are used seasonally (Hays and Lidicker 2000). All
13 managed wetlands were excluded from the habitat model.

14 Construction and restoration associated with Alternative 4 conservation measures would result in
15 effects on modeled Suisun shrew habitat, which would include permanent losses and habitat
16 conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species post-
17 restoration) as indicated in Table 12-4-58. All of the effects on the species would take place over an
18 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of
19 Alternative 4 would also include the following conservation actions over the term of the BDCP to
20 benefit Suisun shrew (see Chapter 3, *Conservation Strategy*, of the BDCP).

- 21 • Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with
22 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California
23 (TBEWNC1.1, associated with CM4)
- 24 • Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500
25 acres of middle and high marsh (primary Suisun shrew habitat) to contribute to total (existing
26 and restored) acreage targets for each complex as specified in the final Recovery Plan for Tidal
27 Marsh Ecosystems of Northern and Central California (TBEWNC1.2, associated with CM4).
- 28 • Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
29 natural community within the reserve system (TBEWNC2.1).
- 30 • Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide at
31 least 200 feet of adjacent grasslands beyond the sea level rise accommodation area, which
32 provides refugia during high tides (GNC1.4, associated with CM3 and CM8).

33 As explained below, with the restoration and protection of these amounts of habitat, impacts on the
34 Suisun shrew would not be adverse for NEPA purposes and would be less than significant for CEQA
35 purposes under Alternative 4.

1 **Table 12-4-58. Changes in Suisun Shrew Modeled Habitat Associated with Alternative 4 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
CM2-CM18	Primary	58	60	0	0	0	0
	Secondary	47	342	0	0	0	0
Total Impacts CM2-CM18		105	401	0	0	0	0
TOTAL IMPACTS		105	401	0	0	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-160: Loss or Conversion of Habitat for and Direct Mortality of Suisun Shrew**

4 BDCP tidal restoration (CM4) would be the only conservation measure resulting in loss of habitat to
5 Suisun shrew. Habitat enhancement and management activities (CM11), which include ground
6 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. Each of
7 these activities is described in detail below. A summary statement of the combined impacts and
8 NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 9
- 10 • *CM4 Tidal Natural Communities Restoration* would result in effects on 401 acres of Suisun shrew modeled habitat, which would include 377 acres of permanent losses and 24 acres of habitat conversions. Suisun shrew may be displaced temporarily from areas of converted habitat but would ultimately provide suitable habitat for the species. However, all 24 acres would be converted from secondary to primary habitat and therefore over would be a net benefit to the species. The hypothetical restoration footprints overlap with two CNDDDB records for Suisun shrew (California Department of Fish and Wildlife 2013).
 - 16 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the restoration of at least 6,000 acres of tidal brackish emergent wetland would be managed to provide habitat for covered species, including Suisun shrew. A variety of habitat management actions included in *CM11 Natural Communities Enhancement and Management* that are designed to enhance and manage these areas may result in localized ground disturbances that could temporarily remove small amounts of Suisun shrew habitat. The areas of grasslands that would be protected and/or restored within 200 feet of restored tidal marsh would also have enhancement and management actions that would include invasive species control, nonnative
- 23

1 wildlife control, and vegetation management. Ground-disturbing activities, such as removal of
2 nonnative vegetation are expected to have minor effects on habitat and are expected to result in
3 overall improvements to and maintenance of Suisun shrew habitat values over the term of the
4 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
5 and minimized by the AMMs listed below.

- 6 • Injury and Direct Mortality: The use of heavy equipment and handtools may result in injury or
7 mortality to Suisun shrew during restoration, enhancement, and management activities.
8 However, preconstruction surveys, construction monitoring, and other measures would be
9 implemented to avoid and minimize injury or mortality of this species during these activities, as
10 required by the AMM listed below.

11 The following paragraphs summarize the combined effects discussed above and describe other
12 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
13 also included.

14 ***Near-Term Timeframe***

15 The near-term BDCP conservation strategy has been evaluated to determine whether it would
16 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
17 the effects of near-term covered activities would not be adverse under NEPA. The Plan would affect
18 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These effects include
19 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary habitat being
20 converted to primary habitat.

21 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
22 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal
23 wetlands, of which approximately 150 feet of this area would benefit the species. These Plan goals
24 represent performance standards for considering the effectiveness of restoration actions. The acres
25 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-
26 term Plan goals would keep pace with the loss of habitat and effects on Suisun shrew.

27 Other factors relevant to effects on Suisun shrew are listed here.

- 28 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
29 loss of habitat and habitat fragmentation.
- 30 • The habitat that would be restored and protected would consist of large blocks of contiguous
31 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
32 vegetation suitable for the species. This would provide greater habitat connectivity and greater
33 habitat value and quantity, with is expected to accommodate larger populations and to therefore
34 increase population resilience to random environmental events and climate change.
- 35 • The amount of tidal habitat restored in the near-term (2,000 acres) would greatly exceed the
36 amount permanently lost (105 acres).

37 Because there would be no project-level effects on Suisun shrew resulting from CM1, the analysis of
38 the effects of conservation actions does not include a comparison with standard ratios used for
39 project-level NEPA analyses.

40 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
41 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
2 *Countermeasure Plan, and AMM26 Salt Marsh Harvest Mouse and Suisun Shrew. All of these AMMs*
3 *include elements that avoid or minimize the risk of affecting habitats and species adjacent to work*
4 *areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are*
5 *provided in Appendix 3B, Environmental Commitments, AMMs, and CMs, of the Final EIR/EIS.*

6 **Late Long-Term Timeframe**

7 The study area supports approximately 7,515 acres of Suisun shrew modeled habitat. Alternative 4
8 as a whole would result in effects on 401 acres of Suisun shrew modeled habitat over the term of the
9 Plan, which would include 377 acres of permanent losses and 24 acres of habitat conversions
10 (roughly 5% of the habitat in the study area).

11 The Plan contains a commitment to restore or create 6,000 acres of tidal brackish emergent
12 wetland, 1,500 acres of which would target middle and high marsh habitat (primary habitat for
13 Suisun shrew) (Objectives TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4) and the
14 protection and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of
15 tidal restoration, of which approximately 150 feet would likely benefit the species) to provide
16 upland refugia for Suisun shrew (Objective GNC1.4, associated with CM3 and CM8). Other factors
17 relevant to effects on Suisun shrew include:

- 18 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
19 loss of habitat and habitat fragmentation.
- 20 ● The habitat that would be restored and protected would consist of large blocks of contiguous
21 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
22 vegetation suitable for the species. This would provide greater habitat connectivity and greater
23 habitat value and quantity, with is expected to accommodate larger populations and to therefore
24 increase population resilience to random environmental events and climate change.
- 25 ● The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost
26 and converted (401 acres).

27 The BDCP's beneficial effects analysis (Chapter 5, Section 5.6, *Effects on Covered Wildlife and Plant*
28 *Species*, of the BDCP) estimates that the restoration and protection actions discussed above could
29 result in the restoration of 6,006 acres and the protection of 232 acres of modeled habitat for Suisun
30 shrew.

31 **NEPA Effects:** In the absence of other conservation actions, the effects on Suisun shrew habitat from
32 Alternative 4 would represent an adverse effect as a result of habitat modification and potential
33 direct mortality of a special-status species. However, the BDCP has committed to habitat protection,
34 restoration, management, and enhancement with CM3, CM4, CM8, and CM11. This habitat
35 protection, restoration, management, and enhancement would be guided by species-specific goals
36 and objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the
37 construction period. Considering these commitments, losses and conversions of Suisun shrew
38 habitat and potential mortality of individuals under Alternative 4 would not be an adverse effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 The near-term BDCP conservation strategy has been evaluated to determine whether it would
4 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
5 the effects of near-term covered activities would be less than significant under CEQA. The Plan
6 would affect 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These
7 effects include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary
8 habitat being converted to primary habitat.

9 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
10 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal
11 wetlands, of which approximately 150 feet would likely benefit the species. These Plan goals
12 represent performance standards for considering the effectiveness of restoration actions. The acres
13 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-
14 term Plan goals would keep pace with the loss of habitat and effects on Suisun shrew.

15 Other factors relevant to impacts on Suisun shrew are listed below.

- 16
- 17 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
loss of habitat and habitat fragmentation.
 - 18 • The habitat that would be restored and protected would consist of large blocks of contiguous
19 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
20 vegetation suitable for the species. This would provide greater habitat connectivity and greater
21 habitat value and quantity, with is expected to accommodate larger populations and to therefore
22 increase population resilience to random environmental events and climate change.
 - 23 • The amount of tidal habitat restored in the near term (2,000 acres) would greatly exceed the
24 amount permanently lost (105 acres).

25 Because there would be no project-level impacts on Suisun shrew resulting from CM1, the analysis
26 of the impacts of conservation actions does not include a comparison with standard ratios used for
27 project-level CEQA analyses.

28 The Plan also includes commitments to implement AMM1–AMM5 and AMM26. All of these AMMs
29 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
30 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
31 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

32 These commitments are more than sufficient to support the conclusion that the near-term effects of
33 Alternative 4 would be less than significant under CEQA. No mitigation would be required.

34 **Late Long-Term Timeframe**

35 The study area supports approximately 7,515 acres of Suisun shrew modeled habitat. Alternative 4
36 as a whole would result in effects on 401 acres of Suisun shrew modeled habitat over the term of the
37 Plan, which would include 377 acres of permanent losses and 24 acres of habitat conversions
38 (roughly 5% of the habitat in the study area). The Plan contains a commitment to restore or create
39 6,000 acres of tidal brackish emergent wetland, 1,500 acres of which would target middle and high
40 marsh habitat (primary habitat for Suisun shrew) (Objective TBEWNC1.1, TBEWNC1.2, SMHM1.1,
41 associated with CM4) and the protection and/or restoration of grassland adjacent to tidal

1 restoration (areas within 200 feet of tidal restoration, of which approximately 150 feet would likely
2 benefit the species) to provide upland refugia for Suisun shrew (Objective GNC1.4, associated with
3 CM3 and CM8). Other factors relevant to effects on Suisun shrew include:

- 4 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
5 loss of habitat and habitat fragmentation.
- 6 • The habitat that would be restored and protected would consist of large blocks of contiguous
7 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
8 vegetation suitable for the species. This would provide greater habitat connectivity and greater
9 habitat value and quantity, with is expected to accommodate larger populations and to therefore
10 increase population resilience to random environmental events and climate change.
- 11 • The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost
12 and converted (401 acres).

13 The BDCP's beneficial effects analysis (Chapter 5, Section 5.6, *Effects on Covered Wildlife and Plant*
14 *Species*, of the BDCP) estimates that the restoration and protection actions discussed above could
15 result in the restoration of 6,006 acres and the protection of 232 acres of modeled habitat for Suisun
16 shrew.

17 Alternative 4 would result in substantial modifications to Suisun shrew habitat in the absence of
18 other conservation actions. However, with habitat protection, restoration, management, and
19 enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and
20 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the construction
21 period, Alternative 4 over the term of the BDCP would not result in a substantial adverse effect
22 through habitat modifications and would not substantially reduce the number or restrict the range
23 of the species. Therefore, the alternative would have a less-than-significant impact on Suisun shrew.
24 No mitigation would be required.

25 **Impact BIO-161: Indirect Effects of Plan Implementation on Suisun Shrew**

26 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),
27 and management and enhancement activities (CM11) could result in temporary noise and visual
28 disturbances to Suisun shrew occurring within 100 feet of these areas over the term of the BDCP.
29 These potential effects would be minimized or avoided through AMM1–AMM5, and AMM26, which
30 would be in effect throughout the term of the Plan.

31 The use of mechanical equipment during the implementation of the conservation measures could
32 cause the accidental release of petroleum or other contaminants that could affect Suisun shrew and
33 its habitat. The inadvertent discharge of sediment could also have a negative effect on the species
34 and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would ensure
35 measures are in place to prevent runoff from the construction area and potential effects of sediment
36 on Suisun shrew.

37 Tidal marsh restoration has the potential to increase Suisun shrew's exposure to mercury. Mercury
38 is transformed into the more bioavailable form of methylmercury under anaerobic conditions,
39 which in the environment typically occurs in sediments subjected to regular wetting and drying
40 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly
41 inundated areas could increase bioavailability of mercury. In general, the highest methylation rates
42 are associated with high tidal marshes that experience intermittent wetting and drying and

1 associated anoxic conditions (Alpers et al. 2008). High and mid tidal marsh is considered to be
2 primary habitat for Suisun shrew and thus the species could be exposed to methylmercury in tidal
3 restoration areas. Suisun shrew could be exposed to methylmercury by feeding on marsh
4 invertebrates that may bioaccumulate methylmercury from marsh sediments. Toxic concentrations
5 of methylmercury have been found in the kidneys of shrews that inhabit contaminated sites and
6 forage on earthworms and other prey that live within contaminated sediments (Talmage and
7 Walton 1993; Hinton and Veiga 2002).

8 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
9 under the plan would generate less methylmercury than the existing managed wetlands. The
10 potential for Suisun shrew exposure to methyl mercury in Suisun Marsh may decrease in the long
11 term because the creation of tidal brackish emergent wetland would predominantly result from the
12 conversion of managed wetlands. *CM12 Methylmercury Management* (as revised in Appendix 11F,
13 *Substantive BDCP Revisions*) includes provisions for project-specific Mercury Management Plans.
14 Along with avoidance and minimization measures and adaptive management and monitoring, CM12
15 could reduce the effects of methylmercury on Suisun shrew resulting from BDCP tidal restoration.

16 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 4
17 would avoid and minimize the potential for substantial adverse effects on Suisun shrew, either
18 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that
19 could substantially reduce the number of Suisun shrew, or restrict the species' range. Therefore, the
20 indirect effects of Alternative 4 would not have an adverse effect on Suisun shrew.

21 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could
22 impact Suisun shrew within 100 feet of these disturbances. The use of mechanical equipment during
23 construction could cause the accidental release of petroleum or other contaminants that could
24 impact Suisun shrew and its habitat. The inadvertent discharge of sediment adjacent to Suisun
25 shrew habitat could also impact the species. With implementation of AMM1–AMM5, and AMM26 as
26 part of Alternative 4 construction, operation and maintenance, the BDCP would avoid the potential
27 for substantial adverse effects on Suisun shrew, either indirectly or through habitat modifications, in
28 that the BDCP would not result in a substantial reduction in numbers or a restriction in the range of
29 Suisun shrew. The indirect effects of Alternative 4 would have a less-than-significant impact on
30 Suisun shrew.

31 Suisun shrew could experience indirect effects from increased exposure to methylmercury as a
32 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects
33 of methylmercury would not result in a substantial reduction in numbers or a restriction in the
34 range of Suisun shrew, and, therefore, would have a less-than significant impact on the species. No
35 mitigation would be required.

36 **San Joaquin Kit Fox and American Badger**

37 Within the study area, the modeled habitat for the San Joaquin kit fox and potential habitat for the
38 American badger is restricted to 5,327 acres of grassland habitat west of Clifton Court Forebay along
39 the study area's southwestern edge, in CZ 7–CZ 10. The study area represents the extreme
40 northeastern corner of the San Joaquin kit fox's range in California, which extends westward and
41 southward from the study area border. The northern range of the San Joaquin kit fox (including the
42 study area) was most likely marginal habitat historically and has been further degraded due to
43 development pressures, habitat loss, and fragmentation (Clark et al. 2007). CNDDB (California
44 Department of Fish and Wildlife 2013) reports twelve occurrences of San Joaquin kit foxes along the

1 extreme western edge of the Plan Area within CZ 8, south of Brentwood (Figure 12-49). However,
 2 Clark et al. (2007) provide evidence that a number of CNDDDB occurrences in the northern portion of
 3 the species' range may be coyote pups misidentified as San Joaquin kit foxes. Smith et al. (2006)
 4 suggest that the northern range may possibly be a population sink for the San Joaquin kit fox. There
 5 are five American badger records in the study area (California Department of Fish and Wildlife
 6 2013). Two are from 1938 and no longer extant. The remaining three are all located in CZ 8, west of
 7 Clifton Court Forebay. Construction and restoration associated with Alternative 4 conservation
 8 measures would result in both temporary and permanent losses of San Joaquin kit and American
 9 badger habitat (Table 12-4-59). Grassland restoration, and protection and management of natural
 10 communities could affect modeled San Joaquin San Joaquin kit fox habitat and potential American
 11 badger habitat. Full implementation of Alternative 4 would also include biological objectives over
 12 the term of the BDCP to benefit the San Joaquin kit fox which would also benefit American badger
 13 which uses similar habitat (BDCP Chapter 3, *Conservation Strategy*). The conservation strategy for
 14 the San Joaquin kit fox involves protecting and enhancing habitat in the northern extent of the
 15 species' range to increase the likelihood that San Joaquin kit fox may reside and breed in the Plan
 16 Area; and providing connectivity to habitat outside the Plan Area. The conservation measures that
 17 would be implemented to achieve the biological goals and objectives are summarized below.

- 18 • Protect and improve habitat linkages that allow terrestrial covered and other native species to
 19 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
 20 associated with CM3–CM8, and CM11).
- 21 • Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
 22 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 23 • Restore or create alkali seasonal wetlands in CZ 1, CZ 8, and/or CZ 11 (up to 72 acres of alkali
 24 seasonal wetland complex restoration) (Objective ASWNC1.2, associated with CM3 and CM9).
- 25 • Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and/or CZ 11, primarily in core
 26 vernal pool recovery areas identified in the Recovery Plan for Vernal Pool Ecosystems of
 27 California and Southern Oregon (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,
 28 associated with CM3).
- 29 • Restore vernal pool complex CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool
 30 acreage (up to 67 acres of vernal pool complex restoration) (Objective VPNC1.2, associated with
 31 CM3 and CM9).
- 32 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 33 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland
 34 (Objective GNC1.2, associated with CM3 and CM8).
- 35 • Increase burrow availability for burrow-dependent species in grasslands surrounding alkali
 36 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective
 37 ASWNC2.3, associated with CM11).
- 38 • Increase prey, especially small mammals and insects, for grassland-foraging species in
 39 grasslands surrounding alkali seasonal wetlands within restored and protected alkali seasonal
 40 wetland complex (Objective ASWNC2.4, associated with CM11).
- 41 • Increase burrow availability for burrow-dependent species in grasslands surrounding vernal
 42 pools within restored and protected vernal pool complex (Objective VPNC2.4, associated with
 43 CM11).

- 1 • Increase prey, especially small mammals and insects, for grassland-foraging species in
2 grasslands surrounding vernal pools within restored and protected vernal pool complex
3 (Objective VPNC2.5, associated with CM11).
- 4 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
5 CM11).
- 6 • Increase prey abundance and accessibility, especially small mammals and insects, for grassland-
7 foraging species (Objective GNC2.4, associated with CM11).

8 As explained below, with the restoration and protection of these amounts of habitat, in addition to
9 the AMMs to reduce potential effects, impacts on San Joaquin kit fox and American badger would not
10 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

11 **Table 12-4-59. Changes in San Joaquin Kit Fox Modeled Habitat Associated with Alternative 4**
12 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT	CM2	CM5
CM1	Modeled Habitat	258	258	68	68	NA	NA
Total Impacts CM1		258	258	68	68	NA	NA
CM2–CM18	Modeled Habitat	3	8	0	0	0	0
Total Impacts CM2–CM18		3	8	0	0	0	0
TOTAL IMPACTS		261	266	68	68	0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

13

14 **Impact BIO-162: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Kit Fox**
15 **and American Badger**

16 Alternative 4 conservation measures would result in the permanent and temporary loss combined
17 of 334 acres of modeled habitat for the San Joaquin kit fox (Table 12-4-59). Because American
18 badger uses grasslands for denning and foraging and may occupy the same range as the San Joaquin
19 kit fox in the project area, effects are anticipated to be the same as those described for San Joaquin
20 kit fox. Construction of Alternative 4 water conveyance facilities (CM1) and recreation facilities
21 (CM11) would remove habitat. Habitat enhancement and management activities (CM11) could
22 result in local adverse effects on species. In addition, construction vehicle activity could cause injury
23 or mortality of San Joaquin kit foxes and badgers. Each of these individual activities is described

1 below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion
2 follow the individual conservation measure discussions.

- 3 • *CM1 Water Facilities and Operation*: Construction of the conveyance facilities would result in the
4 permanent loss of approximately 258 acres and the temporary loss of 68 acres of modeled San
5 Joaquin kit fox and American badger habitat. This habitat is located in areas of naturalized
6 grassland in a highly disturbed or modified setting on lands immediately adjacent to Clifton
7 Court Forebay, in CZ 8. There are three San Joaquin kit fox and no American badger occurrences
8 that overlap with the CM1 footprint.
- 9 • *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails
10 and recreational staging areas would result in the permanent removal of 8 acres of San Joaquin
11 kit fox modeled habitat and American badger potential habitat. *AMM24 San Joaquin Kit Fox*,
12 would be implemented to ensure that San Joaquin kit fox dens are avoided, as described in
13 Appendix 3B, *Environmental Commitments, AMMs, and CMs*. Mitigation Measure BIO-162:
14 *Conduct Preconstruction Survey for American Badger* would be implemented to ensure that
15 American badger dens are avoided.

16 Passive recreation in the reserve system could result in disturbance of San Joaquin kit foxes and
17 American badgers at their den site. Natal and pupping dens would be particularly vulnerable to
18 human disturbance. Additionally, disease could be transmitted from domestic dogs that enter
19 the reserve system with recreational users. However, *AMM37 Recreation* and Mitigation
20 Measure BIO-162 would prohibit construction of new trails within 250 feet of active San Joaquin
21 kit fox and American badger dens. Existing trails would be closed within 250 feet of active
22 natal/pupping dens until young have vacated, and within 50 feet of other active dens. No dogs
23 would be allowed on reserve units with active San Joaquin kit fox and American badger
24 populations. Rodent control would be prohibited even on grazed or equestrian access areas with
25 San Joaquin kit fox or American badger populations. *AMM37* measures to protect San Joaquin kit
26 fox would also benefit American badger if present. With these restrictions, recreation-related
27 effects on San Joaquin kit fox and American badger are expected to be minimal.

28 The BDCP would require the enhancement and management of these protected existing
29 grasslands and restored grasslands to improve their function as a natural community of plants
30 and wildlife and for associated covered species, including San Joaquin kit fox and American
31 badger. The BDCP also includes actions to improve rodent prey availability.

32 However, management activities could result in injury or mortality of San Joaquin kit fox or
33 American badger if individuals were present in work sites or if dens were located in the vicinity
34 of habitat management work sites. A variety of habitat management actions included in *CM11*
35 that are designed to enhance wildlife values on protected lands may result in localized ground
36 disturbances that could temporarily remove small amounts of San Joaquin kit fox and American
37 badger habitat near Clifton Court Forebay, in CZ 8. Ground-disturbing activities, such as removal
38 of nonnative vegetation and road and other infrastructure maintenance activities, are expected
39 to have minor effects on available habitat and are expected to result in overall improvements to
40 and maintenance of San Joaquin kit fox and badger habitat values over the term of the BDCP.
41 These effects cannot be quantified, but are expected to be minimal and would be avoided and
42 minimized through the AMMs and Mitigation Measure BIO-162 listed below. These AMMs and
43 Mitigation Measure BIO-162 would remain in effect throughout the BDCP's construction phase.

- 44 • *Operations and maintenance*: Ongoing maintenance of BDCP facilities would be expected to have
45 little if any adverse effect on San Joaquin kit fox or American badger. Postconstruction

1 operations and maintenance of the above-ground water conveyance facilities and restoration
2 infrastructure could result in ongoing but periodic disturbances that could affect either species'
3 use of the surrounding habitat near Clifton Court Forebay, in CZ 8. Maintenance activities would
4 include vegetation management, levee and structure repair, and regrading of roads and
5 permanent work areas. These effects, however, would be minimized with implementation of
6 AMM1-AMM6, AMM10, and AMM24 and with preconstruction surveys for the American badger,
7 as required by Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American*
8 *Badger*.

- 9 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
10 either species. If San Joaquin kit fox or American badger reside where activities take place (most
11 likely in the vicinity of Clifton Court Forebay, in CZ 8), the operation of equipment for land
12 clearing, construction, operations and maintenance, and restoration, enhancement, and
13 management activities could result in injury to or mortality of either species. Measures would be
14 implemented to avoid and minimize injury to or mortality of these species as described in
15 AMM1-AMM6, AMM10, AMM24, and AMM37 (see Appendix 3B, *Environmental Commitments*,
16 *AMMs, and CMs*) and Mitigation Measure BIO-162.

17 The following paragraphs summarize the combined effects discussed above and describe other
18 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
19 also included.

20 ***Near-Term Timeframe***

21 Because water conveyance facilities construction is being evaluated at the project level, the near-
22 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
23 protection or restoration in an appropriate timeframe to ensure that the construction effects would
24 not be adverse under NEPA.

25 Under Alternative 4 there would be a loss of 329 acres of San Joaquin kit fox modeled habitat and
26 American badger habitat from CM1 (326 acres) and CM11 (3 acres).

27 Typical NEPA project-level mitigation ratio for the natural community that would be affected and
28 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3,
29 *Conservation Strategy*, of the BDCP would be 2:1 for protection of grassland. Using this ratio would
30 indicate that 658 acres of grassland should be protected for San Joaquin kit fox to mitigate near-
31 term losses.

32 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective
33 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland
34 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal
35 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000
36 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities
37 are expected to be concluded during the first 10 years of Plan implementation, which is close
38 enough in time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes.
39 These commitments are more than sufficient to support the conclusion that the near-term effects of
40 Alternative 4 would be not be adverse under NEPA, because the number of acres required to meet
41 the typical ratios described above would be only 658 acres of grassland protected.

42 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger
43 habitat from Alternative 4 would represent an adverse effect as a result of habitat modification and

1 potential direct mortality of special-status species. However, the effects of Alternative 4 would not
2 be adverse with habitat protection, restoration, management, and enhancement in addition to
3 implementation of *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management*
4 *Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment*
5 *Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and*
6 *Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM24 San*
7 *Joaquin Kit Fox*, and *AMM37 Recreation*. AMMs contain elements that avoid or minimize the risk of
8 construction activity affecting habitat and species adjacent to work areas. BDCP Appendix 3.C
9 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
10 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. Remaining effects would be
11 addressed by implementation of Mitigation Measure BIO-162.

12 **Late Long-Term Timeframe**

13 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 4 as a
14 whole would result in the permanent loss of and temporary effects on 334 acres of modeled habitat
15 for San Joaquin kit fox and potential habitat for American badger, representing 6% of the modeled
16 habitat.

17 With full implementation of Alternative 4, at least 1,000 acres of grassland would be protected in CZ
18 8, where the San Joaquin kit fox and American badger is most likely to occur if present in the study
19 area. Additionally, a portion of the 2,000 acres of grassland restoration would likely occur in CZ 8.
20 Assuming the restored grasslands would provide suitable San Joaquin kit fox habitat proportional to
21 the amount of modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in
22 the Plan Area consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored
23 grasslands would be suitable for both species.

24 Because San Joaquin kit fox home ranges are large (varying from approximately 1 to 12 square
25 miles; see BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the
26 conservation of the species. Grasslands would be acquired for protection in locations that provide
27 connectivity to existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining
28 San Joaquin kit fox habitat within and adjacent to the Plan Area. Connectivity to occupied habitat
29 adjacent to the Plan Area would help ensure the movement of San Joaquin kit foxes and American
30 badger, if present, to larger habitat patches outside of the Plan Area in Contra Costa County.
31 Grassland protection would focus in particular on acquiring the largest remaining contiguous
32 patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (BDCP
33 Appendix 2.A, *Covered Species Accounts*). This area connects to more than 620 acres of existing
34 habitat that was protected under the East Contra Costa County HCP/NCCP.

35 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to
36 increase mammal burrows, which could benefit the San Joaquin kit fox and American badger by
37 increasing potential den sites, which are a limiting factor for the San Joaquin kit fox in the northern
38 portion of its range (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective
39 GNC2.3, Objective GNC2.4). These management and enhancement actions are expected to benefit the
40 San Joaquin kit fox as well as the American badger by increasing the habitat value of the protected
41 and restoration grasslands.

42 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the
43 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this
44 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches

1 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool
2 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in
3 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities
4 construction.

5 The BDCP's beneficial effects analysis (Chapter 5, Section 5.6, *Effects on Covered Wildlife and Plant*
6 *Species*, of the BDCP) estimates that the restoration and protection actions discussed above, as well
7 as the restoration of grassland and vernal pool that could overlap with the species model, would
8 result in the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In addition,
9 protection of grassland and vernal pool complex could overlap with the species model and would
10 result in the protection of 1,011 acres of modeled habitat for San Joaquin kit fox. These restoration
11 and protection actions would also benefit the American badger.

12 **NEPA Effects:** In the absence of other conservation actions, the effects on San Joaquin kit fox and
13 American badger habitat from Alternative 4 would represent an adverse effect as a result of habitat
14 modification and potential direct mortality of special-status species. However, with habitat
15 protection, restoration, management, and enhancement associated with CM3, CM8, and CM11 and
16 guided by AMM1–AMM6, AMM10, AMM24, and AMM37, which would be in place during all project
17 activities, and with implementation of Mitigation Measure BIO-162, the effects of Alternative 4 as a
18 whole on San Joaquin kit fox and American badger would not be adverse.

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Because water conveyance facilities construction (CM1) is being evaluated at the project level, the
22 near-term BDCP strategy has been analyzed to determine whether it would provide sufficient
23 habitat protection or restoration in an appropriate timeframe to ensure that the construction effects
24 would be less than significant for CEQA purposes.

25 Under Alternative 4 there would be a loss of 329 acres of San Joaquin kit fox modeled habitat and
26 American badger habitat from CM1 (326 acres) and CM11 (3 acres).

27 Typical CEQA project-level mitigation ratio for the natural community that would be affected and
28 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3,
29 *Conservation Strategy*, of the BDCP would be 2:1 for protection of grassland. Using this ratio would
30 indicate that 658 acres of grassland should be protected for San Joaquin kit fox and American badger
31 to mitigate near-term losses.

32 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective
33 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland
34 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal
35 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000
36 acres of grassland (Objective GNC1.1).

37 These conservation actions would occur in the same timeframe as the construction losses, thereby
38 avoiding significant impacts of habitat loss on San Joaquin kit fox and American badger. These Plan
39 objectives represent performance standards for considering the effectiveness of CM3 protection and
40 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
41 and the additional detail in the biological objectives for San Joaquin kit fox and the mitigation

1 measure for American badger satisfy the typical mitigation that would be applied to the project-level
2 effects of CM1, as well as mitigate the near-term effects of the other conservation measures.

3 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger
4 habitat from Alternative 4 would represent a significant impact as a result of habitat modification
5 and potential direct mortality of a special-status species. However, with habitat protection,
6 restoration, management, and enhancement associated with CM3, CM8, and CM11, and guided by
7 AMM1–AMM6, AMM10, AMM24, and AMM37, which would be in place during all project activities,
8 and with implementation of Mitigation Measure BIO-162, the impact of Alternative 4 as a whole on
9 San Joaquin kit fox and American badger would be less than significant.

10 ***Late Long-Term Timeframe***

11 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 4 as a
12 whole would result in the permanent loss of and temporary effects on 334 acres of modeled habitat
13 for San Joaquin kit fox and potential habitat for American badger.

14 With full implementation of Alternative 4, at least 1,000 acres of grassland would be protected in CZ
15 8, where the San Joaquin kit fox and American badger are most likely to occur if present in the study
16 area. Additionally, a portion of the 2,000 acres of grassland restoration would likely occur in CZ 8.
17 Assuming the restored grasslands would provide suitable San Joaquin kit fox habitat proportional to
18 the amount of modeled habitat in this natural community in the Plan Area an estimated 132 acres of
19 restored grasslands would be suitable for the species.

20 Because San Joaquin kit fox home ranges are large (varying from approximately 1 to 12 square
21 miles; see BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the
22 conservation of the species. Grasslands would be acquired for protection in locations that provide
23 connectivity to existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining
24 San Joaquin kit fox and American badger habitat within and adjacent to the Plan Area. Connectivity
25 to occupied habitat adjacent to the Plan Area would help ensure the movement of San Joaquin kit
26 foxes and American badger, if present, to larger habitat patches outside of the Plan Area in Contra
27 Costa County. Grassland protection would focus in particular on acquiring the largest remaining
28 contiguous patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (BDCP
29 Appendix 2.A). This area connects to more than 620 acres of existing habitat that was protected
30 under the East Contra Costa County HCP/NCCP.

31 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to
32 increase mammal burrows, which could benefit the San Joaquin kit fox and American badger by
33 increasing potential den sites, which are a limiting factor for the San Joaquin kit fox in the northern
34 portion of its range (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective
35 GNC2.3, Objective GNC2.4). These management and enhancement actions are expected to benefit the
36 San Joaquin kit fox as well as the American badger by increasing the habitat value of the protected
37 and restoration grasslands.

38 CZ 8 includes 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the
39 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this
40 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches
41 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool
42 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in

1 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities
2 construction.

3 The BDCP's beneficial effects analysis (Chapter 5, Section 5.6, *Effects on Covered Wildlife and Plant*
4 *Species*, of the BDCP) estimates that the restoration and protection actions discussed above, as well
5 as the restoration of grassland and vernal pool that could overlap with the species model, would
6 result in the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In addition,
7 protection of grassland and vernal pool complex could overlap with the species model and would
8 result in the protection of 1,011 acres of modeled habitat for San Joaquin kit fox. These restoration
9 and protection actions would also benefit the American badger.

10 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger
11 habitat from Alternative 4 would represent a significant impact as a result of habitat modification
12 and potential direct mortality of a special-status species. However, with habitat protection,
13 restoration, management, and enhancement associated with CM3, CM8, and CM11, and guided by
14 AMM1–AMM6, AMM10, AMM24, and AMM37, which would be in place during all project activities,
15 and with implementation of Mitigation Measure BIO-162, the impact of Alternative 4 as a whole on
16 San Joaquin kit fox and American badger would be less than significant.

17 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

18 A qualified biologist provided by DWR will survey for American badger concurrent with the
19 preconstruction survey for San Joaquin kit fox and burrowing owl. If badgers are detected, the
20 biologist will passively relocate badgers out of the work area prior to construction if feasible. If
21 an active den is detected within the work area, DWR will establish a suitable buffer distance and
22 avoid the den until the qualified biologist determines the den is no longer active. Dens that are
23 determined to be inactive by the qualified biologist will be collapsed by hand to prevent
24 occupation of the den between the time of the survey and construction activities. In addition,
25 ground disturbance within project-related conservation areas within 50 feet of active American
26 badger dens would be prohibited. Existing trails would be closed within 250 feet of active
27 natal/pupping dens until young have vacated, and within 50 feet of other active dens. No dogs
28 would be allowed on conservation areas with active American badger populations. Rodent
29 control would be prohibited on areas with American badger populations to ensure rodent prey
30 availability. Mitigation Measure BIO-162 is applicable to all ground-disturbing activities related
31 to construction, restoration, and operations and maintenance.

32 **Impact BIO-163: Indirect Effects of Plan Implementation on San Joaquin Kit Fox and** 33 **American Badger**

34 Noise and visual disturbances outside the project footprint but within 250 feet of construction
35 activities could temporarily affect modeled San Joaquin kit fox habitat and potential American
36 badger. Water conveyance facilities operations and maintenance activities would include vegetation
37 and weed control, rodent control, canal maintenance, infrastructure and road maintenance, levee
38 maintenance, and maintenance and upgrade of electrical systems. Because operations and
39 maintenance are covered activities rodent control would be prohibited in areas with San Joaquin kit
40 fox or American badger populations to ensure rodent prey availability. While maintenance activities
41 are not expected to remove San Joaquin kit fox and badger habitat, operation of equipment could
42 disturb small areas of vegetation around maintained structures and could result in injury or
43 mortality of individual foxes and badgers, if present. Given the remote likelihood of active San

1 Joaquin kit fox or badger dens in the vicinity of the conveyance facility, the potential for this effect is
2 small and would further be minimized with the implementation of seasonal no-disturbance buffers
3 around occupied dens, if any, and other measures as described in AMM1-AMM6, AMM10, AMM24,
4 AMM37, and Mitigation Measure BIO-162.

5 **NEPA Effects:** Implementation of the AMMs listed above Alternative 4 and Mitigation Measure BIO-
6 162 *Conduct Preconstruction Survey for American Badger*, would avoid the potential for substantial
7 adverse effects on San Joaquin kit fox or American badger, either indirectly or through habitat
8 modifications. These measures would also avoid and minimize effects that could substantially
9 reduce the number of San Joaquin kit fox or American badger, or restrict either species' range.
10 Therefore, the indirect effects of Alternative 4 would not have an adverse effect on San Joaquin kit
11 fox or American badger.

12 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
13 as construction-related noise and visual disturbances could impact San Joaquin kit fox and American
14 badger. With implementation of AMM1-AMM6, AMM10, AMM24, and AMM37 as part of Alternative
15 4 construction, operation, and maintenance, the BDCP would avoid the potential for significant
16 impacts on either species, either indirectly or through habitat modifications, and would not result in
17 a substantial reduction in numbers or a restriction in the range of either species; therefore, this
18 impact would be less than significant. In addition, Mitigation Measure BIO-162, as described above,
19 would further reduce the potential for indirect effects of Alternative 4 on American badger.

20 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

21 Please see Mitigation Measure BIO-162 under Impact BIO-162.

22 **San Joaquin Pocket Mouse**

23 Habitat for San Joaquin pocket mouse consists of the grassland natural community throughout the
24 Plan Area. The species requires friable soils for burrowing. Construction and restoration associated
25 with Alternative 4 conservation measures would result in both temporary and permanent losses of
26 San Joaquin pocket mouse habitat as indicated in Table 12-4-60. Full implementation of Alternative
27 4 would also include the following conservation actions over the term of the BDCP that would likely
28 benefit San Joaquin pocket mouse.

- 29 • Protect 8,000 acres of grasslands (GNC1.1, associated with CM3).
- 30 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grasslands
31 (GNC1.2, associated with CM8).
- 32 • Restore and sustain a mosaic of grassland vegetation alliances, reflecting localized water
33 availability, soil chemistry, soil texture, topography, and disturbance regimes, with
34 consideration of historical states (GNC2.1).

35 As explained below, with the restoration or protection of these amounts of habitat, Alternative 4's
36 impacts on San Joaquin pocket mouse would not be adverse for NEPA purposes and would be less
37 than significant for CEQA purposes.

1 **Table 12-4-60. Changes in San Joaquin Pocket Mouse Habitat Associated with Alternative 4**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Grassland	467	467	158	158	NA	NA
Total Impacts CM1		467	467	158	158	NA	NA
CM2–CM18	Grassland	889	2,057	239	273	385–1,277	514
Total Impacts CM2–CM18		889	2,057	239	273	385–1,277	514
TOTAL IMPACTS		1,356	2,524	397	431	385–1,277	514

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. Yolo periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-164: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Pocket**
5 **Mouse**

6 Alternative 4 conservation measures would result in the combined permanent and temporary loss
7 of up to 2,955 acres of habitat for San Joaquin pocket mouse, of which 2,524 acres would be a
8 permanent loss and 431 acres would be a temporary loss of habitat (Table 12-4-60). Conservation
9 measures that would result in these losses are conveyance facilities and transmission line
10 construction, and establishment and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries*
11 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
12 *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM9 Vernal Pool Natural Community and*
13 *Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural Community Enhancement and*
14 *Management*, and *CM18 Conservation Hatcheries*. The majority of habitat loss would result from
15 CM4. Habitat enhancement and management activities (CM11), which include ground disturbance
16 or removal of nonnative vegetation, could result in local adverse habitat effects. In addition,
17 maintenance activities associated with the long-term operation of the water conveyance facilities
18 and other BDCP physical facilities could degrade or eliminate San Joaquin pocket mouse habitat.
19 Each of these individual activities is described below. A summary statement of the combined
20 impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 21 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
22 result in the combined permanent and temporary loss of up to 625 acres of potential San
23 Joaquin pocket mouse habitat (467 acres of permanent loss, 158 acres of temporary loss) in CZ
24 3–CZ 6 and CZ 8. The majority of grassland that would be removed would be in CZ 8, from the
25 modifications to Clifton Court Forebay. Refer to the Terrestrial Biology Mapbook for a detailed

1 view of Alternative 4 construction locations. Construction of the forebay would affect the area
2 where there is a record of San Joaquin pocket mouse (California Department of Fish and Wildlife
3 2013).

- 4 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
5 (CM2) would permanently remove 388 acres of potential San Joaquin pocket mouse habitat in
6 the Yolo Bypass in CZ 2. In addition, 239 acres would be temporarily removed. Most of the
7 grassland losses would occur at the north end of the bypass below Fremont Weir, along the Toe
8 Drain/Tule Canal, and along the west side channels.
- 9 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
10 inundation would permanently remove an estimated 1,122 acres of potential San Joaquin pocket
11 mouse habitat. The majority of the losses would likely occur in the vicinity of Cache Slough, on
12 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
13 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact
14 and fragment remaining grassland just north of Rio Vista in and around French and Prospect
15 Islands, and in an area south of Rio Vista around Threemile Slough.
- 16 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
17 seasonally inundated floodplain would permanently and temporarily remove approximately 85
18 acres of San Joaquin pocket mouse habitat (51 permanent, 34 temporary). These losses would
19 be expected to occur along the San Joaquin River and other major waterways in CZ 7.
- 20 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would impact 410 acres of
21 grasslands, primarily in CZ 7, as part of tidal natural communities restoration (11 acres) and
22 seasonal floodplain restoration (399 acres).
- 23 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Up to 10 acres of grassland
24 would be permanently converted to vernal pool complex. The vernal pool and alkali seasonal
25 wetland restoration would leave intact the grasslands surrounding the vernal pools. Temporary
26 construction-related disturbance of grassland habitat would result from implementation of *CM9*
27 in CZ 1, CZ 8, and CZ 11. However, all areas would be restored to their original or higher value
28 habitat after the construction periods.
- 29 ● *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails
30 and recreational staging areas would result in the permanent removal of 50 acres of grassland.
31 The protection of 8,000 acres of grassland for covered species is expected to benefit San Joaquin
32 pocket mouse by protecting existing habitats from potential loss or degradation that otherwise
33 could occur with future changes in existing land use. Habitat management and enhancement-
34 related activities could cause disturbance or direct mortality to San Joaquin pocket mouse if they
35 are present near work areas.

36 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*
37 *and Management* that are designed to enhance wildlife values in restored or protected habitats
38 could result in localized ground disturbances that could temporarily remove small amounts of
39 San Joaquin pocket mouse habitat. Ground-disturbing activities, such as removal of nonnative
40 vegetation and road and other infrastructure maintenance activities, would be expected to have
41 minor adverse effects on habitat and would be expected to result in overall improvements to
42 and maintenance of habitat values over the term of the BDCP. Noise and visual disturbance from
43 management-related equipment operation could temporarily displace individuals or alter the
44 behavior of the species if adjacent to work areas. With full implementation Alternative 4,

1 enhancement and management actions designed for western burrowing owl would also be
2 expected to benefit San Joaquin pocket mouse. San Joaquin pocket mouse would benefit
3 particularly from protection of grassland habitat against potential loss or degradation that
4 otherwise could occur with future changes in existing land use.

- 5 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of San
6 Joaquin pocket mouse habitat.
- 7 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
8 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
9 disturbances that could affect San Joaquin pocket mouse use of the surrounding habitat.
10 Maintenance activities would include vegetation management, levee and structure repair, and
11 re-grading of roads and permanent work areas. These effects, however, would be reduced by
12 AMMs and conservation actions as described below.
- 13 • *Injury and Direct Mortality*: Construction could result in direct mortality of San Joaquin pocket
14 mouse if present in construction areas.

15 The following paragraphs summarize the combined effects discussed above and describe other
16 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
17 also included.

18 ***Near-Term Timeframe***

19 Because the water conveyance facilities construction is being evaluated at the project level, the near-
20 term BDCP conservation strategy has been evaluated to determine whether it would provide
21 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
22 construction would not be adverse under NEPA. The Plan would remove 1,753 acres of San Joaquin
23 pocket mouse habitat (1,356 permanent, 397 temporary) in the study area in the near-term. One
24 record of San Joaquin pocket mouse near Clifton Court forebay could be affected by the construction
25 of the new forebay. These effects would result from the construction of the water conveyance
26 facilities (CM1, 625 acres), and implementing other conservation measures (Yolo Bypass Fisheries
27 Enhancement [CM2] Tidal Natural Communities Restoration [CM4], Seasonally Inundated
28 Floodplain Restoration [CM5], Riparian Natural Community Restoration (CM7), Vernal Pool and
29 Alkali Seasonal Wetland Complex Restoration [CM9], Natural Community Enhancement and
30 Management – Recreation Facilities (CM11), and Conservation Hatcheries [CM18] 1,128 acres).

31 Typical NEPA project-level mitigation ratios for those natural communities affected by CM1 would
32 be 2:1 protection of grassland habitat. Using these typical ratios would indicate that 1,250 acres of
33 grassland natural communities should be protected to mitigate the CM1 losses of 625 acres of San
34 Joaquin pocket mouse habitat. The near-term effects of other conservation actions would remove
35 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of San Joaquin
36 pocket mouse habitat using the same typical NEPA ratios (2:1 for protection).

37 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
38 grassland natural community in CZ 1, 2, 4, 5, 7, 8, and 11. The protection and restoration of
39 grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
40 pool natural communities which would expand habitat for San Joaquin pocket mouse and reduce the
41 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement
42 and Management*, San Joaquin pocket mouse would likely benefit from the management of the
43 grasslands for general wildlife benefit.

1 These natural community biological goals and objectives would inform the near-term protection and
2 restoration efforts and represent performance standards for considering the effectiveness of
3 restoration actions for the species. The acres of protection and restoration contained in the near-
4 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level
5 effects of CM1 especially considering that a large portion of the impacts to grasslands consists of
6 thin strips of grassland along levees and that areas of grassland protection and restoration would be
7 in large contiguous blocks.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containments and*
11 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
12 *Affected Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of
13 affecting habitats and species adjacent to work areas and RTM storage sites. BDCP Appendix 3.C
14 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
15 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

16 **Late Long-Term Timeframe**

17 The habitat model indicates that the study area supports approximately 78,047 acres of potential
18 habitat for San Joaquin pocket mouse. Alternative 4 as a whole would result in the permanent loss of
19 and temporary effects on 2,955 acres of grasslands that could be suitable for San Joaquin pocket
20 mouse (4% of the habitat in the study area). The locations of these losses are described above in the
21 analyses of individual conservation measures. The Plan includes a commitment to restore or create
22 at least 2,000 acres of grassland in CZ 1, CZ 8, and CZ 11 (Objective GNC1.2) and to protect 8,000
23 acres of grassland (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least
24 2,000 acres protected in CZ 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5, CZ
25 7, CZ 8, and CZ 11 in the study area)(Objective GNC1.1). The Plan's commitment to restore
26 grasslands such that they connect fragmented patches of already protected grasslands (GNC1.2)
27 would improve habitat connectivity and dispersal abilities of San Joaquin pocket mouse within and
28 outside of the plan area. All protected habitat would be managed under *CM11 Natural Communities*
29 *Enhancement and Management*.

30 **NEPA Effects:** In the near-term, the loss of San Joaquin pocket mouse habitat and potential for direct
31 mortality would not be an adverse effect because the BDCP has committed to protecting and
32 restoring an acreage that would meet the typical mitigation ratios described above. In the absence of
33 other conservation actions, the effects on San Joaquin pocket mouse habitat and potential mortality
34 of a special-status species resulting from Alternative 4 would represent an adverse effect in the late
35 long-term. However, the BDCP has committed to habitat protection and restoration associated with
36 CM3, CM8, and CM11. This habitat protection and restoration would be guided by biological goals
37 and objectives and by AMM1–AMM6 and AMM10, which would be in place during construction.
38 Considering these commitments, losses of San Joaquin pocket mouse and potential mortality under
39 Alternative 4 would not be an adverse effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction is being evaluated at the project level, the near-
4 term BDCP conservation strategy has been evaluated to determine whether it would provide
5 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
6 construction would be less than significant. The Plan would remove 1,753 acres of modeled (1,356
7 permanent, 397 temporary) habitat for San Joaquin pocket mouse in the study area in the near-
8 term. One record of San Joaquin pocket mouse near Clifton Court forebay could be affected by the
9 construction of the new forebay. These effects would result from the construction of the water
10 conveyance facilities (CM1, 625 acres), and implementing other conservation measures (Yolo
11 Bypass Fisheries Enhancement [CM2] Tidal Natural Communities Restoration [CM4], Seasonally
12 Inundated Floodplain Restoration [CM5], Riparian Natural Community Restoration (CM7),
13 Grassland Natural Community Restoration [CM8], Vernal Pool and Alkali Seasonal Wetland Complex
14 Restoration [CM9], Natural Community Enhancement and Management – Recreation Facilities
15 (CM11), and Conservation Hatcheries [CM18] 1,116 acres).

16 Typical CEQA project-level mitigation ratios for those natural communities affected by CM1 would
17 be 2:1 protection of grassland habitat. Using these typical ratios would indicate that 1,250 acres of
18 grassland natural communities should be protected to mitigate the CM1 losses of 625 acres of San
19 Joaquin pocket mouse habitat.

20 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
21 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and
22 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,
23 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and
24 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
25 *Enhancement and Management*, San Joaquin pocket mouse would likely benefit from the
26 management of the grasslands for general wildlife benefit.

27 These natural community biological goals and objectives would inform the near-term protection and
28 restoration efforts and represent performance standards for considering the effectiveness of
29 restoration actions for the species. The acres of protection and restoration contained in the near-
30 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level
31 effects of CM1 especially considering that a large portion of the impacted grasslands consists of thin
32 strips of grassland along levees and that areas of grassland protection and restoration would be in
33 large contiguous blocks.

34 The Plan also includes commitments to implement AMM1–AMM6, and AMM10. All of these AMMs
35 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
36 areas and RTM storage sites. BDCP Appendix 3.C describes the AMMs, which have since been
37 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
38 the Final EIR/EIS.

39 These commitments are more than sufficient to support the conclusion that the near-term effects of
40 Alternative 4 would be less than significant under CEQA. No mitigation would be required.

1 **Late Long-Term Timeframe**

2 The habitat model indicates that the study area supports approximately 78,047 acres of potential
3 habitat for San Joaquin pocket mouse. Alternative 4 as a whole would result in the permanent loss of
4 and temporary effects on 2,955 acres of grasslands that could be suitable for San Joaquin pocket
5 mouse (4% of the habitat in the study area). The locations of these losses are described above in the
6 analyses of individual conservation measures. The Plan includes a commitment to restore or create
7 at least 2,000 acres of grassland in CZ 1, 8 and 11 (Objective GNC1.2) and to protect 8,000 acres of
8 grassland (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000
9 acres protected in CZ 11, and the remainder distributed throughout CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8,
10 and CZ 11 in the study area) (Objective GNC1.1). The Plan's commitment to restore grasslands such
11 that they connect fragmented patches of already protected grasslands (Objective GNC1.2) would
12 improve habitat connectivity and dispersal abilities of San Joaquin pocket mouse within and outside
13 of the plan area. All protected habitat would be managed under *CM11 Natural Communities*
14 *Enhancement and Management*.

15 Considering these protection and restoration provisions, which would provide acreages of new
16 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction
17 and restoration activities, and with implementation of AMM1–AMM6 and AMM10, the loss of habitat
18 or direct mortality through implementation of Alternative 4 would not result in a substantial
19 significant impact through habitat modifications and would not substantially reduce the number or
20 restrict the range of San Joaquin pocket mouse. Therefore, the loss of habitat or potential mortality
21 under this alternative would have a less-than-significant impact on San Joaquin pocket mouse.

22 **Impact BIO-165: Indirect Effects of Plan Implementation on San Joaquin Pocket Mouse**

23 Construction activities associated with water conveyance facilities, conservation components and
24 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
25 conveyance facilities, including the transmission facilities, could result in ongoing periodic
26 postconstruction disturbances and noise with localized effects on San Joaquin kit pocket mouse and
27 its habitat over the term of the BDCP. These potential effects would be minimized and avoided
28 through AMM1–AMM6, and AMM10, which would be in effect throughout the plan's construction
29 phase.

30 Water conveyance facilities operations and maintenance activities would include vegetation and
31 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
32 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance
33 activities are not expected to remove pocket mouse habitat, operation of equipment could disturb
34 small areas of vegetation around maintained structures and could result in injury or mortality of
35 individual pocket mice, if present.

36 **NEPA Effects:** Implementation of the AMMs listed above would avoid the potential for substantial
37 adverse effects on San Joaquin pocket mouse, either indirectly or through habitat modifications.
38 These measures would also avoid and minimize effects that could substantially reduce the number
39 of San Joaquin pocket mouse, or restrict the species' range. Therefore, the indirect effects of
40 Alternative 4 would not have an adverse effect on San Joaquin pocket mouse.

41 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
42 as construction-related noise and visual disturbances could impact San Joaquin pocket mouse. With
43 implementation of AMM1–AMM6, and AMM10, as part of Alternative 4 construction, operation, and

1 maintenance, the BDCP would avoid the potential for significant adverse effects on either species,
2 either indirectly or through habitat modifications, and would not result in a substantial reduction in
3 numbers or a restriction in the range of the species. Therefore, the indirect effects under this
4 alternative would have a less-than-significant impact on San Joaquin pocket mouse. No mitigation
5 would be required.

6 **Special-Status Bat Species**

7 Special-status bat species with potential to occur in the study area employ varied roost strategies,
8 from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as
9 tunnels, buildings, and bridges. Various roost strategies could include night roosts, maternity roosts,
10 migration stopover, or hibernation. The habitat types used to assess effects for special-status bats
11 roosting habitat includes valley/foothill riparian natural community, developed lands and
12 landscaped trees, including eucalyptus, palms and orchards. Potential foraging habitat includes all
13 riparian habitat types, cultivated lands, developed lands, grasslands, and wetlands.

14 There is potential for at least thirteen different bat species to be present in the study area (Figure
15 12-51), including four California species of special concern and nine species ranked from low to
16 moderate priority by the Western Bat Working Group (see Table 12A-2 in Appendix 12A, *Special-*
17 *Status Species with Potential to Occur in the Study Area*). In 2009, DHCCP conducted a large-scale
18 effort that involved habitat assessments, bridge surveys, and passive acoustic monitoring surveys
19 for bats (see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data*
20 *Report*, for details on methods and results, and Table 12A-2 in Appendix 12A, *Special-Status Species*
21 *with Potential to Occur in the Study Area*).

22 The majority of the parcels assessed during field surveys contained bat foraging and roosting
23 features and were considered highly suitable habitat, at the time of the 2009 field surveys, DWR
24 biologists initially identified 145 bridges in their survey area. Eleven of the 145 bridges were not
25 accessible and thirteen were determined to not be suitable for bats. Evidence of bat presence was
26 observed at six of the bridges and bat sign (guano, urine staining, odor, or vocalizations) was
27 observed at 26 of the bridges. Biologists observed Mexican free-tailed bats at four of the bridges and
28 unidentified species at the remaining two bridges. One of these bridges, over the Yolo Causeway,
29 was used by approximately 10,000 Mexican free-tailed bats, indicating a maternity roost. A second
30 roost site of about 50 individuals was observed under a bridge in eastern Solano County.

31 The remaining 89 bridges contained structural features that were considered conducive to
32 maternity, solitary, day and/or night roosting. Night roosts may have crevices and cracks but more
33 often have box beams or other less protected roosting spots where bats rest temporarily while
34 feeding. Day roosts are commonly found in bridges with expansion joints, crevices, or cracks where
35 bats are protected from predators and weather. Seventeen bridges in the survey area had no
36 potential for roosting because they lacked surface features from which bats could hang and offered
37 no protection from weather or predators.

38 Construction and restoration associated with Alternative 4 conservation measures would result in
39 both temporary and permanent losses of foraging and roosting habitat for special-status bats as
40 indicated in Table 12-4-61. Protection and restoration for special-status bat species focuses on
41 habitats and does not include manmade structures such as bridges. The conservation measures that
42 would be implemented to achieve the biological goals and objectives that would also benefit special-
43 status bats are summarized below.

- 1 ● Protect or restore 142,200 acres of high-value natural communities (Objective L1.1, associated
2 with CM3). This objective involves protecting and restoring a variety of habitat types described
3 below (see Table 3.3-1 in Chapter 3, *Conservation Strategy*, of the BDCP).
 - 4 ○ Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
5 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
 - 6 ○ Protect 600 acres of existing vernal pool complex (Objective VPNC1.1, associated with CM3).
 - 7 ○ Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
 - 8 ○ Protect 8,100 acres of managed wetland (Objective MWNC1.1, associated with CM3 and
9 CM11).
 - 10 ○ Protect 48,625 acres of cultivated lands (Objective CLNC1.1, associated with CM3 and
11 CM11).
 - 12 ○ Protect, restore, or create 2,740 acres of rice land or equivalent habitat type for the giant
13 garter snake (Objective GGS3.1, associated with CM3, CM4, and CM10).
 - 14 ○ Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective
15 GNC1.2, associated with CM3 and CM8).
 - 16 ○ Restore 67 acres of vernal pool complex (Objective VPNC1.2, associated with CM3 and CM9).
 - 17 ○ Restore and protect 65,000 acres of tidal natural communities (Objective L1.2, associated
18 with CM2 – CM4).
 - 19 ○ Restore or create 5,000 acres of valley/foothill riparian natural community (Objective
20 VFRNC1.1, associated with CM3 and CM7).
 - 21 ○ Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
22 (Objective VFRNC1.2, associated with CM3).

23 As explained below, with the restoration and protection of these amounts of habitat, in addition to
24 mitigation measures to reduce potential effects, impacts on special-status bats would not be adverse
25 for NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-4-61. Changes in Special-Status Bat Roosting and Foraging Habitat Associated with Alternative 4^a

Conservation Measure ^b	Habitat Type ^c	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT	CM2	CM5
CM1	Roosting	64	64	200	200	NA	NA
	Foraging	4,496	4,496	3,459	3,459	NA	NA
Total Impacts CM1		4,560	4,560	3,659	3,659	NA	NA
CM2-CM18	Roosting	524	1,570	167	212	324	411
	Foraging	14,497	60,399	773	2,126	21,265	10,137
Total Impacts CM2-CM18		15,021	61,696	940	2,338	21,589	10,548
TOTAL IMPACTS		19,581	66,256	4,599	5,997	21,589	10,548

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c Affected roosting habitat acreages include valley foothill riparian habitat, developed lands, and orchards. An unknown number of buildings, bridges, tunnels, and individual trees could also be affected but were not included in this analysis. Foraging habitat includes all natural communities, cultivated lands, and developed lands in the study area. Foraging habitat effects for CM2-CM18 were not considered adverse as they reflect a conversion from one foraging habitat type (mostly cultivated lands) to another foraging habitat (wetlands).

^d LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^e Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-166: Loss or Conversion of Habitat for and Direct Mortality of Special-Status Bats**

5 Alternative 4 conservation measure CM1 would result in the permanent and temporary loss
6 combined of up to 264 acres of roosting habitat and 7,955 acres of foraging habitat for special-status
7 bats in the study area. DWR identified two bridges as potential night roosting habitat that could be
8 affected by construction in CM1. Conservation measures Fremont Weir/Yolo Bypass improvements
9 (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5) would result in the
10 permanent and temporary loss of 1,782 acres of roosting habitat and the conversion of
11 approximately 65,525 acres of foraging habitat from mostly cultivated lands and managed wetlands
12 to tidal and nontidal wetlands. Habitat enhancement and management activities (CM11) could result
13 in local adverse effects. In addition, maintenance activities associated with the long-term operation
14 of the water conveyance facilities and other BDCP physical facilities could affect special-status bat
15 habitat. A summary of combined impacts and NEPA effects and a CEQA conclusion follows the
16 individual conservation measure discussions.

- 17 • *CM1 Water Facilities and Operation*: Construction of Alternative 4 conveyance facilities would
18 result in the permanent loss of approximately 64 acres of roosting habitat and 4,496 acres of

1 foraging habitat in the study area. Development of the water conveyance facilities would also
2 result in the temporary removal of up to 200 acres of roosting habitat and up to 3,459 acres of
3 foraging habitat for special-status bats in the study area (Table 12-4-61). DWR identified two
4 bridges with potential night roosting habitat in the forebay embankment area and tunnel muck
5 area that could be permanently affected by construction for CM1. Additional roosting habitat
6 affected by construction and operations includes valley/foothill riparian natural community,
7 developed lands, and landscaped trees, including eucalyptus, palms and orchards.

- 8 • *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the
9 conversion of approximately 2,025 acres of foraging habitat into wetlands that could still be
10 used by bats for foraging. CM2 would also result in the permanent removal of 89 acres and
11 temporary removal of 167 acres of roosting habitat for special-status bats. The maternity colony
12 of Mexican free-tailed bats located at both ends of the Yolo Causeway Bridge could also be
13 affected during construction for CM2. Implementation of Mitigation Measure BIO-166, *Conduct*
14 *Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, would ensure that
15 improvements in the Yolo Bypass avoid effects on roosting special-status bats.
- 16 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
17 inundation would result in the conversion of approximately 56,810 acres of foraging habitat into
18 wetlands that could still be used by bats for foraging. Approximately 1,425 acres of roosting
19 habitat for special-status bats would permanently be affected. This habitat is of low value,
20 consisting of a small, isolated patch surrounded by cultivated lands, and the species have a
21 relatively low likelihood of being present in these areas. The roosting habitat that would be
22 removed consists of relatively small and isolated patches along canals and irrigation ditches
23 surrounded by cultivated lands in the Union Island and Roberts Island areas, and several small
24 patches along the San Joaquin River. Mitigation Measure BIO-166, *Conduct Preconstruction*
25 *Surveys for Roosting Bats and Implement Protective Measures*, requires that tidal natural
26 communities restoration avoid effects on roosting special-status bats.
- 27 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
28 restoration would result in the conversion of an estimated 3,690 acres of foraging habitat into
29 wetlands that could still be used by bats for foraging. CM5 would also result in the permanent
30 removal of 57 acres and temporary removal of 45 acres of roosting habitat for special-status
31 bats in the study area.
- 32 • *CM11 Natural Communities Enhancement and Management*: Implementation of the plan would
33 result in an overall benefit to special-status bats within the study area through protection and
34 restoration of their foraging and roosting habitats. The majority of affected acres would convert
35 agricultural land to natural communities with higher potential foraging and roosting value, such
36 as riparian, tidal and nontidal wetlands, and periodically inundated lands. Restored foraging
37 habitats primarily would replace agricultural lands. Restored habitats are expected to be of
38 higher function because the production of flying insect prey species is expected to be greater in
39 restored wetlands and uplands on which application of pesticides would be reduced relative to
40 affected agricultural habitats. Noise and visual disturbances during implementation of riparian
41 habitat management actions could result in temporary disturbances that, if bat roost sites are
42 present, could cause temporary abandonment of roosts. This effect would be minimized with
43 implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting*
44 *Bats and Implement Protective Measures*.

- 1 • Operations and maintenance: Ongoing facilities operation and maintenance is expected to have
2 little if any adverse effect on special-status bats. Postconstruction operation and maintenance of
3 the above-ground water conveyance facilities and restoration infrastructure could result in
4 ongoing but periodic disturbances that could affect special-status bat use of the surrounding
5 habitat in the Yolo Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ
6 4, CZ 5, CZ 6, CZ 7, and CZ 8). Maintenance activities would include vegetation management,
7 levee and structure repair, and regrading of roads and permanent work areas. These effects,
8 however, would be minimized with implementation of the mitigation measures described
9 below.
- 10 • Injury and direct mortality: In addition, to habitat loss and conversion, construction activities,
11 such as grading, the movement of construction vehicles or heavy equipment, and the installation
12 of water conveyance facilities components and new transmission lines, may result in the direct
13 mortality, injury, or harassment of roosting special-status bats. Construction activities related to
14 conservation components could have similar affects. Preconstruction surveys would be
15 conducted and if roosting or maternity sites are detected, seasonal restrictions would be placed
16 while bats are present, as described below in the mitigation measures.

17 The following paragraphs summarize the combined effects discussed above and describe other
18 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are
19 also included.

20 ***Near-Term Timeframe***

21 Because water conveyance facilities construction is being evaluated at the project level, the near-
22 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
23 protection or restoration in an appropriate timeframe to ensure that the construction effects would
24 not be adverse under NEPA. Because the majority of affected acres would convert agricultural land
25 to natural communities with higher potential foraging and roosting value, such as riparian, tidal and
26 nontidal wetlands, and periodically inundated lands this analysis focuses only on losses to roosting
27 habitat resulting for CM1, CM2, and CM4.

28 Alternative 4 would permanently or temporarily affect 955 acres of roosting habitat for special-
29 status bats in the near-term as a result of implementing CM1 (264 acres roosting habitat), CM2 (256
30 acres roosting habitat), and CM4 (435 acres roosting habitat). Of the 955 acres of affected roosting
31 habitat, 536 acres are valley/foothill riparian habitat. Effects from CM5 would all occur in the late
32 long-term. Most of the roosting habitat losses would occur in a valley/foothill riparian. Typical NEPA
33 project-level mitigation ratios for those natural communities that would be affected for roosting
34 habitat would be 1:1 for restoration and protection of the valley/foothill riparian natural
35 community. Using these ratios would indicate that 536 acres of riparian habitat should be restored
36 and 536 acres of riparian habitat should be protected.

37 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status
38 bats within the study area through protection and restoration of their foraging and roosting habitats
39 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and
40 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities
41 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and
42 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging
43 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective
44 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and

1 Objective GNC1.1,). Restored foraging habitats would replace primarily cultivated lands. Restored
2 habitats are expected to be of higher function because the production of flying insect prey species is
3 expected to be greater in restored wetlands and uplands on which application of pesticides would
4 be reduced relative to affected agricultural habitats. Conservation components in the near-term
5 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 4.

6 In addition, activities associated with natural communities enhancement and protection and with
7 ongoing facilities operations and maintenance could affect special-status bat use of surrounding
8 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,
9 described below, requires preconstruction surveys to reduce these effects.

10 The BDCP also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*
11 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
12 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
13 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM10 Restoration of Temporarily*
14 *Affected Natural Communities*. These AMMs include elements that avoid or minimize the risk of
15 construction activity affecting habitat and species adjacent to work areas and storage sites. BDCP
16 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
17 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

18 **Late Long-Term Timeframe**

19 Alternative 4 as a whole would affect 2,046 acres of roosting habitat (Table 12-4-61). Because the
20 majority of affected acres would convert agricultural land to natural communities with higher
21 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically
22 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5
23 in the late long-term.

24 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-
25 status bats within the study area through protection and restoration of approximately 142,200 acres
26 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to
27 protect the highest quality natural communities and covered species habitat in the Plan Area to
28 optimize the ecological value of the reserve system for conserving covered species and native
29 biodiversity. The target for total protected and restored acreage is based on the sum of all natural
30 community acreage targets. Achieving this objective is intended to protect and restore natural
31 communities, species-specific habitat elements, and species diversity on a landscape-scale.
32 Achieving this objective is also intended to conserve representative natural and seminatural
33 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired
34 ecosystem function, and biological diversity.

35 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and
36 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging
37 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,
38 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,
39 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored
40 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of
41 higher function because the production of flying insect prey species is expected to be greater in
42 restored wetlands and uplands on which application of pesticides would be reduced relative to
43 affected agricultural habitats.

1 Should any of the special-status bat species be detected roosting in the study area, construction of
2 water conveyance facilities and restoration activities would have an adverse effect on roosting
3 special-status bats. Noise and visual disturbances and the potential for injury or mortality of
4 individuals associated within implementation of the restoration activities on active roosts would be
5 minimized with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for*
6 *Roosting Bats and Implement Protective Measures*. Conservation components would sufficiently
7 offset the adverse effects resulting from late long-term effects from CM1, CM2, CM4, and CM5.

8 **NEPA Effects:** In the near-term, the losses of roosting habitat for special-status bats associated with
9 implementing Alternative 4 are not expected to result in substantial adverse effects on special-status
10 bats, either directly or through habitat modifications, and would not result in a substantial reduction
11 in numbers or a restriction in the range of special-status bats because the BDCP has committed to
12 protecting the acreage required to meet the typical mitigation ratios described above. In the late
13 long-term, the losses of roosting habitat for special-status bats, in the absence of other conservation
14 actions, would represent an adverse effect as a result of habitat modification and potential direct
15 mortality of a special-status species. However, with habitat protection and restoration associated
16 with the conservation components, guided by landscape-scale goals and objectives and by AMM1-
17 AMM6, and AMM10, and with implementation of Mitigation Measure BIO-166, the effects of
18 Alternative 4 as a whole on special-status bats would not be adverse.

19 **CEQA Conclusion:**

20 **Near-Term Timeframe**

21 Because water conveyance facilities construction is being evaluated at the project level, the near-
22 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
23 protection or restoration in an appropriate timeframe to ensure that the construction impacts
24 would be less than significant for CEQA purposes. Because the majority of affected acres would
25 convert agricultural land to natural communities with higher potential foraging and roosting value,
26 such as riparian, tidal and nontidal wetlands, and periodically inundated lands this analysis focuses
27 only on losses to roosting habitat for CM1, CM2, and CM4.

28 Alternative 4 would permanently or temporarily affect 955 acres of roosting habitat for special-
29 status bats in the near-term as a result of implementing CM1 (264 acres roosting habitat), CM2 (256
30 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in
31 the late long-term. Of the 955 acres of affected roosting habitat, 536 acres are valley/foothill
32 riparian habitat. Typical CEQA project-level mitigation ratios for those natural communities that
33 would be affected for roosting habitat would be 1:1 for restoration and protection of the
34 valley/foothill riparian natural community. Using these ratios would indicate that 536 acres of
35 riparian habitat should be restored and 536 acres of riparian habitat should be protected.

36 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status
37 bats within the study area through protection and restoration of their foraging and roosting habitats
38 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and
39 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities
40 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and
41 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging
42 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective
43 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and
44 Objective GNC1.1). Restored foraging habitats would replace primarily cultivated lands. Restored

1 habitats are expected to be of higher function because the production of flying insect prey species is
2 expected to be greater in restored wetlands and uplands on which application of pesticides would
3 be reduced relative to affected agricultural habitats. Conservation components in the near-term
4 would sufficiently offset the significant impacts resulting from near-term effects from Alternative 4.

5 In addition, activities associated with natural communities enhancement and protection and with
6 ongoing facilities operations and maintenance could affect special-status bat use of surrounding
7 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,
8 described below, requires preconstruction surveys to reduce these impacts to a less-than-significant
9 level.

10 The permanent loss of roosting habitat from Alternative 4 would be mitigated through
11 implementation of Mitigation Measure BIO-166, which would include protective measures to ensure
12 there is no significant impact under CEQA on roosting special-status bats, either directly or through
13 habitat modifications and no substantial reduction in numbers or a restriction in the range of
14 special-status bats. The BDCP also contains commitments to implement AMM1-6 and AMM10.
15 These AMMs include elements that avoid or minimize the risk of construction activity affecting
16 habitat and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes the
17 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
18 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

19 **Late Long-Term Timeframe**

20 Alternative 4 as a whole would affect 2,046 acres of roosting habitat (Table 12-4-61). Because the
21 majority of affected acres would convert agricultural land to natural communities with higher
22 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically
23 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5
24 in the late long-term.

25 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-
26 status bats within the study area through protection and restoration of approximately 142,200 acres
27 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to
28 protect the highest quality natural communities and covered species habitat in the Plan Area to
29 optimize the ecological value of the reserve system for conserving covered species and native
30 biodiversity. The target for total protected and restored acreage is based on the sum of all natural
31 community acreage targets. Achieving this objective is intended to protect and restore natural
32 communities, species-specific habitat elements, and species diversity on a landscape-scale.
33 Achieving this objective is also intended to conserve representative natural and seminatural
34 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired
35 ecosystem function, and biological diversity.

36 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and
37 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging
38 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,
39 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,
40 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored
41 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of
42 higher function because the production of flying insect prey species is expected to be greater in
43 restored wetlands and uplands on which application of pesticides would be reduced relative to
44 affected agricultural habitats.

1 Should any of the special-status bat species be detected roosting in the study area, construction of
2 water conveyance facilities and restoration activities would have a significant impact on roosting
3 special-status bats. Noise and visual disturbances and the potential for injury or mortality of
4 individuals associated within implementation of the restoration activities on active roosts would be
5 minimized with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for*
6 *Roosting Bats and Implement Protective Measures*. Conservation components would sufficiently
7 offset the significant impacts resulting from late long-term effects from CM1, CM2, CM4, and CM5.

8 The permanent loss of roosting habitat from Alternative 4 would be mitigated through
9 implementation of Mitigation Measure BIO-166, which would include protective measures to ensure
10 there is no significant impact on roosting special-status bats, either directly or through habitat
11 modifications, and no substantial reduction in numbers or a restriction in the range of special-status
12 bats. Therefore, Alternative 4 would not result in a significant impact on special-status bats under
13 CEQA.

14 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and** 15 **Implement Protective Measures**

16 The following measure was designed to avoid and minimize adverse direct and indirect effects
17 on special-status bats. However, baseline data are not available or are limited on how bats use
18 the study area, and on individual numbers of bats and how they vary seasonally. Therefore, it is
19 difficult to determine if there would be a substantial reduction in species numbers. Bat species
20 with potential to occur in the study area employ varied roost strategies, from solitary roosting in
21 foliage of trees to colonial roosting in trees and artificial structures, such as buildings and
22 bridges. Daily and seasonal variations in habitat use are common. To obtain the highest
23 likelihood of detection, preconstruction bat surveys will be conducted by DWR and will include
24 these components.

- 25 • Identification of potential roosting habitat within project footprint.
- 26 • Daytime search for bats and bat sign in and around identified habitat.
- 27 • Evening emergence surveys at potential day-roost sites, using night-vision goggles and/or
28 active full-spectrum acoustic monitoring where species identification is sought.
- 29 • Passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from
30 dusk to dawn over multiple nights.
- 31 • Additional on-site night surveys as needed following passive acoustic detection of special
32 status bats to determine nature of bat use of the structure in question (e.g., use of structure
33 as night roost between foraging bouts).
- 34 • Qualified biologists will have knowledge of the natural history of the species that could
35 occur in the study area and experience using full-spectrum acoustic equipment. During
36 surveys, biologists will avoid unnecessary disturbance of occupied roosts.

37 ***Preconstruction Bridges and Other Structure Surveys***

38 Before work begins on the bridge/structure, qualified biologists will conduct a daytime search
39 for bat sign and evening emergence surveys to determine if the bridge/structure is being used
40 as a roost. Biologists conducting daytime surveys would listen for audible bat calls and would
41 use naked eye, binoculars, and a high-powered spotlight to inspect expansion joints, weep holes,

1 and other bridge features that could house bats. Bridge surfaces and the ground around the
2 bridge/structure would be surveyed for bat sign, such as guano, staining, and prey remains.

3 Evening emergence surveys will consist of at least one biologist stationed on each side of the
4 bridge/structure watching for emerging bats from a half hour before sunset to 1–2 hours after
5 sunset for a minimum of two nights within the season that construction would be taking place.
6 Night-vision goggles and/or full-spectrum acoustic detectors shall be used during emergence
7 surveys to assist in species identification. All emergence surveys would be conducted during
8 favorable weather conditions (calm nights with temperatures conducive to bat activity and no
9 precipitation predicted).

10 Additionally, passive monitoring with full-spectrum bat detectors will be used to assist in
11 determining species present. A minimum of four nights of acoustic monitoring surveys will be
12 conducted within the season that the construction would be taking place. If site security allows,
13 detectors should be set to record bat calls for the duration of each night. To the extent possible,
14 all monitoring will be conducted during favorable weather conditions (calm nights with
15 temperatures conducive to bat activity and no precipitation predicted). The biologists will
16 analyze the bat call data using appropriate software and prepare a report with the results of the
17 surveys. If acoustic data suggest that bats may be using the bridge/structure as a night roost,
18 biologists will conduct a night survey from 1–2 hours past sunset up to 6 hours past sunset to
19 determine if the bridge is serving as a colonial night roost.

20 If suitable roost structures would be removed, additional surveys may be required to determine
21 how the structure is used by bats, whether it is as a night roost, maternity roosts, migration
22 stopover, or for hibernation.

23 ***Preconstruction Tree Surveys***

24 If tree removal or trimming is necessary, qualified biologists will examine trees to be removed
25 or trimmed for suitable bat roosting habitat. High-value habitat features (large tree cavities,
26 basal hollows, loose or peeling bark, larger snags, palm trees with intact thatch, etc.) will be
27 identified and the area around these features searched for bats and bat sign (guano, culled insect
28 parts, staining, etc.). Riparian woodland, orchards, and stands of mature broadleaf trees should
29 be considered potential habitat for solitary foliage roosting bat species.

30 If bat sign is detected, biologists will conduct evening visual emergence survey of the source
31 habitat feature, from a half hour before sunset to 1–2 hours after sunset for a minimum of two
32 nights within the season that construction would be taking place. Methodology should follow
33 that described above for the bridge emergence survey.

34 Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector
35 will be used to assist in determining species present. These surveys would be conducted in
36 coordination with the acoustic monitoring conducted for the bridge/structure.

37 ***Protective Measures for Bats using Bridges/Structures and Trees***

38 Avoidance and minimization measures shall be necessary if it is determined that bats are using
39 the bridge/structure or trees as roost sites and/or sensitive bats species are detected during
40 acoustic monitoring. Appropriate measures will be determined by DWR in consultation with
41 CDFW and shall include, as applicable, the measures listed below.

- 1 • Ensure that bats are protected from noise, vibrations, and light that result from construction
2 activities associated with water conveyance facilities, conservation components and ongoing
3 habitat enhancement, as well as operations and maintenance of above-ground water
4 conveyance facilities, including the transmission facilities. This would be accomplished by
5 either directing noise barriers and lights inward from the disturbance or ensuring that the
6 disturbances do not extend more than 300 feet from the point source.
- 7 • Disturbance of the bridge will be avoided between April 15 and October 31 (the maternity
8 period) to avoid impacts on reproductively active females and dependent young.
- 9 • Installation of exclusion devices from March 1 through October 31 to preclude bats from
10 occupying the bridge during construction. Exclusionary devices will only be installed by or
11 under the supervision of an experienced bat biologist.
- 12 • Tree removal will be avoided between April 15 and September 15 (the maternity period for
13 bats that use trees) to avoid impacts on pregnant females and active maternity roosts
14 (whether colonial or solitary).
- 15 • Tree removal will be conducted between September 15 and October 31 to the maximum
16 extent feasible, which corresponds to a time period when bats would not likely have entered
17 winter hibernation and would not be caring for flightless young. If weather conditions
18 remain conducive to regular bat activity beyond October 31, later tree removal may be
19 considered in consultation with CDFW.
- 20 • Trees will be removed in pieces, rather than felling the entire tree.
- 21 • If a maternity roost is located, whether solitary or colonial, that roost will remain
22 undisturbed with a buffer as determined in consultation with CDFW until September 15 or
23 until a qualified biologist has determined the roost is no longer active.
- 24 • If a non-maternity roost is found, that roost will be avoided to the maximum extent
25 practicable and an appropriate buffer established in consultation with CDFW. Every effort
26 would be made to avoid the roost to the maximum extent feasible, as methods to evict bats
27 from trees are largely untested. However, if the roost cannot be avoided, eviction would be
28 attempted and procedures designed in consultation with CDFW to reduce the likelihood of
29 mortality of evicted bats. In all cases:
 - 30 ○ Eviction will not occur before September 15th and will match the timeframe for tree
31 removal approved by CDFW.
 - 32 ○ Qualified biologists will carry out or oversee the eviction tasks and monitor the tree
33 trimming/removal.
 - 34 ○ Eviction will take place late in the day or in the evening to reduce the likelihood of
35 evicted bats falling prey to diurnal predators.
 - 36 ○ Eviction will take place during weather and temperature conditions conducive to bat
37 activity.
 - 38 ○ Special-status bat roosts would not be disturbed.
- 39 Eviction procedures shall include but are not limited to:
 - 40 ○ Pre-eviction surveys to obtain data to inform the eviction approach and subsequent
41 mitigation requirements. Relevant data may include the species, sex, reproductive status

1 and/or number of bats using the roost, and roost conditions themselves such as
2 temperature and dimensions. Surveys may include visual emergence, night vision,
3 acoustic, and/or capture.

- 4 ○ Structural changes may be made to the roost, performed without harming bats, such
5 that the conditions in the roost are undesirable to roosting bats and the bats leave on
6 their own (e.g., open additional portals so that temperature, wind, light and
7 precipitation regime in the roost change).
- 8 ○ Noninjurious harassment at the roost site to encourage bats to leave on their own, such
9 as ultrasound deterrents or other sensory irritants.

- 10 ● Prior to removal/trimming, after other eviction efforts have been attempted, any confirmed
11 roost tree would be shaken, repeatedly struck with a heavy implement such as an axe and
12 several minutes should pass before felling trees or trimming limbs to allow bats time to
13 arouse and leave the tree. The biologists should search downed vegetation for dead and
14 injured bats. The presence of dead or injured bats would be reported to CDFW.

15 Compensatory mitigation for the loss of roosting habitat will also be determined through
16 consultation with CDFW and may include the construction and installation of suitable
17 replacement habitat onsite. Depending on the species and type of roost lost, various roost
18 replacement habitats have met with some success (e.g., bat houses, “bat bark,” planting
19 cottonwood trees, leaving palm thatch in place rather than trimming). The creation of natural
20 habitat onsite is generally preferable to artificial.

21 Artificial roosts are often unsuccessful, and care must be taken to determine as closely as
22 possible the conditions in the natural roost to be replaced. Even with such care, artificial habitat
23 may fail. Several artificial roosts have been highly successful in replacing bridge roost habitat
24 when incorporated into new bridge designs. “Bat bark” has been successfully used by Arizona
25 Department of Game and Fish to create artificial crevice-roosting bat habitat mounted on pine
26 trees (Mering and Chambers 2012: 765). Bat houses have at best an inconsistent track record
27 but information is mounting on how to create successful houses. There is no single protocol or
28 recipe for bat-house success. Careful study of the roost requirements of the species in question;
29 the particular conditions at the lost roost site including temperature, orientation of the
30 openings, airflow, internal dimensions and structures (cavity vs. crevice, etc.) should increase
31 the chances of designing a successful replacement.

32 Restoring riparian woodland with plantings shows signs of success in Colorado. Western red bat
33 activity has been positively correlated with increased vegetation and tree growth, canopy
34 complexity and restoration acreage at cottonwood-willow restoration sites along the Lower
35 Colorado River (Broderick 2012: 39). These complex woodland areas would ultimately provide
36 a wider range of bat species with preferred roost types, including both foliage-roosting and
37 crevice-/cavity-roosting bats.

38 **Impact BIO-167: Indirect Effects of Plan Implementation on Special-Status Bats**

39 Construction activities associated with water conveyance facilities, conservation components and
40 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
41 conveyance facilities, including the transmission facilities, could result in ongoing periodic
42 disturbances from light, vibrations, and noise with localized effects on special-status bats and their
43 roosting habitat over the term of the BDCP.

1 Water conveyance facilities operations and maintenance activities would include vegetation and
2 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
3 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance
4 activities are not expected to remove special-status bat habitat, operation of equipment could
5 disturb small areas of vegetation around maintained structures and could result in disturbances to
6 roosting bats, if present. Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting*
7 *Bats and Implement Protective Measures*, is available to address these adverse effects.

8 Increased exposure to methylmercury associated with tidal natural communities restoration would
9 potentially indirectly affect special-status bat species. *CM12 Methylmercury Management* (as revised
10 in Appendix 11F, *Substantive BDCP Revisions*) describes the process by which tidal natural
11 communities restoration may increase methyl mercury levels in wetlands in the study area. Mercury
12 has been found in high concentrations in some bat species, such as the Indiana bat. Many bat species
13 forage heavily on aquatic insects, which might result in rapid bioaccumulation (Evers et al. 2012).
14 Measures described in *CM12 Methylmercury Management* are expected to reduce the effects of
15 methylmercury on special-status bat species resulting from BDCP tidal natural communities
16 restoration.

17 **NEPA Effects:** Implementation of the Mitigation Measure BIO-166 for special-status bats and *CM12*
18 *Methylmercury Management* would avoid the potential for substantial adverse effects on roosting
19 special-status bats, either indirectly or through habitat modifications. This mitigation measure
20 would also avoid and minimize effects that could substantially reduce the number of special-status
21 bats, or restrict species' range. Therefore, the indirect effects of Alternative 4 would not have an
22 adverse effect on special-status bats.

23 **CEQA Conclusion:** Indirect effects from conservation components operations and maintenance as
24 well as construction-related noise and visual disturbances could have a significant impact on
25 special-status bat species, either indirectly or through habitat modifications. Mitigation Measure
26 BIO-166 and *CM12 Methylmercury Management* would reduce this impact to a less-than-significant
27 level by implementing protective measures to ensure that Alternative 4 would not result in a
28 substantial reduction in numbers or a restriction in the range of species.

29 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
30 **Implement Protective Measures**

31 See Mitigation Measure BIO-166 under Impact BIO-166.

32 **Impact BIO-168: Periodic Effects of Inundation of Special-Status Bat Habitat as a Result of**
33 **Implementation of Conservation Components**

34 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
35 324 acres of roosting habitat and 21,265 acres of foraging habitat for special-status bats in the study
36 area (Table 12-4-61).

37 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate up to 411 acres of
38 roosting habitat and 10,137 acres of foraging habitat for special-status bats (Table 12-4-61).
39 Potential roosting trees are likely to be retained within seasonally flooded areas, although high
40 velocity flooding could uproot some trees. Seasonal flooding would not adversely affect foraging
41 habitat for the species. The overall effect of seasonal inundation in existing riparian natural
42 communities may instead be beneficial. Historically, flooding was the main natural disturbance

1 regulating ecological processes in riparian areas, and flooding promotes the germination and
2 establishment of many native riparian plants. In the late long-term, seasonal inundation in areas
3 currently occupied by riparian vegetation may contribute to the establishment of high-value habitat
4 for special-status bats that use riparian habitats.

5 **NEPA Effects:** The periodic losses of roosting and foraging habitat for special-status bats associated
6 with implementing Alternative 4 are not expected to result in substantial adverse effects on special-
7 status bats, either directly or through habitat modifications and would not result in a substantial
8 reduction in numbers or a restriction in the range of special-status bats. Mitigation Measure BIO-
9 166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, is
10 available to address any effects of periodic inundation on special-status bats and roosting habitat.
11 Therefore, Alternative 4 would not adversely affect the species.

12 **CEQA Conclusion:** Periodic inundation under CM2 and floodplain restoration under CM5 would
13 periodically affect foraging and roosting habitat for special-status bats in the study area, which could
14 result in a significant impact. Any impact of periodic inundation on special-status bats would be
15 mitigated through implementation of Mitigation Measure BIO-166, which would include protective
16 measures to ensure there is no significant impact on roosting special-status bats, either directly or
17 through habitat modifications and no substantial reduction in numbers or a restriction in the range
18 of special-status bats.

19 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
20 **Implement Protective Measures**

21 See Mitigation Measure BIO-166 under Impact BIO-166.

22 **Plant Species**

23 **Vernal Pool Species**

24 Five covered plant species and 12 noncovered special-status plant species occur in vernal pools in
25 the study area (Tables 12-2 and 12-3, summarized in Table 12-4-62). The vernal pool habitat model
26 used for the impact analysis on vernal pool species was based on vegetation types and associations
27 from various data sets which were used to create maps showing the distribution of vernal pool
28 habitat in the study area according to three habitat types in which these species are known to occur,
29 including vernal pool complex, degraded vernal pool complex, and alkali seasonal wetland habitat.
30 Vernal pool complex habitat consists of vernal pools and uplands that display characteristic vernal
31 pool and swale visual signatures that have not been significantly impacted by agricultural or
32 development practices. Degraded vernal pool complex habitat consists of habitat that ranges from
33 areas with vernal pool and swale visual signatures that display clear evidence of significant
34 disturbance due to plowing, discing, or leveling to areas with clearly artificial basins such as shallow
35 agricultural ditches, depressions in fallow fields, and areas of compacted soils in pastures. Because
36 wetlands in the degraded vernal pool complex are inundated during the wet season and may have
37 historically been located in or near areas with natural vernal pool complex, they may support
38 individuals or small populations of species that are found in vernal pools and swales. However, they
39 do not possess the full complement of ecosystem and community characteristics of natural vernal
40 pools, swales and their associated uplands and they are generally ephemeral features that are
41 eliminated during the course of normal agricultural practices. A small amount of alkali seasonal

1 wetland habitat was included in the model because alkaline vernal pools are also present in some
2 areas mapped as alkali seasonal wetland.

3 Because each of the vernal pool species addressed in this EIR/EIS have specific microhabitat
4 affinities, and because vernal pool habitat within the study area is highly heterogeneous with
5 respect to habitat parameters such as soil type and pool depth, the vernal pool habitat model greatly
6 overestimates the extent of habitat in the study area occupied by each species. However, the vernal
7 pool habitat model is likely to encompass all or most of the potential area within which special-
8 status vernal pool plant species would occur. Therefore, it is not likely to underestimate the extent
9 of occupied habitat or to underestimate the effects of Alternative 4.

10 Full implementation of Alternative 4 would include the following conservation actions over the term
11 of the BDCP to benefit covered vernal pool plant species (see Chapter 3, Section 3.3, *Biological Goals*
12 *and Objectives*, of the BDCP).

- 13 ● Protect at least two currently unprotected occurrences of alkali milk-vetch in the Altamont Hills
14 or Jepson Prairie core recovery areas (Objective VPP1.1, associated with CM3).
- 15 ● Maintain no net loss of Heckard's peppergrass in Conservation Zones 1, 8, or 11 within
16 restoration sites or within the area of affected tidal range of restoration projects (Objective
17 VPP1.2, associated with CM3 and CM9).

18 The construction and restoration activities covered under Alternative 4 could have impacts on
19 special-status vernal pool plant species. Modeled habitat is within the proposed footprint for the
20 Alternative 4 water conveyance facilities and within the hypothetical footprint for restoration
21 activities. One known occurrence of a covered plant species is within the proposed footprint for the
22 Alternative 4 water conveyance facilities. Table 12-4-62 summarizes the acreage of modeled vernal
23 pool habitat in the study area and the number of occurrences of each special-status vernal pool
24 species in the study area.

1 **Table 12-4-62. Summary of Impacts on Vernal Pool Plant Species under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Vernal pool complex	9,557	13	-	-	Habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Degraded vernal pool complex	2,576	377	-	-	Habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Alkali Seasonal Wetland	188	1	-	-	Habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Total	12,321	391	-	-	Habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Covered Species					
Alkali milk-vetch	-	-	16	1	Population loss from construction of the water conveyance facilities
Dwarf downingia	-	-	12	0	None
Boggs Lake hedge-hyssop	-	-	1	0	None
Legenere	-	-	8	0	None
Heckard's peppergrass	-	-	4 ^a	0	None
Noncovered Species					
Ferris' milk-vetch	-	-	6	0	None
Vernal pool smallscale	-	-	2	0	None
Hogwallow starfish	-	-	0	0	None
Ferris' goldfields	-	-	4	0	None
Contra Costa goldfields	-	-	7	0	None
Cotula-leaf navarretia	-	-	5	0	None
Baker's navarretia	-	-	3	0	None
Colusa grass	-	-	1	0	None
Bearded popcorn-flower	-	-	4	0	None
Delta woolly marbles	-	-	3	0	None
Saline clover	-	-	9	0	None
Solano grass	-	-	1	0	None

^a One additional occurrence is in alkali seasonal wetlands.

2

1 **Impact BIO-169: Effects on Habitat and Populations of Vernal Pool Plants**

2 Under Alternative 4, conservation measures would affect habitat for special-status vernal pool
3 species and one occurrence of a noncovered vernal pool species.

4 The individual effects of each relevant conservation measure are addressed below. A summary
5 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
6 conservation measure discussions.

- 7 • *CM1 Water Facilities and Operation*: Twenty-three acres of modeled vernal pool habitat, 19.4
8 acres of critical habitat for Contra Costa goldfields, and one known occurrence of the 17 vernal
9 pool species are within the proposed footprint for the Alternative 4 water conveyance facilities.
10 One occurrence of alkali milk-vetch in CZ 8 would be crossed by an electric transmission line.
11 Under Alternative 4, construction and operation of the water conveyance facilities could affect
12 undiscovered occurrences of the five covered vernal pool species or the 12 noncovered special-
13 status species.

14 The east-west transmission line would not affect four covered vernal pool species that occur in
15 the study area. One occurrence each of dwarf downingia, legenere, Heckard's peppergrass, and
16 Boggs Lake hedge-hyssop are within the east-west transmission line study area. However, the
17 transmission line would not cross any of the occurrences.

- 18 • *CM2 Yolo Bypass Fisheries Enhancement*: No modeled vernal pool habitat and no known
19 occurrences of the 17 vernal pool plant species are within the hypothetical footprint for
20 construction or operation of the Yolo Bypass fisheries enhancements. Therefore, construction
21 and operation of CM2 would not affect the 17 covered or noncovered vernal pool species.

- 22 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit covered
23 vernal pool species by protecting 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective
24 VPNC1.1). The protected vernal pool habitat would be managed and enhanced to sustain
25 populations of native vernal pool species. These benefits also would accrue to any noncovered
26 vernal pool species occurring in the protected vernal pool complex.

- 27 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would result in the
28 inundation of 372 acres of vernal pool complex and would, therefore, potentially affect special-
29 status vernal pool species. However, most of this habitat (370 acres) consists of degraded vernal
30 pool habitat that is unlikely to contain special-status species. In addition, 257.8 acres of critical
31 habitat for Contra Costa goldfields could be affected. No known occurrences of covered or
32 noncovered vernal pool species would be affected by tidal restoration.

- 33 • *CM5 Seasonally Inundated Floodplain Restoration*: No vernal pool habitat or occurrences of
34 special-status vernal pool species are present within areas proposed for floodplain restoration.
35 Therefore, floodplain restoration and construction of new floodplain levees would have no
36 impacts on covered and noncovered vernal pool species.

- 37 • *CM6 Channel Margin Enhancement*: No vernal pool habitat or occurrences of special-status
38 vernal pool species are present within areas proposed for channel margin habitat enhancement.
39 Therefore, channel margin habitat enhancement would have no impacts on covered and
40 noncovered vernal pool species.

- 41 • *CM7 Riparian Natural Community Restoration*: No vernal pool habitat or occurrences of special-
42 status vernal pool plant species are present within areas proposed for riparian habitat

1 enhancement. Therefore, riparian habitat enhancement would have no impacts on covered and
2 noncovered vernal pool species.

- 3 • *CM8 Grassland Natural Community Restoration*: Although the vernal pool complex habitat
4 includes grassland matrix within which the vernal pools occur, grassland restoration activities
5 would take place in nongrasslands (ruderal habitat, cultivated land) or degraded grasslands that
6 are not included within vernal pool complex habitat. Therefore, grassland communities
7 restoration would have no impacts on covered and noncovered vernal pool plant species.
- 8 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: If, through unforeseen
9 circumstances, BDCP activities result in the net loss of vernal pool habitat, CM9 would be
10 implemented to compensate for that loss. Because vernal pool complex restoration would focus
11 on habitat that had been cleared and leveled but maintained an intact duripan or claypan, the
12 likelihood of affecting any special-status vernal pool plant species would be low. However,
13 vernal pool restoration could adversely affect remnant populations of special-status vernal pool
14 species or affect vernal pool habitat adjacent to the restoration areas.
- 15 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
16 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid vernal pool
17 habitat and would have no impacts on covered and noncovered vernal pool plant species.
- 18 • *Avoidance and Minimization Measures*: Effects on covered vernal pool plant species potentially
19 resulting from implementation of Alternative 4 would be avoided or minimized through *AMM11*
20 *Covered Plant Species*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM12*
21 *Vernal Pool Crustaceans*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37*
22 *Recreation*. *AMM11* prohibits ground disturbance or hydrologic disturbance within 250 feet of
23 existing vernal pools. In addition, *AMM11* specifies that individual projects be designed to avoid
24 critical habitat for listed plant and wildlife vernal pool species. *AMM12* limits the direct removal
25 of vernal pool crustacean habitat to no more than 10 wetted acres and the indirect effect to no
26 more than 20 wetted acres through the life of the Plan. *AMM12* also requires that that tidal
27 natural communities restoration or other ground-disturbing covered activities in Conservation
28 Zones 1 and 11 will not result in the adverse modification of primary constituent elements of
29 critical habitat for vernal pool fairy shrimp, conservancy fairy shrimp, and vernal pool tadpole
30 shrimp. These protections would also apply to critical habitat for Contra Costa goldfields, where
31 it overlaps with critical habitat for these vernal pool crustaceans. *AMM30* specifies that the
32 alignment of proposed transmission lines will be designed to avoid sensitive terrestrial and
33 aquatic habitats when siting poles and towers, to the maximum extent feasible. *AMM37* requires
34 that new recreation trails avoid populations of covered vernal pool plant species. BDCP
35 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
36 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

37 In addition, the BDCP includes species-specific goals to benefit covered vernal pool plant species.
38 This includes protecting two occurrences of alkali milk-vetch (Objective VPP1.1) and requiring no
39 net loss of Heckard's peppergrass occurrences (Objective VPP1.2).

40 In summary, no adverse effects on special-status vernal pool plant species would be expected from
41 implementing Alternative 4. Construction of the water conveyance facilities could affect one species,
42 alkali milk-vetch, although adverse effects on this species would be avoided or minimized through
43 implementation of *AMM11* and *AMM30*. No other known occurrences of special-status vernal pool
44 plant species would be affected under Alternative 4. Beneficial effects on special-status vernal pool

1 species could occur by protecting 600 acres of vernal pool complex in CZs 1, 8, and 11 and by
2 protecting occurrences of alkali milk-vetch.

3 The GIS analysis estimated that up to 395 acres of vernal pool complex could be adversely affected
4 by covered activities. However, the actual effect on habitat for special-status vernal pool plant
5 species is expected to be much less than the estimated impact because the BDCP limits the total loss
6 of wetted vernal pool habitat resulting from specific projects to 10 acres (approximately 67 acres of
7 vernal pool complex) over the permit term (AMM12). At the proposed restoration ratios of 1:1
8 (prior to impact) and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal pool
9 complex restoration would be required to compensate for the loss of modeled habitat for special-
10 status vernal pool species (Objective VPNC1.2, associated with CM9). This would be consistent with
11 typical NEPA and CEQA project-level mitigation ratios for vernal pool impacts. The limitation on the
12 loss of wetted vernal pool habitat will constrain the implementation of tidal restoration projects that
13 are adjacent to vernal pool complex, which could affect the feasibility of restoring 65,000 acres of
14 tidal habitat (Objective TPANC1.1, associated with CM4).

15 **NEPA Effects:** The loss of modeled habitat for vernal pool plant species would be minimized by
16 AMM12 and offset through CM9, and effects of constructing CM1 on one occurrence of alkali milk-
17 vetch would be avoided through implementation of AMM30. Therefore, Alternative 4 would not
18 result in adverse effects on covered and noncovered vernal pool plant species.

19 **CEQA Conclusion:** Because loss of modeled habitat for vernal pool plant species would be offset
20 through restoration, and because impacts on occurrences of covered vernal pool plants would be
21 avoided, implementation of Alternative 4 would not result in a reduction in the range or numbers of
22 17 covered and noncovered special-status vernal pool species in the study area. Therefore, impacts
23 on covered and noncovered vernal pool plant species would be less than significant. No mitigation is
24 required.

25 **Alkali Seasonal Wetland Species**

26 Five covered species and three noncovered species occur in alkali seasonal wetlands in the study
27 area (Tables 12-2, 12-3, summarized in Table 12-4-63). Alkali seasonal wetland habitat was
28 modeled separately for four covered plant species occurring in seasonal alkali wetlands.

29 The San Joaquin spearscale habitat model approximated the distribution of suitable San Joaquin
30 spearscale habitat in the study area according to the species' preferred habitat types, intersected
31 with soil series and slope position. Historical and current records of San Joaquin spearscale in the
32 study area indicate that its current distribution is limited to alkaline soil areas with shallow basin or
33 swale microtopography along the western border of the study area. The vegetation cover of the
34 alkaline soils is typically a combination of alkaline soil-adapted species and annual grasses,
35 including annual ryegrass and Mediterranean barley. Habitat types used for the model included
36 alkali seasonal wetlands, vernal pool complex, and grasslands. Soil series used in the model
37 consisted of either clays or clay loams with alkaline horizons. San Joaquin spearscale typically
38 occurs in swales or in level terrain but occasionally occurs on the lower slopes adjacent to streams
39 or swales or where seeps are present. Because some of the soil series with which San Joaquin
40 spearscale is associated can occur on hillsides, slope was used to limit the extent of the model to the
41 toe of the slope where these soils occur by excluding areas with slope greater than 1%. Land uses
42 that are incompatible with the species' habitat requirements, such as modeled habitat polygons
43 falling on leveled or developed lands, were removed from the model.

1 Modeled habitat for brittlescale was mapped as hydrologic features such as stream corridors and
2 playa pools located on alluvium associated with the Montezuma Block along the western boundary
3 of the study area or on alluvium associated with tertiary formations located along the southwest
4 boundary of the study area. Stream corridors (intermittent and perennial) that intersected these
5 geologic units were selected and truncated at the point at which they encountered the upper
6 elevation of intertidal marsh. The corridors were buffered 50 feet (15.2 meters) on either side of
7 their centerlines to capture the estimated maximum extent of alluvium deposits in proximity to the
8 streams. Mapped habitat that was occupied by urban or intensive agricultural uses was removed
9 from the model.

10 The habitat model for heartscale was based on the species distribution in the study area (Solano and
11 Yolo Counties) and on the soil types and plant communities within which it occurs. Potential habitat
12 was determined by intersecting the GIS coverage for three parameters: 1) Yolo and Solano County
13 boundaries; 2) Solano, Pescadero, and Willows soils; and 3) grassland, alkali seasonal wetland, and
14 vernal pool complex natural communities. The model excluded areas that have been developed or
15 cultivated, i.e., where the topography, soils, and hydrology have been substantially altered.

16 Delta button-celery habitat was modeled as alkali seasonal wetland complex, vernal pool complex,
17 other natural seasonal wetland, and grassland occurring on Brentwood, Grangerville, Marcuse,
18 Solano, and Vernalis soil map units within the San Joaquin Basin (i.e., south of the mainstem San
19 Joaquin River). For this species, land cover north of the Discovery Bay area where intensive
20 agriculture was classified as annual grassland were manually deleted from the area of predicted
21 habitat. Additionally, other areas of potential habitat that have been developed were also manually
22 deleted.

23 Full implementation of Alternative 4 would include the following conservation actions over the term
24 of the BDCP to benefit covered alkali seasonal wetland species (see Chapter 3, Section 3.3, *Biological*
25 *Goals and Objectives*, of the BDCP).

- 26 • Of the 150 acres of alkali seasonal wetland complex protected under Objective ASWNC1.1, 600
27 acres of vernal pool complex protected under Objective VPNC1.1, and 8,000 acres of grassland
28 natural community protected under Objective GNC1.1, protect 75 acres of suitable brittlescale
29 habitat and 75 acres of suitable heartscale habitat in Conservation Zones 1, 8, or 11 (Objective
30 BRIT/HART/SJSC1.1, associated with CM3).
- 31 • Protect two currently unprotected occurrences of San Joaquin spearscale in Conservation Zones
32 1, 8, or 11 (Objective BRIT/HART/SJSC1.2, associated with CM3).

33 Modeled habitat for Delta button-celery would be adversely affected by construction of the
34 Alternative 4 water conveyance facilities. One population of crownscale also would be adversely
35 affected by construction of the water conveyance facilities. Modeled habitat for brittlescale and
36 heartscale could be adversely affected by tidal habitat restoration. One occurrence each of San
37 Joaquin spearscale and Heckard's peppergrass could be affected by tidal habitat restoration. No
38 adverse effects on palmate-bracted bird's-beak or recurved larkspur would be expected. Table 12-4-
39 63 summarizes the acreage of modeled alkali seasonal wetland habitat in the study area and the
40 number of occurrences of each special-status alkali seasonal wetland species in the study area.

1 **Table 12-4-63. Summary of Impacts on Seasonal Alkali Wetland Plant Species under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
San Joaquin spearscale modeled habitat	14,933	758	-	-	Habitat loss from construction of water conveyance facilities, construction of Yolo Bypass fisheries enhancements, tidal habitat restoration, and floodplain restoration levee construction
Brittlescale modeled habitat	451	4	-	-	Habitat loss from tidal habitat restoration
Heartscale modeled habitat	6,528	306	-	-	Habitat loss from tidal habitat restoration
Delta button-celery modeled habitat	3,361 ^a	96	-	-	Habitat loss from construction of water conveyance facilities
Alkali seasonal wetlands	3,723	75	-	-	Habitat loss from construction of water conveyance facilities, tidal restoration and Yolo Bypass Fisheries enhancements
Covered Species					
San Joaquin spearscale	-	-	19	2	Population loss from construction of water conveyance facilities and tidal habitat restoration
Brittlescale	-	-	8	0	None
Heartscale	-	-	3	0	None
Delta button-celery	-	-	1 ^b	0	None
Heckard's peppergrass	-	-	1 ^c	1	Population loss from tidal habitat restoration
Noncovered Species					
Crownscale	-	-	17	1	Population loss from construction of water conveyance facilities
Palmate-bracted bird's-beak	-	-	1	0	None
Recurved larkspur	-	-	4	0	None
^a A portion of this acreage consists of riparian habitat. ^b A second occurrence in study area is in riparian habitat. ^c Four additional occurrences of Heckard's peppergrass are associated with vernal pools.					

2

1 **Impact BIO-170: Effects on Habitat and Populations of Alkali Seasonal Wetland Plants**

2 Alternative 4 would have adverse effects on modeled habitat for San Joaquin spearscale, brittlescale,
3 heartscale, and Delta button-celery. It would also have adverse effects on occurrences of San Joaquin
4 spearscale, Heckard's peppergrass, and crownscale.

5 The individual effects of each relevant conservation measure are addressed below. A summary
6 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
7 conservation measure discussions.

- 8 • *CM1 Water Facilities and Operation:* Under Alternative 4, construction of the Byron Tract
9 Forebay would permanently remove 76 acres of modeled habitat for San Joaquin spearscale and
10 96 acres of modeled habitat for Delta button-celery. This could be an adverse effect, depending
11 on whether or not the affected modeled habitat is actually occupied by the species. Modeled
12 habitat is assumed to encompass all potential habitat for a species and may therefore
13 overestimate the area actually occupied. One known occurrence of San Joaquin spearscale near
14 the forebay would be affected by facilities construction. Delta button-celery is not known to
15 occur in CZ 8; the nearest known occurrence, in CZ 9, would not be affected.

16 Construction of the water conveyance facilities would permanently remove about 1.5 acres of
17 habitat occupied by crownscale at the Byron Tract Forebay. All or most of the occurrence would
18 be directly affected.

19 Construction of the water conveyance facilities would not affect brittlescale, heartscale,
20 Heckard's peppergrass, palmate-bracted bird's-beak, or recurved larkspur.

- 21 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo Bypass improvements would
22 permanently remove 56 acres of modeled habitat for San Joaquin spearscale. No known
23 occurrences of San Joaquin spearscale would be affected. No modeled habitat and no known
24 occurrences of the seven other alkali seasonal wetland species are within the hypothetical
25 footprint for construction or operation of the Yolo Bypass fisheries enhancements.

- 26 • *CM3 Natural Communities Protection and Restoration:* Alternative 4 would benefit alkali seasonal
27 wetland species by protecting 150 acres of alkali seasonal wetland in Conservation Zones 1, 8,
28 and/or 11. The protected alkali seasonal wetland habitat would be managed and enhanced to
29 sustain populations of native plant species.

- 30 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration is expected to convert
31 alkali seasonal wetlands on the margins of tidal wetlands to freshwater or brackish tidal marsh.
32 Tidal habitat restoration would convert 622 acres of modeled habitat for San Joaquin spearscale
33 to tidal marsh. Tidal habitat restoration would permanently remove 4 acres of modeled habitat
34 for brittlescale in CZ 1 near Lindsey Slough and in CZ 11 near Nurse Slough; however, the BDCP
35 would allow up to 50 acres of modeled habitat to be converted to tidal wetlands. Tidal habitat
36 restoration would remove 306 acres of modeled habitat for heartscale in CZ 1 in the vicinity of
37 Jepson Prairie and in CZ 11 adjacent to Suisun Marsh. The extent to which the modeled habitat is
38 actually occupied by these species is not known; modeled habitat is assumed to encompass all
39 potential habitat for a species and may therefore overestimate the area actually occupied. Tidal
40 habitat restoration could adversely affect an occurrence of Heckard's peppergrass at Hass
41 Slough and an occurrence of San Joaquin spearscale at Main Prairie, both in CZ 1. These
42 occurrences are based on historic records, and the whether or not the populations still exist is
43 not known. In each case, the loss of modeled habitat and occurrences for covered species would

- 1 be adverse effects. Delta button celery, crownscale, palmate-bracted bird's-beak, and recurved
2 larkspur would not be affected by tidal habitat restoration.
- 3 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
4 would result in the removal of 2 acres of modeled habitat for San Joaquin spearscale. In addition,
5 3 acres would be subject to periodic flooding. No known occurrences of San Joaquin spearscale
6 would be affected. No other alkali seasonal wetland habitat or occurrences of special-status
7 alkali seasonal wetland species are present within areas proposed for floodplain restoration.
8 Therefore, floodplain restoration and construction of new floodplain levees would have no
9 impacts on covered and noncovered alkali seasonal wetland plant species.
 - 10 • *CM6 Channel Margin Enhancement*: No alkali seasonal wetland habitat or occurrences of special-
11 status alkali seasonal wetland plant species are present within areas proposed for channel
12 margin habitat enhancement. Therefore, channel margin habitat enhancement would have no
13 impacts on covered and noncovered alkali seasonal wetland species.
 - 14 • *CM7 Riparian Natural Community Restoration*: No alkali seasonal wetland habitat or occurrences
15 of special-status alkali seasonal wetland plant species are present within areas proposed for
16 riparian habitat enhancement. Therefore, riparian habitat enhancement would have no impacts
17 on covered and noncovered alkali seasonal wetland species.
 - 18 • *CM8 Grassland Natural Community Restoration*: Although the alkali seasonal wetland habitat
19 includes the grassland matrix within which the wetlands occur, grassland restoration activities
20 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands
21 that are not included within alkali seasonal wetland habitat. Therefore, grassland communities
22 restoration would have no impacts on covered and noncovered alkali seasonal wetland species.
 - 23 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Although some vernal pools
24 are alkaline, alkali seasonal wetlands in the study area consist of alkali grassland, alkali meadow,
25 or iodine bush scrub. Therefore, vernal pool restoration would avoid alkali seasonal wetland
26 habitat and would have no impacts on covered and noncovered alkali seasonal wetland plant
27 species. In addition, the BDCP would compensate for the loss of alkali seasonal wetlands
28 resulting from other conservation measures by restoring or creating 72 acres of alkali seasonal
29 wetlands in Conservation Zones 1, 8, or 11 to achieve no net loss of this habitat.
 - 30 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
31 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid alkali
32 seasonal wetland habitat and would have no impacts on covered and noncovered alkali seasonal
33 wetland plant species.
 - 34 • *Avoidance and Minimization Measures*: Effects on special-status alkali seasonal wetland plants
35 potentially resulting from implementation of CM1 and CM4 would be avoided or minimized
36 through *AMM2 Construction Best Management Practices and Monitoring*, *AMM11 Covered Plant*
37 *Species*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37 Recreation*.
38 Under AMM11, surveys for covered plant species would be performed during the
39 planning phase of projects, and any impacts on populations of covered species would be avoided
40 through project design or subsequently minimized through AMM2. In addition, AMM11 prohibits
41 ground disturbance or hydrologic disturbance within 250 feet of existing vernal pools, which
42 would protect those species with modeled habitat that includes vernal pool complex.
43 Occurrences of covered species in vernal pools near tidal wetlands would not be affected by
44 tidal habitat restoration where critical habitat for vernal pool species is present and would be

1 avoided with implementation of AMM11. AMM30 requires that transmission line construction
2 avoid any losses of alkali seasonal wetland complex natural community. AMM37 requires that
3 new recreation trails avoid populations of covered alkali seasonal wetland species. BDCP
4 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
5 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

6 In summary, only one known occurrence of a special-status alkali seasonal wetland species
7 (crownscale) would be affected under Alternative 4, although one historic occurrence of Heckard's
8 peppergrass and one historic occurrence of San Joaquin spearscale could also be affected by tidal
9 restoration activities, if those occurrences still exist. AMM11 would be implemented to avoid an
10 adverse effect on Heckard's peppergrass and San Joaquin spearscale occurrences.

11 The primary effect of Alternative 4 on special-status alkali seasonal wetland plant species would be
12 the loss of potential (i.e., modeled) habitat for San Joaquin spearscale, brittlescale, heartscale, and
13 Delta button-celery. Approximately 75 acre of this habitat loss would be alkali seasonal wetlands.
14 The actual effect on modeled habitat for alkali seasonal wetland species is expected to be somewhat
15 less than the estimated impact because some of this habitat is composed of vernal pool complex, and
16 the BDCP limits the total loss of wetted vernal pool habitat to 10 acres (approximately 67 acres of
17 vernal pool complex) over the permit term (AMM12). Loss of modeled habitat would be
18 compensated for by restoring or creating vernal pool complex, alkali seasonal wetlands, and
19 grasslands, in proportion to the amount of each habitat removed. At the proposed restoration ratios
20 of 1:1 (prior to impact) and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal
21 pool complex restoration would be required to compensate for the loss of modeled habitat
22 composed of vernal pool complex (Objective VPNC1.2, associated with CM9). Approximately 72
23 acres of alkali seasonal wetlands would be restored (Objective ASWC1.2, associated with CM9). Loss
24 of modeled habitat composed of grasslands would be compensated for by restoring grassland
25 habitat on a 1:1 basis (Objective GNC1.1, associated with CM8). These compensation levels would be
26 consistent with typical NEPA and CEQA project-level mitigation ratios for impacts on vernal pools,
27 alkali seasonal wetlands, and grasslands.

28 The BDCP would have a small beneficial effect on special-status alkali seasonal wetland plant
29 species by protecting 150 acres of alkali seasonal wetland habitat. The BDCP also includes the
30 species-specific goal that 75 acres of the protected alkali seasonal wetland habitat would be
31 modeled habitat for brittlescale and heartscale (Objective BRIT/HART/SJSC1.1) and another goal
32 that would protect 2 occurrences of San Joaquin spearscale (Objective BRIT/HART/SJSC1.2). The
33 benefits of habitat protection and management also would accrue to any noncovered alkali seasonal
34 wetland species occurring in the protected habitat.

35 **NEPA Effects:** Under Alternative 4, loss of modeled habitat for alkali seasonal wetland plant species
36 would be offset through restoration of grassland, vernal pool, and alkali seasonal wetland habitat
37 (CM8, CM9), and impacts on one occurrence of San Joaquin spearscale and one occurrence of
38 Heckard's peppergrass would be avoided through AMM11. With avoidance and habitat restoration,
39 these effects would not be adverse. The loss of one occurrence of crownscale, a non-covered species,
40 would result in a reduction in the range and numbers of this species and would be an adverse effect.
41 Adverse effects on crownscale could be avoided or offset through implementation of Mitigation
42 Measure BIO-170.

1 **CEQA Conclusion:** Because loss of modeled habitat for alkali seasonal wetland plant species would
2 be offset through restoration, and because impacts on occurrences of covered alkali seasonal
3 wetland species would be avoided, impacts on alkali seasonal wetlands as a result of implementing
4 Alternative 4 would not result in substantially reducing the number or restricting the range of five
5 covered and two noncovered alkali seasonal wetland plant species. However, conservation
6 measures that benefit or protect covered species do not apply to noncovered species, and loss of the
7 crownscale population at Byron Tract Forebay would be a significant impact. Implementation of
8 Mitigation Measure BIO-170 would reduce this impact to a less-than-significant level by conducting
9 surveys and implementing measures to avoid, minimize, or compensate for impacts to noncovered
10 special-status plant species.

11 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**
12 **Special-Status Plant Species**

13 DWR will evaluate all projects for their impacts on special-status plant species, avoid or
14 minimize impacts on species that occur on project sites, and compensate for impacts on species.
15 All impacts on diamond-petaled California poppy and caper-fruited tropidocarpum shall be
16 avoided. Impacts on other special-status plant species shall be avoided to the extent feasible,
17 and any unavoidable impacts shall be compensated for.

- 18 • DWR shall conduct surveys for special-status plant species within and adjacent to all project
19 sites. Special-status plant surveys required for project-specific permit compliance will be
20 conducted during the planning phase to allow design of the individual restoration projects
21 to avoid adverse modification of habitat for specified covered species if feasible. The
22 purpose of these surveys will be to verify that the locations of special-status species
23 identified in previous record searches or surveys are extant, identify any new special-status
24 species occurrences, and cover any portions of the project area not previously surveyed. The
25 extent of mitigation of direct loss of or indirect effects on special-status plant species will be
26 based on these survey results.
- 27 • All surveys shall be conducted by qualified biologists using the using *Guidelines for*
28 *Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate*
29 *Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating*
30 *Impacts to Special Status Native Plant Populations and Natural Communities* (California
31 Department of Fish and Game 2009) during the season that special-status plant species
32 would be evident and identifiable, i.e., during their blooming season. Locations of special-
33 status plant species in proposed construction areas will be recorded using a GPS unit and
34 flagged.
- 35 • The construction monitoring plan for the protection of covered fish, wildlife, and plant
36 species, prepared by DWR before implementing an approved project, will provide for
37 construction activity monitoring in areas identified during the planning stages and
38 species/habitat surveys as having noncovered special-status plant species.
- 39 • Where surveys determine that a special-status plant species is present in or adjacent to a
40 project site, direct and indirect impacts of the project on the species shall be avoided if
41 feasible through the establishment of 250-foot activity exclusion zones surrounding the
42 periphery of occurrences, within which no ground-disturbing activities shall take place,
43 including construction of new facilities, construction staging, or other temporary work
44 areas. Activity exclusion zones for special-status plant species shall be established according

1 to a 250-foot buffer surrounding the periphery of each special-status plant species, the
2 boundaries of which shall be clearly marked with standard orange plastic construction
3 exclusion fencing or its equivalent. The establishment of activity exclusion zones shall not be
4 required if no construction-related disturbances will occur within 250 feet of the occurrence
5 periphery. The size of activity exclusion zones may be reduced through consultation with a
6 qualified biologist and with concurrence from USFWS or CDFW based on project site-
7 specific conditions.

- 8 • Where avoidance of impacts on a special-status plant species is infeasible, DWR will
9 compensate for loss of individuals or occupied habitat of a special-status plant species
10 through the acquisition, protection, and subsequent management in perpetuity of other
11 existing occurrences at a 2:1 ratio (preservation: impact). DWR will provide detailed
12 information to USFWS and CDFW on the location of the preserved occurrences, quality of
13 the preserved habitat, feasibility of protecting and managing the areas in-perpetuity,
14 responsible parties, and other pertinent information. If suitable occurrences of a special-
15 status plant species are not available for preservation, then the project shall be redesigned
16 to remove features that would result in impacts on that species.

17 **Grassland Species**

18 One covered plant species and 11 noncovered special-status plant species occur in grasslands in the
19 study area (Tables 12-2, 12-3, summarized in Table 12-4-64). The only covered plant species
20 occurring in grassland is Carquinez goldenbush. Carquinez goldenbush modeled habitat included
21 hydrological features such as stream corridors on alluvium derived from the Montezuma Formation.
22 Stream corridors (intermittent and perennial) that intersected these geologic units were selected
23 and truncated at the point at which they encountered the upper elevation of intertidal marsh. The
24 corridors were buffered 50 feet (15 meters) on either side in an effort to capture the estimated
25 maximum extent of alluvium deposits in close proximity to the actual rivers/streams.

26 Full implementation of Alternative 4 would include the following conservation actions over the term
27 of the BDCP to benefit covered grassland species (see Chapter 3, Section 3.3, *Biological Goals and*
28 *Objectives*, of the BDCP).

- 29 • Protect three unprotected occurrences of the Carquinez goldenbush in Conservation Zones 1
30 and/or 11 (Objective CGB1.1, associated with CM3).
- 31 • Maintain and enhance occupied Carquinez goldenbush habitat to slow erosion and reverse
32 degradation from livestock grazing (Objective CGB1.2, associated with CM11).

33 Of 78,047 acres of grasslands in the study area, Alternative 4 would adversely affect 3,449 acres
34 under Alternative 4, including 4 acres that are modeled habitat for Carquinez goldenbush. For 10 of
35 the plant species, no known occurrences would be affected. One of five Parry's rough tarplant
36 occurrences in the study area could be adversely affected by Alternative 4. Table 12-4-64
37 summarizes the acreage of grassland habitat in the study area and the number of occurrences of
38 each special-status grassland species in the study area.

1 **Table 12-4-64. Summary of Impacts on Grassland Plant Species under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Carquinez goldenbush modeled habitat	1,346	4	-	-	Habitat loss from tidal habitat restoration
Grassland	78,047	3,517	-	-	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass Fisheries enhancements, floodplain restoration, and construction of conservation hatcheries
Covered Species					
Carquinez goldenbush	-	-	10	1	Population loss from tidal restoration
Noncovered Species					
Big tarplant	-	-	5	0	None
Round-leaved filaree	-	-	2	0	None
Pappose tarplant	-	-	7	0	None
Parry's rough tarplant	-	-	5	1	Periodic inundation of one occurrence as a result of Yolo Bypass operations
Small-flowered morning-glory	-	-	0	0	None
Diamond-petaled poppy	-	-	1	0	None
Stinkbells	-	-	1	0	None
Fragrant fritillary	-	-	4	0	None
Gairdner's yampah	-	-	0	0	None
Streamside daisy ^a	-	-	1	0	None
Caper-fruited tropidocarpum	-	-	8	0	None

^a This species actually occurs in upland woodland, a habitat that has not been mapped or quantified in the BDCP.

2

3 **Impact BIO-171: Effects on Habitat and Populations of Grassland Plants**

4 Alternative 4 could have adverse effects on modeled habitat for Carquinez goldenbush. It could also
 5 have adverse effects on one occurrence of Carquinez goldenbush and one occurrence of Parry's
 6 rough tarplant. Although Alternative 4 would have no expected effects on known occurrences of the
 7 other special-status plant species that occur in grasslands, the loss of 3,517 acres of grassland would
 8 have the potential to affect undocumented populations of special-status grassland species.

1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: No modeled habitat for Carquinez goldenbush and no
5 known occurrences of the 12 special-status grassland species are within the proposed footprint
6 for the Alternative 4 water conveyance facilities. About 625 acres of grassland habitat would be
7 affected by construction of the water conveyance facilities. However, this grassland habitat
8 consists of small patches of herbaceous ruderal vegetation along levees that do not provide
9 habitat for special-status grassland species. Therefore, under Alternative 4, construction and
10 operation of the water conveyance facilities would not affect the 12 special-status grassland
11 species.
- 12 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries
13 enhancements would remove 627 acres of grassland habitat. Yolo Bypass operations would
14 result in more frequent and longer inundation of 1,597 acres of grasslands in the Yolo Bypass
15 (CZ 2) that include habitat for one occurrence of Parry's rough tarplant. Parry's rough tarplant is
16 a summer-blooming plant that occurs in areas subject to occasional inundation during the wet
17 season, such as swales and seasonal wetlands. Increasing the frequency or duration of
18 inundation may decrease the distribution in some areas by making some conditions too wet but
19 would also expand the distribution into areas that may currently be too dry. Overall, changing
20 the frequency and duration of inundation in the area of this occurrence should not result in a
21 substantial change in the range of numbers of Parry's rough tarplant. Construction and
22 operation of the Yolo Bypass Fisheries enhancements would not affect modeled habitat for
23 Carquinez goldenbush or known occurrences of other special-status grassland species.
- 24 • *CM3 Natural Communities Protection and Restoration*: Alternative 4 would preserve 8,000 acres
25 of grassland habitat, some of which may contain modeled habitat for Carquinez goldenbush.
26 Protection of grassland habitat may also protect undiscovered occurrences of special-status
27 plant species.
- 28 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently
29 remove 1,122 acres of grassland habitat, including 4 acres of modeled habitat for Carquinez
30 goldenbush along the eastern side of Suisun Marsh. One occurrence of Carquinez goldenbush
31 would be partially affected by tidal restoration. No other known occurrences of special-status
32 grassland plants are within the hypothetical footprint of tidal restoration. Therefore, tidal
33 restoration would have impacts on only one known occurrence of special-status grassland
34 species.
- 35 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of new floodplain levees would
36 result in the loss of 85 acres of grassland habitat, periodic inundation of the floodplain would
37 affect 513 acres of grassland habitat, and another 399 acres of grassland habitat would be
38 converted to riparian habitat. However, no modeled habitat for Carquinez goldenbush or known
39 occurrences of special-status grassland plants are present within areas proposed for floodplain
40 restoration, and the affected grassland habitat consists of herbaceous ruderal vegetation that
41 does not support special-status grassland plants. Therefore, floodplain restoration and
42 construction of new floodplain levees would have no impacts on covered and noncovered
43 grassland species.

- 1 • *CM6 Channel Margin Enhancement*: No known occurrences of special-status grassland plants are
2 present within areas proposed for channel margin habitat enhancement. Areas mapped as
3 grassland along levees that would be affected by channel margin habitat enhancement are small
4 patches of ruderal vegetation along levees that do not provide habitat for special-status
5 grassland species and are not modeled habitat for Carquinez goldenbush. Therefore, channel
6 margin habitat enhancement would have no impacts on covered and noncovered grassland
7 species.
- 8 • *CM7 Riparian Natural Community Restoration*: No modeled habitat for Carquinez goldenbush or
9 known occurrences of special-status grassland plants are present within areas proposed for
10 riparian habitat enhancement. Therefore, riparian habitat enhancement would have no impacts
11 on covered and noncovered grassland species.
- 12 • *CM8 Grassland Natural Community Restoration*: Grassland restoration would restore 2,000 acres
13 of grassland habitat. Restoration activities would take place in non-grasslands (ruderal habitat,
14 cultivated land) or degraded grasslands. These areas do not currently provide habitat for
15 special-status grassland plants. Therefore, grassland communities restoration would have no
16 impacts on covered and noncovered grassland species.
- 17 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Vernal pool complex includes
18 vernal pools as well as the surrounding grassland matrix. Because the habitat to be restored
19 would consist of areas of former vernal pool complex that have been leveled for cultivation,
20 special-status grassland plants would not be present. Therefore, vernal pool complex
21 restoration would not affect special-status grassland species.
- 22 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
23 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid grassland
24 habitat and would have no impacts on covered and noncovered grassland species.
- 25 • *CM18 Conservation Hatcheries*: Construction of the conservation hatcheries would remove 35
26 acres of grassland habitat. The removed habitat would consist of ruderal herbaceous vegetation
27 that would not be likely to provide habitat for special-status grassland plants. Therefore,
28 construction of the conservation hatcheries would not be expected to affect special-status
29 grassland species.
- 30 • *Avoidance and Minimization Measures*: Effects on Carquinez goldenbush potentially resulting
31 from implementation of CM4 and potential effects on undiscovered populations of special-status
32 grassland plants would be avoided or minimized through *AMM11 Covered Plant Species*, *AMM2*
33 *Construction Best Management Practices and Monitoring*, and *AMM37 Recreation*. Under AMM11,
34 surveys for covered plant species would be performed during the planning phase of projects,
35 and any impacts on populations of covered species would be avoided through project design or
36 subsequently minimized through AMM2. AMM37 requires that new recreation trails would
37 avoid populations of Carquinez goldenbush. BDCP Appendix 3.C describes the AMMs, which
38 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
39 *AMMs*, and *CMs*, of the Final EIR/EIS.

40 The primary effect of Alternative 4 on special-status grassland plant species is the loss of potential
41 (i.e., modeled) habitat for Carquinez goldenbush, including part of one occurrence. Adverse effects
42 on the occurrence will be minimized through AMM11. Protecting three unprotected occurrences of
43 Carquinez goldenbush (Objective CGB1.1, associated with CM3) and maintaining and enhancing
44 occupied habitat for Carquinez goldenbush (Objective CGB1.2, associated with CM11) would

1 compensate for any residual effects. One occurrence of Parry's rough tarplant would be affected by
2 CM2, but the effect is not expected to be adverse. No known occurrences of the other special-status
3 grassland species would be affected. Implementation of Mitigation Measure BIO-170, *Avoid,*
4 *Minimize, or Compensate for Impacts on Noncovered Special-Status Plant Species*, would address
5 effects on undiscovered occurrences of special-status grassland species through preconstruction
6 surveys and implementing measures to avoid, minimize, or compensate for impacts to noncovered
7 special-status plant species.

8 The BDCP would have a potential beneficial effect on special-status grassland plants by protecting
9 8,000 acres of grassland habitat. To ensure that this habitat preservation would specifically benefit
10 Carquinez goldenbush, the Plan proposes to protect at least three Carquinez goldenbush
11 occurrences in CZs 1 and 11 that are currently not protected and to maintain and enhance occupied
12 Carquinez goldenbush habitat. The preservation of modeled or potential habitat, together with
13 avoidance and minimization of impacts on species occurrences, would reduce any effects of BDCP
14 implementation on covered grassland species to a level that is no longer adverse.

15 **NEPA Effects:** The loss of modeled and occupied habitat for Carquinez goldenbush would be offset
16 through CM3, CM8, and CM11. Therefore, implementation of Alternative 4 would result in no
17 adverse effects on special-status grassland plant species.

18 **CEQA Conclusion:** Because adverse effects on special-status grassland plant species would be
19 avoided or compensated for, Alternative 4 would not result in substantially reducing the numbers or
20 restricting the range of one covered or 11 noncovered special-status grassland species, and this
21 impact would be less than significant. No mitigation is required.

22 **Valley/Foothill Riparian Species**

23 Two covered plants and two noncovered special-status plant species occur in valley/foothill
24 riparian habitat in the study area (Tables 12-2, 12-3, summarized in Table 12-4-65). The
25 valley/foothill riparian habitat model for Delta button-celery and slough thistle was mapped as all of
26 the study area along the flood plain of the San Joaquin River between the levees from the Mossdale
27 Bridge to Vernalis. Whether or not this modeled habitat is actually occupied by Delta button-celery
28 and slough thistle is unknown; all known occurrences of these species within the area of modeled
29 habitat are believed to be extirpated.

30 Full implementation of Alternative 4 would include the following conservation actions over the term
31 of the BDCP to benefit covered valley/foothill riparian plants (see Chapter 3, Section 3.3, *Biological*
32 *Goals and Objectives*, of the BDCP).

- 33 ● Protect and enhance two occurrences of delta button celery. If occurrences are not found in the
34 Plan Area, establish self-sustaining occurrences of delta button celery for a total of two
35 occurrences within the restored floodplain habitat on the mainstem of the San Joaquin River in
36 Conservation Zone 7 between Mossdale and Vernalis. (Objective DBC1.1, associated with CM3
37 and CM11).
- 38 ● Protect and enhance two occurrences of slough thistle. If occurrences are not found in the Plan
39 Area, establish self-sustaining occurrences of slough thistle for a total of two occurrences within
40 the 10,000 acres of restored floodplain on the mainstem of the San Joaquin River in
41 Conservation Zone 7 between Mossdale and Vernalis (Objective ST1.1: associated with CM3 and
42 CM11).

1 Of 17,966 acres of valley/foothill riparian habitat in the study area, Alternative 4 would affect 869
 2 acres, including 33 acres that are modeled habitat for Delta button-celery and 11 acres that are
 3 modeled habitat for slough thistle. Table 12-4-65 summarizes the acreage of modeled habitat for
 4 Delta button-celery and slough thistle and the number of occurrences of each special-status riparian
 5 species in the study area.

6 **Table 12-4-65. Summary of Impacts on Valley/Foothill Riparian Plant Species under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Delta button-celery modeled habitat	3,361 ^a	15	-	-	Habitat loss from floodplain restoration
Slough thistle modeled habitat	1,834	11	-	-	Habitat loss from floodplain restoration
Valley/foothill riparian habitat	17,966	1,133	-	-	Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Covered Species					
Delta button-celery	-	-	1 ^b	1	Occurrence potentially affected by floodplain restoration
Slough thistle	-	-	2	2	Occurrences potentially affected by floodplain restoration
Noncovered Species					
Northern California black walnut	-	-	1	0	None
Wright's trichocoronis	-	-	1	0	None

^a A portion of this acreage consists of alkali seasonal wetland
^b A second occurrence is in alkali seasonal wetland

7

8 **Impact BIO-172: Effects on Habitat and Populations of Valley/Foothill Riparian Plants**

9 No extant occurrences of Delta button-celery, slough thistle, Northern California black walnut, or
 10 Wright's trichocoronis are present in the study area. Therefore, no impacts on special-status
 11 valley/foothill riparian plant species are expected. Modeled habitat for Delta button-celery and
 12 slough thistle, which may support undocumented occurrences of these species, would be affected by
 13 restoration of seasonally inundated floodplain.

14 The individual effects of each relevant conservation measure are addressed below. A summary
 15 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
 16 conservation measure discussions.

- 1 ● *CM1 Water Facilities and Operation*: Construction of the water conveyance facilities would
2 remove 61 acres of valley-foothill riparian habitat under Alternative 4. However, no modeled
3 habitat and no known occurrences of the four special-status valley/foothill riparian species are
4 within the proposed footprint for the Alternative 4 water conveyance facilities. Therefore, under
5 Alternative 4, construction and operation of the water conveyance facilities would not affect
6 covered or noncovered special-status valley/foothill riparian species.
 - 7 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction and operation of the Yolo Bypass fisheries
8 enhancements would adversely affect 378 acres of valley/foothill riparian habitat. However, no
9 modeled habitat and no known occurrences of the four special-status valley/foothill riparian
10 species are within the hypothetical footprint for construction or operation of the Yolo Bypass
11 fisheries enhancements. Therefore, construction and operation of the Yolo Bypass Fisheries
12 enhancements would not affect the covered or noncovered valley/foothill riparian species.
 - 13 ● *CM3 Natural Communities Protection and Restoration*: Alternative 4 would protect 552 acres of
14 existing valley/foothill riparian forest in CZ 7. This action would have no substantial effects on
15 special-status valley/foothill plant species because no extant occurrences of special-status
16 valley/foothill species are present in the study area.
 - 17 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would inundate 552 acres
18 of valley/foothill riparian habitat. However, no modeled habitat and no known occurrences of
19 the four special-status valley/foothill riparian species are within the hypothetical footprint for
20 tidal restoration. Therefore, tidal restoration would not affect the covered or noncovered
21 valley/foothill riparian species.
 - 22 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
23 would remove 78 acres of valley/foothill riparian habitat, including 15 acres of modeled habitat
24 for Delta button-celery along the San Joaquin River in CZ 7. In addition, floodplain restoration
25 would result in more frequent and longer inundation of 18 acres of modeled habitat for Delta
26 button-celery in this area. The area affected contains one historic occurrence of Delta button
27 celery. This occurrence is considered to be extirpated, because all habitat for Delta button-celery
28 at his location has been converted to agriculture (California Department of Fish and Wildlife
29 2013). Therefore, Alternative 4 would not have an adverse effect on Delta button celery in CZ 7.
- 30 The BDCP proposes to benefit Delta button-celery at this location by restoring 5,000 acres of
31 valley/foothill riparian habitat and re-introducing two occurrences of Delta button-celery.
32 Although Delta button celery occurs in riparian habitat, it is not associated with woodland or
33 scrub habitats; rather, it occurs in alkali seasonal wetlands in floodplains, which may or may not
34 also contain adjacent woody riparian habitat. Restoring habitat for Delta button-celery may not
35 be compatible with restoring woody riparian habitat. In addition, establishing new populations
36 of Delta button-celery is an untried, unproven procedure and may not be feasible. Therefore, any
37 beneficial effects on Delta button-celery would be speculative.
- 38 Floodplain restoration levee construction would remove 11 acres of modeled habitat for slough
39 thistle and would result in more frequent and longer inundation of 6 acres of modeled habitat
40 for slough thistle along the San Joaquin River in CZ 7. However, the BDCP would allow up to 50
41 acres of modeled habitat to be converted to riparian habitat. Whether the affected modeled
42 habitat is actually occupied by slough thistle is not known; however, of two historic occurrences
43 of slough thistle present in the study area, only one is considered to be extirpated (California
44 Department of Fish and Wildlife 2013). The BDCP would protect and enhance two occurrences
45 of slough thistle. If occurrences are not found in the study area, then two, self-sustaining

1 occurrences of slough thistle would be established using locally-sourced genetic material for a
2 total of two occurrences within the restored floodplain habitat on the main stem of the San
3 Joaquin River in Conservation Zone 7 between Mossdale and Vernalis. Establishing new
4 populations of slough thistle is an untried, unproven procedure and may not be feasible.
5 Therefore, any beneficial effects on slough thistle would be speculative.

6 One historic occurrence of Wright's trichocoronis in the study area near Lathrop (CZ 7) could
7 also be affected by floodplain restoration. The occurrence is presumed to be extant because the
8 presence or absence of suitable habitat has not been verified by field surveys (California
9 Department of Fish and Wildlife 2013). However, the species has not been observed at this
10 location for nearly a century, and habitat for Wright's trichocoronis, which would have been
11 similar to that for Delta button celery and slough thistle, no longer appears to be present in
12 aerial photographs of the area. Therefore, Alternative 4 would not be expected to have an
13 adverse effect on Wright's trichocoronis.

- 14 • *CM6 Channel Margin Habitat Enhancement*: No modeled habitat or occurrences of special-status
15 valley/foothill riparian species are present within areas proposed for channel margin habitat
16 enhancement. Therefore, channel margin habitat enhancement would have no impacts on
17 covered and noncovered valley/foothill riparian species.
- 18 • *CM7 Riparian Natural Community Restoration*: No extant occurrences of special-status
19 valley/foothill riparian species are present within areas proposed for riparian habitat
20 restoration. Therefore, riparian habitat restoration would have no impacts on covered and
21 noncovered valley/foothill riparian species.
- 22 • *CM8 Grassland Natural Community Restoration*: No occurrences of special-status valley/foothill
23 riparian species are present within areas proposed for grassland communities restoration.
24 Therefore, grassland communities restoration would have no impacts on covered and
25 noncovered valley/foothill riparian species.
- 26 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No occurrences of special-
27 status valley/foothill riparian species are present within areas proposed for vernal pool and
28 alkali seasonal wetland complex restoration. Therefore, vernal pool complex restoration would
29 have no impacts on covered and noncovered valley/foothill riparian species.
- 30 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
31 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid
32 valley/foothill riparian habitat and would have no impacts on covered and noncovered
33 valley/foothill riparian species.
- 34 • *Avoidance and Minimization Measures*: Effects on Delta button-celery and slough thistle
35 potentially resulting from implementation of CM5 would be avoided or minimized though
36 *AMM11 Covered Plant Species* and *AMM2 Construction Best Management Practices and*
37 *Monitoring*. Under AMM11, surveys for covered plant species would be performed during the
38 planning phase of projects, and any impacts on populations of covered species would be avoided
39 through project design or subsequently minimized though AMM2. BDCP Appendix 3.C describes
40 the AMMs, which have since been updated and which are provided in Appendix 3B,
41 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

42 Because no extant occurrences of special-status valley/foothill riparian plant species are known to
43 occur in the study area, Alternative 4 is not expected to adversely affect any special-status
44 valley/foothill riparian plants. Modeled habitat for both Delta button-celery and slough thistle

1 would be affected. Under AMM11, surveys for covered plant species would be performed during the
2 planning phase for floodplain restoration. If Delta button-celery or slough thistle were found to be
3 present in the floodplain restoration area, then the project would be designed to avoid impacts on
4 the populations. Therefore, Alternative 4 would not have an adverse effect on these species.

5 The BDCP proposes to benefit Delta button-celery and slough thistle by restoring 5,000 acres of
6 valley/foothill riparian habitat and re-introducing two occurrences of both species. Establishing
7 new populations of Delta-button-celery or slough thistle would be a beneficial effect. However,
8 establishing new populations is an untried, unproven procedure and may not be feasible.

9 **NEPA Effects:** Implementation of the BDCP under Alternative 4 would not have an adverse effect on
10 special-status valley/foothill riparian plant species.

11 **CEQA Conclusion:** Under Alternative 4, the BDCP would not result in a reduction in the range and
12 numbers of covered and noncovered valley/foothill riparian plant species because no extant
13 occurrences of special-status valley/foothill riparian plant species are known to occur in the study
14 area and because implementation of AMMs would include surveys for covered plant species and
15 measures to avoid or minimize potential impacts through project design. This impact would be less
16 than significant. No mitigation is required.

17 **Tidal Wetland Species**

18 Seven covered plants and one noncovered special-status plant species occur in tidal wetlands in the
19 study area (Tables 12-2, 12-3, summarized in Table 12-4-66). Five tidal wetland habitat models
20 were developed for the seven covered plant species occurring in tidal wetland habitat.

21 Modeled habitat for Mason's lilaepsis and Delta mudwort was mapped as areas within 10 feet (3
22 meters) on either side of the landward boundary of tidal perennial aquatic land cover type, which
23 was obtained from the BDCP GIS vegetation data layer.

24 The side-flowering skullcap model mapped the distribution of suitable habitat in the study area
25 according to the species' habitat association with woody riparian habitat. The model selected Delta
26 riparian vegetation types providing the habitat characteristics that side-flowering skullcap seems to
27 require, namely, woody substrate in freshwater tidal areas. The model included vegetation subunits
28 of the BDCP Valley Riparian natural community characterized by California dogwood, white alder,
29 and arroyo willow.

30 The modeled habitat for soft bird's-beak consisted of pickleweed- and saltgrass-dominated
31 vegetation units located west of the Antioch Bridge. Modeled habitat for these two plant species was
32 mapped as areas within 10 feet (3 meters) on either side of the landward boundary of tidal
33 perennial aquatic land cover types. The model used all Tidal Brackish Emergent Wetland polygons
34 that were limited by specific vegetation units that are known to be closely associated with soft
35 bird's-beak habitat.

36 Habitat for Delta tule pea and Suisun Marsh aster was modeled separately based on the salinity of
37 the water. For the tidal freshwater emergent wetland BDCP land cover type, modeled habitat was
38 mapped as the area within 10 feet (3 meters) of the landward side of the landward boundary,
39 exclusively where this land cover type is adjacent to grassland, vernal pool complex, valley/foothill
40 riparian, or cultivated land habitats cover types. For brackish water areas in and near Suisun Marsh,
41 the model used all tidal brackish emergent wetland polygons within an elevation range of 7 to 10

1 feet (2 to 3 meters) to capture elevations 1 foot (30 centimeters) below intertidal to 2 feet (60
2 centimeters) above intertidal.

3 The modeled habitat for Suisun thistle in and near Suisun Marsh consists of all tidal brackish
4 emergent wetland polygons with the appropriate vegetation. This included vegetation units
5 dominated by saltscale, saltgrass, pickleweed, and broad-leaved peppergrass.

6 Full implementation of Alternative 4 would include the following conservation actions over the term
7 of the BDCP to benefit covered tidal wetland species (see Chapter 3, Section 3.3, *Biological Goals and*
8 *Objectives*, of the BDCP).

- 9 • No net loss of Mason's lilaepsis and delta mudwort occurrences within restoration sites, or
10 within the area of affected tidal range of restoration projects (Objective DMW/ML1.1, associated
11 with CM4 and CM11).
- 12 • No net loss of Delta tule pea and Suisun Marsh aster occurrences within restoration sites
13 (Objective DTP/SMA1.1, associated with CM4 and CM11).
- 14 • Restore tidal inundation to wetlands in the Hill Slough Ecological Reserve and to the ponded
15 area at Rush Ranch (Objective SBB/SuT1.1, associated with CM4).
- 16 • Complete seed banking of all existing Suisun Marsh populations and the representative genetic
17 diversity using accepted seed banking protocols (Objective SBB/SuT1.2, associated with CM11).
- 18 • Establish a cultivated population of Suisun thistle from wild seed using accepted seed collection
19 protocols (Objective SBB/SuT1.3, associated with CM11).
- 20 • Establish two occurrences of Suisun thistle in Conservation Zone 11 (Objective SBB/SuT1.4,
21 associated with CM11).

22 Of 17,357 acres of tidal wetlands in the study area, Alternative 4 would affect 28 acres, including
23 areas that are modeled habitat for Mason's lilaepsis, Delta mudwort, side-flowering skullcap, Delta
24 tule pea, Suisun Marsh aster, soft bird's-beak, and Suisun thistle. Known occurrences of all of these
25 species would be affected. In addition, three occurrences of Bolander's water-hemlock, a noncovered
26 special-status species, could be affected by tidal habitat restoration. Table 12-4-66 summarizes the
27 acreage of modeled habitat for covered tidal wetland species and the number of occurrences of each
28 special-status tidal wetland species in the study area.

1 **Table 12-4-66. Summary of Impacts on Tidal Wetland Plant Species under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Delta mudwort/ Mason's lilaepsis modeled habitat	6,081	62	-	-	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Side-flowering skullcap modeled habitat	2,497	17	-	-	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Soft bird's-beak modeled habitat	1,228	73	-	-	Habitat loss from tidal habitat restoration
Delta tule pea/Suisun Marsh aster modeled habitat	5,853	4	-	-	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Suisun thistle modeled habitat	1,281	73	-	-	Habitat loss from tidal habitat restoration
Tidal brackish emergent wetland	8,501	0	-	-	Habitat loss from tidal habitat restoration
Tidal freshwater emergent wetland	8,856	21	-	-	Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Covered Species					
Delta mudwort	-	-	58	3	Occurrences affected by tidal habitat restoration
Delta tule pea	-	-	106	26	Occurrences affected by tidal habitat restoration
Mason's lilaepsis	-	-	181	23	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Side-flowering skullcap	-	-	12	1	Occurrence affected by construction of water conveyance facilities
Soft bird's-beak	-	-	13	7	Occurrences affected by tidal habitat restoration
Suisun Marsh aster	-	-	164	29	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Suisun thistle	-	-	4	0	None
Noncovered Species					
Bolander's water hemlock	-	-	8	3	Occurrences affected by tidal habitat restoration

2

1 **Impact BIO-173: Effects on Habitat and Populations of Tidal Wetland Plants**

2 Alternative 4 would have adverse effects on tidal marsh special-status plant species through
3 implementation of CM1, CM2, CM4, and CM5. No adverse effects are expected from implementation
4 of CM3, or CM6–CM9.

5 The individual effects of each relevant conservation measure are addressed below. A summary
6 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
7 conservation measure discussions.

- 8 • *CM1 Water Facilities and Operation*: Construction of the Alternative 4 water conveyance facilities
9 would remove 37 acres of modeled habitat for delta mudwort and Mason’s lilaepsis, 6 acres of
10 modeled habitat for side-flowering skullcap, and 3 acres of modeled habitat for Delta tule pea
11 and Suisun Marsh aster. The extent to which modeled habitat is actually occupied by these
12 species is not known; however, eight occurrences of Mason’s lilaepsis, three occurrences of
13 Suisun Marsh aster, and one occurrence of side-flowering skullcap in the study area could be
14 affected by construction impacts. No known occurrences of the other covered and noncovered
15 tidal wetland species would be affected by construction of the water conveyance facilities.
- 16 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries
17 enhancements would remove 5 acres of modeled habitat for Mason’s lilaepsis and delta
18 mudwort. The extent to which modeled habitat is actually occupied by these species is not
19 known; however, no known occurrences in the study area would be affected. Yolo Bypass
20 operations would result in more frequent and longer inundation of 8 acres of modeled habitat
21 Delta tulle peas and Suisun Marsh aster. Two occurrences of Suisun Marsh aster could be affected
22 by Yolo Bypass operations. Habitat for these species is normally periodically inundated or
23 saturated; therefore, a small increase in the frequency and duration of periodic inundation of the
24 habitat would not be expected to have a substantial effect.
- 25 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes restoring or creating
26 20 linear miles of transitional tidal areas within other natural communities that would be
27 created or restored, including 3,000 acres of tidal brackish emergent wetland and 13,900 acres
28 of tidal freshwater emergent wetland. In addition, the habitat and ecosystem functions of these
29 areas would be maintained and enhanced. The BDCP does not specifically propose to protect
30 any occurrences of covered tidal wetland species nor does it propose active restoration of
31 affected habitat or occurrences. Instead, the BDCP assumes that the 20 linear miles of restored
32 transitional tidal areas will be passively colonized by the covered tidal wetland species.
- 33 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently
34 remove 6 acres of modeled habitat for Mason’s lilaepsis and Delta mudwort. Habitat loss would
35 occur through conversion of the species habitat (at and immediately above the tidal zone in
36 marshes and along rivers and streams) to inundated tidal habitat. The extent to which modeled
37 habitat is actually occupied by the species is not known; however, 14 of 181 known occurrences
38 of Mason’s lilaepsis and three of 58 known occurrences of delta mudwort in the study area
39 could be affected by tidal habitat restoration.

40 Tidal habitat restoration would remove 4 acres of modeled habitat for side-flowering skullcap.
41 Whether the affected modeled habitat is actually occupied by side-flowering skullcap is not
42 known; however, none of the 12 known occurrences in the study area would be affected.

43 Tidal habitat restoration would remove 2 acre of modeled habitat for Delta tulle pea and Suisun
44 Marsh aster. Habitat loss would result from conversion of the species habitat (at and

1 immediately above the tidal zone in marshes and along rivers and streams) to inundated tidal
2 habitat. However, the BDCP would allow up to 50 acres of modeled habitat to be converted to
3 inundated tidal habitat. The extent to which modeled habitat is actually occupied by the species
4 is not known; however, 26 of 112 known occurrences of Delta tule pea and 23 of 145
5 occurrences of Suisun Marsh aster in the study area could be affected.

6 Tidal habitat restoration could affect 73 acres of modeled habitat for soft bird's-beak and Suisun
7 thistle, including 1.3 acres of critical habitat. The extent to which modeled habitat is actually
8 occupied by the species is not known; however, seven of 13 known occurrences of soft bird's-
9 beak in the study area could be affected. None of the four known occurrences of Suisun thistle in
10 the study area would be affected.

11 Tidal habitat restoration could affect three of eight known occurrences of Bolander's water-
12 hemlock, a noncovered special-status species in the study area. Because Bolander's water-
13 hemlock occurs in tidal marsh, it may benefit from tidal marsh restoration. However, site
14 preparation, earthwork, and other site activities could adversely affect Bolander's water-
15 hemlock through direct habitat removal.

- 16 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
17 would remove 3 acres of modeled habitat for Mason's lilaeopsis and delta mudwort and 2 acres
18 of modeled habitat for side-flowering skullcap. No known occurrences of these species in the
19 study area would be affected by floodplain restoration.

20 Floodplain restoration would result in more frequent and longer inundation of 12 acres of
21 modeled habitat for Mason's lilaeopsis and delta mudwort, 6 acres of modeled habitat for side-
22 flowering skullcap, and 1 acre of modeled habitat for Delta tule peas and Suisun Marsh aster. No
23 known occurrences of these species in the study area would be affected by periodic inundation
24 of restored floodplain habitat. Habitat for these species is normally periodically inundated or
25 saturated; therefore, a small increase in the frequency and duration of periodic inundation of the
26 habitat would not be expected to have a substantial effect.

- 27 ● *CM6 Channel Margin Enhancement*: Effects of channel margin enhancement were not analyzed
28 separately from the effects of tidal habitat restoration. Channel margin enhancement would
29 have adverse effects on tidal wetland plants through direct removal and habitat modification.
30 However, it would have beneficial effects on these species by improving the habitat functions for
31 these species as a result of riprap removal and creation of floodplain benches. Side-flowering
32 skullcap would benefit from installation of large woody material, which it appears to colonize.
- 33 ● *CM7 Riparian Natural Community Restoration*: Riparian habitat restoration is not expected to
34 adversely affect special-status tidal wetland plants. Preparatory work that involves habitat
35 disturbance would occur during implementation of CM4 and CM5. Riparian plantings carried out
36 for CM7 would be placed in floodplain areas, not in tidal wetlands.
- 37 ● *CM8 Grassland Natural Community Restoration*: No tidal wetlands or occurrences of special-
38 status tidal wetland plants are present within areas proposed for grassland communities
39 restoration. Therefore, grassland communities restoration would have no impacts on covered
40 and noncovered tidal wetland species.
- 41 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No tidal wetlands or
42 occurrences of special-status tidal wetland species are present within areas proposed for vernal
43 pool complex restoration. Therefore, vernal pool complex restoration would have no impacts on
44 covered and noncovered tidal wetland species.

- 1 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
2 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid tidal wetland
3 habitat and would have no impacts on covered and noncovered tidal wetland species.
- 4 • *Avoidance and Minimization Measures*: Effects on covered tidal wetland plant species potentially
5 resulting from implementation of CM1, CM2, CM4, and CM5 would be avoided or minimized
6 though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*
7 *Monitoring*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37 Recreation*.
8 Under AMM11, surveys for covered plant species would be performed during the planning
9 phase of projects, and any impacts on populations of covered species would be avoided through
10 project design or subsequently minimized through AMM2. In addition, AMM11 contains specific
11 guidance to avoid adverse modification of any of the primary constituent elements for Suisun
12 thistle or soft bird's-beak critical habitat. AMM30, which specifies that the alignment of
13 proposed transmission lines will be designed to avoid sensitive terrestrial and aquatic habitats
14 when siting poles and towers, to the maximum extent feasible, would avoid some impacts on
15 Mason's lilaepsis and side-flowering skullcap. AMM37 requires that new recreation trails avoid
16 populations of covered tidal wetland species. BDCP Appendix 3.C describes the AMMs, which
17 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
18 *AMMs, and CMs*, of the Final EIR/EIS.

19 In summary, the GIS analysis indicates that Alternative 4 would result in the loss of modeled habitat
20 for all of the covered species and result in adverse effects on known occurrences of all of the special-
21 status species occurring in tidal wetlands. However, the BDCP predicts that habitat restoration
22 activities would greatly expand the amount of habitat available to each of these species, offsetting
23 any potential loss of habitat or occurrences resulting from covered activities.

24 Delta mudwort could lose 62 acres of modeled habitat (1.0%), including all or part of three
25 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
26 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
27 colonization by Delta mudwort, which could offset this habitat loss. Channel margin enhancement
28 (CM6) and riparian natural community restoration (CM7) will also consider the potential for
29 creating habitat for Delta mudwort; creation of suitable habitat under these measures could also
30 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP
31 predicts that natural expansion of populations into the restored habitat would take place and result
32 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation
33 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that
34 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

35 Mason's lilaepsis could lose 62 acres of modeled habitat (1.0%), including all or part of 23
36 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
37 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
38 colonization by Mason's lilaepsis, which could offset this habitat loss. Channel margin enhancement
39 (CM6) and riparian natural community restoration (CM7) will also consider the potential for
40 creating habitat for Mason's lilaepsis; creation of suitable habitat under these measures could also
41 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP
42 predicts that natural expansion of populations into the restored habitat would take place and result
43 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation
44 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that
45 no net loss of occurrences has been achieved (Monitoring Action CM11-21, associated with CM11).

1 Delta tule pea could lose 5 acres of modeled habitat (0.07%), including all or part of 26 occurrences.
2 The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives
3 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by
4 Delta tule pea, which could offset this habitat loss. Channel margin enhancement (CM6) and riparian
5 natural community restoration (CM7) will also consider the potential for creating habitat for Delta
6 tule pea; creation of suitable habitat under these measures could also help offset this habitat loss.
7 Although active restoration of this species is not proposed, the BDCP predicts that natural expansion
8 of populations into the restored habitat would take place and result in no net loss of occurrences
9 (Objective DTP/SMA1.1, associated with CM11). Post-implementation monitoring of affected
10 occurrences and occurrences in reserve lands would be done to confirm that no net loss of
11 occurrences has been achieved (Monitoring Action CM11-22, associated with CM11).

12 Suisun Marsh aster could lose 5 acres of modeled habitat (0.07%), including all or part of 29
13 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
14 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
15 colonization by Suisun Marsh aster, which could offset this habitat loss. Channel margin
16 enhancement (CM6) and riparian natural community restoration (CM7) will also consider the
17 potential for creating habitat for Suisun marsh aster; creation of suitable habitat under these
18 measures could also help offset this habitat loss. Although active restoration of this species is not
19 proposed, the BDCP predicts that natural expansion of populations into the restored habitat would
20 occur and result in no net loss of occurrences (Objective DTP/SMA1.1, associated with CM11). Post-
21 implementation monitoring of affected occurrences and occurrences in reserve lands would be done
22 to confirm that no net loss of occurrences has been achieved (Monitoring Action CM11-22,
23 associated with CM11).

24 All four of these species (Delta mudwort, Mason's lilaeopsis, Delta tule pea, and Suisun Marsh aster)
25 are widespread in the study area with many occurrences. Habitat modification and loss are the
26 primary stressors that are responsible for their decline and that currently limit their distribution
27 and abundance. Therefore, restoring large areas of habitat and improving habitat functions for these
28 species would provide a reasonable expectation that the distribution and abundance of these
29 species would also improve. Because a relatively small amount of modeled habitat would be
30 adversely affected (less than 1% of the total), it is likely that the initial adverse effects of covered
31 activities on these species would be offset and that the overall effect of Alternative 4 on these
32 species would not be adverse.

33 Side-flowering skullcap could lose 17 acres of modeled habitat (0.68%), including all or part of one
34 occurrence. One occurrence would be avoided through implementation of AMM30. The location of a
35 second potentially affected occurrence, which was last observed in 1892, is not known precisely.
36 Under AMM11, this occurrence would be surveyed for, and because this is a tidal freshwater
37 wetland species, avoidance of the habitat during project construction would be highly likely. The
38 BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives TBEWNC1.1
39 and TFEWNC1.1) would increase the extent of habitat available for colonization by side-flowering
40 skullcap, which could offset this habitat loss. Channel margin enhancement (CM6) and riparian
41 natural community restoration (CM7) will also consider the potential for creating habitat for side-
42 flowering skullcap; creation of suitable habitat under these measures could also help offset this
43 habitat loss. No active restoration of this species is proposed, and no post-implementation
44 monitoring of affected occurrences and occurrences in reserve lands would be done. Because
45 impacts on occurrences of side-flowering skullcap would be avoided, and because loss of modeled

1 habitat for the species would be offset through restoration, the overall effect of Alternative 4 on this
2 species would not be adverse.

3 Soft bird's-beak could lose 73 acres of modeled habitat (6%), including all or part of seven
4 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
5 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
6 colonization by soft bird's-beak, which could offset this habitat loss. Tidal restoration in the Hill
7 Slough Ecological Reserve would be done to increase potential habitat there for soft bird's-beak
8 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and
9 manage livestock in tidal marsh habitat under CM11 could enhance habitat for soft bird's-beak.
10 Although no active restoration of this species is proposed, post-implementation monitoring of soft
11 bird's-beak occurrences in proximity to tidal restoration sites would be done to confirm that
12 occurrences are stable or increasing (Monitoring Action CM11–CM22, associated with CM11). Soft
13 bird's-beak has a restricted distribution in the study area with highly localized occurrences, and
14 habitat modification is the primary factor responsible for the species' decline and limiting the
15 species' distribution and abundance. Improving habitat functions for this species would provide a
16 reasonable expectation that the distribution and abundance of soft bird's-beak would also improve.
17 Although a substantial amount of modeled habitat could be affected, the primary habitat for soft
18 bird's-beak is high tidal brackish marsh, and the affected habitat is low tidal brackish marsh.
19 Therefore, it is likely that the overall effect of Alternative 4 on this species would not be adverse.

20 Suisun thistle could lose 73 acres of modeled habitat (6%), although no occurrences would be
21 affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives
22 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by
23 Suisun thistle, which could offset this habitat loss. Tidal restoration in the Hill Slough Ecological
24 Reserve and at Rush Ranch would be done to increase potential habitat there for Suisun thistle
25 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and
26 manage livestock in tidal marsh habitat under CM11 could enhance habitat for Suisun thistle. In
27 addition, two new occurrences of Suisun thistle would be established in CZ 11 (Objective
28 SBB/SuT1.4, associated with CM11). Post-implementation monitoring of Suisun thistle occurrences
29 in proximity to tidal restoration sites would be done to confirm that occurrences are stable or
30 increasing (Monitoring Action CM11-22, associated with CM11). Habitat restoration, enhancement
31 of habitat functions, and establishment of new occurrences would offset any potential loss of
32 modeled habitat for Suisun Marsh thistle.

33 Three occurrences of Bolander's water-hemlock could be affected. Although the extent of potential
34 habitat affected was not determined, it would be comparable to that for Delta tule pea and Suisun
35 Marsh aster (5 acres). Tidal habitat restoration activities proposed under CM4 (Objectives
36 TBEWNC1.1 and TFEWNC1.1) could increase the extent of habitat available for colonization by
37 Bolander's water-hemlock, which could offset this habitat loss. Because only a few scattered
38 occurrences of Bolander's water-hemlock are present in the study area, there is no reasonable
39 expectation that habitat restoration without active species-specific restoration activities would
40 result in the establishment of new occurrences to offset the losses. Also, because Bolander's water-
41 hemlock is a noncovered species, the species protections and occurrence monitoring afforded to
42 covered species under the BDCP would not apply to this species. Therefore, the effects of Alternative
43 4 on Bolander's water hemlock could be adverse.

44 **NEPA Effects:** The loss of modeled and occupied habitat for special-status tidal wetland plants
45 would be offset through tidal habitat restoration (CM4). Therefore, implementation of Alternative 4

would result in no adverse effects on seven of eight special-status tidal habitat species in the study area. Alternative 4 would result in a reduction in the range and numbers of Bolander’s water-hemlock, which would be an adverse effect. Adverse effects on Bolander’s water-hemlock could be avoided or offset through implementation of Mitigation Measure BIO-170.

CEQA Conclusion: Because loss of occurrences and modeled habitat for covered tidal habitat plant species would be offset through habitat restoration, impacts on covered tidal wetland plants as a result of implementing Alternative 4 would not be significant. However, the loss of Bolander’s water-hemlock populations in CZ 11 would result in a reduction in the range and numbers of this species and would be a significant impact. Implementation of Mitigation Measure BIO-170 would reduce this impact to a less-than-significant level through preconstruction surveys and implementing measures to avoid, minimize, or compensate for impacts to noncovered special-status plant species.

Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered Special-Status Plant Species

Please see Mitigation Measure BIO-170 under Impact BIO-170.

Inland Dune Species

Five special-status plant species occur in inland dune habitat in the study area. None of the species is covered under the BDCP, and no habitat models were prepared for inland dune habitat. Table 12-4-67 summarizes the acreage of inland dune habitat in the study area and the number of occurrences for each special-status inland dune species in the study area.

Table 12-4-67. Summary of Impacts on Inland Dune Plants under Alternative 4

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Inland Dunes	19	0	-	-	None
Noncovered Species					
Hoover’s cryptantha	-	-	1	0	None
Antioch Dunes buckwheat	-	-	1	0	None
Mt. Diablo buckwheat	-	-	1	0	None
Contra Costa wallflower	-	-	3	0	None
Antioch Dunes evening-primrose	-	-	9	0	None

Impact BIO-174: Effects on Habitat and Populations of Inland Dune Plants

Alternative 4 would have no adverse effects on inland dune species (Table 12-4-67). No construction activities or habitat restoration would take place where the species occur. No specific actions to benefit inland dune species are proposed.

NEPA Effects: Implementation of the BDCP under Alternative 4 would not affect special-status inland dune species.

1 **CEQA Conclusion:** Because the BDCP would not affect inland dune habitat, implementation of
2 Alternative 4 would have no impacts on inland dune species. No mitigation is required.

3 **Nontidal Wetland Species**

4 No covered plant species occur in nontidal wetlands in the study area; however, six noncovered
5 special-status plant species occur in nontidal wetlands in the study area. Table 12-4-68 summarizes
6 the acreage of nontidal wetland habitat in the study area and the number of occurrences of each
7 special-status nontidal wetland species in the study area.

8 **Table 12-4-68. Summary of Impacts on Nontidal Wetland Plant Species under Alternative 4**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Nontidal freshwater aquatic	5,567	357	-	-	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, and floodplain restoration
Nontidal freshwater perennial emergent wetland	1,509	140	-	-	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass Fisheries enhancements, and floodplain restoration
Noncovered Species					
Watershield	-	-	3	1	Loss of habitat from construction of water conveyance facilities
Bristly sedge	-	-	18	3	Loss of habitat from construction of water conveyance facilities
Woolly rose-mallow ^a	-	-	121	15	Loss of habitat from construction of water conveyance facilities and tidal habitat restoration
Eel grass pondweed	-	-	1	0	None
Sanford's arrowhead	-	-	23	2	Loss of habitat from construction of water conveyance facilities and tidal habitat restoration
Marsh skullcap ^a	-	-	1	0	None

^a Also occurs in valley/foothill riparian habitat.

9

1 **Impact BIO-175: Effects on Habitat and Populations of Nontidal Wetland Plants**

2 Under Alternative 4, known occurrences watershield, bristly sedge, woolly rose-mallow, and
3 Sanford's arrowhead would be within the proposed footprint for the water conveyance facilities or
4 within the hypothetical footprint for restoration activities and would be adversely affected.
5 Alternative 4 would have no adverse effects on eel-grass pondweed or marsh skullcap.

6 The individual effects of each relevant conservation measure are addressed below. A summary
7 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
8 conservation measure discussions.

- 9 • *CM1 Water Facilities and Operation*: Construction of the Alternative 4 water conveyance facilities
10 would adversely affect four noncovered special-status plant species occurring in nontidal
11 wetlands. One of three watershield occurrences in CZ 5 on Bouldin Island could be affected by
12 construction of the water conveyance facilities. This is a historical occurrence that has not been
13 observed since 1893, and it may be extirpated (California Department of Fish and Wildlife
14 2013). Three occurrences of bristly sedge in CZ 4 and CZ 5, including approximately 1.54 acres
15 of occupied habitat, would be affected by construction of the water conveyance facilities. Fifteen
16 occurrences of woolly rose-mallow would be affected. Six occurrences in CZ 4 could be removed
17 during construction of the intake facilities and disposal of reusable tunnel material, and four
18 occurrences in CZ 6 and four occurrences in CZ 8 would be affected by construction of other
19 facilities and by geotechnical investigations. Construction of the water conveyance facilities
20 would remove occupied habitat at one occurrence of Sanford's arrowhead in CZ 4. Under
21 Alternative 4, construction and operation of the water conveyance facilities could affect 77 acres
22 of nontidal wetlands, which could have adverse effects on undiscovered occurrences of the six
23 non-covered special-status nontidal wetland plant species.
- 24 • *CM2 Yolo Bypass Fisheries Enhancement*: No known occurrences of special-status nontidal
25 wetland plants are present in the hypothetical footprint for construction or operation of the
26 Yolo Bypass fisheries enhancements. Therefore, construction and operation of the Yolo Bypass
27 Fisheries enhancements would not affect special-status nontidal marsh species.
- 28 • *CM3 Natural Communities Protection and Restoration*: No specific natural communities
29 protection is proposed for nontidal wetlands under the BDCP. Therefore, no occurrences of
30 special-status nontidal species are proposed for protection.
- 31 • *CM4 Tidal Natural Communities Restoration*: One known occurrence of Sanford's arrowhead is
32 present within areas that could be affected by tidal habitat restoration in CZ 2. One known
33 occurrence of woolly rose-mallow is present within areas that could be affected by tidal habitat
34 restoration in CZ 7. No other known occurrences of special-status nontidal wetland species are
35 present within areas proposed for tidal habitat restoration. Therefore, tidal habitat restoration
36 could have adverse effects on two special-status nontidal wetland species.
- 37 • *CM5 Seasonally Inundated Floodplain Restoration*: No known occurrences of special-status
38 nontidal wetland species are present within areas proposed for floodplain restoration.
39 Therefore, floodplain restoration and construction of new floodplain levees would have no
40 impacts on special-status nontidal wetland species.
- 41 • *CM6 Channel Margin Enhancement*: No known occurrences of special-status nontidal wetland
42 species are present within areas proposed for channel margin habitat enhancement. Therefore,
43 channel margin habitat enhancement would have no impacts on known occurrences of special-
44 status nontidal wetland species.

- 1 ● *CM7 Riparian Natural Community Restoration*: No known occurrences of special-status nontidal
2 wetland species are present within areas proposed for riparian habitat restoration. Therefore,
3 riparian habitat restoration would have no impacts on known occurrences of special-status
4 nontidal wetland species.
- 5 ● *CM8 Grassland Natural Community Restoration*: No known occurrences of special-status nontidal
6 wetland species are present within areas proposed for grassland communities restoration.
7 Therefore, grassland communities restoration would have no impacts on special-status nontidal
8 wetland species.
- 9 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No known occurrences of
10 special-status nontidal wetland species are present within areas proposed for vernal pool
11 complex restoration. Therefore, vernal pool complex restoration would have no impacts on
12 special-status nontidal wetland species.
- 13 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
14 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid existing
15 nontidal marsh and would have no adverse effects on special-status nontidal wetland species.
16 The BDCP may benefit nontidal wetland species by creating 400 acres of nontidal freshwater
17 marsh, including components of nontidal perennial aquatic and nontidal freshwater perennial
18 emergent wetland communities, and by maintaining and enhancing the habitat functions of
19 protected and created nontidal wetland habitats for covered and other native species. However,
20 no specific actions to benefit noncovered species are proposed.

21 Under Alternative 4, 1,500 acres of nontidal marsh would be restored (Objective NFEW/NPANC1.1,
22 addressed under CM10). However, these wetlands would be restored primarily as habitat for giant
23 garter snake. These habitat restoration activities would be unlikely to expand the amount of habitat
24 available to watershield, bristly sedge, woolly rose-mallow, and Sanford's arrowhead, potential loss
25 of habitat or occurrences resulting from covered activities would not be compensated for. Moreover,
26 because special-status nontidal wetland plant species are not covered under the BDCP, the species
27 protections afforded to covered species under the AMMs do not apply to these species, and the
28 effects of Alternative 4 on these species would be adverse. Implementation of Mitigation Measure
29 BIO-170, *Avoid, Minimize, or Compensate for Impacts on Noncovered Special-Status Plant Species*,
30 would reduce these effects.

31 **NEPA Effects:** Implementation of the BDCP under Alternative 4 could result in a reduction in the
32 range and numbers of watershield, bristly sedge, woolly rose-mallow, and Sanford's arrowhead, four
33 noncovered nontidal wetland species, which would be an adverse effect. Adverse effects on these
34 species could be avoided or offset through implementation of Mitigation Measure BIO-170.

35 **CEQA Conclusion:** Under Alternative 4, construction of the water conveyance facilities could result
36 in a reduction in the range and numbers of watershield, bristly sedge, woolly rose-mallow, and
37 Sanford's arrowhead. Tidal habitat restoration could result in a reduction in the range and numbers
38 of woolly rose-mallow and Sanford's arrowhead. These impacts would be significant.
39 Implementation of Mitigation Measure BIO-170, which requires avoidance, minimization and
40 compensation actions for impacts to noncovered species, would reduce these impacts to a less-than-
41 significant level.

1 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**
2 **Special-Status Plant Species**

3 Please see Mitigation Measure BIO-170 under Impact BIO-170.

4 **General Terrestrial Biology**

5 **Wetlands and Other Waters of the United States**

6 Alternative 4 actions would both permanently and temporarily remove or convert wetlands and
7 open water that are regulated by USACE under Section 404 of the CWA. The Section 404 regulations
8 and relevant information regarding mitigation of impacts on wetlands and waters of the United
9 States are described in Section 12.2.1.1. The following two impacts address the project-level effects
10 of CM1 on these potential wetlands and waters, and the programmatic-level effects of other relevant
11 conservation actions (CM2–CM10). CM11–CM21 would not directly result in loss or conversion of
12 wetlands or other waters of the U.S. The methods used to conduct these analyses are described in
13 Section 12.3.2.4, *Methods Used to Assess Wetlands and Other Waters of the United States*. The waters
14 of the United States data used for this analysis is based on a verified wetland delineation from
15 USACE that was completed in early 2015. These waters of the United States were mapped at finer
16 scale than that which was done for the natural community mapping for the BDCP; therefore, the
17 acreages of these two datasets differ. The waters of the United States mapping identified numerous
18 agricultural ditches and seasonal wetlands occurring within and associated with cultivated lands,
19 which explains the majority of the difference.

20 **Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and**
21 **Other Waters of the United States**

22 Alternative 4 proposes the construction, maintenance, and operation of water conveyance facilities
23 within, or requiring the unavoidable fill of, waters of the United States. The estimated fill of
24 jurisdictional waters associated with this alternative is described in Table 12-4-69. Based on the
25 methodology used to conduct this analysis, the losses would occur at intake, tunnel, pipeline, canal,
26 and RTM and borrow/spoil storage sites, transmission corridors, and multiple temporary work
27 areas associated with the construction activity. The permanent wetland or other waters of the
28 United States loss would occur at various locations along the modified pipeline/tunnel alignment.
29 The majority of the loss would occur due to the expansion of Clifton Court Forebay, new
30 transmission lines, construction of Alternative 4's three intake structures along the eastern bank of
31 the Sacramento River between Clarksburg and Courtland in the north Delta, and at the RTM storage
32 sites associated with tunnel construction at various locations, including sites between Lambert Road
33 and Twin Cities Road, on Bouldin Island, and on Byron Tract, adjacent to Clifton Court Forebay.
34 Through implementation of an environmental commitment to reuse RTM or dispose of it at
35 appropriate facilities, as described in Appendix 3B, *Environmental Commitments, AMMs and CMs*, it is
36 anticipated that the material would be removed from these areas and applied, as appropriate, as
37 bulking material for levee maintenance or as fill material for habitat restoration projects, or would
38 be put to other beneficial means of reuse identified for the material.

39 The temporary effects on wetlands and waters of the United States would also occur mainly at the
40 three intake construction sites along the eastern bank of the Sacramento River, and at barge
41 unloading facilities in the San Joaquin River, Snodgrass Slough, Potato Slough, Connection Slough,

1 Old River, and West Canal. An additional temporary effect would result from dredging of Clifton
2 Court Forebay.

3 **Table 12-4-69. Estimated Fill of Waters of the United States Associated with the Construction of**
4 **Water Conveyance Facilities under Alternative 4 (acres)**

Habitat Type	Permanent Impact	Temporary Impacts Treated as Permanent ^a	Temporary Impact ^b	Total Impact ^c
Agricultural Ditch	42.2	13.2	0	55.4
Alkaline Wetland	10.4	0.1	0	10.5
Clifton Court Forebay	257.9	0	1,930.6	257.9
Conveyance Channel	7.1	2.9	0	10.0
Depression	29.3	6.2	0	35.5
Emergent Wetland	56.8	14.7	0	71.5
Forest	7.2	5.2	0	12.4
Lake	23.2	0	0	23.2
Scrub-Shrub	12.7	3.7	0	16.3
Seasonal Wetland	114.5	10.0	0	124.5
Tidal Channel	15.3	65.6	0	80.8
Vernal Pool	0.3	0	0	0.3
Total	577	121	1,931	698

^a Temporary impacts treated as permanent are temporary impacts expected to last over one year. These impact sites will eventually be restored to pre-project conditions; however, due to the duration of effect, compensatory mitigation will be included for these areas.

^b Temporary impacts are due to dredging Clifton Court Forebay

^c Total does not include temporary impacts to Clifton Court Forebay because these would just be temporary disturbance to open water, which typically do not require compensatory mitigation.

5
6 The majority of the impacts on wetlands and waters of U.S. are to wetlands found within cultivated
7 lands (mostly agricultural ditches and seasonal wetlands) and waters associated with Clifton Court
8 Forebay. The impacted seasonal wetlands mapped within the Conveyance Planning Area, as
9 described in Section 12.3.2.4, *Methods Used to Assess Wetlands and Other Waters of the United States*,
10 all occur in the central Delta within plowed agricultural fields and would be mostly affected by the
11 RTM storage sites and transmission line construction. The effects on Clifton Court Forebay would
12 primarily result from the establishment of new embankments around and across the existing
13 forebay. The forebay would be expanded to the south by an additional 450 acres of storage space
14 resulting in a net gain of open water in the forebay.

15 Unavoidable impacts on waters of the United States would be offset such that the loss of acreage and
16 functions due to construction activities are fully compensated. Wetland functions are defined as a
17 process or series of processes that take place within a wetland. These include the storage of water,
18 transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have
19 value for the wetland itself, for surrounding ecosystems, and for people. Functions can be grouped
20 broadly as habitat, hydrologic/hydraulic, or water quality. Not all wetlands perform all functions nor
21 do they perform all functions equally well. The location and size of a wetland may determine what
22 functions it will perform. For example, the geographic location may determine its habitat functions,
23 and the location of a wetland within a watershed may determine its hydrologic/hydraulic or water-
24 quality functions. Many factors determine how well a wetland will perform these functions: climatic
25 conditions, quantity and quality of water entering the wetland, and disturbances or alteration within

1 the wetland or the surrounding ecosystem. Wetland disturbances may be the result of natural
2 conditions, such as an extended drought, or human activities, such as land clearing, dredging, or the
3 introduction of nonnative species. Wetlands are among the most productive habitats in the world,
4 providing food, water, and shelter for fish, shellfish, birds, and mammals, and serving as a breeding
5 ground and nursery for numerous species. Many endangered plant and animal species are
6 dependent on wetland habitats for their survival. Hydrologic and hydraulic functions are those
7 related to the quantity of water that enters, is stored in, or leaves a wetland. These functions include
8 such factors as the reduction of flow velocity, the role of wetlands as ground-water recharge or
9 discharge areas, and the influence of wetlands on atmospheric processes. Water-quality functions
10 include the trapping of sediment, pollution control, and the biochemical processes that take place as
11 water enters, is stored in, or leaves a wetland.

12 The functions of the waters of the United States that would be temporarily or permanently impacted
13 by this alternative vary greatly depending primarily on existing land uses and historical levels of
14 disturbance. Generally, agricultural ditches and conveyance channels, which are regularly
15 maintained and often devoid of vegetation, support only minimal hydraulic function (water
16 conveyance), with virtually no water quality or habitat function. With respect to Clifton Court
17 Forebay, the facility is regularly maintained, but supports some hydrologic, hydraulic, and water
18 quality functions (e.g., reduction of velocity, groundwater recharge, and trapping of sediment). Tidal
19 channels affected by this alternative support functions in all three categories, but the level at which
20 these functions perform vary depending on setting, size, and level of disturbance. The alkaline
21 wetlands and vernal pools exist in non-native grasslands and have been subjected to some
22 disturbance due to past land uses. Although these features likely support habitat, water quality, and
23 hydrologic/hydraulic functions, the capacity of these features to perform such functions vary
24 depending on the overall ecological setting and level of disturbance. Functions associated with
25 emergent wetland, forest, and scrub-shrub, depend primarily on the location of these habitat types.
26 Where they exist as in-stream (in-channel islands) or as the thick band of habitat adjacent to a
27 waterway, these features are expected to function at a high level. However, where these habitats
28 exist as thin bands, or where they are situated in agricultural fields, their habitat functions will be
29 considerably lower. All of the wetlands classified as seasonal wetlands occur in agricultural fields. As
30 such, their habitat functions have been greatly compromised, but they retain some water quality and
31 hydrologic/hydraulic function. Like seasonal wetlands, most depressions occur within agricultural
32 areas; however the depressions may support wetland vegetation at their edges. The areas mapped
33 as lake are the dredged borrow ponds created during the construction of Interstate 5. Although
34 relatively small, each lake is likely performing functions from all three categories.

35 A functional assessment of wetlands proposed for fill will be conducted during the development of
36 the Conceptual Mitigation Plan as part of the Clean Water Act permitting process. The results of this
37 assessment will be compared with the expected functions at the proposed mitigation site(s) such
38 that it can be confirmed that the compensatory mitigation will in fact accomplish full functional
39 replacement of impacted wetlands. All impacted wetlands would be replaced with fully functional
40 compensatory wetland habitat demonstrating high levels of habitat, water quality, and
41 hydrologic/hydraulic function. Because many impacted wetlands are significantly less than high
42 function, the compensatory mitigation would result in a net increase in wetland function.

43 Alternative 4 was designed to avoid waters of the United States to the maximum extent practicable.
44 Each of the conveyance components has been located in upland areas where it was feasible to do so.
45 Once construction begins, specific measures will be implemented, as described in the AMMs set out
46 in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to further avoid and minimize effects

1 on waters of the United States as well as on special-status species. The AMMs would be implemented
2 at all phases of a project, from siting through design, construction, and on to operations and
3 maintenance. The AMMs that pertain specifically to waters of the U.S. are *AMM1 Worker Awareness*
4 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater*
5 *Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention,*
6 *Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations*
7 *Plan*, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool*
8 *Crustaceans*, *AMM30 Transmission Line Design and Alignment Guidelines*, *AMM34 Construction Site*
9 *Security*, and *AMM36 Notification of Activities in Waterways*.

10 The implementation of measures to avoid and minimize impacts on habitat for aquatic species and
11 species which utilize aquatic habitats, such as California tiger salamander, giant garter snake,
12 California red legged frog, western pond turtle, riparian woodrat, and riparian brush rabbit, would
13 also result in further avoidance and minimization of effects to waters of the United States.

14 Aside from wetland habitats that would be created as a result of implementing CM4–CM10, some of
15 which could serve the dual purpose of offsetting effects to species and mitigating impacts on waters
16 of the U.S., more specific mitigation is required to ensure that there is no net loss of wetland
17 functions and values as a result of implementing Alternative 4 pursuant to USACE's and EPA's
18 Mitigation Rule (see Section 12.2.1.1). Mitigation Measure BIO-176, *Compensatory Mitigation for Fill*
19 *of Waters of the United States*, would be available to address adverse impacts on waters of the United
20 States.

21 **NEPA Effects:** The permanent and temporary loss of these jurisdictional wetlands and waters of the
22 United States as a result of constructing Alternative 4 water conveyance facilities would be a
23 substantial effect if not compensated by wetland protection and/or restoration. This loss would
24 represent a removal of federally protected wetlands as defined by Section 404 of the CWA. Project
25 proponents under Alternative 4 would implement AMM1–AMM7, AMM10, AMM12, AMM30,
26 AMM34, and AMM36, which would avoid and minimize fill of wetlands and waters and any indirect
27 effects on wetlands and waters. However, specific mitigation would be required to ensure that
28 Alternative 4 does not result in a loss of functions and values of waters of the United States and thus
29 that the affect is not adverse. Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters*
30 *of the United States*, would be available to reduce these effects such that they are not adverse.

31 **CEQA Conclusion:** The permanent and temporary loss of these jurisdictional wetlands and waters of
32 the United States as a result of constructing Alternative 4 water conveyance facilities would be a
33 significant impact. Specific mitigation would be required to ensure that Alternative 4 does not result
34 in a loss of functions and values of waters of the United States. Mitigation Measure BIO-176,
35 *Compensatory Mitigation for Fill of Waters of the United States*, would be available to reduce the
36 impact to a less-than-significant level. Alternative 4 does propose to restore up to 76,721 acres of
37 wetland natural communities under the Plan, which would include 65,000 acres of tidal marsh
38 restoration (CM4), 10,000 acres of seasonally inundated floodplain restoration (CM5), 21 acres of
39 vernal pool/alkali seasonal wetlands (CM9; 67 acres of vernal pool complex and 72 acres of alkali
40 seasonal wetland complex assuming a wetland density of 15%), and 1,700 acres of nontidal marsh
41 restoration (CM10). In addition, Alternative 4 would restore 5,000 acres of riparian habitat (CM7),
42 some portion of which may also qualify as forested or scrub-shrub wetland. In addition, 20 miles of
43 levees will have channel margin enhancement conducted on them (CM6), which would include
44 improving channel geometry and restoring riparian, marsh, and mudflat habitats on the water side
45 of levees.

1 The success in implementing these conservation measures would be assured through effectiveness
2 monitoring, which includes success criteria, and adaptive management as outlined in the *Adaptive*
3 *Management and Monitoring* sections of the BDCP for tidal marsh restoration (BDCP Section 3.4.4.4),
4 seasonal floodplain restoration (BDCP Section 3.4.5.4), channel margin enhancement (BDCP Section
5 3.4.6.4), valley/foothill riparian restoration (BDCP Section 3.4.7.4), vernal pool and alkali seasonal
6 wetland complex restoration (BDCP Section 3.4.9.4), and nontidal marsh restoration (BDCP Section
7 3.4.10.3). All restored areas will be secured in fee-title or through conservation easements.

8 Alternative 4 would also result in the protection and management of the following natural
9 communities that contain wetlands: 750 acres of valley/foothill riparian, 600 acres of vernal pool
10 complex, 150 acres of alkali seasonal wetland complex, 8,100 acres of managed wetlands, and 50
11 acres of nontidal marsh. In addition, 8,000 acres of grasslands and 51,625 acres of cultivated lands
12 will be protected and managed, which would likely include areas of seasonal wetlands, ponds, and
13 agricultural ditches.

14 Project proponents under Alternative 4 would also implement AMM1–AMM7, AMM10, AMM12,
15 AMM30, AMM34, and AMM36, which would avoid and minimize fill of waters of the United States
16 and any indirect effects on wetlands and waters. As stated above, specific mitigation would be
17 required to ensure that Alternative 4 does not result in a loss of functions and values of waters of the
18 United States. Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters of the United*
19 *States*, would be available to reduce the impact to a less-than-significant level.

20 **Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United** 21 **States**

22 All mitigation proposed as compensatory mitigation would be subject to specific success criteria,
23 success monitoring, long-term preservation, and long-term maintenance and monitoring
24 pursuant to the requirements of the Mitigation Rule. All compensatory mitigation shall fully
25 replace lost function through the mechanisms discussed below which will result in restoration
26 and/or creation of habitat with at least as much function and value as those of the impacted
27 habitat. In some cases, the mitigation habitat will afford significantly higher function and value
28 than that of impacted habitat.

29 Compensation ratios are driven by type, condition, and location of replacement habitat as
30 compared to type, condition and location of impacted habitat. Compensatory mitigation usually
31 includes restoration, creation, or rehabilitation of aquatic habitat. The USACE does not typically
32 accept preservation as the only form of mitigation; use of preservation as mitigation typically
33 requires a very high ratio of replacement to impact. It is anticipated that ratios will be a
34 minimum of 1:1, depending on the factors listed above.

35 Compensatory mitigation will consist of restoration, creation, and/or rehabilitation of aquatic
36 habitat. Typically, impacted habitat will be replaced in-kind, although impacts on some habitat
37 types such as agricultural ditches, conveyance channels, and Clifton Court Forebay, will be
38 mitigated out-of-kind with higher functioning habitat types such as riparian wetland, marsh,
39 and/or seasonal wetland. Compensatory mitigation shall be accomplished by one, or a
40 combination of the following methods:

- 41 • Purchase credits for restored/created/rehabilitated habitat at an approved wetland
42 mitigation bank;

- 1 • On-site (adjacent to the project footprint) restoration or rehabilitation of wetlands
2 converted to uplands due to past land use activities (such as agriculture) or functionally
3 degraded by such activities;
- 4 • On-site (adjacent to the project footprint) creation of aquatic habitat;
- 5 • Off-site (within the Delta) restoration or rehabilitation of wetlands converted to uplands
6 due to past land use activities (such as agriculture) or functionally degraded by such
7 activities;
- 8 • Off-site (within the Delta) creation of aquatic habitat; and/or
- 9 • Payment into the Corps' Fee-in-Lieu program.

10 *Purchase of Credits or Payment into Fee-in-Lieu Program*

11 It is envisioned that purchase of bank credits and/or payment into a fee-in-lieu program will be
12 utilized for habitat types that would be difficult to restore or create within the Delta. Examples
13 are vernal pool habitat, which requires an intact hardpan or other impervious layer and very
14 specific soil types, and alkali seasonal wetland, which requires a specific set of chemical soil
15 parameters. It is anticipated that only a small amount of compensatory mitigation will fall into
16 these categories.

17 *On-Site Restoration, Rehabilitation and/or Creation*

18 Much of the Delta consists of degraded or converted habitat that is more or less functioning as
19 upland. Opportunities will be sought where on-site restoration, rehabilitation, and/or creation
20 could occur immediately adjacent to the project footprint. It is anticipated that some of the
21 compensatory mitigation will fall into this category.

22 *Off-Site Restoration, Rehabilitation and/or Creation*

23 There exists, within the immediate vicinity of the project area, Delta land which has been subject
24 to agricultural practices or other land uses which have degraded or even converted wetlands
25 that existed historically. Sites within the Delta will be evaluated for their restoration,
26 rehabilitation, and/or creation potential. It is anticipated that most of the compensatory
27 mitigation will fall into this category.

28 Compensatory mitigation will result in no net loss of acreage of waters of the United States and
29 will accomplish full functional replacement of impacted wetlands. All impacted wetlands will be
30 replaced with fully functioning wetland habitat demonstrating high levels of habitat, water
31 quality, and hydrologic/hydraulic function. Since many impacted wetlands are likely to function
32 at significantly less than high levels, the compensatory mitigation will result in a significant net
33 increase in wetland function.

34 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on**
35 **Wetlands and Other Waters of the United States**

36 The habitat protection and restoration activities associated with Alternative 4's other conservation
37 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and waters of
38 the United States in the study area over the course of BDCP conservation action implementation.
39 Because these conservation measures have not been defined to the level of site-specific footprints, it
40 is not possible to delineate and quantify these effects in detail. Several of the conservation measures

1 (CM2, CM4, and CM5) have been described with theoretical footprints for purposes of the effects
 2 analysis contained in BDCP Chapter 5, *Effects Analysis*,

3 Because the wetland delineation was only conducted within the Conveyance Planning Area and not
 4 the remainder of the Plan Area, the effects on potential wetlands and waters of the United States
 5 from CM2-CM10 were analyzed by looking at effects on wetland natural communities mapped
 6 within the theoretical footprints for CM2, CM4, and CM5 by assuming that 100% of the
 7 predominantly wetland natural communities listed in Table 12E-37 of Appendix 12E, *Detailed*
 8 *Accounting of Direct Effects of Alternatives on Natural Communities*, and that 10% of all of the non-
 9 wetland natural communities listed in that table would qualify as wetlands or other waters of the
 10 United States under the CWA. Based on this approach, approximately 19,850 acres of potentially
 11 jurisdictional wetlands and waters could be affected by CM2-CM10. The majority of these impacts
 12 are attributable to the conversion of 13,746 acres of managed wetland to tidal marsh under CM4,
 13 which would likely result in an improvement of wetland function in the Plan Area.

14 **NEPA Effects:** The conversion of existing wetland natural communities to other types of wetland
 15 natural communities through implementation of CM2–CM10 for Alternative 4 would be
 16 approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open
 17 water through implementation of CM4. Although the increase in wetland acreage and wetland
 18 functions from these restoration actions could in part offset the effects on waters of the United
 19 States in these areas, implementation of Mitigation Measure BIO-176, *Compensatory Mitigation for*
 20 *Fill of Waters of the United States*, would be required to ensure that these effects are not adverse.

21 **CEQA Conclusion:** The conversion of existing wetland natural communities to other types of
 22 wetland natural communities through implementation of CM2–CM10 for Alternative 4 would be
 23 approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open
 24 water through implementation of CM4. In total, up to 76,721 acres of wetland natural communities
 25 would be restored under Alternative 4. Although the increase in wetland acreage and wetland
 26 functions from this restoration could in part offset the effects on waters of the United States in these
 27 areas, implementation of Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters of*
 28 *the United States*, would be required to ensure that the impacts are reduced to a less-than-significant
 29 level.

30 **Shorebirds and Waterfowl**

31 Managed wetlands, tidal natural communities, and cultivated lands (including grain and hay crops,
 32 pasture, field crops, rice, and idle lands) provide freshwater nesting, feeding, and resting habitat for
 33 a large number of Pacific flyway waterfowl and shorebirds. The primary effects of concern for
 34 shorebirds and waterfowl are related to the conversion of managed wetland and cultivated lands to
 35 tidal marsh associated with habitat restoration. Ducks Unlimited (2013) conducted an analysis to
 36 determine the effects of BDCP conservation measures on waterfowl, as well as to determine whether
 37 BDCP actions would impede attainment of the goals established by the Central Valley Joint Venture
 38 (CVJV) Implementation Plan for the Delta, Yolo, and Suisun Marsh drainage basins. The CVJV efforts
 39 are guided by its 2006 Implementation Plan, which is founded on the principles of strategic habitat
 40 conservation (Central Valley Joint Venture 2006). Those principles emphasize the establishment of
 41 population abundance objectives and the use of species-habitat models to link population objectives
 42 to habitat needs. The CVJV has used species-habitat models to translate bird abundance objectives
 43 into habitat objectives, while explicitly identifying the biological assumptions that underpin these

1 models and the data used to populate them. As a result, the CVJV's biological planning provides a
 2 framework for evaluating the effects of the BDCP on waterfowl.

3 The Ducks Unlimited waterfowl analysis focused primarily on dabbling ducks. Less than 5% of all
 4 geese in the Central Valley occur in the Yolo, Delta, and Suisun Marsh drainage basins. Moreover,
 5 geese in the Central Valley rely mostly on agricultural habitats to meet their food energy needs. The
 6 BDCP's effect on agricultural habitats is limited to the Delta Basin where about 2500 acres of corn
 7 now available to geese would be converted to other habitats (Ducks Unlimited 2013: Table 5). Food
 8 supplies for geese would still be well in excess of demand even with the loss of these agricultural
 9 habitats (Central Valley Joint Venture 2006, Ducks Unlimited 2013). The duck population objectives
 10 used in the analysis were taken directly from the CVJV Plan. Dabbling duck species make up 92% of
 11 this objective, while diving duck species make up the remaining 8%. Thus, the results were mostly
 12 driven by dabbling duck needs and largely interpreted in the context of dabbling duck foraging
 13 ecology. The 55,000 acres of Tidal Natural Communities Restoration (CM4) would be expected to
 14 benefit diving ducks by providing deep water foraging habitat. Refer to the Ducks Unlimited Report
 15 (Ducks Unlimited 2013) for details of the analysis and methods with respect to the TRUMET model
 16 used to quantify effects on food biomass and food quality.

17 An analysis was conducted to determine the effects of the BDCP covered activities on wintering and
 18 breeding shorebird habitat (ICF International 2013). This analysis evaluated the relative increase
 19 and decrease in natural communities known to provide important foraging, roosting, and breeding
 20 habitat. Similar to the waterfowl analysis, the results were broken up into the three Central Valley
 21 Joint Venture Basins that overlap with the BDCP study area: Yolo, Delta, and Suisun. Natural
 22 community losses and gains were then translated into species-specific outcomes, comparing the
 23 relative habitat value of each BDCP natural community for each Central Valley shorebird species
 24 (Table 1, ICF International 2013). The shorebird species ranking system displayed in Table 1 (ICF
 25 International 2013) was modified from a table in Stralberg et al. (2011). The table was created using
 26 survey data and experts' species-specific habitat rankings. The survey data included fall, winter, and
 27 spring density data. This resulted in an overall, cross-season representation of habitat requirements.

28 **Impact BIO-178: Loss or Conversion of Habitat for Waterfowl and Shorebirds as a Result of**
 29 **Water Conveyance Facilities Construction**

30 Development of the water conveyance facilities (CM1) would result in the permanent removal of
 31 approximately 22 acres of managed wetland, 3 acres of tidal wetlands, 61 acres of nontidal
 32 wetlands, and 3,768 acres of suitable cultivated lands (including grain and hay crops, pasture, field
 33 crops, rice, and idle lands). In addition, 29 acres of managed wetland, 15 acres of tidal wetlands, 15
 34 acres of nontidal wetlands, and 1,339 acres of suitable cultivated lands would be temporarily
 35 impacted. No rice would be impacted as a result of constructing the water conveyance facilities.
 36 These losses of habitat would occur within the first 10 years of Alternative 4 implementation in the
 37 Delta Basin. The BDCP has committed to the near-term protection of 15,400 acres of non-rice
 38 cultivated lands, 200 acres of rice, and 700 acres of rice or "rice equivalent" natural communities
 39 including nontidal wetlands in the near-term. In addition, 4,100 acres of managed wetlands would
 40 be created, protected, and enhanced, 8,850 acres of freshwater tidal wetlands would be restored,
 41 and 2,000 acres of tidal brackish emergent wetland would be restored (see Table 3-4 in Chapter 3,
 42 *Description of Alternatives*).

43 Construction activities could have an adverse effect on nesting shorebirds or waterfowl if they were
 44 present in or adjacent to work areas and could result in destruction of nests or disturbance of

1 nesting and foraging behaviors. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
2 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on
3 nesting birds.

4 **NEPA Effects:** Habitat loss from construction of the Alternative 4 water conveyance facilities would
5 not result in an adverse effect on shorebirds and waterfowl because of the acres of natural
6 communities and cultivated lands that would be restored and protected in the near-term timeframe.
7 If waterfowl were present in or adjacent to work areas, construction activities could result in
8 destruction of nests or disturbance of nesting and foraging behaviors, which would represent an
9 adverse affect on nesting shorebirds and waterfowl individuals. Mitigation Measure BIO-75, *Conduct*
10 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
11 minimize adverse effects on nesting birds.

12 **CEQA Conclusion:** In the absence of other conservation actions, habitat loss from construction of the
13 Alternative 4 water conveyance facilities could represent an adverse effect on shorebirds and
14 waterfowl through habitat modification. However, with of the acres of natural communities and
15 cultivated lands that would be restored and protected in the near-term timeframe, this impact
16 would be less-than significant. If waterfowl were present in or adjacent to work areas, construction
17 activities could result in destruction of nests or disturbance of nesting and foraging behaviors, which
18 would be a significant impact. Implementation of Mitigation Measure BIO-75, *Conduct*
19 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, which would require
20 identification of nesting birds prior to disturbance and would allow for avoidance measures, would
21 reduce this impact on nesting birds to a less-than-significant level.

22 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 23 **Disturbance of Nesting Birds**

24 See Mitigation Measure BIO-75 under Impact BIO-75.

25 **Impact BIO-179: Loss or Conversion of Habitat for Wintering Waterfowl as a Result of** 26 **Implementation of Conservation Components**

27 **Suisun Marsh:** Managed seasonal wetlands in Suisun Marsh would be reduced by an estimated
28 8,818 acres as a result of implementing Alternative 4. This would represent a 25% decrease in
29 managed seasonal wetlands compared with long-term conditions without Alternative 4 (Ducks
30 Unlimited 2013, Table 5; ICF International 2013). There is considerable uncertainty about the
31 biomass and nutritional quality of waterfowl foods produced in Suisun Marsh's managed wetlands,
32 which makes it difficult to identify the amount of mitigation needed. To address this uncertainty,
33 three levels of food biomass and three levels of nutritional quality were modeled for these existing
34 habitats (Ducks Unlimited 2013, Table 7). Three mitigation scenarios were based on these energetic
35 assumptions of biomass and food quality were then run to determine a minimum acreage of
36 managed seasonal wetlands to be protected and enhanced to compensate for the loss of productivity
37 from habitat conversion to tidal wetlands.

- 38 • Scenario 1) Assume that existing managed seasonal wetlands provide low food biomass and low
39 food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh produce
40 50% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds
41 have 60% of the metabolizable energy of seeds produced outside of Suisun Marsh. Given the
42 assumption that managed seasonal wetlands in Suisun Marsh could be enhanced to provide high
43 food biomass and high food quality (equal to wetlands in the Central Valley), 5,000 acres of

1 managed wetlands protected and managed for high biomass and high food quality would
2 mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal marsh.

- 3 • Scenario 2) Assume that the managed seasonal wetlands lost provide medium food biomass and
4 medium food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh
5 produce 75% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and
6 these seeds have 80% of the metabolizable energy of seeds produced outside of Suisun Marsh.
7 Given the assumption that managed seasonal wetlands in Suisun Marsh could be enhanced to
8 provide high food biomass and high food quality (equal to wetlands in the Central Valley),
9 13,300 acres of managed wetlands protected and managed for high biomass and high food
10 quality would mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal
11 marsh.
- 12 • Scenario 3) Assume that existing managed seasonal wetlands provide low food biomass and low
13 food quality. Given the assumption that managed seasonal wetlands in Suisun Marsh could only
14 be enhanced to provide medium food biomass and medium food quality (produce 75% of the
15 seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds have 80% of
16 the metabolizable energy of seeds produced outside of Suisun Marsh), 8,800 acres of managed
17 wetlands protected and managed for medium biomass and medium food quality would mitigate
18 the conversion of 8,857 acres of managed seasonal wetland to tidal marsh.

19 The BDCP has committed to protecting and enhancing a minimum of 5,000 acres of managed
20 seasonal wetlands in Suisun Marsh to compensate for the loss of productivity from habitat
21 conversion to tidal marsh. This minimum commitment of 5,000 acres would mitigate the reduced
22 productivity from conversion of managed seasonal wetlands under the assumptions that 1) existing
23 managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food
24 to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high
25 biomass and high food quality. However, the food biomass and productivity in Suisun Marsh would
26 need to be quantified in order to determine if the 5,000 acres was sufficient to avoid an adverse
27 effect on wintering waterfowl in the Suisun Marsh, or if additional mitigation would be needed.
28 Mitigation Measure BIO-179a, *Conduct Food Studies and Monitoring for Wintering Waterfowl in*
29 *Suisun Marsh*, would be available to address this adverse effect.

30 **Yolo and Delta Basins:** The replacement of 1,400 acres of managed seasonal wetland with 19,000
31 acres of palustrine tidal wetlands in the Delta Watershed, and the replacement of 600 acres of
32 managed seasonal wetlands with 2,000 acres of palustrine tidal wetlands in the Yolo Watershed
33 would not be expected to have an adverse effect on food productivity, under the assumption that
34 these wetlands would provide adequate food sources. However, a monitoring component and a food
35 study in these tidal habitats would be necessary order to demonstrate that there is a less-than-
36 significant loss of food value in these habitats for wintering waterfowl. If it is determined from
37 monitoring, that there is in fact a significant loss in food productivity from habitat conversion to
38 tidal wetlands, the protection and enhancement of managed wetlands in these watersheds would be
39 required to mitigate the change in food biomass and quality. Mitigation Measure BIO-179b, *Conduct*
40 *Food Studies and Monitoring to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and*
41 *Delta Basins*, would be available to address this uncertainty.

42 **NEPA Effects:** There is considerable uncertainty about the biomass and nutritional quality of
43 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify
44 the level of effect that Alternative 4 habitat loss or conversion would have. The BDCP has committed
45 to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in Suisun

1 Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal marsh. Of
2 these 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl. This
3 minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced
4 productivity from conversion of managed seasonal wetlands under the assumptions that 1) existing
5 managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food
6 to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high
7 biomass and high-quality food. However, the food biomass and productivity in Suisun Marsh would
8 need to be quantified to determine if the 5,000 acres would be sufficient for Alternative 4 to avoid an
9 adverse effect on wintering waterfowl in the Suisun Marsh. Mitigation Measure BIO-179a, *Conduct*
10 *Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would be available to address
11 this adverse effect.

12 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal
13 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands
14 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter
15 food productivity for wintering waterfowl. However, the conclusion that these new wetlands would
16 provide adequate food sources is entirely dependent on assumptions about food production in
17 palustrine tidal habitats. Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring to*
18 *Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would be
19 available to address this uncertainty and avoid an adverse effect on wintering waterfowl.

20 **CEQA Conclusion:** There is considerable uncertainty about the biomass and nutritional quality of
21 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify
22 the level of impact that Alternative 4 habitat loss or conversion would have. The BDCP has
23 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in
24 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal
25 marsh. Of these 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.
26 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced
27 productivity resulting from conversion of managed seasonal wetlands under the assumptions that
28 1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-
29 quality food for wintering waterfowl and 2) protected seasonal wetlands can be managed to
30 produce high biomass and high-quality food. However, the food biomass and productivity in Suisun
31 Marsh would need to be quantified to determine if the 5,000 acres would be sufficient for
32 Alternative 4 to avoid having a significant impact on wintering waterfowl in the Suisun Marsh, or if
33 additional mitigation would be needed. Implementation of Mitigation Measure BIO-179a, *Conduct*
34 *Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would address this potential
35 significant impact.

36 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal
37 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands
38 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter
39 food productivity. However, the conclusion that these tidal wetlands would provide adequate food
40 sources for wintering waterfowl is entirely dependent on assumptions about food production in
41 palustrine tidal habitats. Studies of food biomass and food quality in palustrine tidal habitats are
42 needed to confirm that no mitigation for wintering waterfowl would be required in the Yolo and
43 Delta Basins. Implementation of Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring*
44 *to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would address
45 this uncertainty and would reduce the impact of loss or conversion of habitat for wintering
46 waterfowl to a less-than-significant level.

1 **Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering**
2 **Waterfowl in Suisun Marsh**

3 Poorly managed wetlands (considered low biomass and food quality) will be identified and
4 managed by BDCP proponents to improve food quality and biomass. Studies will be required to
5 quantify 1) food production of existing managed wetlands in Suisun Marsh and 2) energetic
6 productivity of brackish and tidal marsh habitats. Protected wetlands will be monitored to
7 measure changes in the energetic productivity of these sites. Based on the food studies and
8 monitoring results, BDCP proponents will determine if the minimum commitment of 5,000 acres
9 is sufficient to meet the goal of 1:1 compensation for loss of wintering waterfowl habitat with
10 the protection and management of managed wetlands in perpetuity. If monitoring demonstrates
11 that additional acreage is needed to meet this goal, additional acreage of protection or creation
12 of managed wetlands and management will be required.

13 **Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate**
14 **Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins**

15 In order to address the uncertainty of the impact of loss of managed wetlands in the Yolo and
16 Delta Basins on wintering waterfowl, BDCP proponents will conduct food studies and
17 monitoring to demonstrate the food quality of palustrine tidal habitats in these basins. If studies
18 show that the assumption of no effect was inaccurate, and the food quality goal of 1:1
19 compensation for wintering waterfowl food value is not met, additional acreage of protection or
20 creation of managed wetland and management will be required.

21 **Impact BIO-180: Loss or Conversion of Habitat for Breeding Waterfowl from Implementation**
22 **of Conservation Components**

23 **Yolo and Delta Basins:** Implementation of Alternative 4 would reduce managed wetlands in the
24 Yolo and Delta basins by 437 acres and 1,155 acres respectively. Under the assumption that 15% of
25 these wetlands are managed as semi-permanent wetlands, Alternative 4 would reduce
26 semipermanent wetlands in the Yolo and Delta drainage basins by 77 acres and 203 acres
27 respectively. While a reduction in these semipermanent habitats would represent a habitat loss for
28 breeding waterfowl, with the restoration of 24,000 acres of palustrine tidal wetlands (see Table 3-4
29 in Chapter 3, *Description of Alternatives*) in the Yolo and Delta basins there would be a less than
30 adverse effect on breeding waterfowl. These palustrine habitats would presumably contain water
31 during the breeding period (i.e., March through July), and would be expected to compensate for the
32 loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta watersheds attributed
33 to Alternative 4.

34 **Suisun Marsh:** Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640
35 acres from the conversion of managed seasonal and semi-permanent wetlands to tidal habitats.
36 Some of the remaining seasonal wetlands could be managed as semi-permanent wetlands to offset
37 the loss of breeding habitat, but this could further reduce food supplies available to wintering
38 waterfowl under the assumption that semi-permanent wetlands provide few food resources
39 compared to seasonally managed habitats (Central Valley Joint Venture 2006).

40 The BDCP includes a commitment to protect and enhance 1,600 acres of permanently flooded
41 managed wetlands in Suisun Marsh to provide habitat for breeding waterfowl. In addition, 5,000
42 acres of semipermanent wetlands that would be protected and enhanced for wintering and

1 migratory waterfowl (see Table 3-4 in Chapter 3, *Description of Alternatives*, of the EIR/EIS;
2 Objective MWNC1.1 in BDCP Chapter 3, *Conservation Strategy*).

3 Food studies and monitoring would be necessary to determine how increases in tidal marsh and
4 salinity levels would affect the overall reproductive capacity of the marsh. These studies would be
5 needed in order to quantify impacts to breeding waterfowl in Suisun Marsh and to determine not
6 only the number of acres that would compensate for loss of breeding habitat at a ratio of 1:1 for
7 habitat value, but how those acres should be managed. Mitigation Measure BIO-180, *Conduct Food
8 and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address the
9 uncertainty of this effect.

10 In addition to providing semipermanent wetlands to breeding waterfowl, the Suisun Marsh contains
11 several key upland areas that have significant nesting value. The largest block of upland habitat in
12 the region is the core area on the Grizzly Island Wildlife Area. This area does not overlap with the
13 hypothetical footprint for *CM4 Tidal Natural Communities Restoration*. However, this core area
14 includes over 2,000 acres of upland grasslands that have some of the highest duck nesting densities
15 in California (Central Valley Joint Venture 2006). A few small wetland areas are scattered within this
16 core grassland mosaic that provide necessary freshwater brooding habitat. If restoration footprints
17 were changed during the implementation process of BDCP to overlap with this area, the effects on
18 breeding waterfowl would likely be greatly increased.

19 **NEPA Effects:** Implementation of Alternative 4 would reduce managed wetlands in the Yolo and
20 Delta basins by 437 acres and 1,155 acres respectively. Under the assumption that 15% of these
21 wetlands are managed as semi-permanent wetlands, Alternative 4 would reduce semi-permanent
22 wetlands in the Yolo and Delta drainage basins by 77 acres and 203 acres, respectively. The
23 reduction in these semi-permanent habitats would represent a habitat loss for breeding waterfowl.
24 However, with the restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta
25 basins, Alternative 4 would not have an adverse effect on breeding waterfowl. These palustrine
26 habitats would presumably contain water during the breeding period (March through July), and
27 would be expected to compensate for the loss of 280 acres of managed semi-permanent wetlands in
28 the Yolo and Delta watersheds attributed to Alternative 4 implementation. Total managed wetlands
29 in Suisun Marsh would decline from 41,012 acres to 30,640 acres with the conversion of managed
30 seasonal and semi-permanent wetlands to tidal habitats. Some of the remaining seasonal wetlands
31 could be managed as semi-permanent wetlands to offset the loss of breeding habitat, but such
32 management could further reduce food supplies available to wintering waterfowl under the
33 assumption that semi-permanent wetlands provide few food resources compared with seasonally
34 managed habitats. The protection and enhancement of 1,600 acres of permanently flooded managed
35 wetlands would provide habitat for breeding waterfowl. However, food studies and monitoring
36 would be necessary to determine how increases in tidal marsh and salinity levels would affect the
37 overall reproductive capacity of the marsh. Therefore, the loss of breeding waterfowl habitat
38 resulting from implementation of Alternative 4 could have an adverse effect. Mitigation Measure
39 BIO-180, *Conduct Food and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be
40 available to address the uncertainty of model assumptions and the potential adverse effect of habitat
41 conversion on breeding waterfowl in Suisun Marsh.

42 **CEQA Conclusion:** Implementation of Alternative 4 would reduce managed wetlands in the Yolo and
43 Delta basins by 437 acres and 1,155 acres respectively. Under the assumption that 15% of these
44 wetlands are managed as semi-permanent wetlands, Alternative 4 would reduce semipermanent
45 wetlands in the Yolo and Delta drainage basins by 77 acres and 203 acres respectively. The

1 reduction in these semi-permanent habitats would represent a habitat loss for breeding waterfowl.
2 However, with the restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta
3 basins, Alternative 4 would have a less-than-significant impact on breeding waterfowl. These
4 palustrine habitats would presumably contain water during the breeding period (March through
5 July), and would be expected to compensate for the loss of 280 acres of managed semi-permanent
6 wetlands in the Yolo and Delta watersheds attributed to Alternative 4.

7 Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640 acres with the
8 conversion of managed seasonal and semi-permanent wetlands to tidal habitats. Some of the
9 remaining seasonal wetlands could be managed as semi-permanent wetlands to offset the loss of
10 breeding habitat, but this management could further reduce food supplies available to wintering
11 waterfowl under the assumption that semi-permanent wetlands provide few food resources
12 compared with seasonally managed habitats. The protection and enhancement of 1,600 acres of
13 permanently flooded managed wetlands would provide habitat for breeding waterfowl. However,
14 food studies and monitoring would be necessary to determine how increases in tidal marsh and
15 salinity levels would affect the overall reproductive capacity of the marsh. Therefore, the loss or
16 conversion of habitat from implementation of Alternative 4 could have a significant impact on
17 breeding waterfowl in Suisun Marsh. Implementation of Mitigation Measure BIO-180, *Conduct Food
18 and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would address the uncertainty of
19 model assumptions and reduce the impact to a less-than-significant level.

20 **Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding**
21 **Waterfowl in Suisun Marsh**

22 To address the uncertainty of the impact of loss of managed wetlands in Suisun Marsh on
23 breeding waterfowl, BDCP proponents will conduct food studies and monitoring to determine
24 how increases in tidal marsh and salinity levels will affect the overall reproductive capacity of
25 the marsh.

26 The required studies will examine how increases in tidal marsh and salinity levels will affect the
27 overall reproductive capacity of the Marsh. Reproductive studies will address but will not be
28 limited to the following questions:

- 29 • How does the distribution of breeding waterfowl in Suisun Marsh differ in tidal versus
30 managed habitats and across salinity gradients?
- 31 • How does waterfowl nest success and nest density vary with respect to tidal versus
32 managed habitats and across salinity gradients?
- 33 • What are the patterns of habitat selection and movements by waterfowl broods in relation
34 to tidal vs. managed habitats, and are there impacts on duckling survival?
- 35 • What is the current relationship between waterfowl reproductive success and interactions
36 with alternate prey and predators, and how is tidal restoration likely to alter these
37 relationships?

38 **Impact BIO-181: Loss or Conversion of Habitat for Shorebirds from Implementation of**
39 **Conservation Components**

40 Shorebird use of the study area varies by species and fluctuates both geographically and by habitat
41 type throughout the year. Shallow flooded agricultural fields and wetlands support large numbers of
42 wintering and migrating shorebirds (Shuford et al. 1998), particularly least and western sandpipers,

1 dunlin, greater yellowlegs and long-billed dowitcher. Rice lands of the Sacramento Valley provide
 2 important breeding habitat for shorebirds such as American avocet and black-necked stilt (Shuford
 3 et al. 2004) and have been designated as a Western Hemisphere Shorebird Reserve Network Site of
 4 International Importance (Hickey et al. 2003). Managed wetlands provide suitable foraging and
 5 roosting habitat for shorebirds; black-necked stilts, avocets, and yellowlegs use this habitat type
 6 almost exclusively. Water depth in all of these habitat types is an important habitat variable as the
 7 majority of shorebird species require water depths of approximately 10–20 cm for foraging (Isola et
 8 al. 2000, Hickey et al. 2003).

9 **Managed Wetlands**

10 **Yolo Basin:** Primarily as a result of *CM4 Tidal Natural Communities Restoration* within the Yolo
 11 Basin, 1,185 acres of managed wetland habitat would be permanently converted; 1,066 acres of
 12 which are protected. In addition, 42 acres of managed wetland habitat would be temporarily lost by
 13 construction-related activities associated with tidal restoration (CM4) and Fisheries Enhancement
 14 activities (CM2) (Table 2, ICF International 2013). Increased inundation frequency, depth and
 15 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could
 16 periodically affect managed wetlands ranging from an estimated 643 acres during a notch flow of
 17 1,000 cfs to an estimated 2,055 acres during a notch flow of 4,000 cfs in the Yolo Basin (see Table
 18 5.4-2, in BDCP Chapter 5, *Effects Analysis*).

19 **Delta Basin:** Within the Delta Basin, 90 acres of managed wetland habitat would be permanently
 20 converted, as a result of tidal restoration (CM4). Thirteen of the 90 acres are protected (Table 3, ICF
 21 International 2013). Periodic flooding would not affect this natural community type in Delta Basin.

22 **Suisun Basin:** Within the Suisun Basin, 11,532 acres of managed wetland habitat would be
 23 permanently converted as a result of tidal restoration (CM4); 10,354 of which are protected. (Table
 24 4, ICF International 2013). Periodic flooding would not affect this natural community type in Suisun
 25 Basin.

26 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
 27 managed wetland habitat suitability (Table 1, ICF International 2013): black-necked stilt
 28 (*Himantopus mexicanus*), greater yellowlegs (*Tringa melanoleuca*), and long-billed dowitcher
 29 (*Limnodromus scolopaceus*). Dunlin (*Calidris alpina*), least sandpiper (*Calidris minutilla*),
 30 semipalmated plover (*Charadrius semipalmatus*), and western sandpiper (*Calidris mauri*), had a rank
 31 2 for managed wetland habitat suitability. Black-bellied plover (*Pluvialis squatarola*) and whimbrel
 32 (*Numenius phaeopus*) both had rank 3 for managed wetland habitat suitability.

33 Managed wetlands would decrease in overall extent by 20% (Table 5, ICF International 2013). Most
 34 of this loss would occur in Suisun with some additional acreage loss in the Yolo Basin. The loss of
 35 managed wetland habitat for covered species and waterfowl would be compensated for with 8,200
 36 acres remaining managed wetland protection in Suisun Marsh. Of these 8,200 acres, the 5,000 acres
 37 of seasonal wetland protected, enhanced, and managed to provide overwintering waterfowl foraging
 38 habitat would be the habitat type most likely to benefit overwintering shorebirds. However, the
 39 1,600 acres of semi-permanent and permanent managed wetlands for breeding waterfowl and 1,500
 40 acres of managed wetlands for salt marsh harvest mouse would also be expected to have some
 41 benefit to wintering and breeding shorebirds.

1 **Cultivated Lands**

2 **Yolo Basin:** Primarily as a result of tidal restoration (CM4) and Fisheries Enhancement activities
3 (CM2) within the Yolo Basin, 8,309 acres of cultivated lands would be permanently converted; 1,272
4 acres of which are protected. Also within the Yolo Basin, increased inundation frequency, depth and
5 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could affect an
6 estimated 3,219 acres of cultivated lands during a notch flow of 1,000 cfs to an estimated 5,512
7 acres during a notch flow of 6,000 cfs (see Table 5.4-2 in BDCP Chapter 5, *Effects Analysis*).

8 **Delta Basin:** Within the Delta Basin, as a result of tidal restoration (CM4) and floodplain restoration
9 (CM5), 25,633 acres of cultivated lands would be permanently converted. There would also be an
10 additional 112 acres lost temporarily due to CM5 activities. Of the total permanently converted
11 lands, 3,925 acres are protected (Table 3, ICF International 2013). Seasonal flooding (CM5) on the
12 restored floodplain would periodically affect 738 acres of cultivated lands in Delta.

13 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
14 cultivated lands habitat suitability (Table 1, ICF International 2013): killdeer (*Charadrius*
15 *vociferous*), long-billed curlew, and whimbrel within pasture habitat. Long-billed dowitcher and
16 killdeer both had a rank 2 for idle crop habitat suitability and black-bellied plover was ranked 2 for
17 pasture habitat. Red-necked phalarope (*Phalaropus lobatus*) and Wilson's phalarope (*Phalaropus*
18 *tricolor*) were both ranked 2 for grain and hay crops. Long-billed dowitcher, dunlin, least sandpiper,
19 and long-billed curlew were all ranked 3 for rice habitat suitability and killdeer was ranked 3 for
20 field crop habitat suitability.

21 Cultivated land loss would occur in all three basins, but the majority of acreage loss would occur in
22 the Delta basin. Pasture crop types would decrease in overall extent by 15% over baseline (Table 5,
23 ICF International 2013), but would increase in protection by 135%. More than half of all cultivated
24 lands within the 48,000-acre BDCP cultivated lands reserve would be in pasture production
25 (primarily alfalfa) and enhanced and managed to benefit Swainson's hawk. Idle crop types are not
26 identified as a specific conservation target in the BDCP, are expected to occur within the reserve and
27 are recognized in the BDCP as having "moderate" foraging habitat value for Swainson's hawk, white-
28 tailed kite, and greater sandhill crane.

29 Grain and hay crop would be expected to decrease by 13% (Table 5, ICF International 2013) while
30 protection, enhancement and management would be expected to increase by 28% (Table 6, ICF
31 International 2013). These crop types would be managed for a tricolored blackbirds, Swainson's
32 hawk, white-tailed kite, greater sandhill crane, and burrowing owls.

33 Rice would decrease in overall extent by 2% (Table 5, ICF International 2013) but increase in total
34 protection by 57%. Rice lands would be protected, enhanced, and managed for the benefit for giant
35 garter snake.

36 **Tidal Wetlands**

37 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)
38 within the Yolo Basin, 194 acres of tidal wetland habitat would be permanently converted; 180 acres
39 of which are protected. In addition, 12 acres of tidal wetland habitat would be temporarily lost by
40 construction-related activities associated with Fisheries Enhancement activities (CM2) (Table 2, ICF
41 International 2013). Periodic flooding in Yolo Bypass would affect 3,957 acres of tidal wetlands in
42 Yolo Basin.

1 **Delta Basin:** Within the Delta Basin, 54 acres of tidal wetlands would be permanently converted as
2 a result of tidal restoration (CM4) (Table 3, ICF International 2013). Of the total permanently
3 converted lands, 26 acres are protected. Periodic flooding in Yolo Bypass would affect 26 acres of
4 tidal wetlands in Delta Basin.

5 **Suisun Basin:** Within the Suisun Basin, 219 acres of tidal wetland habitat would be permanently
6 converted as a result of tidal restoration (CM4); 215 of which are protected. (Table 4, ICF
7 International 2013). Periodic flooding would not affect this natural community type in Suisun Basin.

8 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
9 tidal mudflat habitat suitability (Table 6, ICF International 2013): black-bellied plover, dunlin, least
10 sandpiper, marbled godwit (*Limosa fedoa*), semipalmated plover, short-billed dowitcher
11 (*Limnodromus griseus*), western sandpiper, and willet (*Tringa semipalmata*). Long-billed curlew
12 (*Numenius americanus*) and whimbrel both had a rank 2 for tidal mudflat habitat suitability.
13 American avocet (*Recurvirostra americana*) was ranked 3 for tidal mudflat habitat suitability. For
14 tidal brackish emergent wetland/tidal freshwater emergent wetland, willet was ranked 2 and long-
15 billed curlew and whimbrel were both ranked 3 for habitat suitability.

16 Tidal mudflat habitat would be estimated to increase in extent by 1,780 acres. This extremely large
17 increase in tidal mudflat habitat would occur almost exclusively in Suisun Marsh as the result of
18 tidal restoration and the conversion of existing mid- and high-marsh types to low marsh and tidal
19 mudflats in response to sea level rise. BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*,
20 details the methods and assumptions modeled to come about this result. Tidal mudflat habitats
21 would be expected to require management, however, sediment augmentation has been discussed as
22 an experimental method that could be employed in places like Suisun to combat the loss of intertidal
23 marshes in the face of sea level rise and reduced sediment supplies.

24 Tidal emergent wetland habitat would increase in extent by 152% (Table 5, ICF International 2013).
25 Of the 30,000 acres of emergent wetland restoration, 6,000 acres would be in the Suisun Basin and
26 the rest would be distributed between the Yolo and Delta Basins. Enhancement and management on
27 these lands would be likely to be focused on nonnative, invasive species management. Any
28 additional actions in Suisun would be focused on salt marsh harvest mouse, Suisun shrew, California
29 clapper rail, black rail, Suisun thistle, and soft bird's-beak. In freshwater marshes, enhancement and
30 management would be likely to focus on black rail, western pond turtle, and, in some cases, giant
31 garter snake.

32 **Nontidal Wetlands**

33 **Yolo Basin:** As a result of tidal restoration (CM4) and fisheries enhancement activities (CM2) within
34 the Yolo Basin, 313 acres of nontidal wetland habitat would be permanently converted; 119 acres of
35 which are protected. In addition, 11 acres of nontidal wetland habitat would be temporarily lost by
36 construction-related activities associated with fisheries enhancement activities (CM2) (Table 2, ICF
37 International 2013). Periodic flooding in Yolo Bypass associated with ongoing Fremont Weir
38 operation (CM2) would affect 305 acres of nontidal wetlands in Yolo Basin, specifically nontidal
39 perennial aquatic habitat.

40 **Delta Basin:** Within the Delta Basin, 99 acres of nontidal wetlands would be permanently converted
41 as a result of tidal restoration (CM4) and floodplain restoration (CM5) (Table 3, ICF International
42 2013). There would also be 8 acres of nontidal perennial aquatic habitat temporarily lost from CM5

1 activities. Of the total permanently converted lands, 29 acres are protected. Periodic flooding from
2 CM5 would affect 4 acres of nontidal perennial aquatic habitat in Delta Basin.

3 **Suisun Basin:** Within the Suisun Basin, 1 acre of nontidal wetland habitat, specifically vernal pool
4 complex, would be permanently converted as a result of tidal restoration (CM4); and is not
5 protected. (Table 4, ICF International 2013). Periodic flooding would not affect this natural
6 community type in Suisun Basin.

7 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
8 nontidal wetland habitat suitability (Table 6, ICF International 2013): red-necked phalarope and
9 Wilson's phalarope for nontidal freshwater perennial emergent wetland and American avocet for
10 alkali seasonal wetland complex. Greater yellowlegs had a rank 2 for vernal pool complex habitat
11 suitability. Red-necked phalarope and western sandpiper were both ranked 3 for alkali seasonal
12 wetland habitat suitability and greater yellowlegs was ranked 3 for nontidal freshwater perennial
13 emergent wetland habitat suitability.

14 Nontidal freshwater emergent wetland would increase in extent by 88% as a result of BDCP
15 implementation (Table 5, ICF International 2013). These lands would be managed to benefit giant
16 garter snake and located within the Delta Basin (likely in the vicinity of White Slough) and the Yolo
17 Basin (in the Cache Slough area).

18 Impacts on wetted acres of vernal pool complex and alkali seasonal wetland complex would be
19 avoided and thus loss of this community is not expected. However, up to 10 acres of wetted acre loss
20 could be permitted under the Plan. Protection of vernal pool complex natural community would
21 increase by 13% and by 6% for alkali seasonal wetlands (Table 6, ICF International 2013).
22 Protection of these two community types would enhance and manage habitat for vernal pool
23 crustaceans and alkali-related plant species.

24 The protection and restoration of natural communities would also include management and
25 enhancement actions under *CM11 Natural Communities Enhancement and Management*. The
26 following management activities to benefit shorebirds would be considered for implementation
27 under CM11 in areas where they would not conflict with covered species management.

28 ● Managed wetlands:

- 29 ○ Managed wetlands can be potentially manipulated to provide the optimum water depths for
30 foraging shorebirds and islands for nesting (Hickey et al. 2003).
- 31 ○ During fall and spring, stagger the timing and location of draining and flooding to optimize
32 the extent of shallow-water habitat; varying depths within the wetland unit helps to create
33 temporal variation in foraging opportunities. During warm, dry springs when wetland units
34 dry quickly, wetland units can be re-supplied with water to extend habitat availability for
35 shorebirds.
- 36 ○ Provide open, shallow water habitat adjacent to minimally vegetated, shallowly sloped
37 edges for nesting shorebirds between April and July.
- 38 ○ Provide islands with little to no vegetation to increase the likelihood of shorebird roosting
39 and nesting.
- 40 ○ Create low slopes on islands and levees; gradual angles (10-12:1) are better than steep
41 angles.

- 1 ○ Limit levee maintenance during the nesting season (April through July). However, mowing
2 the center of levees is fine.
- 3 ○ Potentially add material to levees or to islands to encourage nesting for some species.
- 4 ● Cultivated Lands:
- 5 ○ Maintaining a mosaic of dry and flooded crop types, and varying water depths will promote
6 a diverse community of waterbirds, including shorebirds, during fall migration and winter
7 (Shuford et al. 2013).
- 8 ○ To provide wintering habitat for multiple waterbird guilds, including shorebirds, use a
9 combination of flooding practices that include one-time water application and maintenance
10 flooding while also providing unflooded habitat (Strum et al. *in review*).
- 11 ○ The post-harvest flooding of winter wheat and potato fields in early fall (July–September)
12 can provide substantial benefits to shorebirds at a time of very limited shallow-water
13 habitat on the landscape (Shuford et al. 2013).
- 14 ○ Stagger the drawdown of flooded rice and other winter-flooded agricultural fields to
15 prolong the availability of flooded habitat (Iglecia et al. 2012). Be aware of soil type because
16 this practice may not be as effective on soils that drain quickly.
- 17 ○ Remove as much stubble as possible in rice and other agricultural fields after harvest to
18 increase the potential shorebird habitat on intentionally flooded or unflooded fields that
19 may passively gather rain water (Iglecia et al. 2012).
- 20 ○ Shallowly flood available agricultural fields during July, August, and September to provide
21 early fall migration habitat for shorebirds. Fields should be free of vegetation prior to
22 flooding, have minimal micro-topography (e.g., no large clods), and should remain flooded
23 for up to three week periods (after three weeks, vegetation encroachment reduces habitat
24 value for shorebirds; ICF International 2013).
- 25 ○ Manage levee habitats to have minimal vegetation but do not spray herbicide directly or
26 drive on levees during the nesting season (April–July, Iglecia et al. 2012).
- 27 ○ Maintain a minimum top-width of 30 inches for levees, based on increased avocet use of
28 wider levees (Iglecia et al. 2012).
- 29 ○ When possible, flood fields with nesting habitat (modified levees and islands) in late April to
30 provide nesting habitat for American avocets (Iglecia et al. 2012).
- 31 ○ Finer grained substrate (clods smaller than a fist) in rice and other agricultural fields may be
32 more appealing for nesting shorebirds (Iglecia et al. 2012).
- 33 ○ Maintain gently sloping levees and island sides (10-12:1; Iglecia et al. 2012).
- 34 ○ Islands should be disked along with the rest of the field after harvest to help inhibit
35 vegetation growth (Iglecia et al. 2012).

36 **NEPA Effects:** Alternative 4 implementation would result in the conversion of managed wetland and
37 cultivated lands to tidal natural communities, including tidal mudflat. The result would be
38 substantial loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,
39 and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least
40 sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and
41 willet. While substantial losses of cultivated lands would be incurred, protection, enhancement, and

1 management of the remaining acres would likely have substantial benefits for select species of
2 wintering and breeding shorebirds. This is because impacts on crop types would be distributed
3 across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,
4 and rice types. While the protection, enhancement, and management of these crop types are being
5 driven by covered species, these management actions would also benefit shorebirds. The protection,
6 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation
7 for the loss of substantial acreage, would have some incremental benefits for shorebirds, but would
8 be unlikely to compensate for the overall loss. However, with the protection and restoration of acres
9 in the Delta and Yolo watersheds, in addition to the implementation of the management actions
10 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would not
11 be expected to result in an adverse effect on shorebird populations in the study area.

12 **CEQA Conclusion:** Alternative 4 implementation would result in the conversion of managed wetland
13 and cultivated lands to tidal natural communities, including tidal mudflat. The result would be
14 significant loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs, and
15 long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least
16 sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and
17 willet. While significant losses of cultivated lands would be incurred, protection, enhancement, and
18 management of the remaining acres would likely have substantial benefits for select species of
19 wintering and breeding shorebirds. This is because impacts on crop types would be distributed
20 across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,
21 and rice types. While the protection, enhancement, and management of these types are being driven
22 by covered species, these management actions would also benefit shorebirds. The protection,
23 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation
24 for substantial acreage loss, would have some incremental benefits for shorebirds, but would be
25 unlikely to compensate for the overall loss. However, with the protection and restoration of acres in
26 the Delta and Yolo watersheds, in addition to the implementation of the management actions
27 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would be
28 expected to have a less-than-significant impact on shorebird populations in the study area.

29 **Impact BIO-182: Effects on Shorebirds and Waterfowl Associated with Electrical** 30 **Transmission Facilities**

31 New transmission lines installed in the study area would increase the risk for bird-power line
32 strikes, which could result in injury or mortality of shorebirds and waterfowl. The existing network
33 of power lines in the study currently poses a risk for shorebirds and waterfowl in the Delta. New
34 transmission lines would increase this risk and have an adverse effect on shorebird and waterfowl
35 species in the absence of other conservation actions. The implementation of *AMM20 Greater Sandhill*
36 *Crane* would reduce potential effects through the installation of flight diverters on new transmission
37 lines and selected existing transmission lines in the study area.

38 **NEPA Effects:** New transmission lines would increase the risk for shorebird and waterfowl power
39 line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the potential effect of the
40 construction of new transmission lines on shorebird and waterfowl would not be adverse.

41 **CEQA Conclusion:** New transmission lines would increase the risk for shorebird and waterfowl
42 power line strikes which could have a substantial adverse effect as a result of direct mortality. This
43 impact would be significant. The implementation of *AMM20 Greater Sandhill Crane* would reduce the

1 potential impact of power line strikes from the construction of new transmission lines on shorebirds
2 and waterfowl to a less-than-significant level.

3 **Impact BIO-183: Indirect Effects of Plan Implementation on Shorebirds and Waterfowl**

4 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
5 with construction-related activities could result in temporary disturbances that affect shorebird and
6 waterfowl use of modeled habitat. Indirect effects associated with construction include noise, dust,
7 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
8 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
9 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
10 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
11 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use
12 of mechanical equipment during water conveyance construction could cause the accidental release
13 of petroleum or other contaminants that could affect shorebirds and waterfowl or their prey in the
14 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
15 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge
16 of sediment or excessive dust adjacent to shorebirds and waterfowl in the study area could also have
17 a negative effect on these species. AMM1–AMM7 would ensure that measures were in place to
18 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to
19 work areas.

20 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
21 mercury in shorebird and waterfowl species. Mercury is transformed into the more bioavailable
22 form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying
23 such as tidal marshes and flood plains (Alpers et al. 2008). Bioaccumulation of methylmercury varies
24 by species as there are taxonomic differences in rates of detoxification within the liver (Eagles-Smith
25 et al. 2009). Organisms feeding within pelagic-based (algal) foodwebs have been found to have
26 higher concentrations of methylmercury than those in benthic or epibenthic foodwebs; this has been
27 attributed to food chain length and dietary segregation (Grimaldo et al. 2009). That is, the pelagic
28 food chain tends to be longer than the benthic food chain, which allows for greater biomagnification
29 of methylmercury in top predators. Also, there is less prey diversity at the top of the pelagic food
30 chain than in the benthic food chain; pelagic top predators eat smaller fish and little else, while
31 benthic top predators consume a variety of organisms, many of which are lower in the food chain
32 than fishes and thus have less potential for methylmercury biomagnification. Shorebirds and
33 waterfowl that forage on invertebrates and bivalves, may therefore have lower concentrations of
34 methylmercury than diving ducks that forage on fish. A detailed review of the methylmercury issues
35 associated with implementation of the BDCP is contained in Appendix 11F, *Substantive BDCP*
36 *Revisions*. The review includes an overview of the BDCP-related mechanisms that could result in
37 increased mercury in the foodweb, and how exposure of individual species to mercury may occur
38 based on feeding habits and where species habitat overlaps with the areas where mercury
39 bioavailability could increase.

40 Largemouth bass was used as a surrogate species for analysis (Appendix 11F, *Substantive BDCP*
41 *Revisions*) and the modeled effects of mercury concentrations from changes in water operations
42 under CM1 on largemouth bass did not differ substantially from existing conditions; therefore,
43 results also indicate that shorebird and waterfowl mercury tissue concentrations would not
44 measurably increase as a result of CM1 implementation.

1 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
2 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
3 Thus, BDCP restoration activities that create newly inundated areas (CM4 and CM5) could increase
4 bioavailability of mercury. In general, the highest methylation rates are associated with high tidal
5 marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers
6 et al. 2008). Mercury is generally elevated throughout the Delta, and restoration of the lower
7 potential areas in total may result in generalized, very low level increases of mercury. Given that
8 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in
9 some level of effects. Restoration in Suisun Marsh would convert managed wetlands to tidal
10 wetlands, which would be expected to result in an overall reduction in mercury methylation.

11 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
12 into the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific
13 evaluation for each restoration project. On a project-specific basis, where high potential for
14 methylmercury production is identified that restoration design and adaptive management cannot
15 fully address while also meeting restoration objectives, alternate restoration areas would be
16 considered. CM12 would be implemented in coordination with other similar efforts to address
17 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
18 conservation measure would include the following actions.

- 19 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
20 mercury methylation and bioavailability
- 21 ● Define design elements that minimize conditions conducive to generation of methylmercury in
22 restored areas.
- 23 ● Define adaptive management strategies that can be implemented to monitor and minimize
24 actual postrestoration creation and mobilization of methylmercury.

25 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
26 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
27 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
28 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
29 2009). The effect of selenium toxicity differs widely between species and also between age and sex
30 classes within a species. In addition, the effect of selenium on a species can be confounded by
31 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
32 2009).

33 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
34 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
35 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
36 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
37 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
38 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
39 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
40 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
41 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
42 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
43 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
44 levels of selenium have a higher risk of selenium toxicity.

1 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 2 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 3 exacerbate bioaccumulation of selenium in avian species, including shorebird and waterfowl
 4 species. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
 5 selenium, and therefore increase avian exposure from ingestion of prey items with elevated
 6 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase
 7 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).
 8 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was
 9 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
 10 in substantial, long-term increases in selenium concentrations in water in the Delta under any
 11 alternative. However, it is difficult to determine whether the effects of potential increases in
 12 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)
 13 would lead to adverse effects on shorebirds and waterfowl species.

14 Because of the uncertainty that exists at this programmatic level of review, there could be a
 15 substantial effect on shorebirds and waterfowl from increases in selenium associated with
 16 restoration activities. This effect would be addressed through the implementation of *AMM27*
 17 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 18 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
 19 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
 20 selenium management to reduce selenium concentrations and/or bioaccumulation would be
 21 evaluated separately for each restoration effort as part of design and implementation. This
 22 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
 23 design schedule.

24 **NEPA Effects:** Noise and visual disturbances from the construction of Alternative 4 water
 25 conveyance facilities could reduce shorebird and waterfowl use of modeled habitat adjacent to work
 26 areas. Moreover, operation and maintenance of the water conveyance facilities, including the
 27 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could
 28 affect shorebird and waterfowl use of the surrounding habitat. AMM1–AMM7 would minimize these
 29 effects, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
 30 *Disturbance of Nesting Birds*, would be available to address adverse effects on nesting individuals.

31 Tidal habitat restoration could result in increased exposure of shorebirds and waterfowl to
 32 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
 33 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
 34 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the
 35 indirect effects associated with noise and visual disturbances, and increased exposure to selenium
 36 from Alternative 4 implementation would not have an adverse effect on shorebirds and waterfowl.

37 Changes in water operations under CM1 would not be expected to result in increased mercury
 38 bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased
 39 exposure of California least tern to methylmercury. There is potential for increased exposure of the
 40 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
 41 mercury available in the soils and the biogeochemical conditions. However, the concentrations of
 42 methylmercury that are harmful varies by species, and the potential for increased exposure varies
 43 substantially within the study area. Implementation of CM12 which contains measures to assess the
 44 amount of mercury before project development, followed by appropriate design and adaptation

1 management, would minimize the potential for increased methylmercury exposure, and would
2 result in no adverse effect on shorebirds and waterfowl.

3 **CEQA Conclusion:** Indirect effects that include noise and visual disturbance, potential hazardous
4 spills, increased dust and sedimentation, and increased methylmercury and selenium exposure as a
5 result of Alternative 4 water conveyance facilities construction and operation and maintenance
6 would represent an adverse effect as a result of habitat modification and potential for direct
7 mortality of shorebirds and waterfowl in the absence of other conservation actions. This would be a
8 significant impact.

9 AMM1-AMM7, and implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
10 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce potential adverse effects of noise,
11 visual disturbance and potential for spills, dust, and sedimentation.

12 Tidal habitat restoration could result in increased exposure of shorebirds and waterfowl to
13 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
14 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
15 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

16 Changes in water operations under CM1 would not be expected to result in increased mercury
17 bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased
18 exposure of California least tern to methylmercury. There is potential for increased exposure of the
19 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
20 mercury available in the soils and the biogeochemical conditions. However, the concentrations of
21 methylmercury that are harmful varies by species, and the potential for increased exposure varies
22 substantially within the study area. Implementation of CM12 which contains measures to assess the
23 amount of mercury before project development, followed by appropriate design and adaptation
24 management, would minimize the potential for increased methylmercury exposure, and would
25 result in a less-than-significant impact on shorebirds and waterfowl.

26 Therefore, with AMM1-7, AMM27, and CM 12 in place, in addition to the implementation of
27 Mitigation Measure BIO-75, the indirect effects of Alternative 4 implementation would not result in a
28 substantial adverse effect through habitat modification or potential mortality. Therefore, the
29 indirect effects of Alternative 4 implementation would have a less-than-significant impact on
30 shorebirds and waterfowl.

31 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 32 **Disturbance of Nesting Birds**

33 See Mitigation Measure BIO-75 under Impact BIO-75.

34 **Common Wildlife and Plants**

35 Common wildlife and plants are widespread, often abundant, species that are not all covered under
36 laws or regulations that address conservation or protection of individual species. Common wildlife
37 do have some level of protection under California Fish and Game Code and most bird species have
38 protections under the Migratory Bird Treat Act. Examples of common wildlife and plants occurring
39 in the study area are provided within the discussion for each natural community type in Section
40 12.1.2.2, *Special-Status and Other Natural Communities*. Impacts on common wildlife and plants
41 would occur through the same mechanisms discussed for natural communities and special-status
42 wildlife and plants for each alternative.

1 **Impact BIO-184: Effects on Habitat and Populations of Common Wildlife and Plants**

2 Effects on habitat of common wildlife and plants, including habitat removal and conversion, are
3 discussed the analysis of Alternative 4 effects on natural communities (Impacts BIO-1 through BIO-
4 31). In general, effects on habitat of common wildlife and plants would not be adverse. Through the
5 course of implementing the Plan over a 50-year time period, several natural communities and land
6 cover types would be reduced in size, primarily from restoration of other natural communities.
7 Grassland, managed wetland and cultivated lands would be reduced in acreage, so the common
8 species that occupy these habitats would be affected. However, the losses in acreage and value of
9 these habitats would be offset by protection, restoration, enhancement, and management actions
10 contained in the BDCP, including *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal*
11 *Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM6 Channel*
12 *Margin Enhancement*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*
13 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM10*
14 *Nontidal Marsh Restoration*, and *CM11 Natural Communities Enhancement and Management*. In
15 addition, the AMMs contained in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, would
16 be in place to reduce or eliminate the potential to adversely affect both special-status and common
17 wildlife and plants.

18 Direct effects on common wildlife and plants from constructing water conveyance facilities and
19 implementing BDCP conservation measures would include construction or inundation-related
20 disturbances that result in injury or mortality of wildlife or plants and the immediate displacement
21 of wildlife, including increased traffic on local roads from construction vehicles that could increase
22 wildlife mortality and impede wildlife movement. Effects of construction traffic on wildlife moving
23 in the vicinity of Stone Lakes NWR would be minimized by *AMM20 Greater Sandhill Crane*, which
24 includes a measure for the installation of a vegetation screen or other noise and visual barrier along
25 Hood Franklin Road for the benefit of cranes, which would be a minimum of 5 feet high (above the
26 adjacent elevated road, if applicable) and would provide a continuous surface impenetrable by light.
27 This measure would potentially direct wildlife wishing to cross Hood Franklin toward the
28 overcrossing of the canal that links the Stone Lakes properties, just east of the town of Hood. The
29 overcrossing includes strips of terrestrial habitat on either side of the canal.

30 Indirect effects include project-related disturbances to nearby wildlife and plants during
31 construction (e.g., disruption of breeding and foraging behaviors from noise and human activity,
32 habitat degradation from fugitive dust and runoff) and effects occurring later in time (e.g., collisions
33 of birds with transmission lines, habitat fragmentation, vegetation management). Indirect effects
34 could result both from construction and from operations and maintenance (e.g., ground
35 disturbances could result in the spread and establishment of invasive plants).

36 **NEPA Effects:** The direct and indirect effects associated with implementing the conservation
37 measures of Alternative 4 would not be adverse because the conservation measures and AMMs also
38 expand and protect natural communities, avoid or minimize effects on special-status species,
39 prevent the introduction and spread of invasive species, and enhance natural communities. These
40 actions would result in avoiding and minimizing effects on common wildlife and plants as well.

41 **CEQA Conclusion:** Construction and operation of the water conveyance facilities and habitat
42 restoration activities would have impacts on common wildlife and plants in the study area through
43 habitat loss and through direct or indirect loss or injury of individuals. The loss of habitat would not
44 be substantial, because habitat restoration would increase the amount and extent of habitat

1 available for use by most common wildlife and plant species. Conservation measures to avoid or
2 minimize effects on special-status species, to prevent the introduction and spread of invasive
3 species, and to enhance natural communities also would result in avoiding and minimizing effects on
4 common wildlife and plants. Consequently, implementation of the BDCP is not expected to cause any
5 populations of common wildlife or plants to drop below self-sustaining levels, and this impact would
6 be less than significant. No mitigation would be required.

7 **Wildlife Corridors**

8 Essential Connectivity Areas (ECAs) are lands likely to be important to wildlife movement between
9 large, mostly natural areas at the state wide level. The ECAs form a functional network of wildlands
10 that are considered important to the continued support of California's diverse natural communities.
11 Four general areas were identified within the study area that contain ECAs (Figure 12-2). The BDCP
12 also identified important landscape linkages in the Plan Area to guide reserve design, which can also
13 be seen on Figure 12-2.

14 **Impact BIO-185: Effect of BDCP Conservation Measures on Wildlife Corridors**

15 Alternative 4 water conveyance facilities would cross two of the ECAs identified during the analysis,
16 the Stone Lake-Yolo Bypass ECA and the Mandeville Island-Staten Island ECA. The conveyance
17 facilities would also cross two landscape linkages identified in the BDCP, the *Middle River* linkage
18 (#6 in Figure 12-2) and the *Cosumnes to Stone Lakes* linkage (#10 in Figure 12-2). Though the
19 conveyance facilities shown on Figure 12-2 overlap with the line representing the *Sacramento River*
20 linkage (#9 in Figure 12-2) this line generally represents the course of the Sacramento River and is
21 intended to address the needs of aquatic species and will thus not be addressed in this chapter.

22 The construction of Intakes 2 and 3, temporary tunnel work areas, and RTM areas j would occur
23 within the Stone Lake-Yolo Bypass ECA. These activities would result in the permanent loss of
24 narrow strips of riparian vegetation along the Sacramento River and the permanent and temporary
25 loss of cultivated lands. Alternative 4 would not substantially increase impediments to movement of
26 any nonavian wildlife that could move from Stone Lakes to Yolo Bypass because the Sacramento
27 River and Sacramento River Deep Water Ship Channel already create a barrier to dispersal for
28 nonavian species. However, the conversion of riparian and cultivated lands and the presence of the
29 intakes would locally constrict the north-south movement of nonavian terrestrial species in the area
30 between the Sacramento River and the Southern Pacific Dredger Cut west of Stone Lakes, as well as
31 the east-west movement between Stone Lakes and the east bank of the Sacramento River. No
32 records of wildlife species were identified within these construction footprints, though there are
33 several records for Swainson's hawk in the vicinity. Though there would be losses in Swainson's
34 hawk foraging habitat and potential nesting habitat in these areas, these losses would not
35 substantially impede the movements of Swainson's hawks in the area. The loss in habitat is
36 addressed in the Swainson's hawk effects analysis.

37 The addition of temporary transmission lines within the Stone Lake-Yolo Bypass ECA and across the
38 *Cosumnes to Stone Lakes* linkage, which would be in place for approximately 7 years, could adversely
39 affect birds during periods of low visibility. Sandhill cranes that are known to roost at Stone Lakes
40 could particularly be adversely affected by the addition of the north-south running transmission line
41 to the west of Stone Lakes and by the east-west transmission line between Stone Lakes and the
42 *Cosumnes Preserve*; however this line would generally parallel an existing transmission line. The
43 *Cosumnes to Stone Lakes* linkage was developed by BDCP for reserve planning to benefit greater

1 sandhill crane movement from north to south in the Plan Area. Because the proposed east-west
2 transmission line parallels an existing line and would only be in place for approximately 7 years it
3 would not likely create a barrier to the future movement of cranes in this area (see impact
4 discussions for greater and lesser sandhill cranes).

5 The Alternative 4 conveyance facilities would also pass through the Mandeville Island-Staten Island
6 ECA, which also has several known roost locations for greater sandhill crane. Within this ECA,
7 Alternative 4 would result in the construction of a large RTM disposal area on Bouldin Island,
8 permanent access roads on Bouldin and Mandeville Islands, and temporary transmission lines
9 across most of the ECA. As discussed above, the temporary transmission lines could adversely affect
10 the movement of cranes and other bird species during periods of low visibility. The RTM disposal
11 area may create a physical barrier to movement for some species and could make this area unusable
12 as wildlife habitat for close to 10 years during the tunnel construction. The access roads are mostly
13 located on existing dirt and paved roads and would therefore not create any new physical barriers
14 but could temporarily increase road mortality during periods of construction. The conveyance
15 alignment at this location would be within the tunnel and thus not create a barrier to wildlife
16 movement.

17 Alternative 4 temporary transmission lines would cross the *Middle River* linkage on Woodward
18 Island. This linkage was established to guide riparian restoration along the Middle River to improve
19 riparian connectivity for the benefit of riparian brush rabbit, riparian woodrat, least Bell's vireo,
20 yellow-breasted chat, yellow-billed cuckoo, Swainson's hawk, and white-tailed kite. Because this
21 transmission line is temporary it would only temporarily conflict with the future planning for and
22 the current movement of the avian species that use riparian corridors.

23 Alternative 4 conveyance facilities would create some localized disruption in wildlife movement and
24 the temporary and permanent transmission lines would create additional barriers to movement for
25 avian species during periods of low visibility. However, overall the Alternative 4 alignment would
26 not create substantial barriers to movement between ECAs because the majority of the alignment
27 consists of a tunnel that would be beneath riparian corridors, which are the most likely dispersal
28 routes for terrestrial animals in the majority of the study area, and because the large surface impacts
29 (the intakes) are in areas that already have barriers to movement for nonavian terrestrial species
30 (Sacramento River and Sacramento River Deep Water Ship Channel).

31 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*
32 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Communities*
33 *Restoration*). These activities would generally improve the movement of wildlife within and outside
34 of the study area. In addition, the preservation of restored lands (CM3) and the enhancement and
35 management of these areas (CM11) would improve and maintain wildlife corridors within the study
36 area.

37 **NEPA Effects:** Alternative 4 conveyance facilities would create local barriers to dispersal but overall
38 the restoration activities would improve opportunities for wildlife dispersal within the study area
39 and between areas outside of the study area and therefore overall Alternative 4 would not adversely
40 affect wildlife corridors.

41 **CEQA Conclusion:** Alternative 4 conveyance facilities would create some localized disruption in
42 wildlife movement and the permanent and temporary transmission lines would create additional
43 barriers to movement for avian species during periods of low visibility. However, overall the
44 Alternative 4 alignment would not create substantial barriers to movement between ECAs because

1 the majority of the alignment consists of a tunnel that would be beneath riparian corridors, which
2 are the most likely dispersal routes for terrestrial animals in the majority of the study area, and
3 because the large surface impacts, (the intakes) are in areas that already have barriers to movement
4 for nonavian terrestrial species (Sacramento River and Sacramento River Deep Water Ship Channel).

5 Restoration activities would occur in the ECAs within Yolo Bypass (*CM2 Yolo Bypass Fisheries*
6 *Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural Community*
7 *Communities Restoration*). These activities would generally improve the movement of wildlife within
8 and outside of the Plan Area. In addition, the preservation of restored lands (CM3) and the
9 enhancement and management of these areas (CM11) would improve and maintain wildlife
10 corridors within the study area.

11 Alternative 4 conveyance facilities would create local barriers to dispersal and create barriers to
12 safe movement of avian species during periods of low visibility but overall the restoration activities
13 would improve opportunities for wildlife dispersal within the study area and between areas outside
14 of the study area and therefore overall Alternative 4 would result in less-than-significant impacts on
15 wildlife corridors.

16 **Invasive Plant Species**

17 The invasive plant species that primarily affect each natural community in the study area, which
18 include water hyacinth, perennial pepperweed, giant reed, and Brazilian waterweed, are discussed
19 in Section 12.1.4. Invasive species compete with native species for resources and can alter natural
20 communities by altering fire regimes, hydrology (e.g., sedimentation and erosion), light availability,
21 nutrient cycling, and soil chemistry but also have the potential to harm human health and the
22 economy by adversely affecting natural ecosystems, water delivery, flood protection systems,
23 recreation, agricultural lands, and developed areas (Randall and Hoshovsky 2000). The construction
24 and restoration activities covered under the BDCP could result in the introduction or spread of
25 invasive plant species by creating temporary ground disturbance that provides opportunities for
26 colonization by invasive plants in the study area.

27 The primary mechanisms for the introduction of invasive plants as the result of implementation of
28 the BDCP are listed here.

- 29 ● Grading, excavation, grubbing, and placement of fill material.
- 30 ● Breaching, modification, or removal of existing levees and construction of new levees.
- 31 ● Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,
32 electric transmission and gas lines, irrigation infrastructure).
- 33 ● Maintenance of infrastructure.
- 34 ● Removal of existing vegetation and planting/seeding of vegetation.
- 35 ● Maintaining vegetation and vegetation structure (e.g., grazing, mowing, burning, trimming).
- 36 ● Dredging waterways.

37 Clearing operations and the movement of vehicles, equipment, and construction materials in the
38 study area would facilitate the introduction and spread of invasive plants by bringing in or moving
39 seeds and other propagules. These effects would result from four activities.

- 1 • Spreading chipped vegetative material from clearing operations over topsoil after earthwork
2 operations are complete.
- 3 • Importing, distributing, storing, or disposing of fill, reusable tunnel material, borrow, spoil, or
4 dredge material.
- 5 • Traffic from construction vehicles (e.g., water and cement trucks) and personal vehicles of
6 construction staff.
- 7 • Transport of construction materials and equipment within the study area and to/from the study
8 area.

9 Table 12-4-70 lists the acreages of temporary disturbance in each natural community in the study
10 area that would result from implementation of Alternative 4.

11 **Table 12-4-70. Summary of Temporary Disturbance in Natural Communities under Alternative 4**

Natural Community	Temporary Impacts (acres)
Tidal perennial aquatic	2,114
Tidal brackish emergent wetland	0
Tidal freshwater emergent wetland	16
Valley foothill riparian	154
Grassland	424
Inland dune scrub	0
Alkali seasonal wetland complex	0
Vernal pool complex	3
Other natural seasonal wetland	0
Nontidal freshwater perennial emergent wetland	7
Nontidal perennial aquatic	38
Managed wetlands	73
Cultivated lands	2,896
Total	5,649

12

13 **Impact BIO-186: Adverse Effects on Natural Communities Resulting from the Introduction**
14 **and Spread of Invasive Plant Species**

15 Under Alternative 4, the BDCP would have adverse effects on natural communities as a result of the
16 introduction and spread of invasive plant species through implementation of CM1–CM10 and
17 AMM6. No adverse effects are expected from implementation of CM11–CM21.

- 18 • *CM1 Water Facilities and Operations*: Construction of the Alternative 4 water conveyance
19 facilities would result in the temporary disturbance of 3,531 acres that would provide
20 opportunities for colonization by invasive plant species.
- 21 • *CM2 Yolo Bypass Fisheries Enhancements*: Construction of the Yolo Bypass fisheries
22 enhancements would result in the temporary disturbance of 758 acres that would provide
23 opportunities for colonization by invasive plant species. Vegetation maintenance activities for
24 the Fremont Weir and Yolo Bypass improvements may include the removal of giant reed;
25 however, the clearing of linear areas to facilitate water flow may also result in increased

1 opportunities for invasion. Sediment removal, transportation, and application as a source
2 material for restoration or levee projects as part of Fremont Weir and Yolo Bypass maintenance
3 activities could also result in the spread of invasives if the sediment contains viable invasive
4 plant propagules.

- 5 ● *CM3 Natural Communities Protection and Restoration*: The restoration activities in the natural
6 communities located in the eleven CZs would result in the temporary disturbance of restoration
7 areas that would provide opportunities for colonization by invasive plant species.
- 8 ● *CM4 Tidal Natural Communities Restoration*: The activities associated with the restoration of
9 tidal perennial aquatic, tidal mudflat, tidal freshwater emergent wetland, and tidal brackish
10 emergent wetland in ROAs would result in the temporary disturbance of tidal areas that would
11 provide opportunities for colonization by invasive plant species. These adverse effects would be
12 reduced by designing restoration projects to minimize the establishment of nonnative
13 submerged aquatic vegetation, and early restoration projects would be monitored to assess the
14 response of nonnative species to restoration designs and local environmental conditions. If
15 indicated by monitoring results, the BDCP Implementation Office would implement invasive
16 plant control measures in restored natural communities to help ensure the establishment of
17 native marsh plain plant species. Additionally, the BDCP Implementation Office would actively
18 remove submerged and floating aquatic vegetation in subtidal portions of tidal natural
19 community restoration sites.
- 20 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
21 would result in the temporary disturbance of 1,285 acres along channels in the north, east, and
22 south Delta (San Joaquin, Old, and Middle Rivers) that would provide opportunities for
23 colonization by invasive plant species.
- 24 ● *CM6 Channel Margin Enhancement*: The temporary effects of channel margin enhancement were
25 not estimated because specific locations for this activity and their areal extent have not been
26 developed. Channel margin enhancement (Sacramento River between Freeport and Walnut
27 Grove, San Joaquin River between Vernalis and Mossdale, Steamboat and Sutter Sloughs, and
28 salmonid migration channels in the interior Delta) would result in the temporary disturbance of
29 channel areas that would provide opportunities for colonization by invasive plant species.
- 30 ● *CM7 Riparian Natural Community Restoration*: The restoration of valley/foothill riparian habitat
31 would result in the temporary disturbance of riparian areas that would provide opportunities
32 for colonization by invasive plant species.
- 33 ● *CM8 Grassland Natural Community Restoration*: The restoration of grassland habitat in CZs 1, 8,
34 and/or 11 would result in the temporary disturbance of degraded grassland or cultivated land
35 that would provide opportunities for colonization by invasive plant species.
- 36 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: The restoration of vernal pool
37 and alkali seasonal wetland complexes in CZs 1, 8, or 11 would result in the temporary
38 disturbance of grassland areas that would provide opportunities for colonization by invasive
39 plant species.
- 40 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration, which would take place through
41 conversion of agricultural lands in CZs 2 and 4, would result in the temporary disturbance of
42 fallow agricultural areas that would provide opportunities for colonization by invasive plant
43 species. These adverse effects would be reduced by monitoring the development of marsh
44 vegetation to determine if nonnative vegetation needs to be controlled to facilitate the

1 establishment of native marsh vegetation or if restoration success could be improved with
2 supplemental plantings of native species. If indicated by monitoring, nonnative vegetation
3 control measures and supplemental plantings would be implemented.

- 4 • *Avoidance and Minimization Measures: AMM6 Disposal and Reuse of Spoils* would have adverse
5 effects if spoils, RTM, dredged material, or chipped vegetative materials containing viable
6 invasive plant propagules are used as topsoil in uninfested areas.

7 The adverse effects that would result from the introduction and spread of invasive plants through
8 colonization of temporarily disturbed areas would be minimized by implementation of CM11,
9 AMM4, AMM10, and AMM11.

10 *CM11 Natural Communities Enhancement and Management* would reduce these adverse effects by
11 implementing invasive plant control within the BDCP reserve system to reduce competition on
12 native species, thereby improving conditions for covered species, ecosystem function, and native
13 biodiversity. The invasive plant control efforts would target new infestations that are relatively easy
14 to control or the most ecologically damaging nonnative plants for which effective suppression
15 techniques are available. In aquatic and emergent wetland communities, Brazilian waterweed,
16 perennial pepperweed, barbrgrass, and rabbitsfoot grass would be controlled (and tidal mudflats
17 would be maintained). In riparian areas, invasive plant control would focus on reducing or
18 eliminating species such as Himalayan blackberry, giant reed, and perennial pepperweed. In
19 grassland areas, techniques such as grazing and prescribed burning may be used to decrease the
20 cover of invasive plant species.

21 Implementation of AMM4, AMM10, and AMM11 would also reduce the adverse effects that could
22 result from construction activities. The AMMs provide methods to minimize ground disturbance,
23 guidance for developing restoration and monitoring plans for temporary construction effects, and
24 measures to minimize the introduction and spread of invasive plants. AMM4 would involve the
25 preparation and implementation of an erosion and sediment control plan that would control erosion
26 and sedimentation and restore soils and vegetation in affected areas. The restoration and
27 monitoring plans for implementation of AMM10 would involve methods for stockpiling, storing, and
28 restoring topsoil, revegetating disturbed areas, monitoring and maintenance schedules, adaptive
29 management strategies, reporting requirements, and success criteria. AMM10 would also include
30 planting native species appropriate for the natural community being restored, with the exception of
31 some borrow sites in cultivated lands that would be restored as grasslands.

32 AMM11 specifies that the BDCP Implementation Office would retain a qualified botanist or weed
33 scientist prior to clearing operations to determine if affected areas contain invasive plants. If areas
34 to be cleared do contain invasive plants, then chipped vegetation material from those areas would
35 not be used for erosion control but would be disposed of to minimize the spread of invasive plant
36 propagules (e.g., burning, composting). During construction of the water conveyance facilities and
37 construction activities associated with the other CMs, construction vehicles and construction
38 machinery would be cleaned prior to entering construction sites that are in or adjacent natural
39 communities other than cultivated lands and prior to entering any BDCP restoration sites or
40 conservation lands other than cultivated lands. Vehicles working in or travelling off paved roads
41 through areas with infestations of invasive plant species would be cleaned before travelling to other
42 parts of the Plan Area. Cleaning stations would be established at the perimeter of BDCP covered
43 activities along construction routes as well as at the entrance to reserve system lands. Biological
44 monitoring would include locating and mapping locations of invasive plant species within the
45 construction areas during the construction phase and the restoration phase. Infestations of invasive

1 plant species would be targeted for control or eradication as part of the restoration and revegetation
2 of temporarily disturbed construction areas.

3 **NEPA Effects:** The implementation of AMM4, AMM10, and AMM11, and CM11 would reduce the
4 potential for the introduction and spread of invasive plants and avoid or minimize the potential
5 effects on natural communities and special-status species; therefore, these effects would not be
6 adverse.

7 **CEQA Conclusion:** Under Alternative 4, impacts on natural communities from the introduction or
8 spread of invasive plants as a result of implementing the BDCP would not result in the long-term
9 degradation of a sensitive natural community. With implementation of AMM4, AMM10, AMM11 and
10 CM11, the temporary disturbance of land associated with the alternative would be offset and would
11 not result in substantial alteration of site conditions. Therefore, the impact would be considered less
12 than significant. No mitigation would be required.

13 **Compatibility with Plans and Policies**

14 **Impact BIO-187: Compatibility of the Proposed Water Conveyance Facilities and Other** 15 **Conservation Measures with Federal, State, or Local Laws, Plans, Policies, or Executive Orders** 16 **Addressing Terrestrial Biological Resources in the Study Area**

17 Constructing the water conveyance facilities (CM1) and implementing CM2–CM21 for Alternative 4
18 have the potential for being incompatible with plans and policies related to managing and protecting
19 terrestrial biological resources of the study area. A number of laws, plans, policies, programs, and
20 executive orders that are relevant to actions in the study area provide guidance for terrestrial
21 biological resource issues as overviewed in Section 12.2, *Regulatory Setting*. This overview of plan
22 and policy compatibility evaluates whether Alternative 4 would be compatible or incompatible with
23 such enactments, rather than whether impacts would be adverse or not adverse, or significant or
24 less than significant. If the incompatibility relates to an applicable plan, policy, or executive order
25 adopted to avoid or mitigate terrestrial biological resource effects, then an incompatibility might be
26 indicative of a related significant or adverse effect under CEQA and NEPA, respectively. Such
27 physical effects of Alternative 4 on terrestrial biological resources are addressed in the impacts on
28 natural communities and species. The following is a summary of compatibility evaluations related to
29 terrestrial biological resources for laws, plans, policies, and executive orders relevant to the BDCP.

30 **Federal and State Legislation**

- 31 • The federal *Clean Water Act*, *Endangered Species Act*, *Fish and Wildlife Coordination Act*,
32 *Migratory Bird Treaty Act*, *Rivers and Harbors Act* and *Marine Mammal Protection Act* all contain
33 legal guidance that either directly or indirectly promotes or stipulates the protection and
34 conservation of terrestrial biological resources in the process of undertaking activities that
35 involve federal decisionmaking. The biological goals and objectives contained in the BDCP that
36 provide the major guidance for implementing the various conservation elements of Alternative
37 4 are all designed to promote the long-term viability of the natural communities, special-status
38 species, and common species that inhabit the Plan Area. While some of the conservation
39 measures of the alternative involve permanent and temporary loss of natural communities and
40 associated habitats during facilities construction and expansion of certain natural communities,
41 the long-term guidance in the Plan would provide for the long-term viability and expansion of
42 the habitats and special-status species populations in the Plan Area. Alternative 4 conservation

1 actions would be compatible with the policies and directives for terrestrial biological resources
2 contained in these federal laws.

- 3 • *The California Endangered Species Act, California Native Plant Protection Act, Porter-Cologne*
4 *Water Quality Control Act, and Natural Communities Conservation Planning Act* are state laws
5 that have relevance to the management and protection of terrestrial biological resources in the
6 study area. Each of these laws promotes consideration of wildlife and native vegetation either
7 through comprehensive planning or through regulation of activities that may have an adverse
8 effect on the terrestrial and aquatic natural resources of the state. The BDCP, which is the basis
9 for Alternative 4, contains biological goals and objectives that have been developed to promote
10 the species protection and natural resource conservation that are directed by these state laws.
11 Alternative 4 conservation actions would be compatible with the policies and directives
12 contained in these laws.

- 13 • *The Johnston-Baker-Andal-Boatwright Delta Protection Act of 1992 (Delta Protection Act)* and the
14 *Sacramento-San Joaquin Delta Reform Act*, which updated the Delta Protection Act, promote the
15 maintenance and protection of natural resources and the protection of agricultural land uses in
16 the Delta's primary zone through the goals and policies contained in the 2009 updated Land Use
17 and Resources Management Plan (LURMP). While nothing in the LURMP is binding on state
18 agencies that are BDCP proponents, the LURMP does promote restoration and enhancement of
19 habitats for the terrestrial and aquatic species of the Delta on public land. The BDCP biological
20 goals and objectives would be compatible with these LURMP goals (Delta Protection
21 Commission 2010).

- 22 • *The Suisun Marsh Preservation Act of 1974* was designed to protect the Suisun Marsh for long-
23 term use as wildlife habitat, with a goal of preserving and enhancing the quality and diversity of
24 the Marsh's aquatic and wildlife habitats. The BDCP and its plans for protection and restoration
25 of tidal marsh habitats in Suisun Marsh would be compatible with the intent of the Suisun Marsh
26 Preservation Act.

27 ***Plans, Programs, and Policies***

- 28 • *The Delta Plan*, which was developed by the Delta Stewardship Council in compliance with the
29 2009 Sacramento-San Joaquin Delta Reform Act, is mandated to achieve two co-equal goals:
30 provide for a more reliable water supply for California and protect, restore, and enhance the
31 Delta ecosystem. The co-equal goals are to be achieved in a manner that protects and enhances
32 the unique cultural, recreational, natural resource, and agricultural values of the Delta as an
33 evolving place. The BDCP is intended to become a component of the Delta Plan. The Delta
34 Stewardship Council will determine whether the BDCP is compatible with the goals and
35 objectives of the Delta Plan prior to its incorporation into the Plan. The compatibility of the
36 BDCP with the Delta Plan is considered in detail in Chapter 13, Section 13.2.2.2, *The Delta Plan*.

- 37 • *California Wetlands Conservation Policy*, which was adopted by Executive Order in 1993,
38 promotes a long-term gain in the quantity, quality and permanence of wetlands acreages and
39 values in California. The BDCP conservation measures that provide for a significant expansion of
40 wetland acreage and quality in the Delta and Suisun Marsh are compatible with the intent of the
41 California Wetlands Conservation Policy.

- 42 • *The North American Waterfowl Management Plan (NAWMP)* and *Central Valley Joint Venture*
43 *(CVJV)* strive to maintain and expand wetlands and uplands for waterfowl and shorebirds in the
44 major basins of California's Central Valley. The NAWMP is a management plan jointly approved

1 by the United States and Canada in 1986. It contains general guidance from the principal wildlife
 2 management agencies of the two countries for sustaining abundant waterfowl populations by
 3 conserving landscapes through self-directed partnerships (joint ventures) that are guided by
 4 sound science. The CVJV is the joint venture established for overseeing NAWMP implementation
 5 in the Central Valley. The CVJV is made up of 21 conservation organizations, state and federal
 6 government agencies, and one corporation that have formed a partnership to improve the
 7 habitat conditions for breeding and nonbreeding waterfowl, breeding and nonbreeding
 8 shorebirds, waterbirds, and riparian-dependent songbirds in the Central Valley. The CVJV's
 9 2006 Implementation Plan (Central Valley Joint Venture 2006) establishes conservation
 10 objectives and priorities for these bird groups within the basins of the Central Valley. The BDCP
 11 Plan Area includes all or portions of three Implementation Plan basins—the Delta, Yolo and
 12 Suisun basins. The 2006 Implementation Plan contains basin-specific objectives for wetland
 13 restoration, protection of existing wetland habitats, wetland enhancement, adequate power and
 14 water supplies for wetland management, agricultural land enhancement, farmland easements
 15 that maintain waterfowl food resources on agricultural land, and farmland easements that
 16 buffer existing wetlands from urban and residential growth.

17 Implementation of the Alternative 4 conservation measures would result in significant
 18 reductions in cultivated land and managed wetland acreage in the Delta, Yolo and Suisun basins;
 19 however, significant increases in tidal and nontidal wetlands in these basins would be another
 20 result. Because of the large conversion of managed wetland in the Suisun basin, the BDCP has
 21 included a large managed wetland conservation and enhancement goal for this area. For the
 22 Suisun basin conversions to be compatible with the 2006 Implementation Plan goals, this
 23 EIR/EIS has added mitigation that would require food production studies and adaptive
 24 management to ensure that the Suisun basin would continue to provide the waterfowl and
 25 shorebird habitat envisioned in the Implementation Plan.

26 • *Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan, Cosumnes River Preserve*
 27 *Management Plan, Brannan Island and Franks Tract State Recreation Areas General Plan, Yolo*
 28 *Bypass Wildlife Area Land Management Plan, Grizzly Island Wildlife Area Management Plan, and*
 29 *the Lower Sherman Island Wildlife Area Land Management Plan* are primarily designed to
 30 preserve and enhance the natural resource and recreation qualities of these areas.
 31 Implementing Alternative 4, especially construction of CM1 and CM2 facilities, and land
 32 modification associated with CM4 restoration activities, could create temporary disruptions to
 33 the terrestrial biological resource management activities in these management areas. The
 34 proposed locations of the intermediate forebay and the RTM area on Zacharias Island fall within
 35 the Stone Lakes Cooperative Wildlife Management Area identified in the Stone Lakes Wildlife
 36 Refuge Comprehensive Conservation Plan (CCP). The primary objective of the Cooperative
 37 Wildlife Management Area is to maintain lands in private ownership and continue agricultural
 38 production but also allow USFWS to pursue a number of approaches to conserve and manage
 39 lands, depending on the preferences of willing landowners. The location of the intermediate
 40 forebay is an area that is entirely planted in vineyard, which has very little to no habitat value
 41 for wildlife species. The RTM area is used for hay or grain production, which does have high
 42 value for wildlife species. The placement of these project activities in these areas would be in
 43 conflict with the CCP.

44 The ultimate goals of aquatic and terrestrial habitat enhancement and restoration contained in
 45 the BDCP would be compatible with the long-term management goals of these areas. Proposed
 46 restoration areas in the Yolo Bypass, on Sherman Island, and in Suisun Marsh would be designed

1 to be compatible with and to complement the current management direction for these areas and
2 would be required to adapt restoration proposals to meet current policy established for
3 managing these areas.

- 4 • *Suisun Marsh Preservation Agreement* and *Suisun Marsh Plan* are the most recent efforts by the
5 state and federal agencies responsible for Suisun Marsh (the Marsh) to maintain its long-term
6 viability as managed wetlands and wildlife habitat, consistent with the Suisun Marsh
7 Preservation Act. The SMPA was signed in 1987 and modified in 2005 by DWR, CDFW,
8 Reclamation and the Suisun Resource Conservation District to establish the mitigation approach
9 in the Marsh for effects of operating the SWP and CVP. The primary concerns were the effects of
10 CVP and SWP Delta diversions on salinity in the Marsh. The SMPA focused on ways to ensure
11 adequate water quality and quantity for the managed wetlands and wildlife habitats in the
12 Marsh to assure equal waterfowl values in the Marsh. The Suisun Marsh Plan, for which a Final
13 EIS/EIR was released in 2010 by these agencies, provides for restoration of tidal marsh habitat
14 and enhancement of managed wetland in the Marsh, maintenance of waterfowl hunting and
15 recreational opportunities in the Marsh, maintenance and improvement of the Marsh levee
16 system, and protection and enhancement of water quality for beneficial uses of the Marsh. An
17 integral component of the Suisun Marsh Plan is balancing continued managed wetland
18 operation with new tidal wetland restoration to provide improved and greater habitat for fish
19 and wildlife species. The Suisun Marsh Plan is a programmatic, long-term plan and does not
20 include specific projects, project proponents, or funding mechanisms. However, the Suisun
21 Marsh Plan relies on tidal restoration to allow for managed wetland operations to continue. The
22 BDCP would provide a funding mechanism and increased management potential relative to
23 existing and restored habitats, assisting the Suisun Marsh Plan in meeting its broader ecological
24 goals, consistent with long-term operation of the SWP and CVP water conveyance facilities. The
25 conservation actions contained in the BDCP, which are designed to ensure the long-term
26 protection and recovery of special-status fish and wildlife species dependent on the Marsh,
27 would be compatible with the water quality and habitat restoration goals of the SMPA and
28 Suisun Marsh Plan.
- 29 • *California Aquatic Invasive Species Management Plan* does not address terrestrial invasive
30 species. Implementation of the Plan's long-term control and management objectives affect
31 terrestrial species that utilize study area aquatic habitats. These effects are positive in that Plan
32 objectives are to control and remove invasive aquatic species that are detrimental to native
33 aquatic and terrestrial species. Implementation of BDCP's conservation actions would be
34 undertaken with the goal of avoiding any further spread of aquatic invasive species. Alternative
35 4 would, therefore, be compatible with the objectives of the California Aquatic Invasive Species
36 Management Plan.
- 37 • *Habitat Conservation Plans and Natural Community Conservation Plans* are the subject of a
38 detailed analysis at the end of this chapter. The analysis considers the compatibility of the BDCP
39 with all HCPs and NCCPs that share planning area with the BDCP Plan Area.

40 **Executive Orders**

- 41 • *Executive Order 11990: Protection of Wetlands* requires all federal agencies to consider wetland
42 protection in their policies and actions. The BDCP proposes to protect, enhance and expand the
43 wetlands of the Plan Area, and, therefore, would be compatible with Executive Order 11990.

- 1 • *Executive Order 13112: Invasive Species* directs federal agencies to prevent and control the
2 introduction and spread of invasive species in a cost-effective and environmentally sound
3 manner. Alternative 4 construction and restoration actions have the potential to both introduce
4 and spread invasive species in the study area. Implementation of mitigation measures described
5 in this chapter would be capable of making Alternative 4 implementation compatible with
6 Executive Order 13112.
- 7 • *Executive Order 113443: Facilitation of Hunting Heritage and Wildlife Conservation* directs
8 federal agencies whose activities affect public land management, outdoor recreation, and
9 wildlife management to facilitate the expansion and enhancement of hunting opportunities, and
10 the management of game species and their habitat. Alternative 4 conservation measures that
11 involve conversion of cultivated land and managed wetland to tidal and nontidal wetlands and
12 other natural communities would conflict with the hunting expansion and enhancement aspects
13 of this executive order. Refer to Chapter 15, *Recreation*, for a detailed analysis of the effects of
14 alternatives on hunting opportunities. The habitat protection and expansion conservation
15 measures of Alternative 4 would be compatible with the executive order's goal of facilitating the
16 management of habitats for some game species.

17 **NEPA Effects:** The potential plan and policy incompatibilities of implementing Alternative 4
18 identified in the analysis above indicate the potential for a physical consequence to the environment.
19 The primary physical consequence of concern is the conversion of cultivated land and managed
20 wetland to natural wetland and riparian habitat in the study area. The physical effects are discussed
21 in the *Shorebirds and Waterfowl* analysis above, and no additional NEPA effects determination is
22 required related to the compatibility of the alternative with relevant plans and policies. The reader is
23 referred to Chapter 13, Section 13.2, *Regulatory Setting*, for a further discussion of the
24 responsibilities of state and federal agencies to comply with local regulations, and a discussion of
25 the relationship between plan and policy consistency and physical consequences to the
26 environment.

27 **CEQA Conclusion:** The potential plan and policy incompatibilities of implementing Alternative 4
28 identified in the analysis above indicate the potential for a physical consequence to the environment.
29 The primary physical consequence of concern is the conversion of large acreages of cultivated land
30 and managed wetland to natural wetland and riparian habitat in the study area. The physical effects
31 are discussed in the *Shorebirds and Waterfowl* analysis above, and no additional CEQA conclusion is
32 required related to the compatibility of the alternative with relevant plans and policies. The reader is
33 referred to Chapter 13, Section 13.2.3, *Local and Regional Plans, Policies, and Regulations*, for a
34 further discussion of the responsibilities of state and federal agencies to comply with local
35 regulations, and a discussion of the relationship between plan and policy consistency and physical
36 consequences to the environment.

12.3.3.10 Alternative 5—Dual Conveyance with Pipeline/Tunnel and Intake 1 (3,000 cfs; Operational Scenario C)

Alternative 5 proposes construction of only one Sacramento River intake in the north Delta (see Section 3.5.10 in Chapter 3, *Description of Alternatives*, for a complete description of this alternative). Intake 1 would be constructed just across the river and upstream of Clarksburg. A tunnel would be constructed to connect this lone intake and pump station to the forebay located immediately east of Courtland (see Figure 3-2 in Chapter 3). The remainder of the construction associated with Alternative 5 would be the same as Alternatives 1A, 2A, 3, 6A, 7, and 8 that rely on a western tunnel alignment under Andrus and Tyler Islands to transport Sacramento River water across the Delta to the south Delta canals (see Table 12-5-1). For this reason, Alternative 5 is considered here in a summary fashion; the reader is referred to Alternative 1A for a detailed description of impacts that would be associated with implementing Alternative 5. The impacts associated with Alternatives 1A and 5 were derived by comparing the alternatives to the No Action Alternative for NEPA purposes, and to Existing Conditions for CEQA purposes.

Alternative 5 would be operated under Operational Scenario C, which involves north Delta operations as proposed for Alternative 1A and south Delta operations directed by existing biological opinions from USFWS and NMFS. Scenario C includes the additional Delta outflow requirements associated with Scenarios B, D, E, F, and G. These requirements result in larger Delta outflows during September through November of certain water years.

Alternative 5 proposes a significant deviation in the re-establishment of tidal marsh as compared with all of the other BDCP alternatives. Tidal marsh restoration (CM4) would be limited to 25,000 acres for Alternative 5 as opposed to the 65,000 acres proposed for all other BDCP alternatives. The restoration activities would be limited to what is proposed during the first 15 years for the other options. The 40,000-acre reduction would have significant implications for cultivated lands and managed wetland conversion (see Table 12-5-2).

Note that the acres of habitat affected by CM1, as listed in Table 12-5-1, would be acres affected in the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in Table 12-5-3 and Table 12-5-4 for the late long-term timeframe are acres that would be affected cumulatively over the entire 50-year period of the Plan. Table 3-4 in Chapter 3, *Description of Alternatives*, describes the schedule for implementation of natural community restoration and protection conservation measures.

Comparative Differences in CM1 Construction Effects for Alternatives 5 and 1A

With only one intake and pump station located in the north Delta, Alternative 5 would create significant differences in the permanent and temporary loss of natural communities and cultivated lands during water conveyance facilities construction when compared with alternatives having five intakes along the Sacramento River (Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 6A, 6B, and 6C). The relative differences in direct loss of habitat between Alternative 5 and Alternative 1A are included in Table 12-5-1. All of these differences would occur during the near-term timeframe associated with water conveyance facilities construction along and just east of the Sacramento River between Clarksburg and Courtland. Alternative 5 would permanently remove 13 fewer acres of tidal perennial aquatic habitat in the Sacramento River, 12 fewer acres of valley/foothill riparian habitat along the eastern bank of the Sacramento River, 21 fewer acres of grassland along and behind the levees of the river,

1 and 166 fewer acres of cultivated land immediately east of the river (Table 12-5-1). Alternative 5
2 would also permanently affect a smaller acreage of jurisdictional waters (including wetlands) as
3 regulated by Section 404 of the CWA, when compared to Alternative 1A (14 acres fewer; see Table
4 12-5-2). Refer to Table 12-1A-69 for a summary of Alternative 1A permanent and temporary
5 impacts on jurisdictional waters and wetlands.

6 Alternative 5 also would result in significantly fewer temporary losses of natural communities,
7 including reduced losses of tidal perennial aquatic (49 acres less), valley/foothill riparian (11 acres
8 less), grassland (27 acres less), tidal freshwater emergent wetland (3 acres less), and cultivated
9 lands (461 acres less) when compared with Alternative 1A (Table 12-5-1). Alternative 5 would
10 temporarily affect a smaller acreage of jurisdictional waters (including wetlands) as regulated by
11 Section 404 of the CWA, when compared to Alternative 1A (57 acres fewer; see Table 12-5-2). Refer
12 to Table 12-1A-69 for a summary of Alternative 1A permanent and temporary jurisdictional waters
13 and wetlands impacts.

14 These differences in loss of natural communities associated with CM1 construction would create
15 differences in effects on covered and noncovered wildlife species. The reduced level of
16 valley/foothill riparian habitat loss would be a positive influence on valley elderberry longhorn
17 beetle, breeding habitat for raptors, herons and egrets (great egret, snowy egret, great blue heron,
18 Swainson's hawk, Cooper's hawk, white-tailed kite, and black-crowned night heron), and migratory
19 habitat for species that use the river corridor, such as western yellow-billed cuckoo. Species that
20 would benefit from smaller permanent losses of grassland and cultivated land would include
21 foraging raptors (Swainson's hawk, short-eared owl, northern harrier, merlin and white-tailed kite),
22 greater sandhill crane, mountain plover, California horned lark, tricolored blackbird and several
23 species of bats. Alternative 5 would result in a smaller permanent loss (116 acres less) of crane
24 foraging habitat compared to Alternative 1A. The significantly smaller temporary habitat
25 conversions associated with Alternative 5 would have comparable benefits to these species during
26 the construction period. There would be 323 fewer acres of foraging habitat temporarily lost under
27 Alternative 5 for greater sandhill crane than under Alternative 1A because of the lower acreage of
28 cultivated land loss.

29 The differences in effects that construction of the water conveyance facilities associated with
30 Alternatives 1A and 5 could have on special-status plant species are extremely minor. Habitat
31 modeling indicates that Alternative 5 would result in smaller permanent losses of habitat associated
32 with side-flowering skullcap (1 acre less), Mason's lilaeopsis (5 acres less) and delta mudwort
33 (5 acres less), when compared with Alternative 1A. Similar small differences would result from
34 temporary construction effects (6 acres less effect on Mason's lilaeopsis and delta mudwort habitat
35 with Alternative 5).

36 The near-term conservation activities described in Appendix 12D, *Feasibility Assessment of*
37 *Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on Terrestrial*
38 *Biological Resources*, would provide for conservation, enhancement and replacement of habitats
39 affected by the early water conveyance facility construction activities. This conservation activity,
40 which is part of the early implementation of the BDCP, would offset water conveyance facilities
41 construction effects on both covered and noncovered special-status species in the study area.

1 **Table 12-5-1. Alternative 5 Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**
2 **Communities (acres)**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option		Conveyance Option	
		Alternative 5 Removed Habitat (Permanent) ^b	Difference from Alternative 1A	Alternative 5 Removed Habitat (Temporary) ^c	Difference from Alternative 1A
Tidal perennial aquatic ^a	86,263	35	-13	84	-49
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	6	0	3	-3
Valley/foothill riparian	17,966	47	-11	17	-11
Nontidal perennial aquatic	5,567	12	0	9	0
Nontidal freshwater perennial emergent wetland	1,509	1	0	1	0
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	3	0	0	0
Managed wetland	70,798	3	0	83	0
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	294	-21	235	-27
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	3,657	-179	1,730	-461

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Features in this category include the following conveyance-related facilities: Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas.

^c Features in this category include the following conveyance features: Canal Work Area, Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area, and Borrow/Spoil Areas.

3

1 **Table 12-5-2 Alternative 5 Effects on Jurisdictional Wetlands and Waters Relative to Alternative 1A**
2 **(acres)**

Wetland/Water Type	Alternative 5 Impacts on Jurisdictional Wetlands and Waters			
	Permanent Impact	Difference from Alternative 1A	Temporary Impact	Difference from Alternative 1A
Agricultural Ditch	64.8	-0.1	20.7	-2.7
Alkaline Wetland	0.1	0	0	0
Clifton Court Forebay	1.0	0	0	0
Conveyance Channel	12.7	0	1.1	0
Depression	1.9	0	1.5	-0.3
Emergent Wetland	46.8	0	4.7	-2.5
Forest	5.7	-0.1	10.9	-1.0
Lake	0	0	0	-0.3
Scrub-Shrub	18.2	-2.4	1.9	-2.4
Seasonal Wetland	18.7	0.0	26.6	0.0
Tidal Channel	31.4	-11.6	86.3	-47.5
Vernal Pool	0	0	0	0
Total	201	-14	154	-57

3

4 **Effects of Restoration-Related Conservation Actions of Alternative 5**

5 The natural communities and managed land conversions associated with the major restoration-
6 related conservation measures under Alternative 5 (CM2, CM4, and CM5, CM7, CM8, CM10, and
7 CM18) present the greatest potential to affect both covered and noncovered plants and wildlife in
8 the study area. Most of these restoration-related conservation measures (CM2, CM7, CM8, and
9 CM10) would be identical to the other BDCP alternatives. However, for *CM4 Tidal Natural*
10 *Communities Restoration*, Alternative 5 would result in a much smaller conversion of natural
11 habitats, managed wetlands and cultivated lands. Table 12-5-3 lists the permanent and temporary
12 natural community and managed land conversions associated with CM2, CM4, and CM5 for
13 Alternative 5. These losses would be a significant reduction in the acreage of managed wetland
14 (6,445 acres fewer) and cultivated lands (28,142 acres fewer) that would be converted through tidal
15 marsh (tidal perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland)
16 habitat restoration when compared with the other BDCP alternatives. There would be less dramatic
17 reductions in the conversion of tidal (42 acres fewer) and nontidal (169 acres fewer) aquatic and
18 wetland habitats, grassland (390 acres fewer) and valley/foothill riparian habitat (49 acres fewer).
19 Table 12-5-4 presents permanent and temporary natural community effects under other
20 conservation measures. These measures would restore large areas of grassland (CM8),
21 valley/foothill riparian (CM7), and nontidal marsh (CM10) habitats to compensate for the
22 conversions associated with tidal marsh and floodplain restoration, but these other measures would
23 be implemented through the course of the BDCP restoration program. None of these measures
24 includes subsequent expansions of cultivated lands.

1 **Table 12-5-3. Alternative 5 Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**
2 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 ^b		CM4 ^c		CM5 ^d	
	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f
Tidal perennial aquatic ^a	8	11	16	0	2	5
Tidal brackish emergent wetland	0	0	0	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	403	0	43	35
Nontidal perennial aquatic	24	12	68	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	51	0	0	0
Alkali seasonal wetland complex	45	0	13	0	0	0
Vernal pool complex	0	0	269	0	0	0
Managed wetland	24	44	7,301	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	338	239	732	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	11,423	0	2,087	1,194

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Yolo Bypass Fisheries Enhancement.

^c Tidal Natural Communities Restoration.

^d Seasonally Inundated Floodplain Restoration.

^e Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

3

1 **Table 12-5-4. Alternative 5 Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10, CM18)**
2 **that Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 ^a		CM8 ^b		CM10 ^c		CM18 ^d	
	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

a Riparian Natural Community Restoration.

b Grassland Natural Community Restoration.

c Nontidal Marsh Restoration.

d Conservation Hatcheries.

e Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3

4 The 25,000-acre expansion of tidal wetland habitats would occur during the course of the BDCP
5 restoration program. The conversions indicated in Table 12-5-3 include a permanent conversion of
6 16 acres of tidal perennial aquatic, 1 acre of tidal freshwater emergent wetland, 403 acres of
7 valley/foothill riparian, 732 acres of grassland, 13 acres of alkali seasonal wetland complex, 269
8 acres of vernal pool complex, and 68 acres of nontidal perennial aquatic natural communities.
9 Larger acreages of managed wetland (7,301 acres) and cultivated land of various types (11,423
10 acres) would be converted. These conversions would occur in multiple conservation zones, but
11 would be focused in CZs 1, 2, 4, 5 and 11 (see Figure 12-1). Suisun Marsh (CZ 11) would undergo
12 significant conversion of managed wetland while the Cosumnes-Mokelumne area (CZ 4) would have
13 mostly cultivated lands converted. Riparian habitat losses would occur in multiple conservation
14 zones, while grassland conversion would occur primarily in the Yolo Bypass (CZ 2) and the west
15 Delta (CZ 5). Vernal pool inundation would occur in the Cache Slough (CZ 1) and Suisun Marsh (CZ
16 11) areas.

17 This removed habitat supports various life stages of many covered and noncovered species that are
18 found in the study area (see Tables 12-2 and 12-3 in Section 12.1.3, *Special-Status Species*). The loss
19 of managed wetland in the Suisun Marsh area would affect some common waterfowl that prefer
20 freshwater wetlands and prefer the water depths associated with lands that are managed to attract
21 waterfowl. Other species that occupy Suisun Marsh managed wetlands would also be able to occupy
22 the tidal marsh habitats developed as part of CM4. The conversion of valley/foothill riparian habitat
23 would influence special-status species such as valley elderberry longhorn beetle, breeding habitat
24 for raptors, herons and egrets (great egret, snowy egret, great blue heron, Swainson's hawk, Coopers
25 hawk, and black-crowned night heron), and migratory habitat for species that use the riparian
26 corridors, such as western yellow-billed cuckoo. The potential for loss of vernal pool complex
27 through tidal inundation would affect numerous special status fairy shrimp and potentially western
28 spadefoot and California tiger salamander. Grassland conversion would affect foraging for raptors
29 and some passerines, such as loggerhead shrike, tricolored blackbird and grasshopper sparrow. The

1 large acres of converted cultivated land in Cosumnes-Mokelumne area, the west Delta and the Yolo
2 Bypass would affect a variety of species, including raptors, greater sandhill crane, tricolored
3 blackbird, and potentially giant garter snake and western pond turtle.

4 The reader is referred to the Alternative 1A impact analysis above for the broader discussion of
5 overall terrestrial biological resources effects that would result from implementation of Alternative
6 5, beyond only the effects of tidal marsh restoration. The principal effects of concern associated with
7 both Alternative 1A and 5 are related to the conversion of large acreages of cultivated lands and
8 managed wetland to tidal marsh and other habitat types during restoration activities. All of the
9 permanent habitat loss associated with Alternative 5 would take place through the course of
10 implementing the BDCP. The BDCP conservation components are designed to eventually replace and
11 expand habitats that would have a positive influence on plant and animal species covered in the
12 Plan. These conservation components would also have a positive effect on noncovered and common
13 species that occupy the study area.

14 **NEPA Effects:** Alternative 5 would not have adverse effects on the terrestrial natural communities,
15 special-status species and common species that occupy the study area. The alternative also would
16 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive
17 species, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies
18 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat
19 converted by the Plan's conservation actions, including the construction of water conveyance
20 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily affected
21 habitat would be restored to its pre-project condition and the restoration conservation measures
22 (CM2–CM10) would permanently replace primarily cultivated land and managed wetland with tidal
23 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the
24 sensitive natural communities in the study area would have beneficial effects on covered and
25 noncovered species. Where conservation actions would not fully offset effects, the Plan has
26 developed AMMs and this document has included additional mitigation measures to avoid adverse
27 effects. Alternative 5 would not require mitigation measures beyond what is proposed for
28 Alternative 1A to offset effects.

29 **CEQA Conclusion:** Alternative 5 would not have significant and unavoidable impacts on the
30 terrestrial natural communities, special-status species and common species that occupy the study
31 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the
32 risk of introducing invasive species, reduce the value of habitat for waterfowl and shorebirds, or
33 conflict with plans and policies that affect the study area. As with Alternative 1A, there would be
34 large acreages of existing habitat converted by the Plan's conservation actions, including the
35 construction of water conveyance tunnels from the north Delta to Clifton Court Forebay in the south
36 Delta. The temporarily affected habitat would be restored to its pre-project condition and the
37 restoration conservation measures (CM2–CM10) would permanently replace primarily cultivated
38 land and managed wetland with tidal and nontidal marsh, riparian vegetation, and grassland. The
39 increases in acreage and value of the sensitive natural communities in the study area would have
40 beneficial effects on covered, noncovered, and common species. Where conservation actions would
41 not fully offset impacts, the Plan has developed AMMs and this document has included additional
42 mitigation measures to avoid significant impacts. Alternative 5 would not require mitigation
43 measures beyond what is proposed for Alternative 1A to offset effects.

1 As with Alternative 1A, Alternative 5 would require several mitigation measures to be adopted to
2 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
3 measures would be needed beyond the impact offsets provided by Alternative 5 AMMs and CM2-
4 CM21 conservation actions. The relevant mitigation measures, which are included in detail in the
5 analysis of Alternative 1A, are as follows:

- 6 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 7 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 8 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status
9 Reptiles and Implement Applicable AMMs
- 10 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect
11 Effects on Colonies Will Be Minimized
- 12 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater
13 Sandhill Crane Foraging Habitat
- 14 • Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value Lesser
15 Sandhill Crane Foraging Habitat
- 16 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid
17 Disturbance of Nesting Birds
- 18 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing
19 Owl Habitat
- 20 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and
21 Ferruginous Hawk Foraging Habitat
- 22 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 23 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering
24 Habitat
- 25 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 26 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and
27 Grasshopper Sparrow Habitat
- 28 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead
29 Shrike Habitat
- 30 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect
31 Effects on Bank Swallow Will Be Minimized
- 32 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring
33 Flows Upstream of the Study Area
- 34 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 35 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement
36 Protective Measures
- 37 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered
38 Special-Status Plant Species
- 39 • Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United States

- 1 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in
2 Suisun Marsh
- 3 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food
4 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 5 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in
6 Suisun Marsh

7 **12.3.3.11 Alternative 6A—Isolated Conveyance with Pipeline/Tunnel and** 8 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

9 Alternative 6A would affect terrestrial biological resources in the same manner as Alternative 1A.
10 Alternative 6A, which is fully described in Section 3.5.11 of Chapter 3, *Description of Alternatives*,
11 and depicted in Figure 3-2 in Chapter 3, would employ the same construction footprint and include
12 the same suite of conservation components as Alternative 1A. For this reason, Alternative 6A is
13 considered here in a summary fashion; the reader is referred to Alternative 1A for a detailed
14 description of impacts that would be associated with implementing Alternative 6A. The impacts
15 associated with Alternatives 1A and 6A were derived by comparing the alternatives to the No Action
16 Alternative for NEPA purposes, and to Existing Conditions for CEQA purposes.

17 The only difference between the two alternatives is the operational scenario that is proposed.
18 Alternative 6A would use Operational Scenario D rather than Operational Scenario A. Scenario D
19 calls for the pipeline and tunnel to act as an isolated conveyance facility. All water destined for the
20 CVP and SWP canals in the south Delta would be diverted in the north Delta and transported south
21 through the pipeline and tunnel. The pumping of water directly from south Delta channels would no
22 longer occur. Operational Scenario D also provides for an increased Delta outflow during September
23 and October of some water years. These water operations would have no significant effect on
24 terrestrial biological resources in the study area.

25 The reader is referred to the Alternative 1A impact analysis for the broader discussion of overall
26 terrestrial biological resources effects that would result from implementation of Alternative 6A. The
27 Alternative 6A water conveyance facilities construction effects on natural communities are included
28 in Table 12-6A-1. The principal effects of concern associated with both Alternative 1A and 6A are
29 related to the conversion of large acreages of cultivated lands and managed wetland to water
30 conveyance facilities (CM1; Table 12-6A-1), and to tidal marsh and other habitat types (CM2, CM4,
31 and CM5—Table 12-6A-2; CM7, CM8, CM10, and CM18—Table 12-6A-3). Refer to Table 12-1A-69
32 for a summary of Alternative 1A permanent and temporary jurisdictional waters and wetlands
33 impacts.

34 Note that the acres of habitat affected by CM1, as listed in Table 12-6A-1, would be acres affected in
35 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in
36 Table 12-6A-2 and Table 12-6A-3 for the late long-term timeframe are acres that would be affected
37 cumulatively over the entire 50-year period of the Plan. Table 3-4 in Chapter 3, *Description of*
38 *Alternatives*, describes the schedule for implementation of natural community restoration and
39 protection conservation measures.

40 These effects accrue to special-status species and common wildlife species that rely on cultivated
41 lands and managed wetlands during some life stage. Foraging raptors and passerines and some
42 waterbirds are regular inhabitants of the Delta's cultivated lands. The Delta's managed wetlands

1 provide freshwater nesting, feeding and resting habitat for a large number of Pacific flyway
 2 waterfowl and shorebirds, as well as nesting passerines, such as tricolored blackbird. Special-status
 3 plant species that occupy the tidal fringe in Suisun Marsh and parts of the Delta would be subject to
 4 losses associated with physical construction activities (levee breaching and reconstruction) and
 5 changes in water depth and salinity in their current habitat as a result of tidal marsh restoration.

6 **Table 12-6A-1. Alternative 6A Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**
 7 **Communities (acres)**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option		Conveyance Option	
		Alternative 6A Removed Habitat (Permanent) ^b	Difference from Alternative 1A	Alternative 6A Removed Habitat (Temporary) ^c	Difference from Alternative 1A
Tidal perennial aquatic ^a	86,263	48	0	133	0
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	6	0	6	0
Valley/foothill riparian	17,966	58	0	28	0
Nontidal perennial aquatic	5,567	12	0	9	0
Nontidal freshwater perennial emergent wetland	1,509	1	0	1	0
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	3	0	0	0
Managed wetland	70,798	3	0	83	0
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	315	0	262	0
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	3,836	0	2,191	0

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Features in this category include the following conveyance-related facilities: Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas

^c Features in this category include the following conveyance features: Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area and Borrow/Spoil Areas.

8

1 **Table 12-6A-2. Alternative 6A Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**
2 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 ^b		CM4 ^c		CM5 ^d	
	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f
Tidal perennial aquatic ^a	8	11	18	0	2	5
Tidal brackish emergent wetland	0	0	1	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	2,087	1,194

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Yolo Bypass Fisheries Enhancement.

^c Tidal Natural Communities Restoration.

^d Seasonally Inundated Floodplain Restoration.

^e Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

3

1 **Table 12-6A-3. Alternative 6A Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10,**
2 **CM18) that Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 ^a		CM8 ^b		CM10 ^c		CM18 ^d	
	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

^a Riparian Natural Community Restoration.

^b Grassland Natural Community Restoration.

^c Nontidal Marsh Restoration.

^d Conservation Hatcheries.

^e Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3

4 Some of the permanent habitat loss associated with these alternatives would occur during the early,
5 construction-related stage of the BDCP. Other losses would occur over time as some habitats
6 (cultivated lands, managed wetland, valley/foothill riparian and grassland) are converted to tidal
7 marsh (tidal perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland)
8 and other natural communities. The BDCP conservation components are designed to eventually
9 replace and expand habitats that would have a positive influence on plant and animal species
10 covered in the Plan. These conservation components would also have a positive effect on
11 noncovered and common species that occupy the study area.

12 **NEPA Effects:** Alternative 6A would not have adverse effects on the terrestrial natural communities,
13 special-status species and common species that occupy the study area. The alternative also would
14 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive
15 species, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies
16 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat
17 converted by the Plan's conservation actions, including the construction of water conveyance
18 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily affected
19 habitat would be restored to its pre-project condition and the restoration conservation measures
20 (CM2–CM10) would permanently replace primarily cultivated land and managed wetland with tidal
21 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the
22 sensitive natural communities in the study area would have beneficial effects on covered and
23 noncovered species. Where conservation actions would not fully offset effects, the Plan has
24 developed AMMs and this document has included additional mitigation measures to avoid adverse
25 effects. Alternative 6A would not require mitigation measures beyond what is proposed for
26 Alternative 1A to offset effects because the affects to terrestrial resources are exactly the same.

1 **CEQA Conclusion:** Alternative 6A would not have significant and unavoidable impacts on the
2 terrestrial natural communities, special-status species and common species that occupy the study
3 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the
4 risk of introducing invasive species, reduce the value of habitat for waterfowl and shorebirds, or
5 conflict with plans and policies that affect the study area. As with Alternative 1A, there would be
6 large acreages of existing habitat converted by the Plan's conservation actions, including the
7 construction of water conveyance tunnels from the north Delta to Clifton Court Forebay in the south
8 Delta. The temporarily affected habitat would be restored to its pre-project condition and the
9 restoration conservation measures (CM2–CM10) would permanently replace primarily cultivated
10 land and managed wetland with tidal and nontidal marsh, riparian vegetation, and grassland. The
11 increases in acreage and value of the sensitive natural communities in the study area would have
12 beneficial effects on covered, noncovered, and common species. Where conservation actions would
13 not fully offset impacts, the Plan has developed AMMs and this document has included additional
14 mitigation measures to avoid significant impacts. Alternative 6A would not require mitigation
15 measures beyond what is proposed for Alternative 1A to offset effects because the affects to
16 terrestrial resources are exactly the same.

17 As with Alternative 1A, Alternative 6A would require several mitigation measures to be adopted to
18 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
19 measures would be needed beyond the impact offsets provided by Alternative 6A AMMs and CM2–
20 CM21 conservation actions. The relevant mitigation measures, which are included in detail in the
21 analysis of Alternative 1A, are as follows:

- 22 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 23 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 24 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status
25 Reptiles and Implement Applicable AMMs
- 26 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect
27 Effects on Colonies Will Be Minimized
- 28 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater
29 Sandhill Crane Foraging Habitat
- 30 • Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value Lesser
31 Sandhill Crane Foraging Habitat
- 32 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid
33 Disturbance of Nesting Birds
- 34 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing
35 Owl Habitat
- 36 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and
37 Ferruginous Hawk Foraging Habitat
- 38 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 39 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering
40 Habitat
- 41 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat

- 1 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and
2 Grasshopper Sparrow Habitat
- 3 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead
4 Shrike Habitat
- 5 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect
6 Effects on Bank Swallow Will Be Minimized
- 7 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring
8 Flows Upstream of the Study Area
- 9 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 10 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement
11 Protective Measures
- 12 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered
13 Special-Status Plant Species
- 14 • Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United States
- 15 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in
16 Suisun Marsh
- 17 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food
18 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 19 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in
20 Suisun Marsh

21 **12.3.3.12 Alternative 6B—Isolated Conveyance with East Alignment and** 22 **Intakes 1–5 (15,000 cfs; Operational Scenario D)**

23 Alternative 6B would affect terrestrial biological resources in the same manner as Alternative 1B.
24 Alternative 6B, which is described fully in Section 3.5.12 of Chapter 3, *Description of Alternatives*,
25 and depicted in Figure 3-4 in Chapter 3, would employ the same construction footprint and contain
26 the same suite of conservation components as Alternative 1B. For this reason, Alternative 6B is
27 considered here in a summary fashion; the reader is referred to Alternative 1B for a detailed
28 description of impacts that would be associated with implementing Alternative 6B. The impacts
29 associated with Alternatives 1B and 6B were derived by comparing the alternatives with the No
30 Action Alternative for NEPA purposes, and to Existing Conditions for CEQA purposes.

31 The only difference between the two alternatives is the operational scenario that is proposed.
32 Alternative 6B would use Operational Scenario D rather than Operational Scenario A. Scenario D
33 calls for the eastern canal to act as an isolated conveyance facility. All water destined for the CVP and
34 SWP canals in the south Delta would be diverted in the north Delta and transported south through
35 the eastern canal. The pumping of water directly from south Delta channels would no longer occur.
36 Operational Scenario D also provides for an increased Delta outflow during September and October
37 of some water years. These water operations would have no significant effect on terrestrial
38 biological resources in the study area.

1 The Alternative 6B water conveyance facilities construction effects on natural communities are
2 included in Table 12-6B-1. The principal effects of concern associated with both Alternative 1B and
3 6B are related to the conversion of large acreages of cultivated lands and managed wetland to water
4 conveyance facilities (Table 12-6B-1), tidal marsh and other habitat types (Table 12-6B-2 and Table
5 12-6B-3). Refer to Table 12-1B-68 for a summary of Alternative 1B permanent and temporary
6 jurisdictional waters and wetlands impacts.

7 Note that the acres of habitat affected by CM1, as listed in Table 12-6B-1, would be acres affected in
8 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in
9 Table 12-6B-2 and Table 12-6B-3 for the late long-term timeframe are acres affected cumulatively
10 over the entire 50-year period of the Plan. Table 3-4 in Chapter 3, *Description of Alternatives*,
11 describes the schedule for implementation of natural community restoration and protection
12 conservation measures.

13 The major habitat conversions associated with Alternatives 1B and 6B accrue to special-status
14 species and common wildlife species that rely on cultivated lands and managed wetlands during
15 some life stage. Foraging raptors and passerines and some waterbirds are regular inhabitants of the
16 Delta's cultivated lands. The Delta's managed wetlands provide freshwater nesting, feeding and
17 resting habitat for a large number of Pacific flyway waterfowl and shorebirds, as well as nesting
18 passerines, such as tricolored blackbird. Special-status plant species that occupy the tidal fringe in
19 Suisun Marsh and parts of the Delta would be subject to losses associated with physical construction
20 activities (levee breaching and reconstruction) and changes in water depth and salinity in their
21 current habitat as a result of tidal marsh restoration.

1 **Table 12-6B-1. Alternative 6B Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**
2 **Communities (acres)**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option		Conveyance Option	
		Alternative 6B Removed Habitat (Permanent) ^b	Difference from Alternative 1B	Alternative 6B Removed Habitat (Temporary) ^c	Difference from Alternative 1B
Tidal perennial aquatic ^a	86,263	33	0	145	0
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	8	0	11	0
Valley/foothill riparian	17,966	51	0	39	0
Nontidal perennial aquatic	5,567	19	0	5	0
Nontidal freshwater perennial emergent wetland	1,509	5	0	6	0
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	0	0	0	0
Managed wetland	70,798	4	0	18	0
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	400	0	358	0
Inland dune scrub	19	0	0	0	0
Cultivated land	487,106	7,886	0	12,551	0

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Features in this category include the following conveyance-related facilities: Canal, Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas.

^c Features in this category include the following conveyance features: Canal Work Area, Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area, and Borrow/Spoil Areas.

3
4 Some of the permanent habitat loss associated with these alternatives would occur during the early,
5 construction-related stage of the BDCP. Other losses would occur over time as some habitats
6 (cultivated lands, managed wetland, valley/foothill riparian and grassland) are converted to tidal
7 marsh (tidal perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland;
8 CM4) and other natural communities (CM2 and CM5, Table 12-6B-2; CM7, CM8, CM10, and CM18,
9 Table 12-6B-3). The BDCP conservation components are designed to eventually replace and expand
10 habitats that would have a positive influence on plant and animal species covered in the Plan. These
11 conservation components would also have a positive effect on noncovered and common species that
12 occupy the study area.

1 **Table 12-6B-2. Alternative 6B Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**
2 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 ^b		CM4 ^c		CM5 ^d	
	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f
Tidal perennial aquatic ^a	8	11	18	0	2	5
Tidal brackish emergent wetland	0	0	1.	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	2,087	1,194

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Yolo Bypass Fisheries Enhancement.

^c Tidal Natural Communities Restoration

^d Seasonally Inundated Floodplain Restoration

^e Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

3

1 **Table 12-6B-3. Alternative 6B Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10,**
2 **CM18) that Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 ^a		CM8 ^b		CM10 ^c		CM18 ^d	
	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f
Grassland	410	0	0	0	0	0	35	0
Cultivated land	4,553	0	2,000	0	1,950	0	0	0

^a Riparian Natural Community Restoration.

^b Grassland Natural Community Restoration.

^c Nontidal Marsh Restoration.

^d Conservation Hatcheries.

^e Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3

4 **NEPA Effects:** Alternative 6B would not have adverse effects on the terrestrial natural communities,
5 special-status species and common species that occupy the study area except for an adverse effect
6 on giant garter snake population connectivity and on wildlife movement corridors in general. The
7 construction of the canal would substantially inhibit the movement of giant garter snakes and other
8 wildlife from moving within and outside of the Delta. This alternative would not significantly
9 increase the risk of introducing invasive species, reduce the value of habitat for waterfowl and
10 shorebirds, or conflict with plans and policies that affect the study area. As with Alternative 1B,
11 there would be large acreages of existing habitat converted by the Plan's conservation actions,
12 including the construction of the water conveyance canal from the north Delta to Clifton Court
13 Forebay in the south Delta. The temporarily affected habitat would be restored to its pre-project
14 condition and the restoration conservation measures (CM2–CM10) would permanently replace
15 primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian vegetation,
16 and grassland. The increases in acreage and value of the sensitive natural communities in the study
17 area would have beneficial effects on covered and noncovered species. Where conservation actions
18 would not fully offset effects, the Plan has developed AMMs and this document has included
19 additional mitigation measures to avoid and minimize adverse effects to the maximum extent
20 practicable. Alternative 6B would not require mitigation measures beyond what is proposed for
21 Alternative 1B to offset effects.

22 **CEQA Conclusion:** Alternative 6B would not have significant and unavoidable impacts on the
23 terrestrial natural communities, special-status species and common species that occupy the study
24 area except for giant garter snake habitat connectivity, or to wildlife movement corridors in general.
25 The construction of the canal would substantially inhibit the movement of giant garter snakes and
26 other wildlife from moving within and outside of the Delta. The alternative would not increase the
27 risk of introducing invasive species, reduce the value of habitat for waterfowl and shorebirds, or
28 conflict with plans and policies that affect the study area. As with Alternative 1B, there would be
29 large acreages of existing habitat converted by the Plan's conservation actions, including the

1 construction of water conveyance tunnels from the north Delta to Clifton Court Forebay in the south
2 Delta. The temporarily affected habitat would be restored to its pre-project condition and the
3 restoration conservation measures (CM2–CM10) would permanently replace primarily cultivated
4 land and managed wetland with tidal and nontidal marsh, riparian vegetation, and grassland. The
5 increases in acreage and value of the sensitive natural communities in the study area would have
6 beneficial effects on covered, noncovered, and common species. Where conservation actions would
7 not fully offset impacts, the Plan has developed AMMs and this document has included additional
8 mitigation measures to avoid and minimize significant impacts. Alternative 6B would not require
9 mitigation measures beyond what is proposed for Alternative 1B to offset effects. Despite these
10 measures, there would remain significant and unavoidable impacts on giant garter snake population
11 connectivity and wildlife movement corridors from Alternative 6B.

12 As with Alternative 1B, Alternative 6B would require several mitigation measures to be adopted to
13 reduce effects on terrestrial biological resources to less-than-significant levels when possible. These
14 mitigation measures would be needed beyond the impact offsets provided by Alternative 6B AMMs
15 and CM2–CM21 conservation actions. The relevant mitigation measures, which are included in detail
16 in the analysis of Alternative 1B, are as follows:

- 17 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 18 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 19 • Mitigation Measure BIO-50a: Provide Connectivity between Coldani Marsh/White Slough
20 Population and the Giant Garter Snake’s Historical Range
- 21 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status
22 Reptiles and Implement Applicable AMMs
- 23 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect
24 Effects on Colonies Will Be Minimized
- 25 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater
26 Sandhill Crane Foraging Habitat
- 27 • Mitigation Measure BIO-69b: BDCP-Related Construction Will Not Result in A Net Decrease in
28 Crane Use Days on Bract Tract
- 29 • Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value Lesser
30 Sandhill Crane Foraging Habitat
- 31 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid
32 Disturbance of Nesting Birds
- 33 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing
34 Owl Habitat
- 35 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and
36 Ferruginous Hawk Foraging Habitat
- 37 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 38 • Mitigation Measure BIO-121: Compensate for Loss of Short-Eared Owl and Northern Harrier
39 Nesting Habitat
- 40 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering
41 Habitat

- 1 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 2 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and
- 3 Grasshopper Sparrow Habitat
- 4 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead
- 5 Shrike Habitat
- 6 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect
- 7 Effects on Bank Swallow Will Be Minimized
- 8 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring
- 9 Flows Upstream of the Study Area
- 10 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 11 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement
- 12 Protective Measures
- 13 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered
- 14 Special-Status Plant Species
- 15 • Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United States
- 16 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in
- 17 Suisun Marsh
- 18 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food
- 19 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 20 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in
- 21 Suisun Marsh

22 **12.3.3.13 Alternative 6C—Isolated Conveyance with West Alignment and**

23 **Intakes W1–W5 (15,000 cfs; Operational Scenario D)**

24 Alternative 6C would affect terrestrial biological resources in the same manner as Alternative 1C.
25 Alternative 6C, which is described fully in Section 3.5.13 of Chapter 3, *Description of Alternatives*, and
26 depicted in Figure 3-6 in Chapter 3, would employ the same construction footprint and include the
27 same suite of conservation components as Alternative 1C. For this reason, Alternative 6C is
28 considered here in a summary fashion; the reader is referred to Alternative 1C for a detailed
29 description of impacts that would be associated with implementing Alternative 6C. The impacts
30 associated with Alternatives 1C and 6C were derived by comparing the alternatives with the No
31 Action Alternative for NEPA purposes, and to Existing Conditions for CEQA purposes.

32 The only difference between the two alternatives is the operational scenario that is proposed.
33 Alternative 6C would use Operational Scenario D rather than Operational Scenario A. Scenario D
34 calls for the western canal and tunnel to act as an isolated conveyance facility. All water destined for
35 the CVP and SWP canals in the south Delta would be diverted in the north Delta and transported
36 south through the western canal and tunnel. The direct pumping of water from south Delta
37 waterways would no longer occur. Operational Scenario D also provides for an increased Delta
38 outflow during September and October of some water years. These water operations would have no
39 significant effect on terrestrial biological resources in the study area.

1 **CM1 Construction Effects for Alternative 6C**

2 The Alternative 6C water conveyance facilities construction effects on natural communities are
3 included in Table 12-6C-1. The principal effects of concern associated with both Alternative 1C and
4 6C are related to the conversion of large acreages of cultivated lands, managed wetland, grassland,
5 vernal pool complex and alkali seasonal wetland complex to water conveyance facilities (Table 12-
6 6C-1). Refer to Table 12-1C-68 for a summary of Alternative 1C permanent and temporary
7 jurisdictional waters and wetlands impacts.

8 Note that the acres of habitat affected by CM1, as listed in Table 12-6C-1, would be acres affected in
9 the near-term timeframe, or the first 10 years of Plan implementation. The acres represented in
10 Table 12-6C-2 and Table 12-6C-3 for the late long-term timeframe are acres that would be affected
11 cumulatively over the entire 50-year period of the Plan. Table 3-4 in Chapter 3, *Description of*
12 *Alternatives*, describes the schedule for implementation of natural community restoration and
13 protection conservation measures.

14 Construction of the Alternative 6C canal and tunnel in the western Delta and west and northwest of
15 Clifton Court Forebay would have significant impacts on cultivated lands, and grassland, vernal pool
16 and alkali seasonal wetland natural communities. The large acreages of vernal pool and alkali
17 seasonal wetland impacted near Clifton Court Forebay would exceed the offsetting restoration and
18 protection included in the BDCP, so additional mitigation would be required. These effects accrue to
19 special-status species and common wildlife species that rely on cultivated land, grassland, vernal
20 pool complex and alkali seasonal wetland complex during some life stage. Foraging raptors and
21 passerines and some waterbirds are regular inhabitants of the Delta's cultivated lands. Grassland
22 habitats also provide foraging for raptors and passerines, and upland habitat for some mammals and
23 amphibians. Vernal pools provide habitat to special-status crustaceans, California tiger salamander,
24 numerous common waterbirds, and a suite of special-status plants. Alkali seasonal wetland complex
25 provides habitat to California tiger salamander, numerous common waterbirds, foraging raptors and
26 its own suite of special-status, salt tolerant plants.

27 The near-term conservation activities described in Appendix 12D, *Feasibility Assessment of*
28 *Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on Terrestrial*
29 *Biological Resources*, and the mitigation measures proposed in the Alternative 1C analysis would
30 provide for conservation, enhancement and replacement of habitats affected by the early water
31 conveyance facility construction activities of Alternative 6C. This conservation activity, which is part
32 of the early implementation of the BDCP, would offset most water conveyance facilities construction
33 effects on both covered and noncovered special-status species in the study area. As indicated above,
34 additional mitigation would be required for species reliant on vernal pool complex and alkali
35 seasonal wetland complex natural communities.

1 **Table 12-6C-1. Alternative 6C Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**
2 **Communities (acres)**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option		Conveyance Option	
		Alternative 6C Removed Habitat (Permanent) ^b	Difference from Alternative 1C	Alternative 6C Removed Habitat (Temporary) ^c	Difference from Alternative 1C
Tidal perennial aquatic ^a	86,263	25	0	117	0
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	0	0	1	0
Valley/foothill riparian	17,966	40	0	86	0
Nontidal perennial aquatic	5,567	22	0	21	0
Nontidal freshwater perennial emergent wetland	1,509	0	0	5	0
Alkali seasonal wetland complex	3,723	13	0	9	0
Vernal pool complex	12,133	29	0	37	0
Managed wetland	70,798	1	0	145	0
Other natural seasonal wetland	842	2	0	2	0
Grassland	78,047	358	0	320	0
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	6,073	0	9,481	0

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Features in this category include the following conveyance-related facilities: Canal, Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas.

^c Features in this category include the following conveyance features: Canal Work Area, Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area, and Borrow/Spoil Areas.

3

1 **Table 12-6C-2. Alternative 6C Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**
2 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 ^b		CM4 ^c		CM5 ^d	
	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f
Tidal perennial aquatic ^a	8	11	58	0	2	5
Tidal brackish emergent wetland	0	0	0	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	2,087	1,194

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Yolo Bypass Fisheries Enhancement.

^c Tidal Natural Communities Restoration.

^d Seasonally Inundated Floodplain Restoration.

^e Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

3

1 **Table 12-6C-3. Alternative 6C Late Long-Term Restoration Activities (CM7, CM8, CM10, CM18) that**
2 **Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 ^a		CM8 ^b		CM10 ^c		CM18 ^d	
	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

^a Riparian Natural Community Restoration.

^b Grassland Natural Community Restoration.

^c Nontidal Marsh Restoration.

^d Conservation Hatcheries.

^e Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3

4 **Effects of Restoration-Related Actions of Alternative 6C**

5 Some of the permanent habitat loss associated with Alternative 6C would occur during the early,
6 construction-related stage of the BDCP. Other losses would occur over time as some natural
7 communities (cultivated lands, managed wetland, alkali seasonal wetland complex, grassland and
8 valley/foothill riparian) are converted to tidal marsh (tidal perennial aquatic, tidal brackish
9 emergent wetland, tidal freshwater emergent wetland) and other natural communities as part of
10 restoration actions (CM2, CM4, and CM5; Table 12-6C-2; CM7, CM8, CM10, and CM18; Table 12-6C-
11 3). The large acreages of cultivated land and managed wetland converted during marsh, grassland
12 and riparian habitat restoration would affect species similar to those described above for losses
13 associated with CM1, only on a larger scale. The BDCP restoration-related conservation components
14 are designed to eventually replace and expand habitats that would have a positive influence on plant
15 and animal species covered in the Plan. These conservation components would also have a positive
16 effect on noncovered and common species that occupy the study area.

17 **NEPA Effects:** Alternative 6C would not have adverse effects on the terrestrial natural communities,
18 special-status species and common species that occupy the study. The construction of the canal and
19 associated infrastructure would substantially inhibit the movement of wildlife from moving within
20 and outside of the Delta resulting in an adverse effect. This alternative would not significantly
21 increase the risk of introducing invasive species, reduce the value of habitat for waterfowl and
22 shorebirds, or conflict with plans and policies that affect the study area. As with Alternative 1C,
23 there would be large acreages of existing habitat converted by the Plan's conservation actions,
24 including the construction of the water conveyance canal from the north Delta to Clifton Court
25 Forebay in the south Delta. The temporarily affected habitat would be restored to its pre-project
26 condition and the restoration conservation measures (CM2–CM10) would permanently replace
27 primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian vegetation,
28 and grassland. The increases in acreage and value of the sensitive natural communities in the study

1 area would have beneficial effects on covered and noncovered species. Where conservation actions
2 would not fully offset effects, the Plan has developed AMMs and this document has included
3 additional mitigation measures to avoid and minimize adverse effects to the maximum extent
4 practicable. Alternative 6C would not require mitigation measures beyond what is proposed for
5 Alternative 1C to offset effects.

6 **CEQA Conclusion:** Alternative 6C would not have significant and unavoidable impacts on the
7 terrestrial natural communities, special-status species and common species that occupy the study.
8 The construction of the canal and associated infrastructure would substantially inhibit the
9 movement of wildlife from moving within and outside of the Delta resulting in an adverse effect. The
10 alternative would not increase the risk of introducing invasive species, reduce the value of habitat
11 for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As with
12 Alternative 1C, there would be large acreages of existing habitat converted by the Plan's
13 conservation actions, including the construction of water conveyance tunnels from the north Delta
14 to Clifton Court Forebay in the south Delta. The temporarily affected habitat would be restored to its
15 pre-project condition and the restoration conservation measures (CM2–CM10) would permanently
16 replace primarily cultivated land and managed wetland with tidal and nontidal marsh, riparian
17 vegetation, and grassland. The increases in acreage and value of the sensitive natural communities
18 in the study area would have beneficial effects on covered, noncovered, and common species. Where
19 conservation actions would not fully offset impacts, the Plan has developed AMMs and this
20 document has included additional mitigation measures to avoid and minimize significant impacts.
21 Alternative 6C would not require mitigation measures beyond what is proposed for Alternative 1C
22 to offset effects. Despite these measures, there would remain a significant and unavoidable impact
23 on wildlife movement corridors from Alternative 6C.

24 As with Alternative 1C, Alternative 6C would require several mitigation measures to be adopted to
25 reduce effects on terrestrial biological resources to less-than-significant levels when possible. These
26 mitigation measures would be needed beyond the impact offsets provided by Alternative 6C AMMs
27 and CM2–CM21 conservation actions. The relevant mitigation measures, which are included in detail
28 in the analysis of Alternative 1C, are as follows:

- 29 • Mitigation Measure BIO-18: Compensate for Loss of Alkali Seasonal Wetland Complex
- 30 • Mitigation Measure BIO-27: Compensate for Loss of Other Natural Seasonal Wetland
- 31 • Mitigation Measure BIO-32: Restore and Protect Vernal Pool Crustacean Habitat
- 32 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 33 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 34 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status
35 Reptiles and Implement Applicable AMMs
- 36 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect
37 Effects on Colonies Will Be Minimized
- 38 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater
39 Sandhill Crane Foraging Habitat
- 40 • Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value Lesser
41 Sandhill Crane Foraging Habitat

- 1 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid
2 Disturbance of Nesting Birds
- 3 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing
4 Owl Habitat
- 5 • Mitigation Measure BIO-91a, Compensate for Permanent Loss of Low-Value Western Burrowing
6 Owl Habitat
- 7 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and
8 Ferruginous Hawk Foraging Habitat
- 9 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 10 • Mitigation Measure BIO-121: Compensate for Loss of Short-Eared Owl and Northern Harrier
11 Nesting Habitat
- 12 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering
13 Habitat
- 14 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 15 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and
16 Grasshopper Sparrow Habitat
- 17 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead
18 Shrike Habitat
- 19 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect
20 Effects on Bank Swallow Will Be Minimized
- 21 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring
22 Flows Upstream of the Study Area
- 23 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 24 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement
25 Protective Measures
- 26 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered
27 Special-Status Plant Species
- 28 • Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United States
- 29 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in
30 Suisun Marsh
- 31 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food
32 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 33 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in
34 Suisun Marsh

1 **12.3.3.14 Alternative 7—Dual Conveyance with Pipeline/Tunnel, Intakes 2,**
2 **3, and 5, and Enhanced Aquatic Conservation (9,000 cfs;**
3 **Operational Scenario E)**

4 The water conveyance facilities construction elements (CM1) of Alternative 7 would affect
5 terrestrial biological resources in a nearly identical fashion to Alternative 1A. The principal
6 differences between Alternative 7, which is described fully in Section 3.5.14 of Chapter 3, *Description*
7 *of Alternatives*, and depicted in Figure 3-2 in Chapter 3, and Alternative 1A are related to the
8 differing construction footprints. For this reason, Alternative 7 is considered here in a summary
9 fashion; the reader is referred to Alternative 1A for a detailed description of impacts that would be
10 associated with implementing Alternative 7. The impacts associated with Alternatives 1A and 7
11 were derived by comparing the alternatives with the No Action Alternative for NEPA purposes, and
12 to Existing Conditions for CEQA purposes.

13 The Alternative 7 water conveyance facilities would entail construction at north Delta Intakes 2, 3,
14 and 5 rather than 1–5. The locations of these intakes are depicted in Figure 3-2 in Chapter 3.
15 Eliminating Intakes 1 and 4 would reduce the construction footprint along the eastern bank of the
16 Sacramento River just north of Clarksburg and immediately south of Hood. The operational scenario
17 for Alternative 7 (Scenario E) is also different from Alternative 1A (Operational Scenario A), but this
18 change would not significantly alter terrestrial biological resources effects. Alternative 7 operations
19 would extract water from the river at the three intakes and would require additional pumping at the
20 south Delta pumps. Also, Operational Scenario E would involve greater Delta freshwater outflows
21 during September, October and November of some water years when compared with Operational
22 Scenario A.

23 Alternative 7 would include the same conservation activities as Alternative 1A beyond CM1 with
24 two exceptions. *CM6 Channel Margin Enhancement* would include restoration and enhancement
25 activities along 40 miles of river channel in the Delta rather than the 20 miles proposed for all other
26 BDCP alternatives. Also, *CM5 Seasonally Inundated Floodplain Restoration* would expand from
27 10,000 acres to 20,000 acres under Alternative 7. These expansions would have major positive
28 impacts on valley/foothill riparian natural community along major Delta waterways; at the same
29 time, other natural communities and cultivated land would experience reductions as riparian
30 habitats are enhanced and expanded.

31 **Comparative Differences in CM1 Construction Effects for Alternatives 7 and 1A**

32 Because of the elimination of Intakes 1 and 4 and their associated pumps and pipelines, Alternative
33 7 would create relatively small differences in the permanent and temporary loss of natural
34 communities and cultivated lands during water conveyance facilities construction when compared
35 with Alternative 1A (Table 12-7-1). All of these differences would occur during the near-term
36 timeframe associated with water conveyance facilities construction. Alternative 7 would
37 permanently remove 7 fewer acres of tidal perennial aquatic habitat in the Sacramento River, 10
38 fewer acres of valley/foothill riparian habitat along the eastern bank of the Sacramento River, and 5
39 fewer acres of grassland along the river levees. These reductions would occur as a result of not
40 constructing Intakes 1 and 4 on the east bank of the Sacramento River. There would also be a
41 reduction in loss of cultivated lands (95 fewer acres) east of the river near these intake sites.
42 Alternative 7 would also permanently affect a smaller acreage of jurisdictional waters (including
43 wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (7 acres fewer;

1 see Table 12-7-2). Refer to Table 12-1A-69 for a summary of Alternative 1A permanent and
2 temporary jurisdictional waters and wetlands impacts.

3 **Table 12-7-1. Alternative 7 Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**
4 **Communities (acres)**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option		Conveyance Option	
		Alternative 7 Removed Habitat (Permanent) ^b	Difference from Alternative 1A	Alternative 7 Removed Habitat (Temporary) ^c	Difference from Alternative 1A
Tidal perennial aquatic ^a	86,263	41	-7	108	-25
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	6	0	5	-1
Valley/foothill riparian	17,966	48	-10	25	-3
Nontidal perennial aquatic	5,567	12	0	9	0
Nontidal freshwater perennial emergent wetland	1,509	1	0	1	0
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	3	0	0	0
Managed wetland	70,798	3	0	83	0
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	305	-5	255	-7
Inland dune scrub	19	0	0	0	0
Cultivated lands	487,106	3,741	-95	1,977	-214

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Features in this category include the following conveyance-related facilities: Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas.

^c Features in this category include the following conveyance features: Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area, and Borrow/Spoil Areas.

5

1 **Table 12-7-2 Alternative 7 Effects on Jurisdictional Wetlands and Waters Relative to Alternative 1A**
2 **(acres)**

Wetland/Water Type	Alternative 7 Impacts on Jurisdictional Wetlands and Waters			
	Permanent Impact	Difference from Alternative 1A	Temporary Impact	Difference from Alternative 1A
Agricultural Ditch	64.6	-0.3	21.9	-1.6
Alkaline Wetland	0.1	0	0	0
Clifton Court Forebay	1.0	0	0	0
Conveyance Channel	12.7	0	1.1	0
Depression	1.9	0	0.4	-1.3
Emergent Wetland	46.8	0	6.7	-0.6
Forest	5.6	-0.1	10.8	-1.1
Lake	0	0	0.3	0
Scrub-Shrub	20.3	-0.3	3.3	-1.0
Seasonal Wetland	18.7	0	26.6	0
Tidal Channel	36.9	-6.1	109.6	-24.2
Vernal Pool	0	0	0	0
Total	209	-6.8	181	-29.8

3
4 During the water conveyance facilities construction process, Alternative 7 would also involve less
5 temporary loss of habitat when compared with Alternative 1A. The difference would be reflected in
6 reduced losses of tidal perennial aquatic (25 acres less), valley/foothill riparian (3 acres less),
7 grassland (7 acres less), and cultivated land (214 acres less) when compared with Alternative 1A
8 (Table 12-7-1). Alternative 7 would also temporarily affect a smaller acreage of jurisdictional waters
9 (including wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (30
10 acres fewer; see Table 12-7-2). Refer to Table 12-1A-69 for a summary of Alternative 1A permanent
11 and temporary jurisdictional waters and wetlands impacts.

12 These differences in permanent loss of habitat from constructing the water conveyance facility
13 would create differences in effects on covered and noncovered wildlife. The reduced level of
14 valley/foothill riparian habitat loss would be a positive influence on valley elderberry longhorn
15 beetle, breeding habitat for raptors, herons and egrets (great egret, snowy egret, great blue heron,
16 Swainson's hawk, Cooper's hawk, white-tailed kite, and black-crowned night heron), and migratory
17 habitat for species that use the river corridor, such as western yellow-billed cuckoo. Species that
18 would benefit from smaller permanent losses of grassland and cultivated land would include
19 foraging raptors (Swainson's hawk, short-eared owl, northern harrier, merlin and white-tailed kite),
20 greater sandhill crane, mountain plover, California horned lark, tricolored blackbird and several
21 species of bats. Alternative 7 would permanently remove 85 fewer acres of greater sandhill crane
22 foraging habitat when compared to Alternative 1A. The smaller temporary habitat conversions
23 associated with Alternative 7 would have comparable benefits to these species.

24 The differences in effect that Alternatives 1A and 7 could have on special-status plant species are
25 extremely minor. Habitat modeling indicates that Alternative 7 would create 5 fewer acres of habitat
26 loss for Mason's lilaeopsis and delta mudwort when compared with Alternative 1A.

1 The near-term conservation activities described in Appendix 12D, *Feasibility Assessment of*
2 *Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on Terrestrial*
3 *Biological Resources*, and the mitigation measures proposed in the Alternative 1A analysis would
4 provide for protection, enhancement and restoration of habitats affected by the early water
5 conveyance facility construction activities associated with Alternative 7. This conservation activity,
6 which is part of the early implementation of the BDCP, would offset water conveyance facilities
7 construction effects on both covered and noncovered special-status species in the study area.

8 **Effects of Restoration-Related Actions of Alternative 7**

9 The natural communities and managed land conversions associated with the restoration-related
10 conservation measures of Alternative 7 present the greatest potential to affect both covered and
11 noncovered plants and wildlife in the study area (CM2, CM4, and CM5—Table 12-7-3; CM7, CM8,
12 CM10, and CM18—Table 12-7-4). Most of Alternative 7's other conservation measures (CM2, CM4,
13 CM7, CM8, CM10, and CM18) are identical to the other BDCP alternatives described above. However,
14 the seasonally inundated floodplain restoration (CM5) and channel margin enhancement (CM6) for
15 Alternative 7 would be expanded compared with the other BDCP alternatives. The seasonally
16 inundated floodplain restoration would be expanded by 10,000 acres and the channel margin
17 habitat enhancement would be extended for another 20 linear miles. Both of these activities would
18 extend valley/foothill riparian habitat adjacent to some of the Delta's major waterways, including
19 the Sacramento, San Joaquin and Mokelumne Rivers, and Sutter and Steamboat Sloughs. The
20 floodplain expansion would also allow for the introduction of wildlife-compatible cultivated land in
21 the newly created floodplains.

22 The expansion of floodplain habitat would be accomplished through the course of the BDCP
23 restoration program. During that period, setback of levees and other activities associated with the
24 conservation components would permanently remove acreages from some natural communities.
25 The permanent and temporary conversions for Alternative 7 are shown in Table 12-7-3 and Table
26 12-7-4. Table 3-4 in Chapter 3, *Description of Alternatives*, describes the schedule for
27 implementation of natural community restoration and protection conservation measures. The
28 principal permanent losses would be in nontidal perennial aquatic, managed wetland, grassland and
29 cultivated lands natural communities. These losses would affect plant and wildlife species associated
30 with the habitats. Grassland and cultivated lands losses along the Delta waterways mentioned above
31 would reduce foraging habitat for some special-status raptors (short-eared owl, Swainson's hawk,
32 white-tailed kite, northern harrier, merlin, western burrowing owl), greater sandhill crane and
33 tricolored blackbird; upland habitat for giant garter snake and riparian brush rabbit; and dispersal
34 and upland nesting habitat for western pond turtle. The permanent loss of nontidal perennial
35 aquatic habitat would affect aquatic habitat for giant garter snake and western pond turtle. The
36 temporary removal of existing riparian habitat to move levees and prepare stream channels for
37 replanting of riparian species would have a short-term effect on multiple species, including riparian
38 woodrat, riparian brush rabbit, nesting raptors, valley elderberry longhorn beetle, yellow-breasted
39 chat, western yellow-billed cuckoo, and western pond turtle.

1 **Table 12-7-3. Alternative 7 Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**
2 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 ^b		CM4 ^c		CM5 ^d	
	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f
Tidal perennial aquatic ^a	8	11	18	0	4	10
Tidal brackish emergent wetland	0	0	1	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	2	2
Valley/foothill riparian	89	88	552	0	86	70
Nontidal perennial aquatic	24	12	189	0	56	32
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	102	68
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	629	363	39,565	0	4,174	2,388

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Yolo Bypass Fisheries Enhancement.

^c Tidal Natural Communities Restoration.

^d Seasonally Inundated Floodplain Restoration; the acreages included for CM5 in this table were estimated by doubling the acreages calculated for CM5 for other BDCP alternatives. The CM5 acres for other BDCP alternatives were estimated based on a hypothetical footprint for the restoration action, but no similar footprint was developed for Alternative 7.

^e Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

3

1 **Table 12-7-4. Alternative 7 Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10, CM18)**
2 **that Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 ^a		CM8 ^b		CM10 ^c		CM18 ^d	
	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

^a Riparian Natural Community Restoration.

^b Grassland Natural Community Restoration.

^c Nontidal Marsh Restoration.

^d Conservation Hatcheries.

^e Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent.

Temp = Temporary.

3

4 A number of special-status plant species would have modeled habitat affected by the extension of
5 seasonally inundated floodplain for Alternative 7. There would be permanent and temporary effects
6 on this habitat. The habitat lost permanently includes 10 acres for slough thistle, 13 acres for delta
7 button celery, 2 acres each for San Joaquin spearscale and side-flowering skullcap and 1 acre each
8 for Mason's lilaeopsis and delta mudwort. Slightly larger acreages of habitat for these same species
9 would be affected temporarily.

10 For a broader view of the overall effects of Alternative 7 beyond its unique effects associated with
11 CM5 and CM6, the reader is referred to the Alternative 1A impact analysis earlier in this chapter.
12 The principal effects of concern associated with both Alternative 1A and 7 are related to the
13 conversion of large acreages of cultivated lands and managed wetland to tidal marsh and other
14 habitat types. These effects accrue to special-status species and common wildlife species that rely on
15 cultivated lands and managed wetlands during some life stage. Foraging raptors and some
16 waterbirds are regular inhabitants of the Delta's cultivated lands. The Delta's managed wetlands
17 provide freshwater nesting, feeding and resting habitat for a large number of Pacific flyway
18 waterfowl and shorebirds, as well as nesting passerines, such as tricolored blackbird. Special-status
19 plant species that occupy the tidal fringe in Suisun Marsh and parts of the Delta would be subject to
20 losses associated with physical construction activities (levee breaching and reconstruction) and
21 changes in water depth and salinity in their current habitat as a result of tidal marsh restoration.

22 Some of the permanent habitat loss associated with these alternatives would take place during the
23 early, construction-related stage of the BDCP. Other losses would occur over time as some habitats
24 (cultivated lands, managed wetland, valley/foothill riparian and grassland) are converted to tidal
25 marsh (tidal perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland)
26 and other natural communities. The BDCP conservation components are designed to eventually
27 replace and expand habitats that would have a positive influence on plant and animal species

1 covered in the Plan. These conservation components would also have a positive effect on
2 noncovered and common species that occupy the study area.

3 **NEPA Effects:** Alternative 7 would not have adverse effects on the terrestrial natural communities,
4 special-status species and common species that occupy the study area. The alternative also would
5 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive
6 species, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies
7 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat
8 converted by the Plan's conservation actions, including the construction of water conveyance
9 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily affected
10 habitat would be restored to its pre-project condition and the restoration conservation measures
11 (CM2–CM10) would permanently replace primarily cultivated land and managed wetland with tidal
12 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the
13 sensitive natural communities in the study area would have beneficial effects on covered and
14 noncovered species. Where conservation actions would not fully offset effects, the Plan has
15 developed AMMs and this document has included additional mitigation measures to avoid adverse
16 effects. Alternative 7 would not require mitigation measures beyond what is proposed for
17 Alternative 1A to offset effects.

18 **CEQA Conclusion:** Alternative 7 would not have significant and unavoidable impacts on the
19 terrestrial natural communities, special-status species and common species that occupy the study
20 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the
21 risk of introducing invasive species, reduce the value of habitat for waterfowl and shorebirds, or
22 conflict with plans and policies that affect the study area. As with Alternative 1A, there would be
23 large acreages of existing habitat converted by the Plan's conservation actions, including the
24 construction of water conveyance tunnels from the north Delta to Clifton Court Forebay in the south
25 Delta. The temporarily affected habitat would be restored to its pre-project condition and the
26 restoration conservation measures (CM2–CM10) would permanently replace primarily cultivated
27 land and managed wetland with tidal and nontidal marsh, riparian vegetation, and grassland. The
28 increases in acreage and value of the sensitive natural communities in the study area would have
29 beneficial effects on covered, noncovered, and common species. Where conservation actions would
30 not fully offset impacts, the Plan has developed AMMs and this document has included additional
31 mitigation measures to avoid significant impacts. Alternative 7 would not require mitigation
32 measures beyond what is proposed for Alternative 1A to offset effects.

33 As with Alternative 1A, Alternative 7 would require several mitigation measures to be adopted to
34 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
35 measures would be needed beyond the impact offsets provided by Alternative 7 AMMs and CM2–
36 CM21 conservation actions. The relevant mitigation measures, which are included in detail in the
37 analysis of Alternative 1A, are as follows:

- 38 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 39 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 40 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status
41 Reptiles and Implement Applicable AMMs
- 42 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect
43 Effects on Colonies Will Be Minimized

- 1 • Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater
2 Sandhill Crane Foraging Habitat
- 3 • Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value Lesser
4 Sandhill Crane Foraging Habitat
- 5 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid
6 Disturbance of Nesting Birds
- 7 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing
8 Owl Habitat
- 9 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and
10 Ferruginous Hawk Foraging Habitat
- 11 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 12 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering
13 Habitat
- 14 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 15 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and
16 Grasshopper Sparrow Habitat
- 17 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead
18 Shrike Habitat
- 19 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect
20 Effects on Bank Swallow Will Be Minimized
- 21 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring
22 Flows Upstream of the Study Area
- 23 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 24 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement
25 Protective Measures
- 26 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered
27 Special-Status Plant Species
- 28 • Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United States
- 29 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in
30 Suisun Marsh
- 31 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food
32 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 33 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in
34 Suisun Marsh

1 **12.3.3.15 Alternative 8—Dual Conveyance with Pipeline/Tunnel, Intakes 2,**
2 **3, and 5, and Increased Delta Outflow (9,000 cfs; Operational**
3 **Scenario F)**

4 Alternative 8, which is described fully in Section 3.5.15 of Chapter 3, *Description of Alternatives*, and
5 depicted in Figure 3-2 in Chapter 3, would affect terrestrial biological resources in a nearly identical
6 fashion to Alternative 1A. For this reason, Alternative 8 is considered here in a summary fashion; the
7 reader is referred to Alternative 1A for a detailed description of impacts that would be associated
8 with implementing Alternative 8. The impacts associated with Alternatives 1A and 8 were derived
9 by comparing the alternatives with the No Action Alternative for NEPA purposes, and to Existing
10 Conditions for CEQA purposes.

11 The principal differences between these two alternatives would be related to the differing
12 construction footprints of the water conveyance facilities (CM1). The Alternative 8 water
13 conveyance facilities would entail construction at north Delta Intakes 2, 3, and 5 rather than Intakes
14 1–5. The locations of these intakes are depicted in Figure 3-2 in Chapter 3, *Description of*
15 *Alternatives*. Eliminating Intakes 1 and 4 would reduce the construction footprint along the eastern
16 bank of the Sacramento River just north of Clarksburg and immediately south of Hood. The
17 operational scenario for Alternative 8 (Scenario F) is also different from Alternative 1A (Scenario A),
18 but this change would not significantly alter terrestrial biological resources effects. Alternative 8
19 operations would extract water from the river at the three intakes and would require additional
20 pumping at the south Delta pumps. Also, Operational Scenario F would involve greater Delta
21 freshwater outflows during September and October of some water years when compared with
22 Operational Scenario A. All of the conservation measures other than CM1 would be the same as
23 Alternative 1A.

24 **Comparative Differences in CM1 Construction Effects for Alternatives 8 and 1A**

25 Because of the elimination of Intakes 1 and 4 and their associated pumps and pipelines, Alternative
26 8 would create relatively small differences in the permanent and temporary loss of natural
27 communities and cultivated land during water conveyance facilities construction when compared
28 with Alternative 1A (Table 12-8-1). All of these differences would take place during the near-term
29 timeframe associated with water conveyance facilities construction. Alternative 8 would
30 permanently remove 7 fewer acres of tidal perennial aquatic habitat, 10 fewer acres of
31 valley/foothill riparian habitat, and 5 fewer acres of grassland along the east bank of the Sacramento
32 River. Alternative 8 would also remove 95 fewer acres of cultivated land east of the Sacramento
33 River. Alternative 8 would also permanently affect a smaller acreage of jurisdictional waters
34 (including wetlands) as regulated by Section 404 of the CWA, when compared to Alternative 1A (7
35 acres fewer; see Table 12-8-2). Refer to Table 12-1A-69 for a summary of Alternative 1A permanent
36 and temporary jurisdictional waters and wetlands impacts.

37 During the water conveyance facilities construction process, Alternative 8 would involve less
38 temporary loss of habitat when compared with Alternative 1A. There would be reduced losses of
39 tidal perennial aquatic (25 acres less), tidal freshwater emergent wetland (1 acre less),
40 valley/foothill riparian (3 acres less), grassland (7 acres less) and cultivated land (214 acres less)
41 when compared with Alternative 1A (Table 12-8-1). Alternative 8 would also temporarily affect a
42 smaller acreage of jurisdictional waters (including wetlands) as regulated by Section 404 of the
43 CWA, when compared to Alternative 1A (30 acres fewer, see Table 12-8-2). Refer to Table 12-1A-69

1 for a summary of Alternative 1A permanent and temporary jurisdictional waters and wetlands
2 impacts.

3 **Table 12-8-1. Alternative 8 Near-Term Effects of Water Conveyance Facilities (CM1) on Natural**
4 **Communities (acres)**

Natural Community	Total Existing Habitat in Study Area	Conveyance Option		Conveyance Option	
		Alternative 8 Removed Habitat (Permanent) ^b	Difference from Alternative 1A	Alternative 8 Removed Habitat (Temporary) ^c	Difference from Alternative 1A
Tidal perennial aquatic ^a	86,263	41	-7	108	-25
Tidal brackish emergent wetland	8,501	0	0	0	0
Tidal freshwater emergent wetland	8,856	6	0	5	-1
Valley/foothill riparian	17,966	48	-10	25	-3
Nontidal perennial aquatic	5,567	12	0	9	0
Nontidal freshwater perennial emergent wetland	1,509	1	0	1	0
Alkali seasonal wetland complex	3,723	0	0	0	0
Vernal pool complex	12,133	3	0	0	0
Managed wetland	70,798	3	0	83	0
Other natural seasonal wetland	842	0	0	0	0
Grassland	78,047	305	-5	255	-7
Inland dune scrub	19	0	0	0	0
Cultivated land	487,106	3,741	-95	1,977	-214

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Features in this category include the following conveyance-related facilities: Forebay, Afterbay, Intake Facilities, Pump Stations, Permanent Access Roads, Shaft Locations, and Reusable Tunnel Material Storage Areas.

^c Features in this category include the following conveyance features: Barge Unloading Facility, Control Structure Work Area, Intake Road Work Area, Intake Work Area, Pipeline, Pipeline Work Area, Road Work Area, Safe Haven Work Area, Temporary Access Road Work Area, Tunnel Work Area, and Borrow/Spoil Areas.

5

1 **Table 12-8-2 Alternative 8 Effects on Jurisdictional Wetlands and Waters Relative to Alternative 1A**
2 **(acres)**

Wetland/Water Type	Alternative 8 Impacts on Jurisdictional Wetlands and Waters			
	Permanent Impact	Difference from Alternative 1A	Temporary Impact	Difference from Alternative 1A
Agricultural Ditch	64.6	-0.3	21.9	-1.6
Alkaline Wetland	0.1	0	0	0
Clifton Court Forebay	1.0	0	0	0
Conveyance Channel	12.7	0	1.1	0
Depression	1.9	0	0.4	-1.3
Emergent Wetland	46.8	0	6.7	-0.6
Forest	5.6	-0.1	10.8	-1.1
Lake	0	0	0.3	0
Scrub-Shrub	20.3	-0.3	3.3	-1.0
Seasonal Wetland	18.7	0	26.6	0
Tidal Channel	36.9	-6.1	109.6	-24.2
Vernal Pool	0		0	0
Total	209	-6.8	181	-29.8

3

4 These differences in loss of habitat from constructing the water conveyance facilities would create
5 differences in effects on covered and noncovered wildlife. The reduced level of valley/foothill
6 riparian habitat loss would be a positive influence on valley elderberry longhorn beetle, breeding
7 habitat for raptors, herons and egrets (great egret, snowy egret, great blue heron, Swainson's hawk,
8 Cooper's hawk, white-tailed kite and black-crowned night heron), and migratory habitat for species
9 that use the river corridor, such as western yellow-billed cuckoo. Species that would benefit from
10 smaller permanent losses of grassland and cultivated land would include foraging raptors
11 (Swainson's hawk, short-eared owl, northern harrier, merlin and white-tailed kite), greater sandhill
12 crane, mountain plover, California horned lark, tricolored blackbird and several species of bats.
13 Alternative 8 would permanently remove 85 fewer acres of greater sandhill crane foraging habitat
14 when compared to Alternative 1A The smaller temporary habitat conversions associated with
15 Alternative 8 would have comparable benefits to these species.

16 The differences in effect that Alternatives 1A and 8 could have on special-status plant species are
17 extremely minor. Habitat modeling indicates that Alternative 8 would cause 3 fewer acres of
18 permanent and 2 fewer acres of temporary habitat loss for Mason's lilaeopsis and delta mudwort
19 when compared with Alternative 1A.

20 The near-term conservation activities described in Appendix 12D, *Feasibility Assessment of*
21 *Conservation Measures Offsetting Water Conveyance Facilities Construction Impacts on Terrestrial*
22 *Biological Resources*, would provide for conservation, enhancement and replacement of habitats
23 affected by the early water conveyance facility construction activities. This conservation activity,
24 which is part of the early implementation of the BDCP, and the mitigation measures included in the
25 Alternative 1A analysis would offset water conveyance facilities construction effects of Alternative 8
26 on both covered and noncovered special-status species in the study area.

1 **Effects of Restoration-Related Actions of Alternative 8**

2 Natural community changes associated with the other major restoration activities in Alternative 8
3 (CM2, CM4, and CM5— Table 12-8-3; CM7, CM8, CM10, and CM18—Table 12-8-4) would be
4 identical to those described for Alternative 1A. Table 3-4 in Chapter 3, *Description of Alternatives*,
5 describes the schedule for implementation of natural community restoration and protection
6 conservation measures.

7 **Table 12-8-3. Alternative 8 Late Long-Term Effects of Restoration Activities (CM2, CM4, CM5) that**
8 **Affect Most Natural Communities (acres)**

Natural Community	Conservation Measure					
	CM2 ^b		CM4 ^c		CM5 ^d	
	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f	Permanent ^e	Temporary ^f
Tidal perennial aquatic ^a	8	11	18	0	2	5
Tidal brackish emergent wetland	0	0	1	0	0	0
Tidal freshwater emergent wetland	6	0	1	0	1	1
Valley/foothill riparian	89	88	552	0	43	35
Nontidal perennial aquatic	24	12	189	0	28	16
Nontidal freshwater perennial emergent wetland	25	1	99	0	0	0
Alkali seasonal wetland complex	45	0	27	0	0	0
Vernal pool complex	0	0	372	0	0	0
Managed wetland	24	44	13,746	0	0	0
Other natural seasonal wetland	0	0	0	0	0	0
Grassland	388	239	1,122	0	51	34
Inland dune scrub	0	0	0	0	0	0
Cultivated lands	540	1	34,653	0	2,087	1,194

^a Tidal mudflat has been included in the tidal perennial aquatic natural community.

^b Yolo Bypass Fisheries Enhancement.

^c Tidal Natural Communities Restoration.

^d Seasonally Inundated Floodplain Restoration.

^e Features in this category include the following: construction of fish passage structures and infrastructure in the Yolo Bypass, construction of permanent structures and infrastructure associated with restoration, and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, and temporary grading/vegetation removal associated with restoration activities.

9

1 **Table 12-8-4. Alternative 8 Late Long-Term Effects of Restoration Activities (CM7, CM8, CM10, CM18)**
2 **that Affect Only Grassland and Cultivated Lands (acres)**

Natural Community	Conservation Measure							
	CM7 ^a		CM8 ^b		CM10 ^c		CM18 ^d	
	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f	Perm ^e	Temp ^f
Grassland	410	0	0	0	0	0	35	0
Cultivated lands	4,553	0	2,000	0	1,950	0	0	0

^a Riparian Natural Community Restoration.

^b Grassland Natural Community Restoration.

^c Nontidal Marsh Restoration.

^d Conservation Hatcheries.

^e Features in this category include the following: construction of permanent structures and infrastructure associated with restoration, recreation facilities and hatcheries; and loss of habitat associated with removal and replacement by other habitats.

^f Features in this category include the following: temporary work areas associated with construction of permanent restoration features, recreation facilities and hatcheries; and temporary grading/vegetation removal associated with restoration activities.

Perm = Permanent

Temp = Temporary

3

4 The reader is referred to the Alternative 1A impact analysis earlier in this chapter for the broader
5 discussion of overall terrestrial biological resources effects that would result from implementation
6 of Alternative 8 restoration-related conservation actions. The principal effects of concern associated
7 with both Alternative 1A and 8 are related to the conversion of large acreages of cultivated lands,
8 managed wetland, grassland and valley/foothill riparian habitat to tidal marsh and other habitat
9 types during restoration activities. These effects accrue to special-status species and common
10 wildlife species, especially to those that rely on cultivated lands and managed wetland during some
11 life stage. Foraging raptors and some waterbirds are regular inhabitants of the Delta's cultivated
12 lands. The Delta's managed wetlands provide freshwater nesting, feeding and resting habitat for a
13 large number of Pacific flyway waterfowl and shorebirds, as well as nesting passerines, such as
14 tricolored blackbird. Special-status plant species that occupy the tidal fringe in Suisun Marsh and
15 parts of the Delta would be subject to losses associated with physical construction activity (levee
16 breaching and reconstruction) and changes in water depth and salinity in their current habitat as a
17 result of tidal marsh restoration.

18 Some of the permanent habitat loss associated with the restoration components of Alternative 8
19 would occur during the early, construction-related stage of the BDCP. Other losses would occur over
20 time as some habitats (cultivated lands, managed wetland, valley/foothill riparian and grassland)
21 are converted to tidal marsh (tidal perennial aquatic, tidal brackish emergent wetland, tidal
22 freshwater emergent wetland) and other natural communities. The BDCP conservation components,
23 including the restoration components (CM2–CM10), are designed to eventually replace and expand
24 habitats that would have a positive influence on plant and animal species covered in the Plan,
25 including those that rely on managed wetland and cultivated land. These conservation components
26 would also have a positive effect on noncovered and common species that occupy the study area.

1 **NEPA Effects:** Alternative 8 would not have adverse effects on the terrestrial natural communities,
2 special-status species and common species that occupy the study area. The alternative also would
3 not disrupt wildlife movement corridors, significantly increase the risk of introducing invasive
4 species, reduce the value of habitat for waterfowl and shorebirds, or conflict with plans and policies
5 that affect the study area. As with Alternative 1A, there would be large acreages of existing habitat
6 converted by the Plan's conservation actions, including the construction of water conveyance
7 tunnels from the north Delta to Clifton Court Forebay in the south Delta. The temporarily affected
8 habitat would be restored to its pre-project condition and the restoration conservation measures
9 (CM2–CM10) would permanently replace primarily cultivated land and managed wetland with tidal
10 and nontidal marsh, riparian vegetation, and grassland. The increases in acreage and value of the
11 sensitive natural communities in the study area would have beneficial effects on covered and
12 noncovered species. Where conservation actions would not fully offset effects, the Plan has
13 developed AMMs and this document has included additional mitigation measures to avoid adverse
14 effects. Alternative 8 would not require mitigation measures beyond what is proposed for
15 Alternative 1A to offset effects.

16 **CEQA Conclusion:** Alternative 8 would not have significant and unavoidable impacts on the
17 terrestrial natural communities, special-status species and common species that occupy the study
18 area. The alternative also would not disrupt wildlife movement corridors, significantly increase the
19 risk of introducing invasive species, reduce the value of habitat for waterfowl and shorebirds, or
20 conflict with plans and policies that affect the study area. As with Alternative 1A, there would be
21 large acreages of existing habitat converted by the Plan's conservation actions, including the
22 construction of water conveyance tunnels from the north Delta to Clifton Court Forebay in the south
23 Delta. The temporarily affected habitat would be restored to its pre-project condition and the
24 restoration conservation measures (CM2–CM10) would permanently replace primarily cultivated
25 land and managed wetland with tidal and nontidal marsh, riparian vegetation, and grassland. The
26 increases in acreage and value of the sensitive natural communities in the study area would have
27 beneficial effects on covered, noncovered, and common species. Where conservation actions would
28 not fully offset impacts, the Plan has developed AMMs and this document has included additional
29 mitigation measures to avoid significant impacts. Alternative 8 would not require mitigation
30 measures beyond what is proposed for Alternative 1A to offset effects.

31 As with Alternative 1A, Alternative 8 would require several mitigation measures to be adopted to
32 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
33 measures would be needed beyond the impact offsets provided by Alternative 8 AMMs and CM2–
34 CM21 conservation actions. The relevant mitigation measures, which are included in detail in the
35 analysis of Alternative 1A, are as follows:

- 36 ● Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 37 ● Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 38 ● Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status
39 Reptiles and Implement Applicable AMMs
- 40 ● Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect
41 Effects on Colonies Will Be Minimized
- 42 ● Mitigation Measure BIO-69a: Compensate for the Loss of Medium to Very High-Value Greater
43 Sandhill Crane Foraging Habitat

- 1 • Mitigation Measure BIO-72: Compensate for the Loss of Medium- to Very High-Value Lesser
2 Sandhill Crane Foraging Habitat
- 3 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid
4 Disturbance of Nesting Birds
- 5 • Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western Burrowing
6 Owl Habitat
- 7 • Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and
8 Ferruginous Hawk Foraging Habitat
- 9 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 10 • Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover Wintering
11 Habitat
- 12 • Mitigation Measure BIO-129a: Compensate for Loss of Black Tern Nesting Habitat
- 13 • Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned Lark and
14 Grasshopper Sparrow Habitat
- 15 • Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value Loggerhead
16 Shrike Habitat
- 17 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect
18 Effects on Bank Swallow Will Be Minimized
- 19 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring
20 Flows Upstream of the Study Area
- 21 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 22 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement
23 Protective Measures
- 24 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered
25 Special-Status Plant Species
- 26 • Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United States
- 27 • Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering Waterfowl in
28 Suisun Marsh
- 29 • Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate Food
30 Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins
- 31 • Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding Waterfowl in
32 Suisun Marsh

1 **12.3.3.16 Alternative 9—Through Delta/Separate Corridors (15,000 cfs;**
2 **Operational Scenario G)**

3 Section 3.5.16 of Chapter 3, *Description of Alternatives*, describes Alternative 9 in detail, and Figure
4 3-16 depicts the alternative.

5 **Natural Communities**

6 **Tidal Perennial Aquatic**

7 Construction, operation, maintenance and management associated with the conservation
8 components of Alternative 9 would have no long-term adverse effects on the habitats associated
9 with the tidal perennial aquatic natural community. Initial development and construction of CM1,
10 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal or modification of
11 this community (see Table 12-9-1). Full implementation of Alternative 9 would also include the
12 following conservation actions over the term of the BDCP to benefit the tidal perennial aquatic
13 natural community (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 14 • Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
15 accommodate sea level rise (Objective L1.3, associated with CM4).
- 16 • Within the restored and protected tidal natural communities and transitional uplands, restore
17 or create tidal perennial aquatic natural community as necessary when creating tidal emergent
18 wetland (Objective TPANC1.1, associated with CM4).
- 19 • Control invasive aquatic vegetation that adversely affects native fish habitat (Objective
20 TPANC2.1, associated with CM13).

21 There is a variety of other, less specific conservation goals and objectives that would improve the
22 value of tidal perennial aquatic natural community for terrestrial species. As explained below, with
23 the restoration and enhancement of these amounts of habitat, in addition to AMMs, impacts on tidal
24 aquatic natural community would not be adverse for NEPA purposes and would be less than
25 significant for CEQA purposes.

26 Note that two time periods are represented in Table 12-9-1 and the other tables contained in the
27 analysis of Alternative 9. The near-term (NT) acreage effects listed in the table would occur over the
28 first 10 years of Plan implementation. The late long-term (LLT) effects contained in these tables
29 represent the cumulative effects of all activities over the entire 50-year term of the Plan. This table
30 and all impact tables in the chapter include reference to only those CMs that would eliminate natural
31 community acreage either through construction or restoration activities, or would result in periodic
32 inundation of the community. Table 3-4 in Chapter 3, *Description of Alternatives*, describes the
33 schedule for implementation of natural community protection and restoration conservation
34 measures.

1 **Table 12-9-1. Changes in Tidal Perennial Aquatic Natural Community Associated with Alternative 9**
2 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	675	675	345	345	0	0
CM2	8	8	11	11	9-36	0
CM4	11	18	0	0	0	0
CM5		2	0	5	0	39
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	694	703	356	361	9-36	39

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-1: Changes in Tidal Perennial Aquatic Natural Community as a Result of**
5 **Implementing BDCP Conservation Measures**

6 Construction, channel dredging and land grading activities that would accompany the
7 implementation of CM1, CM2, CM4, CM5, and CM6 would permanently affect an estimated 703 acres
8 and temporarily remove 361 acres of tidal perennial aquatic natural community in the study area.
9 These modifications would affect approximately 1% of the 86,263 acres of the community that is
10 mapped in the study area. The majority of the permanent and temporary effects would occur during
11 the first 10 years of Alternative 9 implementation, as water conveyance facilities are constructed
12 and habitat restoration is initiated. Natural communities restoration would add 8,300 acres of tidal
13 wetlands, including an estimated 3,400 acres of tidal perennial aquatic natural community during
14 the same period, which would expand the area of that habitat and offset the losses. The 3,400-acre
15 increase is estimated, based on modeling reported in BDCP Appendix 3.B, Table 5, by comparing
16 existing Plan Area subtidal habitat to near-term subtidal habitat with the Plan. The BDCP beneficial
17 effects analysis for Alternative 4 (BDCP Chapter 5, Section 5.4.1.2) indicates that, while there would
18 be no minimum restoration requirement for the tidal perennial aquatic natural community, an
19 estimated approximately 27,000 acres of tidal perennial aquatic natural community would be
20 restored based on tidal restoration modeling. This estimate is based on Table 5 in BDCP Appendix
21 3.B, subtracting late long-term without project acreage from late long-term with project acreage.
22 The same conservation actions would be implemented for Alternative 9.

23 The individual effects of each relevant conservation measure are addressed below. A summary
24 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
25 conservation measure discussions.

- 1 ● *CM1 Water Facilities and Operation*: Construction of in-water features and dredging of existing
2 Delta waterways as part of Alternative 9's water conveyance facilities would permanently
3 remove 675 acres and temporarily remove 345 acres of tidal perennial aquatic community. The
4 permanent effects would occur at channel dredging sites, operable barrier construction sites
5 and channel widening sites throughout the study area. These construction and dredging
6 activities would not permanently remove the waterways, but would permanently modify the
7 channel bottoms and eliminate any associated aquatic vegetation. The affected areas and type of
8 activity are listed below (refer to the Terrestrial Biology Mapbook for details of these locations).
9 ○ Dredging for channel enlargement in Victoria Canal from Middle River to Old River.
10 ○ Dredging for channel enlargement in Middle River from Victoria Canal to Mildred Island.
11 ○ Canal construction in Old River south of Grant Line Canal.
12 ○ Canal construction across Old River and West Canal at Coney Island.
13 ○ Operable barrier construction in San Joaquin River just north of junction with Old River,
14 near Lathrop.
15 ○ Operable barrier construction in Middle River just south of Victoria Canal.
16 ○ Operable barrier construction in Victoria Canal at its junction with Old River.
17 ○ Operable barrier construction in North Victoria Canal/Woodward Canal just west of Middle
18 River.
19 ○ Operable barrier construction in Railroad Cut at the south end of Bacon Island.
20 ○ Operable barrier construction in Connection Slough just west of Middle River.
21 ○ Operable barrier construction at the west end of Three Mile Slough at its junction with the
22 Sacramento River.
23 ○ Operable barrier construction at the north end of Fishermans Cut at its junction with the San
24 Joaquin River.
25 ○ Operable barrier construction in Old River at its junction with the San Joaquin River north of
26 Franks Tract.
27 ○ Operable barrier construction at the north end of Georgianna Slough at the Sacramento
28 River.
29 ○ Operable barrier construction at the west end of Delta Cross Channel at the Sacramento
30 River.
31 ○ Operable barrier construction in Snodgrass Slough just north of its junction with Delta Cross
32 Channel.
33 ○ Channel enlargement and operable barrier construction in Mokelumne River at Lost Slough.
34 ○ Channel enlargement and connection in the Meadows Slough at its junction with the
35 Sacramento River.
36 ○ Channel enlargement and connection within the Meadows Slough east of the Sacramento
37 River.
38 ○ Fish screen construction in the Sacramento River at Georgianna Slough and Delta Cross
39 Channel.

1 The temporary effects to tidal perennial aquatic natural community would occur primarily along
2 the channels of the Middle River and Victoria Canal, where temporary work areas would be
3 needed to support channel dredging operations described above. Several smaller temporary
4 impact areas would occur where barge operations areas would be developed at these sites.

- 5 ○ North Victoria Canal at Middle River.
- 6 ○ Railroad Cut at Middle River at south end of Bacon Island.
- 7 ○ Middle River at southeastern edge of Bacon Island.
- 8 ○ Middle River at Upper Jones Tract,
- 9 ○ Fishermans Cut at its junction with the San Joaquin River.
- 10 ○ Old River at the San Joaquin River north of Franks Tract.

11 All of these temporary and permanent effects on tidal perennial aquatic natural community from
12 CM1 would occur during the near-term construction period.

- 13 ● *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
14 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
15 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
16 Sacramento Weir improvements. Some of these activities could involve excavation and grading
17 in tidal perennial aquatic areas to improve passage of fish through the bypasses. Based on
18 hypothetical construction footprints, a total of 8 acres could be permanently lost and another 11
19 acres could be temporarily removed. This activity would occur primarily in the near-term
20 timeframe.

21 *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
22 footprints, implementation of CM4 would affect 18 acres of tidal perennial aquatic community.
23 CM4 involves conversion of existing natural communities to a variety of tidal wetlands,
24 including tidal perennial aquatic, tidal brackish emergent, and tidal freshwater emergent
25 wetlands. Specific locations for these conversions are not known. The 18 acres could remain
26 tidal perennial aquatic with a modified tidal prism, or they could eventually be converted to one
27 of the other tidal wetland types. For purposes of this analysis, a conservative approach has been
28 taken and the effect has been discussed simultaneously with the habitat losses associated with
29 other conservation measures. An estimated 65,000 acres of tidal wetlands and transitional
30 uplands would be restored during tidal habitat restoration, consistent with BDCP Objective L1.3.
31 Of these acres, an estimated 27,000 acres of tidal perennial aquatic habitat would be restored,
32 based on modeling conducted by ESA PWA (refer to Table 5 in BDCP Appendix 3.B, *BDCP Tidal
33 Habitat Evolution Assessment*). This restoration would be consistent with BDCP Objective
34 TPANC1.1. Approximately 3,400 acres of the restoration would occur during the first 10 years of
35 Alternative 9 implementation, which would coincide with the timeframe of water conveyance
36 facilities construction. The remaining restoration would be spread over the following 30 years.
37 Tidal natural communities restoration is expected to be focused in the ROAs identified in Figure
38 12-1. Some of the restoration would occur in the lower Yolo Bypass, but restoration would also
39 be spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.

- 40 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
41 would permanently remove 2 acres and temporarily remove 5 acres of tidal perennial aquatic
42 habitat. The construction-related losses would be considered a permanent removal of the tidal
43 perennial aquatic habitats directly affected. This activity is scheduled to start following

1 construction of water conveyance facilities, which is expected to take 10 years. Specific locations
2 for the floodplain restoration have not been identified, but it is expected that much of the
3 activity would occur in the south Delta along the major rivers. Floodplain restoration along the
4 San Joaquin River would improve connectivity for a variety of species that rely on tidal
5 perennial aquatic habitat. The regional and Plan Area landscape linkages along the San Joaquin
6 River are included in Figure 12-2.

- 7 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
8 of small amounts of tidal perennial aquatic habitat along 20 miles of river and sloughs. The
9 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity
10 would occur on tidal perennial aquatic habitat margins, including levees and channel banks. The
11 improvements would occur within the study area on sections of the Sacramento, San Joaquin
12 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

13 The following paragraphs summarize the combined effects discussed above and describe other
14 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
15 also included.

16 ***Near-Term Timeframe***

17 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would
18 affect the tidal perennial aquatic community through CM1 construction losses (675 acres permanent
19 and 345 acres temporary) and the CM2 construction losses (8 acres permanent and 11 acres
20 temporary). These losses would occur at channel dredging sites along Middle River and Victoria
21 Canal, at channel widening and operable barrier construction sites at multiple locations in the study
22 area, and in the northern Yolo Bypass. Approximately 11 acres of the inundation and construction-
23 related effects resulting from CM4 would occur during the near-term throughout the ROAs mapped
24 in Figure 12-1.

25 The construction losses of this special-status natural community would represent an adverse effect
26 if they were not offset by avoidance and minimization measures and restoration actions associated
27 with BDCP conservation components. Loss of tidal perennial aquatic natural community would be
28 considered both a loss in acreage of a sensitive natural community and a loss of waters of the United
29 States as defined by Section 404 of the CWA. The creation of approximately 3,400 acres of high-
30 value tidal perennial aquatic natural community as part of CM4 during the first 10 years of
31 Alternative 9 implementation would offset this near-term loss, avoiding any adverse effect. Typical
32 project-level mitigation ratios (1:1 for restoration) would indicate 1,050 acres of restoration would
33 be needed to offset (i.e., mitigate) the 1,050 acres of effect (a combination of the permanent and
34 temporary near-term effects listed in Table 12-9-1) associated with near-term activities, including
35 water conveyance facilities construction.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
37 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
38 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
39 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
40 storage sites. The AMMs are described in detail in BDCP Appendix 3.C.

41 ***Late Long-Term Timeframe***

42 Implementation of Alternative 9 as a whole would result in relatively minor (approximately 1%)
43 conversions or losses of tidal perennial aquatic community in the study area. These losses or

1 conversions (703 acres of permanent and 361 acres of temporary loss) would be largely associated
2 with construction of the water conveyance facilities (CM1), construction of Yolo Bypass fish
3 improvements (CM2), and inundation during tidal marsh restoration (CM4). Inundation conversions
4 would occur during the course of BDCP restoration activities at various tidal restoration sites
5 throughout the study area. By the end of the Plan timeframe, approximately 27,000 acres of high-
6 value tidal perennial aquatic natural community would be restored (estimated from Table 5 in BDCP
7 Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*).

8 **NEPA Effects:** The creation of approximately 3,400 acres of high-value tidal perennial aquatic
9 natural community as part of CM4 during the first 10 years of Alternative 9 implementation would
10 offset near-term losses associated with construction activities for CM1, CM2, CM4, and CM6,
11 avoiding any adverse effect. Alternative 9, which includes restoration of an estimated 27,000 acres
12 of this natural community over the course of the Plan, would not result in a net long-term reduction
13 in the acreage of a sensitive natural community; the effect would be beneficial.

14 **CEQA Conclusion:**

15 ***Near-Term Timeframe***

16 Alternative 9 would result in the near-term loss or conversion of approximately 1,050 acres of tidal
17 perennial aquatic natural community due to construction of the water conveyance facilities (CM1)
18 and fish passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The
19 losses would occur primarily along the Middle River and Victoria Canal as these channels are
20 dredged to improve capacity, but would also occur at numerous channel widening, barge unloading
21 and operable barrier construction sites throughout the Delta. Losses would also occur within the
22 northern section of the Yolo Bypass. Inundation conversions would occur at various tidal restoration
23 sites throughout the study area. The losses and conversions would be spread across a 10-year near-
24 term timeframe. These losses and conversions would be offset by planned restoration of 3,400 acres
25 of high-value tidal perennial aquatic natural community scheduled for the first 10 years of
26 Alternative 9 implementation (CM4). AMM1, AMM2, AMM6, AMM7, and AMM10 would also be
27 implemented to minimize impacts. Because of these offsetting near-term restoration activities and
28 AMMs, impacts would be less than significant. Typical project-level mitigation ratios (1:1 for
29 restoration) would indicate that 1,050 acres of restoration would be needed to offset (i.e., mitigate)
30 the 1,050 acres of loss or conversion. The restoration would be initiated at the beginning of
31 Alternative 9 implementation to minimize any time lag in the availability of this habitat to special-
32 status species, and would result in a net gain in acreage of this sensitive natural community.

33 ***Late Long-Term Timeframe***

34 At the end of the Plan period, 1,064 acres of the tidal perennial aquatic natural community would be
35 lost or converted and an estimated 27,000 acres of this community would be restored. There would
36 be no net permanent reduction in the acreage of this sensitive natural community within the study
37 area. Therefore, Alternative 9 would not have a substantial adverse effect on this natural
38 community; the impact would be beneficial.

39 **Impact BIO-2: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal**
40 **Perennial Aquatic Natural Community**

41 Two Alternative 9 conservation measures would modify the water depths and inundation/flooding
42 regimes of both natural and man-made waterways in the study area. CM2, which is designed to

1 improve fish passage and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase
 2 periodic inundation of tidal perennial aquatic natural community on small acreages, while CM5
 3 would expose this community to additional flooding as channel margins are modified and levees are
 4 set back to improve fish habitat along some of the major rivers and waterways throughout the study
 5 area.

6 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 9 would
 7 result in an increase in the frequency, magnitude and duration of inundation and changes in
 8 water depth and velocity of 9–36 acres of tidal perennial aquatic natural community. The
 9 methods used to estimate these inundation acreages are described in BDCP Appendix 5.J, *Effects*
 10 *on Natural Communities, Wildlife, and Plants*. The area more frequently affected by inundation
 11 would vary with the flow volume that would pass through the newly constructed notch in the
 12 Fremont Weir. The 9-acre increase in inundation would be associated with a notch flow of 1,000
 13 cfs, and the 36-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases
 14 in flow through Fremont Weir would be expected in 30% of the years. Most of the tidal
 15 perennial aquatic community occurs in the southern section of the bypass on Liberty Island, and,
 16 to a lesser extent, along the eastern edge of the bypass, including the Tule Canal/Toe Drain. The
 17 anticipated change in management of flows in the Yolo Bypass includes more frequent releases
 18 in flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later
 19 releases into the bypass in spring months (April and May). The modification of periodic
 20 inundation events would be expected to be beneficial to the ecological function of tidal perennial
 21 aquatic habitat in the bypass as it relates to BDCP covered aquatic species. The Yolo Bypass
 22 waterway is the key element in the Yolo Bypass landscape linkage mapped in Figure 12-2 and
 23 described in detail in BDCP Chapter 3, Table 3.2-3. The change in periodic inundation in the
 24 bypass would not substantially modify its value for special-status or common terrestrial species.
 25 Water depths and water flow rates would increase over Existing Conditions and the No Action
 26 condition in approximately 30% of the years, but it would not fragment the habitat or make it
 27 less accessible to special-status or common terrestrial species. The modifications would not
 28 result in a loss of this community. The plant species associated with this community are adapted
 29 to inundation. The extended inundation would be designed to expand foraging and spawning
 30 habitat for Delta fishes. The effects of these changes in the inundation regime on terrestrial
 31 species that rely on tidal perennial aquatic habitats are discussed in detail later in this chapter,
 32 under the individual species assessments.

33 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a
 34 seasonal increase in the frequency and duration of flooding of 39 acres of tidal perennial aquatic
 35 habitat. Specific locations for this restoration activity have not been identified, but they would
 36 likely be focused in the south Delta area, along the major rivers and Delta channels. The more
 37 frequent exposure of these wetlands to stream flooding events would be beneficial to the
 38 ecological function of tidal perennial aquatic habitats, especially as they relate to BDCP target
 39 aquatic species. The plant species associated with these tidal perennial aquatic areas are
 40 adapted to inundation and would not be substantially modified.

41 In summary, 48–75 acres of tidal perennial aquatic community in the study area would be subjected
 42 to more frequent increases in water depth and velocity from inundation as a result of implementing
 43 two Alternative 9 conservation measures (CM2 and CM5). Tidal perennial aquatic community is
 44 already, by definition, permanently inundated aquatic habitat of value to terrestrial and aquatic
 45 species in the study area; therefore, periodic changes in water depth and velocity would not result in
 46 a net permanent reduction in the acreage of this community in the study area.

1 **NEPA Effects:** Increasing periodic inundation of tidal perennial aquatic natural community would
2 not have an adverse effect on the community.

3 **CEQA Conclusion:** An estimated 48–75 acres of tidal perennial aquatic community in the study area
4 would be subjected to more frequent increases in water depth and velocity from inundation as a
5 result of implementing CM2 and CM5 under Alternative 9. Tidal perennial aquatic community is
6 already, by definition, permanently inundated aquatic habitat of value to terrestrial and aquatic
7 species in the study area. The periodic inundation would not result in a net permanent reduction in
8 the acreage of this community in the study area. Therefore, there would no substantial adverse
9 effect on the community. The impact would be less than significant.

10 **Impact BIO-3: Modification of Tidal Perennial Aquatic Natural Community from Ongoing**
11 **Operation, Maintenance and Management Activities**

12 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime
13 associated with changed water management is in effect, there would be new ongoing and periodic
14 actions associated with operation, maintenance and management of the BDCP facilities and
15 conservation lands that could affect tidal perennial aquatic natural community in the study area. The
16 ongoing actions include the diversion of Sacramento River flows at two newly screened sites at
17 Georgianna Slough and Delta Cross Channel in the north Delta, the operation of multiple operable
18 barriers in Delta waterways, and modified diversions from south Delta channels. These actions are
19 associated with CM1 (see the impact discussion above for effects associated with CM2). The periodic
20 actions would involve access road and conveyance facility repair, vegetation management at the
21 various water conveyance facilities and habitat restoration sites (CM13), levee repair and
22 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with
23 natural community management plans. The potential effects of these actions are described below.

- 24 • *Modified river flows upstream of and within the study area and modified diversions from south*
25 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified
26 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel, and
27 modified diversions from south Delta channels (Operational Scenario G) would not result in the
28 permanent reduction in acreage of a sensitive natural community in the study area. Flow levels
29 in the upstream rivers would not change such that the acreage of tidal perennial aquatic
30 community would be reduced on a permanent basis. Some minor increases and some decreases
31 would be expected to occur during some seasons and in some water-year types, but there would
32 be no permanent loss. Similarly, modified diversions of Sacramento River flows at Georgianna
33 Slough and Delta Cross Channel would not result in a permanent reduction in tidal perennial
34 aquatic community downstream of these diversions. Flow volumes in these two diversions and
35 in the downstream channels that had been dredged (Middle River and Victoria Canal) would
36 increase under certain Sacramento River flow conditions and water year types. However, tidal
37 influence in the Sacramento River and Delta waterways would continue to be dominant such
38 that there would be no significant change in water levels that might affect in-stream and
39 adjacent vegetation. Modified diversions from south Delta channels would not create a
40 reduction in this natural community.
- 41 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
42 conveyance facilities and levees associated with the BDCP actions have the potential to require
43 removal of adjacent vegetation and could entail earth and rock work in tidal perennial aquatic
44 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering tidal

1 perennial aquatic habitats. These activities would be subject to normal erosion, turbidity and
 2 runoff control management practices, including those developed as part of *AMM2 Construction*
 3 *Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
 4 vegetation removal or earth work adjacent to or within aquatic habitats would require use of
 5 sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces. Proper
 6 implementation of these measures would avoid permanent adverse effects on this community.

- 7 • *Vegetation management*. Vegetation management, in the form of physical removal and chemical
 8 treatment, would be a periodic activity associated with the long-term maintenance of water
 9 conveyance facilities and restoration sites. Vegetation management is also the principal activity
 10 associated with *CM13 Invasive Aquatic Vegetation Control*, and is consistent with BDCP Objective
 11 TRANPC2.1. Use of herbicides to control nuisance vegetation could pose a long-term hazard to
 12 tidal perennial aquatic natural community at or adjacent to treated areas. The hazard could be
 13 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
 14 onto the natural community, or direct discharge of herbicides to tidal perennial aquatic areas
 15 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
 16 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce
 17 hazards to humans and the environment from use of various chemicals during maintenance
 18 activities, including the use of herbicides. These commitments are described in Appendix 3B,
 19 including the commitment to prepare and implement spill prevention, containment, and
 20 countermeasure plans and stormwater pollution prevention plans. Best management practices,
 21 including control of drift and runoff from treated areas, and use of herbicides approved for use
 22 in aquatic environments would also reduce the risk of affecting natural communities adjacent to
 23 water conveyance features and levees associated with restoration activities.

24 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
 25 normal ecological function of tidal aquatic habitats in planned restoration areas. The treatment
 26 activities would be conducted in concert with the California Department of Boating and
 27 Waterways' invasive species removal program. Eliminating large stands of water hyacinth and
 28 Brazilian waterweed would improve habitat conditions for some aquatic species by removing
 29 cover for nonnative predators, improving water flow and removing barriers to movement (see
 30 Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also benefit terrestrial
 31 species that use tidal perennial aquatic natural community for movement corridors and for
 32 foraging. Vegetation management effects on individual species are discussed in the species
 33 sections on following pages.

- 34 • *Channel dredging*. Long-term operation of the Alternative 9 diversions on the Sacramento River
 35 (Georgianna Slough and Delta Cross Channel) would include periodic dredging of sediments that
 36 might accumulate in front of intake and fish screens. Maintenance dredging would also be
 37 required in Middle River and Victoria Canal to maintain channel capacity. The dredging would
 38 occur in tidal perennial aquatic natural community and would result in short-term increases in
 39 turbidity and disturbance of the substrate. These conditions would not eliminate the
 40 community, but would diminish its value for special-status and common species that rely on it
 41 for movement corridor or foraging area. The individual species effects are discussed later in this
 42 chapter. *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater*
 43 *Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention,*
 44 *Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10*
 45 *Restoration of Temporarily Affected Natural Communities* are part of the Plan and would require
 46 actions to avoid or minimize dredging effects on tidal perennial aquatic habitats.

- 1 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
2 communities within the Plan Area (CM11). For tidal perennial aquatic natural community, a
3 management plan would be prepared that specifies actions to improve the value of the habitats
4 for covered species. Actions would include control of invasive nonnative plant and animal
5 species, restrictions on vector control and application of herbicides, and maintenance of
6 infrastructure that would allow for movement through the community. The enhancement efforts
7 would improve the long-term value of this community for both special-status and common
8 species.

9 The various operations and maintenance activities described above could alter acreage of tidal
10 perennial aquatic natural community in the study area through changes in flow patterns and
11 changes in periodic flooding of this community. Activities could also introduce sediment and
12 herbicides that would reduce the value of this community to common and sensitive plant and
13 wildlife species. Other periodic activities associated with the Plan, including management,
14 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
15 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
16 enhance the value of the community. While some of these activities could result in small reductions
17 in acreage, these reductions would be greatly offset by restoration activities planned as part of *CM4*
18 *Tidal Natural Communities Restoration*. The management actions associated with levee repair,
19 periodic dredging and control of invasive plant species would also result in a long-term benefit to
20 the species associated with tidal perennial aquatic habitats by improving water movement.

21 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
22 Alternative 9 would not result in a net permanent reduction in the tidal perennial aquatic natural
23 community within the study area. Therefore, there would be no adverse effect to the community.

24 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would
25 have the potential to create minor losses in total acreage of tidal perennial aquatic natural
26 community in the study area, and could create temporary increases in turbidity and sedimentation.
27 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
28 Implementation of environmental commitments and AMM2, AMM3, AMM4, AMM5, AMM6, and
29 AMM10 would minimize these impacts, and other operations and maintenance activities, including
30 management, protection and enhancement actions associated with *CM3 Natural Communities*
31 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
32 create positive effects, including improved water movement in these habitats. Long-term restoration
33 activities associated with *CM4 Tidal Natural Communities Restoration* would greatly expand this
34 natural community in the study area. Ongoing operation, maintenance and management activities
35 would not result in a net permanent reduction in the acreage and value of this sensitive natural
36 community within the study area. Therefore, there would be a less-than-significant impact.

37 **Tidal Brackish Emergent Wetland**

38 Construction, operation, maintenance and management associated with the conservation
39 components of Alternative 9 would have no adverse effect on the habitats associated with the tidal
40 brackish emergent wetland natural community. Habitat restoration and construction associated
41 with CM1, CM2, CM5, and CM6 would not remove tidal brackish emergent wetland; levee breaching
42 and minor construction associated with CM4 may temporarily remove small amounts of this natural
43 community (see Table 12-9-2). Full implementation of Alternative 9 would include the following

- 1 conservation actions over the term of the BDCP to benefit the tidal brackish emergent wetland
2 natural community.
- 3 • Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
4 accommodate sea level rise (Objective L1.3 associated with CM4).
 - 5 • Within the restored and protected tidal natural communities and transitional uplands, include
6 sufficient transitional uplands along the fringes of restored brackish and freshwater tidal
7 emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow for
8 the future upslope establishment of tidal emergent wetland communities (Objective L1.7,
9 associated with CM4).
 - 10 • Within the restored and protected tidal natural communities and transitional uplands, restore
11 or create at least 6,000 acres of tidal brackish emergent wetland in Conservation Zone 11
12 (Objective TBEWNC1.1 associated with CM4).
 - 13 • Restore connectivity to isolated patches of tidal brackish emergent marsh where isolation has
14 reduced effective use of these marshes by the species that depend on them (Objective
15 TBEWNC1.3 associated with CM4).
 - 16 • Create topographic heterogeneity in restored tidal brackish emergent wetland to provide
17 variation in inundation characteristics and vegetative composition (Objective TBEWNC1.4
18 associated with CM4).
 - 19 • Limit perennial pepperweed to no more than 10% cover in tidal brackish emergent wetland
20 natural community within the reserve system (Objective TBEWNC2.1 associated with CM11).
- 21 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
22 3.3 that would improve the value of tidal brackish emergent wetland natural community for
23 terrestrial species. As explained below, with the restoration and enhancement of these amounts of
24 habitat, in addition to implementation of AMMs, impacts on this natural community would not be
25 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-2. Changes in Tidal Brackish Emergent Wetland Natural Community Associated with**
2 **Alternative 9 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0	0
CM4	Unk.	Unk.	Unk.	Unk.	0	0
CM5	0	0	0	0	0	0
CM6	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-4: Changes in Tidal Brackish Emergent Wetland Natural Community as a Result of**
5 **Implementing BDCP Conservation Measures**

6 Construction of the Alternative 9 water conveyance facilities (CM1) would not affect tidal brackish
7 emergent wetland natural community.

8 Restoration of tidal marsh habitats associated with CM4 would require site preparation, earthwork,
9 and other site activities that could remove tidal brackish emergent wetland. Levee modifications,
10 grading or contouring, filling to compensate for land subsidence, and creation of new channels could
11 also result in the removal of tidal brackish emergent wetland. All of this construction and land
12 modification activity that could affect tidal brackish emergent wetland would occur in Suisun Marsh
13 (CZ 11). The acreage of loss has not been calculated because the specific locations for site
14 preparation and earthwork have not been identified, but the loss would likely be very small (less
15 than 1 acre). These activities would occur through the course of the CM4 restoration program. The
16 restoration elements of CM4 would greatly exceed any of the short-term losses described above. At
17 least 6,000 acres of tidal brackish emergent wetland would be restored in the Plan Area (BDCP
18 Objective TBEWNC1.1, associated with CM4), with 2,000 acres of restoration occurring in the near-
19 term timeframe. In addition, the habitat and ecosystem functions of BDCP restored tidal brackish
20 emergent wetland would be maintained and enhanced (CM11). The BDCP beneficial effects
21 evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.3.2) states that at least 6,000 acres of tidal
22 brackish emergent wetland community would be restored in CZ 11, and that tidal natural
23 communities restoration would decrease habitat fragmentation by providing additional connectivity
24 between isolated patches of tidal brackish emergent wetland. These same conservation actions
25 would be implemented under Alternative 9.

1 The restoration activities associated with CM4 in Suisun Marsh would result in other effects that
 2 could alter the habitat value of tidal brackish emergent wetland. Disturbances associated with levee
 3 breaching and grading or contouring would increase opportunities for the introduction or spread of
 4 invasive species. Implementation of CM11 would limit this risk through invasive species control and
 5 wetland management and enhancement activities to support native species. Tidal flooding of dry
 6 areas could also increase the bioavailability of methylmercury in Suisun Marsh. Site-specific
 7 conditions would dictate the significance of this hazard to tidal brackish marsh vegetation and
 8 associated wildlife. According to the Suisun Marsh Plan EIR/EIS (Bureau of Reclamation et al. 2010,
 9 pg. 5.2-18), marsh creation may generate less methylmercury than is currently being generated by
 10 managed wetlands. However, this has not been confirmed through comprehensive studies. Because
 11 of the difficulty in assessing this risk at a programmatic level, it will need to be considered at a
 12 project level. Site-specific restoration plans that address the creation and mobilization of mercury,
 13 and monitoring and adaptive management as described in *CM12 Methylmercury Management*, would
 14 be available to address the uncertainty of methylmercury levels in restored tidal marsh. Water
 15 temperature fluctuations in newly created marsh and the potential for increased nitrogen
 16 deposition associated with construction vehicles are also issues of concern that are difficult to
 17 quantify at the current stage of restoration design. None of these effects is expected to limit the
 18 extent or value of tidal brackish emergent wetland in the study area.

19 **NEPA Effects:** The increase of tidal brackish emergent wetland associated with CM4 would be a
 20 beneficial effect on the natural community.

21 **CEQA Conclusion:** Tidal brackish emergent wetland natural community could experience small
 22 losses in acreage in Suisun Marsh (CZ 11) as a result of the large-scale tidal marsh restoration
 23 planned as part of CM4. These losses (expected to not exceed 1 acre) would be associated with levee
 24 modification, site preparation and other earthwork needed to expose diked lands to tidal influence.
 25 Because at least 6,000 acres of tidal brackish emergent wetland would be restored in the Plan Area
 26 as part of CM4, including 2,000 acres restored in the near-term timeframe, there would be a large
 27 increase in tidal brackish emergent wetland both in the near-term and over the life of the Plan.
 28 Indirect effects associated with the expansion of tidal brackish emergent wetland natural
 29 community, including the potential spread of invasive species, the generation of methylmercury,
 30 increases in marsh water temperatures, and increased nitrogen deposition are not expected to have
 31 a significant impact on this natural community in the study area. Therefore, this impact would be
 32 beneficial.

33 **Impact BIO-5: Modification of Tidal Brackish Emergent Wetland Natural Community from**
 34 **Ongoing Operation, Maintenance and Management Activities**

35 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime
 36 associated with changed water management is in effect, there would be new ongoing and periodic
 37 actions associated with operation, maintenance and management of the BDCP facilities and
 38 conservation lands that could affect tidal brackish emergent wetland natural community in the
 39 study area. The ongoing actions include the diversion of Sacramento River flows at two newly
 40 screened sites at Georgianna Slough and Delta Cross Channel in the north Delta, the operation of
 41 multiple operable barriers in Delta waterways, and modified diversions from south Delta channels.
 42 These actions are associated with CM1 (see the impact discussion above for effects associated with
 43 CM2). The periodic actions would involve access road and conveyance facility repair, vegetation
 44 management at the various water conveyance facilities and habitat restoration sites (CM11), levee
 45 repair and replacement of levee armoring, channel dredging at the two diversions with fish screens

1 and in the Middle River and Victoria Canal, and habitat enhancement in accordance with natural
2 community management plans. The potential effects of these actions are described below.

- 3 • *Modified river flows upstream of and within the study area and modified diversions from south*
4 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified
5 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel, and
6 modified diversions from south Delta channels (Operational Scenario G) would not result in the
7 permanent reduction in acreage of the tidal brackish emergent wetland natural community in
8 the study area. Flow levels in the upstream rivers would not affect tidal brackish emergent
9 wetland because this community does not exist along upstream rivers. Modified diversions of
10 Sacramento River flows at Georgianna Slough and Delta Cross Channel would not result in a
11 permanent reduction in tidal brackish emergent wetland community downstream of these
12 diversions. Flow volumes in these two diversions and in the downstream channels that had been
13 dredged (Middle River and Victoria Canal) would increase under certain Sacramento River flow
14 conditions and water year types. However, tidal influence in the Sacramento River and Delta
15 waterways would continue to be dominant such that there would be no substantial change in
16 water levels that might affect in-stream and adjacent vegetation. Modified diversions from south
17 Delta channels would not create a reduction in this natural community.
- 18 • *Access road and levee repair.* Periodic repair of access roads and levees associated with the BDCP
19 actions have the potential to require removal of adjacent vegetation and could entail earth and
20 rock work in tidal brackish emergent wetland habitats. This activity could lead to increased soil
21 erosion, turbidity and runoff entering these habitats. The activities would be subject to normal
22 erosion, turbidity and runoff control management practices, including those developed as part
23 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
24 *Sediment Control Plan.* Any vegetation removal or earth work adjacent to or within aquatic
25 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation
26 of disturbed surfaces. Proper implementation of these measures would avoid permanent
27 adverse effects on this community.
- 28 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
29 treatment, would be a periodic activity associated with the long-term maintenance of
30 restoration sites (*CM11 Natural Communities Enhancement and Management*). Use of herbicides
31 to control nuisance vegetation could pose a long-term hazard to tidal brackish emergent
32 wetland natural community at or adjacent to treated areas. The hazard could be created by
33 uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater onto the
34 natural community, or direct discharge of herbicides to wetland areas being treated for invasive
35 species removal. Environmental commitments and *AMM5 Spill Prevention, Containment, and*
36 *Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and the
37 environment from use of various chemicals during maintenance activities, including the use of
38 herbicides. These commitments are described in Appendix 3B, including the commitment to
39 prepare and implement spill prevention, containment, and countermeasure plans and
40 stormwater pollution prevention plans. Best management practices, including control of drift
41 and runoff from treated areas, and use of herbicides approved for use in aquatic environments
42 would also reduce the risk of affecting natural communities adjacent to levees associated with
43 tidal wetland restoration activities.
- 44 • *Channel dredging.* Long-term maintenance of tidal channels that support wetland expansion in
45 Suisun Marsh would include periodic dredging of sediments. The dredging would occur adjacent
46 to tidal brackish emergent wetland natural community and would result in short-term increases

1 in turbidity and disturbance of the substrate. These conditions would not eliminate the
2 community, but would diminish its value in the short term for special-status and common
3 species that rely on it for cover, movement corridor or foraging area. The individual species
4 effects are discussed later in this chapter. *AMM2 Construction Best Management Practices and*
5 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control*
6 *Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of*
7 *Spoils, and AMM10 Restoration of Temporarily Affected Natural Communities* are part of the Plan
8 and would require actions to avoid or minimize dredging effects on adjacent sensitive
9 vegetation.

- 10 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
11 communities within the Plan Area (CM11). For tidal brackish emergent wetland natural
12 community, a management plan would be prepared that specifies actions to improve the value
13 of the habitats for covered species. Actions would include control of invasive nonnative plant
14 and animal species, fire management, restrictions on vector control and application of
15 herbicides, and maintenance of infrastructure that would allow for movement through the
16 community. The enhancement efforts would improve the long-term value of this community for
17 both special-status and common species.

18 The various operations and maintenance activities described above could alter acreage and value of
19 tidal brackish emergent wetland natural community in the study area through water operations,
20 levee and road maintenance, channel dredging and vegetation management in or adjacent to this
21 community. Activities could also introduce sediment and herbicides that would reduce the value of
22 this community to common and sensitive plant and wildlife species. Other periodic activities
23 associated with the Plan, including management, protection and enhancement actions associated
24 with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities*
25 *Enhancement and Management*, would be undertaken to enhance the value of the community. While
26 some of these activities could result in small changes in acreage, these changes would be greatly
27 offset by restoration activities planned as part of *CM4 Tidal Natural Communities Restoration*. The
28 management actions associated with levee repair, periodic dredging and control of invasive plant
29 species would also result in a long-term benefit to the species associated with tidal brackish
30 emergent wetland habitats by improving water movement.

31 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
32 Alternative 9 would not result in a net permanent reduction in the tidal brackish emergent wetland
33 natural community within the study area. Therefore, there would be no adverse effect on this
34 community.

35 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would
36 have the potential to create minor changes (not exceeding 1 acre) in total acreage of tidal brackish
37 emergent wetland natural community in Suisun Marsh, and could create temporary increases in
38 turbidity and sedimentation. The activities could also introduce herbicides periodically to control
39 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM3,
40 AMM4, AMM5, AMM6, and AMM10 would minimize these impacts, and other operations and
41 maintenance activities, including management, protection and enhancement actions associated with
42 *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities Enhancement*
43 *and Management*, would create positive effects, including improved water movement in these
44 habitats. Long-term restoration activities associated with *CM4 Tidal Natural Communities*
45 *Restoration* would greatly expand this natural community in the study area. Ongoing operation,

1 maintenance and management activities would not result in a net permanent reduction in this
2 sensitive natural community within the study area. Therefore, there would be a less-than-significant
3 impact.

4 **Tidal Freshwater Emergent Wetland**

5 Construction, operation, maintenance and management associated with the conservation
6 components of Alternative 9 would have no long-term adverse effects on the habitats associated
7 with the tidal freshwater emergent wetland natural community. Initial development and
8 construction of CM1, CM2, CM4, CM5, and CM6 would result in both permanent and temporary
9 removal of this community (Table 12-9-3). Full implementation of Alternative 9 would also include
10 the following conservation actions over the term of the BDCP to benefit the tidal freshwater
11 emergent wetland natural community.

- 12 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
13 accommodate sea level rise (Objective L1.3 associated with CM4).
- 14 ● Within the 65,000 acres of tidal natural communities and transitional uplands, include sufficient
15 transitional uplands along the fringes of restored brackish and freshwater tidal emergent
16 wetlands to accommodate up to 3 feet of sea level rise where possible and allow for the future
17 upslope establishment of tidal emergent wetland communities (Objective L1.7, associated with
18 CM4).
- 19 ● Within the 65,000 acres of tidal natural communities, restore or create at least 24,000 acres of
20 tidal freshwater emergent wetland in Conservation Zones 1, 2, 4, 5, 6, and/or 7 (Objective
21 TFEWNC1.1, associated with CM4).
- 22 ● Restore tidal freshwater emergent wetlands in areas that increase connectivity among
23 conservation lands (Objective TFEWNC1.2, associated with CM4).
- 24 ● Restore and sustain a diversity of marsh vegetation that reflects historical species compositions
25 and high structural complexity (Objective TFEWNC2.1, associated with CM4).
- 26 ● Create topographic heterogeneity in restored tidal freshwater emergent wetland to provide
27 variation in inundation characteristics and vegetative composition (Objective TFEWNC2.2,
28 associated with CM4).

29 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
30 3.3 that would improve the value of tidal freshwater emergent wetland natural community for
31 terrestrial species. As explained below, with the restoration and enhancement of these amounts of
32 habitat, in addition to implementation of AMMs, impacts on this natural community would not be
33 adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-3. Changes in Tidal Freshwater Emergent Wetland Natural Community Associated with**
2 **Alternative 9 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	62	62	123	123		
CM2	6	6	0	0	24-58	
CM4	1	1	0	0		
CM5	0	1	0	1		3
CM6	Unk.	Unk.	Unk.	Unk.		
TOTAL IMPACTS	69	70	123	124	24-58	3

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-6: Changes in Tidal Freshwater Emergent Wetland Natural Community as a Result**
5 **of Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,
7 CM4, CM5, and CM6 would permanently eliminate an estimated 70 acres and temporarily remove
8 124 acres of tidal freshwater emergent wetland natural community in the study area. These
9 modifications represent approximately 2% of the 8,856 acres of the community that is mapped in
10 the study area. The majority of the permanent and temporary losses would occur during the first 10
11 years of Alternative 9 implementation, as water conveyance facilities are constructed and habitat
12 restoration is initiated. Natural communities restoration would add at least 24,000 acres of tidal
13 freshwater emergent wetland natural community during the course of Plan restoration activities,
14 which would greatly expand the area of this natural community and offset the losses. The BDCP
15 beneficial effects evaluation of Alternative 4 (BDCP Chapter 5, Section 5.4.4.2) states that the
16 implementation of *CM4 Tidal Natural Communities Restoration* will restore at least 24,000 acres of
17 tidal freshwater emergent wetland community in Cache Slough (Conservation Zones 1, 2, and 3), the
18 Cosumnes/Mokelumne (Conservation Zone 4), West Delta (Conservation Zone 5 and 6), and South
19 Delta (Conservation Zone 7) ROAs. The BDCP evaluation also states that the objectives in the Plan
20 will promote vegetation diversity and structural complexity (as incorporated into the restoration
21 design) in restored tidal freshwater marsh. These same conservation actions would be implemented
22 under Alternative 9.

23 The individual effects of each relevant conservation measure are addressed below. A summary
24 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
25 conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation:* Construction of the Alternative 9 water conveyance facilities
2 would permanently remove 62 acres and temporarily remove 123 acres of tidal freshwater
3 emergent wetland community. Most of the permanent loss would occur at the channel dredging
4 sites within the Middle River and Victoria Canal. Middle River dredging would occur from
5 Victoria Canal north to Mildred Island, while Victoria Canal dredging would extend from Middle
6 River westward to Old River. This community exists as fringing vegetation along the banks of
7 these channels and also as fringing vegetation on the islands within the channels. Smaller areas
8 would be permanently lost at operable barrier sites adjacent to Middle River and San Joaquin
9 River. Temporary tidal freshwater emergent wetland removal would occur at dredging work
10 areas along Victoria Canal and Middle River. Detailed mapping of these facilities in relation to
11 natural communities can be found in the Terrestrial Biology Mapbook. These losses would take
12 place during the near-term construction period.

13 There is the potential for increased nitrogen deposition associated with construction vehicles
14 during the construction phase of CM1. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related*
15 *Nitrogen Deposition on BDCP Natural Communities*, addresses this issue in detail. It has been
16 concluded that this potential deposition would pose a low risk of changing tidal freshwater
17 emergent wetland natural community because the construction would contribute a negligible
18 amount of nitrogen to regional projected emissions. No adverse effect is expected.

- 19 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
20 construction or channel modification activities within the Yolo and Sacramento Bypasses,
21 including improvements in flow through the west side channel of the bypass, Putah Creek
22 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. All of
23 these activities could involve excavation and grading in tidal freshwater emergent wetland areas
24 to improve passage of fish through the bypasses. Based on hypothetical construction footprints,
25 a total of 6 acres could be permanently lost to these activities. The loss is expected to occur in
26 the first 10 years of Alternative 9 implementation.

- 27 • *CM4 Tidal Natural Communities Restoration:* Based on hypothetical footprints of this restoration
28 activity, initial land grading and levee modification could permanently remove 1 acre of tidal
29 freshwater emergent wetland natural community. This loss would occur in the near-term
30 timeframe and would occur throughout the ROAs identified for tidal wetland restoration. At the
31 same time, an estimated 24,000 acres of tidal freshwater emergent wetland community would
32 be restored during tidal habitat restoration, consistent with BDCP Objective TFEWNC1.1,
33 associated with CM4. Approximately 8,850 acres of the restoration would occur during the first
34 10 years of Alternative 9 implementation, which would coincide with the timeframe of water
35 conveyance facilities construction. The remaining restoration would be spread over the
36 following 30 years. Tidal wetland communities restoration is expected to be focused in the ROAs
37 identified in Figure 12-1. Restoration would be located and designed to improve habitat
38 connectivity (Objective TFEWNC1.2), improve marsh species diversity (Objective TFEWNC2.1),
39 and provide variation in inundation characteristics (Objective TFEWNC2.2). Some of the
40 restoration would occur in the lower Yolo Bypass, but restoration would also be spread among
41 the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.

42 The restoration activities associated with CM4 in the Plan Area ROAs would result in other
43 effects that could alter the habitat value of tidal freshwater emergent wetland. Disturbances
44 associated with levee breaching and grading or contouring would increase opportunities for the
45 introduction or spread of invasive species. Implementation of CM11 would limit this risk
46 through invasive species control and wetland management and enhancement activities to

1 support native species. Flooding of dry areas for tidal freshwater marsh creation could also
2 increase the bioavailability of methylmercury, especially in the Cache Slough,
3 Cosumnes/Mokelumne and Suisun Marsh ROAs. Site-specific conditions would dictate the
4 significance of this hazard to marsh vegetation and associated wildlife. Because of the difficulty
5 in assessing this risk at a programmatic level, it will need to be considered at a project level.
6 Site-specific restoration plans that address the creation and mobilization of mercury, and
7 monitoring and adaptive management as described in *CM12 Methylmercury Management*, would
8 be available to address the uncertainty of methylmercury levels in restored tidal marsh.

9 Water temperature fluctuations in newly created marsh is also an issue of concern that is
10 difficult to quantify at the current stage of restoration design. None of these effects is expected
11 to limit the extent or value of tidal freshwater emergent wetland in the study area.

- 12 ● *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
13 would permanently remove 1 acre and temporarily remove 1 acre of tidal freshwater emergent
14 wetland habitat. The construction-related losses would be considered a permanent removal of
15 the habitats directly affected. The majority of seasonally inundated floodplain restoration is
16 expected to occur along the lower San Joaquin River in the south and central Delta areas. This
17 activity is scheduled to start following construction of water conveyance facilities, which is
18 expected to take 10 years. Floodplain restoration along the San Joaquin River would improve
19 connectivity for a variety of species that rely on freshwater marsh and riparian habitats. The
20 regional and Plan Area landscape linkages along the San Joaquin River are included in Figure 12-
21 2.
- 22 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
23 of small amounts of tidal freshwater emergent wetland habitat along 20 miles of river and
24 sloughs. The extent of this loss cannot be quantified at this time, but the majority of the
25 enhancement activity would occur on narrow strips of habitat, including levees and channel
26 banks. The improvements would occur within the study area on sections of the Sacramento, San
27 Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

28 The following paragraphs summarize the combined effects discussed above and describe other
29 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
30 also included.

31 ***Near-Term Timeframe***

32 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would
33 affect the tidal freshwater emergent wetland natural community through CM1 construction losses
34 (62 acres permanent and 123 acres temporary), CM2 construction losses (6 acres permanent), and
35 CM4 construction losses (1 acre permanent). These losses would occur primarily in the southern
36 and central Delta along Middle River and Victoria Canal, north and east of Clifton Court Forebay.
37 Smaller areas would be lost at operable barrier sites along Middle River and San Joaquin River in the
38 central Delta, and at various locations within the Yolo Bypass and the tidal restoration ROAs.

39 The construction losses of this special-status natural community would represent an adverse effect
40 if they were not offset by avoidance and minimization measures and restoration actions associated
41 with BDCP conservation components. Loss of tidal freshwater emergent wetland natural community
42 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
43 defined by Section 404 of the CWA. However, the creation of 8,850 acres of tidal freshwater
44 emergent wetland natural community as part of CM4 during the first 10 years of Alternative 9

1 implementation would more than offset this near-term loss, avoiding any adverse effect. Typical
2 project-level mitigation ratios (1:1 for restoration) would indicate that 192 acres of restoration
3 would be needed to offset (i.e., mitigate) the 192 acres of loss (the total permanent and temporary
4 near-term effects listed in Table 12-9-3).

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
6 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
7 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
8 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
9 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
10 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

11 **Late Long-Term Timeframe**

12 Implementation of Alternative 9 as a whole would result in relatively minor (approximately 2%)
13 losses of tidal freshwater emergent wetland community in the study area. These losses (70 acres of
14 permanent and 124 acres of temporary loss) would be largely associated with construction of the
15 water conveyance facilities (CM1), construction of Yolo Bypass fish improvements (CM2), and levee
16 modification and land grading associated with tidal marsh restoration (CM4) and floodplain
17 restoration (CM5). The CM4 and CM5 losses would occur during the course of the CM4 and CM5
18 conservation actions at various tidal and floodplain restoration sites throughout the study area. By
19 the end of the Plan timeframe, a total of 24,000 acres of this natural community would be restored.
20 The restoration would occur over a wide region of the study area, including within the Suisun
21 Marsh, Cosumnes/Mokelumne, Cache Slough, South Delta and Cosumnes/Mokelumne ROAs (see
22 Figure 12-1).

23 **NEPA Effects:** The creation of 8,850 acres of tidal freshwater emergent wetland natural community
24 as part of CM4 during the first 10 years of Alternative 9 implementation would more than offset the
25 construction and inundation-related effects of implementing CM1, CM2, CM4 and CM5, avoiding any
26 adverse effect in the near-term. Because of the 24,000 acres of tidal freshwater emergent wetland
27 restoration that would occur over the course of the Plan, Alternative 9 would not result in a net
28 long-term reduction in the acreage of a sensitive natural community; the effect would be beneficial.

29 **CEQA Conclusion:**

30 **Near-Term Timeframe**

31 Alternative 9 would result in the loss of approximately 192 acres of tidal freshwater emergent
32 wetland natural community due to construction of the water conveyance facilities (CM1) and fish
33 passage improvements (CM2), and tidal marsh restoration (CM4) in the near-term. The construction
34 losses would occur primarily in the southern and central Delta along Middle River and Victoria
35 Canal, north and east of Clifton Court Forebay. Smaller areas would be lost at operable barrier sites
36 along Middle River and San Joaquin River in the central Delta, and at various locations within the
37 Yolo Bypass and the tidal restoration ROAs. The losses would be spread across a 10-year near-term
38 timeframe and would be offset by planned restoration of 8,850 acres of tidal freshwater emergent
39 wetland natural community scheduled for the first 10 years of Alternative 9 implementation (CM4).
40 AMM1, AMM2, AMM6, AMM7, and AMM10 would also be implemented to minimize impacts.
41 Because of these offsetting near-term restoration activities and AMMs, impacts would be less than
42 significant. Typical project-level mitigation ratios (1:1 for restoration) would indicate that 192 acres
43 of restoration would be needed to offset (i.e., mitigate) the 192 acres of loss. The restoration would

1 be initiated at the beginning of Alternative 9 implementation to minimize any time lag in the
2 availability of this habitat to special-status species, and would result in a net gain in acreage of this
3 sensitive natural community.

4 ***Late Long-Term Timeframe***

5 At the end of the Plan period, 194 acres of this community would be lost to conservation activities
6 and 24,000 acres of this community would be restored. There would be no net permanent reduction
7 in the acreage and value of this sensitive natural community within the study area. Therefore,
8 Alternative 9 would not have a substantial adverse effect on this natural community; the impact
9 would be beneficial.

10 **Impact BIO-7: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 11 **Freshwater Emergent Wetland Natural Community**

12 Two Alternative 9 conservation measures would modify the inundation/flooding regimes of both
13 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
14 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
15 of tidal freshwater emergent wetland natural community on small acreages, while CM5 would
16 expose this community to additional flooding as channel margins are modified and levees are set
17 back to improve fish habitat along some of the major rivers and waterways throughout the study
18 area.

- 19 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 9 would
20 result in an increase in the frequency, magnitude and duration of inundation of 24–58 acres of
21 tidal freshwater emergent wetland natural community. The methods used to estimate these
22 inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*
23 *Wildlife, and Plants*. The area more frequently inundated would vary with the flow volume that
24 would pass through the newly constructed notch in the Fremont Weir. The 24-acre increase in
25 inundation would be associated with a notch flow of 1,000 cubic feet per second (cfs), and the
26 58-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow
27 through Fremont Weir would be expected in 30% of the years. Most of this community occurs in
28 the southern section of the bypass on Liberty Island, on the fringes of tidal perennial aquatic
29 habitats. Smaller areas are scattered among the cropland within the bypass, south of Interstate
30 80. The anticipated change in management of flows in the Yolo Bypass includes more frequent
31 releases in flows into the bypass from the Fremont and Sacramento Weirs, and in some years,
32 later releases into the bypass in spring months (April and May). The modification of periodic
33 inundation events would not adversely affect the ecological function of tidal freshwater
34 emergent wetland habitats and would not substantially modify its value for special-status or
35 common terrestrial species. The plants in this natural community are adapted to periodic
36 inundation events within the Yolo Bypass. The effects of this inundation on wildlife and plant
37 species are described in detail in later sections of this chapter.
- 38 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in a
39 seasonal increase in the frequency and duration of inundation of 3 acres of tidal freshwater
40 emergent wetland habitats. Specific locations for this restoration activity have not been
41 identified, but they would likely be focused in the south Delta area, along the major rivers and
42 Delta channels. The reconnection of these wetlands to stream flooding events would be
43 beneficial to their ecological function, especially as they relate to BDCP target terrestrial and

1 aquatic species. Foraging activity and refuge sites would be expanded into areas currently
2 unavailable or infrequently available to some aquatic species.

3 In summary, 27–61 acres of tidal freshwater emergent wetland natural community in the study area
4 would be subjected to more frequent inundation as a result of implementing two Alternative 9
5 conservation measures (CM2 and CM5). Tidal freshwater emergent wetland natural community is a
6 habitat of great value to both terrestrial and aquatic species in the study area.

7 **NEPA Effects:** Periodic inundation of tidal freshwater emergent wetland natural community
8 associated with Alternative 9 would not result in a net permanent reduction in the acreage and
9 value of this community in the study area. There would be no adverse effect.

10 **CEQA Conclusion:** An estimated 27–61 acres of tidal freshwater emergent wetland natural
11 community in the study area would be subjected to more frequent inundation as a result of
12 implementing CM2 and CM5 under Alternative 9. This community is of great value to aquatic and
13 terrestrial species in the study area. The periodic inundation would not result in a net permanent
14 reduction in the acreage and value of this community in the study area. Therefore, there would be a
15 less-than-significant impact on the community.

16 **Impact BIO-8: Modification of Tidal Freshwater Emergent Wetland Natural Community from** 17 **Ongoing Operation, Maintenance and Management Activities**

18 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime
19 associated with changed water management is in effect, there would be new ongoing and periodic
20 actions associated with operation, maintenance and management of the BDCP facilities and
21 conservation lands that could affect tidal freshwater emergent wetland natural community in the
22 study area. The ongoing actions include the diversion of Sacramento River flows at two newly
23 screened sites at Georgianna Slough and Delta Cross Channel in the north Delta, the operation of
24 multiple operable barriers in Delta waterways, and modified diversions from south Delta channels.
25 These actions are associated with CM1 (see the impact discussion above for effects associated with
26 CM2). The periodic actions would involve access road and conveyance facility repair, vegetation
27 management at the various water conveyance facilities and habitat restoration sites (CM13), levee
28 repair and replacement of levee armoring, channel dredging at the two diversions with fish screens
29 and in the Middle River and Victoria Canal, and habitat enhancement in accordance with natural
30 community management plans. The potential effects of these actions are described below.

- 31 • *Modified river flows upstream of and within the study area and modified diversions from south*
32 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified
33 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel, and
34 modified diversions from south Delta channels (Operational Scenario G) would not result in the
35 permanent reduction in acreage of a sensitive natural community in the study area. Flow levels
36 in the upstream rivers would not change such that the acreage of tidal freshwater emergent
37 wetland community would be reduced on a permanent basis. Some minor increases and some
38 decreases would be expected to occur during some seasons and in some water-year types, but
39 there would be no permanent loss. Similarly, modified diversions of Sacramento River flows at
40 Georgianna Slough and Delta Cross Channel would not result in a permanent reduction in tidal
41 freshwater emergent wetland community downstream of these diversions. Flow volumes in
42 these two diversions and in the downstream channels that had been dredged (Middle River and
43 Victoria Canal) would increase under certain Sacramento River flow conditions and water year
44 types. However, tidal influence in the Sacramento River and Delta waterways would continue to

1 be dominant such that there would be no substantial change in water levels that might affect in-
2 stream and adjacent vegetation. Modified diversions from south Delta channels would not create
3 a reduction in this natural community.

- 4 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
5 conveyance facilities and levees associated with the BDCP actions have the potential to require
6 removal of adjacent vegetation and could entail earth and rock work in or adjacent to tidal
7 freshwater emergent wetland habitats. This activity could lead to increased soil erosion,
8 turbidity and runoff entering tidal aquatic habitats. These activities would be subject to normal
9 erosion, turbidity and runoff control management practices, including those developed as part
10 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
11 *Sediment Control Plan*. Any vegetation removal or earth work adjacent to or within emergent
12 wetland habitats would require use of sediment and turbidity barriers, soil stabilization and
13 revegetation of disturbed surfaces. Proper implementation of these measures would avoid
14 permanent adverse effects on this community.
- 15 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
16 treatment, would be a periodic activity associated with the long-term maintenance of water
17 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
18 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
19 tidal freshwater emergent wetland natural community at or adjacent to treated areas. The
20 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
21 stormwater onto the natural community, or direct discharge of herbicides to tidal aquatic areas
22 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
23 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce
24 hazards to humans and the environment from use of various chemicals during maintenance
25 activities, including the use of herbicides. These commitments are described in Appendix 3B,
26 including the commitment to prepare and implement spill prevention, containment, and
27 countermeasure plans and stormwater pollution prevention plans. Best management practices,
28 including control of drift and runoff from treated areas, and use of herbicides approved for use
29 in aquatic environments would also reduce the risk of affecting natural communities adjacent to
30 water conveyance features and levees associated with restoration activities.
- 31 • *Channel dredging.* Long-term operation of the Alternative 9 diversions on the Sacramento River
32 (Georgianna Slough and Delta Cross Channel) would include periodic dredging of sediments that
33 might accumulate in front of intake and fish screens. Maintenance dredging would also be
34 required in Middle River and Victoria Canal to maintain channel capacity. The dredging would
35 occur in the vicinity of tidal freshwater emergent natural community and would result in short-
36 term increases in turbidity and disturbance of the substrate. These conditions would not
37 eliminate the community, but would diminish its value for special-status and common species
38 that rely on it for nesting habitat, cover or foraging area. The individual species effects are
39 discussed later in this chapter. *AMM2 Construction Best Management Practices and Monitoring*,
40 *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5*
41 *Spill Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and
42 *AMM10 Restoration of Temporarily Affected Natural Communities* are part of the Plan and would
43 require actions to avoid or minimize dredging effects on tidal freshwater emergent wetland
44 habitats.

- 1 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
2 communities within the Plan Area (CM11). For tidal freshwater emergent wetland community, a
3 management plan would be prepared that specifies actions to improve the value of the habitats
4 for covered species. Actions would include control of invasive nonnative plant and animal
5 species, fire management, restrictions on vector control and application of herbicides, and
6 maintenance of infrastructure that would allow for movement through the community. The
7 enhancement efforts would improve the long-term value of this community for both special-
8 status and common species.

9 The various operations and maintenance activities described above could alter acreage of tidal
10 freshwater emergent wetland natural community in the study area through changes in flow
11 patterns, channel and levee maintenance, and vegetation control. Activities could also introduce
12 sediment and herbicides that would reduce the value of this community to common and sensitive
13 plant and wildlife species. Other periodic activities associated with the Plan, including management,
14 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
15 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
16 enhance the value of the community. While some of these activities could result in small changes in
17 acreage, these changes would be greatly offset by restoration activities planned as part of *CM4 Tidal*
18 *Natural Communities Restoration*. The management actions associated with levee repair, periodic
19 dredging and control of invasive plant species would also result in a long-term benefit to the species
20 associated with tidal freshwater emergent wetland habitats by improving water movement.

21 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
22 Alternative 9 would not result in a net permanent reduction in the tidal freshwater emergent
23 wetland natural community within the study area. Therefore, there would be no adverse effect on
24 this natural community.

25 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would
26 have the potential to create minor changes in total acreage of tidal freshwater emergent wetland
27 natural community in the study area, and could create temporary increases in turbidity and
28 sedimentation. The activities could also introduce herbicides periodically to control nonnative,
29 invasive plants. Implementation of environmental commitments and AMM2, AMM3, AMM4, AMM5,
30 AMM6, and AMM10 would minimize these impacts, and other operations and maintenance
31 activities, including management, protection and enhancement actions associated with *CM3 Natural*
32 *Communities Protection and Restoration* and *CM11 Natural Communities Enhancement and*
33 *Management*, would create positive effects, including improved water movement in these habitats.
34 Long-term restoration activities associated with *CM4 Tidal Natural Communities Restoration* would
35 expand this natural community in the study area. Ongoing operation, maintenance and management
36 activities would not result in a net permanent reduction in this sensitive natural community within
37 the study area. Therefore, there would be a less-than-significant impact on the community.

38 **Valley/Foothill Riparian**

39 Construction, operation, maintenance and management associated with the conservation
40 components of Alternative 9 would have a near-term adverse effect on the habitats associated with
41 the valley/foothill riparian natural community. Initial development and construction of CM1, CM2,
42 CM4, CM5, and CM6 would result in both permanent and temporary removal of this community (see
43 Table 12-9-4). Full implementation of Alternative 9 would also include the following conservation
44 actions over the term of the BDCP to benefit the valley/foothill riparian natural community.

- 1 • Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000
2 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated
3 with CM7).
- 4 • Protect 750 acres of existing valley/foothill riparian natural community in Conservation Zone 7
5 by year 10 (Objective VFRNC1.2, associated with CM3).
- 6 • Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory
7 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated
8 with CM5 and CM7).
- 9 • Maintain 500 acres of mature riparian forest in Conservation Zones 4 or 7 (Objective VFRNC2.3,
10 associated with CM3 and CM7).
- 11 • Maintain 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion of the early-
12 to late-successional riparian vegetation (VFRNC2.2), in large blocks with a minimum patch size
13 of 50 acres and minimum width of 330 feet (Objective VFRNC2.4, associated with CM3 and
14 CM7).
- 15 • Maintain or increase abundance and distribution of valley/foothill riparian natural community
16 vegetation alliances that are rare or uncommon as recognized by California Department of Fish
17 and Game (2010), such as button willow thickets alliance and blue elderberry stands alliance
18 (Objective VFRNC3.1).

19 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
20 3.3 that would improve the value of valley/foothill riparian natural community for terrestrial
21 species. As explained below, with the restoration and enhancement of these amounts of habitat, in
22 addition to implementation of AMMs and mitigation, impacts on this natural community would not
23 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-4. Changes in Valley/Foothill Riparian Natural Community Associated with**
2 **Alternative 9 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	61	61	248	248	0	0
CM2	89	89	88	88	51-92	0
CM4	298	552	0	0	0	0
CM5	0	43	0	35	0	266
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	448	745	336	371	51-92	266

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-9: Changes in Valley/Foothill Riparian Natural Community as a Result of**
5 **Implementing BDCP Conservation Measures**

6 Construction, channel dredging, land grading and habitat restoration activities that would
7 accompany the implementation of CM1, CM2, CM4, CM5, and CM6 would permanently eliminate an
8 estimated 745 acres and temporarily remove 371 acres of valley/foothill riparian natural
9 community in the study area. These modifications represent approximately 6% of the 17,966 acres
10 of the community that is mapped in the study area. The majority of the permanent and temporary
11 losses would occur during the first 10 years of Alternative 9 implementation, as Delta channels are
12 dredged, new diversion structures and operable barriers are constructed, and habitat restoration is
13 initiated. Valley/foothill riparian protection (750 acres) and restoration (800 acres) would be
14 initiated during the same period, which would partially offset the losses. By the end of the Plan
15 period, 5,000 acres of this natural community would be restored. The BDCP beneficial effects
16 analysis (BDCP Chapter 5, Section 5.4.5.2) indicates that implementation of Alternative 4 would
17 restore or create 5,000 acres of riparian forest and scrub in Conservation Zones 1, 2, 4, 5, 6, and 7,
18 with at least 3,000 acres occurring on restored seasonally inundated floodplain. Alternative 4 would
19 also protect 750 acres of existing valley/foothill riparian natural community in Conservation Zone 7.
20 These same conservation measures would be implemented under Alternative 9.

21 The individual effects of each relevant conservation measure are addressed below. A summary
22 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
23 conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of the Alternative 9 water conveyance facilities
2 would permanently remove 61 acres and temporarily remove 248 acres of valley/foothill
3 riparian natural community. Most of the permanent loss would occur as wider and deeper
4 channels are dredged in Middle River and Victoria Canal, and as operable barriers and new
5 Sacramento River diversions are constructed in various waterways across the Delta. Much of the
6 riparian vegetation in this area is composed of dense stands of willows, brambles and
7 blackberry, and associated low profile woody plants. The principal facilities that would cause
8 permanent losses and the general types of riparian vegetation that would be lost are listed
9 below.
- 10 ○ Victoria Canal dredging: small island patches of riparian dominated by California dogwood.
11 ○ Middle River dredging: large and small patches of riparian on in-channel islands dominated
12 by California dogwood, willow, mixed brambles, tules and bulrush.
13 ○ Canal construction across Old River near Clifton Court Forebay–small patches of riparian on
14 the river margins dominated by blackberry, willow and giant reed;
15 ○ Diversion structures and operable barriers on Sacramento River at Georgianna Slough and
16 Delta Cross Channel: corridors of mixed riparian including valley oak, white alder, willow,
17 mixed brambles and deciduous shrublands.
18 ○ Channel enlargement at the Sacramento River and Meadows Slough: narrow band of
19 riparian dominated by valley oak along the Sacramento River and larger stands of valley oak
20 and willow along Meadows Slough.
21 ○ Operable barrier construction at Mokelumne River and Lost Slough: narrow bands of willow
22 and walnut along the Mokelumne River and larger patches of mixed riparian including
23 walnut, willow, mixed bramble, and white alder along Lost Slough.
24 ○ Operable barrier construction at the San Joaquin River and Fishermans Cut: small patches of
25 willow and mixed brambles.
26 ○ Operable barrier construction on the San Joaquin River at the head of Old River: small
27 stringers and patches of cottonwood, willow and valley oak along the San Joaquin River.
- 28 Temporary losses of riparian community would occur primarily along Middle River between
29 Victoria Canal and Mildred Island, where large dredging work areas and operable barrier work
30 areas would be placed. Some of this vegetation may be temporarily removed as dredging
31 progresses, while other areas may remain in place but be temporarily affected by sedimentation
32 and equipment movement associated with dredging. The riparian vegetation in this area is also
33 composed primarily of dense stands of willows, brambles and blackberry, and associated low
34 profile woody plants. Refer to the Terrestrial Biology Mapbook for a more detailed view of these
35 impact areas. These losses would take place during the near-term construction period.
- 36 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 would involve a number of
37 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
38 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
39 Sacramento Weir improvements. All of these activities could involve excavation and grading in
40 valley/foothill riparian areas to improve passage of fish through the bypasses. Based on
41 hypothetical construction footprints, a total of 89 acres could be permanently lost and another
42 88 acres could be temporarily removed. Most of the riparian losses would occur at the north end
43 of Yolo Bypass where major fish passage improvements are planned. This vegetation is a mix of

1 valley oak, sycamore, cottonwood and willow trees. The riparian areas here are primarily small,
2 disconnected patches with moderate to low value as wildlife movement corridors. Most of these
3 patches lack structural complexity. Excavation to improve water movement in the Toe Drain and
4 in the Sacramento Weir would remove similar vegetation. These losses would occur primarily in
5 the near-term timeframe.

- 6 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
7 footprints, implementation of CM4 would permanently inundate or remove 552 acres of
8 valley/foothill riparian community. The losses would be spread among most of the ROAs
9 established for tidal restoration (see Figure 12-1). No losses would occur from Suisun Marsh
10 restoration. These ROAs support a mix of riparian vegetation types, including valley oak stands,
11 extensive willow and cottonwood stringers along waterways, and areas of scrub vegetation
12 dominated by blackberry. These areas are considered of low to moderate habitat value (BDCP
13 Chapter 5, Section 5.4.5). The actual loss of riparian habitat to marsh restoration would be
14 expected to be smaller than predicted by use of the theoretical footprint. As marsh restoration
15 projects were identified and planned, sites could be selected that avoid riparian areas as much
16 as possible.
- 17 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
18 would permanently remove 43 acres and temporarily remove 35 acres of valley/foothill
19 riparian natural community. The construction-related losses would be considered a permanent
20 removal of the habitats directly affected. These losses would be expected to occur along the San
21 Joaquin River and other major waterways in CZ 7 (see Figure 12-1). This activity is scheduled to
22 start following construction of water conveyance facilities, which is expected to take 10 years.
- 23 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
24 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
25 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
26 activity would occur along waterway margins where riparian habitat stringers exist, including
27 levees and channel banks. The improvements would occur within the study area on sections of
28 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 29 • *CM7 Riparian Natural Community Restoration*: The valley/foothill riparian natural community
30 would be restored primarily in association with the tidal (CM4) and floodplain (CM5)
31 restoration and channel margin enhancements (CM6). Following community-specific goals and
32 objectives in the Plan, a total of 5,000 acres of this community would be restored (BDCP
33 Objective VFRNC1.1) and 750 acres would be protected (BDCP Objective VFRNC1.2) over the life
34 of the Plan. Approximately 800 acres would be restored and the entire 750 acres would be
35 protected in the first 10 years of Plan implementation. Riparian restoration and protection
36 would be focused in CZs 4 and 7 (BDCP Objective VFRNC2.3), with a goal of adding a 500-acre
37 portion of the restoration in one or the other of these zones. A variety of successional stages
38 would also be sought to benefit the variety of sensitive plant and animal species that rely on this
39 natural community in the study area (BDCP Objective VFRNC2.4).

40 The following paragraphs summarize the combined effects discussed above and describe other
41 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
42 also included.

1 **Near-Term Timeframe**

2 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would
 3 affect the valley/foothill riparian natural community through CM1 construction losses (61 acres
 4 permanent and 248 acres temporary) and the CM2 construction losses (89 acres permanent and 88
 5 acres temporary). These losses would occur primarily along Middle River as channel dredging
 6 proceeds, at various operable barrier and diversion structure construction sites scattered across the
 7 Delta, and in the northern Yolo Bypass. Approximately 298 acres of the inundation and
 8 construction-related loss from CM4 would occur in the near-term. These losses would occur
 9 throughout the ROAs mapped in Figure 12-1.

10 The construction losses of this special-status natural community would represent an adverse effect
 11 if they were not offset by avoidance and minimization measures and protection/restoration actions
 12 associated with BDCP conservation components. Loss of valley/foothill riparian natural community
 13 would be considered a loss in acreage of a sensitive natural community, and could be considered a
 14 loss of wetlands as defined in Section 404 of the CWA. As indicated above, much of this riparian loss
 15 would be in small patches or narrow strips along waterways, with limited structural complexity. The
 16 restoration of 800 acres (CM3) and protection (including significant enhancement) of 750 acres of
 17 valley/foothill riparian natural community (CM7) during the first 10 years of Alternative 9
 18 implementation would partially offset this near-term loss. At least 400 acres of the protection is
 19 planned for the first 5 years of Alternative 9 implementation. The restoration areas would be large
 20 areas providing connectivity with existing riparian habitats and would include a variety of trees and
 21 shrubs to produce structural complexity. Typical project-level mitigation ratios (1:1 for restoration
 22 and 1:1 for protection) would indicate that 784 acres of protection and 784 acres of restoration
 23 would be needed to offset (i.e., mitigate) the 784 acres of near-term loss (the combination of
 24 permanent and temporary near-term losses listed in Table 12-9-4). The combined 1,550 acres of
 25 protection and restoration in the near-term, combined with Plan goals for protecting and restoring
 26 high-value riparian habitats, are designed to avoid a temporal lag in the value of riparian habitat
 27 available to sensitive species. The restoration and protection acreages contained in the BDCP would
 28 not be sufficient to provide the typical level of mitigation for this community; therefore, the effect of
 29 Alternative 9 would be adverse. Mitigation would be available to offset this effect.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 31 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
 32 *Barge Operations Plan*, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM18*
 33 *Swainson's Hawk*. All of these AMMs include elements that avoid or minimize the risk of affecting
 34 habitats at work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since
 35 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 36 of the Final EIR/EIS.

37 **Late Long-Term Timeframe**

38 Implementation of Alternative 9 as a whole would result in an estimated 6% loss of valley/foothill
 39 riparian community in the study area. These losses (745 acres of permanent and 371 acres of
 40 temporary loss) would be largely associated with construction of the water conveyance facilities
 41 (CM1), construction of Yolo Bypass fish improvements (CM2), and inundation during tidal marsh
 42 restoration (CM4). Inundation losses would occur during the course of BDCP restoration activities at
 43 various tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of
 44 5,000 acres of this natural community would be restored and 750 acres would be protected (CM7)

1 and CM3, respectively). The restoration would occur primarily in CZs 4 and 7, in the
2 Cosumnes/Mokelumne and South Delta ROAs (see Figure 12-1).

3 **NEPA Effects:** The restoration of 800 acres and protection (including significant enhancement) of
4 750 acres of valley/foothill riparian natural community as part of CM7 and CM3 during the first 10
5 years of Alternative 9 implementation would minimize the near-term loss of this community, but
6 would result in an adverse effect. Because of the Plan's commitment to restoration of 5,000 acres
7 and protection of 750 acres of valley/foothill riparian natural community during the course of the
8 Plan, Alternative 9 would not result in a net long-term reduction in the acreage and value of a
9 sensitive natural community; the effect would be beneficial.

10 **CEQA Conclusion:**

11 **Near-Term Timeframe**

12 Alternative 9 would result in the loss of approximately 784 acres of valley/foothill riparian natural
13 community due to construction of the water conveyance facilities (CM1) and fish passage
14 improvements (CM2), and inundation during tidal marsh restoration (CM4) in the near-term. These
15 losses would occur primarily along Middle River as channel dredging proceeds, at various operable
16 barrier and diversion structure construction sites scattered across the Delta, and in the northern
17 Yolo Bypass. The construction losses would be spread across a 10-year near-term timeframe. These
18 losses would be partially offset by planned restoration of 800 acres (CM7) and protection (including
19 significant enhancement) of 750 acres (CM3) of valley/foothill riparian natural community
20 scheduled for the first 10 years of Alternative 9 implementation. At least 400 acres of the protection
21 is planned for the first 5 years of Alternative 9 implementation. Implementation of Plan goals for the
22 location, patch size and composition of riparian community protection and restoration would aid in
23 maintaining the value of riparian habitats in this near-term period. AMM1, AMM2, AMM6, AMM7,
24 AMM10, and AMM18 would also be implemented to minimize impacts. In spite of these near-term
25 restoration and protection activities and AMMs, impacts would be significant. Typical project-level
26 mitigation ratios (1:1 for protection and 1:1 for restoration) would indicate that 784 acres of
27 protection and 784 acres of restoration would be needed to offset (i.e., mitigate) the 784 acres of
28 loss (the combination of permanent and temporary near-term losses listed in Table 12-9-4).
29 Alternative 9 would be short 34 acres of protection in the near-term to meet typical mitigation
30 ratios. The restoration would be initiated at the beginning of Alternative 9 implementation to
31 minimize any time lag in the availability of this habitat to special-status species. With the
32 implementation of Mitigation Measure BIO-9a, *Compensate for Loss of Valley/Foothill Riparian*
33 *Natural Community*, the impact would be less than significant.

34 **Late Long-Term Timeframe**

35 At the end of the Plan period, 1,116 acres of valley/foothill riparian natural community would be
36 permanently or temporarily removed by conservation actions, 5,000 acres would be restored and
37 750 acres would be protected. There would be no net permanent reduction in the acreage and value
38 of this sensitive natural community within the study area. Therefore, Alternative 9 would not have a
39 substantial adverse effect on this natural community; the impact would be beneficial.

1 **Mitigation Measure BIO-9a: Compensate for Loss of Valley/Foothill Riparian Natural**
2 **Community**

3 To fully compensate for loss of valley/foothill riparian natural community as a result of
4 implementing Alternative 9, DWR shall increase its near-term goals for protection of this natural
5 community to 784 acres.

6 **Impact BIO-10: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
7 **Valley/Foothill Riparian Natural Community**

8 Two Alternative 9 conservation measures would modify the inundation/flooding regimes of both
9 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
10 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
11 of valley/foothill riparian natural community at scattered locations, while CM5 would expose this
12 community to additional flooding as channel margins are modified and levees are set back to
13 improve fish habitat along some of the major rivers and waterways of the study area.

- 14 ● *CM2 Yolo Bypass Fisheries Enhancement:* Operation of the Yolo Bypass under Alternative 9 would
15 result in an increase in the frequency, magnitude and duration of inundation of 51–92 acres of
16 valley/foothill riparian natural community. The area more frequently inundated would vary
17 with the flows that would be passed through the newly constructed notch in the Fremont Weir.
18 The 51 acres would be created by a notch flow of 8,000 cfs and the 92 acres would be created by
19 a notch flow of 4,000 cfs. The methods used to estimate these inundation acreages are described
20 in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. These increased flow
21 conditions would be expected to occur in no more than 30% of all years (see BDCP Chapter 5,
22 Section 5.4.1.2). The valley/foothill riparian community occurs throughout the bypass, including
23 a large acreage just below Fremont Weir in the north end of the bypass. There are other riparian
24 habitat areas on Liberty Island, and, to a lesser extent, along the eastern and western edges of
25 the bypass, including along the Tule Canal/Toe Drain, the west side channels and the
26 Sacramento Bypass. The anticipated change in management of flows in the Yolo Bypass includes
27 more frequent releases in flows into the bypass from the Fremont and Sacramento Weirs, and in
28 some years, later releases into the bypass in spring months (April and May). The modification of
29 periodic inundation events would not adversely affect riparian habitats, as they have persisted
30 under similar high flows and extended inundation periods in the Yolo Bypass. The effects of this
31 inundation on wildlife and plant species are described in detail in later sections of this chapter.
- 32 ● *CM5 Seasonally Inundated Floodplain Restoration:* Floodplain restoration would result in an
33 increase in the frequency and duration of inundation of 266 acres of valley/foothill riparian
34 habitats. Specific locations for this restoration activity have not been identified, but they would
35 likely be focused in the south Delta area, along the major rivers and Delta channels in CZ 7 (see
36 Figure 12-1). The reconnection of riparian vegetation to periodic stream flooding events would
37 be beneficial to the ecological function of this natural community, especially in the germination
38 and establishment of native riparian plants as flood scour increases.

39 In summary, 317–368 acres of valley/foothill riparian community in the study area would be
40 subjected to more frequent inundation as a result of implementing two Alternative 9 conservation
41 measures (CM2 and CM5). The valley/foothill riparian community is conditioned to and benefits
42 from periodic inundation; therefore, periodic inundation would not result in a net permanent
43 reduction in the acreage of this community in the study area. The increased inundation could create

1 a beneficial effect on the community as it relates to germination and establishment of native riparian
2 plants.

3 **NEPA Effects:** Increasing periodic inundation of valley/foothill riparian natural community in the
4 Yolo Bypass and along south Delta waterways would have a beneficial effect on the community.

5 **CEQA Conclusion:** An estimated 317–368 acres of valley/foothill riparian community in the study
6 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5
7 under Alternative 9. The valley/foothill riparian community is conditioned to and benefits from
8 periodic inundation; therefore, periodic inundation would not result in a net permanent reduction in
9 the acreage of this community in the study area. Increasing periodic inundation of valley/foothill
10 riparian natural community in the Yolo Bypass and along south Delta waterways would have a
11 beneficial impact on the community.

12 **Impact BIO-11: Modification of Valley/Foothill Riparian Natural Community from Ongoing** 13 **Operation, Maintenance and Management Activities**

14 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime
15 associated with changed water management is in effect, there would be new ongoing and periodic
16 actions associated with operation, maintenance and management of the BDCP facilities and
17 conservation lands that could affect valley/foothill riparian natural community in the study area.
18 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento
19 River flows at two new diversion structures at Georgianna Slough and Delta Cross Channel, the
20 operation of multiple operable barriers in Delta waterways, modified diversions from south Delta
21 channels, and recreational use of reserve areas. These actions are associated with CM1 and CM11
22 (see the impact discussion above for effects associated with CM2). The periodic actions would
23 involve access road and conveyance facility repair, vegetation management at the various water
24 conveyance facilities and habitat restoration sites (CM11), levee repair and replacement of levee
25 armoring, channel dredging, and habitat enhancement in accordance with natural community
26 management plans. The potential effects of these actions are described below.

- 27 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
28 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect
29 valley/foothill riparian natural community. The anticipated changes in water levels over time
30 with Alternative 9, as compared to no action, would be slightly lower in the October to May
31 timeframe. The small changes in frequency of higher water levels in these lakes would not
32 substantially reduce the small patches of riparian vegetation that occupy the upper fringes of
33 the reservoir pools. Changes in releases that would influence downstream river flows are
34 discussed below.
- 35 • *Modified river flows upstream of and within the study area and modified diversions from south*
36 *Delta channels.* Changes in releases from reservoirs upstream of the study area and their
37 resultant changes in flows in the Sacramento, American and Feather Rivers, modified diversion
38 of Sacramento River flows at Georgianna Slough and Delta Cross Channel, and modified
39 diversions from south Delta channels (Operational Scenario G) would not be expected to result
40 in the permanent reduction in acreage of the valley/foothill riparian natural community along
41 these waterways. There is no evidence that flow levels in the upstream rivers would change
42 such that the acreage of valley/foothill riparian natural community would be reduced on a
43 permanent basis. Riparian habitats along the rivers of the Sacramento Valley have historically
44 been exposed to significant variations in river stage. Based on modeling conducted for the BDCP

1 (see Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*), flow levels in these
 2 upstream rivers could be reduced nearly 20% in certain months of certain water-year types, and
 3 could be increased similarly in certain months of certain water-year types. Estimates of average
 4 changes range from less than 1% to more than 12% decreases in the July to November time
 5 frame when compared to No Action, while estimated average flow levels in the February to May
 6 time frame could increase between 1% and 7% with implementation of Alternative 9. Similar
 7 ranges in average flow changes below Sacramento are included in Appendix 11C, Section 11C.9.
 8 Tidal influence in the Sacramento River and Delta waterways would continue to be dominant
 9 such that there would be no substantial change in water levels that might affect in-stream and
 10 adjacent vegetation. Modified diversions from south Delta channels would not create a
 11 reduction in this natural community.

12 The periodic changes in flows in the Sacramento River, Feather River, and American River
 13 associated with modified reservoir operations, and the increased diversion of Sacramento River
 14 flows at Georgiana Slough and Delta Cross Channel associated with Alternative 9 could affect
 15 salinity, water temperature, dissolved oxygen levels, turbidity, contaminant levels and dilution
 16 capacity in these rivers and Delta waterways. These changes are discussed in detail in Chapter 8,
 17 *Water Quality*. Increases in electrical conductivity (salinity) could occur in the west Delta and
 18 Suisun Marsh as a result of these changed water operations. These salinity changes may alter the
 19 plant composition of riparian habitats along the lower Sacramento and San Joaquin Rivers and
 20 west Delta islands. The severity and extent of these salinity changes would be complicated by
 21 anticipated sea level rise and the effects of downstream tidal restoration over the life of the Plan.
 22 There is the potential that some valley/foothill riparian natural community may be degraded
 23 immediately adjacent to river channels. The riparian communities in the west Delta are
 24 dominated by willows, cottonwood and mixed brambles. These potential changes are not
 25 expected to result in a significant reduction in the acreage and value of valley/foothill riparian
 26 natural community in the study area.

- 27 ● *Access road, water conveyance facilities and levee repair.* Periodic repair of access roads, water
 28 conveyance facilities and levees associated with the BDCP actions have the potential to require
 29 removal of adjacent vegetation and could entail earth and rock work in valley/foothill riparian
 30 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering these
 31 habitats. These activities would be subject to normal erosion, turbidity and runoff control
 32 management practices, including those developed as part of *AMM2 Construction Best*
 33 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
 34 vegetation removal or earth work adjacent to or within riparian habitats would require use of
 35 sediment barriers, soil stabilization and revegetation of disturbed surfaces (*AMM10 Restoration*
 36 *of Temporarily Affected Natural Communities*). Proper implementation of these measures would
 37 avoid permanent adverse effects on this community.
- 38 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical
 39 treatment, would be a periodic activity associated with the long-term maintenance of water
 40 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
 41 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
 42 valley/foothill riparian natural community at or adjacent to treated areas. The hazard could be
 43 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
 44 onto the natural community, or direct discharge of herbicides to riparian areas being treated for
 45 invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment,*
 46 *and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and

1 the environment from use of various chemicals during maintenance activities, including the use
 2 of herbicides. These commitments are described in Appendix 3B, including the commitment to
 3 prepare and implement spill prevention, containment, and countermeasure plans and
 4 stormwater pollution prevention plans. Best management practices, including control of drift
 5 and runoff from treated areas, and use of herbicides approved for use in terrestrial
 6 environments would also reduce the risk of affecting natural communities adjacent to water
 7 conveyance features and levees associated with restoration activities.

- 8 • *Channel dredging.* Long-term operation of the Alternative 9 diversions on the Sacramento River
 9 (Georgianna Slough and Delta Cross Channel) would include periodic dredging of sediments that
 10 might accumulate in front of intake and fish screens. Maintenance dredging would also be
 11 required in Middle River and Victoria Canal to maintain channel capacity. The dredging would
 12 occur adjacent to valley/foothill riparian natural community. This activity should not adversely
 13 affect riparian plants as long as dredging equipment is kept out of riparian areas and dredge
 14 spoil is disposed of outside of riparian corridors. *AMM2 Construction Best Management Practices*
 15 *and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment*
 16 *Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and*
 17 *Reuse of Spoils, and AMM10 Restoration of Temporarily Affected Natural Communities* are part of
 18 the Plan and would require actions to avoid or minimize dredging effects on adjacent sensitive
 19 vegetation.
- 20 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
 21 communities within the Plan Area (CM11). For the valley/foothill riparian natural community, a
 22 management plan would be prepared that specifies actions to improve the value of the habitats
 23 for covered species. Actions would include control of invasive nonnative plant and animal
 24 species, fire management, restrictions on vector control and application of herbicides, and
 25 maintenance of infrastructure that would allow for movement through the community. The
 26 enhancement efforts would improve the long-term value of this community for both special-
 27 status and common species.
- 28 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to
 29 valley/foothill riparian natural community in the reserve system. The activities could include
 30 wildlife and plant viewing and hiking. *CM11 Natural Communities Enhancement and*
 31 *Management* (BDCP Chapter 3, Section 3.4.11) describes this program and identifies applicable
 32 restrictions on recreation that might adversely affect riparian habitat. The BDCP also includes an
 33 avoidance and minimization measure (AMM37) that further dictates limits on recreation
 34 activities that might affect this natural community. Priority would be given to use of existing
 35 trails and roads, with some potential for new trails. Limited tree removal and limb trimming
 36 could also be involved.

37 The various operations and maintenance activities described above could alter acreage of
 38 valley/foothill riparian natural community in the study area through changes in flow patterns and
 39 resultant changes in water quality. Activities could also introduce sediment and herbicides that
 40 would reduce the value of this community to common and sensitive plant and wildlife species.
 41 Recreation activities could encroach on riparian areas and require occasional tree removal. Other
 42 periodic activities associated with the Plan, including management, protection and enhancement
 43 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
 44 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
 45 community. While some of these activities could result in small changes in acreage, these changes
 46 would be greatly offset by restoration and protection activities planned as part of *CM7 Riparian*

1 *Natural Community Restoration* and *CM3 Natural Communities Protection and Restoration*, or
2 minimized by implementation of AMM2, AMM3, AMM4, AMM5, AMM6, AMM10, AMM18, and
3 AMM37. The management actions associated with levee repair, periodic dredging and control of
4 invasive plant species would also result in a long-term benefit to the species associated with
5 riparian habitats by improving water movement in adjacent waterways and by eliminating
6 competitive, invasive species of plants.

7 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
8 Alternative 9 would not result in a net permanent reduction in the valley/foothill riparian natural
9 community within the study area. Therefore, there would be no adverse effect to the community.

10 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would
11 have the potential to create minor changes in total acreage of valley/foothill riparian natural
12 community in the study area, and could create temporary increases in turbidity and sedimentation.
13 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
14 Implementation of environmental commitments and AMM2, AMM3, AMM4, AMM5, AMM6, AMM10,
15 AMM18, and AMM37 would minimize these impacts, and other operations and maintenance
16 activities, including management, protection and enhancement actions associated with *CM3 Natural*
17 *Communities Protection and Restoration* and *CM11 Natural Communities Enhancement and*
18 *Management*, would create positive effects, including reduced competition from invasive, nonnative
19 plants in these habitats. Long-term restoration and protection activities associated with *CM7*
20 *Riparian Natural Community Restoration* and *CM3 Natural Communities Protection and Restoration*
21 would expand this natural community in the study area. Ongoing operation, maintenance and
22 management activities would not result in a net permanent reduction in this sensitive natural
23 community within the study area. Therefore, there would be a less-than-significant impact.

24 **Nontidal Perennial Aquatic**

25 Construction, operation, maintenance and management associated with the conservation
26 components of Alternative 9 would have no long-term adverse effects on the habitats associated
27 with the nontidal perennial aquatic natural community. Initial development and construction of
28 CM2, CM4, CM5, and CM6 would result in both permanent and temporary removal of this
29 community (see Table 12-9-5). Full implementation of Alternative 9 would also include the
30 following conservation actions over the term of the BDCP to benefit the nontidal perennial aquatic
31 natural community.

- 32 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
33 and nontidal freshwater perennial emergent wetland natural communities (Objective
34 NFEW/NPANC1.1, associated with CM10).

35 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
36 3.3 that would improve the value of nontidal perennial aquatic natural community for terrestrial
37 species. As explained below, with the restoration and enhancement of these amounts of habitat, in
38 addition to implementation of AMMs, impacts on this natural community would not be adverse for
39 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-5. Changes in Nontidal Perennial Aquatic Natural Community Associated with**
2 **Alternative 9 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	0	0
CM2	24	24	12	12	50-77	0
CM4	34	189	0	0	0	0
CM5	0	28	0	16	0	25
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	58	241	12	28	50-77	25

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-12: Changes in Nontidal Perennial Aquatic Natural Community as a Result of**
5 **Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM2, CM4,
7 CM5, and CM6 would permanently eliminate an estimated 241 acres and temporarily remove 28
8 acres of nontidal perennial aquatic natural community in the study area. These modifications
9 represent approximately 5% of the 5,567 acres of the community that is mapped in the study area.
10 Approximately 26% (70 acres) of the permanent and temporary losses would occur during the first
11 10 years of Alternative 9 implementation, as habitat restoration is initiated. Natural communities
12 restoration would add 1,200 acres of nontidal marsh over the life of the Plan (CM10), which would
13 expand the area of that habitat and offset the losses. The nontidal marsh restoration would include a
14 mosaic of nontidal perennial aquatic and nontidal freshwater perennial emergent wetland natural
15 communities, as specified in Objective NFEW/NPANC1.1. The BDCP beneficial effects analysis (BDCP
16 Chapter 5, Section 5.4.6.2) indicates that implementation of Alternative 4 would result in the
17 restoration of 1,200 acres of nontidal marsh, and that the restoration will occur in blocks that will be
18 contiguous with the Plan's larger reserve system. The nontidal marsh will be restored in the vicinity
19 of giant garter snake subpopulations identified in the recovery plan for this species (U.S. Fish and
20 Wildlife Service 1998). The same conservation actions would be implemented under Alternative 9.

21 The individual effects of each relevant conservation measure are addressed below. A summary
22 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
23 conservation measure discussions.

- 1 ● *CM1 Water Facilities and Operation*: Construction of the Alternative 9 water conveyance facilities
2 would not affect nontidal perennial aquatic natural community.
- 3 ● *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of
4 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
5 stilling basin improvements, west side channels modifications, Putah Creek realignment
6 activities, and Sacramento Weir and Tule Canal improvements. All of these activities could
7 involve excavation and grading in nontidal perennial aquatic areas to improve passage of fish
8 through the bypasses. Based on hypothetical construction footprints, a total of 24 acres could be
9 permanently lost and another 12 acres could be temporarily removed. This activity would occur
10 primarily in the near-term timeframe.
- 11 ● *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
12 footprints, implementation of CM4 would permanently change to tidally inundated or remove
13 189 acres of nontidal perennial aquatic community. These losses would be expected to occur
14 primarily in the Cache Slough and Cosumnes/Mokelumne ROAs (see Figure 12-1). An estimated
15 1,200 acres of nontidal marsh would be restored during tidal habitat restoration (BDCP
16 Objective NFEW/NPANC1.1, associated with CM10). Approximately 400 acres of the restoration
17 would occur during the first 10 years of Alternative 9 implementation, which would coincide
18 with the timeframe of water conveyance facilities construction. The remaining restoration
19 would be spread over the following 30 years. Nontidal natural communities restoration is
20 expected to be focused in CZs 2, 4 and/or 5 identified in Figure 12-1.
- 21 ● *CM5 Seasonally Inundated Floodplain Restoration*: Based on theoretical footprints, floodplain
22 restoration levee construction would permanently remove 28 acres and temporarily remove 16
23 acres of nontidal perennial aquatic habitat. The construction-related losses would be considered
24 a permanent removal of the nontidal perennial aquatic habitats. It is expected that floodplain
25 restoration would be focused on the south part of the study area, in CZ 7. This activity is
26 scheduled to start following construction of water conveyance facilities, which is expected to
27 take 10 years. Floodplain restoration along the southern Delta rivers would improve
28 connectivity for a variety of species that rely on aquatic and riparian habitats. The regional and
29 Plan Area landscape linkages along the San Joaquin River, Middle River and Old River are
30 included in Figure 12-2. This activity is scheduled to start following construction of water
31 conveyance facilities, which is expected to take 10 years.
- 32 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
33 of small amounts of nontidal perennial aquatic habitat along 20 miles of river and sloughs. The
34 extent of this loss cannot be quantified at this time, but the majority of the enhancement activity
35 would occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.
36 Nontidal marsh adjacent to these tidal areas could be affected. The improvements would occur
37 within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers, and
38 along Steamboat and Sutter Sloughs.
- 39 ● *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal
40 marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic
41 and nontidal freshwater perennial emergent natural communities. This marsh restoration
42 would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and
43 would be accompanied by adjacent grassland restoration or protection.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
3 also included.

4 ***Near-Term Timeframe***

5 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would
6 affect the nontidal perennial aquatic community through CM2 construction losses (24 acres
7 permanent and 12 acres temporary). These losses would occur primarily at scattered locations
8 along the west side channels and the channels associated with the Sacramento and Lisbon Weirs in
9 the Yolo Bypass. Approximately 34 acres of the inundation and construction-related losses from
10 CM4 would occur in the near-term. These losses would occur throughout several of the ROAs
11 mapped in Figure 12-1.

12 The construction losses of this special-status natural community would represent an adverse effect
13 if they were not offset by avoidance and minimization measures and restoration actions associated
14 with BDCP conservation components. Loss of nontidal perennial aquatic natural community would
15 be considered both a loss in acreage of a sensitive natural community and a loss of waters of the
16 United States as defined by Section 404 of the CWA. The creation of 400 acres of nontidal marsh as
17 part of CM10 during the first 10 years of Alternative 9 implementation would offset this near-term
18 loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for restoration and 1:1
19 for protection) would indicate 70 acres of restoration and 70 acres of protection would be needed to
20 offset (i.e., mitigate) the 70 acres of loss. While the Plan does not include protection of nontidal
21 perennial aquatic habitat, it includes well in excess of the typical 1:1 restoration acreage (which
22 includes protection in perpetuity), and therefore compensates for the lack of protection.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
24 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
25 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
26 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
27 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
28 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS.

29 ***Late Long-Term Timeframe***

30 Implementation of Alternative 9 as a whole would result in 5% losses of nontidal perennial aquatic
31 community in the study area. These losses (241 acres of permanent and 28 acres of temporary loss)
32 would be largely associated with construction of Yolo Bypass fish improvements (CM2), and change
33 to tidally influenced inundation during tidal marsh restoration (CM4). The changes in tidally
34 influenced inundation would occur during the course of the CM4 restoration activities at various
35 tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of 1,200
36 acres of nontidal marsh would be restored. The restoration would occur over a wide region of the
37 study area, including within the Cosumnes/Mokelumne, Cache Slough and South Delta ROAs (see
38 Figure 12-1).

39 ***NEPA Effects:*** During the first 10 years of implementing Alternative 9, creating 400 acres of nontidal
40 marsh as part of CM10 would offset the construction-related and inundation losses of 70 acres of
41 nontidal perennial aquatic natural community. There would be no adverse effect. During the full
42 duration of Plan implementation, Alternative 9 would not result in a net reduction in the acreage of

1 the nontidal perennial aquatic natural community; there would be an expansion of nontidal marsh
2 and the effect would be beneficial.

3 **CEQA Conclusion:**

4 **Near-Term Timeframe**

5 Alternative 9 would result in the loss of approximately 70 acres of nontidal perennial aquatic
6 natural community due to construction of fish passage improvements (CM2), and change to tidally
7 influenced inundation during tidal marsh restoration (CM4). The construction losses would occur
8 primarily at scattered locations along the west side channels and the channels associated with the
9 Sacramento and Lisbon Weirs in the Yolo Bypass. The 34 acres of the inundation and construction-
10 related losses from CM4 would occur throughout several of the ROAs mapped in Figure 12-1. The
11 losses would be spread across a 10-year near-term timeframe. These losses would be offset by
12 planned restoration of 400 acres of nontidal marsh scheduled for the first 10 years of Alternative 9
13 implementation (CM10). Also, AMM1, AMM2, AMM6, AMM7, and AMM10 would be implemented to
14 minimize impacts. Because of these offsetting near-term restoration activities and AMMs, impacts
15 would be less than significant. Typical project-level mitigation ratios (1:1 for restoration and 1:1 for
16 protection) would indicate that 70 acres of restoration and 70 acres of protection would be needed
17 to offset (i.e., mitigate) the 70 acres of loss. While the Plan does not include protection of nontidal
18 perennial aquatic habitat, it includes well in excess of the typical 1:1 restoration acreage (which
19 includes protection in perpetuity), and therefore compensates for the lack of protection. The
20 restoration and protection would be initiated at the beginning of Alternative 9 implementation to
21 minimize any time lag in the availability of this habitat to special-status species, and would result in
22 a net gain in acreage of this sensitive natural community.

23 **Late Long-Term Timeframe**

24 At the end of the Plan period, 269 acres of the natural community would be removed and 1,200
25 acres of nontidal marsh would be restored. The nontidal marsh would consist of a mosaic of nontidal
26 perennial aquatic and nontidal freshwater perennial emergent wetland natural communities. There
27 would be no net permanent reduction in the acreage of this sensitive natural community within the
28 study area. Therefore, Alternative 9 would not have a substantial adverse effect on this natural
29 community; the impact would be beneficial.

30 **Impact BIO-13: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
31 **Nontidal Perennial Aquatic Natural Community**

32 Two Alternative 9 conservation measures would modify the inundation/flooding regimes of both
33 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
34 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
35 of nontidal perennial aquatic natural community on small acreages, while CM5 would expose this
36 community to additional flooding as channel margins are modified and levees are set back to
37 improve fish habitat along some of the major rivers and waterways throughout the study area.

- 38 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 9 would
39 result in an increase in the frequency, magnitude and duration of inundation of 50–77 acres of
40 nontidal perennial aquatic natural community. The methods used to estimate these inundation
41 acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and*
42 *Plants*. The area more frequently affected by inundation would vary with the flow volume that

1 would pass through the newly constructed notch in the Fremont Weir. The 50-acre increase in
2 inundation would be associated with a notch flow of 3,000 cubic feet per second (cfs), and the
3 77-acre increase would result from a notch flow of 6,000 cfs. Plan-related increases in flow
4 through Fremont Weir would be expected in 30% of the years. This community occurs in small
5 stringers and patches throughout the bypass, including along the Tule Canal/Toe Drain, the
6 western channels north of Interstate 80, and below the Fremont and Sacramento Weirs. The
7 anticipated change in management of flows in the Yolo Bypass includes more frequent releases
8 in flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later
9 releases into the bypass in spring months (April and May). The modification of periodic
10 inundation events would not adversely affect the ecological function of this natural community
11 and would not substantially modify its value for special-status or common wildlife species.
12 Nontidal perennial aquatic habitats in the Yolo Bypass have developed under a long-term
13 regime of periodic inundation events. The extended inundation would be designed to expand
14 foraging and spawning habitat for Delta fishes. The effects of this inundation on wildlife and
15 plant species are described in detail in later sections of this chapter.

- 16 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
17 increase in the frequency and duration of inundation of an estimated 25 acres of nontidal
18 perennial aquatic habitat. Specific locations for this restoration activity have not been identified,
19 but they would likely be focused in the south Delta area, along the major rivers and Delta
20 channels. The reconnection of these wetlands to stream flooding events would be beneficial to
21 the ecological function of nontidal perennial aquatic habitats, especially as they relate to BDCP
22 target aquatic species. The periodic flooding may also encourage germination of nontidal marsh
23 vegetation.

24 In summary, 75–102 acres of nontidal perennial aquatic community in the study area would be
25 subjected to more frequent inundation as a result of implementing two Alternative 9 conservation
26 measures (CM2 and CM5). Nontidal perennial aquatic community in the Yolo Bypass has developed
27 under a long-term regime of periodic inundation events and inundation along expanded river
28 floodplains would be infrequent.

29 ***NEPA Effects:*** The increased inundation of nontidal perennial aquatic natural community in the Yolo
30 Bypass and along south Delta waterways associated with Alternative 9 would not reduce the
31 acreage of this natural community and could encourage germination of aquatic vegetation. This
32 increased inundation would not be adverse.

33 ***CEQA Conclusion:*** An estimated 75–102 acres of nontidal perennial aquatic community in the study
34 area would be subjected to more frequent inundation as a result of implementing CM2 and CM5
35 under Alternative 9. Nontidal perennial aquatic community would not be significantly impacted
36 because its habitats in the Yolo Bypass have developed under a long-term regime of periodic
37 inundation events and inundation along expanded river floodplains would be infrequent. The
38 periodic inundation would not result in a net permanent reduction in the acreage of this community
39 in the study area. Therefore, there would be no substantial adverse effect on the community. The
40 impact would be less than significant.

41 **Impact BIO-14: Modification of Nontidal Perennial Aquatic Natural Community from Ongoing** 42 **Operation, Maintenance and Management Activities**

43 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime
44 associated with changed water management is in effect, there would be new ongoing and periodic

1 actions associated with operation, maintenance and management of the BDCP facilities and
 2 conservation lands that could affect nontidal perennial aquatic natural community in the study area.
 3 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento
 4 River flows at two newly screened sites at Georgianna Slough and Delta Cross Channel in the north
 5 Delta, the operation of multiple operable barriers in Delta waterways, and modified diversions from
 6 south Delta channels. These actions are associated with CM1 (see the impact discussion above for
 7 effects associated with CM2). The periodic actions would involve access road and conveyance facility
 8 repair, vegetation management at the various water conveyance facilities and habitat restoration
 9 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat
 10 enhancement in accordance with natural community management plans. The potential effects of
 11 these actions are described below.

- 12 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
 13 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would affect
 14 nontidal perennial aquatic natural community, in the form of the reservoir pools. The
 15 Alternative 9 operations scheme would alter the surface elevations of these reservoir pools as
 16 described in Chapter 6, *Surface Water*. These fluctuations would occur within historic ranges
 17 and would not adversely affect the natural community. Changes in releases that would influence
 18 downstream river flows are discussed below.
- 19 • *Modified river flows upstream of and within the study area and modified diversions from south*
 20 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified
 21 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel, and
 22 modified diversions from south Delta channels (Operational Scenario G) would not result in the
 23 permanent reduction in acreage of the nontidal perennial aquatic natural community in the
 24 study area. Flow levels in the upstream rivers would not change such that the acreage of
 25 nontidal perennial aquatic community would be reduced on a permanent basis. Some minor
 26 increases and some decreases would be expected to occur along the major rivers during some
 27 seasons and in some water-year types, but there would be no permanent loss. Similarly,
 28 increased diversions of Sacramento River flows at Georgianna Slough and Delta Cross Channel
 29 would not result in a permanent reduction in nontidal perennial aquatic community
 30 downstream of these diversions. Nontidal wetlands below the diversions are not directly
 31 connected to the rivers, as this section of Delta waterways is tidally influenced. Modified
 32 diversions from south Delta channels would not create a reduction in this natural community.
- 33 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
 34 conveyance facilities and levees associated with the BDCP actions have the potential to require
 35 removal of adjacent vegetation and could entail earth and rock work in nontidal perennial
 36 aquatic habitats. This activity could lead to increased soil erosion, turbidity and runoff entering
 37 nontidal perennial aquatic habitats. These activities would be subject to normal erosion,
 38 turbidity and runoff control management practices, including those developed as part of *AMM2*
 39 *Construction Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment*
 40 *Control Plan*. Any vegetation removal or earth work adjacent to or within aquatic habitats would
 41 require use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed
 42 surfaces. Proper implementation of these measures would avoid permanent adverse effects on
 43 this community.
- 44 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
 45 treatment, would be a periodic activity associated with the long-term maintenance of water
 46 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*

1 *Management*). Vegetation management is also the principal activity associated with *CM13*
 2 *Invasive Aquatic Vegetation Control*. Use of herbicides to control nuisance vegetation could pose
 3 a long-term hazard to nontidal perennial aquatic natural community at or adjacent to treated
 4 areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of
 5 contaminated stormwater onto the natural community, or direct discharge of herbicides to
 6 nontidal perennial aquatic areas being treated for invasive species removal. Environmental
 7 commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been
 8 made part of the BDCP to reduce hazards to humans and the environment from use of various
 9 chemicals during maintenance activities, including the use of herbicides. These commitments
 10 are described in Appendix 3B, including the commitment to prepare and implement spill
 11 prevention, containment, and countermeasure plans and stormwater pollution prevention
 12 plans. Best management practices, including control of drift and runoff from treated areas, and
 13 use of herbicides approved for use in aquatic environments would also reduce the risk of
 14 affecting natural communities adjacent to water conveyance features and levees associated with
 15 restoration activities.

16 Herbicides to remove aquatic invasive species as part of *CM13* would be used to restore the
 17 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
 18 The treatment activities would be conducted in concert with the California Department of
 19 Boating and Waterways' invasive species removal program. Eliminating large stands of water
 20 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
 21 by removing cover for nonnative predators, improving water flow and removing barriers to
 22 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
 23 benefit terrestrial species that use tidal and nontidal perennial aquatic natural community for
 24 movement corridors and for foraging. Vegetation management effects on individual species are
 25 discussed in the species sections on following pages.

- 26 ● *Channel dredging*. Channel dredging associated with Alternative 9 would not affect this natural
 27 community. Nontidal wetlands are not connected to the tidal channels that would be dredged.
 28 *AMM2 Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution*
 29 *Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment,*
 30 *and Countermeasure Plan, AMM6 Reuse and Disposal of Spoils, and AMM10 Restoration of*
 31 *Temporarily Affected Natural Communities* are part of the Plan and would require actions to
 32 avoid or minimize dredging effects on adjacent sensitive vegetation.
- 33 ● *Habitat enhancement*. The BDCP includes a long-term management element for the natural
 34 communities within the Plan Area (*CM11*). For nontidal perennial aquatic natural community, a
 35 management plan would be prepared that specifies actions to improve the value of the habitats
 36 for covered species. Actions would include control of invasive nonnative plant and animal
 37 species, fire management, restrictions on vector control and application of herbicides, and
 38 maintenance of infrastructure that would allow for movement through the community. The
 39 enhancement efforts would improve the long-term value of this community for both special-
 40 status and common species.

41 The various operations and maintenance activities described above could alter acreage of nontidal
 42 perennial aquatic natural community in the study area through changes in flow patterns and
 43 changes in periodic inundation of this community. Activities could also introduce sediment and
 44 herbicides that would reduce the value of this community to common and sensitive plant and
 45 wildlife species. Other periodic activities associated with the Plan would be undertaken to enhance
 46 the value of the community. While some of these activities could result in small changes in acreage,

1 these changes would be greatly offset by restoration activities planned as part of *CM4 Tidal Natural*
2 *Communities Restoration* and protection actions associated with *CM3 Natural Communities*
3 *Protection and Restoration*. The management actions associated with levee repair and control of
4 invasive plant species would also result in a long-term benefit to the species associated with
5 nontidal perennial aquatic habitats by improving water movement.

6 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
7 Alternative 9 would not result in a net permanent reduction in the nontidal perennial aquatic
8 natural community within the study area. Therefore, there would be no adverse effect on this
9 natural community.

10 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would
11 have the potential to create minor changes in total acreage of nontidal perennial aquatic natural
12 community in the study area, and could create temporary increases in turbidity and sedimentation.
13 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
14 Implementation of environmental commitments and AMM2–AMM6 and AMM10 would minimize
15 these impacts, and other operations and maintenance activities would create positive effects,
16 including improved water movement in these habitats. Long-term restoration activities associated
17 with *CM4 Tidal Natural Communities Restoration* and protection actions associated with *CM3*
18 *Natural Communities Protection and Restoration* would greatly expand this natural community in the
19 study area. Ongoing operation, maintenance and management activities would not result in a net
20 permanent reduction in this sensitive natural community within the study area. Therefore, there
21 would be a less-than-significant impact.

22 **Nontidal Freshwater Perennial Emergent Wetland**

23 Construction, operation, maintenance and management associated with the conservation
24 components of Alternative 9 would have no long-term adverse effects on the habitats associated
25 with the nontidal freshwater perennial emergent wetland natural community. Initial development
26 and construction of CM1, CM2, CM4, and CM6 would result in both permanent and temporary
27 removal of this community (see Table 12-9-6). Full implementation of Alternative 9 would also
28 include the following conservation actions over the term of the BDCP to benefit the nontidal
29 freshwater perennial emergent wetland natural community.

- 30 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
31 and nontidal freshwater perennial emergent wetland natural communities (Objective
32 NFEW/NPANC1.1, associated with CM10).
- 33 ● Protect and manage 50 acres of occupied or recently occupied tricolored blackbird nesting
34 habitat located within 5 miles of high-value foraging habitat in Conservation Zones 1, 2, 8 or 11.
35 Nesting habitat will be managed to provide young, lush stands of bulrush/cattail emergent
36 vegetation (Objective TRBL1.1).

37 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
38 3.3 that would improve the value of nontidal freshwater perennial emergent wetland natural
39 community for terrestrial species. As explained below, with the restoration and enhancement of
40 these amounts of habitat, in addition to implementation of AMMs, impacts on this natural
41 community would not be adverse for NEPA purposes and would be less than significant for CEQA
42 purposes.

1 **Table 12-9-6. Changes in Nontidal Freshwater Perennial Emergent Wetland Natural Community**
2 **Associated with Alternative 9 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	1	1	24	24	0	0
CM2	25	25	1	1	6-8	0
CM4	40	99	0	0	0	0
CM5	0	0	0	0	0	8
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	66	125	25	25	6-8	8

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4 **Impact BIO-15: Changes in Nontidal Freshwater Perennial Emergent Wetland Natural**
5 **Community as a Result of Implementing BDCP Conservation Measures**

6 Construction and land grading activities that would accompany the implementation of CM1, CM2,
7 CM4, and CM6 would permanently eliminate an estimated 125 acres and temporarily remove 25
8 acres of nontidal freshwater perennial emergent wetland natural community in the study area.
9 These modifications represent approximately 9% of the 1,509 acres of the community that is
10 mapped in the study area. Approximately 60% (91 acres) of the permanent and temporary losses
11 would occur during the first 10 years of Alternative 9 implementation, as water conveyance facilities
12 are constructed and habitat restoration is initiated. Natural communities restoration would add
13 1,200 acres (CM10) and natural communities protection would protect 50 acres (CM3) of nontidal
14 marsh over the course of Alternative 9 implementation, which would expand the area of that habitat
15 and offset the losses. The nontidal marsh restoration would include a mosaic of nontidal perennial
16 aquatic and nontidal freshwater perennial emergent wetland natural communities, as specified in
17 BDCP Objective NFEW/NPANC1.1 (Table 3.3-1 in BDCP Chapter 3, *Conservation Strategy*). The
18 nontidal marsh protection would be designed to support tricolored blackbird populations in the
19 study area. The BDCP beneficial effects analysis (BDCP Chapter 5, Section 5.4.6.2) indicates that
20 implementation of Alternative 4 would result in the restoration of 1,200 acres of nontidal marsh.
21 The restoration would occur in blocks that are contiguous with the alternative's larger reserve
22 system. The nontidal marsh would be restored in the vicinity of giant garter snake subpopulations
23 identified in the recovery plan for this species (U.S. Fish and Wildlife Service 1998). The same
24 conservation actions would be implemented under Alternative 9.

1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: Construction of the Alternative 9 water conveyance facilities
5 would permanently remove 1 acre and temporarily remove 24 acres of tidal freshwater
6 perennial emergent wetland community. The permanent loss would occur adjacent to Clifton
7 Court Forebay where the new canal would cross Coney Island (see Terrestrial Biology
8 Mapbook). The temporary losses would occur in temporary dredging work areas along Middle
9 River between Victoria Canal and Mildred Island. These wetlands occur in small patches,
10 primarily on the interiors of islands within the Middle River corridor. These losses would take
11 place during the near-term construction period.
- 12 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of
13 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
14 stilling basin improvements, west side channels and Tule Canal modifications, Putah Creek
15 realignment activities, Lisbon Weir modification and Sacramento Weir improvements. Some of
16 these activities could involve excavation and grading in nontidal freshwater perennial emergent
17 wetland areas to improve passage of fish through the bypasses. Based on hypothetical
18 construction footprints, a total of 25 acres could be permanently lost and 1 acre could be
19 temporarily removed. These losses would most likely occur in the Tule Canal and west side
20 channels at the north end of the bypass. The habitat there includes narrow bands within these
21 side channels of the bypass and is isolated from other marsh or open water habitats. The narrow
22 bands are bordered by riparian habitats, primarily willows and cottonwoods. This activity
23 would occur in the near-term timeframe.
- 24 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
25 footprints, implementation of CM4 would permanently inundate or remove 99 acres of nontidal
26 freshwater perennial emergent wetland community. These losses would be expected to occur
27 primarily in the Cache Slough ROA (see Figure 12-1). An estimated 1,200 acres of nontidal
28 marsh would be restored (CM10) and 50 acres would be protected (CM3) during nontidal
29 habitat conservation actions. Approximately 400 acres of the restoration and 25 acres of the
30 protection would occur during the first 10 years of Alternative 9 implementation, which would
31 coincide with the timeframe of water conveyance facilities construction and early tidal marsh
32 restoration. The remaining restoration would be spread over the following 30 years. Nontidal
33 marsh natural communities restoration is expected to be focused in the vicinity of giant garter
34 snake populations in the eastern Delta and near the Yolo Bypass.
- 35 • *CM5 Seasonally Inundated Floodplain Restoration*: Based on theoretical footprints, floodplain
36 restoration levee construction would not affect nontidal freshwater perennial emergent wetland
37 natural community.
- 38 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
39 of small amounts of nontidal freshwater perennial emergent wetland habitat along 20 miles of
40 river and sloughs. The extent of this loss cannot be quantified at this time, but the majority of the
41 enhancement activity would occur on the edges of tidal perennial aquatic habitat, including
42 levees and channel banks. Nontidal marsh adjacent to these tidal areas could be affected. The
43 improvements would occur within the study area on sections of the Sacramento, San Joaquin
44 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

- *CM10 Nontidal Marsh Restoration*: CM10 would entail restoration of 1,200 acres of nontidal marsh in CZs 2, 4 and/or 5. The restoration would create a mosaic of nontidal perennial aquatic and nontidal freshwater perennial emergent natural communities. This marsh restoration would occur in 25-acre or larger patches in or near giant garter snake occupied habitat and would be accompanied by adjacent grassland restoration or protection.

The following paragraphs summarize the combined effects discussed above and describe other BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are also included.

Near-Term Timeframe

During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would affect the nontidal freshwater perennial emergent wetland community through CM1 construction losses (1 acre permanent and 24 acres temporary) and the CM2 construction losses (25 acres permanent and 1 acre temporary). These losses would occur on Coney Island, within the Middle River dredging corridor, and in the Yolo Bypass. Approximately 40 acres of the inundation and construction-related losses from CM4 would occur in the near-term. These losses would occur throughout several of the ROAs mapped in Figure 12-1.

The construction losses of this special-status natural community would represent an adverse effect if they were not offset by avoidance and minimization measures and restoration actions associated with BDCP conservation components. Loss of nontidal freshwater perennial emergent wetland natural community would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as defined by Section 404 of the CWA. However, the creation of 400 acres and protection of 25 acres of nontidal marsh as part of CM3 and CM10 during the first 10 years of Alternative 9 implementation would offset this near-term loss, avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate 91 acres of restoration and 91 acres of protection would be needed to offset (i.e., mitigate) the 91 acres of loss. While the Plan includes just 25 acres of protection in the near-term, it includes well in excess of the typical 1:1 restoration acreage (which includes protection in perpetuity), and therefore compensates for the shortfall in protection.

The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS.

Late Long-Term Timeframe

Implementation of Alternative 9 as a whole would result in a 9% loss of nontidal freshwater perennial emergent wetland community in the study area. These losses (125 acres of permanent and 25 acres of temporary loss) would be largely associated with construction of the Yolo Bypass fish passage improvement facilities (CM2) and inundation during tidal marsh restoration (CM4). Inundation losses would occur through the course of the CM4 restoration activities at various tidal restoration sites throughout the study area. By the end of the Plan timeframe, a total of 1,200 acres of nontidal marsh would be restored and 50 acres would be protected. The restoration would occur near giant garter snake occupied habitat in the eastern Delta and near Yolo Bypass, in CZs 2, 4, and

1 5. The 50 acres of protection would occur in CZ 1, 2, 8, or 11 to provide nesting habitat for tri-
2 colored blackbird (see Figure 12-1).

3 **NEPA Effects:** In the near-term, the combination of creating 400 acres and protecting 25 acres of
4 nontidal perennial marsh as part of CM3 and CM10 would offset the near-term losses associated
5 with construction of CM1, CM2, and CM4 facilities, avoiding any adverse effect. With 1,200 acres of
6 nontidal marsh restoration (BDCP Objective NFEW/NPANC1.1) and 50 acres of protection (BDCP
7 Objective TRBL1.1) included with full implementation of the Plan, Alternative 9 would not result in a
8 net long-term reduction in the acreage of a sensitive natural community; the effect would be
9 beneficial.

10 **CEQA Conclusion:**

11 **Near-Term Timeframe**

12 Alternative 9 would result in the loss of approximately 91 acres of nontidal freshwater perennial
13 emergent wetland natural community due to construction of the water conveyance facilities (CM1)
14 and fish passage improvements (CM2), and inundation during tidal marsh restoration (CM4). The
15 construction losses would occur on Coney Island, within the Middle River dredging corridor, and in
16 the Yolo Bypass. Approximately 40 acres of the inundation and construction-related losses from
17 CM4 would occur in the near-term. These losses would occur throughout several of the ROAs
18 mapped in Figure 12-1.

19 The losses would be spread across a 10-year near-term timeframe. These losses would be offset by
20 planned restoration of 400 acres and protection of 25 acres of nontidal marsh scheduled for the first
21 10 years of Alternative 9 implementation (CM3 and CM10). Also, AMM1, AMM2, AMM6, AMM7, and
22 AMM10 would be implemented to minimize impacts. Because of these offsetting near-term
23 restoration activities and AMMs, impacts would be less than significant. Typical project-level
24 mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 91 acres of
25 restoration and 91 acres of protection would be needed to offset (i.e., mitigate) the 91 acres of loss.
26 While the Plan includes just 25 acres of protection in the near-term, it includes well in excess of the
27 typical 1:1 restoration acreage (which includes protection in perpetuity), and therefore
28 compensates for the shortfall in protection. The restoration and protection would be initiated at the
29 beginning of Alternative 9 implementation to minimize any time lag in the availability of this habitat
30 to special-status species, and would result in a net gain in acreage of this sensitive natural
31 community.

32 **Late Long-Term Timeframe**

33 At the end of the Plan period, 150 acres of the natural community would be removed, 1,200 acres of
34 nontidal marsh would be restored (BDCP Objective NFEW/NPANC1.1) and 50 acres of nontidal
35 marsh would be protected (BDCP Objective TRBL1.1). There would be no net permanent reduction
36 in the acreage of this sensitive natural community within the study area. Therefore, Alternative 9
37 would not have a substantial adverse effect on this natural community; the impact would be
38 beneficial.

39 **Impact BIO-16: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
40 **Nontidal Freshwater Perennial Emergent Wetland Natural Community**

41 Two Alternative 9 conservation measures would modify the inundation/flooding regimes of both
42 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage

1 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
2 of nontidal freshwater perennial emergent wetland natural community on small acreages, while
3 CM5 would expose this community to additional flooding as channel margins are modified and
4 levees are set back to improve fish habitat along some of the major rivers and waterways
5 throughout the study area.

6 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 9 would
7 result in an increase in the frequency and duration of inundation of 6-8 acres of nontidal
8 freshwater perennial emergent wetland natural community. The methods used to estimate
9 these inundation acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities,*
10 *Wildlife, and Plants*. The area more frequently affected by inundation would vary with the flow
11 volume that would pass through the newly constructed notch in the Fremont Weir. The 6-acre
12 increase in inundation would be associated with a notch flow of 1,000 cubic feet per second
13 (cfs), and the 8-acre increase would result from a notch flow of 6,000 cfs. Plan-related increases
14 in flow through Fremont Weir would be expected in 30% of the years. This community occurs in
15 small stringers and isolated patches along the Tule Canal and western channel in the north end
16 of the bypass. These areas are not connected to other adjacent marsh and open water habitats;
17 they are surrounded by riparian habitat, scoured grassland and agricultural lands. The
18 anticipated change in management of flows in the Yolo Bypass includes more frequent releases
19 in flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later
20 releases into the bypass in spring months (April and May). The modification of periodic
21 inundation events would not adversely affect the ecological function of this natural community
22 and would not substantially modify its value for special-status or common wildlife species.
23 Nontidal freshwater perennial emergent wetland plant species in the Yolo Bypass have
24 developed under a long-term regime of periodic inundation events. The extended inundation
25 would be designed to expand foraging and spawning habitat for Delta fishes. The effects of this
26 increased inundation on terrestrial wildlife and plant species are described in detail in later
27 sections of this chapter.

28 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
29 increase in the frequency and duration of inundation of an estimated 8 acres of nontidal
30 freshwater perennial emergent wetland habitat. Specific locations for this restoration activity
31 have not been identified, but they would likely be focused in the south Delta area, along the
32 major rivers and Delta channels. The reconnection of these wetlands to stream flooding events
33 would be beneficial to the ecological function of nontidal freshwater perennial emergent
34 wetland habitats, as they relate to BDCP target aquatic species. The added exposure to
35 inundation could also encourage germination of nontidal marsh plant species. Foraging activity
36 and refuge sites would be expanded into areas currently unavailable or infrequently available to
37 some aquatic species.

38 In summary, 14–16 acres of nontidal freshwater perennial emergent wetland community in the
39 study area would be subjected to more frequent inundation as a result of implementing two
40 Alternative 9 conservation measures (CM2 and CM5). This community would not be adversely
41 affected because its habitats in the Yolo Bypass have developed under a long-term regime of
42 periodic inundation events and inundation along expanded river floodplains would be infrequent.

43 **NEPA Effects:** The increased inundation of nontidal freshwater perennial emergent wetland natural
44 community in the Yolo Bypass and in the southern Delta would not reduce the acreage of this

1 natural community and could encourage germination of emergent wetland vegetation. The
2 increased inundation would not be an adverse effect.

3 **CEQA Conclusion:** An estimated 14–16 acres of nontidal freshwater perennial emergent wetland
4 community in the study area would be subjected to more frequent inundation as a result of
5 implementing CM2 and CM5 under Alternative 9. This community would not be significantly
6 impacted because its habitats in the Yolo Bypass have developed under a long-term regime of
7 periodic inundation events and inundation along expanded river floodplains would be infrequent.
8 The periodic inundation would not result in a net permanent reduction in the acreage of this
9 community in the study area. Therefore, there would be no substantial adverse effect on the
10 community. The impact would be less than significant.

11 **Impact BIO-17: Modification of Nontidal Freshwater Perennial Emergent Wetland Natural** 12 **Community from Ongoing Operation, Maintenance and Management Activities**

13 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime
14 associated with changed water management is in effect, there would be new ongoing and periodic
15 actions associated with operation, maintenance and management of the BDCP facilities and
16 conservation lands that could affect nontidal freshwater perennial emergent wetland natural
17 community in the study area. The ongoing actions include modified operation of upstream
18 reservoirs, the diversion of Sacramento River flows at two newly screened diversions at Georgianna
19 Slough and Delta Cross Channel, the operation of multiple operable barriers in Delta waterways, and
20 modified diversions from south Delta channels. These actions are associated with CM1 (see the
21 impact discussion above for effects associated with CM2). The periodic actions would involve access
22 road and conveyance facility repair, vegetation management at the various water conveyance
23 facilities and habitat restoration sites (CM11), levee repair and replacement of levee armoring,
24 channel dredging, and habitat enhancement in accordance with natural community management
25 plans. The potential effects of these actions are described below.

- 26 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
27 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect
28 nontidal freshwater perennial emergent wetland natural community. These reservoirs do not
29 support significant stands of freshwater emergent wetlands. Changes in releases that would
30 influence downstream river flows are discussed below.
- 31 • *Modified river flows upstream of and within the study area and modified diversions from south*
32 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified
33 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel, and
34 modified diversions from south Delta channels (Operational Scenario G) would not result in the
35 permanent reduction in acreage of the nontidal freshwater perennial emergent wetland natural
36 community in the study area. Flow levels in the upstream rivers would not change such that the
37 acreage of nontidal freshwater perennial emergent wetland community would be reduced on a
38 permanent basis. Some minor increases and some decreases could be expected to occur during
39 some seasons and in some water-year types, but there would be no permanent loss. Similarly,
40 modified diversions of Sacramento River flows at Georgianna Slough and Delta Cross Channel
41 would not result in a permanent reduction in nontidal freshwater perennial emergent wetland
42 community downstream of these diversions. Flow volumes in these two diversions and in the
43 downstream channels that had been dredged (Middle River and Victoria Canal) would increase
44 under certain Sacramento River flow conditions and water year types. However, tidal influence

1 in the Sacramento River and Delta waterways would continue to be dominant such that there
2 would be no substantial change in water levels that might affect in-stream and adjacent
3 vegetation. Modified diversions from south Delta channels would not create a reduction in this
4 natural community.

- 5 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
6 conveyance facilities and levees associated with the BDCP actions have the potential to require
7 removal of adjacent vegetation and could entail earth and rock work in nontidal freshwater
8 perennial emergent wetland habitats. This activity could lead to increased soil erosion, turbidity
9 and runoff entering nontidal freshwater perennial habitats. These activities would be subject to
10 normal erosion, turbidity and runoff control management practices, including those developed
11 as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
12 *Sediment Control Plan*. Any vegetation removal or earth work adjacent to or within aquatic
13 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation
14 of disturbed surfaces. Proper implementation of these measures would avoid permanent
15 adverse effects on this community.
- 16 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
17 treatment, would be a periodic activity associated with the long-term maintenance of water
18 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
19 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
20 nontidal freshwater perennial emergent wetland natural community at or adjacent to treated
21 areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of
22 contaminated stormwater onto the natural community, or direct discharge of herbicides to
23 nontidal perennial wetland areas being treated for invasive species removal. Environmental
24 commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been
25 made part of the BDCP to reduce hazards to humans and the environment from use of various
26 chemicals during maintenance activities, including the use of herbicides. These commitments
27 are described in Appendix 3B, including the commitment to prepare and implement spill
28 prevention, containment, and countermeasure plans and stormwater pollution prevention
29 plans. Best management practices, including control of drift and runoff from treated areas, and
30 use of herbicides approved for use in aquatic environments would also reduce the risk of
31 affecting natural communities adjacent to water conveyance features and levees associated with
32 restoration activities.

33 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
34 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
35 The treatment activities would be conducted in concert with the California Department of
36 Boating and Waterways' invasive species removal program. Eliminating large stands of water
37 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
38 by removing cover for nonnative predators, improving water flow and removing barriers to
39 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
40 benefit terrestrial species that use tidal and nontidal freshwater perennial emergent wetland
41 natural community for movement corridors and for foraging. Vegetation management effects on
42 individual species are discussed in the species sections on following pages.

- 43 • *Channel dredging.* Channel dredging associated with Alternative 9 would not affect this natural
44 community. Nontidal freshwater perennial emergent wetlands are not directly connected to the
45 tidal channels that would be dredged. *AMM2 Construction Best Management Practices and*
46 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control*

1 *Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of*
2 *Spoils, and AMM10 Restoration of Temporarily Affected Natural Communities* are part of the Plan
3 and would require actions to avoid or minimize dredging effects on adjacent sensitive
4 vegetation.

- 5 • **Habitat enhancement.** The BDCP includes a long-term management element for the natural
6 communities within the Plan Area (CM11). For nontidal freshwater perennial emergent wetland
7 natural community, a management plan would be prepared that specifies actions to improve the
8 value of the habitats for covered species. Actions would include control of invasive nonnative
9 plant and animal species, fire management, restrictions on vector control and application of
10 herbicides, and maintenance of infrastructure that would allow for movement through the
11 community. The enhancement efforts would improve the long-term value of this community for
12 both special-status and common species.

13 The various operations and maintenance activities described above could alter acreage of nontidal
14 freshwater perennial emergent wetland natural community in the study area through changes in
15 flow patterns and changes in periodic inundation of this community. Activities could also introduce
16 sediment and herbicides that would reduce the value of this community to common and sensitive
17 plant and wildlife species. Other periodic activities associated with the Plan, including management,
18 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
19 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
20 enhance the value of the community. While some of these activities could result in small changes in
21 acreage, these changes would be greatly offset by restoration activities planned as part of *CM10*
22 *Nontidal Marsh Restoration* and protection actions associated with *CM3 Natural Communities*
23 *Protection and Restoration*. The management actions associated with levee repair and control of
24 invasive plant species would also result in a long-term benefit to the species associated with
25 nontidal freshwater perennial emergent wetland habitats by improving water movement.

26 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
27 Alternative 9 would not result in a net permanent reduction in the nontidal freshwater perennial
28 emergent wetland natural community within the study area. Therefore, there would be no adverse
29 effect on this natural community.

30 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would
31 have the potential to create minor changes in total acreage of nontidal freshwater perennial
32 emergent wetland natural community in the study area, and could create temporary increases in
33 turbidity and sedimentation. The activities could also introduce herbicides periodically to control
34 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM3,
35 AMM4, AMM5, AMM6, and AMM10 would minimize these impacts, and other operations and
36 maintenance activities, including management, protection and enhancement actions associated with
37 *CM3 Natural Communities Protection and Restoration* and *CM11 Natural Communities Enhancement*
38 *and Management*, would create positive effects, including improved water movement in and
39 adjacent to these habitats. Long-term restoration activities associated with *CM10 Nontidal Marsh*
40 *Restoration* and protection actions associated with *CM3 Natural Communities Protection and*
41 *Restoration* would greatly expand this natural community in the study area. Ongoing operation,
42 maintenance and management activities would not result in a net permanent reduction in this
43 sensitive natural community within the study area. Therefore, there would be a less-than-significant
44 impact.

1 **Alkali Seasonal Wetland Complex**

2 Construction, operation, maintenance and management associated with the conservation
3 components of Alternative 9 would have no long-term adverse effects on the habitats associated
4 with the alkali seasonal wetland complex natural community. Initial development and construction
5 of CM2 and CM4 would result in permanent removal of this community (see Table 12-9-7). Full
6 implementation of Alternative 9 would also include the following conservation actions over the term
7 of the BDCP to benefit the alkali seasonal wetland natural community.

- 8 • Protect 150 acres of alkali seasonal wetland in Conservation Zones 1, 8 and/or 11 among a
9 mosaic of protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with
10 CM3).
- 11 • Restore or create alkali seasonal wetlands in Conservation Zones 1, 8, and/or 11 to achieve no
12 net loss of wetted acres (up to 72 acres of alkali seasonal wetland complex restoration)
13 (Objective ASWNC1.2, associated with CM3 and CM9).
- 14 • Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali
15 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).

16 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
17 3.3 that would improve the value of alkali seasonal wetland natural community for terrestrial
18 species. As explained below, with the protection, restoration, and enhancement of the amounts of
19 habitat listed in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural
20 community would not be adverse for NEPA purposes and would be less than significant for CEQA
21 purposes.

22 **Table 12-9-7. Changes in Alkali Seasonal Wetland Complex Natural Community Associated with**
23 **Alternative 9 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	0	0
CM2	45	45	0	0	264-744	0
CM4	13	27	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	58	72	0	0	264-744	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

1 **Impact BIO-18: Changes in Alkali Seasonal Wetland Complex Natural Community as a Result**
2 **of Implementing BDCP Conservation Measures**

3 Construction, land grading and habitat restoration activities that would accompany the
4 implementation of CM2 and CM4 would permanently eliminate an estimated 72 acres of alkali
5 seasonal wetland complex natural community in the study area. These modifications represent
6 approximately 2% of the 3,723 acres of the community that is mapped in the study area. Most of the
7 losses (58 acres or 80%) would occur during the first 10 years of Alternative 9 implementation, as
8 Yolo Bypass improvements and habitat restoration is initiated. Alkali seasonal wetland complex
9 protection (120 acres) and restoration (an estimated 58 acres, but determined by actual level of
10 effect) would be initiated during the same period, which would offset the losses. By the end of the
11 Plan period, 150 acres of this natural community would be protected and 72 acres would be
12 restored. The BDCP beneficial effects analysis for this community (BDCP Chapter 5, Section 5.4.7.2)
13 states that Alternative 4 would protect 150 acres of alkali seasonal wetland in Conservation Zones 1,
14 8, or 11, in a mosaic of protected grasslands and vernal pool complex. This would protect currently
15 unprotected high-value alkali seasonal wetland complex in the Plan Area. These same conservation
16 actions would be implemented under Alternative 9.

17 The individual effects of each relevant conservation measure are addressed below. A summary
18 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
19 conservation measure discussions.

- 20 ● *CM1 Water Facilities and Operation:* Construction of the Alternative 9 water conveyance facilities
21 would not directly affect alkali seasonal wetland complex natural community. The construction
22 activity associated with CM1, however, has the potential to indirectly cause increased nitrogen
23 deposition in alkali seasonal wetland habitats in the vicinity of Clifton Court Forebay. A
24 significant number of cars, trucks, and land grading equipment involved in construction of the
25 canals around Clifton Court Forebay would emit small amounts of atmospheric nitrogen from
26 fuel combustion; this material could be deposited in sensitive alkali seasonal wetland areas that
27 are located west of the major construction areas at the forebay. Nitrogen deposition can pose a
28 risk of adding a fertilizer to nitrogen-limited soils and their associated plants. Nonnative
29 invasive species can be encouraged by the added nitrogen available. BDCP Appendix 5.J,
30 Attachment 5J.A, *Construction-Related Nitrogen Deposition on BDCP Natural Communities*,
31 addresses this issue in detail. It has been concluded that this potential deposition would pose a
32 low risk of changing the alkali seasonal wetland complex in the construction area because the
33 construction would occur primarily downwind of the natural community and the construction
34 would contribute a negligible amount of nitrogen to regional projected emissions. No adverse
35 effect is expected.
- 36 ● *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
37 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
38 stilling basin improvements, Putah Creek realignment activities, Lisbon Weir modification and
39 Sacramento Weir improvements. Realignment of Putah Creek could involve excavation and
40 grading in alkali seasonal wetland complex as a new channel is constructed. Based on
41 hypothetical construction footprints, a total of 45 acres could be permanently lost. This complex
42 is located immediately south of the existing Putah Creek channel within the bypass and is a
43 relatively large, moderate to high value, contiguous expanse of this community. This loss would
44 occur in the near-term timeframe.

- 1 • *CM3 Natural Communities Protection and Restoration:* CM3 proposes to protect at least 150 acres
2 of alkali seasonal wetland complex in CZs 1, 8 and 11 (BDCP Objective ASWNC1.1). The
3 protection would occur in areas containing a mosaic of grassland and vernal pool complex in
4 unfragmented natural landscapes supporting a diversity of native plant and wildlife species.
5 These areas would be both protected and enhanced to increase the cover of alkali seasonal
6 wetland plants relative to nonnative species.
- 7 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration
8 footprints, implementation of CM4 would permanently inundate or remove 13 acres of alkali
9 seasonal wetland complex in the near-term and inundate or remove 27 acres by the end of the
10 Plan timeframe. The losses would be expected to occur in the Cache Slough and Suisun Marsh
11 ROAs established for tidal restoration (see Figure 12-1). The largest losses would likely occur in
12 the Lindsay Slough area and on the northern fringes of Suisun Marsh, north of the Potrero Hills.
13 These losses would not fragment the alkali seasonal wetland communities adjacent to these
14 sloughs because the losses would occur on the edges of the existing habitat.
- 15 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration:* CM9 includes both vernal
16 pool complex and alkali seasonal wetland complex restoration goals. The intent of the
17 conservation measure is to match the acreage of restoration with the actual acreage lost to other
18 conservation measures (primarily CM2 and CM4). The current estimate for alkali seasonal
19 wetland complex restoration is 58 acres in the near-term and a total of 72 acres by the end of
20 the BDCP restoration period. The goal is for no net loss of this natural community, consistent
21 with BDCP Objective ASWNC1.2. Restoration in the Lindsay Slough area of the Cache Slough ROA
22 and the northern region of the Suisun Marsh ROA would be consistent with essential habitat
23 connectivity goals mapped in Figure 12-2 and described in Table 3.2-3 of BDCP Chapter 3,
24 *Conservation Strategy*.

25 The following paragraphs summarize the combined effects discussed above and describe other
26 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
27 also included.

28 ***Near-Term Timeframe***

29 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would
30 affect the alkali seasonal wetland complex natural community through CM2 construction losses (45
31 acres). These losses would occur in the Yolo Bypass south of Putah Creek. Approximately 13 acres of
32 the inundation and construction-related losses in habitat from CM4 would occur in the near-term.
33 These losses would occur primarily in the Cache Slough and Suisun Marsh ROAs mapped in Figure
34 12-1.

35 The construction losses of this special-status natural community would represent an adverse effect
36 if they were not offset by avoidance and minimization measures and restoration actions associated
37 with BDCP conservation components. Loss of alkali seasonal wetland complex natural community
38 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
39 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland
40 complex as part of CM3 and the restoration of 58 acres of this community as part of CM9 during the
41 first 10 years of Alternative 9 implementation would offset this near-term loss, avoiding any adverse
42 effect. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would
43 indicate 116 acres of protection and 58 acres of restoration would be needed to offset (i.e., mitigate)
44 the 58 acres of loss.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*
4 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting
5 habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and
6 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final
7 EIR/EIS.

8 ***Late Long-Term Timeframe***

9 Implementation of Alternative 9 as a whole would result in relatively minor (2%) losses of alkali
10 seasonal wetland natural community in the study area. These losses (72 acres) would be associated
11 with construction of Yolo Bypass fish improvements (CM2) and inundation during tidal marsh
12 restoration (CM4). Inundation losses would occur through the course of the BDCP restoration
13 activities, primarily in the Cache Slough and Suisun Marsh ROAs.

14 ***NEPA Effects:*** In the first 10 years of implementing Alternative 9 conservation measures, 120 acres
15 of alkali seasonal wetland complex would be protected as part of CM3 and 58 acres of this
16 community would be restored as part of CM9. These conservation actions would offset the near-
17 term loss of this community associated with CM2 and CM4, avoiding any adverse effect. By the end
18 of the Plan timeframe, Alternative 9 would protect a total of 150 acres of alkali seasonal wetland
19 natural community (CM3) and would restore up to 72 acres (CM9). The protection and restoration
20 would occur primarily in CZ 1, CZ 8 and/or CZ 11, in the Cache Slough, Suisun Marsh and Clifton
21 Court Forebay areas. Therefore, Alternative 9 would not have an adverse effect on the alkali
22 seasonal wetland complex natural community.

23 ***CEQA Conclusion:***

24 ***Near-Term Timeframe***

25 Alternative 9 would result in the permanent loss of approximately 58 acres of alkali seasonal
26 wetland complex natural community due to construction of fish passage improvements (CM2) and
27 inundation during tidal marsh restoration (CM4). The construction losses would occur primarily in
28 the area just south of Putah Creek in the Yolo Bypass, while inundation losses would occur in the
29 Cache Slough and Suisun Marsh ROAs. The losses would be spread across a 10-year near-term
30 timeframe.

31 The construction losses of this special-status natural community would represent an adverse effect
32 if they were not offset by avoidance and minimization measures and other actions associated with
33 BDCP conservation components. Loss of alkali seasonal wetland complex natural community would
34 be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
35 defined by Section 404 of the CWA. However, the protection of 120 acres of alkali seasonal wetland
36 complex as part of CM3 and the restoration of 58 acres of this community as part of CM9 during the
37 first 10 years of Alternative 9 implementation would offset this near-term loss, avoiding any
38 significant impact. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration)
39 would indicate 116 acres of protection and 58 acres or restoration would be needed to offset (i.e.,
40 mitigate) the 58 acres of loss. Also, AMM1, AMM2, AMM3, AMM4, and AMM10 would be
41 implemented to minimize impacts. Because of the offsetting protection and restoration activities
42 and AMMs, impacts would be less than significant.

1 **Late Long-Term Timeframe**

2 At the end of the Plan period, 72 acres of alkali seasonal wetland complex natural community would
3 be permanently removed by conservation actions, 150 acres would be protected and up to 72 acres
4 would be restored. The restoration acres actually developed would depend on the number of acres
5 affected during Plan implementation. There would be no net permanent reduction in the acreage of
6 this natural community within the study area. Therefore, Alternative 9 would have a less-than-
7 significant impact on this natural community.

8 **Impact BIO-19: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
9 **Alkali Seasonal Wetland Complex Natural Community**

10 *CM2 Yolo Bypass Fisheries Enhancement* would modify the inundation regime of the Yolo Bypass, a
11 man-made waterway. CM2, which is designed to improve fish passage and shallow flooded habitat
12 for Delta fishes in the Yolo Bypass, would increase periodic inundation of alkali seasonal wetland
13 complex natural community at scattered locations in the central and southern sections of the
14 bypass.

15 Operation of the Yolo Bypass under Alternative 9 would result in an increase in the frequency,
16 magnitude and duration of inundation on an estimated 264–744 acres of alkali seasonal wetland
17 complex natural community. The methods used to estimate these inundation acreages are described
18 in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently
19 affected by inundation would vary with the flow volume that would pass through the newly
20 constructed notch in the Fremont Weir. The 264-acre increase in inundation would be associated
21 with a notch flow of 1,000 cubic feet per second (cfs), and the 744-acre increase would result from a
22 notch flow of 4,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in
23 30% of the years. The alkali seasonal wetland complex natural community occurs primarily in the
24 central and southern reaches of the bypass, south of Putah Creek. The stands in this location are
25 relatively large, with moderate to high value for associated plant and wildlife species. The
26 anticipated change in management of flows in the Yolo Bypass includes more frequent releases in
27 flows into the bypass from the Fremont and Sacramento Weirs, and in some years, later releases
28 into the bypass in spring months (April and May).

29 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with
30 Alternative 9 would not adversely affect alkali seasonal wetland complex habitats, as they have
31 persisted under similar high flows and extended inundation periods. There is the potential for some
32 change in plant species composition as a result of longer inundation periods, but the natural
33 community would persist.

34 **CEQA Conclusion:** An estimated 264–744 acres of alkali seasonal wetland complex natural
35 community in the Yolo Bypass would be subjected to more frequent inundation as a result of
36 implementing CM2 under Alternative 9. This natural community is conditioned to periodic
37 inundation; the slight increase in periodic inundation would not result in a net permanent reduction
38 in the acreage of this community in the study area, although some change in plant species
39 composition could occur. Increasing periodic inundation of alkali seasonal wetland complex natural
40 community in the Yolo Bypass would have a less-than-significant impact on the natural community.
41 The effects of this inundation on wildlife and plant species are described in detail in later sections of
42 this chapter.

1 **Impact BIO-20: Modification of Alkali Seasonal Wetland Complex Natural Community from**
 2 **Ongoing Operation, Maintenance and Management Activities**

3 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime
 4 associated with changed water management is in effect, there would be new ongoing and periodic
 5 actions associated with operation, maintenance and management of the BDCP facilities and
 6 conservation lands that could affect alkali seasonal wetland complex natural community in the study
 7 area. The ongoing actions include the diversion of Sacramento River flows at two newly screened
 8 diversions at Georgianna Slough and Delta Cross Channel, modified diversions from south Delta
 9 channels, and recreation in and adjacent to Plan reserves. These actions are associated with CM1
 10 and CM11 (see the impact discussion above for effects associated with CM2). The periodic actions
 11 would involve access road and conveyance facility repair, vegetation management at the various
 12 water conveyance facilities and habitat restoration sites (CM11), levee repair and replacement of
 13 levee armoring, channel dredging, and habitat enhancement in accordance with natural community
 14 management plans. The potential effects of these actions are described below.

- 15 • *Modified river flows upstream of and within the study area and modified diversions from south*
 16 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified
 17 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel, and
 18 modified diversions from south Delta channels (Operational Scenario G) would not affect alkali
 19 seasonal wetland complex natural community. This natural community does not exist within or
 20 adjacent to the active Sacramento River system channels and Delta waterways that would be
 21 affected by modified flow levels.
- 22 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
 23 conveyance facilities and levees associated with the BDCP actions have the potential to require
 24 removal of adjacent vegetation and could entail earth and rock work in or adjacent to alkali
 25 seasonal wetland complex habitats. This activity could lead to increased soil erosion and runoff
 26 entering these habitats. These activities would be subject to normal erosion and runoff control
 27 management practices, including those developed as part of *AMM2 Construction Best*
 28 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
 29 vegetation removal or earth work adjacent to or within alkali seasonal wetland complex habitats
 30 would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces
 31 as required by *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper
 32 implementation of these measures would avoid permanent adverse effects on this community.
- 33 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
 34 treatment, would be a periodic activity associated with the long-term maintenance of water
 35 conveyance facilities and restoration sites (CM11 Natural Communities Enhancement and
 36 Management). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
 37 alkali seasonal wetland complex natural community at or adjacent to treated areas. The hazard
 38 could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
 39 stormwater onto the natural community, or direct discharge of herbicides to alkali seasonal
 40 wetland complex areas being treated for invasive species removal. Environmental commitments
 41 and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been made part of the
 42 BDCP to reduce hazards to humans and the environment from use of various chemicals during
 43 maintenance activities, including the use of herbicides. These commitments are described in
 44 Appendix 3B, including the commitment to prepare and implement spill prevention,
 45 containment, and countermeasure plans and stormwater pollution prevention plans. Best
 46 management practices, including control of drift and runoff from treated areas, and use of

1 herbicides approved for use in terrestrial environments would also reduce the risk of affecting
2 natural communities adjacent to water conveyance features and levees associated with
3 restoration activities.

- 4 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural
5 communities within the Plan Area (CM11). For the alkali seasonal wetland complex natural
6 community, a management plan would be prepared that specifies actions to improve the value
7 of the habitats for covered species. Actions would include control of invasive nonnative plant
8 and animal species, fire management, restrictions on vector control and application of
9 herbicides, and maintenance of infrastructure that would allow for movement through the
10 community. The enhancement efforts would improve the long-term value of this community for
11 both special-status and common species.
- 12 ● *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to alkali
13 seasonal wetland natural community in the reserve system. The activities could include wildlife
14 and plant viewing and hiking. *CM11 Natural Communities Enhancement and Management* (BDCP
15 Chapter 3, Section 3.4.11) describes this program and identifies applicable restrictions on
16 recreation that might adversely affect alkali seasonal wetland habitat. BDCP also includes an
17 avoidance and minimization measure (AMM37) that further dictates limits on recreation
18 activities that might affect this natural community. Most recreation would be docent-led wildlife
19 and botanical tours, using existing trails and roads in the vicinity of the reserves. No new trails
20 would be constructed.

21 The various operations and maintenance activities described above could alter acreage of alkali
22 seasonal wetland complex natural community in the study area. Activities could introduce sediment
23 and herbicides that would reduce the value of this community to common and sensitive plant and
24 wildlife species. Other periodic activities associated with the Plan, including management,
25 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
26 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
27 enhance the value of the community. While some of these activities could result in small changes in
28 acreage, these changes would be offset by protection and restoration activities planned as part of
29 *CM3 Natural Communities Protection and Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
30 *Wetland Complex Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, AMM10,
31 and AMM37. The management actions associated with control of invasive plant species would also
32 result in a long-term benefit to the species associated with alkali seasonal wetland complex habitats
33 by eliminating competitive, invasive species of plants.

34 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
35 Alternative 9 would not result in a net permanent reduction in the alkali seasonal wetland natural
36 community within the study area. Therefore, there would be no adverse effect on this natural
37 community.

38 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would
39 have the potential to create minor changes in total acreage of alkali seasonal wetland complex
40 natural community in the study area, and could create temporary increases in sedimentation in this
41 community. The activities could also introduce herbicides periodically to control nonnative, invasive
42 plants. Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10 and
43 AMM37 would minimize these impacts, and other operations and maintenance activities, including
44 management, protection and enhancement actions associated with *CM3 Natural Communities*
45 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would

1 create positive effects, including reduced competition from invasive, nonnative plants in these
2 habitats. Long-term restoration activities associated with *CM9 Vernal Pool and Alkali Seasonal*
3 *Wetland Complex Restoration* and protection actions associated with *CM3 Natural Communities*
4 *Protection and Restoration* would ensure that the acreage of this natural community would not
5 decrease in the study area. Ongoing operation, maintenance and management activities would not
6 result in a net permanent reduction in this natural community within the study area. Therefore,
7 there would be a less-than-significant impact.

8 **Vernal Pool Complex**

9 Construction, operation, maintenance and management associated with the conservation
10 components of Alternative 9 would have no long-term adverse effects on the habitats associated
11 with the vernal pool complex natural community. Initial development and construction of CM4
12 would result in permanent removal of 372 acres of this community (see Table 12-9-8). Full
13 implementation of Alternative 9 would also include the following conservation actions over the term
14 of the BDCP to benefit the vernal pool complex natural community.

- 15 • Protect 600 acres of existing vernal pool complex in Conservation Zones 1, 8, and 11, primarily
16 in core vernal pool recovery areas (Objective VPNC1.1, associated with CM3).
- 17 • Restore vernal pool complex in Conservation Zones 1, 8, and/or 11 to achieve no net loss of
18 vernal pool acreage (up to 67 acres of vernal pool complex restoration, assuming that all
19 anticipated impacts [10 wetted acres] occur and that the restored vernal pool complex has 15%
20 density of vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).

21 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
22 3.3 that would improve the value of vernal pool complex natural community for terrestrial species.
23 As explained below, with the protection, restoration and enhancement of the amounts of habitat
24 listed in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural
25 community would not be adverse for NEPA purposes and would be less than significant for CEQA
26 purposes.

1
2

Table 12-9-8. Changes in Vernal Pool Complex Natural Community Associated with Alternative 9 (acres)^a

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0-4	0
CM4	201	372	0	0	0	0
CM5	0	0	0	0	0	0
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	201	372	0	0	0-4	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

3

4
5

Impact BIO-21: Changes in Vernal Pool Complex Natural Community as a Result of Implementing BDCP Conservation Measures

6 Construction, land grading and habitat restoration activities that would accompany the
7 implementation of CM4 could permanently eliminate an estimated 372 acres of vernal pool complex
8 natural community in the study area. This modification represents approximately 3% of the 12,133
9 acres of the community that is mapped in the study area. An estimated 201 acres of this loss would
10 occur during the first 10 years of Alternative 9 implementation, as tidal marsh restoration is
11 initiated. Vernal pool complex protection (400 acres) and restoration (an estimated 40 acres, with
12 actual restoration based on level of effect) would be initiated during the same period to counteract
13 the loss of habitat. By the end of the Plan period, 600 acres of this natural community would be
14 protected and up to 67 acres would be restored. There is also a commitment to having restoration
15 activities keep pace with actual loss of vernal pool habitat through the course of CM4 activities
16 (BDCP Chapter 3, Section 3.4.4.27). Because of the high sensitivity of this natural community and its
17 shrinking presence in the Plan Area, avoidance and minimization measures have been built into the
18 BDCP to eliminate the majority of this potential loss. The BDCP beneficial effect analysis (BDCP
19 Chapter 5, Section 5.4.8.2) indicates that implementation of Alternative 4 would protect at least 600
20 acres of vernal pool complex in Conservation Zones 1, 8, and 11 and additional vernal pool complex
21 would be restored to achieve no net loss of this community. The same conservation actions would be
22 implemented under Alternative 9.

23 The individual effects of the relevant conservation measure are addressed below. A summary
24 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
25 conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of the Alternative 9 water conveyance facilities
2 would not directly affect vernal pool complex natural community. Because of the close proximity
3 of construction activity to adjacent vernal pool complex near Clifton Court Forebay, there is the
4 potential for indirect loss or damage to vernal pools from changes in pool hydrology or
5 deposition of construction-related sediment. These potential indirect effects are discussed in
6 detail in the vernal pool crustaceans impact analysis later in this chapter.

7 The construction activity associated with CM1 also has the potential to lead indirectly to
8 increased nitrogen deposition in vernal pool complex habitats in the vicinity of Clifton Court
9 Forebay. A significant number of cars, trucks, and land grading equipment involved in
10 construction of canals in the vicinity of the forebay would emit small amounts of atmospheric
11 nitrogen from fuel combustion; this material could be deposited in sensitive vernal pool areas
12 that are located west of the major construction areas at Clifton Court Forebay. Nitrogen
13 deposition can pose a risk of adding a fertilizer to nitrogen-limited soils and their associated
14 plants. Nonnative invasive species can be encouraged by the added nitrogen available. BDCP
15 Appendix 5.J, Attachment 5J.A, *Construction-Related Nitrogen Deposition on BDCP Natural*
16 *Communities*, addresses this issue in detail. It has been concluded that this potential deposition
17 would pose a low risk of changing the vernal pool complex in the construction areas because the
18 construction would contribute a negligible amount of nitrogen to regional projected emissions.
19 Also, the construction at Clifton Court Forebay would occur primarily downwind of the natural
20 community. No adverse effect is expected.

- 21 • *CM3 Natural Communities Protection and Restoration*: CM3 proposes to protect at least 600 acres
22 of vernal pool complex in CZs 1, 8 and 11 (BDCP Objective VPNC1.1). The protection would
23 occur in areas containing a mosaic of grassland and vernal pool complex in unfragmented
24 natural landscapes supporting a diversity of native plant and wildlife species. These areas would
25 be both protected and enhanced to increase the cover of vernal pool complex plants relative to
26 nonnative species.
- 27 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
28 footprints, implementation of CM4 tidal marsh restoration in CZs 1 and 11 (Cache Slough and
29 Suisun Marsh ROAs; see Figure 12-1) could permanently inundate or remove 201 acres of vernal
30 pool complex in the near-term timeframe. By the end of the Plan period, a total of 372 acres
31 could be affected. The principal areas likely to be affected include the Cache Slough drainage just
32 west of the Yolo Bypass and the Nurse Slough drainage just east of the Potrero Hills.
- 33 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: BDCP CM9 includes both
34 vernal pool complex and alkali seasonal wetland complex restoration goals. The current
35 estimate for vernal pool complex restoration is 40 acres in the near-term and a total of 67 acres
36 by the end of the BDCP restoration period. This restoration conservation measure includes a “no
37 net loss” policy normally applied to this natural community (BDCP Objective VPNC1.2).

38 The following paragraphs summarize the combined effects discussed above and describe other
39 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
40 also included.

41 ***Near-Term Timeframe***

42 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 could
43 affect 201 acres of vernal pool complex natural community through inundation or construction-

1 related losses in habitat from CM4 activities. This loss would likely occur in the Cache Slough or
2 Suisun Marsh ROAs mapped in Figure 12-1.

3 The construction or inundation loss of this special-status natural community would represent an
4 adverse effect if it were not offset by avoidance and minimization measures and restoration actions
5 associated with BDCP conservation components. Loss of vernal pool complex natural community
6 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
7 defined by Section 404 of the CWA. The protection of 400 acres of vernal pool complex as part of
8 CM3 and the restoration of up to 40 acres of this community as part of CM9 during the first 10 years
9 of Alternative 9 implementation would partially offset this near-term loss. The Plan focuses this
10 protection in the core vernal pool areas identified in the USFWS vernal pool recovery plan (U.S. Fish
11 and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8 and CZ 11 (see Figure 12-1). Typical
12 project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 402 acres
13 of protection and 201 acre of restoration would be needed to offset (i.e., mitigate) the 201 acre of
14 loss. Without additional avoidance and minimization measures to reduce the potential effect, the
15 proposed protection and restoration would not meet the typical mitigation for vernal pool complex
16 losses.

17 To avoid this adverse effect, the Plan includes commitments to implement *AMM1 Worker Awareness*
18 *Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater*
19 *Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM10 Restoration of*
20 *Temporarily Affected Natural Communities*, and *AMM12 Vernal Pool Crustaceans*. AMM12 limits the
21 direct removal of vernal pool crustacean habitat to no more than 10 wetted acres and the indirect
22 effect to no more than 20 wetted acres through the life of the Plan. This is equivalent to the direct
23 removal of approximately 67 acres and the indirect removal of approximately 134 acres of vernal
24 pool complex natural community. BDCP Appendix 3.C describes the AMMs, which have since been
25 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to
26 the Final EIR/EIS. With these AMMs in place, Alternative 9 would not adversely affect vernal pool
27 complex natural community in the near-term.

28 **Late Long-Term Timeframe**

29 The late long-term effect on vernal pool complex natural community would be 372 acres of
30 permanent loss. These losses would be associated with the ongoing restoration of tidal wetland in
31 the Cache Slough and Suisun Marsh ROAs. However, 600 acres would be protected (CM3) and up to
32 67 acres would be restored (CM9) through the course of the BDCP implementation. In addition, the
33 avoidance and minimization measures listed above would reduce the actual loss of this community
34 to no more than 10 wetted acres of vernal pool crustacean habitat from direct activities and 20 acres
35 of habitat from indirect effects.

36 **NEPA Effects:** The conservation measures associated with Alternative 9 include protection of 400
37 acres (CM3) and restoration of an estimated 40 acres (CM9) of vernal pool complex in the near-term
38 time frame. The Plan focuses the protection in the core vernal pool areas identified in the USFWS
39 vernal pool recovery plan (U.S. Fish and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8 and
40 CZ 11 (see Figure 12-1). In addition, Alternative 9 includes AMM12 which limits the removal of
41 vernal pool crustacean habitat to no more than 10 wetted acres and the indirect effect to no more
42 than 20 wetted acres through the life of the Plan. With this and other AMMs in place, Alternative 9
43 would not adversely affect vernal pool complex natural community in the near-term. With these

1 conservation measures and AMMs in effect through the entire Plan period, Alternative 9 would not
2 have an adverse effect on the vernal pool complex natural community in the long term.

3 **CEQA Conclusion:**

4 ***Near-Term Timeframe***

5 During the 10-year near-term time frame, Alternative 9 could result in the loss of approximately 201
6 acres of vernal pool complex natural community due to inundation during tidal marsh restoration
7 (CM4). The loss would likely occur in the Cache Slough or Suisun Marsh ROAs.

8 The inundation loss of this special-status natural community would represent a significant impact if
9 it were not offset by avoidance and minimization measures and other actions associated with BDCP
10 conservation components. Loss of vernal pool complex natural community would be considered
11 both a loss in acreage of a sensitive natural community and a loss of wetland as defined by Section
12 404 of the CWA. The protection of 400 acres of vernal pool complex as part of CM3 and the
13 restoration of an estimated 40 acres of this community as part of CM9 during the first 10 years of
14 Alternative 9 implementation would partially offset this near-term loss. CM9 also includes a
15 commitment to have vernal pool restoration keep pace with loss of this natural community. Typical
16 project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 402 acres
17 of protection and 201 acres of restoration would be needed to offset (i.e., mitigate) the 201 acre of
18 loss. Without additional avoidance and minimization measures to reduce the potential impact, the
19 proposed protection and restoration would not meet the typical mitigation for vernal pool complex
20 losses. However, Alternative 9 also includes AMM1, AMM2, AMM3, AMM4, AMM10, and AMM12 to
21 minimize impacts. AMM12 places a strict limit on the acres of wetted vernal pool crustacean habitat
22 that can be lost to conservation actions (10 acres of direct and 20 acres of indirect loss; equivalent to
23 approximately 67 acres of direct loss and 134 acres of indirect loss of vernal pool natural
24 community). Because of the offsetting protection and restoration activities and implementation of
25 AMMs, impacts would be less than significant.

26 ***Late Long-Term Timeframe***

27 At the end of the Plan period, 372 acres of vernal pool complex natural community could be
28 permanently removed. Through CM3 and CM9, 600 acres of vernal pool complex natural community
29 would be protected and up to 67 acres would be restored. In addition, AMM12 would limit the acres
30 of wetted vernal pool crustacean habitat loss to 10 acres from direct actions and 20 acres from
31 indirect actions. There would be no net permanent reduction in the acreage of this natural
32 community within the study area. Alternative 9 would have a less-than-significant impact on this
33 natural community.

34 **Impact BIO-22: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
35 **Vernal Pool Complex Natural Community**

36 *CM2 Yolo Bypass Fisheries Enhancement* would modify the inundation regime of the Yolo Bypass, a
37 man-made waterway. CM2, which is designed to improve fish passage and shallow flooded habitat
38 for Delta fishes in the Yolo Bypass, could increase periodic inundation of a small acreage of vernal
39 pool complex natural community in the southern section of the bypass, south of Putah Creek.

40 Operation of the Yolo Bypass under Alternative 9 would result in an increase in the frequency,
41 magnitude and duration of inundation on an estimated 0–4 acres of vernal pool complex natural
42 community. The methods used to estimate this inundation acreage are described in BDCP Appendix

1 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area more frequently affected by
2 inundation would vary with the flow volume that would pass through the newly constructed notch
3 in the Fremont Weir. The 4-acre increase in inundation would only occur at the highest modeled
4 flow regime, 8,000 cfs. Plan-related increases in flow through Fremont Weir would be expected in
5 30% of the years. The vernal pool complex natural community that would likely be affected occurs
6 in the southern reaches of the bypass, south of Putah Creek. There are several relatively large,
7 contiguous areas of vernal pools on the western edge of the bypass in this area. The anticipated
8 change in management of flows in the Yolo Bypass includes more frequent releases in flows into the
9 bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the bypass in
10 spring months (April and May).

11 **NEPA Effects:** The modification of periodic inundation events in the Yolo Bypass associated with
12 Alternative 9 water operations would not adversely affect vernal pool complex habitats, as they
13 have persisted under similar high flows and extended inundation periods. There is the potential,
14 however, for some change in plant species composition as a result of longer inundation periods.

15 **CEQA Conclusion:** An estimated 0–4 acres of vernal pool complex natural community in the Yolo
16 Bypass would be subjected to more frequent inundation as a result of implementing CM2 under
17 Alternative 9. This natural community is conditioned to periodic inundation; the slight increase in
18 periodic inundation would not result in a net permanent reduction in the acreage of this community
19 in the study area, although some change in plant species composition could occur. Increasing
20 periodic inundation of vernal pool complex natural community in the Yolo Bypass would have a less-
21 than-significant impact on the community.

22 **Impact BIO-23: Modification of Vernal Pool Complex Natural Community from Ongoing** 23 **Operation, Maintenance and Management Activities**

24 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime
25 associated with changed water management is in effect, there would be new ongoing and periodic
26 actions associated with operation, maintenance and management of the BDCP facilities and
27 conservation lands that could affect vernal pool complex natural community in the study area. The
28 ongoing actions include the diversion of Sacramento River flows into newly screened diversion
29 structures at Georgianna Slough and Delta Cross Channel, operation of multiple operable barriers in
30 Delta waterways, modified diversions from south Delta channels, and recreation activities in Plan
31 reserves. These actions are associated with CM1 and CM11 (see the impact discussion above for
32 effects associated with CM2). The periodic actions would involve access road and conveyance facility
33 repair, vegetation management at the various water conveyance facilities and habitat restoration
34 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat
35 enhancement in accordance with natural community management plans. The potential effects of
36 these actions are described below.

- 37 • *Modified river flows upstream of and within the study area and modified diversions from south*
38 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified
39 diversion of Sacramento River flows at newly screened diversions into Georgianna Slough and
40 Delta Cross Channel, operation of multiple operable barriers in Delta waterways, and modified
41 diversions from south Delta channels (Operational Scenario G) would not affect vernal pool
42 complex natural community. This natural community does not exist within or adjacent to the
43 active Sacramento River system channels and Delta waterways.

- 1 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
2 conveyance facilities and levees associated with the BDCP actions have the potential to require
3 removal of adjacent vegetation and could entail earth and rock work adjacent to vernal pool
4 complex habitats. This activity could lead to increased soil erosion and runoff entering these
5 habitats. These activities would be subject to normal erosion and runoff control management
6 practices, including those developed as part of *AMM2 Construction Best Management Practices*
7 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or earth
8 work adjacent to vernal pool complex habitats would require use of sediment barriers, soil
9 stabilization and revegetation of disturbed surfaces as part of *AMM10 Restoration of Temporarily*
10 *Affected Natural Communities*. Proper implementation of these measures would avoid
11 permanent adverse effects on this community.
- 12 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
13 treatment, would be a periodic activity associated with the long-term maintenance of water
14 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
15 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
16 vernal pool complex natural community at or adjacent to treated areas. The hazard could be
17 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
18 onto the natural community, or direct discharge of herbicides to vernal pool complex areas
19 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
20 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce
21 hazards to humans and the environment from use of various chemicals during maintenance
22 activities, including the use of herbicides. These commitments are described in Appendix 3B,
23 *Environmental Commitments, AMMs, and CMs*, including the commitment to prepare and
24 implement spill prevention, containment, and countermeasure plans and stormwater pollution
25 prevention plans. Best management practices, including control of drift and runoff from treated
26 areas, and use of herbicides approved for use in terrestrial or aquatic environments would also
27 reduce the risk of affecting natural communities adjacent to water conveyance features and
28 levees associated with restoration activities.
- 29 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
30 communities within the Plan Area (CM11). For the vernal pool complex natural community, a
31 management plan would be prepared that specifies actions to improve the value of the habitats
32 for covered species. Actions would include control of invasive nonnative plant and animal
33 species, fire management, restrictions on vector control and application of herbicides, and
34 maintenance of infrastructure that would allow for movement through the community. The
35 enhancement efforts would improve the long-term value of this community for both special-
36 status and common species.
- 37 • *Recreation.* The BDCP would allow for certain types of recreation in and adjacent to vernal pool
38 complexes in the reserve system. The activities could include wildlife and plant viewing and
39 hiking. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section
40 3.4.11) describes this program and identifies applicable restrictions on recreation that might
41 adversely affect vernal pool habitat. BDCP also includes an avoidance and minimization measure
42 (AMM37) that further dictates limits on recreation activities that might affect vernal pools.
43 Recreational trails would be limited to existing trails and roads. New trail construction would be
44 prohibited within the vernal pool complex reserves. It is expected that most activities would be
45 docent-led tours of reserves, minimizing adverse effects.

1 The various operations and maintenance activities described above could alter acreage of vernal
2 pool complex natural community in the study area. Activities could introduce sediment and
3 herbicides that would reduce the value of this community to common and sensitive plant and
4 wildlife species. Other periodic activities associated with the Plan, including management,
5 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
6 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
7 enhance the value of the community. While some of these activities could result in small changes in
8 acreage, these changes would be greatly offset by restoration activities planned as part of *CM9*
9 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by implementation of
10 AMM2, AMM4, AMM5, AMM10 and AMM37. The management actions associated with control of
11 invasive plant species would also result in a long-term benefit to the species associated with vernal
12 pool complex habitats by eliminating competitive, invasive species of plants.

13 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
14 Alternative 9 would not result in a net permanent reduction in the vernal pool complex natural
15 community within the study area. Therefore, there would be no adverse effect on this community.

16 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would
17 have the potential to create minor changes in total acreage of vernal pool complex natural
18 community in the study area, and could create temporary increases in sedimentation or damage
19 from recreational activity in this community. The activities could also introduce herbicides
20 periodically to control nonnative, invasive plants. Implementation of environmental commitments
21 and AMM2, AMM4, AMM5, AMM10 and AMM37 would minimize these impacts, and other
22 operations and maintenance activities, including management, protection and enhancement actions
23 associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
24 *Communities Enhancement and Management*, would create positive effects, including reduced
25 competition from invasive, nonnative plants in these habitats. Long-term restoration activities
26 associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and protection
27 actions associated with *CM3 Natural Communities Protection and Restoration* would ensure that the
28 acreage of this natural community would not decrease in the study area. Ongoing operation,
29 maintenance and management activities would not result in a net permanent reduction in this
30 natural community within the study area. Therefore, there would be a less-than-significant impact.

31 **Managed Wetland**

32 The conservation components of Alternative 9 would reduce the acreage of managed wetland
33 currently found in the study area. Initial development and construction of CM1, CM2, CM4, and CM6
34 would result in both permanent and temporary removal of this community (see Table 12-9-9). Full
35 implementation of Alternative 9 would also include the following conservation action over the term
36 of the BDCP to benefit the managed wetland natural community.

- 37 ● Protect and enhance 8,100 acres of managed wetland, at least 1,500 acres of which are in the
38 Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 39 ● Create 320 acres of managed wetlands consisting of greater sandhill crane roosting habitat in
40 minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in
41 Conservation Zones 3, 4, 5, or 6, with consideration of sea level rise and local seasonal flood
42 events (Objective GSHC1.3, associated with CM10).
- 43 ● Create two wetland complexes within the SLNWR refuge boundary. Each complex will consist of
44 at least three wetlands totaling 90 acres of greater sandhill crane roosting habitat. One of the

wetland complexes may be replaced by 180 acres of cultivated lands that are flooded following harvest for crane roosting and foraging habitat (Objective GSHC1.4, associated with CM10).

In addition to this conservation action, creation of similar habitat values by restoring tidal brackish emergent wetland and tidal freshwater emergent wetland as part of CM4 would further offset the losses of managed wetland. The net effect would be a substantial decrease in the amount of managed wetlands, but an increase in similar habitat value for special-status and common species as the managed wetland is converted to tidal marsh. Impacts to this natural community would not be adverse for NEPA purposes and would be less than significant for CEQA purposes. Refer to the *Shorebirds and Waterfowl* impact discussion at the end of this section (Section 12.3.3.16) for further consideration of the effects of removing managed wetland natural community.

Table 12-9-9. Changes in Managed Wetland Associated with Alternative 9 (acres)^a

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	9	9	23	23	0	0
CM2	24	24	44	44	931-2,612	0
CM4	5,718	13,746	0	0	0	0
CM5	0	0	0	0	0	6
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	5,751	13,779	67	67	931-2,612	6

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

Impact BIO-24: Changes in Managed Wetland Natural Community as a Result of Implementing BDCP Conservation Measures

Construction, channel dredging, land grading and habitat restoration activities that would accompany the implementation of CM1, CM2, CM4, and CM6 would permanently eliminate an estimated 13,779 acres of managed wetland in the study area. This modification represents approximately 19% of the 70,798 acres of managed wetland that is mapped in the study area. This loss would occur through the course of BDCP restoration activity, as construction and tidal marsh restoration proceeds. Managed wetland protection (8,100 acres) and restoration (500 acres) would take place over the same period, but would not replace the acreage lost. The BDCP beneficial effects analysis for Alternative 4 (BDCP Chapter 5, Section 5.4.9.2) states that at least 8,100 acres of managed wetlands would be protected, of which at least 1,500 acres will be located within the Grizzly Island marsh complex, consistent with the U.S. Fish and Wildlife Service salt marsh harvest

1 mouse recovery plan. Although the primary purpose of the 1,500 acres of protection is to protect
2 and enhance habitat for the salt marsh harvest mouse, it is also expected to benefit the managed
3 wetland natural community and the diversity of species that use it, including migratory waterfowl
4 and the western pond turtle. These same conservation actions would be implemented under
5 Alternative 9.

6 The individual effects of the relevant conservation measure are addressed below. A summary
7 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
8 conservation measure discussions.

- 9 • *CM1 Water Facilities and Operation:* Construction of the Alternative 9 water conveyance facilities
10 would permanently remove 9 acres and temporarily remove 23 acres of managed wetland
11 community. The permanent losses would occur at canal construction sites over the Old River
12 just south of Clifton Court Forebay and across Coney Island, and at a spoil storage site adjacent
13 to the operable barrier constructed at the northern junction of Old River and the San Joaquin
14 River at Franks Tract. The temporary losses would occur at the Old River canal crossing adjacent
15 to Clifton Court Forebay, at the Old River/San Joaquin River operable barrier at Franks Tract,
16 and at a work area adjacent to the Delta Cross Channel diversion construction site (see
17 Terrestrial Biology Mapbook). These losses would take place during the near-term construction
18 period.
- 19 • *CM2 Yolo Bypass Fisheries Enhancement:* Implementation of CM2 involves a number of
20 construction activities that could permanently or temporarily remove managed wetland,
21 including west side channels modifications, Putah Creek realignment activities, Lisbon Weir
22 modification and Sacramento Weir improvements. All of these activities could involve
23 excavation and grading in managed wetland areas to improve passage of fish through the
24 bypasses. Based on hypothetical construction footprints, a total of 24 acres could be
25 permanently removed and 44 acres could be temporarily removed. This activity would occur in
26 the near-term timeframe.
- 27 • *CM4 Tidal Natural Communities Restoration:* Based on the use of hypothetical restoration
28 footprints, implementation of CM4 would permanently inundate or remove 13,746 acres of
29 managed wetland community. These losses would be expected to occur primarily in the Suisun
30 Marsh ROA, but could also occur in the Cache Slough and West Delta ROAs (see Figure 12-1).
31 These acres of managed wetland would be converted to natural wetland, including large
32 acreages of tidal brackish emergent wetland and tidal freshwater emergent wetland. These
33 natural wetlands provide comparable or improved habitat for the special-status species that
34 occupy managed wetland. The newly created tidal marsh would not create a barrier or result in
35 fragmentation of managed wetland, as most species are capable of utilizing both communities.
36 An estimated 500 acres of managed wetland would be restored and 8,100 acres would be
37 enhanced and protected through *CM3 Natural Communities Protection and Restoration*, as
38 established by BDCP Objective MWNC1.1. All of the restoration and 4,800 acres of the protection
39 would occur during the first 10 years of Alternative 9 implementation, which would coincide
40 with the timeframe of water conveyance facilities construction and early implementation of
41 CM4. The remaining restoration would be spread over the following 30 years. Managed wetland
42 restoration is expected to include at least 320 acres in CZs 3, 4, 5 and 6 (Figure 12-1) to benefit
43 sandhill crane, as stated in BDCP Objective GSHC1.3. The enhancement and protection would be
44 focused in Suisun Marsh, but could also occur in CZs with existing managed wetland (CZs 1, 2, 4,
45 5, 6, and 7).

- 1 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in filling
2 of small amounts of managed wetland habitat along 20 miles of river and sloughs. The extent of
3 this loss cannot be quantified at this time, but the majority of the enhancement activity would
4 occur on the edges of tidal perennial aquatic habitat, including levees and channel banks.
5 Managed wetland adjacent to these tidal areas could be affected. The improvements would
6 occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers,
7 and along Steamboat and Sutter Sloughs.

8 The following paragraphs summarize the combined effects discussed above and describe other
9 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
10 also included.

11 ***Near-Term Timeframe***

12 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would
13 permanently remove 5,751 acres and temporarily remove 67 acres of managed wetland through
14 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. Thirty-two
15 acres of this loss would be associated with construction of the water conveyance facilities (CM1).
16 These losses would occur in various locations, but the majority of the near-term loss would occur in
17 Suisun Marsh and the lower Yolo Bypass as tidal marsh is restored.

18 The construction or inundation loss of this special-status natural community would represent an
19 adverse effect if it were not offset by other conservation actions. Loss of managed wetland natural
20 community would be considered both a loss in acreage of a sensitive natural community and
21 potentially a loss of wetland as defined by Section 404 of the CWA. Many managed wetland areas are
22 interspersed with small natural wetlands that would be regulated under Section 404. The
23 restoration of 500 acres (CM10) and protection and enhancement of 4,800 acres (CM3) of managed
24 wetland during the first 10 years of Alternative 9 implementation would fully offset the losses
25 associated with CM1, but would only partially offset the total near-term loss. The typical project-
26 level mitigation ratio (1:1 for protection) would indicate 32 acres of protection would be needed to
27 offset the 32 acres of loss associated with CM1; a total of 5,818 acres of protection would be needed
28 to offset (i.e., mitigate) the 5,818 acres of permanent and temporary loss from all near-term actions.
29 The combined protection and restoration proposed for managed wetland in the near-term would
30 fall 518 acres short of full replacement. However, the CM4 marsh restoration activities that would be
31 creating this loss would be simultaneously creating 2,000 acres of tidal brackish emergent wetland
32 and 8,850 acres of tidal freshwater emergent wetland in place of the managed wetland in the near-
33 term. This acreage would significantly exceed the number of acres of managed wetlands lost.
34 Mitigation measures would also be undertaken to reduce the effects of managed wetland loss on
35 waterfowl in Suisun Marsh (Mitigation Measure BIO-179a) and the Yolo/Delta basins (Mitigation
36 Measure 179b) if the protection and enhancement actions of CM3 and CM10 were not sufficient to
37 replace the value of managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial*
38 *Biology Effects* discussion later in this section (Section 12.3.3.16).

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*
42 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting
43 habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and

1 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final
2 EIR/EIS.

3 In spite of the managed wetland protection, restoration and avoidance measures contained in
4 Alternative 9, there would be a net reduction in the acreage of this special-status natural community
5 in the near-term. This would be an adverse effect when judged by the significance criteria listed
6 earlier in this chapter. However, the conversion of these managed habitats to natural tidal wetland
7 types that support similar ecological functions (2,000 acres of tidal brackish emergent wetland and
8 8,850 acres of tidal freshwater emergent wetland) would offset this adverse effect. Also, there are
9 other conservation actions contained in the BDCP (CM3 and CM11) that would improve
10 management and enhance existing habitat values, further offsetting the effects of managed wetland
11 loss on covered and noncovered special-status terrestrial species and on common species that rely
12 on this natural community for some life phase. As a result, there would be no adverse effect.

13 ***Late Long-Term Timeframe***

14 At the end of the Plan period, 13,779 acres of managed wetland natural community would be
15 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would
16 be restored. There would be a net permanent reduction in the acreage of this special-status natural
17 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal
18 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this
19 managed wetland.

20 ***NEPA Effects:*** Alternative 9 would result in a loss 13,779 acres of managed wetland within the study
21 area; however, it would also protect and enhance 8,100 acres and restore 500 acres of this habitat.
22 In addition, Alternative 9 would restore 6,000 acres of tidal brackish emergent wetland and 24,000
23 acres of tidal freshwater emergent wetland that support similar ecological functions to those of
24 managed wetland. Therefore, there would be no adverse effect on managed wetland natural
25 community.

26 ***CEQA Conclusion:***

27 ***Near-Term Timeframe***

28 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would
29 permanently remove 5,571 acres and temporarily remove 67 acres of managed wetland through
30 inundation or construction-related losses in habitat from CM1, CM2, and CM4 activities. Thirty-two
31 acres of this loss would be associated with construction of the water conveyance facilities (CM1).
32 These losses would occur in various locations, but the majority of the near-term loss would occur in
33 Suisun Marsh and the lower Yolo Bypass as tidal marsh is restored.

34 The construction or inundation loss of this special-status natural community would represent a
35 significant impact if it were not offset by other conservation actions. Loss of managed wetland
36 natural community would be considered both a loss in acreage of a sensitive natural community and
37 potentially a loss of wetland as defined by Section 404 of the CWA. The restoration of 500 acres and
38 protection and enhancement of 4,800 acres of managed wetland as part of CM3 and CM10 during
39 the first 10 years of Alternative 9 implementation would fully offset the losses associated with CM1,
40 but would only partially offset the total near-term loss. The typical project-level mitigation ratio (1:1
41 for protection) would indicate 32 acres of protection would be needed to offset the 32 acres of loss
42 associated with CM1; a total of 5,818 acres of protection would be needed to offset (i.e., mitigate) the
43 5,818 acres of permanent and temporary loss from all near-term actions. The combined protection

1 and restoration proposed for managed wetland in the near-term would fall 518 acres short of full
2 replacement. However, the CM4 marsh restoration activities that would be creating this loss would
3 be simultaneously creating 2,000 acres of tidal brackish emergent wetland and 4,800 acres of tidal
4 freshwater emergent wetland in place of the managed wetland in the near-term. This acreage would
5 significantly exceed the number of acres of managed wetland lost. Mitigation measures would also
6 be undertaken to reduce the effects of managed wetland loss on waterfowl in Suisun Marsh
7 (Mitigation Measure BIO-179a) and the Yolo/Delta basins (Mitigation Measure 179b) if the
8 protection and enhancement actions of CM3 and CM10 were not sufficient to replace the value of
9 managed wetlands for waterfowl in these basins. Refer to the *General Terrestrial Biology Effects*
10 discussion later in this section (Section 12.3.3.16).

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*
14 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting
15 habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and
16 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final
17 EIR/EIS.

18 In spite of the managed wetland protection, restoration and avoidance measures contained in
19 Alternative 9, there would be a net reduction in the acreage of this special-status natural community
20 in the near-term. This would be a significant impact when judged by the significance criteria listed
21 earlier in this chapter. However, the conversion of these managed habitats to natural tidal wetland
22 types that support similar ecological functions (2,000 acres of tidal brackish emergent wetland and
23 4,800 acres of tidal freshwater emergent wetland) would eliminate this significant impact. Also,
24 there are other conservation actions contained in the BDCP (CM3 and CM11) that would improve
25 management and enhance existing habitat values, further offsetting the impacts of managed wetland
26 loss on covered and noncovered special-status terrestrial species and on common species that rely
27 on this natural community for some life phase. As a result, there would be a less-than-significant
28 impact.

29 ***Late Long-Term Timeframe***

30 At the end of the Plan period, 13,779 acres of managed wetland natural community would be
31 permanently removed by conservation actions, 8,100 acres would be protected and 500 acres would
32 be restored. There would be a net permanent reduction in the acreage of this special-status natural
33 community within the study area. Simultaneously, there would be the creation of 6,000 acres of tidal
34 brackish emergent wetland and 24,000 acres of tidal freshwater emergent wetland in place of this
35 managed wetland. Because these natural wetlands support similar ecological functions to those of
36 managed wetland, there would be a less-than-significant impact.

37 **Impact BIO-25: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 38 **Managed Wetland Natural Community**

39 Two Alternative 9 conservation measures would modify the inundation/flooding regimes of both
40 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
41 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
42 of managed wetland on wildlife management areas and duck clubs scattered up and down the
43 central and southern bypass. CM5 would expose this community to additional flooding as channel

1 margins are modified and levees are set back to improve fish habitat along some of the major rivers
2 and waterways in the south Delta.

- 3 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 9 would
4 result in an increase in the frequency, magnitude and duration of inundation of 931–2,612 acres
5 of managed wetland natural community. The methods used to estimate these inundation
6 acreages are described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and*
7 *Plants*. The area more frequently affected by inundation would vary with the flow volume that
8 would pass through the newly constructed notch in the Fremont Weir. The 931-acre increase in
9 inundation would be associated with a notch flow of 8,000 cubic feet per second (cfs), and the
10 2,612-acre increase would result from a notch flow of 4,000 cfs. Plan-related increases in flow
11 through Fremont Weir would be expected in 30% of the years. Based on the theoretical
12 modeling that has been completed to-date, the largest acreages would be associated with the
13 Sacramento Bypass Wildlife Area, the Yolo Bypass Wildlife Area, and private managed wetlands
14 south of Putah Creek. The anticipated change in management of flows in the Yolo Bypass
15 includes more frequent releases in flows into the bypass from the Fremont and Sacramento
16 Weirs, and in some years, later releases into the bypass in spring months (April and May). With
17 larger flows, the water depths may also increase over Existing Conditions. While the managed
18 wetlands of the Yolo Bypass are conditioned to periodic inundation events, the more frequent
19 and extended inundation periods may make it more difficult to actively manage the areas for
20 maximum food production for certain species (waterfowl primarily) and may alter the plant
21 assemblages in some years. The effects of this periodic inundation on birds and other terrestrial
22 species are discussed later in this chapter. The additional inundation would not be expected to
23 reduce the acreage of managed wetland on a permanent basis. The extended inundation would
24 be designed to expand foraging and spawning habitat for Delta fishes.
- 25 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
26 increase in the frequency and duration of inundation of an estimated 6 acres of managed
27 wetland. Specific locations for this restoration activity have not been identified, but they would
28 likely be focused in the south Delta area, along the major rivers and Delta channels. The
29 connection of these wetlands to stream flooding events would be beneficial to the ecological
30 function of managed wetlands, especially as they relate to BDCP target aquatic species. Foraging
31 activity and refuge sites would be expanded into areas currently unavailable or infrequently
32 available to some aquatic species. The more frequent flooding would periodically interfere with
33 management activities associated with terrestrial species (primarily waterfowl) and may result
34 in changes in plant composition and management strategies over time.

35 In summary, 937–2,618 acres of managed wetland community in the study area would be subjected
36 to more frequent inundation as a result of implementing two Alternative 9 conservation measures
37 (CM2 and CM5).

38 **NEPA Effects:** Managed wetland community would not be adversely affected because much of the
39 acreage affected is conditioned to periodic inundation. The more frequent inundation could create
40 management problems associated with certain species, especially waterfowl, and result in changes
41 over time in plant species composition. The total acreage of managed wetland would not be
42 expected to change permanently as a result of the periodic inundation.

43 **CEQA Conclusion:** An estimated 937–2,618 acres of managed wetland community in the study area
44 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under
45 Alternative 9. Managed wetland community would not be significantly impacted because periodic

1 inundation is already experienced by most of the land that would be affected. There could be
2 increased management problems and a long-term shift in plant species composition. The periodic
3 inundation would not be expected to result in a net permanent reduction in the acreage of this
4 community in the study area. Therefore, there would be a less-than-significant impact on the
5 community.

6 **Impact BIO-26: Modification of Managed Wetland Natural Community from Ongoing**
7 **Operation, Maintenance and Management Activities**

8 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime
9 associated with changed water management is in effect, there would be new ongoing and periodic
10 actions associated with operation, maintenance and management of the BDCP facilities and
11 conservation lands that could affect managed wetland natural community in the study area. The
12 ongoing actions include the diversion of Sacramento River flows into two newly screened diversions
13 at Georgianna Slough and Delta Cross Channel, operation of multiple operable barriers in Delta
14 waterways, modified diversions from south Delta channels, and recreational use of reserve areas.
15 These actions are associated with CM1 and CM11 (see the above impact discussion for effects
16 associated with CM2). The periodic actions would involve access road and conveyance facility
17 repair, vegetation management at the various water conveyance facilities and habitat restoration
18 sites (CM11), levee repair and replacement of levee armoring, channel dredging, and habitat
19 enhancement in accordance with natural community management plans. The potential effects of
20 these actions are described below.

- 21 • *Modified river flows upstream of and within the study area and modified diversions from south*
22 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified
23 diversion of Sacramento River flows at two newly screened diversions at Georgianna Slough and
24 Delta Cross Channel, operation of multiple operable barriers in Delta waterways, and modified
25 diversions from south Delta channels (Operational Scenario G) would not result in the reduction
26 in acreage of the managed wetland natural community in the study area. Flow levels in the
27 upstream rivers would not change to the degree that water levels in adjacent managed wetlands
28 would be altered. Similarly, modified diversions of Sacramento River flows in at Georgianna
29 Slough and Delta Cross Channel would not result in a permanent reduction in the managed
30 wetland community downstream of these diversions. The majority of the managed wetlands
31 below the diversions is not directly connected to the rivers. Modified diversions from south
32 Delta channels would not create a reduction in this natural community.
- 33 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
34 conveyance facilities and levees associated with the BDCP actions have the potential to require
35 removal of adjacent vegetation and could entail earth and rock work in managed wetland
36 habitats. This activity could lead to increased soil erosion, turbidity and runoff entering
37 managed wetlands. These activities would be subject to normal erosion, turbidity and runoff
38 control management practices, including those developed as part of *AMM2 Construction Best*
39 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
40 vegetation removal or earth work adjacent to or within managed wetland habitats would
41 require use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed
42 surfaces. Proper implementation of these measures would avoid permanent adverse effects on
43 this community.
- 44 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
45 treatment, would be a periodic activity associated with the long-term maintenance of water

1 conveyance facilities and restoration sites (*CM11 Natural Resources Enhancement and*
 2 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
 3 managed wetland natural community at or adjacent to treated areas. The hazard could be
 4 created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater
 5 onto the community, or direct discharge of herbicides to managed wetland areas being treated
 6 for invasive species removal. Environmental commitments and *AMM5 Spill Prevention,*
 7 *Containment, and Countermeasure Plan* have been made part of the BDCP to reduce hazards to
 8 humans and the environment from use of various chemicals during maintenance activities,
 9 including the use of herbicides. These commitments are described in Appendix 3B,
 10 *Environmental Commitments, AMMs, and CMs*, including the commitment to prepare and
 11 implement spill prevention, containment, and countermeasure plans and stormwater pollution
 12 prevention plans. Best management practices, including control of drift and runoff from treated
 13 areas, and use of herbicides approved for use in aquatic and terrestrial environments would also
 14 reduce the risk of affecting natural communities adjacent to water conveyance features and
 15 levees associated with restoration activities.

16 Herbicides to remove aquatic invasive species as part of CM13 would be used to restore the
 17 normal ecological function of tidal and nontidal aquatic habitats in planned restoration areas.
 18 The treatment activities would be conducted in concert with the California Department of
 19 Boating and Waterways' invasive species removal program. Eliminating large stands of water
 20 hyacinth and Brazilian waterweed would improve habitat conditions for some aquatic species
 21 by removing cover for nonnative predators, improving water flow and removing barriers to
 22 movement (see Chapter 11, *Fish and Aquatic Resources*). These habitat changes should also
 23 benefit terrestrial species that use managed wetland natural community for movement
 24 corridors and for foraging. Vegetation management effects on individual species are discussed in
 25 the species sections on following pages.

- 26 ● *Habitat enhancement.* The BDCP includes a long-term management element for the natural
 27 communities within the Plan Area (CM11). For the managed wetland natural community, a
 28 management plan would be prepared that specifies actions to improve the value of the habitats
 29 for covered species. Actions would include control of invasive nonnative plant and animal
 30 species, fire management, restrictions on vector control and application of herbicides, and
 31 maintenance of infrastructure that would allow for movement through the community. The
 32 enhancement efforts would improve the long-term value of this community for both special-
 33 status and common species.
- 34 ● *Recreation.* The BDCP would allow hunting, fishing and hiking in managed wetland reserve
 35 areas. *CM11 Natural Communities Enhancement and Management* (BDCP Chapter 3, Section
 36 3.4.11) describes this program and identifies applicable restrictions on recreation that might
 37 adversely affect managed wetland habitat. BDCP also includes an avoidance and minimization
 38 measure (AMM37) that further dictates limits on recreation activities that might affect this
 39 natural community. Hunting would be the dominant activity in fall and winter months, while
 40 fishing and hiking would be allowed in non-hunting months.

41 The various operations and maintenance activities described above could alter acreage of managed
 42 wetland natural community in the study area through facilities maintenance, vegetation
 43 management and recreation. Activities could also introduce sediment and herbicides that would
 44 reduce the value of this community to common and sensitive plant and wildlife species. Other
 45 periodic activities associated with the Plan, including management, protection and enhancement
 46 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*

1 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
2 community. While some of these activities could result in small changes in acreage, these changes
3 would be offset by restoration activities planned as part of *CM4 Tidal Natural Communities*
4 *Restoration*, *CM10 Nontidal Marsh Restoration* and protection and restoration actions associated
5 with *CM3 Natural Communities Protection and Restoration*. Recreation activity effects would be
6 minimized by AMM37 (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). The
7 management actions associated with levee repair and control of invasive plant species would also
8 result in a long-term benefit to the species associated with managed wetland habitats by improving
9 water movement.

10 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
11 Alternative 9 would not result in a net permanent reduction in acreage of the managed wetland
12 natural community within the study area. Therefore, there would be no adverse effect on this
13 natural community.

14 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would
15 have the potential to create minor changes in total acreage of managed wetland natural community
16 in the study area, and could create temporary increases in turbidity and sedimentation. The
17 activities could also introduce herbicides periodically to control nonnative, invasive plants. Hunting
18 could intermittently reduce the availability of this community to special-status and common wildlife
19 species. Implementation of environmental commitments and AMM2, AMM4, AMM5 and AMM37
20 would minimize these impacts, and other operations and maintenance activities, including
21 management, protection and enhancement actions associated with *CM3 Natural Communities*
22 *Protection and Restoration* and *CM11 Natural Communities Enhancement and Management*, would
23 create positive effects, including improved water movement in and adjacent to these habitats. Long-
24 term restoration activities associated with *CM10 Nontidal Marsh Restoration* and *CM4 Tidal Natural*
25 *Communities Restoration* and protection and restoration actions associated with *CM3 Natural*
26 *Communities Protection and Restoration* would expand the ecological functions of this natural
27 community in the study area. Ongoing operation, maintenance and management activities would not
28 result in a net permanent reduction in this sensitive natural community within the study area.
29 Therefore, there would be a less-than-significant impact.

30 **Other Natural Seasonal Wetland**

31 The other natural seasonal wetlands natural community encompasses all the remaining natural (not
32 managed) seasonal wetland communities other than vernal pools and alkali seasonal wetlands.
33 These areas mapped by CDFW (Hickson and Keeler-Wolf 2007) and ICF biologists (the eastern area
34 of additional analysis; see Figure 12-1) consist of seasonally ponded, flooded, or saturated soils
35 dominated by grasses, sedges, or rushes. The largest segments of this community in the study area
36 are located along the Cosumnes River northeast of Thornton, and in the eastern extension of the
37 study area northwest of Rio Vista. Most of the smaller mapped areas are located in the Suisun Marsh
38 ROA on the western edge of the Montezuma Hills and in the interior of the Potrero Hills. There are
39 also other natural seasonal wetlands mapped along Old River and Middle River in CZ 7 (Figure 12-
40 1). The only BDCP conservation component that would potentially affect this natural community is
41 the seasonally inundated floodplain restoration conservation measure (CM5) (see Table 12-9-10).

1 **Table 12-9-10. Changes in Other Natural Seasonal Wetland Associated with Alternative 9 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	0	0
CM2	0	0	0	0	0	0
CM4	0	0	0	0	0	0
CM5	0	0	0	0	0	2
CM6	Unk.	Unk.	Unk.	Unk.	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

Unk. = unknown

2

3 **Impact BIO-27: Modification of Other Natural Seasonal Wetland Natural Community as a**
4 **Result of Implementing BDCP Conservation Measures**

5 Based on theoretical footprints for this activity, *CM5 Seasonally Inundated Floodplain Restoration*
6 could expose 2 acres of other natural seasonal wetland community to additional flooding as channel
7 margins are modified and levees are set back to improve fish habitat along some of the major rivers
8 and waterways throughout the study area. Specific locations for this restoration activity have not
9 been identified, but they would likely be focused in the south Delta area, along the major rivers and
10 Delta channels, including the channels of Old River and Middle River. Several small patches of other
11 natural seasonal wetland natural community are mapped along these waterways. The exposure of
12 these seasonal wetlands to increased but infrequent episodes of stream flooding would not alter
13 their ecological function or species composition. Their value to special-status and common plants
14 and wildlife in the study area would not be affected. The effects of this inundation on wildlife and
15 plant species are described in detail in later sections of this chapter.

16 **NEPA Effects:** Alternative 9 conservation actions would not adversely affect other natural seasonal
17 wetland natural community because the small increase in periodic flooding of up to 2 acres would
18 not alter its function or general species makeup.

19 **CEQA Conclusion:** An estimated 2 acres of other natural seasonal wetland community in the study
20 area would be subjected to more frequent inundation from flood flows as a result of implementing
21 CM5 under Alternative 9. This community would not be significantly impacted because a small
22 increase in periodic flooding would not alter its ecological function or species composition. The
23 periodic inundation would not result in a net permanent reduction in the acreage of this community
24 in the study area. Therefore, there would be no substantial adverse effect on the community. The
25 impact would be less than significant.

1 **Impact BIO-28: Modification of Other Natural Seasonal Wetland Natural Community from**
 2 **Ongoing Operation, Maintenance and Management Activities**

3 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime
 4 associated with changed water management is in effect, there would be new ongoing and periodic
 5 actions associated with operation, maintenance and management of the BDCP facilities and
 6 conservation lands that could affect other natural seasonal wetland natural community in the study
 7 area. The ongoing actions include the diversion of Sacramento River flows at Georgianna Slough and
 8 Delta Cross Channel, operation of multiple operable barriers in Delta waterways, and modified
 9 diversions from south Delta channels. These actions are associated with CM1. The periodic actions
 10 would involve access road and conveyance facility repair, vegetation management at the various
 11 water conveyance facilities and habitat restoration sites (CM11), levee repair and replacement of
 12 levee armoring, channel dredging, and habitat enhancement in accordance with natural community
 13 management plans. The potential effects of these actions are described below.

- 14 ● *Modified river flows upstream of and within the study area and modified diversions from south*
 15 *Delta channels.* Changes in releases from reservoirs upstream of the study area, modified
 16 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel, operation of
 17 multiple operable barriers in Delta waterways, and modified diversions from south Delta
 18 channels (Operational Scenario G) would not affect other natural seasonal wetland natural
 19 community. The small areas mapped in the study area are not in or adjacent to streams that
 20 would experience changes in water levels as a result of these operations.
- 21 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
 22 conveyance facilities and levees associated with the BDCP actions have the potential to require
 23 removal of adjacent vegetation and could entail earth and rock work in or adjacent to other
 24 natural seasonal wetland habitats. This activity could lead to increased soil erosion and runoff
 25 entering these habitats. These activities would be subject to normal erosion and runoff control
 26 management practices, including those developed as part of *AMM2 Construction Best*
 27 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
 28 vegetation removal or earth work adjacent to or within other natural seasonal wetland habitats
 29 would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces,
 30 as required by *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper
 31 implementation of these measures would avoid permanent adverse effects on this community.
- 32 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical
 33 treatment, would be a periodic activity associated with the long-term maintenance of water
 34 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
 35 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
 36 the other natural seasonal wetland natural community at or adjacent to treated areas. The
 37 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
 38 stormwater onto the natural community, or direct discharge of herbicides to wetland areas
 39 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
 40 *Prevention, Containment, and Countermeasure Plan* have been made part of the BDCP to reduce
 41 hazards to humans and the environment from use of various chemicals during maintenance
 42 activities, including the use of herbicides. These commitments are described in Appendix 3B,
 43 *Environmental Commitments, AMMs, and CMs*, including the commitment to prepare and
 44 implement spill prevention, containment, and countermeasure plans and stormwater pollution
 45 prevention plans. Best management practices, including control of drift and runoff from treated
 46 areas, and use of herbicides approved for use in terrestrial or aquatic environments would also

1 reduce the risk of affecting natural communities adjacent to water conveyance features and
2 levees associated with restoration activities.

- 3 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
4 communities within the Plan Area (CM11). For the other natural seasonal wetland natural
5 community, a management plan would be prepared that specifies actions to improve the value
6 of the habitats for covered species. Actions would include control of invasive nonnative plant
7 and animal species, fire management, restrictions on vector control and application of
8 herbicides, and maintenance of infrastructure that would allow for movement through the
9 community. The enhancement efforts would improve the long-term value of this community for
10 both special-status and common species.

11 The various operations and maintenance activities described above could alter acreage of other
12 natural seasonal wetland natural community in the study area. Activities could introduce sediment
13 and herbicides that would reduce the value of this community to common and sensitive plant and
14 wildlife species. Other periodic activities associated with the Plan, including management,
15 protection and enhancement actions associated with *CM3 Natural Communities Protection and*
16 *Restoration* and *CM11 Natural Communities Enhancement and Management*, would be undertaken to
17 enhance the value of the community. While some of these activities could result in small changes in
18 acreage, these changes would be minor when compared to the restoration activities planned as part
19 of *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by
20 implementation of AMM2, AMM4, AMM5, and AMM10. The vernal pool complex conservation
21 measure includes restoration of 139 acres of seasonal wetlands with similar ecological values as the
22 other natural seasonal wetland community. The management actions associated with control of
23 invasive plant species would also result in a long-term benefit to the species associated with other
24 natural seasonal wetland habitats by eliminating competitive, invasive species of plants.

25 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
26 Alternative 9 would not result in a net permanent reduction in the other natural seasonal wetland
27 natural community within the study area. Therefore, there would be no adverse effect on this
28 natural community.

29 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would
30 have the potential to create minor changes in total acreage of other natural seasonal wetland natural
31 community in the study area, and could create temporary increases sedimentation. The activities
32 could also introduce herbicides periodically to control nonnative, invasive plants. Implementation of
33 environmental commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts,
34 and other operations and maintenance activities, including management, protection and
35 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
36 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
37 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration
38 activities associated with *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and
39 protection actions associated with *CM3 Natural Communities Protection and Restoration* would
40 ensure that the ecological values provided by this small natural community would not decrease in
41 the study area. Ongoing operation, maintenance and management activities would not result in a net
42 permanent reduction in this natural community within the study area. Therefore, there would be a
43 less-than-significant impact.

1 **Grassland**

2 Construction, operation, maintenance and management associated with the conservation
3 components of Alternative 9 would have no long-term adverse effects on the habitats associated
4 with the grassland natural community. Initial development and construction of CM1, CM2, CM4,
5 CM5, CM6, CM7, CM11 and CM18 would result in both permanent and temporary removal of this
6 community (see Table 12-9-11). Full implementation of Alternative 9 would also include the
7 following conservation actions over the term of the BDCP to benefit the grassland natural
8 community.

- 9 ● Protect 8,000 acres of grassland with at least 2,000 acres protected in Conservation Zone 1, at
10 least 1,000 acres protected in Conservation Zone 8, and at least 2,000 acres protected in
11 Conservation Zone 11 (Objective GNC1.1, associated with CM3).
- 12 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland and to
13 provide upland habitat adjacent to riparian, tidal, and nontidal natural communities for wildlife
14 foraging and upland refugia (Objective GNC1.2, associated with CM3 and CM8).
- 15 ● Of the 8,000 acres of grassland protected and at least 2,000 acres of grassland restored, protect
16 or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide 200 feet
17 of adjacent grasslands beyond the sea level rise accommodation (Objective GNC1.4, associated
18 with CM3 and CM8).

19 There is a variety of other, less specific conservation goals and objectives in BDCP Chapter 3, Section
20 3.3 that would improve the value of grassland natural community for terrestrial species. As
21 explained below, with the protection, restoration and enhancement of the amounts of habitat listed
22 in the BDCP objectives, in addition to implementation of AMMs, impacts on this natural community
23 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-11. Changes in Grassland Natural Community Associated with Alternative 9 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	82	82	344	344	0	0
CM2	388	388	239	239	385-1,277	0
CM4	448	1,122	0	0	0	0
CM5	0	51	0	34	0	514
CM6	Unk.	Unk.	Unk.	Unk.	0	0
CM7	4	410	0	0	0	0
CM11	13	50	0	0	0	0
CM18	35	35	0	0	0	0
TOTAL IMPACTS	970	2,138	583	617	385-1,277	514

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

Unk. = unknown

2

3 **Impact BIO-29: Changes in Grassland Natural Community as a Result of Implementing BDCP**
4 **Conservation Measures**

5 Construction, channel dredging, land grading and habitat restoration activities that would
6 accompany the implementation of CM1, CM2, CM4, CM5, CM6, CM7, CM11 and CM18 would
7 permanently eliminate an estimated 2,138 acres and temporarily remove 617 acres of grassland
8 natural community in the study area. These modifications represent approximately 3% of the
9 78,047 acres of the community that is mapped in the study area. Approximately 56% (1,553 acres)
10 of the permanent and temporary losses would occur during the first 10 years of Alternative 9
11 implementation, as water conveyance facilities are constructed and habitat restoration is initiated.
12 Grassland protection (2,000 acres) and restoration (1,140 acres) would be initiated during the same
13 period. By the end of the Plan period, 2,000 acres of this natural community would be restored and
14 8,000 acres would be protected. There would be a net reduction in grassland acreage, but an
15 increase in grassland value in the study area. The BDCP beneficial effects analysis for grassland,
16 which was developed for Alternative 4 (BDCP Chapter 5, Section 5.4.11.2), indicates that 8,000 acres
17 of grasslands would be protected in Conservation Zones 1, 2, 4, 5, 7, 8, and 11, and 2,000 acres of
18 grassland would be restored. Grassland protection and restoration would improve connectivity
19 among habitat areas in and adjacent to the Plan Area, improve genetic interchange among native
20 species' populations, and contribute to the long-term conservation of grassland-associated covered
21 species. The same conservation actions would be implemented for Alternative 9.

1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

4 • *CM1 Water Facilities and Operation*: Construction of the Alternative 9 water conveyance facilities
5 would permanently remove 82 acres and temporarily remove 344 acres of grassland natural
6 community. The permanent losses would occur at numerous locations where dredging,
7 construction of operable barriers and canals, and channel enlargement would be undertaken.
8 The main locations affected and the types of grassland lost are listed below (see Terrestrial
9 Biology Mapbook for location details).

- 10 ○ Permanent and temporary losses of thin bands of ruderal herbaceous grasses and forbs at
11 the canal construction site connecting Clifton Court Forebay with the export pipelines.
- 12 ○ Permanent and temporary losses of thin bands of ruderal herbaceous grasses and forbs at
13 the canal construction site that connects Clifton Court Forebay with Victoria Canal.
- 14 ○ Permanent and temporary losses of thin bands of ruderal herbaceous grasses and forbs
15 along Victoria Canal where access roads and a barge unloading facility would be
16 constructed.
- 17 ○ Permanent and temporary losses of thin bands of ruderal herbaceous grasses and forbs
18 along the edges of Middle River between Victoria Canal and Mildred Island where access
19 roads and dredging work areas would be established.
- 20 ○ Permanent losses of rye grassland from the channel enlargement connecting the
21 Sacramento River with the Meadows Slough.
- 22 ○ Permanent and temporary losses of rye grassland from channel enlargement in the
23 Meadows Slough east of the Sacramento River.
- 24 ○ Permanent and temporary losses of ruderal herbaceous grasses and forbs at intake and fish
25 screen construction sites at Delta Cross Channel junction with Sacramento River.
- 26 ○ Permanent and temporary losses of thin bands of ruderal herbaceous grasses and forbs at
27 these operable barrier construction sites (some with barge unloading facilities):
 - 28 • Connection Slough at its junction with Middle River.
 - 29 • Middle River just south of its junction with Victoria Canal.
 - 30 • Old River at its northern junction with the San Joaquin River.
 - 31 • Fishermans Cut at its junction with the San Joaquin River.
 - 32 • Three Mile Slough at its junction with the Sacramento River.

33 These losses would take place during the near-term construction period.

34 The construction activity associated with CM1 also has the potential to lead to increased nitrogen
35 deposition in grassland habitats in the vicinity of Clifton Court Forebay. A significant number of cars,
36 trucks, and land grading equipment involved in construction of canals in and around the forebay
37 would emit small amounts of atmospheric nitrogen from fuel combustion; this material could be
38 deposited in sensitive grassland areas that are located west of the major construction areas at
39 Clifton Court Forebay. Nitrogen deposition can pose a risk of adding a fertilizer to nitrogen-limited
40 soils and their associated plants. Nonnative invasive species can be encouraged by the added

1 nitrogen available. BDCP Appendix 5.J, Attachment 5J.A, *Construction-Related Nitrogen Deposition on*
2 *BDCP Natural Communities*, addresses this issue in detail. It has been concluded that this potential
3 deposition would pose a low risk of changing the grassland in and adjacent to the construction areas
4 because the construction would contribute a negligible amount of nitrogen to regional projected
5 emissions and the existing grassland is dominated by nonnative invasive species of plants. Also, the
6 construction at Clifton Court Forebay would occur primarily downwind of the natural community.
7 No adverse effect is expected.

- 8 • *CM2 Yolo Bypass Fisheries Enhancement*: Implementation of CM2 involves a number of
9 construction activities within the Yolo and Sacramento Bypasses, including Fremont Weir and
10 stilling basin improvements, Putah Creek realignment activities, Toe Drain/Tule Canal and
11 Lisbon Weir modification and Sacramento Weir improvements. All of these activities could
12 involve excavation and grading in grassland areas to improve passage of fish through the
13 bypasses. Based on hypothetical construction footprints, a total of 388 acres could be
14 permanently lost and another 239 acres could be temporarily removed. Most of the grassland
15 losses would occur at the north end of the bypass below Fremont Weir where a large expanse of
16 grassland is present, along the Toe Drain/Tule Canal, and along the west side channels. These
17 grasslands are composed primarily of upland annual grassland and forbs. Some of this grassland
18 removal along the side channels of the bypass could pose barriers to grassland species moving
19 within the bypass. These losses would occur primarily in the near-term timeframe.
- 20 • *CM4 Tidal Natural Communities Restoration*: Based on the use of hypothetical restoration
21 footprints, implementation of CM4 would permanently inundate or remove 448 acres of
22 grassland in the near-term and inundate or remove 1,122 acres of grassland by the end of the
23 Plan timeframe. The losses would occur in a number of ROAs established for tidal restoration
24 (see Figure 12-1). The largest losses would likely occur in the vicinity of Cache Slough, on
25 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
26 bands adjacent to waterways in the South Delta ROA. Most of this grassland is ruderal
27 herbaceous vegetation with low habitat value; some of the larger patches of grassland in the
28 Cache Slough ROA are annual grassland with higher values.
- 29 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
30 would permanently remove 51 acres and temporarily remove 34 acres of grassland natural
31 community. The construction-related losses would be considered a permanent removal of the
32 habitats. These losses would be expected to occur along the San Joaquin River and other major
33 waterways in CZ 7 (see Figure 12-1). The grassland in this area is primarily composed of narrow
34 bands and small patches of ruderal herbaceous grasses and forbs. This activity is scheduled to
35 start following construction of water conveyance facilities, which is expected to take 10 years.
- 36 • *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
37 removal of small amounts of grassland natural community along 20 miles of river and sloughs.
38 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
39 activity would occur along waterway margins where grassland habitat stringers exist, including
40 along levees and channel banks. The improvements would occur within the study area on
41 sections of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter
42 Sloughs.

- 1 • *CM7 Riparian Natural Community Restoration*; Riparian natural community restoration would
2 occur in a variety of settings in the Plan Area, with an emphasis on improving connectivity of
3 existing riparian areas and stream/river corridors, to benefit the movement and interchange of
4 special-status and common species that use these areas. Large tracts would be restored in
5 concert with floodplain restoration (CM5), while narrower bands would be developed as part of
6 channel margin enhancement (CM6) and tidal marsh restoration (CM4). In the process of
7 expanding woody riparian habitat, existing nonnative grassland would be removed. While
8 specific locations for these restoration activities have not been fully developed, use of
9 theoretical footprints for this activity indicate that up to 410 acres of grassland could be lost
10 through the course of Alternative 9 implementation. A majority of this activity would occur in
11 the South Delta and Cosumnes/Mokelumne ROAs (see Figure 12-1).
- 12 • *CM8 Grassland Natural Community Restoration*: The grassland natural community would be
13 restored primarily on the fringes of the Delta, where upland areas merge with Delta wetland and
14 agricultural lands. Restoration would focus on CZs 1, 8, and 11, as proposed by BDCP Objective
15 GNC1.1 (Figure 12-1), with a goal of improving habitat connectivity and increasing the diversity
16 of grassland species (BDCP Objective GNC1.2). Some of the planned 2,000 acres of restoration
17 would occur around existing populations of giant garter snake in the east Delta and the Yolo
18 Bypass area.
- 19 • *CM11 Natural Communities Enhancement and Management*: Natural communities enhancement
20 and management would include a wide range of activities designed to improve habitat
21 conditions in restored and protected lands associated with the BDCP. This measure also
22 promotes sound use of pesticides, vector control activities, invasive species control and fire
23 management in preserve areas. To improve the public's ability to participate in recreational
24 activities in and adjacent to restored and protected habitats, a system of trails is proposed. The
25 location and extent of this system are not yet known, so the analysis of this activity is
26 programmatic. At the current level of planning, it is assumed that the trail system would be
27 located entirely in grassland habitats and would include up to 50 acres of habitat loss.
- 28 • *CM18. Conservation Hatcheries*: The BDCP includes a proposal to design and construct a
29 conservation hatchery to maintain populations of delta smelt and longfin smelt. The location of
30 this facility is not yet firmly established, but for planning purposes it has been assumed that it
31 would be constructed in the vicinity of Rio Vista and would be located in grassland habitat. The
32 grassland in the Rio Vista area includes both California annual grassland and ruderal herbaceous
33 grasses and forbs. The current estimate of the land needed for this facility is 35 acres.

34 The following paragraphs summarize the combined effects discussed above and describe other
35 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
36 also included.

37 ***Near-Term Timeframe***

38 During the near-term timeframe (the first 10 years of BDCP implementation), Alternative 9 would
39 affect the grassland natural community through CM1 construction losses (82 acres permanent and
40 344 acres temporary), CM2 construction losses (388 acres permanent and 239 acres temporary),
41 CM11 recreational trail construction (13 acres permanent), CM18 fish hatchery construction (35
42 acres permanent), and CM7 riparian habitat restoration (4 acres permanent). These losses would
43 occur at multiple locations, including canal, channel enlargement and operable barrier construction
44 sites; adjacent to dredging operations along Middle River; in the northern Yolo Bypass; along the

1 east and west channels within the Yolo Bypass; and at currently unspecified sites for hatchery and
 2 recreational trail construction and riparian restoration. Approximately 448 acres of the inundation
 3 and construction-related losses in habitat from CM4 would occur in the near-term. These tidal
 4 restoration-related losses would occur throughout the ROAs mapped in Figure 12-1.

5 The construction losses of this natural community would not represent an adverse effect based on
 6 the significance criteria used for this chapter because grassland is not considered a special-status or
 7 sensitive natural community. Most Central Valley grasslands are dominated by nonnative annual
 8 grasses and herbs. However, the importance of grassland as a habitat that supports life stages of
 9 numerous special-status plants and wildlife is well documented (see BDCP Chapter 3, *Conservation*
 10 *Strategy*). The significance of losses in grassland habitat is, therefore, discussed in more detail in
 11 species analyses later in this chapter. The combination of restoring 1,140 acres (CM8) and
 12 protecting 2,000 acres (CM3) of grassland natural community during the first 10 years of BDCP
 13 implementation, and the commitment to restore temporarily affected grassland (583 acres) to its
 14 pre-project condition within 1 year of completing construction as required by *AMM10 Restoration of*
 15 *Temporarily Affected Natural Communities*, would offset this near-term loss, avoiding any loss in the
 16 value of this habitat for special-status species. The restoration of grassland would include protection
 17 in perpetuity, and the protected and restored habitat would be managed and enhanced to benefit
 18 special-status and common wildlife species (CM3 and CM11). The typical project-level mitigation
 19 ratio (2:1 for protection) would indicate that 3,106 acres of protection would be needed to offset
 20 (i.e., mitigate) the 1,553 acres of near-term temporary and permanent loss. The combination of
 21 protection and restoration (2,000 acres of protection and 1,140 acres of restoration), along with the
 22 enhancement and management associated with CM3 and CM11 contained in the BDCP is designed to
 23 avoid a temporal lag in the value of grassland habitat available to sensitive species. There would be
 24 no adverse effect.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness training*, *AMM2*
 26 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, and
 27 *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or minimize the risk of
 28 affecting habitats at work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
 29 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
 30 *AMMs, and CMs*, to the Final EIR/EIS.

31 **Late Long-Term Timeframe**

32 Implementation of Alternative 9 as a whole would result in approximately 3% losses of grassland
 33 natural community in the study area. These losses (2,138 acres of permanent and 617 acres of
 34 temporary loss) would be largely associated with construction of the water conveyance facilities
 35 (CM1), construction of Yolo Bypass fish improvements (CM2), inundation during tidal marsh
 36 restoration (CM4), and riparian habitat restoration (CM7). Inundation losses would occur through
 37 the course of BDCP restoration activities at various tidal restoration sites throughout the study area.

38 **NEPA Effects:** By the end of the Plan timeframe, a total of 2,000 acres of this natural community
 39 would be restored (CM8) and 8,000 acres would be protected (CM3). The restoration would occur
 40 primarily in CZ 1, CZ 8, and CZ 11, in the Cache Slough, Suisun Marsh and Clifton Court Forebay
 41 areas. Temporarily affected grassland would also be restored following construction activity. The
 42 2,000 acres of restoration associated with CM8, and the restoration of temporarily affected
 43 grassland required by AMM10 (617 acres for Alternative 9) would not totally replace the grassland
 44 acres lost through the Plan timeframe (2,755 acres). There would be a permanent loss of 138 acres

1 of grassland in the study area. However, the combination of restoration, protection and
2 enhancement of grassland associated with Alternative 9 would improve the habitat value of this
3 community in the study area; there would not be an adverse effect on the grassland natural
4 community.

5 ***CEQA Conclusion:***

6 ***Near-Term Timeframe***

7 Alternative 9 would result in the loss of approximately 1,553 acres of grassland natural community
8 in the near-term (a combination of the temporary and permanent losses listed in Table 12-9-11) due
9 to construction of the water conveyance facilities (CM1), fish passage improvements (CM2), riparian
10 habitat restoration (CM7), recreational trail development (CM11), fish hatchery construction
11 (CM18), and inundation during tidal marsh restoration (CM4). The construction losses would occur
12 at multiple canal and operable barrier construction sites, at channel enlargement sites, at dredging
13 locations along Middle River and Victoria Canal, within the northern section of the Yolo Bypass, and
14 at currently unspecified sites for hatchery and recreational trail construction and riparian habitat
15 restoration. Inundation losses would occur at various tidal restoration sites throughout the study
16 area. The construction losses would be spread across a 10-year near-term timeframe.

17 The construction losses of this natural community would not represent a significant impact based
18 on the significance criteria used for this chapter because grassland is not considered a special-status
19 or sensitive natural community. Nonetheless, these losses would be offset by planned restoration of
20 1,140 acres and protection of 2,000 acres of grassland natural community scheduled for the first 10
21 years of Alternative 9 implementation, and restoration of temporarily affected grassland (583 acres
22 for Alternative 9) as dictated by AMM10. Also, AMM1, AMM2, AMM6, and AMM7 would be
23 implemented to minimize impacts. Because of these offsetting near-term restoration and protection
24 activities and AMMs, impacts would be less than significant. Typical project-level mitigation ratios
25 (2:1 for protection) would indicate that 3,106 acres of protection would be needed to offset (i.e.,
26 mitigate) the 1,553 acres of loss. The combination of two approaches (protection and restoration)
27 contained in the BDCP conservation measures and avoidance and minimization measures is
28 designed to avoid a temporal lag in the value of grassland habitat available to special-status species.
29 The protection and restoration would be initiated at the beginning of Alternative 9 implementation
30 to minimize any time lag in the availability of this habitat to special-status species.

31 ***Late Long-Term Timeframe***

32 At the end of the Plan period, 2,755 acres of grassland natural community would be permanently or
33 temporarily removed by conservation actions, 2,000 acres would be restored and 8,000 acres would
34 be protected. Temporarily affected areas would also be restored (617 acres for Alternative 9). While
35 there would be a net permanent reduction in the acreage of this natural community within the study
36 area (total loss of 138 acres), there would be an increase in the value of grassland for special-status
37 and common species in the study area through the combination of conservation actions (CM3 and
38 CM8) and avoidance and minimization measures (AMM1, AMM2, AMM6, AMM7, and AMM10).
39 Therefore, Alternative 9 would have a less-than-significant impact on this natural community.

1 **Impact BIO-30: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
2 **Grassland Natural Community**

3 Two Alternative 9 conservation measures would modify the inundation/flooding regimes of both
4 natural and man-made waterways in the study area. CM2, which is designed to improve fish passage
5 and shallow flooded habitat for Delta fishes in the Yolo Bypass, would increase periodic inundation
6 of grassland natural community at scattered locations, while CM5 would expose this community to
7 additional flooding as channel margins are modified and levees are set back to improve fish habitat
8 along some of the major rivers and waterways of the study area.

- 9
- 10 • *CM2 Yolo Bypass Fisheries Enhancement*: Operation of the Yolo Bypass under Alternative 9 would
11 result in an increase in the frequency, magnitude and duration of inundation of 385–1,277 acres
12 of grassland natural community. The methods used to estimate this inundation acreage are
13 described in BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*. The area
14 more frequently affected by inundation would vary with the flow volume that would pass
15 through the newly constructed notch in the Fremont Weir. The 385-acre increase in inundation
16 would occur at the 1,000 cfs flow regime, while the 1,277-acre increase would occur at the 4,000
17 cfs flow regime. Plan-related increases in flow through Fremont Weir would be expected in 30%
18 of the years. The grassland community occurs throughout the bypass, including a large acreage
19 just below Fremont Weir in the north end of the bypass, in stringers along the internal
20 waterways of the bypass and in larger patches in the lower bypass. The anticipated change in
21 management of flows in the Yolo Bypass includes more frequent releases in flows into the
22 bypass from the Fremont and Sacramento Weirs, and in some years, later releases into the
23 bypass in spring months (April and May). The modification of periodic inundation events would
24 not adversely affect grassland habitats, as they have persisted under similar high flows and
25 extended inundation periods. There is the potential for some change in grass species
26 composition as a result of longer inundation periods. The effects of this inundation on wildlife
27 and plant species are described in detail in later sections of this chapter.
 - 28 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration would result in an
29 increase in the frequency and duration of inundation of 85 acres of grassland habitats (a
30 combination of the temporary and permanent losses listed in Table 12-9-11). Specific locations
31 for this restoration activity have not been identified, but they would likely be focused in the
32 south Delta area, along the major rivers and Delta channels in CZ 7 (see Figure 12-1). The
33 increase in periodic stream flooding events would not adversely affect the habitat values and
34 functions of grassland natural community.

34 In summary, 899–1,791 acres of grassland natural community in the study area would be subjected
35 to more frequent inundation as a result of implementing two Alternative 9 conservation measures
36 (CM2 and CM5).

37 **NEPA Effects:** The grasslands in the Yolo Bypass and along river floodplains in the south Delta are
38 conditioned to periodic inundation; therefore, periodic inundation would not result in a net
39 permanent reduction in the acreage and value of this community in the study area. Increasing
40 periodic inundation of grassland natural community in the Yolo Bypass and along south Delta
41 waterways would not constitute an adverse effect.

42 **CEQA Conclusion:** An estimated 899–1,791 acres of grassland natural community in the study area
43 would be subjected to more frequent inundation as a result of implementing CM2 and CM5 under
44 Alternative 9. The grassland natural community is conditioned to periodic inundation; therefore,

1 periodic inundation would not result in a net permanent reduction in the acreage of this community
2 in the study area. Increasing periodic inundation of grassland natural community in the Yolo Bypass
3 and along south Delta waterways would have a less-than-significant impact on the community.

4 **Impact BIO-31: Modification of Grassland Natural Community from Ongoing Operation,**
5 **Maintenance and Management Activities**

6 Once the physical facilities associated with Alternative 9 are constructed and the stream flow regime
7 associated with changed water management is in effect, there would be new ongoing and periodic
8 actions associated with operation, maintenance and management of the BDCP facilities and
9 conservation lands that could affect grassland natural community in the study area. The ongoing
10 actions include the diversion of Sacramento River flows at two newly screened sites at Georgianna
11 Slough and Delta Cross Channel in the north Delta, operation of multiple operable barriers in Delta
12 waterways, and modified diversions from south Delta channels. These actions are associated with
13 CM1 (see the impact discussion above for effects associated with CM2). The periodic actions would
14 involve access road and conveyance facility repair, vegetation management at the various water
15 conveyance facilities and habitat restoration sites (CM13), levee repair and replacement of levee
16 armoring, channel dredging, and habitat enhancement in accordance with natural community
17 management plans. The potential effects of these actions are described below.

- 18 ● *Modified river flows upstream of and within the study area and modified diversions from south*
19 *Delta channels* Changes in releases from reservoirs upstream of the study area, modified
20 diversion of Sacramento River flows at Georgianna Slough and Delta Cross Channel in the north
21 Delta, modified diversions from south Delta channels (Operational Scenario G) would not result
22 in the permanent reduction in acreage of grassland natural community in the study area. Flow
23 levels in the upstream rivers would not change such that the acreage of this community would
24 be reduced on a permanent basis. The grassland along rivers upstream of planned north Delta
25 diversions is primarily ruderal vegetation on levee banks and is dependent on winter and spring
26 rains for germination and growth rather on than river levels. Similarly, modified diversions of
27 Sacramento River flows at Georgianna Slough and Delta Cross Channel would not result in a
28 permanent reduction in grassland natural community downstream of these diversions. The
29 reductions in flows below the intakes would occur primarily in the wet months when the
30 existing nonnative annual grasslands along river levees are dormant, and like upstream
31 grassland, this community is dependent on winter and spring rains for germination and growth
32 in the winter and spring months, not on river stage. Anticipated small changes in river salinity in
33 the west Delta and Suisun Marsh would not create a substantial change in grassland acreage in
34 these areas. Modified diversions from south Delta channels would not create a reduction in this
35 natural community.
- 36 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
37 conveyance facilities and levees associated with the BDCP actions have the potential to require
38 removal of adjacent vegetation and could entail earth and rock work in grassland habitats. This
39 activity could lead to increased soil erosion and runoff entering these habitats. These activities
40 would be subject to normal erosion and runoff control management practices, including those
41 developed as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4*
42 *Erosion and Sediment Control Plan*. Any vegetation removal or earth work adjacent to or within
43 grassland habitats would require use of sediment barriers, soil stabilization and revegetation of
44 disturbed surfaces (*AMM10 Restoration of Temporarily Affected Natural Communities*). Proper
45 implementation of these measures would avoid permanent adverse effects on this community.

- 1 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
2 treatment, would be a periodic activity associated with the long-term maintenance of water
3 conveyance facilities and restoration sites (*CM11 Natural Communities Enhancement and*
4 *Management*). Use of herbicides to control nuisance vegetation could pose a long-term hazard to
5 grassland natural community at or adjacent to treated areas. The hazard could be created by
6 uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater onto the
7 natural community, or direct discharge of herbicides to grassland areas being treated for
8 invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment,*
9 *and Countermeasure Plan* have been made part of the BDCP to reduce hazards to humans and
10 the environment from use of various chemicals during maintenance activities, including the use
11 of herbicides. These commitments are described in Appendix 3B, *Environmental Commitments,*
12 *AMMs, and CMs*, including the commitment to prepare and implement spill prevention,
13 containment, and countermeasure plans and stormwater pollution prevention plans. Best
14 management practices, including control of drift and runoff from treated areas, and use of
15 herbicides approved for use in terrestrial environments would also reduce the risk of affecting
16 natural communities adjacent to water conveyance features and levees associated with
17 restoration activities.

- 18 • *Channel dredging.* Long-term operation of the Alternative 9 intakes at Georgianna Slough and
19 Delta Cross Channel would include periodic dredging of sediments that might accumulate in
20 front of intake screens. Periodic dredging would also be needed to maintain channel capacity in
21 Middle River and Victoria Canal. The dredging could occur adjacent to grassland natural
22 community. This activity should not permanently reduce the acreage of grassland natural
23 community because it is periodic in nature; the grassland in the vicinity of the proposed intakes
24 and dredged channels is ruderal grasses and herbs with low habitat value. *AMM2 Construction*
25 *Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4*
26 *Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure*
27 *Plan, AMM6 Disposal and Reuse of Spoils, and AMM10 Restoration of Temporarily Affected Natural*
28 *Communities* are part of the Plan and would require actions to avoid or minimize dredging
29 effects on adjacent sensitive vegetation.

- 30 • *Habitat enhancement.* The BDCP includes a long-term management element for the natural
31 communities within the Plan Area (CM11). For the grassland natural community, a management
32 plan would be prepared that specifies actions to improve the value of the habitats for covered
33 species. Actions would include control of invasive nonnative plant and animal species, fire
34 management, restrictions on vector control and application of herbicides, and maintenance of
35 infrastructure that would allow for movement through the community. The enhancement efforts
36 would improve the long-term value of this community for both special-status and common
37 species.

38 The various operations and maintenance activities described above could alter acreage of grassland
39 natural community in the study area through changes in flow patterns and periodic facilities
40 maintenance and dredging. Activities could also introduce sediment and herbicides that would
41 reduce the value of this community to common and sensitive plant and wildlife species. Other
42 periodic activities associated with the Plan, including management, protection and enhancement
43 actions associated with *CM3 Natural Communities Protection and Restoration* and *CM11 Natural*
44 *Communities Enhancement and Management*, would be undertaken to enhance the value of the
45 community. While some of these activities could result in small changes in acreage, these changes
46 would be offset by restoration activities planned as part of *CM8 Grassland Natural Community*

1 *Restoration*, or minimized by implementation of AMM2, AMM3, AMM4, AMM5, AMM6, and AMM10.
2 The management actions associated with levee repair, periodic dredging and control of invasive
3 plant species would also result in a long-term benefit to the species associated with grassland
4 habitats by improving water movement in adjacent waterways and by eliminating competitive,
5 invasive species of plants.

6 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
7 Alternative 9 would not result in a net permanent reduction in the grassland natural community
8 within the study area. Therefore, there would be no adverse effect on this natural community.

9 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 9 would
10 have the potential to create minor changes in total acreage of grassland natural community in the
11 study area, and could create temporary increases sedimentation. The activities could also introduce
12 herbicides periodically to control nonnative, invasive plants. Implementation of environmental
13 commitments and AMM2, AMM3, AMM4, AMM5, AMM6, and AMM10 would minimize these impacts,
14 and other operations and maintenance activities, including management, protection and
15 enhancement actions associated with *CM3 Natural Communities Protection and Restoration* and
16 *CM11 Natural Communities Enhancement and Management*, would create positive effects, including
17 reduced competition from invasive, nonnative plants in these habitats. Long-term restoration
18 activities associated with *CM8 Grassland Natural Community Restoration* and protection actions
19 associated with *CM3 Natural Communities Protection and Restoration* would increase the value of
20 this natural community in the study area. Ongoing operation, maintenance and management
21 activities would not result in a net permanent reduction in the value of this natural community
22 within the study area. Therefore, there would be a less-than-significant impact.

23 **Inland Dune Scrub**

24 The inland dune scrub natural community is composed of vegetated, stabilized sand dunes
25 associated with river and estuarine systems. In the study area, the inland dune scrub community
26 includes approximately 19 acres of remnants of low-lying ancient stabilized dunes related to the
27 Antioch Dunes formation located near the town of Antioch (CZ 10; see Figure 12-1). While this
28 community is within the BDCP Plan Area, none of the Alternative 9 conservation measures or
29 covered actions is expected to affect it.

30 **Cultivated Lands**

31 Cultivated lands is the major land cover type in the study area (487,106 acres; see Table 12-1 in
32 Section 12.1.2, *Land Cover Types*). The Delta, the Yolo Bypass and the Cache Slough drainage are
33 dominated by various types of agricultural activities, with crop production the dominant element
34 (see Figure 12-1). Major crops and cover types in agricultural production include grain and hay
35 crops (wheat, oats and barley), field crops (corn, beans and safflower), truck crops (tomatoes,
36 asparagus and melons), pasture (alfalfa, native and nonnative pasture), rice, orchards, and
37 vineyards. Tables 12-2 and 12-3 list special-status wildlife species supported by cultivated lands.

38 The effects of Alternative 9 on cultivated lands are discussed from various perspectives in this
39 document. Chapter 14, *Agricultural Resources*, includes a detailed analysis of cropland conversion as
40 it relates to agricultural productivity. Many of the discussions of individual terrestrial plant and
41 wildlife species in this chapter also focus on the relevance of cultivated land loss. Because cultivated
42 lands is not a natural community and because the effects of its loss are captured in the individual
43 species analyses below, there is no separate analysis of this land cover type presented here. Table

1 14-8 in Chapter 14 provides a comparison of important farmland losses that would result from
2 construction of CM1 water conveyance facilities for each alternative, and Table 14A-1 in Appendix
3 14A, *Individual Crop Effects as a Result of BDCP Water Conveyance Facility Construction*, provides a
4 similar comparison for losses of individual crops. Table 12-ES-1 in this chapter's Summary of Effects
5 identifies the total cultivated land loss for all project alternatives. For Alternative 9, the total loss
6 (permanent and temporary) is estimated to be 55,091 acres. The majority of the permanent loss
7 would be associated with habitat restoration activities, including Yolo Bypass fisheries enhancement
8 (CM2; 629 acres), tidal marsh restoration (CM4; 39,565 acres), floodplain restoration (CM5; 2,087
9 acres), riparian natural community restoration (CM7; 960 acres), grassland restoration (CM8; 2,000
10 acres) and nontidal marsh restoration (CM10; 1,950 acres). Construction of the through-Delta water
11 conveyance facilities (CM1) would permanently remove 350 acres of cultivated land.

12 **Developed Lands**

13 Additional lands in the study area that were not designated with a natural community type have
14 been characterized here as developed lands. Developed lands include lands with residential,
15 industrial, and urban land uses, as well as landscaped areas, riprap, road surfaces and other
16 transportation facilities. Developed lands support some common plant and wildlife species, whose
17 abundance and species richness vary with the intensity of development. One special-status species,
18 the giant garter snake, is closely associated with a small element of developed lands; specifically,
19 embankments and levees near water that are covered with riprap. There are approximately 90,660
20 acres of developed lands in the study area.

21 As with cultivated lands, no effort has been made to analyze the effects of BDCP covered actions on
22 this land cover type. It is not a natural community. The effects of its conversion are discussed in
23 Chapter 13, *Land Use*. Where the loss of developed lands may affect individual special-status species
24 or common species, the impact analysis is contained in that species discussion.

25 **Wildlife Species**

26 **Vernal Pool Crustaceans**

27 This section describes the effects of Alternative 9, including water conveyance facilities construction
28 and implementation of other conservation components, on vernal pool crustaceans (California
29 linderiella, Conservancy fairy shrimp, longhorn fairy shrimp, midvalley fairy shrimp, vernal pool
30 fairy shrimp, and vernal pool tadpole shrimp). The habitat model used to assess effects for the
31 vernal pool crustaceans consists of: vernal pool complex, which consists of vernal pools and uplands
32 that display characteristic vernal pool and swale visual signatures that have not been significantly
33 affected by agricultural or development practices; alkali seasonal wetlands in CZ 8; and degraded
34 vernal pool complex, which consists of low-value ephemeral habitat ranging from areas with vernal
35 pool and swale visual signatures that display clear evidence of significant disturbance due to
36 plowing, discing, or leveling to areas with clearly artificial basins such as shallow agricultural
37 ditches, depressions in fallow fields, and areas of compacted soils in pastures. For the purpose of the
38 effects analysis, vernal pool complex is categorized as high-value for vernal pool crustaceans and
39 degraded vernal pool complex is categorized as low-value for these species. Alkali seasonal wetlands
40 in CZ 8 were included in the model as high-value habitat for vernal pool crustaceans. Also included
41 as low-value for vernal pool crustaceans are areas along the eastern boundary of Conservation Zone
42 11 that are mapped as vernal pool complex because they flood seasonally and support typical vernal

1 pool plants, but which do not include topographic depressions that are characteristic of vernal pool
2 crustacean habitat.

3 Construction and restoration associated with Alternative 9 conservation measures would result in
4 permanent losses (see Table 12-9-12) and indirect conversions of vernal pool crustacean modeled
5 habitat. The majority of the losses would take place over an extended period of time as tidal marsh is
6 restored in the Plan Area. Full implementation of Alternative 9 would also include the following
7 conservation actions over the term of the BDCP to benefit vernal pool crustaceans (BDCP Chapter 3,
8 *Conservation Strategy*).

- 9 ● Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool
10 recovery areas (Objective VPNC1.1, associated with CM3).
- 11 ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool
12 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective
13 VPNC1.2, associated with CM9).
- 14 ● Increase size and connectivity of protected vernal pool complexes in plan area and increase
15 connectivity with complexes outside the Plan Area (Objective VPNC1.3)
- 16 ● Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective
17 VPNC1.4)
- 18 ● Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for
19 supporting and sustaining vernal pool species (Objective VPNC2.1)
- 20 ● Protect one currently unprotected occurrence of conservancy fairy shrimp (Objective VPC1.1)

21 As explained below, with the restoration or protection of these amounts of habitat, in addition to
22 implementation of AMMs, impacts on vernal pool crustaceans would not be adverse for NEPA
23 purposes and would be less than significant for CEQA purposes.

1
2

Table 12-9-12. Changes in Vernal Pool Crustacean Modeled Habitat Associated with Alternative 9 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	0	0	0	0	NA	NA
	Low-value	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
CM2-CM18 ^b	High-value	0	0	0	0	0-4	0
	Low-value	201	372	0	0	0	0
Total Impacts CM2-CM18		201	372	0	0	0-4	0
TOTAL IMPACTS		201	372	0	0	0-4	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-32: Loss or Conversion of Habitat for and Direct Mortality of Vernal Pool**
5 **Crustaceans**

6 Alternative 9 conservation measures would result in the direct, permanent loss of up to 372 acres
7 modeled vernal pool crustacean habitat, all of which would be to low-value habitat and would all be
8 based on the hypothetical footprints for tidal natural communities restoration (CM4). In addition,
9 the conservation measures could result in the indirect conversion due to hydrologic changes of an
10 additional 135 acres of vernal pool crustacean habitat (89 acres of high-value habitat and 45 acres of
11 low-value habitat) from the hypothetical footprints for tidal restoration (CM4). Tidal restoration
12 activities may result in the modification of hardpan and changes to the perched water table, which
13 could lead to alterations in the rate, extent, and duration of inundation of nearby vernal pool
14 crustacean habitat. USFWS typically considers construction within 250 feet of vernal pool
15 crustacean habitat to constitute a possible conversion of crustacean habitat unless more detailed
16 information is provided to further refine the limits of any such effects. For the purposes of this
17 analysis, the 250-foot buffer was applied to the water conveyance facilities work areas where
18 surface and subsurface disturbance activities would take place and to restoration hypothetical
19 footprints. Habitat enhancement and management activities (CM11), which include disturbance or
20 removal of nonnative vegetation, could result in local adverse habitat effects.

21 Alternative 9 would also result in impacts on critical habitat for Conservancy fairy shrimp (248
22 acres), vernal pool fairy shrimp (270 acres), and vernal pool tadpole shrimp (270 acres). The
23 hypothetical tidal restoration (CM4) footprints in CZ 11 account for all of these effects. *AMM12*

1 *Vernal Pool Crustaceans* would ensure that there would be no adverse modification of the primary
2 constituent elements of critical habitat for these species.

3 Because the estimates of habitat loss resulting from tidal inundation are based on projections of
4 where restoration may occur, actual effects are expected to be lower because sites would be selected
5 and restoration projects designed to minimize or avoid effects on the covered vernal pool
6 crustaceans. As specified in *AMM12 Vernal Pool Crustaceans* and *CM9 Vernal Pool and Alkali Seasonal*
7 *Wetland Complex Restoration*, the BDCP Implementation Office would ensure that tidal restoration
8 projects and other covered activities would be designed such that no more than a total of 10 wetted
9 acres of vernal pool crustacean habitat are permanently lost. *AMM12* would also ensure that no
10 more than 20 wetted acres of vernal pool crustacean habitat are indirectly affected by alterations to
11 hydrology resulting from adjacent BDCP covered activities, in particular tidal restoration. The term
12 *wetted acres* refers to an area that would be defined by the three parameter wetland delineation
13 method used by USACE to determine the limits of a wetland, which involves an evaluation of
14 wetland soil, vegetation, and hydrology characteristics. This acreage differs from vernal pool
15 complex acreages in that a vernal pool complex is composed of individual wetlands (vernal pools)
16 and those upland areas that are in between and surrounding them, which provide the supporting
17 hydrology (surface runoff and groundwater input), organic and nutrient inputs, and refuge for the
18 terrestrial phase of some vernal pool species.

19 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the
20 individual conservation measure discussions.

- 21 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
22 in the permanent loss of approximately 372 acres of low-value vernal pool crustacean habitat,
23 which consists of degraded vernal pool complex. The BDCP describes degraded vernal pool
24 complex as areas of low- value ephemeral habitat ranging from areas with vernal pool and swale
25 visual signatures that display clear evidence of significant disturbance due to plowing, discing,
26 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions
27 in fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or
28 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery
29 found that these habitats appear to generally have low densities. However, areas mapped as
30 degraded vernal pool complex may still provide habitat for vernal pool crustaceans as evidenced
31 by records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella
32 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Wildlife
33 2013). Helm (1998) notes that many vernal pool crustaceans can occur in degraded vernal pool
34 habitats and artificial habitats. In CZs 2 and 4, there are several records of covered vernal pool
35 crustaceans occurring outside of modeled habitat in areas that appear to be road side ditches. So
36 though degraded vernal pool complexes may not represent botanically diverse vernal pools they
37 still can provide habitat for vernal pool crustaceans and thus the loss of 372 acres of degraded
38 vernal pool complex may result in the loss of occupied vernal pool crustacean habitat. In
39 addition, tidal restoration could result in the indirect conversion of 136 acres of vernal pool
40 crustacean habitat, which consist of 89 acres of high-value and 45 acres of low-value habitat.
41 The hypothetical restoration footprints overlap with a CNDDB record for vernal pool fairy
42 shrimp near the current edge of Suisun Marsh. Tidal natural community restoration under
43 Alternative 9 would also result in impacts on critical habitat for Conservancy fairy shrimp (248
44 acres), vernal pool tadpole shrimp (270 acres), and vernal pool fairy shrimp (270 acres). *AMM12*
45 *Vernal Pool Crustaceans* would ensure that there would be no adverse modification of the
46 primary constituent elements of critical habitat for these species.

- 1 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,
2 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of
3 vernal pool complex would benefit vernal pool crustaceans (Table 12-9-12). A variety of habitat
4 management actions included in CM11 that are designed to enhance wildlife values in BDCP-
5 protected habitats may result in localized ground disturbances that could temporarily affect
6 vernal pool crustacean habitat. Ground-disturbing activities, such as removal of nonnative
7 vegetation and road and other infrastructure maintenance, are expected to have minor effects
8 on vernal pool crustacean habitat and are expected to result in overall improvements to and
9 maintenance of vernal pool crustacean habitat values over the term of the BDCP. Human
10 presence for recreation activities could result in the injury or mortality of, and degradation of
11 habitat for, vernal pool crustaceans through trampling pool edges, increased turbidity,
12 unauthorized collection, and introduction of trash. These effects cannot be quantified, but are
13 expected to be minimal and would be avoided and minimized by the AMMs listed below.

14 The following paragraphs summarize the combined effects discussed above and describe other
15 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
16 also included. Table 12-9-13 was prepared to further analyze BDCP effects on vernal pool
17 crustaceans using wetted acres of habitat in order to compare the effects of this alternative with the
18 effect limits established in BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*, and *AMM12*
19 *Vernal Pool Crustaceans*, which are measured in wetted acres of vernal pool crustacean habitat.
20 Wetted acres were estimated by using the BDCP’s assumption that restored vernal pool complexes
21 would have a 15% density of vernal pools (i.e., of 100 acres of vernal pool complex 15 acres would
22 constitute vernal pools and the remaining 85 acres supporting uplands). Based on an informal
23 evaluation of aerial photographs of the Plan Area it is likely that the actual densities within the Plan
24 Area are approximately 10%, but the 15% density value was chosen as a conservative estimate for
25 determining effects.

26 **Table 12-9-13. Estimated Effects on Wetted Vernal Pool Crustacean Habitat under Alternative 9**
27 **(acres)**

		Direct Loss		Indirect Conversion	
		Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit ^a		5	10	10	20
Alternative 9 Impact ^b	CM1 ^c	0	0	0	0
	CM4 ^d	30.2	55.8	11.0	20.3
Total		30.2	55.8	11.0	20.3

^a Because roughly half of the impacts would occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

^b These acreages were generated by assuming that the modeled habitat identified in Table 12-9-12 has densities of wetted vernal pool crustacean habitat at 15%. The direct effects numbers include permanent and temporary impacts.

^c The temporary impacts from transmission line construction associated with CM1 would be zero because the commitment in AMM30, which calls for temporary transmission lines to avoid removal of alkali seasonal wetland and vernal pool wetted acres. This would lower CM1 impacts to 2.3 acres.

^d These impacts are based on the hypothetical restoration footprints and would likely be lower based on the BDCP’s commitment to minimize and avoid effects on vernal pool crustacean habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-
3 term BDCP conservation strategy has been evaluated to determine whether it would provide
4 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
5 construction would not be adverse under NEPA and would be less than significant under CEQA.
6 Table 12-9-12 lists the impacts on modeled vernal pool crustacean habitat that is based on the
7 natural community mapping done within the study area. The impacts from tidal natural
8 communities restoration (CM4) are based on hypothetical footprints and do not reflect actual
9 impacts on vernal pool crustacean habitat considering the BDCP's commitment to design restoration
10 projects to minimize or avoid effects on covered vernal pool crustaceans (see AMM12). As seen in
11 Table 12-9-13, Alternative 9 would not meet the Plan's near-term biological goals and objectives for
12 direct loss and indirect conversion unless near-term tidal restoration projects are designed to
13 ensure that they do not exceed these impact limits.

14 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be
15 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are mitigated by
16 protecting vernal pools at a 2:1 ratio. If impacts on wetted vernal pools from tidal restoration stay
17 within the limit presented in Table 12-9-13, the near-term effects of tidal restoration would require
18 up to 5 wetted acres of vernal pool restoration and up to 30 wetted acres of vernal pool protection
19 (or 200 acres of vernal pool complex protection using the 15% density assumption).

20 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
21 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
22 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
23 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
24 restoration would be determined during implementation based on the following criteria.

- 25 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to
26 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly
27 affected (1:1 ratio).
- 28 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
29 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
30 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

31 The species-specific biological goals and objectives would also inform the near-term protection and
32 restoration efforts. These Plan goals represent performance standards for considering the
33 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
34 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean
35 habitat.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
40 *Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM37 Recreation*. All of these AMMs
41 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
42 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
43 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
3 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
4 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-9-13, Alternative 9 would not meet
5 the Plan's late long-term biological goals and objectives for direct and indirect effects unless tidal
6 restoration projects are designed to ensure that that they do not exceed these impact limits.

7 The Plan has committed to a late long-term goal of protecting 600 acres of vernal pool complex in
8 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
9 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
10 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
11 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection
12 and restoration would be achieved using the criteria presented above as well as by following the
13 other specific biological goals and objectives, which include:

- 14 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 15 ● Protecting the range of inundation characteristics that are currently represented by vernal pool
16 throughout the Plan Area (Objective VPNC1.4)
- 17 ● Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective
18 VPC1.1)

19 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
20 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
21 restoration and protection of alkali seasonal wetlands that could overlap with the species model,
22 could result in the restoration of 51 acres and the protection of 608 acres of modeled habitat for
23 vernal pool crustaceans.

24 **NEPA Effects:** The near-term loss of vernal pool crustacean habitat under Alternative 9 would not be
25 adverse under NEPA because the BDCP has committed to avoiding and minimizing effects from tidal
26 restoration and to restoring and protecting an acreage that meets or exceeds the typical mitigation
27 ratios described above. In the absence of other conservation actions, the modification of vernal pool
28 crustacean habitat and potential mortality of a special-status species resulting from Alternative 9 in
29 the late long-term would represent an adverse effect. However, the BDCP has committed to impact
30 limits for vernal pool crustacean habitat and to habitat protection, restoration, management, and
31 enhancement associated with CM3, CM9, and CM11. This habitat protection, restoration,
32 management and enhancement would be guided by species-specific goals and objectives, and by
33 AMM1-AMM6, AMM10, AMM12, AMM30, and AMM37, which would be in place throughout the
34 period of construction. Considering these commitments, losses and conversion of vernal pool
35 crustacean habitat under Alternative 9 would not be an adverse effect.

36 **CEQA Conclusion:**

37 **Near-Term Timeframe**

38 Because the water conveyance facilities construction is being evaluated at the project level, the near-
39 term BDCP conservation strategy has been evaluated to determine whether it would provide
40 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
41 construction would be less than significant. Table 12-9-12 lists the impacts on modeled vernal pool
42 crustacean habitat that is based on the natural community mapping done within the study area. The

1 impacts from tidal natural communities restoration (CM4) are based on hypothetical footprints and
2 do not reflect actual impacts on vernal pool crustacean habitat considering the BDCP's commitment
3 to design restoration projects to minimize or avoid effects on covered vernal pool crustaceans (see
4 AMM12). As seen in Table 12-9-13, Alternative 9 would not meet the Plan's near-term biological
5 goals and objectives for direct and indirect effects unless near-term tidal restoration projects are
6 designed to ensure that they do not exceed these impact limits.

7 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be
8 1:1 for restoration and 2:1 for protection. Typically, indirect conversion impacts are mitigated by
9 protecting vernal pools at a 2:1 ratio. If impacts on wetted vernal pools from tidal restoration stay
10 within the near-term effect limit presented in Table 12-9-13, the near-term effects of tidal
11 restoration would require up to 5 wetted acres of vernal pool restoration and up to 30 wetted acres
12 of vernal pool protection (or 200 acres of vernal pool complex protection using the 15% density
13 assumption).

14 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
15 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
16 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
17 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
18 restoration would be determined during implementation based on the following criteria.

- 19 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to
20 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly
21 affected (1:1 ratio).
- 22 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
23 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
24 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

25 The species-specific biological goals and objectives would also inform the near-term protection and
26 restoration efforts. These Plan goals represent performance standards for considering the
27 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
28 term Plan goals would keep pace with the loss of habitat and effects on vernal pool crustacean
29 habitat.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
34 *Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM37 Recreation*. All of these AMMs
35 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
36 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
37 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS.

38 The natural community restoration and protection activities are expected to be concluded in the
39 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts on
40 constitute adequate mitigation for CEQA purposes. These commitments, implemented together with
41 the AMMs and biological goals and objectives, are more than sufficient to support the conclusion
42 that the near-term effects of Alternative 9 would be less than significant under CEQA.

1 **Late Long-Term Timeframe**

2 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
3 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
4 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-9-13, Alternative 9 would not meet
5 the Plan's late long-term biological goals and objectives for direct and indirect effects unless near-
6 term tidal restoration projects are designed to ensure that they do not exceed these impact
7 limits.

8 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in
9 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
10 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
11 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
12 such that the Plan results in no net loss of vernal pool acreage. The protection and restoration would
13 be achieved using the criteria presented above as well as by following the other specific biological
14 goals and objectives, which include:

- 15 ● Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- 16 ● Protecting the range of inundation characteristics that are currently represented by vernal pool
17 throughout the Plan Area (Objective VPNC1.4)
- 18 ● Protecting one currently unprotected occurrence of conservancy fairy shrimp (Objective
19 VPC1.1)

20 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
21 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
22 restoration and protection of alkali seasonal wetlands that could overlap with the species model,
23 could result in the restoration of 51 acres and the protection of 608 acres of modeled habitat for
24 vernal pool crustaceans.

25 The effects on vernal pool crustacean habitat from Alternative 9 would represent an adverse effect
26 as a result of habitat modification of a special-status species and potential for direct mortality in the
27 absence of other conservation actions. However, the BDCP has committed to impact limits for vernal
28 pool crustacean habitat and to habitat protection, restoration, and management and enhancement
29 associated with CM3, CM9, and CM11. These conservation activities would be guided by species-
30 specific goals and objectives, and by AMM1-AMM6, AMM10, AMM12, and AMM37, which would be
31 in place throughout the time period any construction activity would be occurring. Considering these
32 commitments, Alternative 9 over the term of the BDCP would not result in a substantial adverse
33 effect through habitat modifications and would not substantially reduce the number or restrict the
34 range of vernal pool crustaceans. Therefore, Alternative 9 would have a less-than-significant impact
35 on vernal pool crustaceans.

36 **Impact BIO-33: Indirect Effects of Plan Implementation on Vernal Pool Crustaceans**

37 Construction and maintenance activities associated with restoration actions could indirectly affect
38 vernal pool crustaceans and their habitat in the vicinity of construction and restoration areas, and
39 maintenance activities. These potential effects would be minimized or avoided through AMM1-6, 10,
40 and 12, which would be in effect throughout the Plan's construction phase.

41 **NEPA Effects:** Restoration activities could indirectly affect vernal pool crustaceans and their habitat
42 in the vicinity of construction areas. Ground-disturbing activities, stockpiling of soils, and

1 maintenance and refueling of heavy equipment could result in the inadvertent release of sediment
2 and hazardous substances into this habitat. These potential effects would be avoided and minimized
3 through AMM1–AMM6, which would be in effect throughout the Plan’s construction phase. The
4 indirect effects of Alternative 9 on vernal pool crustacean habitat would not be adverse under NEPA.

5 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance
6 facilities, and restoration actions could indirectly impact vernal pool crustaceans and their habitat in
7 the vicinity of construction and restoration areas, and maintenance activities. These potential
8 impacts would be minimized or avoided through AMM1–AMM6, AMM10, and AMM12, which would
9 be in effect throughout the construction phase. The indirect impacts of Alternative 9 would be less
10 than significant under CEQA.

11 **Impact BIO-34: Periodic Effects of Inundation of Vernal Pool Crustacean Habitat as a Result of** 12 **Implementation of Conservation Components**

13 Flooding of the Yolo Bypass under *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
14 0 to 4 acres of modeled vernal pool crustacean habitat (Table 12-9-12). There would be no periodic
15 effects resulting from *CM5 Seasonally Inundated Floodplain Restoration*.

16 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the
17 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,
18 periodic inundation could affect vernal pool crustaceans occupying areas ranging from 0 acres of
19 habitat during most notch flows to an estimated 4 acres during a notch flow of 6,000 cubic feet per
20 second (cfs). BDCP-associated inundation of areas that would not otherwise have been inundated is
21 expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop
22 the remaining 70% of all years, and during those years notch operations would not typically affect
23 the maximum extent of inundation. In more than half of all years under Existing Conditions, an area
24 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass
25 flooding is expected to have a minimal effect on vernal pool crustaceans and would thus not be
26 adverse under NEPA.

27 **CEQA Conclusion:** Alternative 9 would periodically inundate at most 4 acres of vernal pool
28 crustacean habitat during the maximum flows over the Fremont Weir. The periodic inundation is
29 not anticipated to result in a conversion of vernal pool crustacean habitat into different wetland
30 habitat. BDCP-associated inundation of areas that would not otherwise have been inundated is
31 expected to occur in no more than 30% of all years, because Fremont Weir is expected to overtop
32 the remaining 70% of all years, and during those years notch operations would not typically affect
33 the maximum extent of inundation. In more than half of all years under Existing Conditions, an area
34 greater than the BDCP-related inundation area already inundates in the bypass. Yolo Bypass
35 flooding is expected to have a minimal effect on vernal pool crustaceans and would thus result in
36 less-than-significant impacts on the species.

37 **Valley Elderberry Longhorn Beetle**

38 This section describes the effects of Alternative 9, including water conveyance facilities construction
39 and implementation of other conservation measures, on the valley elderberry longhorn beetle. That
40 habitat model used to assess the effects for valley elderberry longhorn beetle is based on riparian
41 habitat and nonriparian habitat (channels and grasslands within 200 feet of channels). Construction
42 and restoration associated with Alternative 9 conservation measures would result in both
43 temporary and permanent losses of valley elderberry longhorn beetle modeled habitat as indicated

1 in Table 12-9-14. The majority of the losses would take place over an extended period of time as the
 2 restoration conservation measures are being implemented. In addition, an estimated 15 elderberry
 3 shrubs could be impacted by the Alternative 9 conveyance alignment (CM1). Full implementation of
 4 the Alternative 9 would also include the following conservation actions over the term of the BDCP to
 5 benefit valley elderberry longhorn beetle (BDCP Chapter 3, *Conservation Strategy*).

- 6 • Mitigate impacts on elderberry shrubs consistent with USFWS conservation guidelines for the
 7 species (Objective VELB1.1)
- 8 • Site elderberry longhorn beetle habitat restoration adjacent to occupied habitat (Objective
 9 VELB1.2)
- 10 • Restore 5,000 acres of valley/foothill riparian (Objective VFRNC1.1, associated with CM7)
- 11 • Protect 750 acres of valley/foothill riparian (Objective VFRNC1.2, associated with CM3)
- 12 • Maintain or increase the abundance and distribution of rare or uncommon vegetation alliances,
 13 such as *Sambuca nigra* (blue elderberry stands) alliance (Objective VFRNC3.1, associated with
 14 CM7 and CM11)

15 As explained below, with the restoration or protection of these amounts of habitat, impacts on valley
 16 elderberry longhorn beetle would not be adverse for NEPA purposes and would be less than
 17 significant for CEQA purposes.

18 **Table 12-9-14. Changes in Valley Elderberry Longhorn Beetle Modeled Habitat Associated with**
 19 **Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	61	61	248	248	NA	NA
	Nonriparian	75	75	280	280	NA	NA
Total Impacts CM1		136	136	528	528	NA	NA
CM2–CM18	Riparian	381	678	76	111	44–80	266
	Nonriparian	142	311	94	108	103–244	287
Total Impacts CM2–CM18		523	989	170	219	161–325	553
TOTAL IMPACTS		659	1,125	698	747	161–325	553

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-35: Loss of Valley Elderberry Longhorn Beetle Habitat**

2 Alternative 9 conservation measures would result in the permanent and temporary loss combined
3 of up to 1,872 acres of modeled valley elderberry longhorn beetle habitat (1,098 acres of riparian
4 habitat and 774 acres of nonriparian habitat), and an estimated 15 elderberry shrubs from CM1,
5 which represent potential habitat for the species (Table 12-9-14). Due to the limitation of the habitat
6 suitability model, all of these effects are assumed to be a large overestimate of the true effect on
7 potential valley elderberry longhorn beetle habitat. Conservation measures that would result in
8 these losses are conveyance facilities and transmission line construction, and establishment and use
9 of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat
10 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management
11 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could
12 result in local adverse habitat effects. In addition, maintenance activities associated with the long-
13 term operation of the water conveyance facilities and other BDCP physical facilities could degrade
14 or eliminate valley elderberry longhorn beetle habitat. Timely implementation of the near-term
15 habitat protection and restoration contained in the Plan and implementation of AMMs committed to
16 in the Plan would result in no adverse effects under NEPA and less-than-significant impacts under
17 CEQA. Each of these activities is described below.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would
19 result in the permanent and temporary combined loss of approximately 664 acres of modeled
20 valley elderberry longhorn beetle habitat, composed of 309 acres of riparian habitat and 355
21 acres of nonriparian habitat (Table 12-9-14). In addition, an estimated 15 shrubs could be
22 removed as a result of conveyance facility construction. The exact number of shrubs to be
23 impacted would be determined during pre-construction surveys of the footprints of the
24 conveyance facility and associated work areas as part of the implementation of *AMM15 Valley*
25 *Elderberry Longhorn Beetle*. Most of these impacts are associated with the channel enlargement
26 and operable barrier construction. There are no records of valley elderberry longhorn beetle
27 within these impact areas. The portion of the above impacts that result from temporary habitat
28 loss includes 528 acres of modeled valley elderberry longhorn beetle habitat (248 acres riparian
29 and 280 acres nonriparian habitat). Elderberry shrubs could be affected from ground-disturbing
30 activities associated with conveyance construction footprints, temporary access roads, and
31 staging areas.
- 32 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction activity associated with fisheries
33 improvements in the Yolo Bypass would result in the permanent and temporary removal of
34 approximately 295 acres of modeled valley elderberry longhorn beetle habitat, composed of 159
35 acres of riparian habitat and 136 acres of nonriparian habitat. Approximately 125 acres of
36 permanent impacts (83 acres of riparian and 41 acres of nonriparian) would mostly occur at the
37 north end of the Yolo Bypass from Fremont Weir improvements. The 170 acres of temporary
38 impacts (76 acres of riparian and 94 acres of nonriparian) would mostly be from work on the
39 Fremont Weir, the Sacramento Weir, and levees along the Bypass. Elderberry shrubs could be
40 affected from ground-disturbing activities associated with the re-contouring of surface
41 topography, excavation or modification of channels, levee modification, and removal of riprap
42 and other protections from channel banks.
- 43 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
44 in the permanent loss of approximately 8131 acres of modeled valley elderberry longhorn
45 beetle habitat, composed of 552 acres of riparian and 260 acres of nonriparian habitat. The
46 majority of these impacts would be associated with tidal restoration in the Delta and only 42

1 acres of these impacts (all nonriparian) would be from tidal restoration in Suisun Marsh.
2 Elderberry shrubs could be affected from ground-disturbing activities associated with the re-
3 contouring of surface topography, excavation or modification of channels, type conversion from
4 riparian and grasslands to tidal habitat, levee removal and modification, and removal of riprap
5 and other protections from channel banks.

- 6 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
7 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
8 approximately 101 acres of valley elderberry longhorn beetle habitat, composed of 78 acres of
9 riparian and 23 acres of nonriparian. Approximately half of these impacts (52 acres) would be
10 permanent impacts from levee construction and the other half (49 acres) would be temporary
11 impacts associated with the levee construction. There is one CNDDDB record of valley elderberry
12 longhorn beetle occurring in CZ 7 just wet of Middle River on Union Island. This record and
13 other elderberry shrubs could be affected from ground-disturbing activities associated with the
14 re-contouring of surface topography, excavation or modification of channels, levee removal and
15 modification, and removal of riprap and other protections from channel banks.
- 16 • *CM11 Natural Communities Enhancement and Management*: Activities associated with natural
17 communities enhancement and management, such as grazing practices and ground disturbance
18 or herbicide use in the control of nonnative vegetation, intended to maintain and improve
19 habitat functions of BDCP protected habitats for covered species could result in loss of
20 elderberry shrubs and the potential for injury or mortality to beetles. These effects cannot be
21 quantified, but are expected to be minimal and would be avoided and minimized by the AMMs
22 discussed below.
- 23 • *Operations and maintenance*: Postconstruction operation and maintenance of the above-ground
24 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
25 disturbances that could affect valley elderberry beetle. Maintenance activities would include
26 vegetation management, levee and structure repair, and re-grading of roads and permanent
27 work areas could affect elderberry shrubs occupied by the species. These effects, however,
28 would be reduced by AMMs described below.

29 The following paragraphs summarize the combined effects discussed above and describe other
30 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
31 also included.

32 ***Near-Term Timeframe***

33 Because the water conveyance facilities construction is being evaluated at the project level, the near-
34 term BDCP conservation strategy has been evaluated to determine whether it would provide
35 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
36 construction would not be adverse under NEPA and would be less than significant under CEQA.
37 Alternative 9 would result in permanent and temporary impacts on 1,357 acres of modeled habitat
38 (766 acres of riparian and 591 acres of nonriparian) for valley elderberry longhorn beetle in the
39 study area in the near-term. These effects would result from the construction of the water
40 conveyance facilities (CM1, 309 acres of riparian and 355 acres of nonriparian), and implementing
41 other conservation measures (Yolo Bypass fisheries improvements [CM2] and tidal restoration
42 [CM4], 693 acres of modeled habitat). The other conservation measures account for 457 of the 766
43 acres (60%) of impacts on riparian habitat. Based on the DHCCP survey data of the conveyance
44 planning area, an estimated 15 elderberry shrubs would be impacted by conveyance construction in

1 the near-term by CM1 (see Section 12.3.2.3 for a discussion on the methods used to make this
2 estimate).

3 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
4 CM1 and that are identified as habitat for valley elderberry longhorn beetle in Chapter 3 of the BDCP
5 would be 1:1 for restoration and 1:1 for protection for riparian habitat. Using these typical ratios
6 would indicate that 309 acres of the riparian habitat should be restored/created and 309 acres of
7 existing riparian should be protected to mitigate the CM1 losses of valley elderberry longhorn beetle
8 habitat. The near-term effects of other conservation actions would require 457 acres of riparian
9 restoration and 457 acres of riparian protection using the same typical NEPA and CEQA ratios (1:1
10 for restoration and 1:1 for protection).

11 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800
12 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same
13 timeframe as the construction and early restoration losses. In addition, BDCP Objectives VELB 1.1
14 and 1.2 call for implementing the USFWS conservation guidelines for valley elderberry longhorn
15 beetle (transplanting elderberry shrubs and planting elderberry seedlings and associated natives)
16 and siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites
17 confirmed to be occupied by valley elderberry longhorn beetle. These objectives would be met
18 through the implementation of CM7 *Riparian Natural Community Restoration*. CM7 *Riparian Natural*
19 *Community Restoration* specifically calls for the planting of elderberry shrubs in large, contiguous
20 clusters with a mosaic of associated natives as part of riparian restoration consistent with USFWS
21 conservation guidelines (U.S. Fish and Wildlife Service 1999a). These Plan goals represent
22 performance standards for considering the effectiveness of restoration actions. The acres of
23 protection proposed in the near-term Plan goals are just slightly less (16 acres less) than what
24 would be considered the typical mitigation requirements for riparian natural community impacts.
25 However, the Plan's commitments in BDCP Objectives VELB 1.1 and 1.2 would satisfy typical
26 mitigation requirements for valley elderberry longhorn beetle and thus the Plan would sufficiently
27 reduce the effects from CM1 and other near-term conservation measures.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM15 Valley Elderberry Longhorn*
32 *Beetle*. AMM15 requires surveys for elderberry shrubs within 100 feet of any ground disturbing
33 activities, the implementation of avoidance and minimize measures for any shrubs that are
34 identified within this 100-foot buffer, and transplanting shrubs that can't be avoided. All of these
35 AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to
36 work areas and RTM storage sites. BDCP Appendix 3.C describes the AMMs, which have since been
37 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to
38 the Final EIR/EIS.

39 **Late Long-Term Timeframe**

40 Based on modeled habitat, the study area supports approximately 34,456 acres of modeled habitat
41 (17,786 acres of riparian and 16,670 acres of nonriparian) for valley elderberry longhorn beetle.
42 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 1,872 acres
43 of modeled valley elderberry longhorn beetle habitat (1,098 acres of riparian habitat and 774 acres
44 of nonriparian habitat) during the term of the Plan (5% of the modeled habitat in the study area).

1 The locations of these losses are described above in the analyses of individual conservation
2 measures. These losses would not fragment any known populations of valley elderberry longhorn
3 beetle. The Plan includes a commitment to protect 750 acres of riparian habitat and
4 restoring/creating 5,000 acres of riparian habitat in the Plan Area. According to Objective VELB1.2,
5 the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied habitat,
6 which would provide connectivity between occupied and restored habitats and improve the species'
7 ability to disperse within and outside the Plan Area. Other factors relevant to effects on valley
8 elderberry longhorn beetle include:

- 9 ● Habitat loss is widely dispersed throughout the study area and would not be concentrated in
10 any one location.
- 11 ● There would be a temporal loss of riparian habitat during the near-term evaluation period
12 because most of the affected riparian vegetation would be removed during the near-term
13 timeframe, while large quantities of riparian habitat would not be restored until the early and
14 late long-term timeframes. Effects on valley elderberry longhorn beetle of this temporal loss of
15 riparian vegetation are expected to be minimal because much of the riparian habitat in the Plan
16 Area is not known to be currently occupied by the species, because all elderberry shrubs that
17 are suitable for transplantation would be moved to conservation areas in the Plan Area, and
18 because most of the affected community is composed of small patches of riparian scrub and
19 herbaceous vegetation that are fragmented and distributed across the agricultural landscape of
20 the Plan Area and thus are likely to provide no or low-value habitat for the beetle.
- 21 ● Temporarily disturbed areas would be restored within 1 year following completion of
22 construction and management activities. Under AMM10, a restoration and monitoring plan
23 would be developed prior to initiating any construction-related activities associated with the
24 conservation measures or other covered activities that would result in temporary effects on
25 natural communities.

26 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
27 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as other
28 actions that overlap with the nonriparian portions of the species model, could result in the
29 restoration of 4,857 acres (riparian) and the protection of 2,363 acres (729 acres of riparian and
30 1,634 acres of nonriparian channels and grassland) of modeled habitat for valley elderberry
31 longhorn beetle.

32 **NEPA Effects:** The near-term loss of valley elderberry longhorn beetle habitat under Alternative 9
33 would not be adverse because the BDCP has committed to restoring and protecting an acreage that
34 exceeds the typical mitigation ratios described above, in addition to avoiding impacts on shrubs and
35 transplanting those that can't be avoided. In the absence of other conservation actions, the losses of
36 valley elderberry longhorn beetle habitat and potential for direct mortality of a special-status
37 species associated with Alternative 9 in the late long-term would represent an adverse effect.
38 However, with habitat protection and restoration associated with CM7, guided by species-specific
39 goals and objectives and by AMM1-AMM6, AMM10, and AMM15, which would be in place
40 throughout the construction period, the effects of Alternative 9 as a whole on valley elderberry
41 longhorn beetle would not be adverse under NEPA.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction is being evaluated at the project level, the near-
4 term BDCP conservation strategy has been evaluated to determine whether it would provide
5 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
6 construction would be less than significant. Alternative 9 would result in permanent and temporary
7 impacts on 1,357 acres of modeled habitat (766 acres of riparian and 591 acres of nonriparian) for
8 valley elderberry longhorn beetle in the study area in the near-term. These impacts would result
9 from the construction of the water conveyance facilities (CM1, 309 acres of riparian and 355 acres of
10 nonriparian), and implementing other conservation measures (Yolo Bypass fisheries improvements
11 [CM2] and tidal restoration [CM4], 693 acres of modeled habitat). The other conservation measures
12 account for 457 of the 766 acres (60%) of impacts on riparian habitat. Based on the DHCCP survey
13 data of the conveyance planning area, an estimated 15 elderberry shrubs would be impacted by
14 conveyance construction in the near-term by CM1 (see Section 12.3.2.3 for a discussion on the
15 methods used to make this estimate).

16 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
17 CM1 and that are identified in the biological goals and objectives for valley elderberry longhorn
18 beetle in Chapter 3 of the BDCP would be 1:1 for restoration and 1:1 for protection for riparian
19 habitat. Using these typical ratios would indicate that 309 acres of the riparian habitat should be
20 restored/created and 309 acres of existing riparian should be protected to mitigate the CM1 losses
21 of valley elderberry longhorn beetle habitat. The near-term effects of other conservation actions
22 would require 457 acres of riparian restoration and 457 acres of riparian protection using the same
23 typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

24 The BDCP has committed to near-term goals of protecting 750 acres of riparian and restoring 800
25 acres of riparian habitat in the Plan Area. These conservation actions would occur in the same
26 timeframe as the construction and early restoration losses, thereby avoiding adverse effects on
27 valley elderberry longhorn beetle. In addition, BDCP Objectives VELB 1.1 and 1.2, which call for
28 implementing the USFWS conservation guidelines for valley elderberry longhorn beetle
29 (transplanting elderberry shrubs and planting elderberry seedlings and associated natives) and
30 siting elderberry restoration within drainages immediately adjacent to or in the vicinity of sites
31 confirmed to be occupied by valley elderberry longhorn beetle. These objectives would be met
32 through the implementation of *CM7 Riparian Natural Community Restoration*. CM7 specifically calls
33 for the planting of elderberry shrubs in large, contiguous clusters with a mosaic of associated
34 natives as part of riparian restoration consistent with USFWS conservation guidelines (U.S. Fish and
35 Wildlife Service 1999a). These Plan goals represent performance standards for considering the
36 effectiveness of restoration actions. The acres of protection proposed in the near-term Plan goals are
37 just slightly less (16 acres less) than what would be considered the typical mitigation requirements
38 for riparian natural community impacts. However, the Plan's commitments in BDCP Objectives VELB
39 1.1 and 1.2 would satisfy typical mitigation requirements for valley elderberry longhorn beetle and
40 thus the Plan would sufficiently reduce the effects from CM1 and other near-term conservation
41 measures.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness training, AMM2*
43 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
44 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM15 Valley Elderberry Longhorn*
2 *Beetle.* AMM15 requires surveys for elderberry shrubs within 100 feet of any ground disturbing
3 activities; the implementation of avoidance and minimize measures for any shrubs that are
4 identified within this 100-foot buffer, and transplanting shrubs that can't be avoided. All of these
5 AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to
6 work areas and RTM storage sites. BDCP Appendix 3.C describes the AMMs, which have since been
7 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to
8 the Final EIR/EIS.

9 The acres of protection proposed in the near-term Plan goals are just slightly less (16 acres less)
10 than what would be considered the typical mitigation requirements for riparian natural community
11 impacts. However, the Plan's commitments in BDCP Objectives VELB 1.1 and 1.2 would satisfy
12 typical mitigation requirements for valley elderberry longhorn beetle and thus the Plan would
13 sufficiently reduce the effects from CM1 and other near-term conservation measures. These
14 commitments, implemented together with the AMMs, are more than sufficient to support the
15 conclusion that the near-term effects of Alternative 9 would be less than significant under CEQA.

16 ***Late Long-Term Timeframe***

17 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 1,872 acres
18 of modeled valley elderberry longhorn beetle habitat (1,098 acres of riparian habitat and 774 acres
19 of nonriparian habitat) during the term of the Plan (5% of the modeled habitat in the study area).
20 The locations of these losses are described above in the analyses of individual conservation
21 measures. These losses would not fragment any known populations of valley elderberry longhorn
22 beetle. The Plan includes a commitment to protect 750 acres of riparian habitat and
23 restoring/creating 5,000 acres of riparian habitat in the Plan Area. According to Objective VELB1.2,
24 the restoration of elderberry longhorn beetle habitat would occur adjacent to occupied habitat,
25 which would provide connectivity between occupied and restored habitats and improve the species'
26 ability to disperse within and outside the Plan Area. The BDCP also includes a number of AMM1-
27 AMM6, AMM10, and AMM15) directed at minimizing or avoiding potential impacts on valley
28 elderberry longhorn beetle. The large acreages of conservation would adequately compensate for
29 the modeled habitats lost to construction and restoration activities.

30 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
31 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as other
32 actions that overlap with the nonriparian portions of the species model, could result in the
33 restoration of 4,857 acres (riparian) and the protection of 2,363 acres (729 acres of riparian and
34 1,634 acres of nonriparian channels and grassland) of modeled habitat for valley elderberry
35 longhorn beetle.

36 Considering these protection and restoration provisions, which would provide acreages of new or
37 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction
38 and restoration activities, implementation of Alternative 9 as a whole would not result in a
39 substantial adverse effect through habitat modifications and would not substantially reduce the
40 number or restrict the range of the species. Therefore, the alternative would have a less-than-
41 significant impact on valley elderberry longhorn beetle.

1 **Impact BIO-36: Indirect Effects on Valley Elderberry Longhorn Beetle and its Habitat**

2 Construction activities associated with water conveyance facilities, conservation components and
3 ongoing habitat enhancement, as well as operation and maintenance of above-ground water
4 conveyance facilities, including the transmission facilities, could result in ongoing periodic
5 postconstruction disturbances with localized impacts on valley elderberry longhorn beetle over the
6 term of the BDCP. Construction related effects could result from ground-disturbing activities,
7 stockpiling of soils, and maintenance and refueling of heavy equipment could result in dust and the
8 inadvertent release of hazardous substances in areas where elderberry shrubs occur. A GIS analysis
9 (see Section 12.3.2.3 for a discussion on the methods used to make this estimate) estimates that
10 approximately 103 shrubs could be indirectly affected by conveyance facilities construction (CM1).
11 Restoration activities could result in excavation or modification of channels, type conversion from
12 riparian and grasslands to tidal habitat, levee removal and modification, and removal of riprap and
13 other protections from channel banks that occur within 100 feet of an elderberry shrubs. These
14 potential effects would be minimized or avoided through AMM1–AMM6, AMM10, and AMM15,
15 which would be in effect throughout the Plan’s construction phase.

16 **NEPA Effects:** The indirect effects on valley elderberry longhorn beetle as a result of implementing
17 Alternative 9 conservation actions would not have an adverse effect on valley elderberry longhorn
18 beetle.

19 **CEQA Conclusion:** Ground-disturbing activities, stockpiling of soils, and the potential release of dust
20 and hazardous substances would accompany construction of the water conveyance facilities. An
21 estimated 103 shrubs could be indirectly affected by conveyance facilities construction (CM1). In
22 addition, ground-disturbing activities associated with the re-contouring of surface topography,
23 excavation or modification of channels, type conversion from riparian and grasslands to tidal
24 habitat, levee removal and modification, and removal of riprap and other protections from channel
25 banks could indirectly affected elderberry shrubs that occur within 100 feet of these restoration
26 activities. With the implementation of AMM1–AMM6, AMM10, and AMM15 as part of Alternative 9
27 construction, operation, and maintenance, the BDCP would avoid the potential for substantial
28 adverse indirect effects on valley elderberry longhorn beetle in that the Plan would not result in a
29 substantial reduction in numbers or a restriction in the range of valley elderberry longhorn beetle.
30 Therefore, the indirect effects under this alternative would have a less-than-significant impact on
31 valley elderberry longhorn beetle.

32 **Impact BIO-37: Periodic Effects of Inundation of Valley Elderberry Longhorn Beetle Habitat**
33 **as a Result of Implementation of Conservation Components**

34 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
35 161 to 325 acres of modeled valley elderberry longhorn beetle habitat (Table 12-9-14).

36 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 553 acres of modeled
37 valley elderberry longhorn beetle habitat (Table 12-9-14).

38 It is unknown at this time how much of the modeled habitat that would be inundated as a result of
39 CM2 and CM5 actually contains elderberry shrubs. Elderberry shrubs have been found to be
40 intolerant of long periods of inundation and there is evidence that they die very quickly after even
41 short periods of flooding (River Partners 2008). During monitoring of a restoration project at the
42 San Joaquin River National Wildlife Refuge, River Partners found that nearly all (99% to 100%) of
43 the 4-year-old elderberry shrubs in restoration plots died after 15–17 weeks of inundation, and

1 River Partners noted in general that the shrubs died very quickly after even short periods of
2 flooding (River Partners 2008). Talley et al (2006) in their report assisting the USFWS 5-year review
3 of the species, note that elderberry shrubs respond negatively to saturated soil conditions and that
4 they can only tolerate temporary root crown inundation. Therefore, in the areas that would be
5 periodically inundated by the implementation of CM2 it is likely that there are few, if any, mature
6 shrubs in these areas because under current conditions they would be inundated in about 50% of all
7 years for approximately 7 weeks. The areas affected by CM5 are not currently inundated and thus
8 elderberry shrubs could present in these areas.

9 The periodic effects on modeled habitat for valley elderberry longhorn beetle associated with
10 implementing Alternative 9 could adversely affect valley elderberry longhorn beetle habitat
11 (elderberry shrubs) and make modeled habitat there unsuitable for future elderberry
12 establishment. Based on the information presented above, the current conditions in those areas that
13 would be periodically inundated in Yolo Bypass (CM2) are not likely very suitable for elderberry
14 shrubs and thus CM2 would likely have minimal effects, if any, on the species. The modeled habitat
15 that would be periodically inundated from the implementation of CM5 could result in adverse effects
16 on valley elderberry longhorn beetle.

17 **NEPA Effects:** Periodic effects of the inundation of valley elderberry longhorn beetle habitat as a
18 result of implementing Alternative 9 conservation actions would not be adverse under NEPA when
19 taking into consideration CM7 habitat protection and restoration. This habitat protection and
20 restoration would be guided by species-specific goals and objectives, and by AMM1–AMM6, AMM10,
21 and AMM15, which would be in place throughout the time period that periodic effects would occur.

22 **CEQA Conclusion:** Alternative 9 (CM2 and CM5) would have periodic impacts on modeled valley
23 elderberry longhorn beetle habitat. The periodic inundation of between 161 and 325 acres (CM2)
24 and 553 acres (CM5) of modeled habitat could result in the death of elderberry shrubs that may
25 occur there and thus potentially impact valley elderberry longhorn beetle. The Plan includes the
26 restoration of 5,000 acres of riparian habitat (Objective VFRNC1.1) and the protection of 750 acres
27 riparian habitat (VFRNC1.2) would include areas for elderberry restoration and protection. The
28 BDCP also includes AMM1–AMM6, AMM10, and AMM15, which would minimize and avoid impacts
29 on valley elderberry longhorn beetle prior to Yolo Bypass fisheries enhancement and floodplain
30 restoration activities. AMM15, which includes measure for following the USFWS conservation
31 guidelines for valley elderberry longhorn beetle (U.S. Fish and Wildlife Service 1999a), would be
32 used to identify shrubs for transplanting to conservation areas that otherwise could be adversely
33 affected by periodic inundation in Yolo Bypass and floodplain restoration areas. These conservation
34 actions would compensate for the periodic impacts on valley elderberry longhorn beetle.

35 Considering these protection and restoration provisions and avoidance and minimization measures,
36 implementation of Alternative 9 as a whole would not result in a substantial adverse effect through
37 habitat modifications and would not substantially reduce the number or restrict the range of the
38 species. Therefore, periodic effects of inundation resulting from Alternative 9 would have a less-
39 than-significant impact on valley elderberry longhorn beetle.

40 **Nonlisted Vernal Pool Invertebrates**

41 This section describes the effects of Alternative 9, including water conveyance facilities construction
42 and implementation of other conservation components, on other, noncovered vernal pool
43 invertebrates that are not covered by the plan (Blennosperma vernal pool andrenid bee, hairy water
44 flea, Ricksecker's water scavenger beetle, curved-foot hygrotus beetle, molestan blister beetle).

1 Little is known about the range of these species so it is assumed that they have potential to occur in
2 the same areas described by the vernal pool crustacean modeled habitat. That habitat model
3 consists of: vernal pool complex, which consists of vernal pools and uplands that display
4 characteristic vernal pool and swale visual signatures that have not been significantly affected by
5 agricultural or development practices; alkali seasonal wetlands in CZ 8; and degraded vernal pool
6 complex, which consists of low-value ephemeral habitat ranging from areas with vernal pool and
7 swale visual signatures that display clear evidence of significant disturbance due to plowing, discing,
8 or leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in
9 fallow fields, and areas of compacted soils in pastures. For the purpose of the effects analysis, vernal
10 pool complex is categorized as high-value and degraded vernal pool complex is categorized as low-
11 value for these species. Alkali seasonal wetlands in CZ 8 were also included as high-value habitat for
12 vernal pool crustaceans in the model. Also included as low-value for vernal pool habitat are areas
13 along the eastern boundary of CZ 11 that are mapped as vernal pool complex because they flood
14 seasonally and support typical vernal pool plants, but do not include topographic depressions that
15 are characteristic of vernal pools.

16 Construction and restoration associated with Alternative 9 conservation measures would result in
17 permanent losses of habitat for nonlisted vernal pool invertebrates as indicated in Table 12-9-15
18 and indirect conversions of vernal pool habitat. The majority of the losses would take place over an
19 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of
20 Alternative 9 would also include the following conservation actions over the term of the BDCP that
21 would benefit nonlisted vernal pool invertebrates (BDCP Chapter 3, *Conservation Strategy*).

- 22 ● Protect 600 acres of vernal pool complex in CZ 1, CZ 8, or CZ 11, primarily in core vernal pool
23 recovery areas (Objective VPNC1.1, associated with CM3).
- 24 ● Restore vernal pool complex in CZ 1, CZ 8, and CZ 11 to achieve no net loss of vernal pool
25 acreage (up to 67 acres of vernal pool complex restoration [10 wetted acres])(Objective
26 VPNC1.2, associated with CM9).
- 27 ● Increase size and connectivity of protected vernal pool complexes in plan area and increase
28 connectivity with complexes outside the Plan Area (Objective VPNC1.3)
- 29 ● Protect the range of inundation characteristics of vernal pools in the Plan Area (Objective
30 VPNC1.4)
- 31 ● Maintain and enhance vernal pool complexes to provide appropriate inundation (ponding) for
32 supporting and sustaining vernal pool species (Objective VPNC2.1)

33 As explained below, with the restoration or protection of these amounts of habitat, impacts on
34 nonlisted vernal pool invertebrates would be adverse for NEPA purposes and would be significant
35 for CEQA purposes.

1
2

Table 12-9-15. Changes in Nonlisted Vernal Pool Invertebrate Habitat Associated with Alternative 9 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	0	0	0	0	NA	NA
	Low-value	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0		NA	NA
CM2–CM18 ^e	High-value	0	0	0	0	0-4	0
	Low-value	201	372	0	0	0	0
Total Impacts CM2–CM18		201	372	0	0	0-4	0
TOTAL IMPACTS		201	372	0	0	0-4	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

^e Includes indirect conversion impacts

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-38: Loss or Conversion of Habitat for and Direct Mortality of Nonlisted Vernal**
5 **Pool Invertebrates**

6 Alternative 9 conservation measures would result in the direct, permanent loss of up to 372 acres of
7 low-value vernal pool habitat from tidal habitat restoration (CM4). In addition, the conservation
8 measures could result in the indirect conversion due to hydrologic changes of an additional 135
9 acres of vernal pool habitat (89 acres of high-value habitat and 45 acres of low-value habitat) from
10 tidal restoration (CM4). Tidal restoration activities may result in the modification of hardpan and
11 changes to the perched water table, which could lead to alterations in the rate, extent, and duration
12 of inundation of nearby vernal pool habitat. USFWS typically considers construction within 250 feet
13 of vernal pools to constitute a possible conversion of the habitat unless more detailed information is
14 provided to further refine the limits of any such effects. For the purposes of this analysis, the 250-
15 foot buffer was applied to the water conveyance facilities work areas where surface and subsurface
16 disturbance activities would take place and to restoration hypothetical footprints. Habitat
17 enhancement and management activities (CM11), which include disturbance or removal of
18 nonnative vegetation, could result in local adverse habitat effects.

19 Because the estimates of habitat loss resulting from tidal inundation are based on projections of
20 where restoration may occur, actual effects are expected to be lower because sites would be selected
21 and restoration projects designed to minimize or avoid effects on vernal pools and alkali seasonal
22 wetlands. As specified in the BDCP, the BDCP Implementation Office would ensure that tidal
23 restoration projects and other covered activities would be designed such that no more than a total of

1 10 wetted acres of vernal pool habitat are directly affected and that no more than 20 wetted acres of
2 vernal pool habitat are indirectly affected by BDCP covered activities (AMM12). The term *wetted*
3 *acres* refers to an area that would be defined by the three parameter wetland delineation method
4 used by USACE to determine the limits of a wetland, which includes an evaluation of wetland soil,
5 vegetation, and hydrology characteristics. This acreage differs from vernal pool complex acreages in
6 that a vernal pool complex is composed of individual wetlands (vernal pools) and those upland
7 areas that are in between and surrounding them, which provide the supporting hydrology (surface
8 runoff and groundwater input), organic and nutrient inputs, and refuge for the terrestrial phase of
9 some vernal pool species.

10 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the
11 individual conservation measure discussions.

- 12 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
13 in the permanent loss of approximately 372 acres of low-value vernal pool habitat, which
14 consists of degraded vernal pool complex. The BDCP describes degraded vernal pool complex as
15 areas of low-value ephemeral habitat ranging from areas with vernal pool and swale visual
16 signatures that display clear evidence of significant disturbance due to plowing, discing, or
17 leveling to areas with clearly artificial basins such as shallow agricultural ditches, depressions in
18 fallow fields, and areas of compacted soils in pastures. The actual density of vernal pools or
19 other aquatic features in these areas is unknown, but a 2012 review of Google Earth imagery
20 found that these habitats appear to generally have low densities. However, areas mapped as
21 degraded vernal pool complex may still provide habitat for vernal pool species as evidenced by
22 records of vernal pool fairy shrimp, vernal pool tadpole shrimp, and California linderiella
23 occurring in degraded vernal pool complex in CZ 4 (California Department of Fish and Wildlife
24 2013). So though degraded vernal pool complexes may not represent botanically diverse vernal
25 pools they still can provide habitat for vernal pool invertebrates and thus the loss of 372 acres of
26 degraded vernal pool complex may result in the loss of occupied vernal pool invertebrate
27 habitat. In addition, tidal restoration could result in the indirect conversion of 135 acres of
28 vernal pool habitat, which consist of 89 acres of high-value and 45 acres of low-value habitat. No
29 records of nonlisted vernal pool invertebrates would be directly impacted by conservation
30 actions.
- 31 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP,
32 restoration/creation of vernal pools to achieve no net loss and the protection of 600 acres of
33 vernal pool complex would benefit vernal pool invertebrates (Table 12-9-15). A variety of
34 habitat management actions included in CM11 that are designed to enhance wildlife values in
35 BDCP-protected habitats may result in localized ground disturbances that could temporarily
36 affect vernal pool invertebrate habitat. Ground-disturbing activities, such as removal of
37 nonnative vegetation and road and other infrastructure maintenance, are expected to have
38 minor effects on vernal pool invertebrate habitat and are expected to result in overall
39 improvements to and maintenance of vernal pool habitat values over the term of the BDCP.
40 These effects cannot be quantified, but are expected to be minimal and would be avoided and
41 minimized by the AMMs listed below.

42 The following paragraphs summarize the combined effects discussed above and describe other
43 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
44 also included. Table 12-9-16 was prepared to further analyze BDCP effects on nonlisted vernal pool
45 invertebrates using wetted acres of nonlisted vernal pool invertebrate habitat in order to compare

1 to the effects of this alternative with the effect limits established in BDCP Chapter 3, Section 3.3,
2 *Biological Goals and Objectives*, and AMM12, which are measured in wetted acres of vernal pool
3 species habitat. Based on an informal evaluation of aerial photographs of the Plan Area it is likely
4 that the actual densities within the Plan Area are approximately 10%, but the 15% density value
5 was chosen as a conservative estimate for determining effects.

6 **Table 12-9-16. Estimated Effects on Wetted Nonlisted Vernal Pool Invertebrate Habitat under**
7 **Alternative 9 (acres)**

	Direct Loss		Indirect Conversion	
	Near-Term	Late Long-Term	Near-Term	Late Long-Term
BDCP Impact Limit ^a	5	10	10	20
Alternative 9 Impact ^b	CM1 ^c	0	0	0
	CM4 ^d	30.2	55.8	11.0
Total	30.2	55.8	11.0	20.3

^a Because roughly half of the impacts would occur in the near-term, it is assumed that the impact limit in the near-term would be 5 wetted acres for direct loss and 10 acres for indirect.

^b These acreages were generated by assuming that the modeled habitat identified in Table 12-9-15 has densities of wetted vernal pool species habitat at 15%. The direct effects numbers include permanent and temporary impacts.

^c The temporary impacts from transmission line construction associated with CM1 would be zero because the commitment in AMM30, which calls for temporary transmission lines to avoid removal of alkali seasonal wetland and vernal pool wetted acres. This would lower CM1 impacts to 2.3 acres.

^d These impacts are based on the hypothetical restoration footprints and would likely be lower based on the BDCP's commitment to minimize and avoid effects on nonlisted vernal pool invertebrate habitat as much as practicable. The values for near-term indirect effects were assumed to be slightly more than half of what the late long-term value would be.

8

9 ***Near-Term Timeframe***

10 Because the water conveyance facilities construction is being evaluated at the project level, the near-
11 term BDCP conservation strategy has been evaluated to determine whether it would provide
12 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
13 construction would not be adverse under NEPA and would be less than significant under CEQA.
14 Table 12-9-16 above lists the impacts on nonlisted vernal pool invertebrate habitat that is based on
15 the natural community mapping done within the study area. The impacts from tidal natural
16 communities restoration (CM4) are based on hypothetical footprints and do not reflect actual
17 impacts on vernal pool habitat considering the BDCP's commitment to design restoration projects to
18 minimize or avoid effects on vernal pools (see AMM12). As seen in Table 12-9-16, Alternative 9
19 would not meet the Plan's near-term biological goals and objectives for direct and indirect effects
20 unless near-term tidal restoration projects are designed to ensure that they do not exceed these
21 impact limits.

22 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be
23 1:1 for restoration and 2:1 for protection. Typically, indirect impacts are mitigated by protecting
24 vernal pool species habitat at a 2:1 ratio. If impacts on wetted vernal pools from tidal restoration
25 stay within the near-term effect limit presented in Table 12-9-16, the near-term effects of tidal
26 restoration would require up to 5 acres of vernal pool restoration and up to 30 wetted acres of

1 vernal pool protection (or 200 acres of vernal pool complex protection using the 15% density
2 assumption).

3 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
4 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
5 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
6 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
7 restoration would be determined during implementation based on the following criteria.

- 8 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to
9 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly
10 affected (1:1 ratio).
- 11 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
12 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted
13 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

14 The species-specific biological goals and objectives would also inform the near-term protection and
15 restoration efforts. These Plan goals represent performance standards for considering the
16 effectiveness of restoration actions. The acres of protection and restoration contained in the near-
17 term Plan goals would keep pace with the loss of habitat and effects on nonlisted vernal pool
18 invertebrate habitat.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
23 *Natural Communities*, *AMM30 Transmission Line Design and Alignment Guidelines*, and *AMM37*
24 *Recreation*. *AMM12 Vernal Pool Crustaceans*, although developed for vernal pool crustaceans,
25 includes measures to avoid and minimize direct and indirect effects on vernal pools and would thus
26 be applicable to nonlisted vernal pool invertebrates as well. All of these AMMs include elements that
27 avoid or minimize the risk of affecting habitats and species adjacent to work areas. BDCP Appendix
28 3.C describes the AMMs, which have since been updated and which are provided in Appendix 3B,
29 *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS.

30 **Late Long-Term Timeframe**

31 The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss
32 and no more than 20 wetted acres of indirect conversion effects on vernal pools by the late long-
33 term (see Objective VPNC1.2 and AMM12). As seen in Table 12-9-16, Alternative 9 would not meet
34 the Plan's late long-term biological goals and objectives for direct and indirect effects unless tidal
35 restoration projects are designed to ensure that they do not exceed these impact limits.

36 The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in
37 either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective
38 VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre
39 directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools
40 such that the Plan results in no net loss of vernal pool acreage (Objective VPNC1.2). The protection
41 and restoration would be achieved using the criteria presented above as well as by the following
42 other specific biological goals and objectives.

- 1 • Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3).
- 2 • Protecting the range of inundation characteristics that are currently represented by vernal pool
- 3 throughout the Plan Area (Objective VPNC1.4).

4 **NEPA Effects:** The near-term loss of vernal pool habitat under Alternative 9 would not be adverse
5 under NEPA because the BDCP has committed to avoiding and minimizing effects from tidal
6 restoration and to restoring and protecting an acreage that meets or exceeds the typical mitigation
7 ratios described above. In the absence of other conservation actions, the potential modification of
8 vernal pool habitat and potential mortality of special-status species resulting from Alternative 9 in
9 the late long-term would represent an adverse effect. However, the BDCP has committed to impact
10 limits for vernal pool habitat and to habitat protection, restoration, management and enhancement
11 associated with CM3, CM9, and CM11. This habitat protection, restoration, management, and
12 enhancement would be guided by species-specific goals and objectives, and by AMM1–AMM6,
13 AMM10, AMM12, AMM30, and AMM37, which would be in place throughout the time period of
14 construction. Considering these commitments, losses and conversions of nonlisted vernal pool
15 invertebrates habitat under Alternative 9 would not be adverse.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Because the water conveyance facilities construction is being evaluated at the project level, the near-
19 term BDCP conservation strategy has been evaluated to determine whether it would provide
20 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
21 construction would be less than significant. Table 12-9-15 lists the impacts on nonlisted vernal pool
22 invertebrate habitat that is based on the natural community mapping done within the study area.
23 The impacts from tidal natural communities restoration (CM4) are based on hypothetical footprints
24 and do not reflect actual impacts on vernal pool habitat considering the BDCP's commitment to
25 design restoration projects to minimize or avoid effects on vernal pools (see AMM12). As seen in
26 Table 12-9-16, Alternative 9 would not meet the Plan's near-term biological goals and objectives for
27 direct and indirect effects unless near-term tidal restoration projects are designed to ensure that
28 they do not exceed these impact limits.

29 Typical NEPA and CEQA project-level mitigation ratios for vernal pools affected by CM1 would be
30 1:1 for restoration and 2:1 for protection. Typically, indirect impacts are mitigated by protecting
31 vernal pools at a 2:1 ratio. If impacts on wetted vernal pools from tidal restoration stay within the
32 near-term effect limit presented in Table 12-9-16, the near-term effects of tidal restoration would
33 require up to 5 acres of vernal pool restoration and up to 30 wetted acres of vernal pool protection
34 (or 200 acres of vernal pool complex protection using the 15% density assumption).

35 The BDCP has committed to near-term goal of protecting 400 acres of vernal pool complex (see
36 Table 3-4 in Chapter 3, *Description of Alternatives*) by protecting at least 2 wetted acres of vernal
37 pools for each wetted acre directly or indirectly affected. The BDCP has also committed to
38 restoring/creating vernal pools such that there is no net loss of vernal pool acreage. The amount of
39 restoration would be determined during implementation based on the following criteria.

- 40 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to
41 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly
42 affected (1:1 ratio).

- If restoration takes place concurrent with impacts (i.e., restoration construction is completed, but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

The species-specific biological goals and objectives would also inform the near-term protection and restoration efforts. These Plan goals represent performance standards for considering the effectiveness of restoration actions. The acres of protection and restoration contained in the near-term Plan goals would keep pace with the loss of habitat and effects on nonlisted vernal pool invertebrates.

The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily Affected Natural Communities*, and *Alignment Guidelines*, and *AMM37 Recreation*. *AMM12 Vernal Pool Crustaceans*, though developed for vernal pool crustaceans, includes measures to avoid and minimize direct and indirect effects on vernal pools and would thus be applicable to nonlisted vernal pool invertebrates as well. All of these AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS.

The natural community restoration and protection activities are expected to be concluded in the first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts on constitute adequate mitigation for CEQA purposes. These commitments, implemented together with the AMMs and biological goals and objectives, are more than sufficient to support the conclusion that the near-term effects of Alternative 9 would be less than significant under CEQA.

Late Long-Term Timeframe

The BDCP states that covered activities would not result in more than 10 wetted acres of direct loss and no more than 20 wetted acres of indirect effects on vernal pools by the long-term term (see Objective VPNC1.2 and AMM12). As seen in Table 12-9-16, Alternative 9 would not meet the Plan's late long-term biological goals and objectives for direct and indirect effects unless near-term tidal restoration projects are designed to ensure that they do not exceed these impact limits.

The Plan has committed to late long-term goal of protecting 600 acres of vernal pool complex in either Conservation Zones 1, 8, or 11, primarily in core vernal pool recovery areas (Objective VPNC1.1) by protecting at least 2 wetted acres of vernal pools protected for each wetted acre directly or indirectly affected. The Plan also includes a commitment to restore or create vernal pools such that the Plan results in no net loss of vernal pool acreage. The protection and restoration would be achieved using the criteria presented above as well as by following the other specific biological goals and objectives, which include:

- Increasing the size and connectivity of protected vernal pool complexes (Objective VPNC1.3)
- Protecting the range of inundation characteristics that are currently represented by vernal pool throughout the Plan Area (Objective VPNC1.4)

The effects on nonlisted pool invertebrate species habitat from Alternative 9 would represent an adverse effect as a result of habitat modification of a special-status species and potential for direct

1 mortality in the absence of other conservation actions. However, the BDCP has committed to impact
2 limits for vernal pools and alkali seasonal wetlands and to habitat protection, restoration, and
3 management and enhancement associated with CM3, CM9, and CM11. These conservation activities
4 would be guided by species-specific goals and objectives, and AMM1–AMM6, AMM10, AMM12, and
5 AMM37, which would be in place throughout the time period any construction activity would be
6 occurring. Considering these commitments, Alternative 9 over the term of the BDCP would not
7 result in a substantial adverse effect through habitat modifications and would not substantially
8 reduce the number or restrict the range of nonlisted vernal pool invertebrates. Therefore,
9 Alternative 9 would have a less-than-significant impact on nonlisted vernal pool invertebrates.

10 **Impact BIO-39: Indirect Effects of Plan Implementation on Nonlisted Vernal Pool**
11 **Invertebrates**

12 Construction and maintenance activities associated with water conveyance facilities, and restoration
13 actions could indirectly affect nonlisted vernal pool invertebrates and their habitat in the vicinity of
14 construction and restoration areas, and maintenance activities. These potential effects would be
15 minimized or avoided through AMM1–AMM6, and AMM10, which would be in effect throughout the
16 Plan’s construction phase.

17 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly
18 affect nonlisted vernal pool invertebrates and their habitat in the vicinity of construction areas.
19 Ground-disturbing activities, stockpiling of soils, and maintenance and refueling of heavy equipment
20 could result in the inadvertent release of sediment and hazardous substances into this habitat.
21 These potential effects would be avoided and minimized through AMM1–AMM6, which would be in
22 effect throughout the Plan’s construction phase. Nonlisted vernal pool invertebrates and their
23 habitat could be periodically indirectly affected by maintenance activities at water conveyance
24 facilities. Embankment maintenance activities around Clifton Court Forebays could result in the
25 inadvertent discharge of sediments and hazardous materials into nonlisted vernal pool invertebrate
26 habitat that occurs along the southern and western boundaries of the forebays. These potential
27 effects would be avoided and minimized through AMM1–AMM6, which would be in effect
28 throughout the term of the Plan. The indirect effects of plan implementation under Alternative 9
29 would not be adverse.

30 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance
31 facilities, and restoration actions could indirectly impact nonlisted vernal pool invertebrates and
32 their habitat in the vicinity of construction and restoration areas, and maintenance activities. These
33 potential impacts would be minimized or avoided through AMM1–AMM6, and AMM10, which would
34 be in effect throughout the Plan’s construction phase. The indirect impacts of Alternative 9 would be
35 less than significant.

36 **Impact BIO-40: Periodic Effects of Inundation of Nonlisted Vernal Pool Invertebrates’ Habitat**
37 **as a Result of Implementation of Conservation Components**

38 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect 0
39 to 4 acres of modeled habitat for nonlisted vernal pool invertebrates (Table 12-9-15). There would
40 be no periodic effects resulting from *CM5 Seasonally Inundated Floodplain Restoration*

41 **NEPA Effects:** BDCP Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, describes the
42 methods used to estimate periodic inundation effects in the Yolo Bypass. Based on this method,
43 periodic inundation could affect nonlisted vernal pool invertebrates occupying areas ranging from 0

1 acres of habitat during most notch flows, to an estimated 4 acres during a notch flow of 6,000 cfs.
2 BDCP-associated inundation of areas that would not otherwise have been inundated is expected to
3 occur in no more than 30% of all years, because Fremont Weir is expected to overtop the remaining
4 70% of all years, and during those years notch operations would not typically affect the maximum
5 extent of inundation. In more than half of all years under Existing Conditions, an area greater than
6 the BDCP-related inundation area already inundates in the bypass. Yolo Bypass flooding is expected
7 to have a minimal effect on nonlisted vernal pool invertebrates and would thus not be adverse under
8 NEPA.

9 **CEQA Conclusion:** Alternative 9 would periodically inundate at most 4 acres of nonlisted vernal pool
10 invertebrates' habitat during the maximum flows over the Fremont Weir. The periodic inundation is
11 not anticipated to result in a conversion of nonlisted vernal pool invertebrates' habitat into different
12 wetland habitat. BDCP-associated inundation of areas that would not otherwise have been
13 inundated is expected to occur in no more than 30% of all years, because Fremont Weir is expected
14 to overtop the remaining 70% of all years, and during those years notch operations would not
15 typically affect the maximum extent of inundation. In more than half of all years under Existing
16 Conditions, an area greater than the BDCP-related inundation area already inundates in the bypass.
17 Yolo Bypass flooding is expected to have a minimal effect on nonlisted vernal pool invertebrates and
18 would thus result in less-than-significant impacts on the species.

19 **Sacramento and Antioch Dunes Anthicid Beetles**

20 This section describes the effects of Alternative 9, including water conveyance facilities construction
21 and implementation of other conservation components, on Sacramento and Antioch Dunes anthicid
22 beetles. Potential habitat in the study area includes the inland dune scrub at Antioch Dunes NWR,
23 sand bars along the Sacramento and San Joaquin Rivers, and sandy dredge spoil piles (California
24 Department of Fish and Game 2006c and 2006d).

25 The construction, and operations and maintenance of the water conveyance facilities under
26 Alternative 9 would not likely affect Sacramento and Antioch Dunes anthicid beetles. The channel
27 work and associated infrastructure would generally avoid affects to channel margins where sand
28 bars are likely to form. Conveyance construction would not affect inland dune scrub at Antioch
29 Dunes NWR. No dredge spoil areas that could be occupied by Sacramento anthicid beetle were
30 identified within conveyance facilities footprints during a review of Google Earth imagery. Also, a
31 review of the locations of the Alternative 9 operable barriers and areas of channel modifications on
32 Google Earth imagery did not reveal any sandbars in the channels or along the channel margins.
33 These portions of the Delta have steep, riprap lined channel banks that are likely not conducive to
34 the formation of sandbars and flows there are slow enough that sand deposits are unlikely.

35 Implementation of BDCP restoration based conservation measures could affect habitat for
36 Sacramento and Antioch Dunes anthicid beetles. Both species are known to utilize interior sand
37 dunes and sandbar habitat. The only interior sand dune habitat within the Plan Area is at Antioch
38 Dunes, which would not be impacted by the Alternative 9 conservation measures. Both species are
39 known to occur along the Sacramento River and San Joaquin Rivers. The implementation of BDCP
40 restoration actions, and other covered activities could affect habitat for Sacramento and Antioch
41 Dunes anthicid beetles along channels throughout the Plan Area; however the extent of these
42 habitats in the Plan Area is unknown because these areas were not identified at the scale of mapping
43 done within the study area. Because of current and historic channel modifications (channel
44 straightening and dredging) and levee construction throughout the Delta, sandbar habitat is likely

1 very limited and restricted to channel margins. The implementation of *CM4 Tidal Natural*
 2 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM6 Channel Margin*
 3 *Enhancement* could impact sandbar habitat along the river channels and possibly sandy, dredge
 4 piles on Delta islands.

5 Over the term of the BDCP, Alternative 9 would likely result in beneficial effects on Sacramento and
 6 Antioch Dunes anthicid beetles. The following Alternative 9 objectives would generally increase
 7 opportunities for the formation of sandbars in the Plan Area.

- 8 ● Restore 10,000 acres of seasonally inundated floodplain (Objective L2.11, associated with CM5).
- 9 ● Enhance 20 miles of channel margin habitat (Objective L2.12, associated with CM6),
- 10 ● Restore 5,000 acres of riparian habitat, with at least 3,000 acres occurring on restored
 11 seasonally inundated floodplain. (VFRNC1.1, associated with CM7).

12 These measures would improve shoreline conditions by creating benches along levees, shallow
 13 habitat along margins and in floodplains, and increasing shoreline vegetation, all of which would
 14 likely contribute to the formation of sandbars along Delta river channels where these measures
 15 would be implemented. Increasing the structural diversity of Delta river channel margins and
 16 floodplains would create opportunities for sand to be deposited and for sandbars to subsequently
 17 form. As explained below, potential impacts on Sacramento and Antioch Dunes anthicid beetles
 18 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

19 **Table 12-9-17. Changes in Sacramento and Antioch Dunes Anthicid Beetles’ Habitat Associated**
 20 **with Alternative 9 (acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2–CM18	0	0	0	0	0	0
	0	0	0	0	0	0
Total Impacts CM2–CM18	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-41: Loss or Conversion of Habitat for and Direct Mortality of Sacramento and**
2 **Antioch Dunes Anthicid Beetles**

3 Implementation of Alternative 9 conservation measures could affect Sacramento and Antioch Dunes
4 anthicid beetles and their habitat. As mentioned above, the extent of this habitat in the study area is
5 unknown but it is assumed that sand bars likely occur along to some degree along the Sacramento
6 and San Joaquin Rivers and that some islands in the Delta may contain sandy dredge spoil piles. A
7 review of Google Earth imagery of the north Delta did identify three general areas that appear to
8 have accumulations of sandy soils (with some vegetation), possibly from dredge disposal, are
9 Decker Island, the western portion of Bradford Island, and the southwestern tip of Grand Island. A
10 review of Google Earth imagery of the south Delta did identify sandbar habitat along the San Joaquin
11 River from the southern end of the Plan Area downstream to an area just west of Lathrop. An
12 additional area along Paradise Cut was identified just north of I-5. Conservation measures that could
13 result in impacts on Sacramento and Antioch Dunes anthicid beetles are tidal habitat restoration
14 (CM4), floodplain restoration (CM5), and channel margin enhancement (CM6). In addition,
15 maintenance activities associated with the long-term operation of the water conveyance facilities
16 and other BDCP physical facilities could degrade or eliminate habitat for Sacramento and Antioch
17 Dunes anthicid beetles. Each of these individual activities is described below. A summary statement
18 of the combined impacts and NEPA and CEQA conclusions follows the individual conservation
19 measure discussions.

- 20 • *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration could impact
21 the areas of sandy soils identified from aerial photographs on Decker Island, the western
22 portion of Bradford Island, and on the southwestern tip of Grand Island because these areas fall
23 within the West Delta Restoration Opportunity Area (ROA). The West Delta ROA has been
24 identified in the BDCP (BDCP Chapter 3, *Conservation Strategy*, Section 3.4.4) as providing
25 opportunities for creating subtidal aquatic and tidal marsh habitats. The methods and
26 techniques identified in the BDCP that may be used for tidal restoration include the
27 recontouring of lands so that they have elevations suitable for the establishment of marsh plains
28 and the eventual breaching of levees. There are three CNDDDB records of Sacramento anthicid
29 beetle (just north of Rio Vista, one just south of Rio Vista along the west shore of the Sacramento
30 River, and one on Grand Island) and one CNDDDB record of Antioch Dunes anthicid beetle (just
31 north of Rio Vista) that fall within the West Delta ROA (California Department of Fish and
32 Wildlife 2013). Tidal restoration actions in the West Delta ROA may eliminate potential habitat
33 and impact occupied habitat of both Sacramento and Antioch Dunes anthicid beetles.
- 34 • *CM5 Seasonally Inundated Floodplain Restoration:* Seasonally inundated floodplain restoration
35 could impact areas with sandbars that were identified in a review of aerial photographs. The
36 sandbars identified along the San Joaquin River and Paradise Cut are within the conceptual
37 corridors (Corridors 1a, 1b, 2a, and 4) identified in Figure 3.4-20 of the BDCP. There are four
38 CNDDDB records for Sacramento anthicid beetle in the conceptual corridor along the San Joaquin
39 River (California Department of Fish and Wildlife 2013). Floodplain restoration actions in these
40 conceptual corridors could impact potential habitat for both these species and occupied habitat
41 of Sacramento anthicid beetle.
- 42 • *CM6 Channel Margin Enhancement:* Channel margin enhancement could result in impacts on 20
43 miles of channel margin that could contain sandbars.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
3 also included.

4 The BDCP could result in substantial affects to Sacramento and Antioch Dunes anthicid beetles
5 because all of the habitat identifiable from aerial photo review falls within either the West Delta
6 ROA, which is being considered for tidal restoration (CM4), or within three of the conceptual
7 corridors being considered for floodplain restoration (CM5). Furthermore, all seven of the records
8 for Sacramento anthicid beetle within the study area fall within areas being considered for
9 restoration (CM4 and CM5), which represent over half of the extant records for this species range
10 wide (7 of 13), and the only extant record for Antioch Dunes anthicid beetle, which represent one of
11 five extant records range wide, falls within the West Delta ROA that is just north of Rio Vista. These
12 occurrences could be affected by restoration if these areas are chosen as restoration projects.
13 However, over the term of the BDCP, implementation of conservation components would likely
14 benefit Sacramento and Antioch Dunes anthicid beetles. CM5, CM6, and CM7 would generally
15 contribute to the formation of sandbar habitat in the Plan Area. These measures would improve
16 shoreline conditions by creating benches along levees (CM6), creating shallow margin and
17 floodplain habitat (CM5), and increasing shoreline vegetation (CM7), all of which would likely
18 contribute to the formation of sandbars along Delta river channels where these measures would be
19 implemented. Increasing the structural diversity of Delta river channel margins would create areas
20 of slow water that would allow for sand to be deposited and for sandbars to subsequently form.
21 Other factors relevant to effects on Sacramento and Antioch Dunes anthicid beetle include:

- 22 • The actual extent of suitable and occupied habitat for these species in the plan is unknown.
- 23 • The sandbar habitat occupied by Sacramento anthicid beetle along the San Joaquin River would
24 likely not be directly impacted where floodplain restoration occurs because the physical
25 disturbance would be to adjacent levees and agricultural areas. Though these actions would
26 change hydrologic conditions that could overtime remove the existing sandbars, the expanded
27 floodplain would create conditions suitable for the formation of new and possibly larger
28 sandbars.
- 29 • Floodplain restoration would be phased over a period of 30 years so that not all sandbar habitat
30 within these areas would be affected at once. Furthermore, as floodplain restoration is being
31 implemented new sandbar habitat would likely be forming prior and/or concurrent with future
32 floodplain restoration projects that may affect sandbar habitat on the San Joaquin River and/or
33 Paradise Cut.

34 **NEPA Effects:** The potential impacts on Sacramento and Antioch Dunes anthicid beetles associated
35 with Alternative 9 as a whole would represent an adverse effect as a result of habitat modification of
36 a special-status species and potential for direct mortality in the absence of other conservation
37 actions. However, with implementation of restoration associated with CM5, CM6, and CM7, which
38 would be phased throughout the time period when the impacts would be occurring, the effects of
39 Alternative 9 as a whole on Sacramento and Antioch Dunes anthicid beetles would not be adverse
40 under NEPA.

41 **CEQA Conclusion:** Alternative 9 would impact Sacramento and Antioch Dunes anthicid beetles'
42 habitat and could impact seven occurrences of Sacramento anthicid beetle and one occurrence of
43 Antioch Dunes anthicid beetle. However, over the term of the BDCP, implementation of conservation
44 components would likely benefit Sacramento and Antioch Dunes anthicid beetles. BDCP

1 conservation components, particularly conservation measures CM5, CM6, and CM7, would generally
2 contribute to the formation of sandbar habitat in the Plan Area. Floodplain restoration (CM5) would
3 be phased over a period of 30 years so that not all sandbar habitat within these areas would be
4 affected at once. Furthermore, as floodplain restoration is being implemented new sandbar habitat
5 would likely be forming prior and/or concurrent with future floodplain restoration projects that
6 may affect sandbar habitat on the San Joaquin River and/or Paradise Cut.

7 Considering that floodplain (CM5), channel margin enhancement (CM6), and riparian restoration
8 (CM7) would contribute to the replacement of and possible expansion of sandbar habitat in the
9 Delta and be phased throughout the time period when the impacts would be occurring, the
10 implementation of Alternative 9 as a whole would not result in a substantial adverse effect though
11 habitat modification and would not substantially reduce the number or restrict the range of these
12 species. Therefore, the alternative would have a less-than-significant impact on Sacramento and
13 Antioch Dunes anthicid beetles.

14 **Delta Green Ground Beetle**

15 This section describes the effects of Alternative 9 on delta green ground beetle. Suitable habitat in
16 the study area would be vernal pool complexes and annual grasslands in the general Jepson Prairie
17 area. The construction, and operations and maintenance of the water conveyance facilities under
18 Alternative 9 would not affect delta green ground beetle because the facilities and construction area
19 are outside the known range of the species. Implementation of Alternative 9 could affect delta green
20 ground beetle through the protection of grasslands and vernal pool complex (CM3) in the vicinity of
21 Jepson Prairie and the subsequent implementation of habitat enhancement and management actions
22 and recreational trail construction (CM11) in these areas. In addition, tidal natural communities
23 restoration (CM4) and vernal pool and alkali seasonal wetland complex restoration (CM9) could
24 result in potential impacts on delta green ground beetle and its habitat. Full implementation of
25 Alternative 9 would likely result in beneficial effects on delta green ground beetle through the
26 following conservation actions.

- 27 ● Protect 2,000 acres of grassland in CZ 1 (Objective GNC1.1, associated with CM3).
- 28 ● Protect 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective VPNC1.1, associated with
29 CM3).
- 30 ● Restore up to 67 acres of vernal pool complex in CZs 1, 8, and/or 11 (Objective VPNC1.2,
31 associated with CM9).

32 These areas could contain currently occupied habitat for delta green ground beetle and/or create
33 conditions suitable for eventual range expansion. As explained below, potential impacts on delta
34 green ground beetle would be adverse for NEPA purposes and would be significant for CEQA
35 purposes. Mitigation Measure BIO-42, *Avoid Impacts on Delta Green Ground Beetle and its Habitat*,
36 would reduce the effects under NEPA and reduce the impacts to a less-than-significant level under
37 CEQA.

1 **Table 12-9-18. Changes in Delta Green Ground Beetle Habitat Associated with Alternative 9**
2 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2-CM18	0	0	0	0	0	0
	0	0	0	0	0	0
Total Impacts CM2-CM18	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-42: Loss or Conversion of Habitat for and Direct Mortality of Delta Green Ground**
5 **Beetle**

6 Alternative 9 conservation measures could result in the conversion of habitat and/or direct
7 mortality to delta green ground beetle. Conservation measures that could affect delta green ground
8 beetle are tidal natural communities habitat restoration (CM4), vernal pool and alkali seasonal
9 wetland complex restoration (CM9), and habitat enhancement and management activities (CM11) in
10 CZ 1. CZ 1 is the only portion of the Plan Area that contains occupied and potential habitat for delta
11 green ground beetle. The range of the delta green ground beetle is currently believed to be generally
12 bound by Travis Air Force Base to the west, Highway 113 to the east, Hay Road to the north, and
13 Creed Road to the south (Arnold and Kavanaugh 2007; U.S. Fish and Wildlife Service 2009a). Further
14 discussion of this potential effect is provided below, and NEPA and CEQA conclusions follow.

- 15 • *CM4 Tidal Natural Communities Restoration:* Tidal restoration in the Cache Slough ROA could
16 result in the loss of delta green ground beetle habitat if restoration is planned in areas known to
17 be or potentially occupied by the species. CM4 identifies 5,000 acres of freshwater tidal natural
18 communities restoration in the Cache Slough ROA and Lindsey Slough and Calhoun Cut have
19 been identified as areas suitable for restoration. Lindsey Slough is just east of Jepson Prairie and
20 Calhoun Cut, which is off of Lindsey Slough (see Figure 12-1), goes into the general Jepson
21 Prairie area and is adjacent to areas of potential habitat for delta green ground beetle. The tidal
22 restoration methods and techniques identified in CM4 (see BDCP Chapter 3, Section 3.4.4.3.3)
23 includes excavating channels; modifying ditches, cuts, and levees to encourage tidal circulation;
24 and scalping higher elevation areas to create marsh plains. These disturbances could affect delta
25 green ground beetle through habitat modification, either directly or indirectly through

1 hydrologic modifications, and/or result in direct mortality to the species. No CNDDDB records for
2 delta green ground beetle are intersected by the hypothetical tidal restoration footprints being
3 used by the BDCP.

- 4 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration:* Vernal pool restoration may
5 occur in CZ 1 and could result in disturbance to delta green ground beetle habitat if restoration
6 is planned in areas known to be or potentially occupied by the species. These restoration
7 activities would most likely take place in areas that were historically vernal pool complexes that
8 have since been highly degraded, but which are suitable for vernal pool restoration. These areas
9 would not likely provide habitat for delta green ground beetle. However, if these activities do
10 take place in suitable habitat, then disturbances could result in direct mortality of the species.
11 Nevertheless, restoration ultimately would expand habitat available to the species.
- 12 • *CM11 Natural Communities Enhancement and Management:* As described in *CM3 Natural*
13 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in
14 CZ 1 and a portion of the 600 acres of protection and possibly some of the up to 10 wetted acres
15 of vernal pool restoration could also occur in CZ 1. Potential effects from CM11 could include
16 direct mortality to larvae and adults from the implementation of grassland management
17 techniques, which may include livestock grazing, prescribed burning, and mowing. In addition to
18 these grassland and vernal pool complex management actions, CM11 also includes guidelines
19 and techniques for invasive plant control, which may include manual control (hand-pulling and
20 digging), mechanical control (large equipment), and chemical control, though some of these
21 methods would be restricted in areas where rare plants occur or in critical habitat for vernal
22 pool species. The creation of new recreation trails as part of CM11 would result in impacts on
23 15.5 acres of grasslands within CZ 1, which could affect delta green ground beetle if present.

24 **NEPA Effects:** The protection of 2,000 acres of grassland in CZ 1 (CM3) and the protection of 600
25 acres of vernal pool complex and up 10 wetted acres of vernal pool complex restoration, some of
26 which could occur in CZ 1 (CM3 and CM9) could benefit delta green ground beetle if these areas
27 occur within the range of the species. Tidal natural communities restoration (CM4), vernal pool and
28 alkali seasonal wetland complex restoration (CM9), and recreational trail construction and
29 subsequent enhancement and management actions (CM11) could impact delta green ground beetle.
30 The management of these grasslands and vernal pool complexes according to *CM11 Natural*
31 *Communities Enhancement and Management* and the construction of recreational trails in CZ 1 has a
32 potential to affect this species. AMM37 would ensure that new trails in vernal pool complexes be
33 sited at least 250 feet from wetland features, or closer if site-specific information indicates that local
34 watershed surrounding a vernal pools is not adversely affected. Direct mortality and/or the affects
35 to delta green ground beetle habitat would be an adverse effect under NEPA. Implementation of
36 Mitigation Measure BIO-42, *Avoid Impacts on Delta Green Ground Beetle and its Habitat*, would
37 reduce this effect.

38 **CEQA Conclusion:** The implementation of grassland and vernal pool complex protection (CM3), tidal
39 natural communities restoration (CM4), vernal pool and alkali seasonal wetland complex
40 restoration (CM9), and recreational trail construction and subsequent enhancement and
41 management actions (CM11) could impact delta green ground beetle. Tidal restoration projects
42 around Calhoun Cut and possible Lindsey Slough could affect habitat and result in direct mortality to
43 the species from excavating channels; modifying ditches, cuts, and levees to encourage tidal
44 circulation; and scalping higher elevation areas to create marsh plains. Potential impacts from CM11
45 could include direct mortality to larvae and adults resulting from the implementation of recreation

1 trail construction in 15.5 acres of grassland in CZ 1 and from grassland management techniques,
2 which may include livestock grazing, prescribed burning, and mowing. AMM37 would ensure that
3 new trails in vernal pool complexes be sited at least 250 feet from wetland features, or closer if site-
4 specific information indicates that local watershed surrounding a vernal pools is not adversely
5 affected. CM11 also includes guidelines and techniques for invasive plant control, which may include
6 manual control (hand-pulling and digging), mechanical control (large equipment), and chemical
7 control, though some of these methods would be restricted in areas where rare plants occur and in
8 critical habitat for vernal pool species. These actions could result in adverse effects through habitat
9 modification and a possible reduction in the number of the species or restrict its range, and
10 therefore result in significant impacts on delta green ground beetle. Implementation of Mitigation
11 Measure BIO-42 would reduce these potential impacts on a less-than-significant level.

12 **Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat**

13 As part of the design and development of management plans for conservation areas in the area
14 of Jepson Prairie, BDCP proponents will implement the following measures to avoid effects on
15 delta green ground beetle.

- 16 • If habitat restoration or protection is planned for the lands adjacent to Calhoun Cut and non-
17 cultivated lands on the western side of Lindsey Slough, these area will be evaluated by a
18 USFWS approved biologist for potential delta green ground beetle habitat (large playa pools,
19 or other similar aquatic features, with low growing vegetation or bare soils around the
20 perimeter). The biologist will have previous experience with identifying suitable habitat
21 requirements for delta green ground beetle.
- 22 • Any suitable habitat identified by the biologist (with previous experience with delta green
23 ground beetle) within the species current range will be considered potentially occupied and
24 all ground disturbing covered activities in these areas will be avoided, which for the Plan
25 Area is generally the area west of State Route 113.
- 26 • Any other areas identified as suitable habitat outside of the current range of the species will
27 be surveyed by a biologist with previous experience in surveying for and identifying delta
28 green ground beetle. No ground disturbing covered activities will occur in areas identified as
29 occupied by delta green ground beetle.
- 30 • Based on the results of the habitat evaluations and surveys, site-specific restoration and
31 management plans will be developed so that they don't conflict with the recovery goals for
32 delta green ground beetle in the USFWS's 2005 Recovery Plan for Vernal Pool Ecosystems of
33 California and Southern Oregon (U.S. Fish and Wildlife Service 2005). Plans will include
34 measures to protect and manage for delta green ground beetle so that they continue to
35 support existing populations or allow for future colonization.

36 **Callippe Silverspot Butterfly**

37 This section describes the effects of Alternative 9 on callippe silverspot butterfly. Suitable habitats
38 are typically in areas influenced by coastal fog with hilltops that support the specie's host-plant,
39 Johnny jump-ups. Preferred nectar flowers used by adults include thistles, blessed milk thistle, and
40 coyote wild mint. Other native nectar sources include hairy false goldeneaster, coast buckwheat,
41 mourning bride, and California buckeye. The construction, and operations and maintenance of the
42 water conveyance facilities under Alternative 9 would not result in impacts on callippe silverspot
43 butterfly or its habitat. If Cordelia Hills and Potrero Hills are identified for grassland protection

1 opportunities as part of *CM3 Natural Communities Protection and Restoration* and the subsequent
 2 implementation of *CM11 Natural Communities Enhancement and Management*, could affect callippe
 3 silverspot butterfly. Callippe silverspot butterfly has been documented in the western most portion
 4 of the Plan Area (CZ 11) in the Cordelia Hills (Solano County Water Agency 2009). Potential habitat
 5 for the species (grassy hills with *Viola pedunculata*) is present in the Potrero Hills, but it has not
 6 been observed there (EDAW 2005, California Department of Fish and Wildlife 2013). Though CZ 11
 7 has been identified as potential area for grassland restoration in *CM8 Grassland Natural Community*
 8 *Restoration*, the primary goal there is to restore small patches of grassland to connect to Jepson
 9 Prairie and/or the restoration of upland grasses adjacent to tidal brackish emergent wetland in
 10 Suisun Marsh, both of which would not be areas suitable for Callippe silverspot butterfly. The full
 11 implementation of Alternative 9 would protect up to 2,000 acres of grassland in CZ 11 (Objective
 12 GNC1.1, associated with CM3), some of which may contain habitat for Callippe silverspot butterfly.
 13 Any potential effects on callippe silverspot would be avoided and minimized through the
 14 implementation of Mitigation Measure BIO-43, *Avoid and Minimize Loss of Callippe Silverspot*
 15 *Butterfly Habitat*. As explained below, potential impacts on callippe silverspot would be adverse for
 16 NEPA purposes and would be significant for CEQA purposes. Mitigation Measure BIO-43 would
 17 reduce the effects under NEPA and reduce the impacts on less-than significant under CEQA.

18 **Table 12-9-19. Changes in Callippe Silverspot Butterfly Habitat Associated with Alternative 9**
 19 **(acres)^a**

Conservation Measure ^b	Permanent		Temporary		Periodic ^d	
	NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	0	0	0	0	NA	NA
	0	0	0	0	NA	NA
Total Impacts CM1	0	0	0	0	NA	NA
CM2-CM18	0	0	0	0	0	0
	0	0	0	0	0	0
Total Impacts CM2-CM18	0	0	0	0	0	0
TOTAL IMPACTS	0	0	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.
^b See discussion below for a description of applicable CMs.
^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.
^d Periodic effects were estimated for the late long-term only.
 NT = near-term
 LLT = late long-term
 NA = not applicable

20
 21 **Impact BIO-43: Loss or Conversion of Habitat for and Direct Mortality of Callippe Silverspot**
 22 **Butterfly**

23 Alternative 9 conservation measures could result in the conversion of habitat for and direct
 24 mortality of callippe silverspot butterfly. Only one conservation measure was identified as

1 potentially affecting callippe silverspot butterfly, *CM11 Natural Communities Enhancement and*
2 *Management*, which could result in the disturbance of callippe silverspot butterfly habitat if such
3 areas are acquired as part of grassland protection under *CM3 Natural Communities Protection and*
4 *Restoration*. Further discussion of this potential effect is provided below and NEPA and CEQA
5 conclusions follow.

6 *CM11 Natural Communities Enhancement and Management*: As described in *CM3 Natural*
7 *Communities Protection and Restoration*, up to 2,000 acres of grasslands would be protected in CZ
8 11. If areas chosen for protection include Cordelia Hills or Potrero Hills, where there is known and
9 potential habitat, respectively, then grassland enhancement and management actions could affect
10 the callippe silverspot butterfly. Potential effects from CM11 could include the loss of larval host and
11 nectar sources and direct mortality to larvae and adults from the installation of artificial nesting
12 burrows and structures and the implementation of grassland management techniques, which may
13 include livestock grazing, prescribed burning, and mowing. In addition to these grassland
14 management actions, CM11 also includes guidelines and techniques for invasive plant control, which
15 may include manual control (hand-pulling and digging), mechanical control (large equipment), and
16 chemical control. Several of the preferred nectar sources are thistles, some of which have been
17 identified by the California Invasive Plant Council as having limited to moderate ecological impacts
18 (California Invasive Plant Council 2006).

19 **NEPA Effects:** The protection of 2,000 acres of grassland within CZ 11 could benefit callippe
20 silverspot butterfly if these protected areas include occupied and potential habitat on the hill tops in
21 Cordelia Hills and Potrero Hills. The management of these grasslands according to *CM11 Natural*
22 *Communities Enhancement and Management* has potential to adversely affect this species. Direct
23 mortality and/or the removal of larval host plants and nectar sources for adults would be an adverse
24 effect under NEPA. Implementation of Mitigation Measure BIO-43, *Avoid and Minimize Loss of*
25 *Callippe Silverspot Butterfly Habitat*, would ensure the effect is not adverse.

26 **CEQA Conclusion:** If grasslands within the Cordelia Hills and Potrero Hills are protected as part of
27 *CM3 Natural Communities Protection and Restoration* then the subsequent management of these
28 grasslands according to *CM11 Natural Communities Enhancement and Management* has affect this
29 species. Potential impacts from CM11 could include the loss of larval host and nectar sources and
30 direct mortality to larvae and adults resulting from the installation of artificial nesting burrows and
31 structures and the implementation of grassland management techniques, which may include
32 livestock grazing, prescribed burning, and mowing. In addition to these grassland management
33 actions, CM11 also includes guidelines and techniques for invasive plant control, which may include
34 manual control (hand-pulling and digging), mechanical control (large equipment), and chemical
35 control, which could result in direct and indirect effects on larval host plants and nectar plants.
36 These actions could result in adverse effects through habitat modification and a possible reduction
37 in the number of the species or restrict its range and would therefore result in significant impact on
38 the species under CEQA. However, over the term of BDCP callippe silverspot butterfly could benefit
39 from the protection of occupied and potential habitat for the species with the implementation of
40 Mitigation Measure BIO-43, which would avoid and minimize effects from management actions and
41 thus reduce the potential impact to a less-than-significant level.

1 **Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly**
2 **Habitat**

3 As part of the development of site-specific management plans on protected grasslands in the
4 Cordelia Hills and/or Potrero Hills, BDCP proponents will implement the following measures to
5 avoid and minimize the loss of callippe silverspot habitat.

- 6 ● Hilltops in Cordelia Hills and Potrero Hills will be surveyed for callippe silverspot larval host
7 plants (Johnny jump-ups) by a biologist familiar with identifying this plant species. These
8 surveys should occur during the plant's blooming period (typically early January through
9 April)
- 10 ● If larval host plants are present, then presence/absence surveys for callippe silverspot
11 butterfly larvae will be conducted according to the most recent USFWS approved survey
12 methods by a biologist with previous experience in surveying for and identifying callippe
13 larvae and/or signs of larval presence. These surveys should be conducted prior to the adult
14 flight season, which usually starts in mid-May.
- 15 ● If larvae are detected then no further surveys are necessary. If larvae are not detected then
16 surveys for adults will be conducted by a biologist familiar with surveying for and
17 identifying callippe silverspot. Surveys typically start in mid-May and continue weekly for 8
18 to 10 weeks.
- 19 ● If callippe silverspot butterflies are detected, then the site-specific management plans will
20 be written to include measures to protect and manage for larval host plants and nectar
21 sources so that they continue to support existing populations and/or allow for future
22 colonization. Mapping of both larval host plants and nectar sources will be incorporated into
23 the management plans.

24 **California Red-Legged Frog**

25 Modeled California red-legged frog habitat in the study area is restricted to freshwater aquatic and
26 grassland habitat, and immediately adjacent cultivated lands along the study area's southwestern
27 edge in CZ 7, CZ 8, CZ 9, and CZ 11. Pools in perennial and seasonal streams and stock ponds provide
28 potential aquatic habitat for this species. While stock ponds are underrepresented as a modeled
29 habitat, none is expected to be affected by BDCP actions. Construction and restoration associated
30 with Alternative 9 conservation measures would result in permanent losses of California red-legged
31 frog modeled habitat as indicated in Table 12-9-20. Factors considered in assessing the value of
32 affected habitat for the California red-legged frog, to the extent that information is available, are
33 presence of limiting habitat (aquatic breeding habitat), known occurrences and clusters of
34 occurrences, proximity of the affected habitat to existing protected lands, and the overall degraded
35 or fragmented nature of the habitat. The study area represents the extreme eastern edge of the
36 species' coastal range, and species' occurrences are reported only from CZ 8 and CZ 11. Full
37 implementation of Alternative 9 would also include the following biological objectives over the term
38 of the BDCP to benefit the California red-legged frog (BDCP Chapter 3, *Conservation Strategy*).

- 39 ● Increase native species diversity and relative cover of native plant species, and reduce the
40 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11,
41 CM13, and CM20).
- 42 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).

- 1 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic
2 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with
3 CM3)
- 4 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
5 CM11).
- 6 • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and
7 duration and suitable composition of vegetative cover to support breeding for covered
8 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

9 As explained below, with the restoration and protection of these amounts of habitat, in addition to
10 implementation of AMMs, impacts on California red-legged frog would not be adverse for NEPA
11 purposes and would be less than significant for CEQA purposes.

12 **Table 12-9-20. Changes in California Red-Legged Frog Modeled Habitat Associated with**
13 **Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic	0	0	0	0	NA	NA
	Upland	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	8	24	0	0	0	0
Total Impacts CM2-CM18		8	24	0	0	0	0
TOTAL IMPACTS		8	24	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

14

15 **Impact BIO-44: Loss or Conversion of Habitat for and Direct Mortality of California Red-**
16 **Legged Frog**

17 Alternative 9 conservation measure CM11 would result in the permanent loss of 24 acres of
18 modeled upland habitat for t California red-legged frog. There are no California red-legged frog
19 occurrences that overlap with the Plan footprint. Construction activities associated recreational
20 facilities, including operation of construction equipment, could result in temporary effects on, as
21 well as injury and mortality of, California red-legged frogs. In addition, natural enhancement and
22 management activities (CM11), which include ground disturbance or removal of nonnative
23 vegetation, could result in local adverse habitat effects. In addition, maintenance activities

1 associated with the long-term operation of the water conveyance facilities and other BDCP physical
2 facilities could degrade or eliminate California red-legged frog habitat including injury and mortality
3 of California red-legged frogs. Each of these individual activities is described below. A summary
4 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual
5 conservation measure discussions.

- 6 • *CM11 Natural Communities Enhancement and Management*: Based on the recreation
7 assumptions described in BDCP Chapter 3, Section 3.4.11, an estimated 24 acres of upland cover
8 and dispersal habitat for the California red-legged frog would be removed as a result of
9 constructing trails and associated recreational facilities. Passive recreation in the reserve
10 system could result in trampling and disturbance of egg masses in water bodies, degradation of
11 water quality through erosion and sedimentation, and trampling of sites adjacent to upland
12 habitat used for cover and movement. However, *AMM37 Recreation* requires protection of water
13 bodies from recreational activities and requires trail setbacks from wetlands. With these
14 restrictions, recreation-related effects on California red-legged frog are expected to be minimal.

15 Activities associated with natural communities enhancement and management in protected
16 California red-legged frog habitat, such as ground disturbance or herbicide use to control
17 nonnative vegetation, could result in local adverse habitat effects on, and injury or mortality of,
18 California red-legged frogs. These effects would be avoided and minimized with implementation
19 of the AMMs discussed below. Herbicides would only be used in California red-legged frog
20 habitat in accordance with the written recommendation of a licensed, registered pest control
21 advisor and in conformance with label precautions and federal, state, and local regulations in a
22 manner that avoids or minimizes harm to the California red-legged frog.

- 23 • *Critical habitat*: Several conservation measures would be implemented in California red-legged
24 frog habitat and designated critical habitat in CZ 8 and CZ 11. Approximately 2,460 acres of
25 designated critical habitat for the California red-legged frog overlaps with the study area along
26 the western edge of CZ 11 in critical habitat unit SOL-1. An additional 862 acres of designated
27 critical habitat is also present along the western edge of CZ 8 in critical habitat unit ALA-2.
28 Conservation actions to protect and enhance grassland habitat for covered species, including
29 California red-legged frog, in CZ 8 could include acquisition and enhancement of designated
30 critical habitat for the California red-legged frog and California tiger salamander. Any habitat
31 enhancement actions for these species in designated critical habitat are expected to enhance the
32 value of any affected designated critical habitat for conservation of California red-legged frog.
33 These actions would result in an overall benefit to California red-legged frog within the study
34 area through protection and management of grasslands with associated intermittent stream
35 habitat and through restoration of vernal pool complex habitat and its associated grassland
36 habitat.

- 37 • *Operations and maintenance*: Ongoing water conveyance facilities operation and maintenance is
38 expected to have little if any adverse effect on the California red-legged frog. Postconstruction
39 operation and maintenance of the above-ground water conveyance facilities could result in
40 ongoing but periodic postconstruction disturbances that could affect California red-legged frog
41 use of the surrounding habitat. Operation of maintenance equipment, including vehicle use
42 along transmission corridors in CZ 8, could also result in injury or mortality of California red-
43 legged frogs if present in work sites. Implementation conservation actions and implementation
44 of AMM1–AMM6, AMM10, AMM14, and AMM37 would reduce these effects.

- 1 • Injury and direct mortality: Construction activities associated with t vernal pool complex
2 restoration, and habitat and management enhancement-related activities, including operation of
3 construction equipment, could result in injury or mortality of California red-legged frogs.
4 Breeding, foraging, dispersal, and overwintering behavior may be altered during construction
5 activities, resulting in injury or mortality of California red-legged frog. Frogs occupying burrows
6 could be trapped and crushed during ground-disturbing activities. Degradation and loss of
7 estivation habitat is also anticipated to result from the removal of vegetative cover and
8 collapsing of burrows. Injury or mortality would be avoided and minimized through
9 implementation of seasonal constraints and preconstruction surveys in suitable habitat,
10 collapsing unoccupied burrows, and relocating frogs outside of the construction area as
11 described in AMM1–AMM6, AMM10, AMM14, and AMM37.

12 The following paragraphs summarize the combined effects discussed above and describe other
13 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
14 also included.

15 ***Near-Term Timeframe***

16 Because the water conveyance facilities construction is being evaluated at the project level, the near-
17 term BDCP conservation strategy has been evaluated to determine whether it would provide
18 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
19 construction would not be adverse under NEPA.

20 Alternative 9 would permanently remove 8 acres of upland terrestrial cover habitat for California
21 red-legged frog. The effects would result from construction of recreational facilities (CM11).

22 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
23 and that are identified in the biological goals and objectives for California’s red-legged frog in
24 Chapter 3 of the BDCP would be 2:1 for protection of grassland habitats. Using these ratios would
25 indicate that 16 acres of grassland should be protected for California red-legged frog to mitigate the
26 near-term losses.

27 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area
28 (Table 3-4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of grassland in
29 CZ 8, west of Byron Highway, would benefit California red-legged frog by providing habitat in the
30 portion of the Plan Area with the highest long-term conservation value for the species based on
31 known species occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with
32 Objective GNC1.3, ponds and other aquatic features within the grasslands would be protected to
33 provide aquatic habitat for this species, and surrounding grassland would provide dispersal and
34 aestivation habitat which would compensate for the loss of 1 acre of aquatic habitat. In addition,
35 aquatic features in grasslands would be maintained and enhanced to provide suitable inundation
36 depth and duration to support breeding habitat for covered amphibians (Objective GNC2.5).

37 These conservation actions would occur in the same timeframe as the construction losses, thereby
38 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives
39 represent performance standards for considering the effectiveness of CM3 protection and
40 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
41 and the additional detail in the biological objectives for California red-legged frog satisfy the typical
42 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-
43 term effects of the other conservation measures.

1 The plan also contains commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM10 Restoration of Temporarily Affected*
5 *Natural Communities, AMM14 California Red-Legged Frog, and AMM37 Recreation.* These AMMs
6 include elements that avoid or minimize the risk of affecting individuals and species habitats
7 adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since
8 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs,*
9 to the Final EIR/EIS, *Avoidance and Minimization Measures.*

10 **Late Long-Term Timeframe**

11 The habitat model indicates that the study area supports approximately 159 acres of aquatic 7,766
12 acres of upland habitat for California red-legged frog.

13 Alternative 9 as a whole would result in the permanent loss of 24 acres of upland habitat for
14 California red-legged frog for the term of the plan (less than 1% of the total upland habitat in the
15 study area). Most of the California red-legged frog upland habitat that would be removed consists of
16 naturalized grassland or cultivated land in a highly disturbed or modified setting on lands
17 immediately adjacent to Clifton Court Forebay. The removed upland cover and dispersal habitat is
18 within 0.5 mile of a cluster of known California red-legged frog occurrences to the west. However,
19 this habitat consists mostly of cultivated lands and small patches of grasslands, and past and current
20 surveys in this area have not found any evidence that this habitat is being used (Appendix 12C, *2009*
21 *to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*).

22 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
23 4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of grassland in CZ 8
24 west of Byron Highway would benefit the California red-legged frog by providing habitat in the
25 portion of the study area with the highest long-term conservation value for the species based on
26 known species occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with
27 Objective GNC1.3, ponds and other aquatic features in the grasslands would also be protected to
28 provide aquatic habitat for this species, and the surrounding grassland would provide dispersal and
29 aestivation habitat. Aquatic features in the protected grasslands in CZ 8 would be maintained and
30 enhanced to provide suitable inundation depth and duration and suitable composition of vegetative
31 cover to support breeding California red-legged frogs (Objective GNC2.5). Additionally, livestock
32 exclusion from streams and ponds and other measures would be implemented as described in CM11
33 to promote growth of aquatic vegetation with appropriate cover characteristics favorable to
34 California red-legged frogs. Lands protected in CZ 8 would connect with lands protected under the
35 *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros Watershed lands, including
36 grassland areas supporting this species. This objective would ensure that California red-legged frog
37 upland and associated aquatic habitats would be protected and enhanced in the largest possible
38 patch sizes adjacent to occupied habitat within and adjacent to the Plan Area.

39 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
40 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
41 restoration of tidal freshwater emergent wetland, grassland, valley/foothill riparian, and vernal pool
42 complex that could overlap with the species model, would result in the restoration of 16 acres of
43 aquatic and 351 acres of upland modeled habitat for California red-legged frog. In addition,
44 protection of managed wetland, grassland, valley/foothill riparian, and vernal pool complex could

1 overlap with the species model and would result in the protection of 3 acres of aquatic and 1,047
2 acres of upland California red-legged frog modeled habitat.

3 **NEPA Effects:** In the near-term, the loss of California red-legged frog habitat under Alternative 9
4 would be not be adverse because the BDCP has committed to protecting and restoring the acreage
5 required to meet the typical mitigation ratios described above. In the late long-term, the losses of
6 California red-legged frog aquatic and upland habitat associated with Alternative 9, in the absence of
7 other conservation actions, would represent an adverse effect as a result of habitat modification of a
8 special-status species and potential for direct mortality. However, with habitat protection and
9 restoration associated with the conservation components, guided by landscape-scale goals and
10 objectives and by AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative 9 as a
11 whole on California red-legged frog would not be adverse.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction is being evaluated at the project level, the near-
15 term BDCP conservation strategy has been evaluated to determine whether it would provide
16 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
17 construction would be less than significant under CEQA.

18 Alternative 9 would permanently remove 8 acres of upland terrestrial cover habitat for California
19 red-legged frog. The effects would result from construction of recreational facilities (CM11).

20 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
21 and that are identified in the biological goals and objectives for California's red-legged frog in
22 Chapter 3 of the BDCP would be 2:1 for protection of grassland habitats. Using these ratios would
23 indicate that 16 acres of grassland should be protected for California red-legged frog to mitigate the
24 near-term losses.

25 The BDCP has committed to near-term protection of up to 2,000 acres grassland in the Plan Area
26 (Table 3-4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of grassland in
27 CZ 8, west of Byron Highway, would benefit California red-legged frog by providing habitat in the
28 portion of the Plan Area with the highest long-term conservation value for the species based on
29 known species occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with
30 Objective GNC1.3, ponds and other aquatic features within the grasslands would be protected to
31 provide aquatic habitat for this species, and surrounding grassland would provide dispersal and
32 aestivation habitat which would compensate for the loss of 1 acre of aquatic habitat. In addition,
33 aquatic features in grasslands would be maintained and enhanced to provide suitable inundation
34 depth and duration to support breeding habitat for covered amphibians (Objective GNC2.5).

35 These conservation actions would occur in the same timeframe as the construction losses, thereby
36 avoiding adverse effects of habitat loss on California red-legged frog. These Plan objectives
37 represent performance standards for considering the effectiveness of CM3 protection and
38 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
39 and the additional detail in the biological objectives for California red-legged frog satisfy the typical
40 mitigation that would be applied to the project-level effects of CM1, as well as mitigate the near-
41 term effects of the other conservation measures.

1 The BDCP also contains commitments to implement AMM1–AMM6, AMM10, AMM14, and AMM37.
2 These AMMs include elements that avoid or minimize the risk of affecting individuals and species
3 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
4 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
5 *AMMs, and CMs*, of the Final EIR/EIS.

6 These commitments are more than sufficient to support the conclusion that the near-term effects of
7 Alternative 9 on California red-legged frog would be less than significant under CEQA, because the
8 number of acres required to meet the typical ratios described above would be only 16 acres of
9 upland communities protected.

10 **Late Long-Term Timeframe**

11 The habitat model indicates that the study area supports approximately 159 acres of aquatic 7,766
12 acres of upland habitat for California red-legged frog. Alternative 9 as a whole would result in the
13 permanent loss of 24 acres of upland habitat for California red-legged frog for the term of the plan
14 (less than 1% of the total upland habitat in the study area). Most of the California red-legged frog
15 upland habitat that would be removed consists of naturalized grassland or cultivated land in a
16 highly disturbed or modified setting on lands immediately adjacent to Clifton Court Forebay. The
17 removed upland cover and dispersal habitat is within 0.5 mile of a cluster of known California red-
18 legged frog occurrences to the west. However, this habitat consists mostly of cultivated lands and
19 small patches of grasslands, and past and current surveys in this area have not found any evidence
20 that this habitat is being used (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*
21 *Environmental Data Report*).

22 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
23 4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of grassland in CZ 8
24 west of Byron Highway would benefit the California red-legged frog by providing habitat in the
25 portion of the study area with the highest long-term conservation value for the species based on
26 known species occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with
27 Objective GNC1.3, ponds and other aquatic features in the grasslands would also be protected to
28 provide aquatic habitat for this species, and the surrounding grassland would provide dispersal and
29 aestivation habitat. Aquatic features in the protected grasslands in CZ 8 would be maintained and
30 enhanced to provide suitable inundation depth and duration and suitable composition of vegetative
31 cover to support breeding California red-legged frogs (Objective GNC2.5). Additionally, livestock
32 exclusion from streams and ponds and other measures would be implemented as described in CM11
33 to promote growth of aquatic vegetation with appropriate cover characteristics favorable to
34 California red-legged frogs. Lands protected in CZ 8 would connect with lands protected under the
35 *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros Watershed lands, including
36 grassland areas supporting this species. This objective would ensure that California red-legged frog
37 upland and associated aquatic habitats would be protected and enhanced in the largest possible
38 patch sizes adjacent to occupied habitat within and adjacent to the Plan Area.

39 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
40 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
41 restoration of tidal freshwater emergent wetland, grassland, valley/foothill riparian, and vernal pool
42 complex that could overlap with the species model, would result in the restoration of 16 acres of
43 aquatic and 351 acres of upland modeled habitat for California red-legged frog. In addition,
44 protection of managed wetland, grassland, valley/foothill riparian, and vernal pool complex could

1 overlap with the species model and would result in the protection of 3 acres of aquatic and 1,047
2 acres of upland California red-legged frog modeled habitat.

3 In the absence of other conservation actions, the losses of California red-legged frog aquatic and
4 upland habitat associated with Alternative 9 would represent an adverse effect as a result of habitat
5 modification of a special-status species and potential for direct mortality. However, with habitat
6 protection and restoration associated with the conservation components, guided by landscape-scale
7 goals and objectives and by AMM1–AMM6, AMM10, AMM14, and AMM37, the effects of Alternative 9
8 would have a less-than-significant impact on California red-legged frog.

9 **Impact BIO-45: Indirect Effects of Plan Implementation on California Red-Legged Frog**

10 Noise and visual disturbance including artificial nighttime lighting outside the project footprint but
11 within 500 feet of construction activities are indirect effects that could temporarily affect the use of
12 California red-legged frog habitat, all of which is upland cover and dispersal habitat. The areas to be
13 affected are near Clifton Court Forebay, and no California red-legged frogs were detected during
14 recent surveys conducted in this area (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
15 *EIR/EIS Environmental Data Report*).

16 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment
17 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability
18 of California red-legged frog habitat downstream of the construction area by filling in pools and
19 smothering eggs. Accidental spills of toxic fluids also could result in the subsequent loss of California
20 red-legged frog if these materials enter the aquatic system. Hydrocarbon and heavy metal pollutants
21 associated with roadside runoff also have the potential to enter the aquatic system, affecting water
22 quality and California red-legged frog.

23 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM14, and AMM37 as part of
24 implementing Alternative 9 would avoid the potential for substantial adverse effects on California
25 red-legged frogs, either indirectly or through habitat modifications. These AMMs would also avoid
26 and minimize effects that could substantially reduce the number of California red-legged frogs, or
27 restrict the species' range. Therefore, the indirect effects of Alternative 9 would not have an adverse
28 effect on California red-legged frog.

29 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance, as well
30 as construction-related noise and visual disturbances including artificial nighttime lighting, could
31 impact California red-legged frog in aquatic and upland habitats. The use of mechanical equipment
32 during construction could cause the accidental release of petroleum or other contaminants that
33 could impact California red-legged frog or its prey. The inadvertent discharge of sediment or
34 excessive dust adjacent to California red-legged frog habitat could also have a negative impact on the
35 species or its prey. With implementation of AMM1–AMM6, AMM10, AMM14, and AMM37,
36 construction, operation, and maintenance under Alternative 9 would avoid the potential for
37 substantial adverse effects on California red-legged frog, either indirectly or through habitat
38 modifications, and would not result in a substantial reduction in numbers or a restriction in the
39 range of California red-legged frogs. The indirect effects of Alternative 9 would have a less-than-
40 significant impact on California red-legged frogs.

1 California Tiger Salamander

2 Modeled California tiger salamander habitat in the study area contains two habitat types: terrestrial
3 cover and aestivation habitat, and aquatic breeding habitat and is restricted to CZ 1, CZ 2, CZ 4, CZ 5,
4 CZ 7, CZ 8, and CZ 11 (Figure 12-14). Modeled terrestrial cover and aestivation habitat contains all
5 grassland types and alkali seasonal wetland with a minimum patch size of 100 acres and within a
6 geographic area defined by species records and areas most likely to support the species. Patches of
7 grassland that were below the 100-acre minimum patch size but were contiguous with grasslands
8 outside of the study area boundary were included. Modeled aquatic breeding habitat for the
9 California tiger salamander includes vernal pools and seasonal and perennial ponds.

10 Factors considered in assessing the value of affected habitat for California tiger salamander, to the
11 extent that information is available, include presence of limiting habitat (aquatic breeding habitat),
12 known occurrences and clusters of occurrences, proximity of the affected habitat to existing
13 protected lands, and the overall degraded or fragmented nature of the habitat. While conservation
14 measures implemented in other CZs could have potential effects on California tiger salamander,
15 those activities in CZ 8 and CZ 11 are considered to have a proportionately larger effect due to their
16 closer proximity to known occurrences of the species.

17 Alternative 9 is expected to result in the temporary, permanent, and periodic removal of upland
18 habitat that California tiger salamander uses for cover and dispersal (Table 12-9-21). Potential
19 aquatic habitat for this species would not be affected. While stock ponds are underrepresented as a
20 modeled habitat, none is expected to be affected by BDCP actions. Full implementation of Alternative
21 9 would also include the following biological objectives over the term of the BDCP to benefit the
22 California tiger salamander (BDCP Chapter 3, *Conservation Strategy*).

- 23 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
24 between existing conservation lands (Objective L1.6, associated with CM3).
- 25 ● Increase native species diversity and relative cover of native plant species, and reduce the
26 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 27 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to
28 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
29 associated with CM3, CM8, and CM11).
- 30 ● Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
31 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 32 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining alkali
33 seasonal wetland species (Objective ASWNC2.1, associated with CM3 and CM11).
- 34 ● Increase burrow availability for burrow-dependent species in grasslands surrounding alkali
35 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective
36 ASWNC2.3, associated with CM11).
- 37 ● Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and/or CZ 11, primarily in core
38 vernal pool recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of*
39 *California and Southern Oregon* (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,
40 associated with CM3).

- 1 • Restore vernal pool complex in CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool
2 acreaage (up to 67 acres of vernal pool complex restoration, assuming that all anticipated
3 impacts [10 wetted acres] occur and that the restored vernal pool complex has 15% density of
4 vernal pools) (Objective VPNC1.2, associated with CM3 and CM9).
- 5 • Increase the size and connectivity of protected vernal pool complex within the Plan Area and
6 increase connectivity with protected vernal pool complex adjacent to the Plan Area (Objective
7 VPNC1.3, associated with CM3).
- 8 • Protect the range of inundation characteristics that are currently represented by vernal pools
9 throughout the Plan Area (Objective VPNC1.4, associated with CM3).
- 10 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 11 • Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective
12 GNC1.2, associated with CM3 and CM8).
- 13 • Protect stock ponds and other aquatic features within protected grasslands to provide aquatic
14 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with
15 CM3).
- 16 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
17 CM11).
- 18 • Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and
19 duration and suitable composition of vegetative cover to support breeding for covered
20 amphibian and aquatic reptile species (Objective GNC2.5, associated with CM11).

21 As explained below, with the restoration or protection of these amounts of habitat, in addition to the
22 implementation of AMMs, impacts on California tiger salamander would not be adverse for NEPA
23 purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-21. Changes in California Tiger Salamander Modeled Habitat Associated with**
2 **Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic	0	0	0	0	NA	NA
	Upland	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2-CM18	Aquatic	0	0	0	0	0	0
	Upland	292	634	0	0	191-639	0
Total Impacts CM2-CM18		292	634	0	0	191-639	0
TOTAL IMPACTS		292	634	0	0	191-639	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3
4 **Impact BIO-46: Loss or Conversion of Habitat for and Direct Mortality of California Tiger**
5 **Salamander**

6 Alternative 9 conservation measures would result in the permanent loss of up to 634 acres of
7 modeled upland habitat for California tiger salamander (Table 12-9-21). There are no California
8 tiger salamander occurrences that overlap with the Plan footprint. Conservation measures that
9 would result in these losses are Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat
10 restoration (CM4), construction of recreational facilities, and construction of a conservation fish
11 hatchery (CM18). Habitat enhancement and management activities (CM11), which include ground
12 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In
13 addition, maintenance activities associated with the long-term operation of the water conveyance
14 facilities and other BDCP physical facilities could degrade or eliminate California tiger salamander
15 habitat. Each of these individual activities is described below. A summary statement of the combined
16 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure
17 discussions.

- 18 • *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the
19 permanent removal of approximately 42 acres of terrestrial cover and aestivation habitat for the
20 California tiger salamander in the late long-term. The modeled habitat in the Yolo Bypass is of
21 low potential for California tiger salamander: There have been no observations of California
22 tiger salamander in this area based on the results of a number of surveys for vernal pool
23 invertebrates and plants, and the bypass lacks vernal pool complexes with large, deep pools or

1 large grassland areas with stock ponds and similar aquatic features that hold water long enough
2 to provide potential breeding habitat for this species.

- 3 • *CM4 Tidal Natural Communities Restoration*: This activity would result in the permanent
4 removal of approximately 517 acres of terrestrial cover and aestivation habitat in the study area
5 in the late long-term. Tidal restoration in the Cache Slough area would result in habitat loss
6 along the edges of Lindsey Slough and Duck Slough, and adjacent to cultivated land along the
7 eastern edge of a block of modeled habitat. The modeled aquatic breeding habitat nearby the
8 hypothetical tidal restoration footprint is of relatively high value, consisting of vernal pool
9 complex along Lindsey Slough within the Jepson Prairie area in and near open space. The Jepson
10 Prairie area includes numerous California tiger salamander CNDDDB recorded occurrences and
11 overlaps with Critical Habitat Unit 2, Jepson Prairie Unit, for this species. However, the
12 hypothetical tidal restoration footprint does not overlap with critical habitat or recorded
13 occurrences in this area. The tidal restoration at Lindsey Slough would occur along the
14 northeastern edge of the Jepson Prairie block of habitat and would not contribute to
15 fragmentation. Because the estimates of habitat loss resulting from tidal inundation are based
16 on projections of where restoration may occur, actual effects are expected to be lower because
17 of the ability to select sites that minimize effects on California tiger salamander.
- 18 • *CM11 Natural Communities Enhancement and Management*: Based on the recreation
19 assumptions described in BDCP Chapter 3, Section 3.4.11, an estimated 40 acres of terrestrial
20 cover and aestivation habitat for the California tiger salamander would be removed as a result of
21 constructing trails and associated recreational facilities. Passive recreation in the reserve
22 system could result in trampling and disturbance of eggs and larvae in water bodies,
23 degradation of water quality through erosion and sedimentation, and trampling of sites adjacent
24 to upland habitat used for cover and movement. However, *AMM37 Recreation* requires
25 protection of water bodies from recreational activities and requires trail setbacks from
26 wetlands. With these restrictions, recreation related effects on California tiger salamander are
27 expected to be minimal.

28 Habitat enhancement- and management-related activities in protected California tiger
29 salamander habitats would result in overall improvements to and maintenance of California
30 tiger salamander habitat values over the term of the BDCP. At least 1,000 acres of grassland
31 habitat and some unknown acres of vernal pool complex habitat in CZ 8 are expected to benefit
32 the California tiger salamander through protection of existing upland cover and dispersal
33 habitat from potential loss or degradation that otherwise could happen with future changes in
34 existing land use. Activities associated with natural communities enhancement and management
35 over the term of the BDCP in protected California tiger salamander habitat, such as ground
36 disturbance or herbicide use to control nonnative vegetation, could result in local adverse
37 habitat effects and injury or mortality of California tiger salamander and disturbance effects if
38 individuals are present in work sites. Implementation of AMM1-AMM6, AMM10, AMM13, and
39 AMM37 would reduce these effects. Herbicides would only be used in California tiger
40 salamander habitat in accordance with the written recommendation of a licensed, registered
41 Pest Control Advisor and in conformance with label precautions and federal, state, and local
42 regulations in a manner that avoids or minimizes harm to the California tiger salamander.

- 43 • *CM18 Conservation Hatcheries*: This activity could result in the permanent removal of
44 approximately 35 acres of terrestrial cover and aestivation habitat for California tiger
45 salamander in the Yolo Bypass area (CZ 2). The specifications and operations of this facility have

1 not been developed, although the facility is expected to be constructed near Rio Vista on
2 cultivated lands in low-value habitat for the species.

- 3 ● Critical habitat: Approximately 1,781 acres of designated Critical Habitat Unit 2, Jepson Prairie
4 Unit, for California tiger salamander overlap the study area in CZ 1. While this area is located
5 within the Cache Slough Complex, it is not expected to be affected by BDCP tidal habitat
6 restoration actions. Tidal habitat would be restored approximately 2 miles east of SR 113, with
7 some restoration taking place along the Barker and Lindsey Slough channels west to
8 approximately SR 113 and a small amount (0.4 acre) taking place along the Lindsey Slough
9 Channel west of SR 113 into Critical Habitat Unit 2.
- 10 ● Operations and maintenance: Ongoing facilities operation and maintenance is expected to have
11 little if any adverse effect on the California tiger salamander. Postconstruction operation and
12 maintenance of the above-ground water conveyance facilities could result in ongoing but
13 periodic disturbances that could affect California tiger salamander use of the surrounding
14 habitat. Operation of maintenance equipment, including vehicle use along transmission
15 corridors in CZ 8, could also result in injury or mortality of California tiger salamanders if
16 present in work sites. These effects, however, would be minimized with implementation of the
17 California tiger salamander measures described in AMM1–AMM6, AMM10, AMM13, and
18 AMM37.
- 19 ● Injury and direct mortality: Construction activities associated with the water conveyance
20 facilities, vernal pool complex restoration, and habitat and management enhancement-related
21 activities, including operation of construction equipment, could result in injury or mortality of
22 California tiger salamanders. Foraging, dispersal, and overwintering behavior may be altered
23 during construction activities, resulting in injury or mortality of California tiger salamander if
24 the species is present. Salamanders occupying burrows could be trapped and crushed during
25 ground-disturbing activities. Degradation and loss of estivation habitat is also anticipated to
26 result from the removal of vegetative cover and collapsing of burrows. Injury or mortality would
27 be avoided and minimized through implementation of seasonal constraints and preconstruction
28 surveys in suitable habitat, collapsing unoccupied burrows, and relocating salamanders outside
29 of the construction area as described in AMM1–AMM6, AMM10, AMM13, and AMM37.

30 The following paragraphs summarize the combined effects discussed above and describe other
31 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are
32 also included.

33 ***Near-Term Timeframe***

34 Because the water conveyance facilities construction is being evaluated at the project level, the near-
35 term BDCP conservation strategy has been evaluated to determine whether it would provide
36 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
37 construction effects would not be adverse under NEPA.

38 Alternative 9 would permanently remove approximately 292 acres of upland terrestrial cover
39 habitat for California tiger salamander. There would be no effect on aquatic habitat. The effects
40 would result from Yolo Bypass improvements (CM2, 42 acres), tidal habitat restoration (CM4, 203
41 acres), construction of recreational facilities (CM11, 12 acres), and construction of conservation
42 hatcheries (CM18, 35 acres).

1 The typical NEPA project-level mitigation ratio of 2:1 for protected grassland habitats would
2 indicate that 584 acres of grassland should be protected in the near-term for California tiger
3 salamander to mitigate the near-term losses.

4 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective
5 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic habitat
6 (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective GNC1.1).
7 The landscape-scale goals and objectives would inform the near-term protection and restoration
8 efforts. The natural community restoration and protection activities are expected to be concluded
9 during the first 10 years of plan implementation, which is close enough in time to the occurrence of
10 impacts to constitute adequate mitigation for NEPA purposes.

11 In addition, the plan contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
15 *Natural Communities*, *AMM13 California Tiger Salamander*, and *AMM37 Recreation*. These AMMs
16 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
17 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
18 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
19 EIR/EIS.

20 **Late Long-Term Timeframe**

21 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and
22 29,459 acres of upland modeled habitat for California tiger salamander. Alternative 9 as a whole
23 would result in the permanent loss of, and temporary effects on 634 acres of upland habitat for
24 California tiger salamander for the term of the plan (less than 2% of the total upland habitat in the
25 study area). The location of these losses is described above in the discussions of CM2, CM4, CM11,
26 and CM18.

27 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
28 4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of grassland in CZ 8
29 west of Byron Highway would benefit the California tiger salamander by providing habitat in the
30 portion of the study area with the highest long-term conservation value for the species based on
31 known species occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with
32 Objective GNC1.3, ponds and other aquatic features in the grasslands would also be protected to
33 provide aquatic habitat for this species, and the surrounding grassland would provide dispersal and
34 aestivation habitat. Aquatic features in the protected grasslands in CZ 8 would be maintained and
35 enhanced to provide suitable inundation depth and duration and suitable composition of vegetative
36 cover to support breeding California tiger salamanders (Objective GNC2.5). Additionally, livestock
37 exclusion from streams and ponds and other measures would be implemented as described in CM11
38 to promote growth of aquatic vegetation with appropriate cover characteristics favorable to
39 California tiger salamanders. Lands protected in CZ 8 would connect with lands protected under the
40 *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros Watershed lands, including
41 grassland areas supporting this species. This objective would ensure that California tiger
42 salamander upland and associated aquatic habitats would be protected and enhanced in the largest
43 possible patch sizes adjacent to occupied habitat within and adjacent to the Plan Area.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
2 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
3 restoration of alkali seasonal wetland complex, vernal pool complex, and grassland that could
4 overlap with the species model, would result in the restoration of 88 acres of aquatic and 598 acres
5 of upland modeled habitat for California tiger salamander. In addition, protection of alkali seasonal
6 wetland complex, vernal pool complex, and grassland that could overlap with the species model,
7 would result in the protection of 750 acres of aquatic and 5,000 acres of upland California tiger
8 salamander modeled habitat.

9 **NEPA Effects:** In the near-term, the loss of California tiger salamander habitat under Alternative 9
10 would be not be adverse because the BDCP has committed to protecting the acreage required to
11 meet the typical mitigation ratios described above. In the late long-term, the losses of California tiger
12 salamander upland habitat associated with Alternative 9, in the absence of other conservation
13 actions, would represent an adverse effect as a result of habitat modification of a special-status
14 species and potential for direct mortality. However, with habitat protection and restoration
15 associated with the conservation components, guided by landscape-scale goals and objectives and
16 by AMM1–AMM6, AMM10, AMM13, and AMM37, the effects of Alternative 9 as a whole on California
17 tiger salamander would not be adverse.

18 **CEQA Conclusion:**

19 **Near-Term Timeframe**

20 Because the water conveyance facilities construction is being evaluated at the project level, the near-
21 term BDCP conservation strategy has been evaluated to determine whether it would provide
22 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
23 construction would be less than significant.

24 Alternative 9 would permanently remove approximately 292 acres of upland terrestrial cover
25 habitat for California tiger salamander. There would be no effect on aquatic habitat. The effects
26 would result from Yolo Bypass improvements (CM2, 42 acres), tidal habitat restoration (CM4, 203
27 acres), construction of recreational facilities (CM11, 12 acres), and construction of conservation
28 hatcheries (CM18, 35 acres).

29 The typical CEQA project-level mitigation ratio of 2:1 for protected grassland habitats would
30 indicate that 584 acres of grassland should be protected in the near-term for California tiger
31 salamander to mitigate the near-term losses.

32 The BDCP has committed to near-term restoration of up to 1,140 acres of upland habitat (Objective
33 GNC1.2) and 40 acres of aquatic habitat and to protection of at least 520 acres of aquatic habitat
34 (Objective ASWNC1.1 and Objective VPNC1.1) and 2,000 acres of upland habitat (Objective GNC1.1).
35 The landscape-scale goals and objectives would inform the near-term protection and restoration
36 efforts. The natural community restoration and protection activities are expected to be concluded
37 during the first 10 years of plan implementation, which is close enough in time to the occurrence of
38 impacts to constitute adequate mitigation for CEQA purposes.

39 In addition, the plan contains commitments to implement AMM1–AMM6, AMM10, AMM13, and
40 AMM37, which include elements that avoid or minimize the risk of affecting habitats and species
41 adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since
42 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
43 of the Final EIR/EIS. These commitments are more than sufficient to support the conclusion that the

1 near-term impacts of Alternative 9 on California tiger salamander would be less than significant
2 under CEQA, because the number of acres required to meet the typical ratios described above would
3 be only 584 acres of upland communities protected.

4 ***Late Long-Term Timeframe***

5 Based on the habitat model, the study area supports approximately 8,273 acres of aquatic and
6 29,459 acres of upland modeled habitat for California tiger salamander. Alternative 9 as a whole
7 would result in the permanent loss of, and temporary effects on 634 acres of upland habitat for
8 California tiger salamander for the term of the plan (less than 2% of the total upland habitat in the
9 study area). The location of these losses is described above in the discussions of CM2, CM4, CM11,
10 and CM18.

11 The BDCP has committed to long-term protection of 8,000 acres grassland in the Plan Area (Table 3-
12 4 in Chapter 3, *Description of Alternatives*). Protection of at least 1,000 acres of grassland in CZ 8
13 west of Byron Highway would benefit the California tiger salamander by providing habitat in the
14 portion of the study area with the highest long-term conservation value for the species based on
15 known species occurrences and large, contiguous habitat areas (Objective GNC1.1). Consistent with
16 Objective GNC1.3, ponds and other aquatic features in the grasslands would also be protected to
17 provide aquatic habitat for this species, and the surrounding grassland would provide dispersal and
18 aestivation habitat. Aquatic features in the protected grasslands in CZ 8 would be maintained and
19 enhanced to provide suitable inundation depth and duration and suitable composition of vegetative
20 cover to support breeding California tiger salamanders (Objective GNC2.5). Additionally, livestock
21 exclusion from streams and ponds and other measures would be implemented as described in CM11
22 to promote growth of aquatic vegetation with appropriate cover characteristics favorable to
23 California tiger salamanders. Lands protected in CZ 8 would connect with lands protected under the
24 *East Contra Costa County HCP/NCCP* and the extensive Los Vaqueros Watershed lands, including
25 grassland areas supporting this species. This objective would ensure that California tiger
26 salamander upland and associated aquatic habitats would be protected and enhanced in the largest
27 possible patch sizes adjacent to occupied habitat within and adjacent to the Plan Area.

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
29 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
30 restoration of alkali seasonal wetland complex, vernal pool complex, and grassland that could
31 overlap with the species model, would result in the restoration of 88 acres of aquatic and 598 acres
32 of upland modeled habitat for California tiger salamander. In addition, protection of alkali seasonal
33 wetland complex, vernal pool complex, and grassland that could overlap with the species model,
34 would result in the protection of 750 acres of aquatic and 5,000 acres of upland California tiger
35 salamander modeled habitat.

36 In the absence of other conservation actions, the losses of California tiger salamander upland habitat
37 associated with Alternative 9 would represent an adverse effect as a result of habitat modification of
38 a special-status species and potential for direct mortality. However, with habitat protection and
39 restoration associated with the conservation components, guided by landscape-scale goals and
40 objectives and by AMM1-AMM6, AMM10, AMM13, and AMM37, which would be in place throughout
41 the construction phase, the impacts of Alternative 9 as a whole on California tiger salamander would
42 not be significant under CEQA.

1 **Impact BIO-47: Indirect Effects of Plan Implementation on California Tiger Salamander**

2 Indirect effects could occur outside of the construction footprint but within 500 feet of California
3 tiger salamander habitat. Activities associated with conservation component construction and
4 ongoing habitat enhancement, as well as operation and maintenance of above-ground water
5 conveyance facilities, including the transmission facilities, could result in ongoing but periodic
6 postconstruction disturbances with localized effects on California tiger salamander and its habitat,
7 and temporary noise and visual disturbances, including artificial night lighting at a worksite, over
8 the term of the BDCP. Most of the areas indirectly affected are associated with the construction of
9 Byron Forebay and its borrow and spoil areas in CZ 8.

10 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment
11 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability
12 of California tiger salamander habitat downstream of the construction area by filling in pools and
13 smothering eggs. Accidental spills of toxic fluids into the aquatic system could result in the
14 subsequent loss of California tiger salamander habitat. Hydrocarbon and heavy metal pollutants
15 associated with roadside runoff also have the potential to enter the aquatic system, affecting water
16 quality and California tiger salamander.

17 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, AMM13, and AMM37 under Alternative 9
18 would avoid or minimize the potential for substantial adverse effects on California tiger
19 salamanders, either indirectly or through habitat modifications. These AMMs would also avoid and
20 minimize effects that could substantially reduce the number of California tiger salamanders or
21 restrict the species' range. Therefore, the indirect effects of Alternative 9 would not have an adverse
22 effect on California tiger salamander.

23 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
24 as construction-related noise and visual disturbances including artificial night lighting at a worksite
25 could impact California tiger salamander in aquatic and upland habitats. The use of mechanical
26 equipment during construction could cause the accidental release of petroleum or other
27 contaminants that could impact California tiger salamander or its prey. The inadvertent discharge of
28 sediment or excessive dust adjacent to California tiger salamander habitat could also have a negative
29 impact on the species or its prey. With implementation of AMM1–AMM6, AMM10, AMM13, and
30 AMM37 as part of Alternative 9, the BDCP would avoid the potential for substantial adverse effects
31 on California tiger salamander, either indirectly or through habitat modifications, and would not
32 result in a substantial reduction in numbers or a restriction in the range of California tiger
33 salamanders. The indirect effects of Alternative 9 would have a less-than-significant impact on
34 California tiger salamander.

35 **Impact BIO-48: Periodic Effects of Inundation of California Tiger Salamander Habitat as a**
36 **Result of Implementation of Conservation Components**

37 *CM2 Yolo Bypass Fisheries Enhancement* is the only conservation measure expected to result in
38 periodic inundation of California tiger salamander habitat. Periodic inundation of Yolo Bypass could
39 affect from an estimated 191 acres of terrestrial habitat during a notch flow of 1,000 cfs, to an
40 estimated 639 acres of terrestrial habitat during a notch flow of 4,000 cfs in CZ 1 (Table 12-9-21).
41 This effect would only occur during an estimated maximum of 30% of years and in areas that are
42 already inundated in more than half of all years; therefore, these areas are expected to provide only
43 marginal terrestrial habitat for the California tiger salamander under existing conditions. No aquatic
44 breeding habitat would be affected (Table 12-9-21). The modeled habitat in the Yolo Bypass in the

1 vicinity of terrestrial habitat is of low value in that there are no California tiger salamander records
2 in this area and the bypass lacks vernal pool complexes with large, deep pools, or large grassland
3 areas with stock ponds and similar aquatic features that provide the habitat of highest value for this
4 species. Therefore, the terrestrial habitat to be affected has a small likelihood of supporting
5 California tiger salamanders, and Yolo Bypass operations are expected to have a minimal effect on
6 the species, if any.

7 **NEPA Effects:** The effects of periodic inundation from Alternative 9 would not have an adverse effect
8 on California tiger salamander.

9 **CEQA Conclusion:** Flooding of the Yolo Bypass from Fremont Weir operations would periodically
10 increase the frequency and duration of inundation of 191–639 acres of terrestrial habitat for
11 California tiger salamander. Because this area is considered low-value habitat and there are no
12 California tiger salamander records in the area, and because of the lack of suitable breeding habitat
13 in this area, the effects of periodic inundation of California tiger salamander habitat from
14 Alternative 9 would have a less-than-significant impact.

15 **Giant Garter Snake**

16 This section describes the effects of Alternative 9, including water conveyance facilities construction
17 and implementation of other conservation components, on the giant garter snake. The habitat model
18 used to assess effects for the giant garter snake is based on aquatic habitat and upland habitat.
19 Modeled aquatic habitat is composed of tidal perennial aquatic (except in Suisun Marsh), tidal
20 freshwater perennial emergent wetland, nontidal freshwater emergent wetland, and nontidal
21 perennial aquatic natural communities; rice fields; and artificial canals and ditches. Modeled upland
22 habitat is composed of all nonwetland and nonaquatic natural communities within 200 feet of
23 modeled aquatic habitat features (primarily grassland and cropland). The modeled upland habitat is
24 ranked as high-, moderate-, or low-value based on giant garter snake associations between
25 vegetation and cover types (U.S. Fish and Wildlife Service 2012) and historical and recent
26 occurrence records (Hansen pers. comm. in Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan*
27 *EIR/EIS Environmental Data Report*), and presence of features necessary to fulfill the species' life
28 cycle requirements. Modeled habitat is expressed in acres for aquatic and upland habitats, and in
29 miles for linear movement corridors in aquatic habitat. Other factors considered in assessing the
30 value of affected habitat for the giant garter snake, to the extent that information is available, are
31 proximity to conserved lands and recorded occurrences of the species, proximity to giant garter
32 snake subpopulations (Yolo Basin/Willow Slough and Coldani Marsh-White Slough) in the study
33 area that are identified in the draft recovery plan for this species (U.S. Fish and Wildlife Service
34 1999b), and contribution to connectivity between giant garter snake subpopulations.

35 Construction and restoration associated with Alternative 9 conservation measures would result in
36 both temporary and permanent losses of giant garter snake modeled habitat as indicated in Table
37 12-9-22. The majority of the losses would take place over an extended period of time as tidal marsh
38 is restored in the study area. Full implementation of Alternative 9 would also include the following
39 biological objectives over the term of the BDCP to benefit the giant garter snake (BDCP Chapter 3,
40 *Conservation Strategy*).

- 41 • Increase native species diversity and relative cover of native plant species, and reduce the
42 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).

- 1 • Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of
2 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective
3 TFEWNC1.1, associated with CM3 and CM4).
- 4 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
5 and nontidal freshwater emergent wetland natural communities, with suitable habitat
6 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,
7 associated with CM3 and CM10).
- 8 • Protect 48,625 acres of cultivated lands that provide suitable habitat for covered and other
9 native wildlife species (Objective CLNC1.1, associated with CM3 and CM11).
- 10 • Target cultivated land conservation to provide connectivity between other conservation lands
11 (Objective CLNC1.2, associated with CM3).
- 12 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
13 lands that occur in cultivated lands within the reserve system, including isolated valley oak
14 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
15 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
16 with CM3 and CM11).
- 17 • Of the at least 1,200 acres of nontidal marsh created under (Objective NFEW/NPANC1.1), create
18 600 acres of aquatic habitat giant garter snake aquatic habitat that is connected to the 1,500
19 acres of rice land or equivalent-value habitat described below in Objective GGS1.4 (Objective
20 GGS1.1, associated with CM3, CM4, and CM10).
- 21 • Of the 8,000 acres of grassland protected under Objective GNC1.1 and 2,000 acres restored
22 under Objective GNC1.2, create or protect 200 acres of high-value upland giant garter snake
23 habitat adjacent to the at least 600 acres of nontidal perennial habitat being restored and/or
24 created in CZ 4 and/or CZ 5 (Objective GGS1.2, associated with CM3 and CM8).
- 25 • Protect giant garter snakes on restored and protected nontidal marsh and adjacent uplands
26 (Objectives GGS1.1 and GGS1.2) from incidental injury or mortality by establishing 200-foot
27 buffers between protected giant garter snake habitat and roads (other than those roads
28 primarily used to support adjacent cultivated lands and levees). Establish giant garter snake
29 reserves at least 2,500 feet from urban areas or areas zoned for urban development (Objective
30 GGS1.3, associated with CM3).
- 31 • Create connections from the White Slough population to other areas in the giant garter snake's
32 historical range in the Stone Lakes vicinity by protecting, restoring, and/or creating at least
33 1,500 acres of rice land or equivalent-value habitat (e.g., perennial wetland) for the giant garter
34 snake in CZ 4 and/or CZ 5. Any portion of the 1,500 acres may consist of tidal freshwater
35 emergent wetland and may overlap with the 24,000 acres of tidally restored freshwater
36 emergent wetland if it meets specific giant garter snake habitat criteria described in CM4. Up to
37 500 (33%) of the 1,500 acres may consist of suitable uplands adjacent to protected or restored
38 aquatic habitat (Objective GGS1.4, associated with CM3 and CM4).
- 39 • Of the at least 1,200 acres of nontidal marsh created under Objective NFEW/NPANC1.1, create
40 600 acres of connected aquatic giant garter snake habitat outside the Yolo Bypass in CZ 2
41 (Objective GGS2.1, associated with CM3 and CM10).
- 42 • Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres restored
43 under Objective GNC1.2, create or protect 200 acres of high-value upland habitat adjacent to the

1 600 acres of nontidal marsh created in CZ 2 outside of Yolo Bypass (GGS2.1) (Objective GGS2.2,
2 associated with CM3 and CM8).

- 3 • To expand upon and buffer the newly restored/created nontidal perennial habitat in CZ 2,
4 protect 700 acres of cultivated lands, with 500 acres consisting of rice land and the remainder
5 consisting of compatible cultivated land that can support giant garter snakes. The cultivated
6 lands may be a subset of lands protected for the cultivated lands natural community and other
7 covered species (Objective GGS2.3, associated with CM3).
- 8 • Protect giant garter snakes on created nontidal marsh (Objective GGS2.1) and created or
9 protected adjacent uplands (Objective GGS2.2) from incidental injury or mortality by
10 establishing 200-foot buffers between protected giant garter snake habitat and roads, and
11 establishing giant garter snake reserves at least 2,500 feet from urban areas or areas zoned for
12 urban development (Objective GGS2.4, associated with CM3).
- 13 • Protect, restore, and/or create 2,740 acres of rice land or equivalent-value habitat (e.g.,
14 perennial wetland) for the giant garter snake in CZ 1, CZ 2, CZ 4, or CZ 5. Up to 500 acres may
15 consist of tidal freshwater emergent wetland and may overlap with the at least 5,000 acres of
16 tidally restored freshwater emergent wetland in the Cache Slough ROA if this portion meets
17 giant garter snake habitat criteria specified in CM4. Up to 1,700 acres may consist of rice fields
18 in the Yolo Bypass if this portion meets the criteria specified in CM3, *Reserve Design*
19 *Requirements by Species*. Any remaining acreage would consist of rice land or equivalent-value
20 habitat outside the Yolo Bypass. Up to 915 (33%) of the 2,740 acres may consist of suitable
21 uplands adjacent to protected or restored aquatic habitat (Objective GGS3.1, associated with
22 CM3, CM4, and CM10).

23 As explained below, with the restoration or protection of these amounts of habitat, in addition to the
24 implementation of AMMs, impacts on giant garter snake would not be adverse for NEPA purposes
25 and would be less than significant for CEQA purposes.

1 **Table 12-9-22. Changes in Giant Garter Snake Modeled Habitat Associated with Alternative 9^a**

Conservation Measure ^b	Habitat Type ^c	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT ^d	CM2	CM5
CM1	Aquatic (acres)	210	210	266	266	NA	NA
	Upland (acres)	154	154	627	627	NA	NA
	Aquatic (miles)	20	20	20	20	NA	NA
Total Impacts CM1 (acres)		364	364	893	893	NA	NA
CM2–CM18	Aquatic (acres)	179	498	15	38	NA	NA
	Upland (acres)	1,467	2,443	219	261	582–1,402	331
	Aquatic (miles)	49	189	9	10	NA	NA
Total Impacts CM2–CM18 (acres)		1,646	2,941	234	299	582–1,402	331
TOTAL IMPACTS CM1–CM18 (acres)		2,010	3,305	1,127	1,192	582–1,402	331

- ^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.
- ^b See discussion below for a description of applicable CMs.
- ^c Aquatic acres represent tidal and nontidal habitat combined, and upland acres represent low-, moderate-, and high-value acreages combined.
- ^d LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.
- ^e Periodic effects were estimated for the late long-term only. CM2 periodic impacts on upland habitats only are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.
- NT = near-term
LLT = late long-term
NA = not applicable

2

3 **Impact BIO-49: Loss or Conversion of Habitat for and Direct Mortality of Giant Garter Snake**

4 Alternative 9 conservation measures would result in the permanent and temporary loss combined
5 of up to 1,012 acres of modeled aquatic habitat (tidal and nontidal combined), up to 3,485 acres of
6 modeled upland habitat, and up to 239 miles of channels providing aquatic movement habitat for
7 the giant garter snake (Table 12-9-22). There is one giant garter snake occurrence that overlaps
8 with the Plan footprint. Conservation measures that would result in these losses are conveyance
9 facilities and transmission line construction, and establishment and use of borrow and spoil areas
10 (CM1), Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain
11 restoration (CM5), and construction of a conservation fish hatchery (CM18). Habitat enhancement
12 and management activities (CM11), which include ground disturbance or removal of nonnative
13 vegetation, could result in local adverse habitat effects. In addition, maintenance activities
14 associated with the long-term operation of the water conveyance facilities and other BDCP physical
15 facilities could degrade or eliminate giant garter snake habitat. Each of these individual activities is
16 described below. A summary statement of the combined impacts and NEPA effects and a CEQA
17 conclusion follow the individual conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would
2 result in the permanent loss of approximately 364 acres of modeled giant garter snake habitat,
3 composed of 210 acres of aquatic habitat and 154 acres of upland habitat (Table 12-9-22). The
4 364 acres of upland habitat that would be removed for the construction of the conveyance
5 facilities consists of 23 acres of high-, 96 acres of moderate-, and 35 acres of low-value habitat.
6 In addition, approximately 20 miles of channels providing giant garter snake movement habitat
7 would be removed as a result of conveyance facilities construction. Development of the water
8 conveyance facilities would also result in the temporary removal of up to 266 acres of giant
9 garter snake aquatic habitat and up to 627 acres of adjacent upland habitat in areas near
10 construction in CZ 5 and CZ 6 (see Table 12-9-22 and Terrestrial Biology Map Book). In addition,
11 approximately 20 miles of channels providing giant garter snake movement habitat would be
12 temporarily removed as a result of conveyance facilities construction.

13 Most of the habitat that would be lost is located in the central Delta, in CZ 6, and CZ 8 south of
14 Bacon Island. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 9
15 construction locations. Water facilities construction and operation is expected to have low to
16 moderate potential for adverse effects on giant garter snake aquatic habitat on Mandeville
17 Island because it is not located near or between subpopulations identified in the draft recovery
18 plan. However, giant garter snake occurrences were reported in 1992 in the vicinity of Snodgrass
19 Slough just northeast of Locke in CZ 5 and in 1996 on the north side of Columbia Cut on the
20 south side of Medford Island in CZ 6. There would be no effect from construction of CM1 near
21 the CZ 6 occurrence. However, there would be both permanent (channel enlargement and
22 connections) and temporary impacts on modeled giant garter snake habitat in Meadow Slough
23 which is hydrologically connected to Snodgrass Slough and is less than 0.4 miles away from the
24 giant garter snake occurrence.

- 25 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction activity associated with fisheries
26 improvements in the Yolo Bypass would result in the permanent and temporary removal of
27 approximately 83 acres of aquatic habitat and 458 acres of upland habitat for the giant garter
28 snake in the late long-term. The upland habitat that would be removed is composed of 336 acres
29 of high-value, 121 acres of moderate-value, and 1 acre of low-value habitat. Approximately 14
30 miles (less than 1% of total miles in Plan Area) of channels providing giant garter snake habitat
31 for movements would be removed as a result of Fremont Weir/Yolo Bypass Improvements.
32 Most of this habitat removal would occur at the north end of the Yolo Bypass, near Fremont
33 Weir. Construction is expected to have adverse effects on giant garter snake aquatic habitat in
34 the Yolo Bypass area because it is near the Yolo Basin/Willow Slough subpopulation.

35 In addition to habitat loss from construction related activities in Yolo Bypass, late season
36 flooding in the bypass may result in loss of rice habitat (considered aquatic habitat for giant
37 garter snake) by precluding the preparation and planting of rice fields. The methods for
38 estimating loss of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment
39 5J.E, *Estimation of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo*
40 *Bypass*. This analysis concludes that the estimated loss of rice is 1,662 acres which was
41 considered to occur late long-term.

- 42 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
43 in the permanent loss of approximately 395 acres of aquatic habitat and 2,123 acres of upland
44 habitat for the giant garter snake to tidal marsh in the late long-term. The upland habitat
45 affected by tidal inundation includes 594 acres of high-value, 1,375 acres of moderate-value, and
46 154 acres of low-value habitat. In addition, approximately 138 miles of channels providing giant

1 garter snake movement habitat would be removed as a result of tidal natural communities
 2 restoration. Most of the effects of tidal natural communities restoration would occur in the
 3 Cache Slough and Yolo Bypass areas (CZ 1 and CZ 2). This aquatic habitat is of low to moderate
 4 value: it is in and near Category 1 open space but is not near any giant garter snake occurrences
 5 and is not near or between giant garter snake subpopulations identified in the draft recovery
 6 plan. Tidal natural communities restoration is expected to have little to no adverse effects on
 7 giant garter snake aquatic or upland habitat in the Cache Slough ROA. There are no giant garter
 8 snake occurrences in this area, which is already tidally influenced so it has limited value for the
 9 giant garter snake (giant garter snakes may occur in tidally muted areas but are not likely to use
 10 aquatic areas with a strong tidal influence).

11 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
 12 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
 13 approximately 60 acres of aquatic habitat and 89 acres of upland habitat for giant garter snake.
 14 The upland habitat to be removed is composed of 51 acres of moderate-value and 38 acres of
 15 low-value upland habitat. Approximately 2 miles of channels providing giant garter snake
 16 movement habitat would be removed as a result of floodplain restoration. Seasonally inundated
 17 floodplain restoration is expected to have little to no adverse effects on giant garter snake
 18 aquatic habitat because the site is not located near or between giant garter snake
 19 subpopulations identified in the draft recovery plan. As with CM4, the estimates of the effect of
 20 seasonal floodplain levee construction and inundation are based on projections of where
 21 restoration may occur. Actual effects are expected to be lower because sites would be selected to
 22 minimize effects on giant garter snake habitat.

23 • *CM11 Natural Communities Enhancement and Management*: Passive recreation in the reserve
 24 system could result in human disturbance of giant garter snakes basking in upland areas and
 25 compaction of upland burrow sites used for brumation. However, *AMM37 Recreation* requires
 26 setbacks for trails in giant garter snake habitat. With this measure in place, recreation-related
 27 effects on giant garter snake are expected to be minimal.

28 A variety of habitat management actions included in CM11 that are designed to enhance wildlife
 29 values in BDCP-protected habitats may result in localized ground disturbances that could
 30 temporarily remove small amounts of giant garter snake habitat. Ground-disturbing activities,
 31 such as removal of nonnative vegetation and road and other infrastructure maintenance, are
 32 expected to have minor effects on available giant garter snake habitat and are expected to result
 33 in overall improvements to and maintenance of giant garter snake habitat values over the term
 34 of the BDCP. These effects cannot be quantified, but are expected to be minimal and would be
 35 avoided and minimized by the AMMs listed below.

36 • *CM18 Conservation Hatcheries*: Construction for conservation hatcheries could result in the
 37 permanent removal of 35 acres of moderate-value upland habitat for the giant garter snake in
 38 the Yolo Bypass area (CZ 2).

39 • *Operations and maintenance*: Postconstruction operation and maintenance of the above-ground
 40 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
 41 disturbances that could affect giant garter snake use of the surrounding habitat in the Yolo
 42 Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, CZ 7,
 43 and CZ 8). Maintenance activities would include vegetation management, levee and structure
 44 repair, and regrading of roads and permanent work areas. These effects, however, would be
 45 reduced by AMMs and conservation actions as described below.

- 1 • Injury and direct mortality: Construction vehicle activity may cause injury or mortality of the
2 giant garter snake. If snakes reside where activities take place (most likely in the vicinity of the
3 two subpopulations: Yolo Basin/Willow Slough [CZ 2] and the Coldani Marsh-White Slough [CZ
4 4 and CZ 5]), the operation of equipment for land clearing, construction, conveyance facilities
5 operation and maintenance, and habitat restoration, enhancement, and management could
6 result in injury or mortality of giant garter snakes. This risk is highest from late fall through
7 early spring, when the snakes are dormant. Increased vehicular traffic associated with BDCP
8 actions could contribute to a higher incidence of road kill. However, preconstruction surveys
9 would be implemented after the project planning phase and prior to any ground-disturbing
10 activity. Any disturbance to suitable aquatic and upland sites in or near the project footprint
11 would be avoided to the extent feasible, and the loss of aquatic habitat and grassland vegetation
12 would be minimized through adjustments to project design, as practicable. Construction
13 monitoring, and other measures would be implemented to avoid and minimize injury or
14 mortality of this species during construction, as described in *AMM16 Giant Garter Snake*.

15 The following paragraphs summarize the combined effects discussed above and describe other
16 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
17 also included.

18 ***Near-Term Timeframe***

19 Because the water conveyance facilities construction is being evaluated at the project level, the near-
20 term BDCP conservation strategy has been evaluated to determine whether it would provide
21 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
22 construction would not be adverse under NEPA.

23 Alternative 9 would permanently and temporarily remove 670 acres of aquatic habitat and 2,467
24 acres of upland habitat for giant garter snake in the study area during the near-term. These effects
25 would result from the construction of the water conveyance facilities (CM1, 476 acres of aquatic and
26 781 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458
27 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres of upland
28 habitat), and conservation hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses
29 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat
30 losses would occur in cropland and grassland communities. In addition, approximately 98 miles of
31 irrigation and drainage channels providing giant garter snake movement habitat would be removed.
32 The habitat model likely overestimates the relative value of irrigation and drainage canals in the
33 vicinity of White Slough and south due to its proximity to records that likely represent single
34 displaced snakes, not viable populations.

35 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
36 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the
37 BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection
38 of upland habitats. Using these ratios would indicate that 670 acres of aquatic habitat should be
39 restored, 670 acres of aquatic habitat should be protected, and 4,934 acres of upland habitat should
40 be protected for giant garter snake to mitigate the near-term losses.

41 The BDCP has committed to near-term restoration of up to 8,100 acres of aquatic habitat and up to
42 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to
43 be protected and restored in the near-term specifically for the giant garter snake total 3,900 acres
44 (400 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated lands including at least

1 500 acres of rice) in CZ 2, and acres of rice or habitat of equivalent value in CZ 2, CZ 4, and CZ 5.
2 Additionally, 2,400 acres of rice or habitat equivalent (1,500 acres under Objective GGS1.4 and 900
3 acres under Objective GGS3.1) would be restored or protected to create connections from the
4 Coldani Marsh/White Slough population to other areas in the giant garter snake historical range.
5 Additionally, 900 of the 2,400 acres of rice land or habitat of equivalent value would be protected
6 and restored for the giant garter snake to achieve a 1:1 ratio of habitat conserved to habitat affected
7 (habitat affected includes uplands periodically flooded and rice lost due to late season flooding in
8 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage
9 ditches located in cultivated lands and suitable for giant garter snake movement would be
10 maintained and protected within the reserve system, which would include isolated valley oak trees,
11 trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water
12 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

13 These habitat protection and restoration measures would benefit the giant garter snake and the
14 plan's species-specific biological goals and objectives would inform the near-term protection and
15 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and
16 providing connectivity between protected areas, is considered the most effective approach to giant
17 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
18 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and
19 are identified as important for the recovery of the species in the draft recovery plan for the species
20 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat
21 would focus on these two important subpopulations.

22 The species-specific biological goals and objectives would inform the near-term protection and
23 restoration efforts. The natural community restoration and protection activities are expected to be
24 concluded during the first 10 years of Plan implementation, which is close enough in time to the
25 occurrence of impacts to constitute adequate mitigation for NEPA purposes. These commitments are
26 more than sufficient to support the conclusion that the near-term effects of Alternative 9 would be
27 not be adverse under NEPA, because the number of acres required to meet the typical ratios
28 described above would be only 670 acres of aquatic communities restored, 670 acres of aquatic
29 communities protected, and 4,934 acres of upland communities protected.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
34 *Restoration of Temporarily Affected Natural Communities*, *AMM16 Giant Garter Snake*, and *AMM37*
35 *Recreation*. All of these AMMs include elements that avoid or minimize the risk of BDCP activities
36 affecting habitats and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes
37 the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
38 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

39 **Late Long-Term Timeframe**

40 Based on modeled habitat, the study area supports approximately 31,281 acres of aquatic and
41 53,285 acres of upland habitat for giant garter snake. Alternative 9 as a whole would result in the
42 permanent loss of and temporary effects on 1,012 acres of aquatic habitat and 3,485 acres of upland
43 habitat for giant garter snake during the term of the plan (3% of the total aquatic habitat and 6% of

1 the total upland habitat in the study area). The locations of these losses are described above in the
2 analyses of individual conservation measures.

3 The BDCP has committed to protecting 8,000 acres of grassland and 48,625 acres of cultivated lands
4 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of
5 grasslands in the study area. Lands to be protected and restored specifically for the giant garter
6 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated
7 lands including at least 500 acres of rice) in CZ 2, and acres of rice or habitat of equivalent value in
8 CZ 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under
9 Objective GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create
10 connections from the Coldani Marsh/White Slough population to other areas in the giant garter
11 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value would
12 be protected and restored for the giant garter snake under Objective GGS3.1 to achieve a 1:1 ratio of
13 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice
14 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of
15 high-value habitat targeted specifically for giant garter snake, the protection and restoration of
16 other natural communities is expected to provide additional restoration of 4,430 acres and
17 protection of 3,733 acres of garter snake habitat.

18 Protection and management of cultivated lands (CM3 and CM11) would also benefit the giant garter
19 snake by providing connectivity and maintaining irrigation and drainage channels that provide
20 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake
21 movement habitat on the protected cultivated lands is proportional to the modeled habitat on
22 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support
23 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by
24 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

25 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the
26 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter
27 snake. Protecting and expanding existing giant garter snake subpopulations, and providing
28 connectivity between protected areas, is considered the most effective approach to giant garter
29 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
30 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area
31 and are identified as important for the recovery of the species in the draft recovery plan for the
32 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake
33 habitat would focus on these two important subpopulations.

34 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
35 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
36 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal
37 perennial aquatic, tidal freshwater emergent wetland, alkali seasonal wetland, grassland, and vernal
38 pool complex that could overlap with the species model, would result in the restoration of 3,450
39 acres of aquatic and 980 acres of upland modeled habitat for giant garter snake. In addition,
40 protection of cultivated land, grassland, alkali seasonal wetland, and vernal pool complex could
41 overlap with the species model and would result in the protection of 1,547 acres of aquatic and
42 2,185 acres of upland giant garter snake modeled habitat.

43 **NEPA Effects:** In the near-term, the loss of giant garter snake habitat under Alternative 9 would not
44 be adverse because the BDCP has committed to protecting and restoring the acreage required to

1 meet the typical mitigation ratios described above. In the late long-term, the losses of giant garter
2 snake associated with Alternative 9, in the absence of other conservation actions, would represent
3 an adverse effect as a result of habitat modification of a special-status species and potential for
4 direct mortality. However, with habitat protection and restoration associated with the conservation
5 components, guided by landscape-scale goals and objectives and AMM1–AMM7, AMM10, AMM16,
6 and AMM37, the effects of Alternative 9 as a whole on giant garter snake would not be adverse.

7 ***CEQA Conclusion:***

8 ***Near-Term Timeframe***

9 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
10 the near-term BDCP conservation strategy has been evaluated to determine whether it would
11 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
12 effects of construction would be less than significant under CEQA.

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14 acres of upland habitat for giant garter snake in the study area during the near-term. These effects
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16 781 acres of upland habitat), Yolo Bypass fisheries improvements (CM2, 83 acres of aquatic and 458
17 acres of upland habitat), from tidal restoration (CM4, 111 acres of aquatic and 1,193 acres of upland
18 habitat), and conservation hatcheries (CM18, 35 acres of upland habitat). The aquatic habitat losses
19 would occur in tidal and nontidal wetland natural communities and rice fields. The upland habitat
20 losses would occur in cropland and grassland communities. In addition, approximately 98 miles of
21 irrigation and drainage channels providing giant garter snake movement habitat would be removed.
22 The habitat model likely overestimates the relative value of irrigation and drainage canals in the
23 vicinity of White Slough and south due to its proximity to records that likely represent single
24 displaced snakes, not viable populations.

25 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
26 and that are identified in the biological goals and objectives for giant garter snake in Chapter 3 of the
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29 restored, 670 acres of aquatic habitat should be protected, and 4,934 acres of upland habitat should
30 be protected for giant garter snake to mitigate the near-term losses.

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32 1,140 acres of upland habitat, and to protection of at least 16,900 acres of upland habitat. Lands to
33 be protected and restored in the near-term specifically for the giant garter snake total 3,900 acres
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42 Yolo Bypass as a result of CM2) (Objective GGS3.1). An unknown number of irrigation and drainage
43 ditches located in cultivated lands and suitable for giant garter snake movement would be
44 maintained and protected within the reserve system, which would include isolated valley oak trees,

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2 conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3).

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4 plan's species-specific biological goals and objectives would inform the near-term protection and
5 restoration efforts. Protecting and expanding existing giant garter snake subpopulations, and
6 providing connectivity between protected areas, is considered the most effective approach to giant
7 garter snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
8 Slough subpopulations are the only known populations of giant garter snakes in the Plan Area and
9 are identified as important for the recovery of the species in the draft recovery plan for the species
10 (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake habitat
11 would focus on these two important subpopulations.

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13 restoration efforts. The natural community restoration and protection activities are expected to be
14 concluded during the first 10 years of Plan implementation, which is close enough in time to the
15 occurrence of impacts to constitute adequate mitigation for CEQA purposes. These commitments are
16 more than sufficient to support the conclusion that the near-term effects of Alternative 9 would be
17 not be adverse under CEQA, because the number of acres required to meet the typical ratios
18 described above would be only 670 acres of aquatic communities restored, 670 acres of aquatic
19 communities protected, and 4,934 acres of upland communities protected.

20 The Plan also includes commitments to implement AMM1-AMM7, AMM10, AMM16, and AMM37. All
21 of these AMMs include elements that avoid or minimize the risk of BDCP activities affecting habitats
22 and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
23 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
24 *AMMs, and CMs*, of the Final EIR/EIS.

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29 habitat for giant garter snake during the term of the plan (3% of the total aquatic habitat and 6% of
30 the total upland habitat in the study area). The locations of these losses are described above in the
31 analyses of individual conservation measures.

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33 in the study area, and restoring 25,100 acres tidal and nontidal wetlands and 2,000 acres of
34 grasslands in the study area. Lands to be protected and restored specifically for the giant garter
35 snake total 6,540 acres (1,200 acres nontidal marsh, 400 acres of grassland, 700 acres of cultivated
36 lands including at least 500 acres of rice) in CZ 2, and acres of rice or habitat of equivalent value in
37 CZ 2, CZ 4, and CZ 5. Additionally, 4,240 acres of rice or habitat equivalent (1,500 acres under
38 Objective GGS1.4 and 2,740 acres under Objective GGS3.1) would be restored or protected to create
39 connections from the Coldani Marsh/White Slough population to other areas in the giant garter
40 snake historical range. Additionally, the 2,740 acres of rice land or habitat of equivalent value under
41 Objective GGS3.1 would be protected and restored for the giant garter snake to achieve a 1:1 ratio of
42 habitat conserved to habitat affected (habitat affected includes uplands periodically flooded and rice
43 lost due to late season flooding in Yolo Bypass as a result of CM2). In addition to the 6,540 acres of
44 high-value habitat targeted specifically for giant garter snake, the protection and restoration of

1 other natural communities is expected to provide additional restoration of 4,430 acres and
2 protection of 3,733 acres of garter snake habitat.

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4 snake by providing connectivity and maintaining irrigation and drainage channels that provide
5 aquatic habitat for the snake. Assuming the length of canals and ditches providing giant garter snake
6 movement habitat on the protected cultivated lands is proportional to the modeled habitat on
7 cultivated lands in the Plan Area, the 48,625 acres of protected cultivated lands would support
8 approximately 281 miles of movement habitat for the giant garter snake (2,784 miles multiplied by
9 0.101 [48,625 acres protected of 481,909 acres in Plan Area]).

10 Giant garter snake habitat would be restored and protected specifically, to conserve and expand the
11 Coldani Marsh/White Slough and Yolo Basin/Willow Slough subpopulations of the giant garter
12 snake. Protecting and expanding existing giant garter snake subpopulations, and providing
13 connectivity between protected areas, is considered the most effective approach to giant garter
14 snake conservation in the Plan Area. The Coldani Marsh/White Slough and Yolo Basin/Willow
15 Slough subpopulations are the only known subpopulations of giant garter snakes in the Plan Area
16 and are identified as important for the recovery of the species in the draft recovery plan for the
17 species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant garter snake
18 habitat would focus on these two important subpopulations.

19 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
20 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
21 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal
22 perennial aquatic, tidal freshwater emergent wetland, alkali seasonal wetland, grassland, and vernal
23 pool complex that could overlap with the species model, would result in the restoration of 3,450
24 acres of aquatic and 980 acres of upland modeled habitat for giant garter snake. In addition,
25 protection of cultivated land, grassland, alkali seasonal wetland, and vernal pool complex could
26 overlap with the species model and would result in the protection of 1,547 acres of aquatic and
27 2,185 acres of upland giant garter snake modeled habitat.

28 The BDCP also includes a number of AMM1-AMM7, AMM10, AMM16, and AMM37 directed at
29 minimizing or avoiding potential impacts on adjacent habitats during construction and operation of
30 the conservation measures. Considering the protection and restoration provisions, which would
31 provide acreages of new or enhanced habitat in amounts greater than necessary to compensate for
32 habitats lost to construction and restoration activities, implementation of Alternative 9 as a whole
33 would not result in a substantial adverse effect through habitat modifications and would not
34 substantially reduce the number or restrict the range of the species. Therefore, the loss of giant
35 garter snake habitat and potential mortality of snakes would have a less-than-significant impact on
36 giant garter snake under CEQA.

37 **Impact BIO-50: Indirect Effects of Plan Implementation on Giant Garter Snake**

38 Construction activities outside the project footprint but within 200 feet of construction associated
39 with water conveyance facilities, conservation components and ongoing habitat enhancement, as
40 well as operation and maintenance of above-ground water conveyance facilities, including the
41 transmission facilities, could result in ongoing periodic postconstruction disturbances with localized
42 effects on giant garter snake habitat, and temporary noise and visual disturbances over the term of
43 the BDCP. These potential effects would be minimized or avoided through AMM1-AMM7, AMM10,
44 AMM16, and AMM37, which would be in effect throughout the plan's construction phase.

1 The use of mechanical equipment during water conveyance facilities construction could cause the
2 accidental release of petroleum or other contaminants that could affect giant garter snake or its
3 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to giant garter snake
4 habitat could also have a negative effect on the species or its prey. AMM1–AMM6 would minimize
5 the likelihood of such spills occurring and would ensure measures are in place to prevent runoff
6 from the construction area and potential effects of sediment or dust on giant garter snake or its
7 prey.

8 Covered activities have the potential to exacerbate bioaccumulation of mercury in covered species
9 that feed on aquatic species, including giant garter snake. The operational impacts of new flows
10 under CM1 were analyzed to assess potential effects on mercury concentration and bioavailability.
11 Results indicated that changes in total mercury levels in water and fish tissues due to future
12 operational conditions were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and
13 5D.4-5).

14 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to
15 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
16 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
17 floodplains. Thus, BDCP restoration activities that create newly inundated areas could increase
18 bioavailability of mercury. Increased methylmercury associated with natural community and
19 floodplain restoration may indirectly affect giant garter snake, which feeds on small fishes, tadpoles,
20 and small frogs, especially introduced species, such as small bullfrogs (*Rana catesbeiana*) and their
21 larvae, carp (*Cyprinus carpio*), and mosquitofish (*Gambusia affinis*). In general, the highest
22 methylation rates are associated with high tidal marshes that experience intermittent wetting and
23 drying and associated anoxic conditions (Alpers et al. 2008). Along with avoidance and minimization
24 measures and adaptive management and monitoring, *CM12 Methylmercury Management* is expected
25 to reduce the amount of methylmercury resulting from the restoration of natural communities and
26 floodplains.

27 Extant populations of giant garter snake within the study area are known only from the upper Yolo
28 Basin and at the Coldani Marsh/White Slough area. Davis et al. (2007) found mercury
29 concentrations in fish at White Slough (and the Central Delta in general) to be relatively low
30 compared to other areas of the Delta. No restoration activities involving flooding (and subsequent
31 methylation of mercury) are planned within the known range of the Coldani Marsh/White Slough
32 giant garter snake population. Effects on giant garter snake from increased methylmercury
33 exposures is more likely in the Yolo Basin, where some of the highest concentrations of mercury and
34 methylmercury have been documented (Foe et al. 2008). Effects from exposure to methylmercury
35 may include decreased predator avoidance, reduced success in prey capture, difficulty in shedding,
36 and reduced ability to move between shelter and foraging or thermoregulation areas (Wylie et al.
37 2009). Planned floodplain restoration activities in the Yolo Basin are expected to seasonally increase
38 methylmercury production, although production would be minimized by *CM12 Methylmercury*
39 *Mitigation*. Further, the periods of production and increased exposure to methylmercury do not
40 overlap with giant garter snake seasonal activity periods. This seasonal trend should help to
41 decrease risk to the giant garter snake, although snakes could prey on individuals that have been
42 exposed to methylmercury during the previous season.

43 The potential mobilization or creation of methylmercury within the study area varies with site-
44 specific conditions and would need to be assessed at the project level. Measures described in *CM12*
45 *Methylmercury Management* include provisions for project-specific Mercury Management Plans.

1 Along with avoidance and minimization measures and adaptive management and monitoring, CM12
2 is expected to reduce the effects of methylmercury resulting from BDCP natural communities and
3 floodplain restoration on giant garter snake.

4 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 9
5 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or
6 through habitat modifications. These AMMs would also avoid and minimize effects that could
7 substantially reduce the number of giant garter snakes or restrict the species' range. Therefore, the
8 indirect effects of Alternative 9 would not have an adverse effect on giant garter snake.

9 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
10 as construction-related noise and visual disturbances could impact giant garter snake in aquatic and
11 upland habitats. The use of mechanical equipment during construction could cause the accidental
12 release of petroleum or other contaminants that could impact giant garter snake or its prey. The
13 inadvertent discharge of sediment or excessive dust adjacent to giant garter snake habitat could also
14 have a negative impact on the species or its prey. With implementation of AMM1-AMM7, AMM10,
15 AMM16, and AMM37 as part of Alternative 9 construction, operation and maintenance, the BDCP
16 would avoid the potential for substantial adverse effects on giant garter snakes, either indirectly or
17 through habitat modifications. Alternative 9 would not result in a substantial reduction in numbers
18 or a restriction in the range of giant garter snakes. Therefore, the indirect effects of Alternative 9
19 would have a less-than-significant impact on giant garter snakes.

20 Giant garter snake could experience indirect effects from increased exposure to methylmercury as a
21 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects
22 of methylmercury would not result in a substantial reduction in numbers or a restriction in the
23 range of giant garter snakes, and, therefore, would have a less-than-significant impact on giant
24 garter snakes.

25 **Impact BIO-50a: Loss of Connectivity among Giant Garter Snakes in the Coldani Marsh/White** 26 **Slough Subpopulation, Stone Lakes National Wildlife Refuge, and the Delta**

27 Implementation of Alternative 9 would not introduce a substantial barrier to the movement among
28 giant garter snakes in the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife
29 Refuge, and the Delta in the study area.

30 **NEPA Effects:** Alternative 9 would not adversely affect connectivity among giant garter snakes in the
31 Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife Refuge, and the Delta in
32 the study area.

33 **CEQA Conclusion:** Alternative 9 would have a less-than-significant impact on connectivity between
34 giant garter snakes in the study area.

35 **Impact BIO-51: Periodic Effects of Inundation of Giant Garter Snake Habitat as a Result of** 36 **Implementation of Conservation Components**

37 *CM2 Yolo Bypass Fisheries Enhancement:* The proposed changes in Fremont Weir operations would
38 occur intermittently from as early as mid-November through as late as mid-May. The core
39 operations would occur during the winter/spring period, which corresponds mostly with the giant
40 garter snake's inactive season. During this time, snakes are overwintering underground. Giant garter
41 snakes that occur in the bypass during the active season could overwinter in the bypass during the
42 inactive season: these snakes may be vulnerable to inundation of the bypass and could be drowned

1 or displaced from overwintering sites. However, most typically, Fremont Weir “notch” operations
2 would occur on the shoulders of time periods in which the Sacramento River rises enough for
3 Fremont Weir to overtop passively, without the proposed project. Project-associated inundation of
4 areas that would not otherwise have been inundated is expected to occur in no more than 30% of all
5 years, since Fremont Weir is expected to overtop the remaining estimated 70% of all years, and
6 during those years notch operations would not typically affect the maximum extent of inundation
7 that would have occurred. Currently, in more than half of all years, an area greater than the area that
8 would be inundated as a result of covered activities is already inundated during the snake’s inactive
9 season (Kirkland pers. comm.). Duration of inundation may also be an important factor determining
10 effects on overwintering giant garter snakes. Radiotelemetry studies have revealed giant garter
11 snakes surviving in burrows that had been inundated for 2 to 3 weeks, but it is unknown what
12 duration of inundation the snakes can survive while overwintering in their burrows.

13 Appendix 5.J, *Effects on Natural Communities, Wildlife, and Plants*, provides the method used to
14 estimate periodic inundation effects in the Yolo Bypass. Based on this method, periodic inundation
15 could affect giant garter snakes overwintering in upland areas ranging from an estimated 582 acres
16 of upland habitat during notch flow of 1,000 cfs to an estimated 1,402 acres during a 4,000-cfs notch
17 flow. The 4,000-cfs notch flow would affect an estimated 888 acres of high-value habitat and 514
18 acres of moderate-value habitat.

19 As noted above under the discussion of habitat loss from construction-related activities in Yolo
20 Bypass, late season flooding in the bypass may result in loss of rice habitat (considered aquatic
21 habitat for giant garter snake) by precluding the preparation and planting of a maximum of 1,662
22 acres of rice fields (BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter
23 Snake Summer Foraging Habitat in the Yolo Bypass*). This analysis concludes that the estimated loss
24 of rice is 1,662 acres which was considered to occur late long-term. Restoration and protection of
25 2,740 acres of rice land or habitat of equivalent value for the giant garter snake would achieve a 1:1
26 ratio of habitat conserved to habitat affected (habitat affected includes uplands periodically flooded
27 and rice lost due to late season flooding in Yolo Bypass as a result of CM2).

28 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 606 acres of upland
29 habitat for the giant garter snake in the south Delta (CZ 7). The upland habitat to be inundated
30 contains 432 acres of moderate-value and 174 acres of low-value habitat. The area between existing
31 levees would be breached and the newly constructed setback levees would be inundated through
32 seasonal flooding. The restored floodplain would include a range of elevations from low-lying areas
33 that flood frequently (e.g., every 1 to 2 years) to high-elevation areas that flood infrequently (e.g.,
34 every 10 years or more). There are no records of giant garter snakes in the vicinity of where
35 floodplain restoration is expected to occur.

36 Based on modeled habitat for the giant garter snake, the study area supports approximately 53,285
37 acres of upland habitat for giant garter snake. Approximately 2,008 acres of giant garter snake
38 upland habitat (4% of total upland habitat in the study area) may be adversely affected by periodic
39 flooding as a consequence of floodplain restoration and the operation of the Fremont Weir.

40 **NEPA Effects:** Periodic effects on upland habitat for giant garter snake associated with
41 implementing Alternative 9 are not expected to result in substantial adverse effects on giant garter
42 snakes, either directly or through habitat modifications, as it would not result in a substantial
43 reduction in numbers or a restriction in the range of giant garter snakes. Therefore, Alternative 9
44 would not adversely affect the species.

1 **CEQA Conclusion:** Flooding of the Yolo Bypass from CM2 and creation of seasonally inundated
 2 floodplain in various parts of the study area (CM5) would periodically affect a total of approximately
 3 2,008 acres of upland habitat for giant garter snake. The inundation could affect overwintering
 4 snakes. Project-associated inundation of areas that would not otherwise have been inundated is
 5 expected to occur in no more than 30% of all years, since Fremont Weir is expected to overtop the
 6 remaining estimated 70% of all years, and during those years notch operations would not typically
 7 affect the maximum extent of inundation. Currently, in more than half of all years, an area greater
 8 than the area that would be inundated as a result of covered activities is already inundated during
 9 the snake's inactive season (Kirkland pers. comm.). Therefore, increased inundation in the Yolo
 10 Bypass as a result of BDCP is expected to have a minimal effect on the Yolo Basin/Willow Slough
 11 subpopulation. Therefore, implementing Alternative 9, including AMM1–AMM7, AMM10, and
 12 AMM16, would not be expected to result in substantial adverse effects on giant garter snakes, either
 13 directly or through habitat modifications, because it would not result in a substantial reduction in
 14 numbers or a restriction in the range of giant garter snakes. Periodic effects of inundation under
 15 Alternative 9 would have a less-than-significant impact on the species.

16 **Western Pond Turtle**

17 The habitat model used to assess effects on the western pond turtle is based on aquatic and upland
 18 nesting and overwintering habitat. Further details regarding the habitat model, including
 19 assumptions on which the model is based, are provided in BDCP Appendix 2.A, Section 2A.30,
 20 *Western Pond Turtle*. The model quantified two types of upland nesting and overwintering habitat,
 21 including upland habitat in natural communities as well as upland in agricultural areas adjacent to
 22 aquatic habitats. Both of these upland habitat types are combined for this analysis. Factors
 23 considered in assessing the value of affected aquatic habitat are natural community type and
 24 availability of adjacent nesting and overwintering habitat. The highest value aquatic habitat types in
 25 the study area consist of nontidal freshwater perennial emergent wetlands and ponds adjacent to
 26 suitable nesting and overwintering habitat (Patterson pers. comm.). Less detail is provided on
 27 effects on dispersal habitat because, although dispersal habitat is important for maintaining and
 28 increasing distribution and genetic diversity, turtles have been known to travel over many different
 29 land cover types; therefore, this habitat type is not considered limiting. The value of dispersal
 30 habitat depends less on the habitat type itself than on the proximity of that habitat type to high-
 31 value aquatic and nesting and overwintering habitat.

32 Construction and restoration associated with Alternative 9 conservation measures would result in
 33 both temporary and permanent losses of western pond turtle modeled habitat, as indicated in Table
 34 12-9-23. The majority of these losses would take place over an extended period of time as tidal
 35 marsh is restored in the study area. Full implementation of Alternative 9 would also include the
 36 following biological objectives over the term of the BDCP to benefit the western pond turtle (BDCP
 37 Chapter 3, *Conservation Strategy*).

- 38 ● Protect or restore 142,200 acres of high-value natural communities and covered species
 39 habitats (Objective L1.1, associated with CM3).
- 40 ● Restore and protect 65,000 acres of tidal natural communities and transitional uplands to
 41 accommodate sea level rise. Minimum restoration targets for tidal natural communities in
 42 each ROA are 7,000 acres in Suisun Marsh ROA, 5,000 acres in Cache Slough ROA, 1,500 acres in
 43 Cosumnes/Mokelumne ROA, 2,100 acres in West Delta ROA, and 5,000 acres in South Delta ROA
 44 (Objective L1.3, associated with CM2, CM3, and CM4).

- 1 ● Within the 65,000 acres of tidal natural communities and transitional uplands (Objective L1.3),
2 include sufficient transitional uplands along the fringes of restored brackish and freshwater
3 tidal emergent wetlands to accommodate up to 3 feet of sea level rise where possible and allow
4 for the future upslope establishment of tidal emergent wetland communities (Objective L1.7,
5 associated with CM3, CM4, and CM8).
- 6 ● Allow floods to promote fluvial processes, such that bare mineral soils are available for natural
7 recolonization of vegetation, desirable natural community vegetation is regenerated, and
8 structural diversity is promoted, or implement management actions that mimic those natural
9 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 10 ● Allow lateral river channel migration (Objective L2.2, associated with CM3 and CM5).
- 11 ● Within the 65,000 acres of tidal natural communities (L1.3), restore or create 24,000 acres of
12 tidal freshwater emergent wetland in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7 (Objective
13 TFEWNC1.1, associated with CM3 and CM4).
- 14 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
15 and nontidal freshwater emergent wetland natural communities, with suitable habitat
16 characteristics for giant garter snake and western pond turtle (Objective NFEW/NPANC1.1,
17 associated with CM3 and CM10).
- 18 ● Protect and enhance 8,100 acres of managed wetland, 1,500 acres of which are in the Grizzly
19 Island Marsh Complex (Objective MWNC1.1, associated with CM3 and CM11).
- 20 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 21 ● Protect stock ponds and other aquatic features within protected grasslands to provide aquatic
22 breeding habitat for native amphibians and aquatic reptiles (Objective GNC1.3, associated with
23 CM3).
- 24 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
25 lands that occur in cultivated lands within the reserve system, including isolated valley oak
26 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
27 water conveyance channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated
28 with CM3 and CM11).
- 29 As explained below, with the restoration and protection of these amounts of habitat, in addition to
30 implementation of AMMs, impacts on western pond turtle would not be adverse for NEPA purposes
31 and would be less than significant for CEQA purposes.

1 **Table 12-9-23. Changes in Western Pond Turtle Modeled Habitat Associated with Alternative 9^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Aquatic (acres)	685	685	468	468	NA	NA
	Upland (acres) ^e	59	59	174	174	NA	NA
	Aquatic (miles)	1	1	8	8	NA	NA
Total Impacts CM1 (acres)		744	744	642	642	NA	NA
CM2–CM18	Aquatic (acres)	82	114	23	44	NA	NA
	Upland (acres) ^e	414	1,028	119	136	283–798	331
	Aquatic (miles)	25	109	3	4	NA	NA
Total Impacts CM2–CM18 (acres)		496	1,142	142	180	283–798	331
TOTAL IMPACTS CM1–CM18 (acres)		1,240	1,886	784	822	283–798	331

- ^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.
- ^b See discussion below for a description of applicable CMs.
- ^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.
- ^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.
- ^e Upland acres represent upland nesting and overwintering habitat acreages combined for both natural communities and agricultural lands adjacent to aquatic habitats.

NT = near-term
LLT = late long-term
NA = not applicable

2

3 **Impact BIO-52: Loss or Conversion of Habitat for and Direct Mortality of Western Pond Turtle**

4 Alternative 9 conservation measures would result in the permanent and temporary loss of up to
5 1,311 acres of aquatic habitat and 1,397 acres of upland nesting and overwintering habitat (Table
6 12-9-23). There are no western pond turtle occurrences that overlap with the CM1 footprint (Figure
7 12-16). Activities that would result in the temporary and permanent loss of western pond turtle
8 modeled habitat are conveyance facilities and transmission line construction, and establishment and
9 use of RTM, borrow, and spoils areas (CM1), Yolo Bypass improvements (CM2), tidal habitat
10 restoration (CM4), seasonally inundated floodplain restoration (CM5), and riparian restoration
11 (CM7). Habitat enhancement and management activities (CM11), such as ground disturbance or
12 removal of nonnative vegetation, could result in local adverse habitat effects. In addition,
13 maintenance activities associated with the long-term operation of the water conveyance facilities
14 and other BDCP physical facilities could degrade or eliminate western pond turtle habitat. The
15 activity accounting for most (80%) of the habitat loss or conversion would be *CM4 Tidal Natural*
16 *Communities Restoration*. Each of these individual activities is described below. A summary
17 statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual
18 conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would
2 result in the permanent loss of approximately 685 acres of aquatic habitat and 59 acres of
3 upland nesting and overwintering habitat for the western pond turtle in the study area (Table
4 12-9-23). Development of the water conveyance facilities would also result in the temporary
5 removal of up to 468 acres of aquatic habitat and 174 acres of nesting and overwintering habitat
6 for the western pond turtle in the study area (see Table 12-9-23). Approximately 1 mile of
7 channels providing western pond turtle movement habitat would be removed and 8 miles
8 would be temporarily disturbed. There are no western pond turtle occurrences that overlap
9 with the CM1 footprint but these are numerous occurrences scattered throughout the Delta. The
10 majority of the permanent loss of aquatic habitat and nesting and overwintering habitat would
11 be near Clifton Court Forebay in CZ 8. Refer to the Terrestrial Biology Map Book for a detailed
12 view of Alternative 9 construction locations. The aquatic habitat in the Clifton Court Forebay
13 area is considered to be of reasonably high-value because it consists of agricultural ditches in or
14 near known species occurrences. The nesting and overwintering and dispersal habitat that
15 would be lost consists primarily of cultivated lands with some small portion of ruderal grassland
16 habitat. Except for remnant, uncultivated patches, the cultivated lands are not suitable for
17 nesting and overwintering unless left fallow. Construction of the water conveyance facilities
18 would also affect dispersal habitat, which is primarily cultivated lands. While there are western
19 pond turtle occurrences scattered throughout CZ 3, CZ 4, CZ 5, and CZ 6, this effect is widely
20 dispersed because of the long, linear nature of the pipeline footprint.
- 21 • *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the
22 permanent and temporary removal of approximately 60 acres of aquatic habitat and 249 acres
23 of upland nesting and overwintering habitat for the western pond turtle. Approximately 4 miles
24 of channels providing western pond turtle movement habitat would be permanently or
25 temporarily removed as a result of Yolo Bypass improvements. Although there are no CNDDB
26 occurrences for western pond turtle in the Yolo Bypass, the species is known to be present in
27 the Yolo Bypass Wildlife Area (California Department of Fish and Wildlife 2013).
- 28 • *CM4 Tidal Natural Communities Restoration*: Tidal natural communities restoration would result
29 in the conversion of approximately 45 acres of aquatic habitat and 872 acres of upland nesting
30 and overwintering habitat for western pond turtle to tidal marsh. Approximately 106 miles of
31 channels providing western pond turtle movement habitat would be removed as a result of
32 restoration. Tidal habitat restoration is expected to change existing salinity and flow conditions
33 rather than lead to complete loss of aquatic habitat. Restoration of tidal flow where habitat
34 consists of the calm waters of managed freshwater ponds and wetlands could have an adverse
35 effect on the western pond turtle. Tidal restoration outside Suisun Marsh is likely to create
36 suitable, slow-moving freshwater slough and marsh habitat.

37 Although the aquatic habitat model includes all tidal perennial aquatic, tidal brackish emergent
38 wetland, and managed wetland as habitat, most of the Suisun Marsh pond turtle observations
39 have been in the interior drainage ditches or near water control structures not hydrologically
40 connected to Suisun Marsh. While the model does not include an aquatic class type called
41 *drainage ditches* and therefore an effect on this habitat type cannot be calculated, it is likely that
42 this general type of habitat accounts for a very small portion of the total modeled aquatic effects;
43 almost certainly less than 5%, or less than 287 acres of the modeled aquatic habitat affected by
44 tidal restoration. The suitable nesting and overwintering habitat that would be affected in the
45 interior of Suisun Marsh is limited, because the levees likely function as the primary nesting and
46 overwintering habitat. The nesting and overwintering habitat of highest value to be affected is

1 on the fringe of the marsh where the aquatic habitat is adjacent to undeveloped grassland
2 habitat.

3 The habitat affected in the interior Delta (West Delta and South Delta) is of low value, consisting
4 of levees and intensively farmed cultivated lands, while the Cache Slough and Cosumnes-
5 Mokelumne ROAs are less intensively farmed and have higher-value habitat for the turtle.
6 Because the estimates of the effect of tidal inundation are based on projections of where
7 restoration may occur, actual effects are expected to be lower because sites would be selected to
8 minimize effects on western pond turtle habitat (see AMM17 in Appendix 3B, *Environmental*
9 *Commitments, AMMs, and CMs*).

- 10 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
11 restoration in the south Delta (CZ 7) would result in the permanent and temporary removal of
12 approximately 53 acres of aquatic habitat and 33 acres of upland habitat for western pond
13 turtle. Approximately 3 miles of channels providing western pond turtle movement habitat
14 would be removed as a result of floodplain restoration. Although there are no CNDDB
15 occurrences for pond turtles in the areas where floodplain restoration is likely to occur, the
16 species is known to occur along the San Joaquin River to the south in the San Joaquin River
17 National Wildlife Refuge. As with CM4, the estimates of the effect of seasonal floodplain levee
18 construction and inundation are based on projections of where restoration may occur. Actual
19 effects are expected to be lower because sites would be selected to minimize effects on western
20 pond turtle habitat.

- 21 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration that is part of tidal natural
22 communities restoration in CZ 1 and CZ 2, would result in the permanent removal of 10 acres of
23 upland nesting and overwintering habitat for western pond turtle.

- 24 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
25 actions included in CM11 that are designed to enhance wildlife values in BDCP protected
26 habitats may result in localized ground disturbances that could temporarily remove small
27 amounts of western pond turtle habitat. Ground-disturbing activities, such as removal of
28 nonnative vegetation and road and other infrastructure maintenance, are expected to have
29 minor adverse effects on available western pond turtle habitat and are expected to result in
30 overall improvements to and maintenance of western pond turtle habitat values over the term
31 of the BDCP. In addition, effects would be avoided and minimized by the AMMs listed below.

32 Management of the 6,600 acres of managed wetlands to be protected for waterfowl and
33 shorebirds is not expected to result in overall adverse effects for the western pond turtle.
34 Management actions that would improve wetland quality and diversity on managed wetlands
35 include control and eradication of invasive plants; maintenance of a diversity of vegetation types
36 and elevations, including upland areas to provide flood refugia; water management and leaching
37 to reduce salinity; and enhancement of water management infrastructure (improvements to
38 enhance drainage capacity, levee maintenance). These management actions could benefit the
39 western pond turtle. The 6,600 acres of protected managed wetlands would be monitored and
40 adaptively managed to ensure that management options are implemented to avoid adverse
41 effects on the western pond turtle.

- 42 ● *Operations and maintenance*: Ongoing maintenance of BDCP facilities is expected to have little if
43 any adverse effect on the western pond turtle. Postconstruction operation and maintenance of
44 the above-ground water conveyance facilities and restoration infrastructure could result in
45 ongoing but periodic disturbances that could affect western pond turtle use where there is

1 suitable habitat in the study area. Maintenance activities would include vegetation management,
2 levee and structure repair, and regrading of roads and permanent work areas. These effects,
3 however, would be minimized by AMMs and conservation actions described below.

- 4 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
5 western pond turtles. If turtles reside where conservation measures are implemented (most
6 likely in the vicinity of aquatic habitats in the study area), the operation of equipment for land
7 clearing, construction, conveyance facilities operation and maintenance, and habitat restoration,
8 enhancement, and management could result in injury or mortality of western pond turtles.
9 However, to avoid injury or mortality, preconstruction surveys would be conducted in suitable
10 aquatic or upland habitat for the western pond turtle, and turtles found would be relocated
11 outside the construction areas, as required by the AMMs listed below.

12 The following paragraphs summarize the combined effects discussed above and describe other
13 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
14 also included.

15 ***Near-Term Timeframe***

16 Because the water conveyance facilities construction is being evaluated at the project level, the near-
17 term BDCP conservation strategy has been evaluated to determine whether it would provide
18 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
19 construction would not be adverse under NEPA.

20 Alternative 9 would temporarily and permanently remove 1,258 acres of aquatic habitat and 766
21 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These
22 effects would result from water conveyance facilities construction (CM1, 1,153 acres of aquatic and
23 233 acres of upland habitats), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of
24 upland habitats), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland
25 habitats), and riparian restoration (CM7, 4 acres of upland habitat).

26 Typical project-level mitigation ratios for those natural communities that would be affected and that
27 are identified in the biological goals and objectives for western pond turtle in Chapter 3 of the BDCP
28 would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for protection of
29 upland habitats. Using these ratios would indicate that 1,258 acres of aquatic habitat should be
30 restored, 1,258 acres of aquatic habitat should be protected, and 1,532 acres of upland habitat
31 should be protected for western pond turtle to mitigate the near-term losses.

32 The conservation strategy for western pond turtle involves restoration and protection of aquatic
33 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
34 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
35 addressed at the landscape and natural community levels. The BDCP has committed to near-term
36 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,
37 Objective NFEW/NPANC1.1, and Objective MWNC1.1) and up to 2,000 acres of upland habitat
38 (Objective GNC1.1). In addition, the protection and management of existing managed wetland
39 habitat in Suisun Marsh may increase the value of aquatic habitat. The most beneficial restoration
40 would occur in freshwater emergent wetland consisting of slow-moving slough and marsh adjacent
41 to protected, undisturbed grassland. Additionally, basking platforms would be installed as needed in
42 restored freshwater marsh to benefit the western pond turtle.

1 The natural community restoration and protection activities would be concluded in the first 10
2 years of Plan implementation, which is close enough in time to the impacts of construction to
3 constitute adequate mitigation. Because the number of acres required to meet the typical ratios
4 described above would be only 1,258 acres of aquatic communities protected, 1,258 acres restored,
5 and 1,532 acres of upland communities protected, the 24,350 acres of aquatic and 2,000 acres of
6 upland habitats restored or created in the near-term Plan goals, and the additional detail in the
7 biological goals for western pond turtle, are more than sufficient to support the conclusion that the
8 near-term impacts of habitat loss and direct mortality under Alternative 9 on western pond turtles
9 would not be adverse.

10 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
14 *Natural Communities*, and *AMM17 Western Pond Turtle*. These AMMs include elements that would
15 avoid or minimize the risk of affecting habitats and species adjacent to work areas and storage sites.
16 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in
17 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

18 **Late Long-Term Timeframe**

19 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and
20 28,864 acres of upland habitat for western pond turtle. Alternative 9 would remove 1,311 acres of
21 aquatic habitat and 1,397 acres of upland habitat for western pond turtle in the late long-term
22 timeframe.

23 Implementation of Alternative 9 as a whole would increase the extent and distribution of high-value
24 aquatic and upland nesting and overwintering habitat for western pond turtle in the study area.
25 While the extent of dispersal habitat is expected to be reduced by approximately 9%, this habitat is
26 abundant in the study area (composed primarily of cultivated lands), is not believed to be a factor
27 limiting the turtle, and would be replaced with higher-value habitats for western pond turtle.

28 The conservation strategy for western pond turtle involves restoration and protection of aquatic
29 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
30 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
31 addressed at the landscape and natural community levels. The BDCP has committed to late long-
32 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective
33 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) and up to 8,000 acres of upland habitat (Objective
34 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun
35 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in
36 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,
37 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are
38 preserved and managed as part of the 45,405 acres of protected cultivated lands described above for
39 giant garter snake are also expected to benefit the species. Additionally, basking platforms would be
40 installed as needed in restored freshwater marsh to benefit the western pond turtle.

41 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and
42 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow
43 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species
44 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to

1 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat
2 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle
3 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident
4 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the
5 rabbit.

6 The study area represents only a small portion of the range of the western pond turtle in California
7 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and
8 temporary loss or conversion of habitat for the western pond turtle, and other effects described
9 above, are not expected to result in an adverse effect on the long-term survival and recovery of
10 western pond turtle because for the following reasons.

- 11 • The study area represents a small portion of the species' entire range.
- 12 • Only 1% of the habitat in the study area would be removed or converted.

13 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
14 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
15 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal
16 perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland, grassland,
17 valley foothill riparian, that could overlap with the species model, would result in the restoration of
18 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western pond turtle. In
19 addition, protection of cultivated land, managed wetland, grassland, and valley/foothill riparian
20 could overlap with the species model and would result in the protection of 1,281 acres of aquatic
21 and 4,993 acres of upland western pond turtle modeled habitat.

22 **NEPA Effects:** In the near-term, the loss of western pond turtle habitat under Alternative 9 would
23 not be adverse because the BDCP has committed to protecting and restoring the acreage required to
24 meet the typical mitigation ratios described above. In the late long-term, the losses of western pond
25 turtle habitat associated with Alternative 9, in the absence of other conservation actions, would
26 represent an adverse effect as a result of habitat modification of a special-status species and
27 potential for direct mortality. However, with habitat protection and restoration associated with the
28 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,
29 AMM10, and AMM17, the effects of Alternative 9 as a whole on western pond turtle would not be
30 adverse.

31 **CEQA Conclusion:**

32 **Near-Term Timeframe**

33 Because *CM1 Water Facilities and Operation* construction is being evaluated at the project level, the
34 near-term BDCP conservation strategy has been evaluated to determine whether it would provide
35 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
36 construction would be less than significant under CEQA.

37 Alternative 9 would temporarily and permanently remove 1,258 acres of aquatic habitat and 766
38 acres of upland nesting and overwintering habitat for western pond turtle in the near-term. These
39 effects would result from water conveyance facilities construction (CM1, 1,153 acres of aquatic and
40 233 acres of upland habitats), Yolo Bypass improvements (CM2, 60 acres of aquatic and 249 acres of
41 upland habitats), tidal habitat restoration (CM4, 45 acres of aquatic and 280 acres of upland
42 habitats), and riparian restoration (CM7, 4 acres of upland habitat).

1 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
2 and that are identified in the biological goals and objectives for western pond turtle in Chapter 3 of
3 the BDCP would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for
4 protection of upland habitats. Using these ratios would indicate that 1,258 acres of aquatic habitat
5 should be restored, 1,258 acres of aquatic habitat should be protected, and 1,532 acres of upland
6 habitat should be protected for western pond turtle to mitigate the near-term losses.

7 The conservation strategy for western pond turtle involves restoration and protection of aquatic
8 and adjacent upland habitat, and establishment of an interconnected reserve system that provides
9 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
10 addressed at the landscape and natural community levels. The BDCP has committed to near-term
11 restoration and creation of up to 24,350 acres of aquatic habitat (Objective L1.1, Objective L1.3,
12 Objective NFEW/NPANC1.1, and Objective MWNC1.1) and up to 2,000 acres of upland habitat
13 (Objective GNC1.1). In addition, the protection and management of existing managed wetland
14 habitat in Suisun Marsh may increase the value of aquatic habitat. The most beneficial restoration
15 would occur in freshwater emergent wetland consisting of slow-moving slough and marsh adjacent
16 to protected, undisturbed grassland. Additionally, basking platforms would be installed as needed in
17 restored freshwater marsh to benefit the western pond turtle.

18 The natural community restoration and protection activities would be concluded in the first 10
19 years of Plan implementation, which is close enough in time to the impacts of construction to
20 constitute adequate mitigation for CEQA purposes. Because the number of acres required to meet
21 the typical ratios described above would be only 1,258 acres of aquatic communities protected,
22 1,258 acres of aquatic communities restored and 1,532 acres of upland communities protected, the
23 24,350 acres of aquatic and 2,000 acres of upland habitats restored or created in the near-term Plan
24 goals, and the additional detail in the biological goals for western pond turtle, are more than
25 sufficient to support the conclusion that the near-term impacts of habitat loss and direct mortality
26 under Alternative 9 on western pond turtles would be less than significant.

27 In addition, the plan also contains commitments to implement AMM1–6, AMM10, and AMM17,
28 which include elements that would avoid or minimize the risk of directly and indirectly affecting
29 habitats and species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes
30 the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
31 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

32 **Late Long-Term Timeframe**

33 Based on modeled habitat, the study area supports approximately 81,666 acres of aquatic and
34 28,864 acres of upland habitat for western pond turtle. Alternative 9 would remove 1,311 acres of
35 aquatic habitat and 1,397 acres of upland habitat for western pond turtle in the late long-term
36 timeframe.

37 Implementation of Alternative 9 as a whole would increase the extent and distribution of high-value
38 aquatic and upland nesting and overwintering habitat for western pond turtle in the study area.
39 While the extent of dispersal habitat is expected to be reduced by approximately 1%, this habitat is
40 abundant in the study area (composed primarily of cultivated lands), is not believed to be a factor
41 limiting the turtle, and would be replaced with higher-value habitats for western pond turtle.

42 The conservation strategy for western pond turtle involves restoration and protection of aquatic
43 and adjacent upland habitat, and establishment of an interconnected reserve system that provides

1 for western pond turtle dispersal. The habitat protection and restoration needs for this species are
2 addressed at the landscape and natural community levels. The BDCP has committed to late long-
3 term restoration and creation of up to 74,300 acres of aquatic habitat (Objective L1.1, Objective
4 L1.3, Objective NFEW/NPANC1.1, MWNC1.1) and up to 8,000 acres of upland habitat (Objective
5 GNC1.1). In addition, the protection and management of existing managed wetland habitat in Suisun
6 Marsh may increase the value of aquatic habitat. The most beneficial restoration would occur in
7 freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,
8 undisturbed grassland. Aquatic features (e.g., ditches and ponds) and adjacent uplands that are
9 preserved and managed as part of the 45,405 acres of protected cultivated lands described above for
10 giant garter snake are also expected to benefit the species. Additionally, basking platforms would be
11 installed as needed in restored freshwater marsh to benefit the western pond turtle.

12 Riparian and floodplain restoration would potentially increase the quantity and value of aquatic and
13 nesting and overwintering habitat. Where the floodplain is widened and restored, this would allow
14 oxbows and slow-moving side channels to form, providing suitable aquatic habitat for this species
15 (Bury and Germano 2008; Ernst and Lovich 2009). Where riparian vegetation is restored adjacent to
16 slower-moving channels, sloughs, and ponds, downed trees can provide important basking habitat
17 and cover habitat for turtles. Riparian restoration in those more interior portions of Old and Middle
18 Rivers that would be managed for riparian brush rabbit habitat have potential to benefit resident
19 western pond turtles as riparian-adjacent grassland is an important habitat characteristic for the
20 rabbit.

21 The study area represents only a small portion of the range of the western pond turtle in California
22 (which includes most all the Pacific drainages) and southern Oregon. Effects from permanent and
23 temporary loss or conversion of habitat for the western pond turtle, and other effects described
24 above, are not expected to result in an adverse effect on the long-term survival and recovery of
25 western pond turtle because for the following reasons.

- 26 • The study area represents a small portion of the species' entire range.
- 27 • Only 1% of the habitat in the study area would be removed or converted.

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
29 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
30 restoration of managed wetland, nontidal freshwater perennial emergent wetland, nontidal
31 perennial aquatic, tidal brackish emergent wetland, tidal freshwater emergent wetland, grassland,
32 valley foothill riparian, that could overlap with the species model, would result in the restoration of
33 29,738 acres of aquatic and 1,421 acres of upland modeled habitat for western pond turtle. In
34 addition, protection of cultivated land, managed wetland, grassland, and valley/foothill riparian
35 could overlap with the species model and would result in the protection of 1,281 acres of aquatic
36 and 4,993 acres of upland western pond turtle modeled habitat.

37 The loss of western pond turtle habitat associated with Alternative 9 as a whole would represent an
38 adverse effect as a result of habitat modification of a special-status species and the potential for
39 direct mortality of turtles. However, considering the habitat restoration and protection associated
40 with the conservation components, guided by landscape-scale goals and objectives and AMM1-
41 AMM6, AMM10, and AMM17, which would be in place throughout the construction phase, the loss of
42 habitat and potential mortality would not have an adverse effect on western pond turtle. Therefore,
43 the loss of western pond turtle habitat and potential mortality of turtles from Alternative 9 would
44 have a less-than-significant impact on western pond turtle.

1 **Impact BIO-53: Indirect Effects of Plan Implementation on Western Pond Turtle**

2 Indirect effects on western pond turtle within 200 feet of construction activities could temporarily
3 affect the use of aquatic habitat and upland nesting, overwintering, and dispersal habitat for the
4 western pond turtle. Construction activities outside the construction footprint but within 200 feet of
5 water conveyance facilities, conservation components and ongoing habitat enhancement, as well as
6 operation and maintenance of above-ground water conveyance facilities, including the transmission
7 facilities, could result in ongoing periodic postconstruction disturbances with localized impacts on
8 western pond turtle habitat, and temporary noise and visual disturbances over the term of the
9 BDCP. The use of mechanical equipment during water conveyance facilities construction could cause
10 the accidental release of petroleum or other contaminants that could affect western pond turtle or
11 its aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond
12 turtle aquatic habitat could also have a negative effect on the species or its prey. AMM1–AMM6, and
13 AMM10 would minimize the likelihood of such spills and would ensure measures are in place to
14 prevent runoff from the construction area and potential effects of sediment or dust on western pond
15 turtle or its prey.

16 Water operations would affect salinity gradients in Suisun Marsh. This effect mechanism cannot be
17 disaggregated from tidal natural community restoration in Suisun Marsh. It is expected that the
18 salinity of water in Suisun Marsh would generally increase as a result of water operations and
19 operation of salinity control gates to mimic a more natural water flow. Results of modeling for full
20 implementation of the BDCP show salinity to double by the late long-term compared with current
21 conditions during late fall and winter months. Changes in salinity would not be uniform across
22 Suisun Marsh, as salinity would likely be more pronounced in some tidal channels and sloughs than
23 others, and most of the salinity increase would occur during the fall and winter. Western pond
24 turtles are primarily a freshwater species, although they can also be found in brackish marsh, and
25 could respond negatively to increased salinity in Suisun Marsh. However, most of the Suisun Marsh
26 pond turtle observations have been in the interior drainage ditches or near water control structures
27 not connected to tidal channels and sloughs in Suisun Marsh which is where increases in salinity
28 would occur. Therefore, the potential effects associated with changes in salinity are not expected to
29 adversely affect western pond turtles.

30 **NEPA Effects:** With implementation of AMM1–AMM6, AMM10, and AMM17 as part of Alternative 9,
31 the BDCP would avoid the potential for substantial adverse effects on western pond turtles, either
32 directly or through habitat modifications. These AMMs would also avoid and minimize effects that
33 could substantially reduce the number of western pond turtles or restrict the species range.
34 Therefore, the indirect effects of Alternative 9 would not have an adverse effect on western pond
35 turtle.

36 **CEQA Conclusion:** Indirect effects resulting from conservation measure operations and maintenance
37 as well as construction-related noise and visual disturbances could impact western pond turtle in
38 aquatic and upland habitats. The use of mechanical equipment during construction could cause the
39 accidental release of petroleum or other contaminants that could affect western pond turtle or its
40 prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond turtle
41 habitat could also have a negative effect on the species or its prey. Changes in water salinity would
42 have a less-than-significant impact on western pond turtles because most of the salinity increases
43 would occur in areas not used extensively by western pond turtles. With implementation of AMM1–
44 AMM6, AMM10, AMM17, and AMM37 as part of Alternative 9 construction, operation, and
45 maintenance, the BDCP would avoid the potential for substantial adverse effects on western pond

1 turtles, either indirectly or through habitat modifications, and would not result in a substantial
2 reduction in numbers or a restriction in the range of western pond turtles. The indirect effects of
3 Alternative 9 would have a less-than-significant impact on western pond turtles.

4 **Impact BIO-54: Periodic Effects of Inundation of Western Pond Turtle Habitat as a Result of**
5 **Implementation of Conservation Components**

6 *CM2 Yolo Bypass Fisheries Enhancement* would result in periodic inundation that could affect
7 western pond turtle and its upland habitat. Appendix 5.J, *Effects on Natural Communities, Wildlife,*
8 *and Plants* provides the method used to estimate periodic inundation effects in the Yolo Bypass.
9 Based on this method, periodic inundation could affect from an estimated 283 acres of habitat
10 during 1,000 cfs notch flow to an estimated 798 acres of habitat during 4,000 cfs notch flow (Table
11 12-4-23). This effect would occur during an estimated maximum of 30% of years, in areas that are
12 already inundated in more than half of all years; therefore, these areas are expected to provide only
13 marginal overwintering habitat for the western pond turtle under Existing Conditions. Furthermore,
14 Yolo Bypass inundation is not expected to affect nesting western pond turtles because operations
15 would not occur during the nesting season (approximately May through October). Therefore, Yolo
16 Bypass operations are expected to have a minimal effect, if any, on western pond turtles in the Yolo
17 Bypass.

18 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate 331 acres of upland
19 habitat for the western pond turtle in the south Delta (CZ 7). Seasonal flooding in restored
20 floodplains is not expected to adversely affect aquatic and dispersal habitat, because these habitat
21 functions are expected to remain in the seasonally inundated floodplains. Floodplains are not
22 expected to be inundated during the nesting season; however, turtle hatchlings may overwinter in
23 the nest and could be affected by flooding. Restored floodplains would transition from areas that flood
24 frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or more);
25 adverse effects on turtle hatchlings are most likely at the lower elevations of the restored floodplain,
26 where frequent flooding occurs.

27 **NEPA Effects:** Periodic effects on upland habitat for western pond turtle from CM2 and CM5
28 associated with implementing Alternative 9 are not expected to result in substantial adverse effects
29 either directly or through habitat modifications because there would not be a substantial reduction
30 in numbers or a restriction in the range of western pond turtles. Therefore, Alternative 9 would not
31 adversely affect the species.

32 **CEQA Conclusion:** Flooding of the Yolo Bypass and creation of seasonally inundated floodplain in
33 various parts of the study area would periodically affect a total of up to 283–798 acres from CM2
34 and approximately 331 acres from CM5 of upland habitat for western pond turtle. These acreages
35 represent only 1% of the total upland western pond turtle habitat in the study area. Most of the
36 increase in inundation would occur in the winter and early spring months, when western pond
37 turtles may be in the water or overwintering and occupying upland habitats. Therefore,
38 implementing Alternative 9, including AMM1–AMM6, AMM10, and AMM17, would not be expected
39 to result in substantial adverse effects on western pond turtle, either directly or through habitat
40 modifications, because it would not result in a substantial reduction in numbers or a restriction in
41 the range of western pond turtles. Periodic effects of inundation under Alternative 9 would have a
42 less-than-significant impact on the species.

1 **Silvery Legless Lizard, San Joaquin Coachwhip, and Blainville’s Horned Lizard**

2 This section describes the effects of Alternative 9 on the silvery legless lizard, San Joaquin
3 coachwhip, and Blainville’s horned lizard (special-status reptiles). The habitat types used to assess
4 effects on silvery legless lizard are limited to inland sand dunes near Antioch (CZ 9 and CZ 10),
5 which would not be affected by construction or restoration activities. This species is not discussed
6 any further.

7 The habitat types used to assess effects on the San Joaquin coachwhip are alkali seasonal wetland
8 complex, grassland, and inland dune scrub west of Byron Highway (CZ 7) and west of Old River and
9 West Canal (CZ 8). The habitat types used to assess effects on the Blainville’s horned lizard are the
10 same as those for the coachwhip in CZ 7 and CZ 8. There is also potential habitat for the horned
11 lizard to occur in grassland habitat around Stone Lake (CZ 4) Although the expected range for San
12 Joaquin coachwhip and Blainville’s horned lizard extends into the study area, there are no records
13 for either of these species within the study area (California Department of Fish and Wildlife 2013).
14 In addition, historic museum records show that Blainville’s horned lizard occurrences could have been
15 extirpated within the study area (Jennings and Hayes 1994).

16 Alternative 9 is expected to result in the temporary and permanent removal of habitat that special-
17 status reptiles uses for cover and dispersal (Table 12-9-24). BDCP actions that could affect this
18 habitat are limited to construction and maintenance of the water conveyance facilities in the vicinity
19 of Clifton Court Forebay, and grassland restoration, protection and management. Full
20 implementation of Alternative 9 would also include the following biological objectives over the term
21 of the BDCP that would also benefit special-status reptiles (BDCP Chapter 3, *Conservation Strategy*).

- 22 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
23 between existing conservation lands (Objective L1.6, associated with CM3).
- 24 ● Increase native species diversity and relative cover of native plant species, and reduce the
25 introduction and proliferation of nonnative species (Objective L2.6, associated with CM11).
- 26 ● Protect and improve habitat linkages that allow native terrestrial species to move between
27 protected habitats within and adjacent to the Plan Area (Objective L3.1, associated with CM3,
28 CM8, and CM11).
- 29 ● Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 30 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland
31 (Objective GNC1.2, associated with CM3 and CM8).

32 As explained below, with the restoration or protection of these amounts of habitat, in addition to
33 implementation of AMMs, impacts on special-status reptiles would not be adverse for NEPA
34 purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-24. Changes in Special-Status Reptile Habitat Associated with Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT ^d	CM2	CM5
CM1	Grassland ^c	20	20	10	10	NA	NA
Total Impacts CM1		20	20	10	10	NA	NA
CM2–CM18	Grassland ^c	0	0	0	0	0	0
Total Impacts CM2–CM18		0	0	0	0	0	0
TOTAL IMPACTS		20	20	10	10	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c Grassland impacts include alkali seasonal wetland complex, grassland, and inland dune scrub habitats.

^d LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^e Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-55: Loss or Conversion of Habitat for and Direct Mortality of Special-Status**
4 **Reptiles**

5 Alternative 9 conservation measures would result in the permanent and temporary loss of 30 acres
6 of potential habitat for special-status reptiles (Table 12-9-24). Water conveyance facilities and
7 transmission line construction, including establishment and use of RTM, borrow, and spoils areas,
8 (CM1) would cause the loss of special-status reptile habitat. In addition, habitat enhancement and
9 management activities (CM11), such as ground disturbance or removal of nonnative vegetation,
10 could result in local adverse habitat effects for special-status reptiles. In addition to habitat loss and
11 conversion, construction activities, such as grading, the movement of construction vehicles or heavy
12 equipment, and the installation of water conveyance facilities components and new transmission
13 lines, may result in the direct mortality, injury, or harassment of special-status reptiles, including the
14 potential crushing of individuals and disruption of essential behaviors. Construction of access roads
15 could fragment suitable habitat, impede upland movements in some areas, and increase the risk of
16 road mortality. Construction activities related to conservation components could have similar
17 affects. Each of these individual activities is described below. A summary statement of the combined
18 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure
19 discussions.

- 20 • *CM1 Water Facilities and Operation*: Development of the conveyance facilities would result in the
21 permanent loss of approximately 20 acres of habitat for special-status reptiles in the vicinity of
22 Clifton Court Forebay. Construction-related effects would temporarily disturb 10 acres of
23 suitable habitat for special-status reptiles in the study area.

- 1 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
2 actions included in *CM11* that are designed to enhance wildlife values in BDCP-protected
3 habitats may result in localized ground disturbances that could temporarily remove small
4 amounts of special-status reptile habitat. Ground-disturbing activities, such as removal of
5 nonnative vegetation and road and other infrastructure maintenance, are expected to have
6 minor adverse effects on available special-status reptile habitat and are expected to result in
7 overall improvements to and maintenance of species habitat values over the term of the BDCP.
8 These effects cannot be quantified, but are expected to be minimal and would be reduced
9 through implementation of Mitigation Measure BIO-55 *Conduct Preconstruction Surveys for*
10 *Noncovered Special-Status Reptiles and Implement Applicable AMMs*.
- 11 • Operations and maintenance: Ongoing facilities operation and maintenance is expected to have
12 little if any adverse effect on special-status reptiles. Postconstruction operation and
13 maintenance of the above-ground water conveyance facilities could result in ongoing but
14 periodic disturbances that could affect special-status reptiles' use of suitable habitat in the study
15 area. These effects, however, would be minimized with implementation of Mitigation Measure
16 BIO-55.
- 17 • Injury and direct mortality: Construction vehicles may cause injury to or mortality of special-
18 status reptiles. The operation of equipment for land clearing, construction, operation and
19 maintenance, and restoration, enhancement, and management activities could result in injury or
20 mortality. This risk is highest from late fall through early spring, when special-status reptiles are
21 not as active. However, the risk of crushing Blainville's horned lizard would not necessarily be
22 lower during the active season, because the species uses crypsis to hide from predators and
23 would be hard to spot from a moving vehicle. Seasonal risk reduction may be more appropriate
24 for the coachwhip, but there is still a risk of crushing the horned lizard during the active season.
25 In addition, both species would not be active under conditions of extreme temperatures and
26 could be taking cover in burrows or crevices or under structures such as rocks or logs (Morey
27 2000). They could also burrow beneath the soil and be crushed by vehicles. *P. blainvillii* may
28 only be active during the early morning and evening hours in the summer (Morey 2000).
29 Increased vehicular traffic associated with BDCP actions could contribute to a higher incidence
30 of road kill. However, conducting construction during the late-spring through early fall periods
31 when feasible, and when temperatures are 67–100 degrees F, and implementation of Mitigation
32 Measure BIO-55 would avoid and minimize injury or mortality of special-status reptiles during
33 construction.

34 The following paragraphs summarize the combined effects discussed above and describe other
35 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
36 also included.

37 ***Near-Term Timeframe***

38 Because the water conveyance facilities construction is being evaluated at the project level, the near-
39 term BDCP conservation strategy has been evaluated to determine whether it would provide
40 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
41 construction effects would not be adverse under NEPA.

42 Alternative 9 would remove 30 acres of grassland habitat for special-status reptiles. The typical
43 NEPA mitigation ratio (2:1 for protection) for this natural community would indicate that 60 acres
44 should be protected in the near-term to offset CM1 losses.

1 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection
2 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all
3 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and
4 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

5 Considering the BDCP conservation strategy and the implementation of Mitigation Measure BIO-55.
6 to avoid and minimize injury or mortality of special-status reptiles during construction, the
7 permanent and temporary loss of special-status reptile habitat and the potential mortality of either
8 species from Alternative 9 would not be an adverse effect.

9 ***Late Long-Term Timeframe***

10 Alternative 9 as a whole would result in the permanent loss of 30 acres of habitat for special-status
11 reptiles over the life of the plan.

12 Effects of water conveyance facilities construction would be offset through the plan's long-term
13 commitment to protect 8,000 acres of grassland, and grassland associated with alkali seasonal
14 wetlands and vernal pool complexes, and to restore 2,000 acres of grassland in the Plan Area.
15 Grassland protection would focus in particular on acquiring the largest remaining contiguous
16 patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (Objective
17 GNC1.1). This area connects to more than 620 acres of existing habitat that is protected under the
18 East Contra Costa County HCP/NCCP.

19 Other effects would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*
20 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable AMMs*. The
21 plan as a whole is expected to benefit special-status reptiles that could be present by protecting
22 potential habitat from loss or degradation that otherwise could occur with future changes in existing
23 land use. To the extent that grassland habitat is restored in CZ 8, restoration would replace
24 unsuitable special-status reptile habitat, such as cultivated land, with high-value cover, foraging, and
25 dispersal habitat. The overall effect would be beneficial because the plan would result in a net
26 increase in acreage of grassland habitat in the study area.

27 BDCP's commitment to protect the largest remaining contiguous habitat patches (including
28 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in
29 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities
30 construction.

31 ***NEPA Effects:*** In the near-term and late long-term, the loss of special-status reptile habitat under
32 Alternative 9 would be not be adverse because the BDCP has committed to protecting the acreage
33 required to meet the typical mitigation ratios described above and because of the implementation of
34 Mitigation Measure BIO-55.

35 ***CEQA Conclusion:***

36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction is being evaluated at the project level, the near-
38 term BDCP conservation strategy has been evaluated to determine whether it would provide
39 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
40 construction effects would be less than significant under CEQA.

1 Alternative 9 would remove 30 acres of grassland habitat for special-status reptiles. The typical
2 CEQA mitigation ratio (2:1 for protection) for this natural community would indicate that 60 acres
3 should be protected in the near-term to offset CM1 losses.

4 The BDCP has committed to near-term restoration of 1,140 acres of grassland (CM8) and protection
5 of up to 2,000 acres of grassland in the Plan Area (CM3). These conservation actions are all
6 associated with CM3 and CM8 and would occur in the same timeframe as CM1 construction and
7 early restoration losses, thereby avoiding adverse effects on special-status reptiles.

8 The natural community restoration and protection activities are expected to be concluded during
9 the first 10 years of Plan implementation, which would be close enough to the timing of construction
10 impacts to constitute mitigation for CEQA purposes. Considering the BDCP conservation strategy
11 and the implementation of Mitigation Measure BIO-55, the permanent and temporary loss of
12 special-status reptile habitat and the potential mortality of either species would be a less-than-
13 significant impact under CEQA.

14 **Late Long-Term Timeframe**

15 Alternative 9 as a whole would result in the permanent loss of 30 acres of habitat for special-status
16 reptiles over the life of the plan. Effects of water conveyance facilities construction would be offset
17 through the plan's long-term commitment to protect up to 8,000 acres of grassland, and grassland
18 associated with alkali seasonal wetlands and vernal pool complexes, and to restore 2,000 acres of
19 grassland in the Plan Area (Objective GNC1.1 and Objective GNC1.2). Grassland protection would
20 focus in particular on acquiring the largest remaining contiguous patches of unprotected grassland
21 habitat, which are located south of SR 4 in CZ 8 (Objective GNC1.1). This area connects to more than
22 620 acres of existing habitat that is protected under the East Contra Costa County HCP/NCCP.

23 Other effects would be reduced through implementation of Mitigation Measure BIO-55, *Conduct*
24 *Preconstruction Surveys for Noncovered Special-Status Reptiles and Implement Applicable AMMs*. The
25 plan as a whole is expected to benefit special-status reptiles that could be present by protecting
26 potential habitat from loss or degradation that otherwise could occur with future changes in existing
27 land use. To the extent that grassland habitat is restored in CZ 8, restoration would replace
28 unsuitable special-status reptile habitat, such as cultivated land, with high-value cover, foraging, and
29 dispersal habitat. The overall effect would be beneficial because the plan would result in a net
30 increase in acreage of grassland habitat in the Plan Area.

31 BDCP's commitment to protect the largest remaining contiguous habitat patches (including
32 grasslands and the grassland component of alkali seasonal wetland and vernal pool complexes) in
33 CZ 8 would sufficiently offset the adverse effects resulting from water conveyance facilities
34 construction. Considering the BDCP conservation strategy and the implementation of Mitigation
35 Measure BIO-55, the permanent and temporary loss of special-status reptile habitat and the
36 potential mortality of either species under Alternative 9 would not result in a significant impact
37 under CEQA.

38 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-** 39 **Status Reptiles and Implement Applicable AMMs**

40 DWR will retain a qualified biologist to conduct a habitat assessment in construction and
41 restoration areas that are relatively undisturbed or have a moderate to high potential to support
42 noncovered special-status reptiles (Blainville's horned lizard and San Joaquin coachwhip) in CZ

1 4, CZ 7, and CZ 8. The qualified biologist will survey for noncovered special-status reptiles in
2 areas of suitable habitat concurrent with the preconstruction surveys for covered species in CZ
3 4, CZ 7, and CZ 8. If special-status reptiles are found in work areas, the biologist will first attempt
4 to allow these species to move out of the work area on their own but if conditions do not allow
5 this, individuals will be captured by the biologist and relocated to the nearest suitable habitat
6 outside of the work area as determined in consultation with CDFW. To the extent feasible, work
7 in areas of suitable habitat for Blainville's horned lizard and San Joaquin coachwhip should not
8 be conducted during periods of cold and hot temperatures (below 67 degrees F and above 100
9 degrees F), because both species would be relatively inactive during these periods and could be
10 taking cover in loose soil, in burrows or crevices, or under structures such as rocks or logs
11 (Morey 2000). This would reduce the impact of being crushed by vehicles and equipment.

12 In addition, *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices*
13 *and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
14 *Affected Natural Communities*, will be implemented for all noncovered special-status reptiles
15 adversely affected by the BDCP to avoid, minimize, or compensate for impacts.

16 **Impact BIO-56: Indirect Effects of Plan Implementation on Special-Status Reptile Species**

17 Construction activities associated with water conveyance facilities, conservation components and
18 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
19 conveyance facilities, including the transmission facilities, could result in ongoing periodic
20 postconstruction disturbances and noise with localized effects on special-status reptiles and their
21 habitat over the term of the BDCP. In addition, construction activities could indirectly affect special-
22 status reptiles if construction resulted in the introduction of invasive weeds that create vegetative
23 cover that is too dense for the species to navigate. Construction vehicles and equipment can
24 transport in their tires and various parts under the vehicles invasive weed seeds and vegetative
25 parts from other regions to construction sites, resulting in habitat degradation. These potential
26 effects would be reduced through implementation of *AMM10 Restoration of Temporarily Affected*
27 *Natural Communities*. Water conveyance facilities operations and maintenance activities would
28 include vegetation and weed control, ground squirrel control, canal maintenance, infrastructure and
29 road maintenance, levee maintenance, and maintenance and upgrade of electrical systems. While
30 maintenance activities are not expected to remove special-status reptile habitat, operation of
31 equipment could disturb small areas of vegetation around maintained structures and could result in
32 injury or mortality of individual special-status reptiles, if present.

33 **NEPA Effects:** Implementation of the Mitigation Measure BIO-55, *Conduct Preconstruction Surveys*
34 *for Noncovered Special-Status Reptiles and Implement Applicable AMMs* would avoid the potential for
35 substantial adverse effects on these species, either indirectly or through habitat modifications. The
36 mitigation measures would also avoid and minimize effects that could substantially reduce the
37 number of special-status reptiles, or restrict either species' range. Therefore, with implementation
38 of Mitigation Measure BIO-55, the indirect effects of Alternative 9 on special-status reptiles would
39 not be adverse under NEPA.

40 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
41 as construction-related noise and visual disturbances could impact special-status reptiles. In
42 addition, construction activities could indirectly affect special-status reptiles if construction resulted
43 in the introduction of invasive weeds that create vegetative cover that is too dense for the species to
44 navigate. Water conveyance facilities operations and maintenance activities, such as vegetation and

1 weed control, and road maintenance, are not expected to remove special-status reptile habitat, but
2 operation of equipment could disturb small areas of vegetation around maintained structures and
3 could result in injury or mortality of individual special-status reptiles, if present.

4 With implementation of Mitigation Measure BIO-55 as part of Alternative 9 construction, operation,
5 and maintenance, the BDCP would avoid the potential for significant effects on special-status reptile
6 species, either indirectly or through habitat modifications, and would not result in a substantial
7 reduction in numbers or a restriction in the range of either species. With implementation of
8 Mitigation Measure BIO-55, the indirect effects of Alternative 9 would have a less-than-significant
9 impact on special-status reptiles.

10 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**
11 **Status Reptiles and Implement Applicable AMMs**

12 See description of Mitigation Measure BIO-55 under Impact BIO-55.

13 **California Black Rail**

14 This section describes the effects of Alternative 9, including water conveyance facilities construction
15 and implementation of other conservation components, on the California black rail. The habitat
16 model used to assess effects for the California black rail is based on primary breeding habitat and
17 secondary habitat. Primary (breeding) habitat for this species within the Delta includes all
18 *Schoenoplectus* and *Typha*-dominated tidal and nontidal freshwater emergent wetland in patches
19 greater than 0.55 acre (essentially instream islands of the San Joaquin River and its tributaries and
20 White Slough Wildlife Area). In Suisun Marsh, primary habitat includes all *Schoenoplectus* and
21 *Typha*-dominated, and *Salicornia*-dominated patches greater than 0.55 acre, with the exception that
22 all low marsh habitats dominated by *Schoenoplectus acutus* and *S. californicus* and all managed
23 wetlands, in general, are considered secondary habitat with lesser ecological value. Upland
24 transitional zones, providing refugia during high tides, within 150 feet of the tidal wetland edge
25 were also included as secondary habitat. Secondary habitats generally provide only a few ecological
26 functions such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland
27 transition zones), while primary habitats provide multiple functions, including breeding, effective
28 predator cover, and valuable foraging opportunities.

29 Construction and restoration associated with Alternative 9 conservation measures would result in
30 both temporary and permanent losses of California black rail modeled habitat as indicated in Table
31 12-9-25. Full implementation of Alternative 9 would also include the following conservation actions
32 over the term of the BDCP to benefit the California black rail (BDCP Chapter 3 Section 3.3, *Biological*
33 *Goals and Objectives*).

- 34
- 35 ● Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11, including at
36 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
37 with CM4).
 - 38 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
39 and/or 7 (Objective TFEWNC1.1, associated with CM4).
 - 40 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
41 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
 - 42 ● Create 1,700 acres of black rail habitat between restored tidal freshwater emergent wetlands
and transitional uplands to provide upland refugia (Objective CBR1.1, associated with CM4).

- 1 • Create topographic heterogeneity in restored tidal brackish and freshwater emergent wetlands
2 (Objectives TBEWNC1.4 and TFEWNC2.2, associated with CM4).
- 3 • Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
4 natural community within the reserve system (Objective TBEWNC2.1, associated with CM11).

5 As explained below, with the restoration and protection of these amounts of habitat, in addition to
6 natural community enhancement and management commitments (including *CM12 Methylmercury*
7 *Management*) and implementation of AMM1–AMM7, *AMM38 California Black Rail*, and *AMM27*
8 *Selenium Management*, impacts on the California black rail would not be adverse for NEPA purposes
9 and would be less than significant for CEQA purposes.

10 **Table 12-9-25. Changes in California Black Rail Modeled Habitat Associated with Alternative 9**
11 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	15	15	296	296	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		15	15	296	296	NA	NA
CM2–CM18	Primary	76	84	0	0	0	0
	Secondary	986	3,044	0	0	0	6
Total Impacts CM2–CM18		1,062	3,128	0	0	09	6
TOTAL IMPACTS		1,077	3,143	296	296		

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

12

13 **Impact BIO-57: Loss or Conversion of Habitat for and Direct Mortality of California Black Rail**

14 Alternative 9 conservation measures would result in the combined permanent loss or conversion
15 and temporary loss of up to 395 acres of modeled primary habitat, and up to 3,044 acres of modeled
16 secondary habitat for California black rail (Table 12-9-25). Conservation measures that would result
17 in these losses are conveyance facilities and transmission line construction, and establishment and
18 use of borrow and spoil areas (CM1) and tidal habitat restoration (CM4). Habitat enhancement and
19 management activities (CM11) activities, which include ground disturbance or removal of nonnative
20 vegetation, could result in local adverse habitat effects. In addition, maintenance activities
21 associated with the long-term operation of the water conveyance facilities and other BDCP physical
22 facilities could degrade or eliminate California black rail habitat. Each of these individual activities is

1 described below. A summary statement of the combined NEPA effects, and a CEQA conclusion follow
2 the individual conservation measure discussions.

- 3 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would
4 result in the combined permanent and temporary loss of up to 311 acres of modeled California
5 black rail primary habitat, (15 acres of permanent loss, 296 acres of temporary loss)y habitat,
6 Table 12-9-25). Activities that would permanently impact black rail habitat consist of instream
7 island channel dredging. Permanent losses of habitat would occur from the dredging of Victoria
8 Canal. Although the channel dredging in Middle River would avoid the majority of the instream
9 islands, small portions of these islands would be permanently affected by this activity.
10 Temporary disturbances of California black rail habitat would primarily occur from dredging
11 activities in Middle River, which would cause temporary disturbances from dredging equipment
12 use, turbidity, and other temporary effects. The CM1 permanent construction footprint overlaps
13 with 16 California black rail occurrences in Middle River. Three of these occurrences overlap
14 with the channel dredging footprint, and 13 occurrences are located in temporary dredging
15 work areas. *AMM38 California Black Rail* would minimize potential effects of construction on
16 nesting California black rail. Refer to the Terrestrial Biology Map Book for a detailed view of
17 Alternative 9 construction locations.
- 18 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction or channel modification from fish passage
19 improvements associated with the Yolo Bypass would result in the permanent removal of
20 approximately 5 acres of primary California black rail habitat in CZ 2. There are no occurrences
21 of California black rail that intersect with the CM1 footprint. The loss is expected to occur during
22 the first 10 years of Alternative 9 implementation.
- 23 • *CM4 Tidal Natural Communities Restoration*: California black rail modeled habitat would be
24 affected by tidal marsh restoration. Some California black rail modeled habitat would be
25 permanently lost such that it no longer serves as habitat, while other modeled habitat would
26 change value through conversion from one habitat type to another. Tidal habitat restoration site
27 preparation and inundation would result in the permanent loss of 79 acres of primary habitat
28 and 3,044 acres of secondary habitat for California black rail. Of the 79 acres of primary habitat
29 lost, an estimated 76 acres would be converted to low marsh, or secondary habitat, for the
30 species due to increased water elevations.

31 The majority of the effects of tidal natural communities restoration would occur in Suisun Marsh
32 (CZ 11). Much of the natural wetland habitat that would be removed occurs in isolated patches
33 and would be replaced by larger continuous areas of tidal wetlands that are expected to support
34 higher habitat functions for the rail than the impacted wetlands. As described in the BDCP,
35 restoration of up to 24,000 acres of tidal freshwater emergent wetland in the Delta and at least
36 6,000 acres of tidal brackish emergent wetland natural communities in CZ 11 by the late long-
37 term would benefit California black rail. The primary habitat for the species in the Delta consists
38 of inchannel islands, which are in areas that are most vulnerable to the effects of sea level rise in
39 the study area. Tidal restoration under CM4 would ensure that land is protected adjacent to
40 current habitat in the delta with the consideration of sea level rise. Tidal restoration projects
41 would include an ecotone between wetlands and transitional uplands which would provide
42 upland refugia for the species.

43 The tidal natural communities restoration would be phased through the course of the BDCP
44 restoration program to allow for recovery of some areas before the initiation of restoration
45 actions in other areas. However, California black rails have a greater use of mature tidal marshes

1 and, therefore, it would be years before the newly restored marshes provided suitable habitat
2 for the species. In the long-term, tidal natural communities restoration is expected to have little
3 to no adverse effects on California black rail habitat because the habitat removed would be
4 replaced by a greater acreage of high-value tidal wetland and, thus, is expected to provide a
5 benefit for California black rail.

- 6 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
7 actions contained in *CM11 Natural Communities Enhancement and Management* that are
8 designed to enhance wildlife values in restored and protected tidal wetland habitats may result
9 in localized ground disturbances that could temporarily remove small amounts of California
10 black rail habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
11 road and other infrastructure maintenance activities, are expected to have minor adverse effects
12 on available California black rail habitat and are expected to result in overall improvements and
13 maintenance of California black rail habitat values over the term of the BDCP. Noise and visual
14 disturbances during implementation of habitat management actions could also result in
15 temporary disturbances that affect California black rail use of the surrounding habitat. These
16 effects cannot be quantified, but would be avoided and minimized by the AMMs listed below.
17 Additional actions under CM11 include the control of nonnative predators to reduce nest
18 predation as needed.
- 19 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
20 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
21 disturbances that could affect California black rail use of the surrounding habitat in Suisun and
22 the central Delta. Maintenance activities would include vegetation management, levee and
23 structure repair, and re-grading of roads and permanent work areas. These effects, however,
24 would be reduced by AMMs and conservation actions as described below.
- 25 • *Injury and Direct Mortality*: Construction vehicle activity may cause injury or mortality to
26 California black rail. If rails are present adjacent to covered activities, the operation of
27 equipment for land clearing, construction, conveyance facilities operation and maintenance, and
28 habitat restoration, enhancement, and management could result in injury or mortality of
29 California black rail. Increased vehicular traffic associated with BDCP actions could contribute to
30 a higher incidence of road kill. However, conducting construction outside of the breeding season
31 where feasible (reducing the risk of impacting active nests), construction monitoring, and other
32 measures would be implemented to avoid and minimize injury or mortality of the species during
33 construction, as required by AMM1–AMM7 and *AMM38 California Black Rail*.

34 The following paragraphs summarize the combined effects discussed above and describe other
35 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
36 included.

37 ***Near-Term Timeframe***

38 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
39 the near-term BDCP conservation strategy has been evaluated to determine whether it would
40 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
41 effects of construction would not be adverse under NEPA. With Alternative 9 implementation, there
42 would be a loss of 1,373 acres of modeled habitat for California black rail in the study area in the
43 near-term. These effects would result from the construction of the water conveyance facilities (CM1,
44 311 acres of primary habitat), and implementing other conservation measures (*CM2 Yolo Bypass*

1 *Fisheries Enhancement and CM4 Tidal Natural Communities Restoration*—76 acres of primary
2 habitat, 986 acres of secondary habitat).

3 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
4 be affected and that are identified in the biological goals and objectives for California black rail in
5 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such
6 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.
7 Using this ratio would indicate that 311 acres of tidal natural communities should be
8 restored/created to compensate for the CM1 losses of California black rail habitat. The near-term
9 effects of other conservation actions would remove 1,062 acres of tidal natural communities,
10 therefore requiring 1,062 acres of tidal natural communities restoration using the same typical
11 NEPA and CEQA ratio (1:1 for restoration).

12 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
13 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in
14 the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are all
15 associated with CM4 and would occur in the same timeframe as the construction and early
16 restoration losses, thereby avoiding adverse effects of habitat loss on California black rail. The tidal
17 brackish emergent wetland would be restored in CZ 11 among the Western Suisun/Hill Slough
18 Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton
19 Marsh complex (Objective TBEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and the tidal
20 freshwater emergent wetland would be restored in CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, and/or CZ 7
21 (Objective TFEWNC1.1). In addition, tidal brackish and tidal freshwater emergent wetlands would
22 be restored in a way that creates topographic heterogeneity and in areas that increase connectivity
23 among protected lands (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of the 4,800 acres of
24 managed wetland protected and enhanced in CZ 11 would benefit the California black rail through
25 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
26 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
27 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). These Plan
28 objectives represent performance standards for considering the effectiveness of CM4 restoration
29 actions. The acres of restoration and protection contained in the near-term Plan goals and the
30 additional detail in the biological objectives for California black rail satisfy the typical mitigation that
31 would be applied to the project-level effects of CM1, as well as mitigate the near-term effects of the
32 other conservation measures.

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
34 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
35 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
36 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM38*
37 *California Black Rail*. All of these AMMs include elements that would avoid or minimize the risk of
38 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
39 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
40 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

41 **Late Long-Term Timeframe**

42 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary
43 habitat for California black rail. Alternative 9 as a whole would result in the permanent loss of and
44 temporary effects on 395 acres of primary habitat and 3,044 acres of secondary habitat for

1 California black rail during the term of the Plan (2% of the total primary habitat in the study area
 2 and 17% of the total secondary habitat in the study area). The locations of these losses are described
 3 above in the analyses of individual conservation measures. The Plan includes conservation
 4 commitments through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000
 5 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres
 6 of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). These
 7 tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse
 8 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh
 9 vegetation with dense, tall stands of pickleweed and bulrush cover serving as primary habitat for
 10 California black rail in Suisun Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of
 11 upland refugia for California black rail would be created between the restored tidal freshwater
 12 emergent wetlands and transitional uplands to provide cover from predators (Objectives
 13 TBEWNC1.4, TFEWNC2.2, and CBR1.1). Portions of the 8,100 acres of managed wetland protected
 14 and enhanced in CZ 11 as part of *CM3 Natural Communities Protection and Restoration* would benefit
 15 the California black rail through the enhancement of degraded areas (such as areas of bare ground
 16 or marsh where the predominant vegetation consists of invasive species such as perennial
 17 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
 18 (Objective MWNC1.1). Additional pressures on the species such as loss of habitat from invasive
 19 species and mortality from nest predators would also be addressed through the BDCP. Perennial
 20 pepperweed, which outcompetes suitable nesting habitat for California black rail (such as
 21 pickleweed) would be reduced to no more than 10% cover in the tidal brackish emergent wetland
 22 natural community within CZ 11 (TBEWNC2.1). In addition, nonnative predators would be
 23 controlled to reduce nest predation if necessary through *CM11 Natural Communities Enhancement*
 24 *and Management*.

25 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
 26 *Plant Species*) estimates that the restoration and protection actions discussed above would result in
 27 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for
 28 California black rail and the protection of 275 acres of secondary habitat for the species.

29 **NEPA Effects:** The loss of California black rail habitat and potential direct mortality of this special-
 30 status species under Alternative 9 would represent an adverse effect in the absence of other
 31 conservation actions. However, with habitat protection and restoration associated with CM4, guided
 32 by the biological objectives for the species and by *AMM1 Worker Awareness Training, AMM2*
 33 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
 34 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 35 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM38*
 36 *California Black Rail*, which would be in place throughout the construction period, the effects of
 37 Alternative 9 as a whole on California black rail would not be adverse under NEPA.

38 **CEQA Conclusion:**

39 **Near-Term Timeframe**

40 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 41 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 42 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 43 effects of construction would be less than significant under CEQA. With Alternative 9
 44 implementation, there would be a loss of 1,373 acres of modeled habitat for California black rail in

1 the study area in the near-term. These effects would result from the construction of the water
2 conveyance facilities (CM1, 311 acres of primary habitat), and implementing other conservation
3 measures (*CM2 Yolo Bypass Fisheries Enhancement* and *CM4 Tidal Natural Communities*
4 *Restoration*—76 acres of primary habitat, 986 acres of secondary habitat).

5 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
6 be affected and that are identified in the biological goals and objectives for California black rail in
7 Chapter 3 of the BDCP would be 1:1 for restoration/creation of wetland natural communities such
8 as tidal freshwater emergent wetland, tidal brackish emergent wetland, and managed wetland.
9 Using this ratio would indicate that 311 acres of tidal natural communities should be
10 restored/created to compensate for the CM1 losses of California black rail habitat. The near-term
11 effects of other conservation actions would remove 1,062 acres of tidal natural communities,
12 therefore requiring 1,062 acres of tidal natural communities restoration using the same typical
13 NEPA and CEQA ratio (1:1 for restoration).

14 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
15 wetland, 8,850 acres of tidal freshwater emergent wetland, and 4,800 acres of managed wetland in
16 the Plan Area (Table 3-4 in Chapter 3). These conservation actions are all associated with CM4 and
17 would occur in the same timeframe as the construction and early restoration losses, thereby
18 avoiding adverse effects of habitat loss on California black rail. The tidal brackish emergent wetland
19 would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the Suisun
20 Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex (Objective
21 TBEWNC1.1) and the tidal freshwater emergent wetland would be restored in CZ 1, CZ 2, CZ 4, CZ 5,
22 CZ 6, and/or CZ 7 (Objective TFEWNC1.1). In addition, tidal brackish and tidal freshwater emergent
23 wetlands would be restored in a way that creates topographic heterogeneity and in areas that
24 increase connectivity among protected lands (Objectives TBEWNC1.4 and TFEWNC2.2). Portions of
25 the 4,800 acres of managed wetland protected and enhanced in CZ 11 would benefit the California
26 black rail through the enhancement of degraded areas (such as areas of bare ground or marsh where
27 the predominant vegetation consists of invasive species such as perennial pepperweed) to
28 vegetation such as pickleweed-alkali heath-American bulrush plant associations (Objective
29 MWNC1.1). These Plan objectives represent performance standards for considering the
30 effectiveness of CM4 restoration actions.

31 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
32 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
33 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
34 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM38*
35 *California Black Rail*. All of these AMMs include elements that would avoid or minimize the risk of
36 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
37 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
38 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

39 The natural community restoration and protection activities would be concluded in the first 10
40 years of Alternative 9 implementation, which is close enough in time to the occurrence of impacts to
41 constitute adequate mitigation for CEQA purposes. In addition, *AMM38 California Black Rail* and
42 *AMM1–AMM7* would avoid and minimize potential impacts on the species from construction-related
43 habitat loss and noise and disturbance. Because the number of acres required to meet the typical
44 mitigation ratio described above would be only 3,608 acres of restored/created tidal natural
45 communities, the 10,850 acres of tidal brackish and tidal freshwater emergent wetland restoration

1 and the 4,100 acres of managed wetland protection and enhancement contained in the near-term
2 Plan goals, and the additional detail in the biological objectives for California black rail, are more
3 than sufficient to support the conclusion that the near-term impacts of habitat loss and direct
4 mortality under Alternative 9 would be less than significant under CEQA.

5 ***Late Long-Term Timeframe***

6 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary
7 habitat for California black rail. Alternative 9 as a whole would result in the permanent loss of and
8 temporary effects on 395 acres of primary habitat and 3,044 acres of secondary habitat for
9 California black rail during the term of the Plan (2% of the total primary habitat in the study area
10 and 17% of the total secondary habitat in the study area). The locations of these losses are described
11 above in the analyses of individual conservation measures. The Plan includes conservation
12 commitments through *CM4 Tidal Natural Communities Restoration* to restore or create at least 6,000
13 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1) and at least 24,000 acres
14 of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (TFEWNC1.1). These tidal
15 wetlands would be restored as a mosaic of large, interconnected and biologically diverse patches
16 and much of the restored marsh would consist of middle-and high-marsh vegetation with dense, tall
17 stands of pickleweed and bulrush cover, serving as primary habitat for California black rail in Suisun
18 Marsh (Objective TBEWNC1.1). In the Delta, at least 1,700 acres of upland refugia for California
19 black rail would be created between the restored tidal freshwater emergent wetlands and
20 transitional uplands to provide cover from predators (Objectives TBEWNC1.4, TFEWNC2.2, and
21 CBR1.1). Portions of the 8,100 acres of managed wetland protected and enhanced in CZ 11 as part of
22 *CM3 Natural Communities Protection and Restoration* would benefit the California black rail through
23 the enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
24 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
25 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). Additional
26 pressures on the species such as loss of habitat from invasive species and mortality from nest
27 predators would also be addressed through the BDCP. Perennial pepperweed, which outcompetes
28 suitable nesting habitat for California black rail (such as pickleweed) would be reduced to no more
29 than 10% cover in the tidal brackish emergent wetland natural community within CZ 11 (Objective
30 TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if
31 necessary through *CM11 Natural Communities Enhancement and Management*.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM38*
36 *California Black Rail*. All of these AMMs include elements that would avoid or minimize the risk of
37 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
38 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
39 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

40 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
41 *Plant Species*) estimates that the restoration and protection actions discussed above would result in
42 the restoration of 3,579 acres of primary habitat and 12,115 acres of secondary habitat for
43 California black rail and the protection of 275 acres of secondary habitat for the species.

1 Considering these protection and restoration provisions, which would provide acreages of new or
2 enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction
3 and restoration activities, loss of habitat or direct mortality through implementation of Alternative 9
4 would not result in a substantial adverse effect through habitat modifications and would not
5 substantially reduce the number or restrict the range of the species. Therefore, the alternative
6 would have a less-than-significant impact on California black rail.

7 **Impact BIO-58: Effects on California Black Rail Associated with Electrical Transmission** 8 **Facilities**

9 New transmission lines would increase the risk for bird-power line strikes, which could result in
10 injury or mortality of California black rail. A variety of rail species are known to suffer mortality
11 from transmission line collision, likely associated with migration and flights between foraging areas
12 (Eddleman et al 1994). Due to their wing shape and body size, rails have low to moderate flight
13 maneuverability (Bevanger 1998), increasing susceptibility to collision mortality. However, there
14 are relatively few records of California black rail collisions with overhead wires. California black
15 rails exhibit daytime site fidelity and a lack of long-distance night migration, two factors which are
16 associated with low collision risk in avian species (Eddleman et al. 1994). California black rail
17 movements in the study area are likely short, seasonal, and at low altitudes, typically less than 16
18 feet (5 meters) (Eddleman et al 1994). However, although the species may have low to moderate
19 flight maneuverability, the bird's behavior (e.g., sedentary, nonmigratory, ground-nesting and
20 foraging, solitary, no flocking, secretive) reduces potential exposure to overhead wires and
21 vulnerability to collision mortality (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird*
22 *Collisions at Proposed BDCP Powerlines*). Marking transmission lines with flight diverters that make
23 the lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
24 Drewien 1995). For example, Yee (2008) estimated that marking devices in the Central Valley could
25 reduce avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new project
26 transmission lines would be fitted with flight diverters, which would eliminate any potential for
27 mortality of California black rail individuals from powerline collisions.

28 Transmission line poles and towers also provide perching substrate for raptors, which are predators
29 on California black rail. Although there is potential for transmission lines constructed in the Delta to
30 increase perching opportunities for raptors and result in increased predation pressure on local
31 black rails, little is currently known about the seasonal movements of black rails or the potential for
32 increased predation on rails near power poles. Therefore, because of the limited area over which
33 poles would be installed relative to the amount of California black rail habitat in the Delta, it is
34 assumed that the increase risk of predation on California black rail from an increase in raptor
35 perching opportunities would be negligible.

36 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
37 adverse effect because the risk of bird strike is considered to be minimal based on the species' flight
38 behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike
39 diverters on all new powerlines and select existing powerlines, which would minimize the risk of
40 bird strike for California black rails in the Delta. The increased risk of predation on California black
41 rail from an increase in raptor perching opportunities would be negligible because of the limited
42 area over which poles would be installed relative to the amount of California black rail habitat in the
43 Delta. Therefore, the construction and operation of new transmission lines would not result in an
44 adverse effect on California black rail.

1 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
2 significant impact on California black rail because the risk of bird strike is considered to be minimal
3 based on the species' flight behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the
4 commitment to place bird strike diverters on all new powerlines, which would minimize the risk of
5 bird strike for California black rails in the Delta. The increased risk of predation on California black
6 rail from an increase in raptor perching opportunities would be negligible because of the limited
7 area over which poles would be installed relative to the amount of California black rail habitat in the
8 Delta. Therefore, the construction and operation of new transmission lines under Alternative 9
9 would result in a less-than-significant impact on California black rail.

10 **Impact BIO-59: Indirect Effects of Plan Implementation on California Black Rail**

11 **Indirect Construction-Related Effects:** Both primary and secondary habitat for California black
12 rail within the vicinity of proposed construction areas could be indirectly affected by construction
13 activities. Indirect effects associated with construction include noise, dust, and visual disturbance
14 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
15 footprint but within 500 feet from the construction edge. Construction noise above background
16 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
17 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
18 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
19 the extent to which these noise levels could affect California black rail. The use of mechanical
20 equipment during water conveyance facilities construction could cause the accidental release of
21 petroleum or other contaminants that could affect California black rail in the surrounding habitat.
22 The inadvertent discharge of sediment or excessive dust adjacent to California black rail habitat
23 could also affect the species.

24 If construction occurs during the nesting season, these indirect effects could result in the loss or
25 abandonment of nests, and mortality of any eggs and/or nestlings. However, there is a commitment
26 in AMM38 that preconstruction surveys of potential breeding habitat would be conducted within
27 700 feet of project activities, and a 500-foot no-disturbance buffer would be established around any
28 territorial call-centers during the breeding season (see Appendix 3B, *Environmental Commitments,*
29 *AMMs, and CMs*). In addition, construction would be avoided altogether if breeding territories cannot
30 be accurately delimited.

31 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients
32 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would
33 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh
34 would generally increase as a result of water operations and operations of salinity-control gates to
35 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland
36 plant communities tolerant of more brackish environments, which should be beneficial to California
37 black rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

38 **Methylmercury Exposure:** The modeled primary habitat for California black rail includes tidal
39 brackish emergent wetland and tidal freshwater emergent wetland in Suisun Marsh and the Delta
40 west of Sherman Island, and instream islands and White Slough Wildlife Area in the central Delta.
41 Black rails typically occur in the high marsh zone near the upper limit of tidal flooding in salt and
42 brackish habitats. Low marsh, managed wetlands, and the upland fringe are considered secondary
43 habitat. California black rails are a top predator in the benthic food chain; they nest and forage in
44 dense vegetation and prey on isopods, insects and arthropods from the surface of mud and

1 vegetation They also consume insects and seeds from bulrushes (*Schoenoplectus* spp.) and cattails
2 (*Typha* spp.) (Eddleman et al. 1994).

3 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
4 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
5 species would overestimate the effects on black rail. Organisms feeding within pelagic-based (algal)
6 foodwebs have been found to have higher concentrations of methylmercury than those in benthic or
7 epibenthic foodwebs; this has been attributed to food chain length and dietary segregation
8 (Grimaldo et al. 2009). Modeled effects of mercury concentrations from changes in water operations
9 under CM1 on largemouth bass did not differ substantially from existing conditions; therefore,
10 results also indicate that black rail mercury tissue concentrations would not measurably increase as
11 a result of CM1 implementation.

12 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
13 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
14 Thus, Alternative 9 restoration activities that create newly inundated areas could increase
15 bioavailability of mercury. In general, the highest methylation rates are associated with high tidal
16 marshes (primary black rail habitat) that experience intermittent wetting and drying and associated
17 anoxic conditions (Alpers et al. 2008); however, the majority of the overlap between restoration
18 areas and black rail habitat is within Suisun Marsh, where conversion of managed wetlands to tidal
19 wetlands is expected to result in an overall reduction in mercury methylation. Mercury is generally
20 elevated throughout the Delta, and restoration of the lower potential areas in total may result in
21 generalized, very low level increases of mercury. Given that some species have elevated mercury
22 tissue levels pre-BDCP, these low level increases could result in some level of effects. CM 12 would
23 be implemented to address this risk of low level increases in methylmercury that could add to the
24 current elevated tissue concentrations.

25 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
26 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
27 each restoration project. If a project is identified where there is a high potential for methylmercury
28 production that could not be fully addressed through restoration design and adaptive management,
29 alternate restoration areas would be considered. CM12 would be implemented in coordination with
30 other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury
31 Monitoring and Analysis Section. This conservation measure would include the following actions.

- 32 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
33 mercury methylation and bioavailability
- 34 ● Define design elements that minimize conditions conducive to generation of methylmercury in
35 restored areas.
- 36 ● Define adaptive management strategies that can be implemented to monitor and minimize
37 actual postrestoration creation and mobilization of methylmercury.

38 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
39 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
40 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
41 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
42 2009). The effect of selenium toxicity differs widely between species and also between age and sex
43 classes within a species. In addition, the effect of selenium on a species can be confounded by

1 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 2 2009).

3 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 4 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 5 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 6 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 7 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 8 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 9 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 10 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 11 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 12 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
 13 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 14 levels of selenium have a higher risk of selenium toxicity.

15 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 16 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 17 exacerbate bioaccumulation of selenium in avian species, including California black rail. Marsh (tidal
 18 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
 19 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP
 20 restoration activities that create newly inundated areas could increase bioavailability of selenium
 21 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
 22 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
 23 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
 24 increases in selenium concentrations in water in the Delta under any alternative. However, it is
 25 difficult to determine whether the effects of potential increases in selenium bioavailability
 26 associated with restoration-related conservation measures (CM4, CM5) would lead to adverse
 27 effects on California black rail.

28 Because of the uncertainty that exists at this programmatic level of review, there could be a
 29 substantial effect on California black rail from increases in selenium associated with restoration
 30 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
 31 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
 32 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
 33 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
 34 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
 35 separately for each restoration effort as part of design and implementation. This avoidance and
 36 minimization measure would be implemented as part of the tidal habitat restoration design
 37 schedule.

38 **NEPA Effects:** Noise and visual disturbances related to construction-related activities from
 39 conservation measures could disturb California black rail habitat adjacent to work sites. Potential
 40 effects of noise and visual disturbances on California black rail would be minimized with *AMM38*
 41 *California Black Rail*. *AMM1–AMM7*, including *AMM2 Construction Best Management Practices and*
 42 *Monitoring*, would minimize the likelihood of spills from occurring and ensure that measures were
 43 in place to prevent runoff from the construction area and to avoid negative effects of dust on the
 44 species. Implementation of Operational Scenario A, including operation of salinity-control gates, and

1 tidal habitat restoration are expected to increase water salinity in Suisun Marsh, which would be
2 expected to establish tidal marsh similar to historic conditions.

3 Changes in water operations under CM1 would not be expected to result in increased mercury
4 bioavailability or exposures to Delta foodwebs. Restoration actions that would create high and low
5 tidal marsh, which is black rail habitat, could provide biogeochemical conditions for methylation of
6 mercury in the newly inundated soils. There is potential for increased exposure of the foodwebs to
7 methylmercury in these areas, with the level of exposure dependent on the amounts of mercury
8 available in the soils and the biogeochemical conditions. However, the planned ROA's do not overlap
9 with the areas of highest mercury concentrations, which are in the in Yolo Bypass. Also, the
10 conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected to reduce the
11 overall production of methylmercury, resulting in a net benefit to species. Implementation of CM12
12 which contains measures to assess the amount of mercury before project development, followed by
13 appropriate design and adaptation management, would minimize the potential for increased
14 methylmercury exposure, and would result in no adverse effect on the species.

15 Tidal habitat restoration could result in increased exposure of California black rail to selenium. This
16 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
17 would provide specific tidal habitat restoration design elements to reduce the potential for
18 bioaccumulation of selenium and its bioavailability in tidal habitats.

19 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities and other
20 conservation measures could disturb primary and secondary California black rail habitat adjacent to
21 work sites. *AMM38 California Black Rail* would avoid and minimize impacts on California black rail
22 from noise and visual disturbance. The use of mechanical equipment during water conveyance
23 facilities construction could cause the accidental release of petroleum or other contaminants that
24 could affect California black rail in the surrounding habitat. The inadvertent discharge of sediment
25 or excessive dust adjacent to California black rail habitat could also affect the species. These impacts
26 on California black rail would be less than significant with the incorporation of AMM1-AMM7,
27 including *AMM2 Construction Best Management Practices and Monitoring*, into the BDCP.
28 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
29 habitat restoration are expected to increase water salinity in Suisun Marsh. These salinity gradient
30 changes should have a beneficial impact on California black rail through the establishment of tidal
31 marsh similar to historic conditions.

32 Tidal habitat restoration is unlikely to have a significant impact on California black rail through
33 increased exposure to methylmercury, as rails currently reside in tidal marshes where elevated
34 methylmercury levels exist. However, it is unknown what concentrations of methylmercury are
35 harmful to the species. Site-specific restoration plans in addition to monitoring and adaptive
36 management, described in *CM12 Methylmercury Management*, would address the uncertainty of
37 methylmercury levels in restored tidal marsh. Tidal habitat restoration could result in increased
38 exposure of California black rail to selenium. This effect would be addressed through the
39 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
40 restoration design elements to reduce the potential for bioaccumulation of selenium and its
41 bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 9 implementation would
42 have a less-than-significant impact on California black rail.

43 Tidal habitat restoration could result in increased exposure of California black rail to selenium. This
44 effect would be addressed through the implementation of *AMM27 Selenium Management*, which

1 would provide specific tidal habitat restoration design elements to reduce the potential for
2 bioaccumulation of selenium and its bioavailability in tidal habitats. With implementation of
3 AMM27, potential for increased selenium exposure would result in no adverse effect on the species.

4 Changes in water operations under CM1 would not be expected to result in increased mercury
5 bioavailability or exposures to Delta foodwebs. Restoration Actions that would create high and low
6 tidal marsh, which is Black Rail habitat, could provide biogeochemical conditions for methylation of
7 mercury in the newly inundated soils. There is potential for increased exposure of the foodwebs to
8 methylmercury in these areas, with the level of exposure dependent on the amounts of mercury
9 available in the soils and the biogeochemical conditions. However, the planned ROA's do not overlap
10 with the areas of highest mercury concentrations, which are in the in Yolo Bypass. Also, the
11 conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected to reduce the
12 overall production of methylmercury, resulting in a net benefit to species. Implementation of CM12
13 which contains measures to assess the amount of mercury before project development, followed by
14 appropriate design and adaptation management, would minimize the potential for increased
15 methylmercury exposure, and would result in no adverse effect on the species.

16 With these measures in place, indirect effects of plan implementation would not result in a
17 substantial adverse effect on the species through habitat modification or potential mortality of a
18 special-status species. Therefore, the indirect effects of Alternative 9 implementation would have a
19 less-than-significant impact on California black rail. No mitigation would be required.

20 **Impact BIO-60: Fragmentation of California Black Rail Habitat as a Result of Conservation** 21 **Component Implementation**

22 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create
23 temporary barriers to California black rail movements. Grading, filling, contouring and other initial
24 ground-disturbing activities could remove habitat along movement corridors used by individuals
25 and potentially temporarily reduce access to adjacent habitat areas. The temporary adverse effects
26 of fragmentation of tidal brackish emergent wetland habitat for California black rail or restoration
27 activities resulting in barriers to movement would be minimized through sequencing of *CM4 Tidal*
28 *Natural Community Restoration* activities. The tidal natural communities restoration would be
29 phased through the course of the BDCP restoration program to allow for recovery of some areas
30 before restoration actions are initiated in other areas. In addition, *AMM38 California Black Rail*
31 would avoid and minimize effects on California black rail.

32 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to
33 movement would not represent an adverse effect on California black rail as a result of habitat
34 modification of a special-status species because *CM4 Tidal Natural Communities Restoration* would
35 be phased to allow for the recovery of some areas before restoration actions are initiated in other
36 areas. In addition, *AMM38 California Black Rail* would avoid and minimize effects on California black
37 rail.

38 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to
39 movement would represent a less-than-significant impact on California black rail as a result of
40 habitat modification of a special-status species because *CM4 Tidal Natural Communities Restoration*
41 would be phased to allow for the recovery of some areas before restoration actions are initiated in
42 other areas. In addition, *AMM38 California Black Rail* would avoid and minimize impacts on
43 California black rail.

1 **Impact BIO-61: Periodic Effects of Inundation of California Black Rail Habitat as a Result of**
2 **Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would not result in the
4 periodic inundation of modeled habitat for California black rail. There are no records for California
5 black rails in the Yolo Bypass, although the species is highly secretive and the extent to which the
6 area has been surveyed for California black rails is unknown. Therefore, there is potential for the
7 species to occur in the Yolo Bypass. In addition, rails may occur in the bypass after restoration
8 activities are completed. However, periodic inundation would not result in permanent habitat loss
9 and would not prevent use of the bypass by current or future rail populations.

10 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,
11 construction of setback levees could result in increased magnitude, frequency and duration of
12 periodic inundation by up to 6 acres of modeled California black rail habitat in CZ 7. The risk of
13 changes in inundation frequency, magnitude, and duration through CM2 and CM5 affecting
14 California black rail are considered to be low, and would not be expected to result in adverse effects
15 on the species.

16 **NEPA Effects:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*
17 *Seasonally Inundated Floodplain Restoration* would not represent an adverse effect on California
18 black rail as a result of habitat modification of a special-status species because periodic inundation
19 would not result in permanent habitat loss and would not prevent use of the bypass by current or
20 future rail populations. The risk of changes in inundation frequency and duration through CM2 and
21 CM5 affecting California black rail is considered to be low.

22 **CEQA Conclusion:** Periodic inundation under *CM2 Yolo Bypass Fisheries Enhancement* and *CM5*
23 *Seasonally Inundated Floodplain Restoration* would represent a less-than-significant impact on
24 California black rail because periodic inundation would not result in permanent habitat loss and
25 would not prevent use of the bypass by current or future rail populations. The risk of changes in
26 inundation frequency and duration as a result of CM2 and CM5 affecting California black rail is
27 considered to be low.

28 **California Clapper Rail**

29 This section describes the effects of Alternative 9, including water conveyance facilities construction
30 and implementation of other conservation components, on California clapper rail. California clapper
31 rail habitat includes mostly middle marsh habitat with select emergent wetland plant alliances.
32 Secondary habitats generally provide only a few ecological functions such as foraging (low marsh)
33 or high-tide refuge (upland transition zones), while primary habitats provide multiple functions
34 including breeding, effective predator cover, and forage. Further details regarding the habitat model,
35 including assumptions on which the model is based, are provided in BDCP Appendix 2.A, *Covered*
36 *Species Accounts*.

37 Construction and restoration associated with Alternative 9 conservation measures would result in
38 both temporary and permanent losses of California clapper rail modeled habitat as indicated in
39 Table 12-9-26. Full implementation of Alternative 9 would also include the following conservation
40 actions over the term of the BDCP to benefit the California clapper rail (BDCP Chapter 3, Section 3.3,
41 *Biological Goals and Objectives*).

- Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated with CM4).

As explained below, with the restoration and protection of these amounts of habitat, in addition to natural community enhancement and management commitments (including *CM12 Methylmercury Management*) and implementation of *AMM1-AMM7*, *AMM19 California Clapper Rail*, and *AMM27 Selenium Management*, impacts on the California clapper rail would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-9-26. Changes to California Clapper Rail Modeled Habitat Associated with Alternative 9 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2-CM18	Primary	26	27	0	0	0	0
	Secondary	50	50	0	0	0	0
Total Impacts CM2-CM18		76	77	0	0	0	0
TOTAL IMPACTS		76	77	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-62: Loss or Conversion of Habitat for and Direct Mortality of California Clapper Rail

Alternative 9 conservation measures would result in the total loss or conversion of up to 77 acres of modeled clapper rail habitat consisting of 27 acres of primary habitat and 50 acres of secondary habitat (Table 12-9-26). The conservation measure that would result in these losses is tidal natural communities restoration (CM4). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would convert approximately 77 acres of modeled California clapper rail habitat (27 acres of primary habitat,

1 50 acres of secondary habitat), the majority of which would occur in CZ 11. The tidal marsh
2 restoration action would not result in the permanent loss of any California clapper rail habitat in
3 the study area. However, approximately 27 acres of primary habitat would be converted to
4 secondary low marsh habitat and 50 acres of secondary habitat would be converted to middle or
5 high marsh. Full implementation of CM4 would restore or create at least 6,000 acres of tidal
6 brackish emergent wetland in CZ 11. Tidal wetlands would be restored as a mosaic of large,
7 interconnected, and biologically diverse patches that supported a natural gradient extending
8 from subtidal to the upland fringe. Much of the restored tidal brackish emergent wetland would
9 meet the primary habitat requirements of the California clapper rail, including development of
10 mid- and high-marsh vegetation with dense, tall stands of pickleweed cover. Restoration would
11 be sequenced and spaced in a manner that minimizes any temporary, initial loss of habitat and
12 habitat fragmentation.

- 13 ● *CM11 Natural Communities Enhancement and Management*: Because the entire California
14 clapper rail population is restricted to the San Francisco Bay Area estuary, BDCP enhancement
15 and restoration actions would be expected to benefit the species by creating the potential for
16 extending its abundance and distribution in Suisun Marsh. Occupied California clapper rail
17 habitat would be monitored to determine if there is a need for predator control actions. If
18 implemented, nonnative predators would be controlled as needed to reduce nest predation and
19 to help maintain species abundance. A variety of habitat management actions included in *CM11*
20 *Natural Communities Enhancement and Management* that are designed to enhance wildlife
21 values in restored and protected tidal wetland habitats could result in localized ground
22 disturbances that could temporarily remove small amounts of California clapper rail habitat.
23 Ground-disturbing activities, such as removal of nonnative vegetation and road and other
24 infrastructure maintenance activities, would be expected to have minor adverse effects on
25 available California clapper rail habitat. These potential effects are currently not quantifiable,
26 but would be minimized with implementation *AMM19 California Clapper Rail* (see Appendix 3B,
27 *Environmental Commitments, AMMs, and CMs*).
- 28 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration
29 infrastructure could result in ongoing but periodic disturbances that could affect California
30 clapper rail use of the surrounding habitat in Suisun. Maintenance activities could include
31 vegetation management, and levee repair. These effects, however, would be reduced by AMMs
32 and conservation actions as described below.
- 33 ● *Injury and Direct Mortality*: Construction vehicle activity may cause injury or mortality to
34 California black rail. If rails are present adjacent to covered activities, the operation of
35 equipment for land clearing, and habitat restoration, enhancement, and management could
36 result in injury or mortality of California clapper rail. Operation of construction equipment could
37 result in injury or mortality of California clapper rails. Risk would be greatest to eggs and
38 nestlings susceptible to land clearing activities, nest abandonment, or increased exposure to the
39 elements or to predators. Injury to adults and fledged juveniles is less likely as these individuals
40 are expected to avoid contact with construction equipment. However, nest sites would be
41 avoided during the nesting season as required by AMM1–AMM7 and *AMM19 California Clapper*
42 *Rail*.

43 The following paragraphs summarize the combined effects discussed above and describe other
44 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
45 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
5 effects of construction would not be adverse under NEPA. There would be no impacts resulting from
6 the construction of the water conveyance facilities (CM1). However, there would be a loss of 76
7 acres of modeled habitat for California clapper rail in the study area in the near-term. These effects
8 would result from implementing *CM4 Tidal Natural Communities Restoration* (26 acres of primary
9 and 50 acres of secondary habitat).

10 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
11 CM4 and that are identified in the biological goals and objectives for California clapper rail in
12 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
13 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be
14 restored/created to compensate for the CM4 losses of California clapper rail habitat.

15 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
16 wetland in the Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation
17 actions are associated with CM4 and would occur in the same timeframe as the early restoration
18 losses, thereby avoiding adverse effects on California clapper rail. The tidal brackish emergent
19 wetland would be restored in CZ 11 among the Western Suisun/Hill Slough Marsh Complex, the
20 Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse Slough/Denverton Marsh complex
21 (Objective TBEWNC1.1) and would be restored in a way that creates topographic heterogeneity and
22 in areas that increase connectivity among protected lands (Objectives TBEWNC1.4). These biological
23 goals and objectives would inform the near-term restoration efforts and represent performance
24 standards for considering the effectiveness of restoration actions. These Plan objectives represent
25 performance standards for considering the effectiveness of CM4 restoration actions. The acres of
26 restoration contained in the near-term Plan goals satisfy the typical mitigation that would be
27 applied to the near-term effects of tidal restoration.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
32 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
33 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
34 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
35 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

36 **Late Long-Term Timeframe**

37 The habitat model indicates that the study area supports approximately 296 acres of primary and
38 6,420 acres of secondary habitat for California clapper rail. Alternative 9 as a whole would result in
39 the permanent loss of and temporary effects on 27 acres of primary habitat and 50 acres of
40 secondary habitat for California clapper rail during the term of the Plan (9% of the total primary
41 habitat in the study area and less than 1% of the total secondary habitat in the study area). The
42 locations of these losses are described above in the analyses of individual conservation measures.
43 The Plan includes a commitments through *CM4 Tidal Natural Communities Restoration* to restore or
44 create at least 6,000 acres of tidal brackish emergent wetlands for California clapper rail in Suisun

1 Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would be restored as a mosaic of large,
2 interconnected and biologically diverse patches and at least 1,500 acres of the restored marsh
3 would consist of middle-and high-marsh vegetation, serving as primary habitat for California
4 clapper rail in Suisun Marsh (Objectives TBEWNC1.1 and TBEWNC1.2). Additional pressures on the
5 species such as loss of habitat from invasive species and mortality from nest predators would also
6 be addressed through the BDCP. Perennial pepperweed, which outcompetes suitable clapper rail
7 habitat (such as pickleweed) would be reduced to no more than 10% cover in the tidal brackish
8 emergent wetland natural community within CZ 11 (Objective TBEWNC2.1). In addition, nonnative
9 predators would be controlled to reduce nest predation if necessary through *CM11 Natural*
10 *Communities Enhancement and Management*.

11 The BDCP's beneficial effects analysis (BDCP Chapter 5, *Effects Analysis*) estimates that the
12 restoration and protection actions discussed above, would result in the restoration of 1,500 acres of
13 primary habitat and 4,500 acres of secondary habitat for California clapper rail.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
18 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
19 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
20 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
21 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

22 **NEPA Effects:** In the absence of other conservation actions, the loss of California clapper rail habitat
23 associated with Alternative 9 would represent an adverse effect as a result of habitat modification
24 and potential direct mortality of a special-status species. However, with habitat protection and
25 restoration associated with CM4, guided by biological goals and objectives and by *AMM1 Worker*
26 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*
27 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*
28 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge*
29 *Operations Plan*, and *AMM19 California Clapper Rail*, which would be in place throughout the
30 construction period, the effects of Alternative 9 as a whole on California clapper rail would not be
31 adverse under NEPA.

32 **CEQA Conclusion:**

33 **Near-Term Timeframe**

34 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
35 the near-term BDCP conservation strategy has been evaluated to determine whether it would
36 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
37 effects of construction would be less than significant under CEQA. There would be no impacts
38 resulting from the construction of the water conveyance facilities (CM1). However, there would be a
39 loss of 76 acres of modeled habitat for California clapper rail in the study area in the near-term from
40 the implementation of *CM4 Tidal Natural Communities Restoration* (26 acres of primary and 50 acres
41 of secondary habitat).

42 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
43 CM4 and that are identified in the biological goals and objectives for California clapper rail in

1 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
2 Using this ratio would indicate that 76 acres of tidal brackish emergent wetland should be
3 restored/created to mitigate the CM4 losses of California clapper rail habitat.

4 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
5 wetland in the study area. These conservation actions are associated with CM4 and would occur in
6 the same timeframe as the early restoration losses, thereby avoiding adverse effects on California
7 clapper rail. The tidal brackish emergent wetland would be restored in CZ 11 among the Western
8 Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh Complex, and the Nurse
9 Slough/Denverton Marsh complex (Objective TBEWNC1.1) and would be restored in a way that
10 creates topographic heterogeneity and in areas that increase connectivity among protected lands
11 (Objectives TBEWNC1.4).

12 These biological goals and objectives would inform the near-term restoration efforts and represent
13 performance standards for considering the effectiveness of restoration actions. These Plan
14 objectives represent performance standards for considering the effectiveness of CM4 restoration
15 actions.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
20 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
21 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
22 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
23 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

24 The natural community restoration and protection activities would be concluded in the first 10
25 years of Plan implementation, which is close enough in time to the occurrence of restoration impacts
26 to constitute adequate mitigation for CEQA purposes. In addition, *AMM19 California Clapper Rail* and
27 *AMM1-AMM7* would avoid and minimize potential impacts on the species from construction-related
28 habitat loss and noise and disturbance. Because the number of acres required to meet the typical
29 mitigation ratio described above would be only 76 acres of restored tidal natural communities, the
30 2,000 acres of tidal brackish emergent wetland restoration contained in the near-term Plan goals,
31 and the additional detail in the biological objectives for California clapper rail, are more than
32 sufficient to support the conclusion that the near-term impacts of habitat loss and direct mortality
33 under Alternative 9 would be less than significant under CEQA.

34 ***Late Long-Term Timeframe***

35 The habitat model indicates that the study area supports approximately 296 acres of primary and
36 6,420 acres of secondary habitat for California clapper rail. Alternative 9 as a whole would result in
37 the permanent loss of and temporary effects on 27 acres of primary habitat and 8 acres of secondary
38 habitat for California clapper rail during the term of the Plan (9% of the total primary habitat in the
39 study area and less than 1% of the total secondary habitat in the study area). The locations of these
40 losses are described above in the analyses of individual conservation measures. The Plan includes a
41 commitment to restore or create at least 6,000 acres of tidal brackish emergent wetlands for
42 California clapper rail in Suisun Marsh in CZ 11 (Objective TBEWNC1.1). These tidal wetlands would
43 be restored as a mosaic of large, interconnected and biologically diverse patches and much of the
44 restored marsh would consist of middle-and high-marsh vegetation with dense, tall stands of

1 pickleweed, serving as primary habitat for clapper rail in Suisun Marsh (Objective TBEWNC1.1).
2 Additional pressures on the species such as loss of habitat from invasive species and mortality from
3 nest predators would also be addressed through the BDCP. Perennial pepperweed, which
4 outcompetes suitable clapper rail habitat (such as pickleweed) would be reduced to no more than
5 10% cover in the tidal brackish emergent wetland natural community within CZ 11 (Objective
6 TBEWNC2.1). In addition, nonnative predators would be controlled to reduce nest predation if
7 necessary through *CM11 Natural Communities Enhancement and Management*.

8 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
9 *Plant Species*) estimates that the restoration and protection actions discussed above, would result in
10 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat for California
11 clapper rail.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM19*
16 *California Clapper Rail*. All of these AMMs include elements that would avoid or minimize the risk of
17 affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the
18 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
19 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

20 Considering Alternative 9's protection and restoration provisions, which would provide acreages of
21 new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to
22 construction and restoration activities, loss of habitat or direct mortality through implementation of
23 Alternative 9 would not result in a substantial adverse effect through habitat modifications and
24 would not substantially reduce the number or restrict the range of California clapper rail. Therefore,
25 the alternative would have a less-than-significant impact on California clapper rail.

26 **Impact BIO-63: Indirect Effects of Plan Implementation on California Clapper Rail**

27 **Indirect Construction-Related Effects:** California clapper rail habitat within the vicinity of
28 proposed restoration areas could be indirectly affected by construction activities. Indirect effects
29 associated with construction include noise, dust, and visual disturbance caused by grading, filling,
30 contouring, and other ground-disturbing operations outside the project footprint but within 500
31 feet from the construction edge. Construction noise above background noise levels (greater than 50
32 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,
33 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
34 *Crane*, Table 4), although there are no available data to determine the extent to which these noise
35 levels could affect California clapper rail. The use of mechanical equipment during construction-
36 related restoration activities could cause the accidental release of petroleum or other contaminants
37 that could affect California clapper rail in the surrounding habitat. The inadvertent discharge of
38 sediment or excessive dust adjacent to California clapper habitat could also affect the species. If
39 construction occurs during the nesting season, these indirect effects could result in the loss or
40 abandonment of nests, and mortality of any eggs and/or nestlings. However, there is a commitment
41 in *AMM19 California Clapper Rail* that preconstruction surveys of potential breeding habitat would
42 be conducted within 500 feet of project activities, and a 500-foot no-disturbance buffer would be
43 established around any territorial call-centers during the breeding season (see Appendix 3B,

1 *Environmental Commitments, AMMs, and CMs*). In addition, construction would be avoided altogether
2 if breeding territories cannot be accurately delimited.

3 Preconstruction surveys conducted under *AMM19 California Clapper Rail* would ensure
4 construction-related noise and visual disturbances would not have an adverse effect on California
5 clapper rail. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
6 *Monitoring*, would minimize the likelihood of such spills from occurring and ensure measures were
7 in place to prevent runoff from the construction area and to avoid negative effects of dust on the
8 species. Therefore, with the implementation of AMM1–AMM7 and *AMM19 California Clapper Rail*,
9 there would be no adverse effect on California clapper rail.

10 **Salinity:** Water operations under Operational Scenario A would have an effect on salinity gradients
11 in Suisun Marsh. These effects cannot be disaggregated from tidal habitat restoration, which would
12 also cause changes in salinity gradients. It is expected that the salinity of water in Suisun Marsh
13 would generally increase as a result of water operations and operations of salinity-control gates to
14 mimic a more natural water flow. This would likely encourage the establishment of tidal wetland
15 plant communities tolerant of more brackish environments, which would be beneficial to California
16 clapper rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

17 **Methylmercury Exposure:** California clapper rail modeled habitat includes primarily middle marsh
18 habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is also used if it is
19 of high value, and low marsh provides foraging habitat for the species. California clapper rails are a
20 top predator in the benthic food chain; they forage by probing their beaks into the mud (Zembal and
21 Fancher 1988) and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects
22 (Eddleman and Conway 1998).

23 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
24 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
25 species would overestimate the effects on California clapper rail. Organisms feeding within pelagic-
26 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
27 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
28 segregation (Grimaldo et al. 2009).

29 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
30 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
31 Thus, Alternative 9 restoration activities that create newly inundated areas could increase
32 bioavailability of mercury. Concentrations of methylmercury known to be toxic to bird embryos
33 have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003);
34 however, currently, it is unknown how much of the sediment-derived methylmercury enters the
35 food chain in Suisun Marsh or what tissue concentrations are actually harmful to the California
36 clapper rail. In general, the highest methylation rates are associated with high tidal marshes that
37 experience intermittent wetting and drying and associated anoxic conditions (Alpers et al. 2008). In
38 Suisun Marsh, the conversion of managed wetlands to tidal wetlands is expected to result in an
39 overall reduction in mercury methylation. Due to the complex and very site-specific factors that
40 determine if mercury becomes mobilized into the foodweb, *CM12 Methylmercury Management* is
41 included to provide for site-specific evaluation for each restoration project. If a project is identified
42 where there is a high potential for methylmercury production that could not be fully addressed
43 through restoration design and adaptive management, alternate restoration areas would be
44 considered. CM12 would be implemented in coordination with other similar efforts to address

1 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
2 conservation measure would include the following actions.

- 3 • Assess pre-restoration conditions to determine the risk that the project could result in increased
4 mercury methylation and bioavailability.
- 5 • Define design elements that minimize conditions conducive to generation of methylmercury in
6 restored areas.
- 7 • Define adaptive management strategies that can be implemented to monitor and minimize
8 actual postrestoration creation and mobilization of methylmercury.

9 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
10 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
11 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
12 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
13 2009). The effect of selenium toxicity differs widely between species and also between age and sex
14 classes within a species. In addition, the effect of selenium on a species can be confounded by
15 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
16 2009).

17 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
18 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
19 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
20 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
21 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
22 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
23 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
24 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
25 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
26 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
27 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
28 have a higher risk of selenium toxicity.

29 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
30 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
31 exacerbate bioaccumulation of selenium in avian species, including California clapper rail. Marsh
32 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
33 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
34 Alternative 9 restoration activities that create newly inundated areas could increase bioavailability
35 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
36 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
37 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
38 increases in selenium concentrations in water in the Delta under any alternative. However, it is
39 difficult to determine whether the effects of potential increases in selenium bioavailability
40 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
41 effects on California clapper rail.

42 Because of the uncertainty that exists at this programmatic level of review, there could be a
43 substantial effect on California clapper rail from increases in selenium associated with restoration
44 activities. This effect would be addressed through the implementation of *AMM27 Selenium*

1 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
2 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
3 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
4 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
5 separately for each restoration effort as part of design and implementation. This avoidance and
6 minimization measure would be implemented as part of the tidal habitat restoration design
7 schedule.

8 **NEPA Effects:** Noise and visual disturbances related to construction-related activities from
9 conservation measures could disturb California clapper rail habitat adjacent to work sites. Potential
10 effects of noise and visual disturbances on California clapper rail would be minimized with *AMM19*
11 *California Clapper Rail*. *AMM1–AMM7*, including *AMM2 Construction Best Management Practices and*
12 *Monitoring*, would minimize the likelihood of spills from occurring and ensure that measures were
13 in place to prevent runoff from the construction area and to avoid negative effects of dust on the
14 species.

15 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
16 habitat restoration are expected to increase water salinity in Suisun Marsh, which would be
17 expected to establish tidal marsh similar to historic conditions. Tidal habitat restoration could result
18 in increased exposure of California clapper rail to selenium. This effect would be addressed through
19 the implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
20 restoration design elements to reduce the potential for bioaccumulation of selenium and its
21 bioavailability in tidal habitats.

22 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
23 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
24 the California clapper rail foodweb to methylmercury in these areas, with the level of exposure
25 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
26 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
27 to reduce the overall production of methylmercury, resulting in a net benefit to species.
28 Implementation of *CM12*, which contains measures to assess the amount of mercury before project
29 development, followed by appropriate design and adaptation management, would minimize the
30 potential for increased methylmercury exposure, and would result in no adverse effect on the
31 species.

32 The indirect effects associated with noise and visual disturbances, potential spills of hazardous
33 material, changes in salinity, and increased exposure to selenium from Alternative 9 implementation
34 would not have an adverse effect on California clapper rail.

35 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities from the
36 conservation measures could disturb approximately 542 acres of California clapper rail habitat
37 adjacent to work sites. *AMM19 California Clapper Rail* would avoid and minimize impacts on
38 California clapper rail from noise and visual disturbance. The use of mechanical equipment during
39 restoration activities could cause the accidental release of petroleum or other contaminants or the
40 inadvertent discharge of sediment or excessive dust adjacent to California clapper rail habitat could
41 also affect the species. These impacts on California clapper rail would be less than significant with
42 the incorporation of *AMM1–AMM7* into the BDCP. Implementation of Operational Scenario A,
43 including operation of salinity-control gates, and tidal habitat restoration are expected to increase
44 water salinity in Suisun Marsh. These salinity gradient changes should have a beneficial impact on

1 California clapper rail through the establishment of tidal marsh similar to historic conditions. Tidal
2 habitat restoration could result in increased exposure of California clapper rail to selenium. This
3 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
4 would provide specific tidal habitat restoration design elements to reduce the potential for
5 bioaccumulation of selenium and its bioavailability in tidal habitats.

6 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
7 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
8 the California clapper rail foodweb to methylmercury in these areas, with the level of exposure
9 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
10 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
11 to reduce the overall production of methylmercury, resulting in a net benefit to species.
12 Implementation of CM12, which contains measures to assess the amount of mercury before project
13 development, followed by appropriate design and adaptation management, would minimize the
14 potential for increased methylmercury exposure, and would result in no adverse effect on the
15 species.

16 With these measures in place, indirect effects of plan implementation would not result in a
17 substantial adverse effect on the species through habitat modification or potential mortality of a
18 special-status species. Therefore, the indirect effects of Alternative 9 implementation would have a
19 less-than-significant impact on California clapper rail.

20 **Impact BIO-64: Effects on California Clapper Rail Associated with Electrical Transmission** 21 **Facilities**

22 Isolated patches of suitable California clapper rail habitat may occur in the Plan Area as far east as
23 (but not including) Sherman Island. Home range and territory of the California clapper rail is not
24 known, but in locations outside of California, clapper rail territory ranges 0.3 acre to 8 acres (0.1 to
25 3.2 hectares) (Rush et al. 2012), indicating that known occurrences are not likely to intersect with
26 the proposed lines (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP*
27 *Transmission Lines*). The location of the current population and suitable habitat for the species make
28 collision with the proposed transmission lines highly unlikely.

29 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse
30 effect on California clapper rail because the location of the current population and suitable habitat
31 for the species would make collision with the proposed transmission lines highly unlikely.

32 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
33 significant impact on California clapper rail because the location of the current population and
34 suitable habitat for the species would make collision with the proposed transmission lines highly
35 unlikely.

36 **Impact BIO-65: Fragmentation of California Clapper Rail Habitat as a Result of Conservation** 37 **Component Implementation**

38 Restoration activities may temporarily fragment existing wetlands in Suisun Marsh and could create
39 temporary barriers to movements of California clapper rail. Grading, filling, contouring and other
40 initial ground-disturbing activities could remove habitat along movement corridors used by
41 individuals and, thus, temporarily reduce access to adjacent habitat areas. The temporary adverse
42 effects of fragmentation of tidal brackish emergent wetland habitat for California clapper rail or

1 restoration activities resulting in barriers to movement would be minimized through sequencing of
2 restoration activities to minimize effects of temporary habitat loss. In addition, *AMM19 California*
3 *Clapper Rail* would avoid and minimize effects on California clapper rail.

4 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to
5 movement would not represent an adverse effect on California clapper rail as a result of special-
6 status species habitat modification because *CM4 Tidal Natural Communities Restoration* would be
7 phased to allow for the recovery of some areas before restoration actions are initiated in other
8 areas. In addition, *AMM19 California Clapper Rail* would avoid and minimize effects on California
9 clapper rail.

10 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to
11 movement would represent a less-than-significant impact on California clapper rail as a result of
12 habitat modification of a special status species because Tidal Natural Communities Restoration
13 (CM4) would be phased to allow for the recovery of some areas before initiating restoration actions
14 in other areas. In addition, *AMM19 California Clapper Rail* would avoid and minimize
15 effects on California clapper rail.

16 **California Least Tern**

17 This section describe the effects of Alternative 9, including water conveyance facilities construction
18 and implementation of other conservation components on California least tern. California least tern
19 modeled habitat identifies foraging habitat as all tidal perennial aquatic natural community in the
20 study area. Breeding habitat is not included in the model because most of the natural shoreline in
21 the study area that historically provided nesting sites has been modified or removed.

22 Construction and restoration associated with Alternative 9 conservation measures would result in
23 both temporary and permanent losses of California least tern modeled habitat as indicated in Table
24 12-9-27. Full implementation of Alternative 9 would also include the following conservation actions
25 over the term of the BDCP to benefit California least tern (BDCP Chapter 3, Section 3.3, *Biological*
26 *Goals and Objectives*).

- 27 ● Restore and protect at least 65,000 acres of tidal natural communities and transitional uplands
28 to accommodate sea level rise (Objective L1.3, associated with CM4).
- 29 ● Within the 65,000 acres of tidal natural communities and transitional uplands, restore or create
30 tidal perennial aquatic natural community as necessary when creating tidal emergent wetland
31 (Objective TPANC1.1, associated with CM4).
- 32 ● Control invasive aquatic vegetation that adversely affects native fish habitat (Objective
33 TPANC2.1, associated with CM13).

34 Least terns currently nest on artificial fill adjacent to tidal perennial aquatic habitat in the vicinity of
35 Suisun Marsh and the west Delta, and additional nesting could occur at the edge of tidal perennial
36 waters whenever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy
37 or gravelly substrates with sparse vegetation).

38 As explained below, with the restoration and protection of tidal perennial aquatic foraging habitat,
39 in addition to natural community enhancement and management commitments (including CM12
40 *Methylmercury Management*) and implementation of AMM1–AMM7, *AMM27 Selenium Management*,
41 and mitigation to avoid impacts on terns should they nest in the study area, impacts on the

1 California least tern would not be adverse for NEPA purposes and would be less than significant for
2 CEQA purposes.

3 **Table 12-9-27. Changes in California Least Tern Modeled Habitat Associated with Alternative 9**
4 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Foraging	675	675	345	345	NA	NA
Total Impacts CM1		675	675	345	345	NA	NA
CM2–CM18	Foraging	38	46	11	16	NA	NA
Total Impacts CM2–CM18		38	46	11	16	NA	NA
TOTAL IMPACTS		713	721	356	361	NA	NA

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

5

6 **Impact BIO-66: Loss or Conversion of Habitat for and Direct Mortality of California Least Tern**

7 Alternative 9 conservation measures would result in the combined permanent and temporary loss
8 of up to 1,082 acres of modeled foraging habitat for California least tern, consisting of 721 acres of
9 permanent loss and 361 acres of temporary loss (Table 12-9-27). The conservation measures that
10 would result in these losses are construction of water conveyance facilities and operation (CM1),
11 Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5).
12 The majority of the permanent and temporary losses would occur during the first 10 years of BDCP
13 implementation, as water conveyance facilities are constructed and habitat restoration is initiated.
14 The majority of the permanent and temporary losses would occur during the first 10 years of BDCP
15 implementation, as water conveyance facilities are constructed and habitat restoration is initiated.
16 Habitat enhancement and management activities (CM11), which include ground disturbance or
17 removal of nonnative vegetation, could also result in local adverse habitat effects. In addition,
18 maintenance activities associated with the long-term operation of the water conveyance facilities
19 and other BDCP physical facilities could degrade or eliminate California least tern foraging habitat.
20 Each of these individual activities is described below. A summary statement of the combined
21 impacts, NEPA effects, and a CEQA conclusion follow the individual conservation measure
22 discussions.

- 23 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would
24 result in the combined permanent and temporary loss of up to 1,020 acres of modeled California
25 least tern aquatic foraging habitat (Table 12-9-27). Of the 1,020 acres of modeled habitat that
26 would be removed for the construction of the conveyance facilities, 345 acres would be a

1 temporary loss. Permanent impacts on California least tern foraging habitat would include canal
 2 Construction, dredging for channel enlargement, and operable barrier construction. However,
 3 impacts would not permanently remove the waterways, but would permanently modify the
 4 channel bottoms and eliminate any associated aquatic vegetation. The temporary effects on
 5 California least tern foraging habitat would occur primarily along the channels of the Middle
 6 River and Victoria Canal, where temporary work areas would be needed to support channel
 7 dredging operations. Several smaller temporary impact areas would occur where barge
 8 operations areas would be developed. The CM1 footprint does not overlap with any California
 9 least tern occurrences. Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall*
 10 *Be Avoided and Indirect Effects on Colonies Will Be Minimized*, (described below) would require
 11 preconstruction surveys and the establishment of no-disturbance buffers and would be
 12 available to address potential effects on terns were they to nest in the vicinity of the
 13 construction footprint. Refer to the Terrestrial Biology Map Book for a detailed view of
 14 Alternative 9 construction locations.

- 15 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancement
 16 would result in the permanent loss of 8 acres and the temporary loss of 11 acres of modeled
 17 aquatic foraging habitat for California least tern in CZ 2. Activities from Fremont and
 18 Sacramento Weir improvements, Putah Creek realignment, and Lisbon Weir modification could
 19 involve excavation and grading in tidal perennial aquatic areas to improve passage of fish
 20 through the bypasses. The loss is expected to occur during the first 10 years of Alternative 9
 21 implementation.
- 22 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration actions would result in the
 23 permanent loss of 36 acres of modeled aquatic foraging habitat for California least tern. An
 24 estimated 65,000 acres of tidal wetlands would be restored during tidal habitat restoration,
 25 consistent with BDCP Objective L1.3. Of these acres, an estimated 27,000 acres of tidal perennial
 26 aquatic would be restored, based on modeling conducted by ESAPWA (refer to Table 5 in BDCP
 27 Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). This restoration is consistent with
 28 BDCP Objective TPANC1.1. Tidal perennial aquatic restoration would be expected to
 29 substantially increase the primary productivity of fish, increasing the prey base for California
 30 least tern. Approximately 3,400 acres of the restoration would happen during the first 10 years
 31 of BDCP implementation, which would coincide with the timeframe of water conveyance
 32 facilities construction. The remaining restoration would be phased over the following 30 years.
 33 Some of the restoration would occur in the lower Yolo Bypass, but restoration would also be
 34 spread among the Suisun Marsh, South Delta, Cosumnes/Mokelumne and West Delta ROAs.
- 35 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 36 seasonally inundated floodplain would result in the permanent loss of 2 acres and the
 37 temporary loss of 5 acres of modeled aquatic foraging habitat for California least tern. This
 38 activity is scheduled to start following construction of water conveyance facilities, which is
 39 expected to take 10 years. Specific locations for the floodplain restoration have not been
 40 identified, but it is expected that much of the activity would occur in the south Delta along the
 41 major rivers.
- 42 ● *CM11 Natural Communities Enhancement and Management*: Noise and visual disturbances
 43 during implementation of habitat management actions could result in temporary disturbances
 44 that affect California least tern use of the surrounding habitat. These effects cannot be
 45 quantified, but are expected to be minimal because few management activities would be
 46 implemented in aquatic habitat and because terns are not expected to nest on protected lands.

1 Surveys would be conducted prior to ground disturbance in any areas that have suitable nesting
2 substrate for California least tern (flat, unvegetated areas near aquatic foraging habitat) and
3 injury mortality and noise and visual disturbance of nesting terns would be avoided and
4 minimized by the AMMs and Mitigation Measure BIO-66, *California Least Tern Nesting Colonies*
5 *Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, described below.

- 6 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
7 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
8 postconstruction disturbances, localized impacts on California least tern foraging habitat, and
9 temporary noise and disturbances over the term of the BDCP. Maintenance activities would
10 include vegetation management, levee and structure repair, and re-grading of roads and
11 permanent work areas which could be adjacent to California least tern foraging habitat. These
12 effects, however, would be reduced by AMMs listed below.
- 13 ● Injury and Direct Mortality: California least terns currently nest in the vicinity of potential
14 restoration sites in Suisun Marsh and west Delta area (CZ 10 and CZ 11). New nesting colonies
15 could establish if suitable nesting habitat is created during restoration activities (e.g., placement
16 of unvegetated fill to raise surface elevations prior to breaching levees during restoration
17 efforts). If nesting occurs where covered activities are undertaken, the operation of equipment
18 for land clearing, construction, conveyance facilities operation and maintenance, and habitat
19 restoration, enhancement, and management could result in injury or mortality of California least
20 tern. Risk of injury or disturbance would be greatest to eggs and nestlings susceptible to land-
21 clearing activities, abandonment of nests and nesting colonies, or increased exposure to the
22 elements or to predators. Injury to adults or fledged juveniles is less likely as these individuals
23 would be expected to avoid contact with construction equipment. However, injury or mortality
24 would be avoided through planning and preconstruction surveys to identify nesting colonies,
25 the design of projects to avoid locations with least tern colonies, and the provision for 500-foot
26 buffers as required by Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be*
27 *Avoided and Indirect Effects on Colonies Will Be Minimized*.

28 The following paragraph summarizes the combined effects discussed above and describe other
29 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
30 included.

31 ***Near-Term Timeframe***

32 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
33 the near-term BDCP conservation strategy has been evaluated to determine whether it would
34 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
35 the effects of construction would not be adverse under NEPA. With Alternative 9 implementation,
36 there would be a loss of 1,069 acres of modeled foraging habitat for California least tern in the study
37 area in the near-term. These effects would result from the construction of the water conveyance
38 facilities (CM1, 1,020 acres), and implementing other conservation measures (Yolo Bypass fisheries
39 improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All modeled foraging habitat
40 impacts would occur in tidal perennial aquatic natural communities.

41 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
42 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would
43 indicate that 1,069 acres of the tidal perennial aquatic natural community should be
44 restored/created to compensate for the CM1 losses of California least tern foraging habitat. The

1 near-term effects of other conservation actions would remove 49 acres of tidal perennial aquatic
2 habitat, and therefore require 49 acres of tidal perennial aquatic natural community restoration
3 using the same typical NEPA and CEQA ratio (1:1 for restoration).

4 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities
5 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3,
6 *Description of Alternatives*). This conservation action would result in the creation of approximately
7 3,400 acres of high quality tidal perennial aquatic natural community, based on modeling conducted
8 by ESAPWA (refer to Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*) (Tidal
9 perennial aquatic) restoration would occur in the same timeframe as the construction and early
10 restoration losses, thereby avoiding adverse effects on California least tern from loss of foraging
11 habitat.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3, Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
16 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
17 species habitats at or adjacent to work areas and storage sites. BDCP Appendix 3.C describes the
18 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
19 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

20 The California least tern is not a species that is covered under the BDCP. Although nesting by
21 California least tern is not expected to occur, restoration sites could attract individuals wherever
22 disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly
23 substrates with sparse vegetation). If nesting were to occur, construction activities could have an
24 adverse effect on California least tern. Mitigation Measure BIO-66, *California Least Tern Nesting*
25 *Colonies Shall be Avoided and Indirect Effects on Colonies Will be Minimized*, would be available to
26 address this adverse effect on nesting California least terns.

27 **Late Long-Term Timeframe**

28 The habitat model indicates that the study area supports approximately 86,263 acres of foraging
29 habitat for California least tern. Alternative 9 as a whole would result in the permanent loss of and
30 temporary effects on 1,082 acres of foraging habitat during the term of the Plan (1% of the total
31 habitat in the study area). The locations of these losses are described above in the analyses of
32 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*
33 *Natural Communities Restoration* would restore an estimated 27,000 acres of high quality tidal
34 perennial aquatic natural community would be restored (estimated from Table 5 in BDCP Appendix
35 3.B, *BDCP Tidal Habitat Evolution Assessment*). The restoration would occur over a wide region of
36 the study area, including within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South
37 Delta ROAs (see Figure 12-1).

38 **NEPA Effects:** The loss of California least tern foraging habitat and potential direct mortality
39 associated with Alternative 9 would represent an adverse effect in the absence of other conservation
40 actions. Although nesting by California least tern is not expected to occur, restoration sites could
41 attract individuals wherever disturbed or artificial sites mimic habitat conditions sought for nesting
42 (i.e., sandy or gravelly substrates with sparse vegetation). If nesting were to occur, construction
43 activities could have an adverse effect on California least tern. Mitigation Measure BIO-66, *California*
44 *Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies will be Minimized*, would

1 be available to address this adverse effect on nesting California least terns. With habitat restoration
2 associated with CM4 and guided by *AMM1 Worker Awareness Training, AMM2 Construction Best*
3 *Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion*
4 *and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6*
5 *Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*, which would be in place throughout
6 the construction period, the effects of Alternative 9 as a whole on California least tern would not be
7 adverse under NEPA.

8 **CEQA Conclusion:**

9 **Near-Term Timeframe**

10 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
11 the near-term BDCP conservation strategy has been evaluated to determine whether it would
12 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
13 the effects of construction would be less than significant under CEQA. With Alternative 9
14 implementation, there would be a loss of 1,069 acres of modeled foraging habitat for California least
15 tern in the study area in the near-term. These effects would result from the construction of the
16 water conveyance facilities (CM1, 1,020 acres), and implementing other conservation measures
17 (Yolo Bypass fisheries improvements [CM2], and tidal habitat restoration [CM4] - 49 acres). All
18 modeled foraging habitat impacts would occur in tidal perennial aquatic natural communities.

19 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
20 CM1 would be 1:1 for restoration/creation of tidal perennial aquatic habitat. Using this ratio would
21 indicate that 1,069 acres of the tidal perennial aquatic natural community should be
22 restored/created to compensate for the CM1 losses of California least tern foraging habitat. The
23 near-term effects of other conservation actions would remove 49 acres of tidal perennial aquatic
24 habitat, and therefore require 49 acres of tidal perennial aquatic natural community restoration
25 using the same typical NEPA and CEQA ratio (1:1 for restoration).

26 The BDCP has committed to near-term goals of restoring 19,150 acres of tidal natural communities
27 in the Plan Area through *CM4 Tidal Natural Communities Restoration* (Table 3-4 in Chapter 3).
28 Modeling conducted by ESA PWA indicates that this conservation action would result in the creation
29 of approximately 3,400 acres of high-value tidal perennial aquatic natural community (refer to Table
30 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*). Tidal perennial aquatic
31 restoration would occur in the same timeframe as the construction and early restoration losses,
32 thereby avoiding adverse effects on California least tern.

33 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
34 *Construction Best Management Practices and Monitoring, AMM3, Stormwater Pollution Prevention*
35 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment and*
36 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
37 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
38 species habitats at or adjacent to work areas and storage sites. BDCP Appendix 3.C describes the
39 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
40 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

41 Although nesting by California least tern is not expected to occur, restoration sites could attract
42 individuals wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e.,
43 sandy or gravelly substrates with sparse vegetation). If nesting were to occur, construction activities

1 could have an adverse effect on California least tern. Mitigation Measure BIO-66, *California Least*
2 *Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies will be Minimized*, would
3 reduce the impact on nesting California least terns to a less-than-significant level.

4 The natural community restoration and protection activities would be concluded in the first 10
5 years of Plan implementation, which is close enough in time to the occurrence of impacts to
6 constitute adequate mitigation for CEQA purposes. In addition, AMM1–AMM7 and Mitigation
7 Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on*
8 *Colonies will be Minimized*, would avoid and minimize potential impacts on the species from
9 construction-related habitat loss and noise and disturbance. Because the number of acres required
10 to meet the typical mitigation ratio described above would be only 2,309 acres of restored tidal
11 perennial aquatic habitat, the 3,400 acres of tidal perennial aquatic restoration estimated in the
12 near-term, are more than sufficient to support the conclusion that the near-term impacts of habitat
13 loss and direct mortality under Alternative 9 would be less than significant under CEQA.

14 **Late Long-Term Timeframe**

15 The habitat model indicates that the study area supports approximately 86,263 acres of foraging
16 habitat for California least tern. Alternative 9 as a whole would result in the permanent loss of and
17 temporary effects on 1,082 acres of foraging habitat during the term of the Plan (1% of the total
18 habitat in the study area). The locations of these losses are described above in the analyses of
19 individual conservation measures. The Plan includes conservation commitments through *CM4 Tidal*
20 *Natural Communities Restoration* to restore an estimated 27,000 acres of high-value tidal perennial
21 aquatic natural community (estimated from Table 5 in BDCP Appendix 3.B, *BDCP Tidal Habitat*
22 *Evolution Assessment*). The restoration would occur over a wide region of the study area, including
23 within the Suisun Marsh, Cosumnes/Mokelumne, Cache Creek, and South Delta ROAs (see Figure
24 12-1).

25 In the absence of other conservation actions, the loss of California least tern foraging habitat and
26 potential direct mortality associated with Alternative 9 would represent an adverse effect as a result
27 of habitat modification of a special-status species and potential for direct mortality. Although
28 nesting by California least tern is not expected to occur, restoration sites could attract individuals
29 wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or
30 gravelly substrates with sparse vegetation). If nesting were to occur, construction activities could
31 have a significant impact on California least tern. The loss of California least tern foraging habitat
32 and potential direct mortality associated with Alternative 9 would represent a significant impact in
33 the absence of other conservation actions. However, with habitat restoration associated with CM4,
34 and guided by *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices*
35 *and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control*
36 *Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of*
37 *Spoils*, *AMM7 Barge Operations Plan*, and with implementation of Mitigation Measure BIO-66,
38 *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be*
39 *Minimized*, the loss of habitat or mortality under this alternative would have a less-than-significant
40 impact on California least tern.

1 **Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and**
2 **Indirect Effects on Colonies Will Be Minimized**

3 If suitable nesting habitat for California least tern (flat unvegetated areas near aquatic foraging
4 habitat) is identified during planning level surveys, DWR will ensure that a qualified biologist
5 with experience observing the species and its nests conducts at least three preconstruction
6 surveys for this species during the nesting season. DWR will design projects to avoid the loss of
7 California least tern nesting colonies. No construction will take place within 500 feet of
8 California least tern nests during the nesting season (April 15 to August 15 or as determined
9 through surveys). Only inspection, maintenance, research, or monitoring activities may be
10 performed during the least tern breeding season in areas within or adjacent to least tern
11 breeding habitat with USFWS and CDFW approval under the supervision of a qualified biologist.

12 **Impact BIO-67: Indirect Effects of Plan Implementation on California Least Tern**

13 **Indirect Construction- and Operation-Related Effects:** Indirect effects associated with
14 construction that could affect California least tern include noise, dust, and visual disturbance caused
15 by grading, filling, contouring, and other ground-disturbing operations outside the project footprint
16 but within 500 feet from the construction edge. Construction noise above background noise levels
17 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
18 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
19 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
20 which these noise levels could affect California least tern. The use of mechanical equipment during
21 water conveyance facilities construction could cause the accidental release of petroleum or other
22 contaminants that could affect California least tern or their prey species in the surrounding habitat.
23 The inadvertent discharge of sediment or excessive dust adjacent to foraging habitat could also
24 affect the species. Noise and visual disturbance is not expected to have an adverse effect on
25 California least tern foraging behavior. As described in Mitigation Measure BIO-66, *California Least*
26 *Tern Nesting Colonies Shall Be Avoided and Indirect Effects on Colonies Will Be Minimized*, if least tern
27 nests were found during planning or preconstruction surveys, no construction would take place
28 within 500 feet of active nests. In addition, AMM1–AMM7, including construction best management
29 practices, would minimize the likelihood of spills from occurring or excessive dust being created
30 during construction. Should a spill occur, implementation of these AMMs would greatly reduce the
31 likelihood of individuals being affected.

32 **Methylmercury Exposure:** Covered activities have the potential to exacerbate the bioaccumulation
33 of mercury in the California least tern. The operational impacts of new flows under CM1 were
34 analyzed using a DSM-2 based model to assess potential effects on mercury concentration and
35 bioavailability. Largemouth bass were used as a surrogate species for this analysis and results would
36 be expected to be similar or lower for the California least tern. Results indicated that changes in total
37 mercury levels in water and large mouth bass tissues were insignificant (see BDCP Appendix 5.D,
38 Tables 5D.4-3, 5D.4-4, and 5D.4-5).

39 Marsh (tidal and nontidal) and floodplain restoration also have the potential to increase exposure to
40 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
41 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
42 flood plains. Thus, BDCP restoration activities that create newly inundated areas could increase
43 bioavailability of mercury. Increased methylmercury associated with natural community and

1 floodplain restoration may indirectly affect California least tern, via uptake through consumption of
2 prey (as described in BDCP Appendix 5.D, *Contaminants*).

3 Schwarzbach and Adelsbach (2003) investigated mercury exposure in 15 species of birds inhabiting
4 the Bay-Delta ecosystem. Among the species studied, the highest concentrations of mercury were
5 found in the eggs of piscivorous birds (terns and cormorants) that bioaccumulate mercury from
6 their fish prey. The very highest concentrations were found in Caspian and Forster's terns, especially
7 those inhabiting South San Francisco Bay. Based on three California least tern eggs collected from
8 Alameda Naval Air Station in the San Francisco Central Bay, concentrations in California least tern
9 eggs were a third (0.3 ppm) those of the eggs of the other two terns. Because of the small sample
10 size, there is a high degree of uncertainty regarding the levels of mercury that may be present in
11 California least tern eggs. If the mercury levels measured at Alameda Naval Air Station are
12 representative of the population in the San Francisco Bay, they would not be expected to result in
13 adverse effects on tern hatchlings. Hatching and fledging success were not reduced in common tern
14 eggs in Germany with mercury concentrations of 6.7 ppm (Hothem and Powell 2000).

15 Mercury is generally elevated throughout the Delta, and restoration of the lower potential areas in
16 total may result in generalized, very low level increases of mercury. Given that some species have
17 elevated mercury tissue levels pre-BDCP, these low level increases could result in some level of
18 effects. CM12, described below, will be implemented to address this risk of low level increases in
19 methylmercury which could add to the current elevated tissue concentrations.

- 20 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
21 mercury methylation and bioavailability
- 22 ● Define design elements that minimize conditions conducive to generation of methylmercury in
23 restored areas.
- 24 ● Define adaptive management strategies that can be implemented to monitor and minimize
25 actual postrestoration creation and mobilization of methylmercury.

26 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
27 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
28 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
29 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
30 2009). The effect of selenium toxicity differs widely between species and also between age and sex
31 classes within a species. In addition, the effect of selenium on a species can be confounded by
32 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
33 2009).

34 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
35 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
36 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
37 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
38 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
39 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
40 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
41 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
42 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
43 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic

1 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
2 levels of selenium have a higher risk of selenium toxicity.

3 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
4 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
5 exacerbate bioaccumulation of selenium in avian species, including California least tern. Marsh (tidal
6 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
7 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP
8 restoration activities that create newly inundated areas could increase bioavailability of selenium
9 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
10 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
11 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
12 increases in selenium concentrations in water in the Delta under any alternative. However, it is
13 difficult to determine whether the effects of potential increases in selenium bioavailability
14 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
15 effects on California least tern.

16 Because of the uncertainty that exists at this programmatic level of review, there could be a
17 substantial effect on California least tern from increases in selenium associated with restoration
18 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
19 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
20 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. Furthermore, the
21 effectiveness of selenium management to reduce selenium concentrations and/or bioaccumulation
22 would be evaluated separately for each restoration effort as part of design and implementation. This
23 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
24 design schedule.

25 **NEPA Effects:** Noise and visual disturbances within 500 feet of construction-related activities from
26 the CMs could disturb California least tern foraging habitat adjacent to work sites. Mitigation
27 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on*
28 *Colonies Will Be Minimized*, would be available to address this potential adverse effect. AMM1–
29 AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would minimize
30 the likelihood of spills from occurring and ensure that measures were in place to prevent runoff
31 from the construction area and to avoid negative effects of dust on the species. Tidal habitat
32 restoration could result in increased exposure of California least tern to selenium. This effect would
33 be addressed through the implementation of *AMM27 Selenium Management*, which would provide
34 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
35 selenium and its bioavailability in tidal habitats.

36 Changes in water operations under CM1 would not be expected to result in increased mercury
37 bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased
38 exposure of California least tern to methylmercury. There is potential for increased exposure of the
39 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
40 mercury available in the soils and the biogeochemical conditions. However, it is unknown what
41 concentrations of methylmercury are harmful to the species, and the potential for increased
42 exposure varies substantially within the study area. Implementation of CM12 which contains
43 measures to assess the amount of mercury before project development, followed by appropriate
44 design and adaptation management, would minimize the potential for increased methylmercury
45 exposure, and would result in no adverse effect on the species.

1 **CEQA Conclusion:** Noise and visual disturbances within 500 feet of construction-related activities
2 from the CMs could disturb California least tern foraging habitat adjacent to work sites.
3 Implementation of Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be*
4 *Avoided and Indirect Effects on Colonies Will Be Minimized*, would avoid this potential adverse effect.

5 AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would
6 minimize the likelihood of spills from occurring and ensure that measures were in place to prevent
7 runoff from the construction area and to avoid negative effects of dust on the species.

8 Tidal habitat restoration could result in increased exposure of California least tern to selenium. This
9 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
10 would provide specific tidal habitat restoration design elements to reduce the potential for
11 bioaccumulation of selenium and its bioavailability in tidal habitats.

12 Changes in water operations under CM1 would not be expected to result in increased mercury
13 bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could result in increased
14 exposure of California least tern to methylmercury. There is potential for increased exposure of the
15 foodwebs to methylmercury in these areas, with the level of exposure dependent on the amounts of
16 mercury available in the soils and the biogeochemical conditions. However, it is unknown what
17 concentrations of methylmercury are harmful to the species, and the potential for increased
18 exposure varies substantially within the study area. Implementation of CM12 which contains
19 measures to assess the amount of mercury before project development, followed by appropriate
20 design and adaptation management, would minimize the potential for increased methylmercury
21 exposure, and would result in no adverse effect on the species.

22 With AMM1-7, AMM12, AMM27, and CM12 in place, in addition to the implementation of Mitigation
23 Measure BIO-66, the indirect effects of plan implementation would not result in a substantial
24 adverse effect on the species through habitat modification or potential mortality of a special-status
25 species. Therefore, the indirect effects of Alternative 9 implementation would have a less-than-
26 significant impact on California least tern.

27 **Mitigation Measure BIO-66, California Least Tern Nesting Colonies Shall Be Avoided and**
28 **Indirect Effects on Colonies Will Be Minimized**

29 See Mitigation Measure BIO-66 under Impact BIO-66.

30 **Impact BIO-68: Effects on California Least Tern Associated with Electrical Transmission**
31 **Facilities**

32 The risk of mortality of California least tern from the construction of new transmission lines is
33 considered to be minimal based on tern flight behaviors and its unlikely use of habitats near the
34 transmission line corridors. Terns exhibit low wing loading and high aspect-ratio wings and as a
35 result can maneuver relatively quickly around an obstacle such as a transmission line. Their wing
36 structure and design allows for rapid flight and quick, evasive actions (see BDCP Appendix 5.J,
37 Attachment 5.J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). Marking
38 transmission lines with flight diverters that make the lines more visible to birds has been shown to
39 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
40 marking devices in the Central Valley could reduce avian mortality by 60%. All new project
41 transmission lines would be fitted with flight diverters. Bird flight diverters would make

1 transmission lines highly visible to California least terns and would substantially reduce the
2 potential for powerline collisions.

3 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
4 adverse effect on California least tern as a result of direct mortality of a special-status species
5 because they are uncommon in the vicinity of proposed transmission lines and because the
6 probability of bird-powerline strikes is highly unlikely due to tern flight behaviors. All new
7 transmission lines constructed as a result of the project would be fitted with bird diverters, which
8 have been shown to reduce avian mortality by 60%. With implementation of *AMM20 Greater*
9 *Sandhill Crane*, the construction and operation of transmission lines would not result in an adverse
10 effect on California least tern.

11 **CEQA Conclusion:** The construction and presence of new transmission lines would represent a less-
12 than-significant impact on California least tern as a result of direct mortality of a special-status
13 species because they are uncommon in the vicinity of proposed transmission lines and because the
14 probability of bird-powerline strikes is highly unlikely due to tern flight behaviors. All new
15 transmission lines constructed as a result of the project would be fitted with bird diverters, which
16 have been shown to reduce avian mortality by 60%. With implementation of *AMM20 Greater*
17 *Sandhill Crane*, the construction and operation of transmission lines would result in a less-than-
18 significant impact on California least tern.

19 **Greater Sandhill Crane**

20 This section describes the effects of Alternative 9, including water conveyance facilities construction
21 and implementation of other conservation components, on greater sandhill crane. Greater sandhill
22 cranes in the Plan Area are almost entirely dependent on privately owned agricultural lands for
23 foraging. Long-term sustainability of the species is thus dependent on providing a matrix of
24 compatible crop types that afford suitable foraging habitat and maintaining compatible agricultural
25 practices, while sustaining and increasing the extent of other essential habitat elements such as
26 night roosting habitat. The habitat model for greater sandhill crane includes “roosting and foraging”
27 and “foraging” habitat. These habitat types include certain agricultural types, specific grassland
28 types, irrigated pastures and hay crops, managed seasonal wetland, and other natural seasonal
29 wetland. Roosting and foraging habitat includes known, traditional roost sites that also provide
30 foraging habitat (BDCP Appendix 2.A, *Covered Species Accounts*). Both temporary and permanent
31 roost sites were identified for greater Sandhill crane. Permanent roosting and foraging sites are
32 those used regularly, year after year, while temporary roosting and foraging sites are those used in
33 some years. Factors included in assessing the value of affected habitat for the greater sandhill crane
34 includes the relative habitat value of specific crop or land cover types, and proximity to known roost
35 sites. Foraging habitat for greater sandhill crane included crop types and natural communities up to
36 4 miles from known roost sites, within the boundary of the winter crane use area (BDCP Appendix
37 2A).

38 Construction and restoration associated with Alternative 9 conservation measures would result in
39 both temporary and permanent losses of foraging and roosting habitat for greater sandhill crane as
40 indicated in Table 12-9-28. Full implementation of Alternative 9 would also include the following
41 conservation actions over the term of the BDCP to benefit the greater sandhill crane (BDCP Chapter
42 3, Section 3.3, *Biological Goals and Objectives*).

- 43 • Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at
44 least 80% maintained in very high-value types in any given year. This protected habitat would

1 be within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6. Selection of protected habitat
2 locations would consider sea level rise and local seasonal flood events, greater sandhill crane
3 population levels, and the location of foraging habitat loss. Patch size of protected cultivated
4 lands will be at least 160 acres (Objective GSHC1.1, associated with CM3).

- 5 ● To create additional high-value greater sandhill crane winter foraging habitat, 10% of the
6 habitat protected under Objective GSHC1.1 would involve acquiring low-value habitat or
7 nonhabitat areas and converting them to high- or very high-value habitat. Habitat would be
8 created within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6. Selection of protected
9 habitat locations would consider sea level rise and local seasonal flood events, greater sandhill
10 crane population levels, and the location of foraging habitat loss (Objective GSHC1.2, associated
11 with CM3).
- 12 ● Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the
13 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise
14 and local seasonal flood events. The wetlands would be located within 2 miles of existing
15 permanent roost sites and protected in association with other protected natural community
16 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide
17 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 18 ● Create at least two 90-acre wetland complexes within the Stone Lakes NWR project boundary.
19 The complexes would be no more than 2 miles apart and would help provide connectivity
20 between the Stone Lakes and Cosumnes greater sandhill crane populations. Each complex would
21 consist of at least three wetlands totaling at least 90 acres of greater sandhill crane roosting
22 habitat, and would be protected in association with other protected natural community types
23 (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e., two
24 sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be
25 replaced by 180 acres of cultivated lands (e.g., cornfields) that would be flooded following
26 harvest to support roosting cranes and provide highest-value foraging habitat, provided such
27 substitution is consistent with the long-term conservation goals of Stone Lakes NWR for greater
28 sandhill crane (Objective GSHC1.4, associated with CM10).
- 29 ● Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost
30 sites. The habitat would consist of active cornfields that are flooded following harvest to support
31 roosting cranes and that provide highest-value foraging habitat. Individual fields would be at
32 least 40 acres and locations may be shifted throughout the Greater Sandhill Crane Winter Use
33 Area, but would be sited with consideration of the location of roosting habitat loss and would be
34 in place prior to roosting habitat loss (Objective GSHC1.5, associated with CM3).
- 35 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
36 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 37 ● Target cultivated land conservation to provide connectivity between other conservation lands
38 (Objective CLNC1.2, associated with CM3).
- 39 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
40 lands that occur in cultivated lands within the reserve system, including water conveyance
41 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

42 As explained below, with the restoration and protection of these amounts of habitat, in addition to
43 natural community enhancement and management commitments (including *CM12 Methylmercury*
44 *Management*) and implementation of *AMM1-AMM7*, *AMM20 Greater Sandhill Crane*, *AMM27*

1 *Selenium Management, and AMM30 Transmission Line Design and Alignment Guidelines, impacts on*
2 *the greater sandhill crane would be less than significant for CEQA purposes.*

3 **Table 12-9-28. Changes in Greater Sandhill Crane Modeled Habitat Associated with Alternative 9**
4 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	0	0	NA	NA
	Roosting and Foraging - Temporary	0	0	25	25	NA	NA
	Foraging	37	37	552	552	0	0
Total Impacts CM1		37	37	577	577	0	0
CM2-CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	2,776	4,367	0	0	0	0
Total Impacts CM2-CM18		2,776	4,408	0	0	0	0
Total Roosting/Foraging - Permanent		0	0	0	0	0	0
Total Roosting/Foraging - Temporary		0	41	25	25	0	0
Total Foraging		2,813	4,404	552	552	0	0
TOTAL IMPACTS		2,813	4,445	577	577	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

5
6 **Impact BIO-69: Loss or Conversion of Habitat for and Direct Mortality of Greater Sandhill**
7 **Crane**

8 Alternative 9 conservation measures would result in the combined permanent and temporary loss
9 of up to 66 acres of modeled roosting and foraging habitat for greater sandhill crane (41 acres of
10 permanent loss and 25 acres of temporary loss) and 4,956 acres of foraging habitat for greater
11 sandhill crane (4,404 of permanent loss, 552 acres of temporary loss, Table 12-9-28). Conservation
12 measures that would result in these losses are conveyance facilities and transmission line
13 construction, and establishment and use of borrow and spoil areas (CM1), Tidal Natural
14 Communities Restoration (CM4), Grassland Natural Community Restoration (CM8), Nontidal Marsh
15 Natural Community Restoration (CM10), and Natural Communities Enhancement and Management

1 (CM11). The majority of habitat loss would result from water conveyance facility construction and
2 conversion of habitat to tidal natural communities through CM4. Habitat enhancement and
3 management activities through CM11, which include ground disturbance or removal of nonnative
4 vegetation, could also result in local adverse habitat effects. In addition, maintenance activities
5 associated with the long-term operation of the water conveyance facilities and other BDCP physical
6 facilities could degrade or eliminate greater sandhill crane modeled habitat. Each of these individual
7 activities is described below. A summary statement of the combined impacts, NEPA effects and a
8 CEQA conclusion follow the individual conservation measure discussions.

- 9 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities as they
10 are currently designed would result in the permanent loss of up to 37 acres of modeled greater
11 sandhill crane foraging habitat. Foraging habitat that would be permanently impacted by CM1
12 would consist of 1 acre of very high-value, 0 acres of high-value, and 9 acres of medium-value
13 foraging habitat (Table 12-9-29). Permanent loss of foraging habitat would result from intake
14 and fish screen construction, channel enlargement, and transmission line construction in CZ 4, 5,
15 and 6. Fish barrier construction would permanently impact foraging habitat in CZ 6 on Bradford
16 Island, Bacon Island, north of Woodward Island, and between Mandeville and Bradford Island.
17 In addition, 25 acres of temporary roosting and foraging habitat, and 552 acres of foraging
18 habitat would be temporarily removed (Table 12-9-28). Temporary habitat loss would primarily
19 result from potential borrow and spoil areas (367 acres) and work areas for the above
20 construction activities. The temporarily removed habitat would consist primarily of cultivated
21 lands and it would be restored within 1 year following construction. However, it would not
22 necessarily be restored to its original topography and it could be restored as grasslands in the
23 place of cultivated lands.

24 The temporary roosting and foraging habitat that would be temporarily impacted is located on
25 the east side of Bradford Island. The temporary roost site would be impacted by a concrete
26 batch plant, an operable barrier work area, and a borrow and spoil area. The implementation of
27 *AMM20 Greater Sandhill Crane* would require that all CM1 activities be designed to avoid direct
28 loss of crane roost sites. Avoidance of crane roost sites would be accomplished either by siting
29 activities outside of identified roost sites or by relocating the roost site if it consisted of
30 cultivated lands (roost sites consisting of wetlands would not be subject to re-location).
31 Relocated roost sites would be established prior to construction activities affecting the original
32 roost site (as described for *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental*
33 *Commitments, AMMs, and CMs*). Therefore there would be no loss of crane roosting and foraging
34 habitat as a result of water conveyance facility construction once the facilities were fully
35 designed. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 9
36 construction locations.

1
2

Table 12-9-29. Total Amount of Greater Sandhill Crane Foraging Habitat Affected under Alternative 9

Foraging Habitat Value Class	Land Cover Type	Acres Affected by CM1 permanent (temporary)	Acres Affected by CM2-CM18 permanent (temporary)
Very high	Corn, rice	1 (51)	1,155 (0)
High	Wheat, managed wetlands,	0 (8)	489 (0)
Medium	Alfalfa and alfalfa mixtures, irrigated mixed pasture, irrigated native pasture, irrigated pasture, irrigated other pasture, grain and hay crops, miscellaneous grain and hay, mixed grain and hay, nonirrigated mixed grain and hay, other grain crops, sudan, miscellaneous grasses, grassland, alkali seasonal wetlands, vernal pool complex	9 (348)	1,403 (0)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry), native vegetation	27 (145)	1,320 (0)
Total		37 (552)	4,367

3

- 4 • *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration

5 footprint, this activity would result in the permanent loss or conversion of approximately 2,754

6 acres of greater sandhill crane habitat, consisting of 41 acres of temporary roosting and foraging

7 habitat and 2,713 acres of foraging habitat. Loss of foraging habitat from CM4 would consist of

8 716 acres of very high-value, 304 acres of high value, 873 acres of medium-value, and 821 acres

9 of low-value foraging habitat. This loss would occur in the Cosumnes-Mokelumne River and West

10 Delta ROAs. Tidal wetland restoration in CZ 4 could occur between the high crane use areas of

11 the central Delta and the Cosumnes River Preserve. However, the conversion of grasslands and

12 cultivated lands to tidal wetlands would not prohibit crane movement or reduce use of these

13 areas. In CZ 5, loss of modeled habitat would occur along the western edge of the greater

14 sandhill crane winter use area and therefore would not result in fragmentation of traditional

15 crane habitats. Therefore fragmentation of habitat from tidal restoration activities would be

16 expected to be minimal. Approximately 1,951 acres of foraging habitat would be impacted

17 within the first 10 years of Alternative 9 implementation.
- 18 • *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands that

19 provide foraging habitat for greater sandhill crane would be converted to grassland by the late

20 long-term timeframe. No roosting/foraging habitat would be impacted by grassland restoration

21 activities. The restored grasslands would continue to provide foraging habitat value for the

22 greater sandhill crane. Approximately 257 acres would be impacted within the first 10 years of

23 Plan implementation.

- 1 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent
2 conversion of approximately 1,350 acres of modeled foraging habitat for the greater sandhill
3 crane. A portion of the restored nontidal marsh would be expected to continue to provide
4 roosting and foraging habitat value for the greater sandhill crane. However, some of this
5 restored marsh would be unsuitable as it would lack emergent vegetation and consist of open
6 water that would be too deep to provide suitable roosting or foraging habitat. Approximately
7 567 acres of habitat would be converted to nontidal marsh within the first 10 years of
8 Alternative 9 implementation.

- 9 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
10 actions included in CM11 that are designed to enhance wildlife values in restored or protected
11 habitats could result in localized ground disturbances that could temporarily remove small
12 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
13 vegetation and road and other infrastructure maintenance activities, would be expected to have
14 minor adverse effects on available habitat and would be expected to result in overall
15 improvements to and maintenance of habitat values over the term of the BDCP. The potential for
16 these activities to result in direct mortality of greater sandhill crane would be minimized with
17 the implementation of *AMM20 Greater Sandhill Crane*. CM11 would also include the construction
18 of recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP
19 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead
20 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
21 disturbed areas when and where possible. If new ground disturbance was necessary, greater
22 sandhill crane habitat would be avoided, with the exception of a permanent loss of 4 acres of
23 grassland foraging habitat (1 acre of which would be impacted within the first 10 years of
24 Alternative 9 implementation).

- 25 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
26 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
27 disturbances that could affect greater sandhill crane use of the surrounding habitat.
28 Maintenance activities would include vegetation management, levee and structure repair, and
29 re-grading of roads and permanent work areas. These effects, could be adverse as sandhill
30 cranes are sensitive to disturbance. However, impacts would be reduced by AMMs, and
31 conservation actions as described below.

- 32 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
33 direct mortality of greater sandhill crane if they were present in the Plan Area, because they
34 would be expected to avoid contact with construction and other equipment. Potential effects
35 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.
36 The potential for injury and direct mortality from electrical transmission facilities is discussed
37 below under Impact BIO-70.

38 The following paragraphs summarize the combined effects discussed above and describe other
39 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
40 included.

41 ***Near-Term Timeframe***

42 Because the water conveyance facilities construction is being evaluated at the project level, the near-
43 term BDCP conservation strategy has been evaluated to determine whether it would provide
44 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of

1 construction would not be adverse under NEPA. Based on current design footprints, Alternative 9
 2 would remove 25 acres roosting and foraging habitat (temporary loss from CM1) in the study area
 3 in the near-term. In addition, 3,364 acres of foraging habitat would be removed or converted in the
 4 near-term (CM1, 589 acres; *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural*
 5 *Community Restoration*, and *CM11 Natural Communities Enhancement and Management*—2,776
 6 acres). Of these near-term acres of foraging habitat impact, 2,352 acres would be moderate- to very
 7 high-value habitat (CM1, 417 acres, CM4-11, 1,935 acres).

8 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
 9 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in
 10 Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1
 11 protection of high- to very high-value foraging habitat for loss of moderate- to very high-value
 12 foraging habitat. Using these ratios would indicate that 25 acres of greater roosting habitat should
 13 be restored/created and 25 acres should be protected to compensate for the CM1 losses of greater
 14 sandhill crane roosting and foraging habitat. In addition, 417 acres of high- to very high-value
 15 foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane moderate-
 16 to very high-value foraging habitat. The near-term effects of other conservation actions would
 17 remove 1,935 acres of moderate- to very high-value foraging habitat, and therefore require 1,935
 18 acres of protection of high- to very high-value foraging habitat using the same typical NEPA and
 19 CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1
 20 protection for the loss of foraging habitat).

21 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane
 22 roost sites were directly impacted by CM1 covered activities (including transmission lines and their
 23 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
 24 result of water conveyance facility construction once the facilities were fully designed, which would
 25 avoid the CM1 impact on 25 acres of roosting and foraging habitat once the project design is final.
 26 Indirect effects of construction-related noise and visual disturbance are discussed below under
 27 Impact BIO-71.

28 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
 29 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3, *Description of*
 30 *Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in the
 31 same timeframe as the construction and early restoration losses. Up to 95 acres of roosting habitat
 32 would be created within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts
 33 would consist of active cornfields that are flooded following harvest to support roosting cranes and
 34 also provide the highest-value foraging habitat for the species. Individual fields would be at least 40
 35 acres could shift locations throughout the Greater Sandhill Crane Winter Use Area, and would be in
 36 place prior to roosting habitat loss. Of the 500 acres of managed wetlands to be created for roosting
 37 habitat, 320 acres would be created in minimum patch sizes of 40 acres within the Greater Sandhill
 38 Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3). Restoration sites would be identified
 39 with consideration of sea level rise and local seasonal flood events. These wetlands would be
 40 created within 2 miles of existing permanent roost sites and protected in association with other
 41 protected natural community types at a ratio of 2:1 upland to wetland habitat to provide buffers that
 42 will protect cranes from the types of disturbances that would otherwise result from adjacent roads
 43 and developed areas (e.g., roads, noise, visual disturbance, lighting). The remaining 180 acres of
 44 crane roosting habitat would be constructed within the Stone Lakes NWR project boundary (BDCP
 45 Chapter 3, Figure 3.3-6) and would be designed to provide connectivity between the Stone Lakes
 46 and Cosumnes greater sandhill crane populations (Objective GSHC1.4). The large patch sizes of

1 these wetland complexes would provide additional conservation to address the threats of vineyard
2 conversion, urbanization to the east, and sea level rise to the west of greater sandhill crane
3 wintering habitat.

4 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
5 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
6 BIO-69a, *Compensate for the Loss of Medium- to Very High-Value Greater Sandhill Crane Foraging*
7 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the
8 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were
9 compensated for with appropriate crop types and natural communities.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
14 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
15 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
16 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
17 to the Final EIR/EIS.

18 **Late Long-Term Timeframe**

19 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676
20 acres of foraging habitat for greater sandhill crane. Alternative 9 as a whole would result in the
21 permanent loss of and temporary effects on 66 acres of roosting and foraging habitat (less than 1%
22 of the total habitat in the study area) and 4,956 acres of foraging habitat (3% of the total habitat in
23 the study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost
24 by the late long-term timeframe would consist of 3,464 acres of medium- to very high-value foraging
25 habitat. The locations of these losses are described above in the analyses of individual conservation
26 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites
27 were directly affected by water conveyance facilities including transmission lines and associated
28 footprints. In addition, temporarily removed habitat would be restored within 1 year following
29 construction. However, it would not necessarily be restored to its original topography and it could
30 result in the conversion of cultivated lands to grasslands.

31 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
32 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres
33 of greater Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at
34 least 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
35 GSHC1.1).

36 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
37 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
38 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
39 and local seasonal flood events. These wetlands would be created within 2 miles of existing
40 permanent roost sites and protected in association with other protected natural community types at
41 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
42 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
43 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
44 constructed within the Stone Lakes NWRproject boundary (BDCP Chapter 3, Figure 3.3-6) and

1 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
2 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland
3 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. One
4 of the 90-acre wetland complexes created under this objective could be replaced by 180 acres of
5 cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting cranes and
6 provide highest-value foraging habitat, provided such substitution is consistent with the long-term
7 conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The large
8 patch sizes of these wetland complexes would provide additional conservation to address the
9 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
10 sandhill crane wintering habitat.

11 To compensate for near-term impacts on crane roosting and foraging habitat, 95 acres of roosting
12 habitat would be created within 2 miles of existing permanent roost sites (Objective GSHC1.5).
13 These roosts would consist of active cornfields that are flooded following harvest to support
14 roosting cranes and also provide the highest-value foraging habitat for the species. Individual fields
15 would be at least 40 acres could shift locations throughout the Greater Sandhill Crane Winter Use
16 Area, but would be sited with consideration of the location of roosting habitat loss and would be in
17 place prior to roosting habitat loss.

18 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
19 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
20 types in any given year (Objective GSHC1.1). To create additional high-value foraging habitat in the
21 study area, 10% of these acres of protected foraging habitat would result from the conversion of
22 low-value or nonhabitat areas to high- or very high-value habitat (Objective GSHC1.2). These acres
23 of protected foraging habitat would be located within 2 miles of known roosting sites in CZs 3, 4, 5,
24 and/or 6 and would consider sea level rise and local seasonal flood events, greater Sandhill crane
25 population levels, and the location of foraging habitat loss. The patch size of these protected lands
26 would be at least 160 acres (Objectives GSHC1.1 and GSHC1.2). Because agricultural habitat values
27 change over time based largely on economically driven agricultural practices, protecting crane
28 habitat would provide enhanced stability to agricultural habitat value within the crane use area that
29 does not currently exist.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
34 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
35 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
36 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
37 to the Final EIR/EIS.

38 ***CEQA Conclusion:***

39 ***Near-Term Timeframe***

40 Because the water conveyance facilities construction is being evaluated at the project level, the near-
41 term BDCP conservation strategy has been evaluated to determine whether it would provide
42 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
43 construction would be less than significant. Based on current design footprints, Alternative 9 would
44 remove 25 acres roosting and foraging habitat (temporary loss from CM1) in the study area in the

1 near-term. In addition, 3,364 acres of foraging habitat would be removed or converted in the near-
2 term (CM1, 589 acres; *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural*
3 *Community Restoration*, and *CM11 Natural Communities Enhancement and Management—2,776*
4 acres). Of these near-term acres of foraging habitat impact, 2,352 acres would be moderate- to very
5 high-value habitat (CM1, 417 acres, CM4-11, 1,935 acres).

6 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
7 CM1 and that are identified in the biological goals and objectives for greater sandhill crane in
8 Chapter 3 of the BDCP would be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1
9 protection of high- to very high-value foraging habitat for loss of moderate- to very high-value
10 foraging habitat. Using these ratios would indicate that 25 acres of greater roosting habitat should
11 be restored/created and 25 acres should be protected to compensate for the CM1 losses of greater
12 sandhill crane roosting and foraging habitat. In addition, 417 acres of high- to very high-value
13 foraging habitat should be protected to mitigate the CM1 losses of greater sandhill crane moderate-
14 to very high-value foraging habitat. The near-term effects of other conservation actions would
15 remove 1,935 acres of moderate- to very high-value foraging habitat, and therefore require 1,935
16 acres of protection of high- to very high-value foraging habitat using the same typical NEPA and
17 CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1
18 protection for the loss of foraging habitat).

19 The implementation of *AMM20 Greater Sandhill Crane* would require that no greater sandhill crane
20 roost sites were directly impacted by CM1 covered activities (including transmission lines and their
21 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
22 result of water conveyance facility construction once the facilities were fully designed, which would
23 avoid the CM1 impact on 25 acres of roosting and foraging habitat once the project design is final.
24 Indirect effects of construction-related noise and visual disturbance are discussed below under
25 Impact BIO-71.

26 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
27 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3, *Description of*
28 *Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in the
29 same timeframe as the construction and early restoration losses. Up to 95 acres of roosting habitat
30 would be created within 2 miles of existing permanent roost sites (Objective GSHC1.5). These roosts
31 would consist of active cornfields that are flooded following harvest to support roosting cranes and
32 also provide the highest-value foraging habitat for the species. Individual fields would be at least 40
33 acres could shift locations throughout the Greater Sandhill Crane Winter Use Area, and would be in
34 place prior to roosting habitat loss. Of the 500 acres of managed wetlands to be created for roosting
35 habitat, 320 acres would be created in minimum patch sizes of 40 acres within the Greater Sandhill
36 Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3). Restoration sites would be identified
37 with consideration of sea level rise and local seasonal flood events. These wetlands would be
38 created within 2 miles of existing permanent roost sites and protected in association with other
39 protected natural community types at a ratio of 2:1 upland to wetland habitat to provide buffers that
40 will protect cranes from the types of disturbances that would otherwise result from adjacent roads
41 and developed areas (e.g., roads, noise, visual disturbance, lighting). The remaining 180 acres of
42 crane roosting habitat would be constructed within the Stone Lakes National Wildlife Refuge project
43 boundary (BDCP Chapter 3, Figure 3.3-6) and would be designed to provide connectivity between
44 the Stone Lakes and Cosumnes greater sandhill crane populations (Objective GSHC1.4). The large
45 patch sizes of these wetland complexes would provide additional conservation to address the

1 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
2 sandhill crane wintering habitat.

3 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
4 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
5 BIO-69a would be available to guide the near-term protection of cultivated lands to ensure that the
6 near-term impacts of moderate- to very high-value habitat for greater sandhill crane were
7 compensated for with appropriate crop types and natural communities.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
12 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
13 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
14 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
15 to the Final EIR/EIS.

16 **Late Long-Term Timeframe**

17 The study area supports approximately 23,919 acres of roosting and foraging habitat and 164,676
18 acres of foraging habitat for greater sandhill crane. Alternative 9 as a whole would result in the
19 permanent loss of and temporary effects on 66 acres of roosting and foraging habitat (less than 1%
20 of the total habitat in the study area) and 4,956 acres of foraging habitat (3% of the total habitat in
21 the study area) for the greater sandhill crane during the term of the Plan. The foraging habitat lost
22 by the late long-term timeframe would consist of 3,464 acres of medium- to very high-value foraging
23 habitat. The locations of these losses are described above in the analyses of individual conservation
24 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites
25 were directly affected by water conveyance facilities including transmission lines and associated
26 footprints. In addition, temporarily removed habitat would be restored within 1 year following
27 construction. However, it would not necessarily be restored to its original topography and it could
28 result in the conversion of cultivated lands to grasslands.

29 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
30 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres
31 of greater Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at
32 least 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
33 GSHC1.1).

34 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
35 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
36 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
37 and local seasonal flood events. These wetlands would be created within 2 miles of existing
38 permanent roost sites and protected in association with other protected natural community types at
39 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
40 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
41 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
42 constructed within the Stone Lakes NWRproject boundary (BDCP Chapter 3, Figure 3.3-6) and
43 would be designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill
44 crane populations (Objective GSHC1.4). These wetlands would consist of two 90-acre wetland

1 complexes each consisting of at least three wetlands and would be no more than 2 miles apart. One
2 of the 90-acre wetland complexes created under this objective could be replaced by 180 acres of
3 cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting cranes and
4 provide highest-value foraging habitat, provided such substitution is consistent with the long-term
5 conservation goals of Stone Lakes National Wildlife Refuge for greater sandhill crane. The large
6 patch sizes of these wetland complexes would provide additional conservation to address the
7 threats of vineyard conversion, urbanization to the east, and sea level rise to the west of greater
8 sandhill crane wintering habitat.

9 To compensate for near-term impacts on crane roosting and foraging habitat, 95 acres of roosting
10 habitat would be created within 2 miles of existing permanent roost sites (Objective GSHC1.5).
11 These roosts would consist of active cornfields that are flooded following harvest to support
12 roosting cranes and also provide the highest-value foraging habitat for the species. Individual fields
13 would be at least 40 acres could shift locations throughout the Greater Sandhill Crane Winter Use
14 Area, but would be sited with consideration of the location of roosting habitat loss and would be in
15 place prior to roosting habitat loss.

16 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
17 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
18 types in any given year (Objective GSHC1.1). To create additional high-value foraging habitat in the
19 study area, 10% of these acres of protected foraging habitat would result from the conversion of
20 low-value or nonhabitat areas to high- or very high-value habitat (Objective GSHC1.2). These acres
21 of protected foraging habitat would be located within 2 miles of known roosting sites in CZs 3, 4, 5,
22 and/or 6 and would consider sea level rise and local seasonal flood events, greater Sandhill crane
23 population levels, and the location of foraging habitat loss. The patch size of these protected lands
24 would be at least 160 acres (Objectives GSHC1.1 and GSHC1.2). Because agricultural habitat values
25 change over time based largely on economically driven agricultural practices, protecting crane
26 habitat would provide enhanced stability to agricultural habitat value within the crane use area that
27 does not currently exist.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
32 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
33 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
34 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
35 to the Final EIR/EIS.

36 Considering Alternative 9's protection and restoration provisions, in addition to Mitigation Measure
37 BIO-69a, which would compensate for the loss of medium- to very high-value foraging habitat at a
38 ratio of 1:1 prior to or concurrent with impacts, loss of habitat and direct mortality through
39 implementation of Alternative 9 would not result in a substantial adverse effect through habitat
40 modifications and would not substantially reduce the number or restrict the range of the species.
41 Therefore, the alternative would have a less-than-significant impact on greater sandhill crane.

1 **Mitigation Measure BIO-69a: Compensate for the loss of Medium to Very High-Value**
2 **Greater Sandhill Crane Foraging Habitat**

3 DWR will compensate for the loss of greater sandhill crane medium- to very high-value foraging
4 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan
5 Area. Compensation must occur prior to or concurrent within the impacts to minimize the
6 effects of habitat loss. The crop types and natural communities that are included in foraging
7 habitat value categories are listed in Table 12-9-29. Foraging habitat conservation must occur
8 within the greater sandhill crane winter use area and the location of protected habitat or
9 conservation easements must be preapproved by the USFWS and CDFW.

10 **Impact BIO-70: Effects on Greater Sandhill Crane Associated with Electrical Transmission**
11 **Facilities**

12 Greater sandhill cranes are susceptible to collision with power lines and other structures during
13 periods of inclement weather and low visibility (Avian Power Line Interaction Committee 1994,
14 Brown and Drewien 1995, Manville 2005). There are extensive existing transmission and
15 distribution lines in the sandhill crane winter use area. These include a network of distribution lines
16 that are between 11- and 22-kV. In addition, there are two 115-kV lines that cross the study area,
17 one that overlaps with the greater sandhill crane winter use area between Antioch and I-5 east of
18 Hood, and one that crosses the northern tip of the crane winter use area north of Clarksburg. There
19 are 69-kV lines within the study area that parallel Twin Cities Road, Herzog Road, Lambert Road,
20 and the Southern Pacific Dredge Cut in the vicinity of Stone Lakes NWR. At the south end of the
21 winter use area, there are three 230-kV transmission lines that follow I-5, and then cut southwest
22 through Holt, and two 500-kV lines cross the southwestern corner of the winter use area. This
23 existing network of power lines in the study currently poses a collision and electrocution risk for
24 sandhill cranes, because they cross over or surround sandhill crane roost sites in the study area.

25 Both permanent and temporary electrical transmission lines would be constructed to supply
26 construction and operational power to Alternative 9 facilities. The potential for birdstrikes could
27 also be exacerbated by construction-related effects, especially in low-visibility conditions. The
28 potential mortality of greater sandhill crane in the area of the proposed transmission lines under
29 Alternative 9 was estimated using collision mortality rates by Brown and Drewien (1995) and an
30 estimate of potential crossings along the proposed lines (methods are described in BDCP Appendix
31 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). This analysis
32 concluded that mortality risk could be substantially reduced by marking new transmission lines to
33 increase their visibility to sandhill cranes.

34 Typically, higher-voltage (230-kV) lines vary in height from 90 to 110 feet, while subtransmission
35 (69-kV) lines vary from 50 to 70 feet (Avian Power Line Interaction Committee 2006). The
36 Alternative 9 alignment would primarily use existing transmission and distribution lines and would
37 require the installation of approximately 42 miles of transmission line (3 miles of 60-kV line, 38
38 miles of 12-kV line, and 0.5 miles of 480-V line). These lines would occur in the vicinity of Walnut
39 Grove and adjacent to fish screen and operable barrier structures throughout the CM1 footprint.
40 Temporary lines would be removed after construction of the water conveyance facilities, within 10
41 years.

42 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
43 transmission line alignment, such as co-locating transmission lines when it would minimize effects
44 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. After the

1 Draft EIR/EIS was issued in December 2013, additional avoidance features were added to *AMM20*
 2 *Greater Sandhill Crane*. *AMM20 Greater Sandhill Crane* requires that Alternative 9 meet the
 3 performance standard of no mortality of greater sandhill crane associated with the new facilities.
 4 This would be achieved by implementing one or any combination of the following: 1) siting new
 5 transmission lines in lower bird strike risk zones; 2) removing, relocating or undergrounding
 6 existing lines where feasible; 3) using natural gas generators in lieu of installing transmission lines
 7 in high-risk zones of the greater sandhill crane winter use area; 4) undergrounding new lines in
 8 high-risk zones of the greater sandhill crane winter use area; 5) permanently installing flight
 9 diverters on existing lines over lengths equal to or greater than the length of the new transmission
 10 lines in the crane winter use area; 6) for areas outside of the Stone Lakes NWR project boundary,
 11 shifting locations of flooded areas that provide crane roosts to lower risk areas. These measures are
 12 described in detail in *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental Commitments,*
 13 *AMMs, and CMs.*

14 The implementation of the measures (described above) under *AMM20 Greater Sandhill Crane* would
 15 substantially reduce the potential for crane collisions with transmission lines. Potential measures
 16 that would eliminate this risk include using natural gas generators in lieu of transmission lines or
 17 undergrounding new lines in high-risk zones in the greater sandhill crane winter use area. Marking
 18 transmission lines with flight diverters that make the lines more visible to birds has been shown to
 19 reduce the incidence of bird mortality, including for sandhill cranes (Brown and Drewien 1995). Yee
 20 (2008) estimated that marking devices in the Central Valley could reduce avian mortality by 60%.
 21 All new transmission lines would be fitted with flight diverters. The installation of flight diverters on
 22 existing permanent lines would be prioritized in the highest risk zones for greater sandhill crane (as
 23 described in BDCP Appendix 5.J, Appendix 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP*
 24 *Powerlines*) and diverters would be installed in a configuration that research indicates would reduce
 25 bird strike risk by at least 60%. The length of existing line to be fitted with bird strike diverters will
 26 be equal to the length of new transmission lines constructed as a result of the project, in an area
 27 with the same or higher greater sandhill crane strike risk to provide a net benefit to the species. For
 28 optimum results, the recommended spacing distance for bird flight diverters is 15 to 16.5 feet (4.5
 29 to 5 meters) (Avian Power Line Interaction Committee 1994). Placing diverters on existing lines
 30 would be expected to reduce existing mortality in the Plan Area and therefore result in a net benefit
 31 to the greater sandhill crane population because these flight diverters would be maintained in
 32 perpetuity.

33 **NEPA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
 34 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
 35 current proposed transmission line alignment under Alternative 9 is not fully designed, and line
 36 locations are not final. *AMM30 Transmission Line Design and Alignment Guidelines* would require
 37 design features for the transmission line alignment, such as co-locating transmission lines when it
 38 would minimize effects on sandhill cranes, to avoid impacts on sensitive habitats to the maximum
 39 extent feasible. The implementation of *AMM20 Greater Sandhill Crane* would require that the final
 40 transmission line alignment avoid crane roost sites and achieve the performance standard of no
 41 mortality of greater sandhill crane associated with the new facilities. All new transmission lines
 42 constructed as a result of the project would be fitted with bird diverters, which have been shown to
 43 reduce avian mortality by 60%. With incorporation of *AMM30 Transmission Line Design and*
 44 *Alignment Guidelines* and one or a combination of the measures to greatly reduce the risk of bird
 45 strike described in *AMM20 Greater Sandhill Crane*, the construction and operation of transmission
 46 lines under Alternative 9 would not result in an adverse effect on greater sandhill crane.

1 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
2 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
3 current proposed transmission line alignment under Alternative 9 is not fully designed, and line
4 locations are not final. *AMM30 Transmission Line Design and Alignment Guidelines* would require
5 design features for the transmission line alignment, such as co-locating transmission lines when it
6 would minimize effects on sandhill cranes, to avoid impacts on sensitive habitats to the maximum
7 extent feasible. The implementation of *AMM20 Greater Sandhill Crane* would require that the final
8 transmission line alignment avoid crane roost sites and achieve the performance standard of no
9 mortality of greater sandhill crane associated with the new facilities. All new transmission lines
10 constructed as a result of the project would be fitted with bird diverters, which have been shown to
11 reduce avian mortality by 60%. With incorporation of *AMM30 Transmission Line Design and*
12 *Alignment Guidelines* and one or a combination of the measures to greatly reduce the risk of bird
13 strike described in *AMM20 Greater Sandhill Crane*, the construction and operation of transmission
14 lines under Alternative 9 would have a less-than-significant impact on greater sandhill crane.

15 **Impact BIO-71: Indirect Effects of Plan Implementation on Greater Sandhill Crane**

16 **Indirect Construction- and Operation-Related Effects:** Sandhill cranes are sensitive to
17 disturbance. Noise and visual disturbances from the construction of water conveyance facilities and
18 other conservation measures could reduce greater sandhill crane use of modeled habitat adjacent to
19 work areas. Indirect effects associated with construction include noise, dust, and visual disturbance
20 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
21 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the
22 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise
23 and visual disturbances that could affect greater sandhill crane use of surrounding habitat. These
24 effects could result from periodic vehicle use along the conveyance corridor, inspection and
25 maintenance of aboveground facilities, and similar activities. These potential effects would be
26 minimized with implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3B,
27 *Environmental Commitments, AMMs, and CMs*.

28 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would
29 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill
30 crane (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
31 *Conveyance Facility on Sandhill Crane*). The same methods were employed to address the potential
32 noise effects on cranes from Alternative 9 and to determine that as much as 1,217–5,108 acres of
33 crane habitat could potentially be affected by general construction noise above baseline level (50–
34 60 dBA). This would include 44 – 157 acres of temporary crane roosting habitat and 1,173 – 4,951
35 acres of crane foraging habitat. In addition, 0-40 acres of permanent crane roosting habitat, 38 – 688
36 acres of temporary crane roosting habitat, and 1,392 – 7,699 acres of crane foraging habitat could be
37 affected by noise from pile driving that would be above baseline level (50–60dBA, Table 12-9-30).
38 The analysis was conducted based on the assumption that there would be direct line-of-sight from
39 sandhill crane habitat areas to the construction site, and, therefore, provides a worst-case estimate
40 of effects. In many areas the existing levees would partially or completely block the line-of-sight and
41 would function as effective noise barriers, substantially reducing noise transmission. However,
42 there is insufficient data to assess the effects that increased noise levels would have on sandhill
43 crane behavior.

1 **Table 12-9-30. Greater Sandhill Crane Habitat Affected by General Construction and Pile Driving**
2 **Noise Under Alternative 9 (acres)**

Habitat Type	General Construction		Pile Driving	
	Above 60 dBA	Above 50 dBA	Above 60 dBA	Above 50 dBA
Permanent Roosting	0	0	0	40
Temporary Roosting	44	157	38	688
Foraging	1,173	4,951	1,392	7,699
Total Habitat	1,217	5,108	1,430	8,426

3
4 Evening and nighttime construction activities would require the use of extremely bright lights.
5 Nighttime construction could also result in headlights flashing into roost sites when construction
6 vehicles are turning onto or off of construction access routes. Proposed surge towers would require
7 the use of safety lights that would alert low-flying aircraft to the presence of these structures
8 because of their height. Little data is available on the effects of impact of artificial lighting on
9 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes
10 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP
11 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to
12 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting
13 include a reduction in the cranes' quality of nocturnal rest, and effects on their sense of photo-period
14 which might cause them to shift their physiology towards earlier migration and breeding (BDCP
15 Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes' overall
16 fitness and reproductive success (which could in turn have population-level impacts). A change in
17 photo-period interpretation could also cause cranes to fly out earlier from roost sites to forage and
18 might increase their risk of power line collisions if they were to leave roosts before dawn (BDCP
19 Chapter 5, *Effects Analysis*).

20 The effects of noise and visual disturbance on greater sandhill crane would be minimized through
21 the implementation of *AMM20 Greater Sandhill Crane* (Appendix 3B, *Environmental Commitments,*
22 *AMMs, and CMs*). Activities within 0.75 mile of crane roosting habitat would reduce construction
23 noise during night time hours (from one hour before sunset to one hour after sunrise) such that
24 construction noise levels do not exceed 50 dBA L_{eq} (1 hour) at the nearest temporary or permanent
25 roosts during periods when the roost sites are available (flooded). In addition, the area of crane
26 foraging habitat that would be affected during the day (from one hour after sunrise to one hour
27 before sunset) by construction noise exceeding 50 dBA L_{eq} (1 hour) would also be minimized.
28 Unavoidable noise related effects would be compensated for by the enhancement of 0.1 acre of
29 foraging habitat for every acre indirectly affected within the 50 dBA L_{eq} (1 hour) construction noise
30 contour. With these measures in place, indirect effects of noise and visual disturbance from
31 construction activities are not expected to reduce the greater sandhill crane population in the study
32 area.

33 The use of mechanical equipment during water conveyance facilities construction could cause the
34 accidental release of petroleum or other contaminants that could affect greater sandhill crane in the
35 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to greater
36 sandhill crane habitat could also affect the species. AMM1–AMM7, including *AMM2 Construction Best*
37 *Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that

1 measures were in place to prevent runoff from the construction area and negative effects of dust on
2 foraging habitat.

3 **Methylmercury Exposure:** Largemouth bass was used as a surrogate species for analysis
4 (Appendix 11F, *Substantive BDCP Revisions*). Results of the quantitative modeling of mercury effects
5 on largemouth bass as a surrogate species would overestimate the effects on greater sandhill crane.
6 Organisms feeding within pelagic-based (algal) foodwebs have been found to have higher
7 concentrations of methylmercury than those in benthic or epibenthic foodwebs; this has been
8 attributed to food chain length and dietary segregation (Grimaldo et al. 2009). Therefore, potential
9 indirect effects of increased mercury exposure is likely low for greater sandhill crane because they
10 primarily forage on cultivated crops. Modeled effects of mercury concentrations from changes in
11 water operations under CM1 on largemouth bass did not differ substantially from existing
12 conditions; therefore, results also indicate that greater sandhill crane tissue concentrations would
13 not measurably increase as a result of CM1 implementation.

14 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
15 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
16 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
17 mercury. Increased methylmercury associated with natural community and floodplain restoration
18 may indirectly affect greater sandhill crane via uptake in lower trophic levels (see Appendix 5.D,
19 *Contaminants*, of the BDCP). Mercury is generally elevated throughout the Delta, and restoration of
20 the lower potential areas in total may result in generalized, very low level increases of mercury.
21 Given that some species have elevated mercury tissue levels pre-BDCP, these low level increases
22 could result in some level of effects.

23 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
24 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
25 each restoration project. If a project is identified where there is a high potential for methylmercury
26 production that could not be fully addressed through restoration design and adaptive management,
27 alternate restoration areas would be considered. CM12 would be implemented in coordination with
28 other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury
29 Monitoring and Analysis Section. This conservation measure would include the following actions.

- 30 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
31 mercury methylation and bioavailability
- 32 ● Define design elements that minimize conditions conducive to generation of methylmercury in
33 restored areas.
- 34 ● Define adaptive management strategies that can be implemented to monitor and minimize
35 actual postrestoration creation and mobilization of methylmercury.

36 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
37 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
38 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
39 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
40 2009). The effect of selenium toxicity differs widely between species and also between age and sex
41 classes within a species. In addition, the effect of selenium on a species can be confounded by
42 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
43 2009).

1 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 2 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 3 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 4 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 5 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 6 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 7 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 8 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 9 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 10 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
 11 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 12 levels of selenium have a higher risk of selenium toxicity.

13 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 14 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 15 exacerbate bioaccumulation of selenium in avian species, including greater sandhill crane. Marsh
 16 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
 17 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
 18 BDCP restoration activities that create newly inundated areas could increase bioavailability of
 19 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
 20 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
 21 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
 22 long-term increases in selenium concentrations in water in the Delta under any alternative.
 23 However, it is difficult to determine whether the effects of potential increases in selenium
 24 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to
 25 adverse effects on greater sandhill crane.

26 Because of the uncertainty that exists at this programmatic level of review, there could be a
 27 substantial effect on greater sandhill crane from increases in selenium associated with restoration
 28 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
 29 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
 30 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
 31 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
 32 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
 33 separately for each restoration effort as part of design and implementation. This avoidance and
 34 minimization measure would be implemented as part of the tidal habitat restoration design
 35 schedule.

36 **NEPA Effects:** Crane habitat could potentially be affected by general construction noise above
 37 baseline level (50–60 dBA). Construction in certain areas would take place 7 days a week and 24
 38 hours a day and evening and nighttime construction activities would require the use of extremely
 39 bright lights, which could adversely affect roosting cranes by impacting their sense of photo-period
 40 and by exposing them to predators. Effects of noise and visual disturbance could substantially alter
 41 the suitability of habitat for greater sandhill crane. *AMM20 Greater Sandhill Crane* would include
 42 requirements (described above) to minimize the effects of noise and visual disturbance on greater
 43 sandhill cranes and to mitigate effects on habitat.

44 Tidal habitat restoration could result in increased exposure of greater sandhill crane to selenium
 45 which could result in the potential mortality of a special-status species. This effect would be

1 addressed through the implementation of *AMM27 Selenium Management*, which would provide
2 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
3 selenium and its bioavailability in tidal habitats.

4 The implementation of tidal natural communities restoration or floodplain restoration could result
5 in increased exposure of greater sandhill crane to methylmercury. The potential indirect effects of
6 increased mercury exposure is likely low for greater sandhill crane because they primarily forage on
7 cultivated crops. Implementation of CM12 which contains measures to assess the amount of
8 mercury before project development, followed by appropriate design and adaptation management,
9 would minimize the potential for increased methylmercury exposure, and would result in no
10 adverse effect on the species.

11 **CEQA Conclusion:** Crane habitat could potentially be affected by general construction noise and pile
12 driving above baseline level (50–60 dBA). Construction in certain areas would take place 7 days a
13 week and 24 hours a day and evening and nighttime construction activities would require the use of
14 extremely bright lights, which could adversely affect roosting cranes by impacting their sense of
15 photo-period and by exposing them to predators. Effects of noise and visual disturbance could
16 substantially alter the suitability of habitat for greater sandhill crane. This would be a significant
17 impact. *AMM20 Greater Sandhill Crane* would include requirements (described above) to minimize
18 the effects of noise and visual disturbance on greater sandhill cranes and to mitigate effects on
19 habitat.

20 Tidal habitat restoration could result in increased exposure of greater sandhill crane to selenium
21 which could result in the potential mortality of a special-status species. This would be a significant
22 impact. This effect would be addressed through the implementation of *AMM27 Selenium*
23 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
24 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

25 Methylmercury tissue concentrations in greater sandhill cranes would not be expected to
26 measurably increase as a result of water operations under CM1 compared to the No Action
27 Alternative. The implementation of tidal natural communities restoration or floodplain restoration
28 could result in increased exposure of greater sandhill crane to methylmercury. This would be a
29 significant impact. The potential indirect effects of increased mercury exposure is likely low for
30 greater sandhill crane because they primarily forage on cultivated crops. Implementation of CM12
31 which contains measures to assess the amount of mercury before project development, followed by
32 appropriate design and adaptation management, would minimize the potential for increased
33 methylmercury exposure, and would result in no adverse effect on the species.

34 With AMM1–AMM7, AMM20, AMM27, and CM12 in place, the indirect effects of plan implementation
35 under Alternative 9 would not substantially reduce the number or restrict the range of greater
36 sandhill cranes. Therefore, the indirect effects of Alternative 9 implementation would have a less-
37 than-significant impact on greater sandhill crane.

38 **Lesser Sandhill Crane**

39 Lesser sandhill cranes in the Plan Area are almost entirely dependent on privately owned
40 agricultural lands for foraging. Long-term sustainability of the lesser sandhill crane is thus
41 dependent on providing a matrix of compatible crop types that afford suitable foraging habitat and
42 maintaining compatible agricultural practices, while sustaining and increasing the extent of other
43 essential habitat elements such as night roosting habitat. The habitat model for lesser sandhill crane

1 identifies “roosting and foraging” and “foraging” habitat. These habitat types include suitable
 2 foraging and roosting habitat in the study area as certain agricultural types, specific grassland types,
 3 irrigated pastures and hay crops, managed seasonal wetland, and other natural seasonal wetland.
 4 Roosting and foraging habitat consists of traditional roost sites that are known to be used by
 5 sandhill cranes (both greater and lesser) and that provide foraging habitat. Detail regarding the
 6 roosting and foraging modeled habitat for both subspecies of sandhill crane is included in BDCP
 7 Appendix 2.A *Covered Species Accounts*. Both temporary and permanent roost sites were identified
 8 for sandhill cranes. Permanent roosting and foraging sites are those used regularly, year after year,
 9 while temporary roosting and foraging sites are those used in some years. The assessment of the
 10 loss of foraging habitat for the lesser sandhill crane considers the relative habitat value of specific
 11 crop or land cover types. Although both the greater and the lesser sandhill crane use similar crop or
 12 land cover types, these provide different values of foraging habitat for the two subspecies based on
 13 proportional use of these habitats. Lesser sandhill cranes are less traditional than greater sandhill
 14 cranes and are more likely to move between different roost site complexes and different wintering
 15 regions (Ivey pers. comm.) The wintering range is ten times larger than the greater sandhill crane
 16 and their average foraging flight radius from roost sites is twice that of greater sandhill cranes.
 17 Because of this higher mobility, lesser sandhill cranes are more flexible in their use of foraging areas
 18 than the greater sandhill crane.

19 Construction and restoration associated with Alternative 9 conservation measures would result in
 20 both temporary and permanent losses of foraging and roosting habitat for lesser sandhill crane as
 21 indicated in Table 12-9-31. Full implementation of Alternative 9 would include the following
 22 conservation actions over the term of the BDCP that would benefit the lesser sandhill crane (BDCP
 23 Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 24 ● Protect at least 7,300 acres of high- to very high-value habitat for greater sandhill crane, with at
 25 least 80% maintained in very high-value types in any given year. Habitat would be protected
 26 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6. The selection of protected habitat
 27 locations would consider sea level rise and local seasonal flood events, greater sandhill crane
 28 population levels, and the location of foraging habitat loss. Patch size of protected cultivated
 29 lands would be at least 160 acres (Objective GSHC1.1, associated with CM3).
- 30 ● To create additional high-value greater sandhill crane winter foraging habitat, 10% of the
 31 habitat protected under Objective GSHC1.1 would involve acquiring low-value habitat or
 32 nonhabitat areas and converting it to high- or very high-value habitat. Habitat would be created
 33 within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6. The selection of areas in which
 34 habitat would be created would consider sea level rise and local seasonal flood events, greater
 35 sandhill crane population levels, and the location of foraging habitat loss (Objective GSHC1.2,
 36 associated with CM3).
- 37 ● Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the
 38 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise
 39 and local seasonal flood events. The wetlands would be located within 2 miles of existing
 40 permanent roost sites and protected in association with other protected natural community
 41 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide
 42 buffers around the wetlands (Objective GSHC1.3, associated with CM3).
- 43 ● Create at least two 90-acre wetland complexes within the Stone Lakes NWR project boundary.
 44 The complexes would be no more than 2 miles apart and would help provide connectivity
 45 between the Stone Lakes and Cosumnes greater sandhill crane populations. Each complex would

1 consist of at least three wetlands totaling at least 90 acres of greater sandhill crane roosting
2 habitat, and would be protected in association with other protected natural community types
3 (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e., two
4 sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be
5 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
6 support roosting cranes and provide highest-value foraging habitat, provided such substitution
7 is consistent with the long-term conservation goals of Stone Lakes NWR for greater sandhill
8 crane. (Objective GSHC1.4, associated with CM10).

- 9 ● Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost
10 sites. The habitat would consist of active cornfields that are flooded following harvest to support
11 roosting cranes and that provide highest-value foraging habitat. Individual fields would be at
12 least 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area,
13 but would be sited with consideration of the location of roosting habitat loss and would be in
14 place prior to roosting habitat loss (Objective GSCH1.5, associated with CM3).
- 15 ● Target cultivated land conservation to provide connectivity between other conservation lands
16 (Objective CLNC1.2, associated with CM3).
- 17 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
18 lands that occur in cultivated lands within the reserve system, including, water conveyance
19 channels, grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

20 As explained below, with the restoration and protection of these amounts of habitat, in addition to
21 natural community enhancement and management commitments (including *CM12 Methylmercury*
22 *Management*) and implementation of AMM1–AMM7, *AMM20 Greater Sandhill Crane*, *AMM27*
23 *Selenium Management*, and *AMM30 Transmission Line Design and Alignment Guidelines*, impacts on
24 the lesser sandhill crane would not be adverse for NEPA purposes and would be less than significant
25 for CEQA purposes.

1
2

Table 12-9-31. Changes in Lesser Sandhill Crane Modeled Habitat Associated with Alternative 9 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Roosting and Foraging - Permanent	0	0	0	0	NA	NA
	Roosting and Foraging - Temporary	0	0	25	25	NA	NA
	Foraging	44	44	1,600	1,600	NA	NA
Total Impacts CM1		44	44	1,625	1,625	NA	NA
CM2-CM18	Roosting and Foraging - Permanent	0	0	0	0	0	0
	Roosting and Foraging - Temporary	0	41	0	0	0	0
	Foraging	3,610	12,131	2	4	0	0
Total Impacts CM2-CM18		3,610	12,172	2	4	0	0
Total Roosting and Foraging - Permanent		0	0	0	0	0	0
Total Roosting and Foraging - Temporary		0	41	25	25	0	0
Total Foraging		3,654	12,175	1,602	1,604	0	0
TOTAL IMPACTS		3,654	12,216	1,627	1,629	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-72: Loss or Conversion of Habitat for and Direct Mortality of Lesser Sandhill**
5 **Crane**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss
7 of up to 66 acres of modeled roosting and foraging habitat (41 acres of permanent loss and 25 acres
8 of temporary loss) and 13,779 acres of foraging habitat (12,175 acres of permanent loss and 1,604
9 acres of temporary loss) for lesser sandhill crane Table 12-9-31). Conservation measures that would
10 result in these losses are conveyance facilities and transmission line construction, and establishment
11 and use of borrow and spoil areas (CM1), Yolo Bypass Fisheries Improvements (CM2), Tidal Natural
12 Communities Restoration (CM4), Grassland Natural Community Restoration (CM8), Nontidal Marsh
13 Natural Community Restoration (CM10), and Natural Communities Enhancement and Management
14 (CM11). The majority of habitat loss would result from water conveyance facility construction and

1 conversion of habitat to tidal natural communities through CM4. Habitat enhancement and
2 management activities through CM11, which include ground disturbance or removal of nonnative
3 vegetation, could also result in local adverse habitat effects. In addition, maintenance activities
4 associated with the long-term operation of the water conveyance facilities and other BDCP physical
5 facilities could degrade or eliminate lesser sandhill crane modeled habitat. Each of these individual
6 activities is described below. A summary statement of the combined impacts, NEPA effects and a
7 CEQA conclusion follow the individual conservation measure discussions.

- 8 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities as they
9 are currently designed would result in the permanent loss of up to 44 acres of lesser sandhill
10 crane foraging habitat. Foraging habitat that would be permanently impacted by CM1 would
11 consist of 9 acre of very high-value, 2 acres of high-value, and 29 acres of medium-value foraging
12 habitat (Table 12-9-32). Permanent loss of foraging habitat would result from intake and fish
13 screen construction, channel enlargement, and transmission line construction in CZ 4, 5, and 6.
14 Fish barrier construction would permanently impact foraging habitat in CZ 6 on Bradford Island,
15 Bacon Island, north of Woodward Island, and between Mandeville and Bradford Island. In
16 addition, 25 acres of temporary roosting and foraging habitat, and 1,600 acres of foraging
17 habitat would be temporarily removed (Table 12-9-31). Temporary habitat loss would primarily
18 result from potential borrow and spoil areas (1,278 acres) and work areas for the above
19 construction activities. The temporarily removed habitat would consist primarily of cultivated
20 lands and it would be restored within 1 year following construction. However, it would not
21 necessarily be restored to its original topography and it could be restored as grasslands in the
22 place of cultivated lands.

23 The temporary roosting and foraging habitat that would be temporarily impacted is located on
24 the east side of Bradford Island. The temporary roost site would be impacted by a concrete
25 batch plant, an operable barrier work area, and a borrow and spoil area. The implementation of
26 *AMM20 Greater Sandhill Crane* would require that all CM1 activities be designed to avoid direct
27 loss of crane roost sites. Avoidance of crane roost sites would be accomplished either by siting
28 activities outside of identified roost sites or by relocating the roost site if it consisted of
29 cultivated lands (roost sites consisting of wetlands would not be subject to re-location).
30 Relocated roost sites would be established prior to construction activities affecting the original
31 roost site (as described for *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental*
32 *Commitments, AMMs, and CMs*). Therefore there would be no loss of crane roosting and foraging
33 habitat as a result of water conveyance facility construction once the facilities were fully
34 designed. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 9
35 construction locations.

1 **Table 12-9-32. Total Amount of Lesser Sandhill Crane Foraging Habitat Affected under**
2 **Alternative 9**

Foraging Habitat Value Class	Land Cover Type	CM1 Permanent (Temporary)	CM2–CM18 Permanent (Temporary)
Very high	Corn, alfalfa and alfalfa mixtures	9 (1,095)	4,083 (0)
High	Mixed pasture, native pasture, other pasture, irrigated pasture, native vegetation, rice	2 (29)	2,058 (0)
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, non-irrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, wheat, other grain crops, managed wetlands	29 (235)	2,220 (2)
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	4 (241)	3,745 (2)
None	Vineyards, orchards	0 (0)	23 (0)

- 3
- 4 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction under CM2 would result in a permanent
5 loss of 267 acres and a temporary loss of 2 acres of lesser sandhill crane foraging habitat in CZ 2.
6 Lesser sandhill crane use in this area is less common than in the central Delta. Construction
7 impacts from CM2 would occur within the first 10 years of Alternative 9 implementation.
 - 8 • *CM4 Tidal Natural Communities Restoration*: Based on the hypothetical tidal restoration
9 footprint, this activity would result in the permanent loss or conversion of approximately
10 10,248 acres of lesser sandhill crane habitat, consisting of 41 acres of temporary roosting and
11 foraging habitat and 10,207 acres of foraging habitat. Loss of foraging habitat from CM4 would
12 consist of 3,642 acres of very high-value, 1,529 acres of high value, 2,040 acres of medium-value,
13 and 2,983 acres of low-value foraging habitat (Table 12-9-32). Habitat loss would primarily
14 occur in the Cosumnes-Mokelumne River and West Delta ROAs. Tidal wetland restoration in CZ 4
15 could occur between the high crane use areas of the central Delta and the Cosumnes River
16 Preserve. However, the conversion of grasslands and cultivated lands to tidal wetlands would
17 not prohibit crane movement or reduce use of these areas. Lesser sandhill cranes are less
18 traditional than greater sandhill cranes and would be more adaptable to changes in land use.
19 Approximately 2,516 acres of foraging habitat would be removed within the first 10 years of
20 Alternative 9 implementation.
 - 21 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees would result in
22 the loss of 2 acres of low-value lesser sandhill crane foraging habitat (1 acre of permanent loss, 1
23 acres of temporary loss). This impact would occur after the first 10 years of Alternative 9
24 implementation.
 - 25 • *CM8 Grassland Natural Community Restoration*: Approximately 300 acres of cultivated lands
26 (foraging habitat) would be converted to grassland. No roosting/foraging habitat would be

1 impacted by grassland restoration activities. The restored grasslands would continue to provide
2 foraging habitat value for the lesser sandhill crane. Approximately 257 acres would be impacted
3 within the first 10 years of Alternative 9 implementation.

- 4 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would result in the permanent
5 conversion of approximately 1,350 acres of modeled foraging habitat for the lesser sandhill
6 crane. A portion of the restored nontidal marsh would be expected to continue to provide
7 roosting and foraging habitat value for the lesser sandhill crane. However, some of this restored
8 marsh would be unsuitable as it would lack emergent vegetation and consist of open water that
9 would be too deep to provide suitable roosting or foraging habitat. Approximately 567 acres of
10 habitat would be converted to nontidal marsh within the first 10 years of Alternative 9
11 implementation.
- 12 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
13 actions included in *CM11* that are designed to enhance wildlife values in restored or protected
14 habitats could result in localized ground disturbances that could temporarily remove small
15 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
16 vegetation and road and other infrastructure maintenance activities, would be expected to have
17 minor adverse effects on available habitat and would be expected to result in overall
18 improvements to and maintenance of habitat values over the term of the BDCP. The potential for
19 these activities to result in direct mortality of lesser sandhill crane would be minimized with the
20 implementation of *AMM20 Greater Sandhill Crane*. *CM11* would also include the construction of
21 recreational-related facilities including trails, interpretive signs, and picnic tables (BDCP
22 Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of trailhead
23 facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
24 disturbed areas when and where possible. If new ground disturbance was necessary, sandhill
25 crane habitat would be avoided, with the exception of a permanent loss of 4 acres of grassland
26 foraging habitat (1 acre of which would be impacted within the first 10 years of Plan
27 implementation).
- 28 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
29 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
30 disturbances that could affect lesser sandhill crane use of the surrounding habitat. Maintenance
31 activities would include vegetation management, levee and structure repair, and re-grading of
32 roads and permanent work areas. These effects, could be adverse as sandhill cranes are
33 sensitive to disturbance. However, impacts would be reduced by AMMs, and conservation
34 actions as described below.
- 35 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
36 direct mortality of lesser sandhill crane if they were present in the study area, because they
37 would be expected to avoid contact with construction and other equipment. Potential effects
38 would be avoided and minimized with the implementation of *AMM20 Greater Sandhill Crane*.
39 Injury and mortality from electrical transmission facilities are described below under Impact
40 BIO-73.

41 The following paragraphs summarize the combined effects discussed above and describe other
42 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
43 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-
3 term BDCP conservation strategy has been evaluated to determine whether it would provide
4 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
5 construction would not be adverse under NEPA. Based on current design footprints, Alternative 9
6 would remove 25 acres roosting and foraging habitat (temporary loss from CM1) in the study area
7 in the near-term. In addition, 5,257 acres of foraging habitat would be removed or converted in the
8 near-term (CM1, 1,664 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural*
9 *Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*
10 *Communities Enhancement and Management*—3,612 acres). Of these near-term acres of foraging
11 habitat impacted, 3,906 acres would be medium- to very high-value habitat (CM1, 1,339 acres, CM2-
12 11, 2,507 acres).

13 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
14 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging
15 habitat. Using these ratios would indicate that 25 acres of lesser sandhill crane roosting habitat
16 should be restored/created and 25 acres should be protected to compensate for the CM1 losses of
17 lesser sandhill crane roosting and foraging habitat. In addition, 1,339 acres of high- to very high-
18 value foraging habitat should be protected to mitigate the CM1 losses of lesser sandhill crane
19 medium- to very high-value foraging habitat. The near-term effects of other conservation actions
20 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require
21 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA
22 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1
23 protection for the loss of foraging habitat).

24 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost
25 sites were directly impacted by CM1 covered activities (including transmission lines and their
26 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
27 result of water conveyance facility construction once the facilities were fully designed, which would
28 avoid the CM1 impact on 411 acres of roosting and foraging habitat once the project design is final.
29 Indirect effects of construction-related noise and visual disturbance are discussed below under
30 Impact BIO-74.

31 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
32 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3, *Description of*
33 *Alternatives*). These conservation actions are associated with CM3 and CM10 and would occur in the
34 same timeframe as the construction and early restoration losses.

35 The BDCP also includes the following objectives for the greater sandhill crane which would also
36 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
37 winter use areas.

38 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
39 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
40 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
41 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
42 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting
43 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed
44 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of

1 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).
2 Restoration sites would be identified with consideration of sea level rise and local seasonal flood
3 events. These wetlands would be created within 2 miles of existing permanent roost sites and
4 protected in association with other protected natural community types at a ratio of 2:1 upland to
5 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would
6 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,
7 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone
8 Lakes National Wildlife Refuge project boundary (BDCP Chapter 3, Figure 3.3-6) and would be
9 designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill crane
10 populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would provide
11 additional conservation to address the threats of vineyard conversion, urbanization to the east, and
12 sea level rise to the west of greater sandhill crane wintering habitat.

13 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
14 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
15 *BIO-72, Compensate for the Loss of Medium- to Very High-Value Lesser Sandhill Crane Foraging*
16 *Habitat*, would be available to guide the near-term protection of cultivated lands to ensure that the
17 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were
18 compensated for with appropriate crop types and natural communities.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
23 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
24 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
25 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
26 to the Final EIR/EIS.

27 ***Late Long-Term Timeframe***

28 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475
29 acres of foraging habitat for lesser sandhill crane. Alternative 9 as a whole would result in the
30 permanent loss of and temporary effects on 66 acres of roosting and foraging habitat (less than 1%
31 of the total habitat in the study area) and 13,779 acres of foraging habitat (6% of the total habitat in
32 the study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by
33 the late long-term timeframe would consist of 9,762 acres of medium- to very high-value foraging
34 habitat. The locations of these losses are described above in the analyses of individual conservation
35 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites
36 were directly affected by water conveyance facilities including transmission lines and associated
37 footprints. In addition, temporarily removed habitat would be restored within 1 year following
38 construction. However, it would not necessarily be restored to its original topography and it could
39 result in the conversion of cultivated lands to grasslands.

40 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
41 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres
42 of greater Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at
43 least 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective

1 GSHC1.1). These croptypes would also provide high- to very high-value habitat for the lesser
2 sandhill crane.

3 The BDCP also includes the following objectives for the greater sandhill crane which would also
4 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
5 winter use areas.

6 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
7 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
8 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
9 and local seasonal flood events. These wetlands would be created within 2 miles of existing
10 permanent roost sites and protected in association with other protected natural community types at
11 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
12 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
13 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
14 constructed within the Stone Lakes National Wildlife Refuge project boundary (BDCP Chapter 3,
15 Figure 3.3-6) and would be designed to provide connectivity between the Stone Lakes and
16 Cosumnes greater sandhill crane populations (Objective GSHC1.4). These wetlands would consist of
17 two 90-acre wetland complexes each consisting of at least three wetlands and would be no more
18 than 2 miles apart. The large patch sizes of these wetland complexes would provide additional
19 conservation to address the threats of vineyard conversion, urbanization to the east, and sea level
20 rise to the west of greater sandhill crane wintering habitat. Approximately 95 acres of roosting
21 habitat would be created within 2 miles of existing permanent roost sites (Objective GSHC1.5).
22 These roosts would consist of active cornfields that are flooded following harvest to support
23 roosting cranes and also provide the highest-value foraging habitat for the species. Individual fields
24 would be at least 40 acres could shift locations throughout the Greater Sandhill Crane Winter Use
25 Area, but would be sited with consideration of the location of roosting habitat loss and would be in
26 place prior to roosting habitat loss.

27 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
28 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
29 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
30 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
31 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
32 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives
33 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
34 economically driven agricultural practices, protecting crane habitat would provide enhanced
35 stability to agricultural habitat value within the crane use area that does not currently exist.
36 Although lesser sandhill cranes are less traditional in their use of roost sites in the Delta, these
37 objectives for the greater sandhill crane would also benefit the lesser sandhill crane.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
41 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
42 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
43 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
44 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
45 to the Final EIR/EIS.

1 **NEPA Effects:** The loss of lesser sandhill crane habitat and potential for direct mortality of this
2 special status species under Alternative 9 would represent an adverse effect in the absence of other
3 conservation actions. However, with habitat protection and restoration associated with *CM3 Natural*
4 *Communities Protection and Restoration* and *CM10 Nontidal Marsh Restoration*, guided by biological
5 goals and objectives for the species and by *AMM1–AMM7*, *AMM20 Greater Sandhill Crane*, which
6 would be in place throughout the construction period, and Mitigation Measure BIO-72, which would
7 be available to compensate for loss of medium- to very high-value foraging habitat, the effects of
8 habitat loss and potential mortality on lesser sandhill crane would not be adverse under NEPA.

9 **CEQA Conclusion:**

10 **Near-Term Timeframe**

11 Because the water conveyance facilities construction is being evaluated at the project level, the near-
12 term BDCP conservation strategy has been evaluated to determine whether it would provide
13 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
14 construction would be less than significant under CEQA. Based on current design footprints,
15 Alternative 9 would remove 25 acres roosting and foraging habitat (temporary loss from *CM1*) in
16 the study area in the near-term. In addition, 5,257 acres of foraging habitat would be removed or
17 converted in the near-term (*CM1*, 1,664 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal*
18 *Natural Communities Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM11 Natural*
19 *Communities Enhancement and Management*—3,612 acres). Of these near-term acres of foraging
20 habitat impacted, 3,906 acres would be medium- to very high-value habitat (*CM1*, 1,339 acres, *CM2-*
21 *11*, 2,507 acres).

22 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
23 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging
24 habitat. Using these ratios would indicate that 25 acres of lesser sandhill crane roosting habitat
25 should be restored/created and 25 acres should be protected to compensate for the *CM1* losses of
26 lesser sandhill crane roosting and foraging habitat. In addition, 1,339 acres of high- to very high-
27 value foraging habitat should be protected to mitigate the *CM1* losses of lesser sandhill crane
28 medium- to very high-value foraging habitat. The near-term effects of other conservation actions
29 would remove 2,507 acres of medium- to very high-value foraging habitat, and therefore require
30 2,507 acres of protection of high- to very high-value foraging habitat using the same typical NEPA
31 and CEQA ratios (1:1 restoration and 1:1 protection for the loss of roosting and foraging habitat; 1:1
32 protection for the loss of foraging habitat).

33 The implementation of *AMM20 Greater Sandhill Crane* would require that no sandhill crane roost
34 sites were directly impacted by *CM1* covered activities (including transmission lines and their
35 associated footprints). Therefore there would be no loss of crane roosting and foraging habitat as a
36 result of water conveyance facility construction once the facilities were fully designed, which would
37 avoid the *CM1* impact on 411 acres of roosting and foraging habitat once the project design is final.
38 Indirect effects of construction-related noise and visual disturbance are discussed below under
39 Impact BIO-74.

40 The BDCP has committed to near-term goals of creating 500 acres of managed wetlands and
41 protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3). These
42 conservation actions are associated with *CM3* and *CM10* and would occur in the same timeframe as
43 the construction and early restoration losses.

1 The BDCP also includes the following objectives for the greater sandhill crane which would also
2 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
3 winter use areas.

4 Up to 95 acres of roosting habitat would be created within 2 miles of existing permanent roost sites
5 (Objective GSHC1.5). These roosts would consist of active cornfields that are flooded following
6 harvest to support roosting cranes and also provide the highest-value foraging habitat for the
7 species. Individual fields would be at least 40 acres could shift locations throughout the Greater
8 Sandhill Crane Winter Use Area, but would be sited with consideration of the location of roosting
9 habitat loss and would be in place prior to roosting habitat loss. Of the 500 acres of managed
10 wetlands to be created for roosting habitat, 320 acres would be created in minimum patch sizes of
11 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6 (Objective GSHC1.3).
12 Restoration sites would be identified with consideration of sea level rise and local seasonal flood
13 events. These wetlands would be created within 2 miles of existing permanent roost sites and
14 protected in association with other protected natural community types at a ratio of 2:1 upland to
15 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would
16 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,
17 lighting). The remaining 180 acres of crane roosting habitat would be constructed within the Stone
18 Lakes National Wildlife Refuge project boundary (BDCP Chapter 3, Figure 3.3-6) and would be
19 designed to provide connectivity between the Stone Lakes and Cosumnes greater sandhill crane
20 populations (Objective GSHC1.4). The large patch sizes of these wetland complexes would provide
21 additional conservation to address the threats of vineyard conversion, urbanization to the east, and
22 sea level rise to the west of greater sandhill crane wintering habitat.

23 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
24 species would be protected in the near-term time period (Objective CLNC1.1). Mitigation Measure
25 BIO-72 would be available to guide the near-term protection of cultivated lands to ensure that the
26 nearterm impacts of medium- to very high-value foraging habitat for lesser sandhill crane were
27 compensated for with appropriate crop types and natural communities.

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
32 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
33 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
34 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
35 to the Final EIR/EIS.

36 ***Late Long-Term Timeframe***

37 The study area supports approximately 23,919 acres of roosting and foraging habitat and 240,475
38 acres of foraging habitat for lesser sandhill crane. Alternative 9 as a whole would result in the
39 permanent loss of and temporary effects on 66 acres of roosting and foraging habitat (less than 1%
40 of the total habitat in the study area) and 13,779 acres of foraging habitat (6% of the total habitat in
41 the study area) for the lesser sandhill crane during the term of the Plan. The foraging habitat lost by
42 the late long-term timeframe would consist of 9,762 acres of medium- to very high-value foraging
43 habitat. The locations of these losses are described above in the analyses of individual conservation
44 measures. The implementation of *AMM20 Greater Sandhill Crane* would require that no roost sites

1 were directly affected by water conveyance facilities including transmission lines and associated
2 footprints. In addition, temporarily removed habitat would be restored within 1 year following
3 construction. However, it would not necessarily be restored to its original topography and it could
4 result in the conversion of cultivated lands to grasslands.

5 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
6 *Restoration* and *CM10 Nontidal Marsh Restoration* to restore or create at least 595 acres
7 of greater Sandhill crane roost habitat (Objectives GSHC1.3, GSHC1.4, and GSHC1.5) and to protect at
8 least 7,300 acres of high- to very high-value foraging habitat for greater Sandhill crane (Objective
9 GSHC1.1). These croptypes would also provide high- to very high-value habitat for the lesser
10 sandhill crane.

11 The BDCP also includes the following objectives for the greater sandhill crane which would also
12 benefit the lesser sandhill crane, as they utilize similar habitats and face similar threats within their
13 winter use areas.

14 Of the 500 acres of managed wetlands to be created for roosting habitat, 320 acres would be created
15 in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5,
16 or 6 (Objective GSHC1.3). Restoration sites would be identified with consideration of sea level rise
17 and local seasonal flood events. These wetlands would be created within 2 miles of existing
18 permanent roost sites and protected in association with other protected natural community types at
19 a ratio of 2:1 upland to wetland habitat to provide buffers that will protect cranes from the types of
20 disturbances that would otherwise result from adjacent roads and developed areas (e.g., roads,
21 noise, visual disturbance, lighting). The remaining 180 acres of crane roosting habitat would be
22 constructed within the Stone Lakes National Wildlife Refuge project boundary (BDCP Chapter 3,
23 Figure 3.3-6) and would be designed to provide connectivity between the Stone Lakes and
24 Cosumnes greater sandhill crane populations (Objective GSHC1.4). These wetlands would consist of
25 two 90-acre wetland complexes each consisting of at least three wetlands and would be no more
26 than 2 miles apart. The large patch sizes of these wetland complexes would provide additional
27 conservation to address the threats of vineyard conversion, urbanization to the east, and sea level
28 rise to the west of greater sandhill crane wintering habitat. Approximately 95 acres of roosting
29 habitat would be created within 2 miles of existing permanent roost sites (Objective GSHC1.5).
30 These roosts would consist of active cornfields that are flooded following harvest to support
31 roosting cranes and also provide the highest-value foraging habitat for the species. Individual fields
32 would be at least 40 acres could shift locations throughout the Greater Sandhill Crane Winter Use
33 Area, but would be sited with consideration of the location of roosting habitat loss and would be in
34 place prior to roosting habitat loss.

35 The BDCP has committed to protecting 7,300 acres of high- to very high-value greater sandhill crane
36 foraging habitat by the late long-term timeframe with at least 80% maintained in very-high value
37 types in any given year (Objective GSHC1.1). These acres of protected foraging habitat would be
38 located within 2 miles of known roosting sites in CZs 3, 4, 5, and/or 6 and would consider sea level
39 rise and local seasonal flood events, greater Sandhill crane population levels, and the location of
40 foraging habitat loss. The patch size of these protected lands would be at least 160 acres (Objectives
41 GSHC1.1 and GSHC1.2). Because agricultural habitat values change over time based largely on
42 economically driven agricultural practices, protecting crane habitat would provide enhanced
43 stability to agricultural habitat value within the crane use area that does not currently exist.
44 Although lesser sandhill cranes are less traditional in their use of roost sites in the Delta, these
45 objectives for the greater sandhill crane would also benefit the lesser sandhill crane.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs,*
8 to the Final EIR/EIS.

9 Considering Alternative 9's protection and restoration provisions, in addition to Mitigation Measure
10 BIO-72, which would compensate for the loss of medium- to very high-value foraging habitat at a
11 ratio of 1:1, loss of habitat or direct mortality through implementation of Alternative 9 would not
12 result in a substantial adverse effect through habitat modifications and would not substantially
13 reduce the number or restrict the range of the species. Therefore, the alternative would have a less-
14 than-significant impact on lesser sandhill crane.

15 **Mitigation Measure BIO-72: Compensate for the loss of Medium- to Very High-Value** 16 **Lesser Sandhill Crane Foraging Habitat**

17 DWR must compensate for the loss of lesser sandhill crane medium- to very high-value foraging
18 habitat at a ratio of 1:1 by protecting or managing high- to very high-value habitat in the Plan
19 Area. Compensation must occur prior to or concurrent with the impacts to minimize the effects
20 of habitat loss. The crop types and natural communities that are included in foraging value
21 categories are listed in Table 12-9-32. Foraging habitat conservation must occur within 10
22 kilometers of traditional sandhill crane roost sites and the location of protected habitat or
23 conservation easements must be preapproved by CDFW.

24 **Impact BIO-73: Effects on Lesser Sandhill Crane Associated with Electrical Transmission** 25 **Facilities**

26 Sandhill cranes are susceptible to collision with power lines and other structures during periods of
27 inclement weather and low visibility (Avian Power Line Interaction Committee 1994, Brown and
28 Drewien 1995, Manville 2005). There are extensive existing transmission and distribution lines in
29 the sandhill crane winter use area. These include a network of distribution lines that are between
30 11- and 22-kV. In addition, there are two 115-kV lines that cross the study area, one that overlaps
31 with the greater sandhill crane winter use area between Antioch and I-5 east of Hood, and one that
32 crosses the northern tip of the crane winter use area north of Clarksburg. There are 69-kV lines
33 within the study area that parallel Twin Cities Road, Herzog Road, Lambert Road, and the Southern
34 Pacific Dredge Cut in the vicinity of Stone Lakes NWR. At the south end of the winter use area, there
35 are three 230-kV transmission lines that follow I-5, and then cut southwest through Holt, and two
36 500-kV lines cross the southwestern corner of the winter use area. This existing network of power
37 lines in the study currently poses a collision and electrocution risk for sandhill cranes, because they
38 cross over or surround sandhill crane roost sites in the study area.

39 Both permanent and temporary electrical transmission lines would be constructed to supply
40 construction and operational power to Alternative 9 facilities. The potential mortality of greater
41 sandhill crane in the area of the proposed transmission lines under Alternative 9 was estimated
42 using collision mortality rates by Brown and Drewien (1995) and an estimate of potential crossings
43 along the proposed lines (methods are described in BDCP Appendix 5.J, Attachment 5J.C, *Analysis of*

1 *Potential Bird Collisions at Proposed BDCP Powerlines*). This analysis concluded that mortality risk
2 could be substantially reduced by marking new transmission lines to increase their visibility to
3 sandhill cranes. Lesser sandhill cranes use the same roost sites as greater sandhill cranes. However,
4 their numbers fluctuate greatly over the season as they are more mobile and use a broader
5 landscape than greater sandhill cranes. Mortality risk would be similarly reduced for lesser sandhill
6 cranes by marking new transmission lines.

7 Typically, higher-voltage (230- kV) lines vary in height from 90 to 110 feet, while subtransmission
8 (69-kV) lines vary from 50 to 70 feet (Avian Power Line Interaction Committee 2006). The
9 Alternative 9 alignment would primarily use existing transmission and distribution lines and would
10 require the installation of approximately 42 miles of transmission line (3 miles of 60-kV line, 38
11 miles of 12-kV line, and 0.5 miles of 480-V line). These lines would occur in the vicinity of Walnut
12 Grove and adjacent to fish screen and operable barrier structures throughout the CM1 footprint.
13 Temporary lines would be removed after construction of the water conveyance facilities, within 10
14 years.

15 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
16 transmission line alignment, such as co-locating transmission lines when it would minimize effects
17 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. After the
18 Draft EIR/EIS was issued in December 2013, additional avoidance features were added to *AMM20*
19 *Greater Sandhill Crane*. *AMM20 Greater Sandhill Crane* requires that Alternative 9 meet the
20 performance standard of no mortality of greater sandhill crane associated with the new facilities.
21 This would be achieved by implementing one or any combination of the following: 1) siting new
22 transmission lines in lower bird strike risk zones; 2) removing, relocating or undergrounding
23 existing lines where feasible; 3) using natural gas generators in lieu of installing transmission lines
24 in high-risk zones of the greater sandhill crane winter use area; 4) undergrounding new lines in
25 high-risk zones of the greater sandhill crane winter use area; 5) permanently installing flight
26 diverters on existing lines over lengths equal to or greater than the length of the new transmission
27 lines in the crane winter use area; 6) for areas outside of the Stone Lakes NWR project boundary,
28 shifting locations of flooded areas that provide crane roosts to lower risk areas. These measures are
29 described in detail in *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental Commitments*,
30 *AMMs, and CMs*.

31 The implementation of the measures described above under *AMM20 Greater Sandhill Crane* would
32 substantially reduce the potential for lesser sandhill crane collisions with transmission lines.
33 Potential measures that would eliminate this risk include using natural gas generators in lieu of
34 transmission lines or undergrounding new lines in high-risk zones in the greater sandhill crane
35 winter use area. Marking transmission lines with flight diverters that make the lines more visible to
36 birds has been shown to reduce the incidence of bird mortality, including for sandhill cranes (Brown
37 and Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce
38 avian mortality by 60%. All new transmission lines would be fitted with flight diverters. The
39 installation of flight diverters on existing permanent lines would be prioritized in the highest risk
40 zones for greater sandhill crane (as described in BDCP Appendix 5.J, Attachment 5J.C, *Analysis of*
41 *Potential Bird Collisions at Proposed BDCP Powerlines*) and diverters would be installed in a
42 configuration that research indicates would reduce bird strike risk by at least 60%. The length of
43 existing line to be fitted with bird strike diverters would be equal to the length of new transmission
44 lines constructed as a result of the project, in an area with the same or higher greater sandhill crane
45 strike risk to provide a net benefit to the species. For optimum results, the recommended spacing
46 distance for bird flight diverters is 15 to 16.5 feet (4.5 to 5 meters) (Avian Power Line Interaction

1 Committee 1994). Placing diverters on existing lines would be expected to reduce existing lesser
2 and greater sandhill crane mortality in the Plan Area and therefore result in a net benefit to the
3 lesser sandhill crane population because these flight diverters would be maintained in perpetuity.

4 **NEPA Effects:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
5 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
6 current proposed transmission line alignment under Alternative 9 is not fully designed, and line
7 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the
8 final transmission line alignment avoid crane roost sites and achieve the performance standard of
9 no mortality of greater sandhill crane associated with the new facilities, which would also benefit
10 the lesser sandhill crane. *AMM30 Transmission Line Design and Alignment Guidelines* would require
11 design features for the transmission line alignment, such as co-locating transmission lines when it
12 would minimize effects on sandhill cranes, to avoid impacts on sensitive habitats to the maximum
13 extent feasible. All new transmission lines constructed as a result of the project would be fitted with
14 bird diverters, which have been shown to reduce avian mortality by 60%. With incorporation of
15 *AMM30 Transmission Line Design and Alignment Guidelines* and one or a combination of the
16 measures to greatly reduce the risk of bird strike described in *AMM20 Greater Sandhill Crane*, the
17 construction and operation of transmission lines under Alternative 9 would not result in an adverse
18 effect on lesser sandhill crane.

19 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
20 existing network of power lines in the study area currently poses a risk for sandhill cranes. The
21 current proposed transmission line alignment under Alternative 9 is not fully designed, and line
22 locations are not final. The implementation of *AMM20 Greater Sandhill Crane* would require that the
23 final transmission line alignment avoid crane roost sites and achieve the performance standard of
24 no mortality of greater sandhill crane associated with the new facilities, which would also benefit
25 lesser sandhill crane. *AMM30 Transmission Line Design and Alignment Guidelines* would require
26 design features for the transmission line alignment, such as co-locating transmission lines when it
27 would minimize effects on sandhill cranes, to avoid impacts on sensitive habitats to the maximum
28 extent feasible. All new transmission lines constructed as a result of the project would be fitted with
29 bird diverters, which have been shown to reduce avian mortality by 60%. With incorporation of
30 *AMM30 Transmission Line Design and Alignment Guidelines* and one or a combination of the
31 measures to greatly reduce the risk of bird strike described in *AMM20 Greater Sandhill Crane*, the
32 construction and operation of transmission lines under Alternative 9 would have a less-than-
33 significant impact on lesser sandhill crane.

34 **Impact BIO-74: Indirect Effects of Plan Implementation on Lesser Sandhill Crane**

35 **Indirect Construction- and Operation-Related Effects:** Sandhill cranes are sensitive to
36 disturbance. Noise and visual disturbances from the construction of water conveyance facilities and
37 other conservation measures could reduce lesser sandhill crane use of modeled habitat adjacent to
38 work areas. Indirect effects associated with construction include noise, dust, and visual disturbance
39 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
40 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the
41 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise
42 and visual disturbances that could affect lesser sandhill crane use of surrounding habitat. These
43 effects could result from periodic vehicle use along the conveyance corridor, inspection and
44 maintenance of aboveground facilities, and similar activities. These potential effects would be

1 minimized with implementation of *AMM20 Greater Sandhill Crane* described in Appendix 3B,
2 *Environmental Commitments, AMMs, and CMs*.

3 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would
4 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill
5 crane (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
6 *Conveyance Facility on Sandhill Crane*). The same methods were employed to addresses the potential
7 noise effects on cranes from Alternative 9 and to determine that as much as 1,217–5,108 acres of
8 crane habitat could potentially be affected by general construction noise above baseline level (50–
9 60 dBA). This would include 44–157 acres of temporary crane roosting habitat and 1,173–4,951
10 acres of crane foraging habitat. In addition, 0–40 acres of permanent crane roosting habitat, 38–688
11 acres of temporary crane roosting habitat, and 1,392–7,699 acres of crane foraging habitat could be
12 affected by noise from pile driving that would be above baseline level (50–60dBA, Table 12-9-30
13 under Impact BIO-71).

14 The analysis was conducted based on the assumption that there would be direct line-of-sight from
15 sandhill crane habitat areas to the construction site, and, therefore, provides a worst-case estimate
16 of effects. In many areas the existing levees would partially or completely block the line-of-sight and
17 would function as effective noise barriers, substantially reducing noise transmission. However,
18 there is insufficient data to assess the effects that increased noise levels would have on sandhill
19 crane behavior. Similar acreages of lesser sandhill crane habitat would be expected to be indirectly
20 affected. However, lesser sandhill cranes are less traditional in their winter roost sites and may be
21 more likely to travel away from disturbed areas to roost and forage in more suitable habitat.

22 Evening and nighttime construction activities would require the use of extremely bright lights.
23 Nighttime construction could also result in headlights flashing into roost sites when construction
24 vehicles are turning onto or off of construction access routes. Proposed surge towers would require
25 the use of safety lights that would alert low-flying aircraft to the presence of these structures
26 because of their height. Little data is available on the effects of impact of artificial lighting on
27 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes
28 to flush and it is thought that they may avoid roosting in areas where lighting is bright (BDCP
29 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to
30 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting
31 include a reduction in the cranes' quality of nocturnal rest, and effects on their "sense of photo-
32 period which might cause them to shift their physiology towards earlier migration and breeding."
33 (BDCP Chapter 5, *Effects Analysis*). Effects such as these could prove detrimental to the cranes'
34 overall fitness and reproductive success (which could in turn have population-level impacts). A
35 change in photo-period interpretation could also cause cranes to fly out earlier from roost sites to
36 forage and might increase their risk of power line collisions if they were to leave roosts before dawn
37 (BDCP Chapter 5, *Effects Analysis*).

38 The effects of noise and visual disturbance on lesser sandhill crane would be minimized through the
39 implementation of *AMM20* (Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Activities
40 within 0.75 mile of crane roosting habitat would reduce construction noise during night time hours
41 (from one hour before sunset to one hour after sunrise) such that construction noise levels do not
42 exceed 50 dBA L_{eq} (1 hour) at the nearest temporary or permanent roosts during periods when the
43 roost sites are available (flooded). In addition, the area of crane foraging habitat that would be
44 affected during the day (from one hour after sunrise to one hour before sunset) by construction
45 noise exceeding 50 dBA L_{eq} (1 hour) would also be minimized. Unavoidable noise related effects

1 would be compensated for by the enhancement of 0.1 acre of foraging habitat for every acre
2 indirectly affected within the 50 dBA L_{eq} (1 hour) construction noise contour. With these measures
3 in place, indirect effects of noise and visual disturbance from construction activities are not expected
4 to reduce the lesser sandhill crane population in the study area.

5 The use of mechanical equipment during water conveyance facilities construction could cause the
6 accidental release of petroleum or other contaminants that could affect lesser sandhill cranes in the
7 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to lesser
8 sandhill crane habitat could also affect the subspecies. AMM1–AMM7, including *AMM2 Construction*
9 *Best Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure
10 that measures were in place to prevent runoff from the construction area and negative effects of
11 dust on foraging habitat.

12 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
13 mercury in lesser sandhill cranes. Largemouth bass was used as a surrogate species for analysis
14 (Appendix 11F, *Substantive BDCP Revisions*). Results of the quantitative modeling of mercury effects
15 on largemouth bass as a surrogate species would overestimate the effects on lesser sandhill crane as
16 they primarily forage on cultivated crops and invertebrates. Organisms feeding within pelagic-based
17 (algal) foodwebs have been found to have higher concentrations of methylmercury than those in
18 benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
19 segregation (Grimaldo et al. 2009). Modeled effects of mercury concentrations from changes in
20 water operations under CM1 on largemouth bass did not differ substantially from existing
21 conditions; therefore, results also indicate that lesser sandhill crane tissue concentrations would not
22 measurably increase as a result of CM1 implementation.

23 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
24 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
25 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
26 mercury. Increased methylmercury associated with natural community and floodplain restoration
27 may indirectly affect lesser sandhill crane via uptake in lower trophic levels (see BDCP Appendix
28 5.D, *Contaminants*). Mercury is generally elevated throughout the Delta, and restoration of the lower
29 potential areas in total may result in generalized, very low level increases of mercury. Given that
30 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in
31 some level of effects.

32 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
33 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
34 each restoration project. If a project is identified where there is a high potential for methylmercury
35 production that could not be fully addressed through restoration design and adaptive management,
36 alternate restoration areas would be considered. CM12 would be implemented in coordination with
37 other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury
38 Monitoring and Analysis Section. This conservation measure would include the following actions.

- 39 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
40 mercury methylation and bioavailability
- 41 ● Define design elements that minimize conditions conducive to generation of methylmercury in
42 restored areas.

1 Define adaptive management strategies that can be implemented to monitor and minimize actual
2 postrestoration creation and mobilization of methylmercury.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex
8 classes within a species. In addition, the effect of selenium on a species can be confounded by
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
10 2009).

11 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
12 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
13 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
14 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
15 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
16 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
17 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
18 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
19 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
20 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
21 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
22 levels of selenium have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
24 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
25 exacerbate bioaccumulation of selenium in avian species, including the lesser sandhill crane. Marsh
26 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
27 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
28 BDCP restoration activities that create newly inundated areas could increase bioavailability of
29 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
30 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
31 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
32 long-term increases in selenium concentrations in water in the Delta under any alternative.
33 However, it is difficult to determine whether the effects of potential increases in selenium
34 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
35 lead to adverse effects on lesser sandhill crane.

36 Because of the uncertainty that exists at this programmatic level of review, there could be a
37 substantial effect on lesser sandhill crane from increases in selenium associated with restoration
38 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
39 *Management* (BDCP Appendix 3.C, *Avoidance and Minimization Measures*) which would provide
40 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
41 selenium and its bioavailability in tidal habitats. Furthermore, the effectiveness of selenium
42 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
43 separately for each restoration effort as part of design and implementation. This avoidance and
44 minimization measure would be implemented as part of the tidal habitat restoration design
45 schedule.

1 **NEPA Effects:** Crane habitat could potentially be affected by general construction noise and pile
2 driving above baseline level (50–60 dBA). However, lesser sandhill cranes are less traditional in
3 their winter roost sites than greater sandhill cranes and may be more likely to travel away from
4 disturbed areas to roost in more suitable habitat. Construction in certain areas would take place 7
5 days a week and 24 hours a day and evening and nighttime construction activities would require the
6 use of extremely bright lights, which could adversely affect roosting cranes by impacting their sense
7 of photo-period and by exposing them to predators.

8 Effects of noise and visual disturbance could substantially alter the suitability of habitat for lesser
9 sandhill crane. *AMM20 Greater Sandhill Crane* would include requirements (described above) to
10 minimize the effects of noise and visual disturbance on sandhill cranes and to mitigate effects on
11 habitat.

12 Tidal habitat restoration could result in increased exposure of lesser sandhill crane to selenium
13 which could result in the mortality of a special-status species. This effect would be addressed
14 through the implementation of *AMM27 Selenium Management*, which would provide specific tidal
15 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its
16 bioavailability in tidal habitats.

17 The implementation of tidal natural communities restoration or floodplain restoration could result
18 in increased exposure of lesser sandhill crane to methylmercury. The potential indirect effects of
19 increased mercury exposure is likely low for lesser sandhill crane because they primarily forage on
20 cultivated crops and associated invertebrates. Implementation of CM12 which contains measures to
21 assess the amount of mercury before project development, followed by appropriate design and
22 adaptation management, would minimize the potential for increased methylmercury exposure, and
23 would result in no adverse effect on the species.

24 **CEQA Conclusion:** Crane habitat could potentially be affected by general construction noise and pile
25 driving above baseline level (50–60 dBA). However, lesser sandhill cranes are less traditional in
26 their winter roost sites and may be more likely to travel away from disturbed areas to roost in more
27 suitable habitat. Construction in certain areas would take place 7 days a week and 24 hours a day
28 and evening and nighttime construction activities would require the use of extremely bright lights,
29 which could adversely affect roosting cranes by impacting their sense of photo-period and by
30 exposing them to predators.

31 Effects of noise and visual disturbance could substantially alter the suitability of habitat for lesser
32 sandhill crane. This would be a significant impact. With *AMM20 Greater Sandhill Crane* in place,
33 which would include requirements (described above) to minimize the effects of noise and visual
34 disturbance on sandhill cranes and to mitigate effects on habitat, there would not be an adverse
35 effect on lesser sandhill crane.

36 Tidal habitat restoration could result in increased exposure of lesser sandhill crane to selenium
37 which could result in the potential mortality of a special-status species. This would be a significant
38 impact. This effect would be addressed through the implementation of *AMM27 Selenium*
39 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
40 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

41 Methylmercury tissue concentrations in lesser sandhill crane would not be expected to measurably
42 increase as a result of water operations under CM1 compared to the No Action Alternative. The
43 implementation of tidal natural communities restoration or floodplain restoration could result in

1 increased exposure of lesser sandhill crane to methylmercury. This would be a significant impact.
2 The potential indirect effects of increased mercury exposure is likely low for lesser sandhill crane
3 because they primarily forage on cultivated crops and associated invertebrates. Implementation of
4 CM12 which contains measures to assess the amount of mercury before project development,
5 followed by appropriate design and adaptation management, would minimize the potential for
6 increased methylmercury exposure, and would result in no adverse effect on lesser sandhill crane.

7 With AMM1–AMM7, AMM20, AMM27, and CM12 in place, the indirect effects of plan implementation
8 under Alternative 9 would not substantially reduce the number or restrict the range of lesser
9 sandhill cranes. Therefore, the indirect effects of Alternative 9 implementation would have a less-
10 than-significant impact on lesser sandhill crane.

11 **Least Bell's Vireo and Yellow Warbler**

12 Least Bell's vireo and yellow warbler modeled habitat identifies suitable nesting and migratory
13 habitat as those plant alliances from the valley/foothill riparian modeled habitat that contain a
14 dense shrub component, including all willow-dominated alliances.

15 Construction and restoration associated with Alternative 9 conservation measures would result in
16 both temporary and permanent losses of least Bell's vireo and yellow warbler modeled habitat as
17 indicated in Table 12-9-33. Full implementation of Alternative 9 would also include the following
18 conservation actions over the term of the BDCP to benefit least Bell's vireo and yellow warbler
19 (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 20 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community with at least
21 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
22 associated with CM7).
- 23 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
24 10 (Objective VFRNC1.2, associated with CM7).
- 25 ● Maintain and enhance structural heterogeneity (Objective VFRNC2.1, associated with CM7).
- 26 ● Maintain at least 1,000 acres of early- to mid-successional vegetation (Objective VFRNC2.2,
27 associated with CM7).
- 28 ● Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,
29 associated with CM3 and CM7).
- 30 ● Maintain the at least 500 acres of mature riparian forest (Objective VFRNC2.3) intermixed with
31 a portion of the early- to mid-successional riparian vegetation (Objective VFRNC2.2) in large
32 blocks with a minimum patch size of 50 acres and minimum width of 330 feet (Objective
33 VFRNC2.4, associated with CM3 and CM7).

34 As explained below, with the restoration and protection of these amounts of habitat, in addition to
35 natural community enhancement and management commitments and implementation of AMM1–
36 AMM7, *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
37 *Cuckoo*, and Mitigation Measure BIO-75, impacts on least Bell's vireo and yellow warbler would not
38 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-33. Changes in Least Bell’s Vireo and Yellow Warbler Modeled Habitat Associated with**
2 **Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Migratory and breeding	49	49	233	233	NA	NA
Total Impacts CM1		49	49	233	233	NA	NA
CM2–CM18	Migratory and breeding	382	656	88	109	48–85	148
Total Impacts CM2–CM18		382	656	88	109	48–85	148
TOTAL IMPACTS		431	705	321	342	48–85	148

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-75: Loss or Conversion of Habitat for and Direct Mortality of Least Bell’s Vireo**
5 **and Yellow Warbler**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss
7 of up to 1,047 acres of modeled habitat (705 acres of permanent loss, 342 acres of temporary loss)
8 for least Bell’s vireo and yellow warbler (Table 12-9-33). Conservation measures that would result
9 in these losses are conveyance facilities and transmission line construction, and establishment and
10 use of borrow and spoil areas (CM1), Fremont Weir/Yolo Bypass fisheries improvements (CM2),
11 tidal natural communities restoration (CM4), and seasonally inundated floodplain restoration
12 (CM5). Habitat enhancement and management activities (CM11) which include ground disturbance
13 or removal of nonnative vegetation, could result in local adverse habitat effects. In addition,
14 maintenance activities associated with the long-term operation of the water conveyance facilities
15 and other BDCP physical facilities could degrade or eliminate least Bell’s vireo and yellow warbler
16 habitat. Each of these individual activities is described below. A summary statement of the combined
17 impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure
18 discussions.

- 19 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would
20 result in the combined permanent and temporary loss of up to 282 acres of modeled least Bell’s
21 vireo and yellow warbler habitat (Table 12-9-33). Of the 282 acres of modeled habitat that
22 would be removed for the construction of the conveyance facilities, 49 acres would be a
23 permanent loss and 233 acres would be a temporary loss of habitat. Most of the permanent loss
24 would occur as wider and deeper channels are dredged in Middle River and Victoria Canal, and

1 as operable barriers and new Sacramento River diversions are constructed in various
2 waterways across the Delta. Temporary losses of riparian community would occur primarily
3 along Middle River between Victoria Canal and Mildred Island, where large dredging work areas
4 and operable barrier work areas would be placed. Some of this vegetation may be temporarily
5 removed as dredging progresses, while other areas could remain in place but be temporarily
6 affected by sedimentation and equipment movement associated with dredging.

7 Temporarily affected areas would be restored as riparian habitat within 1 year following
8 completion of construction activities as described in *AMM10 Restoration of Temporarily Affected*
9 *Natural Communities*. Although the effects are considered temporary, the restored riparian
10 habitat would require at least four years for ecological succession to occur and for restored
11 riparian habitat to functionally replace habitat that has been affected. However, restored
12 riparian vegetation can have the habitat structure to support breeding vireos within 3 to 5
13 years, particularly if the restored vegetation is adjacent to established riparian areas (Kus
14 2002), and similar habitat would be suitable for yellow warbler. The majority of the riparian
15 vegetation to be temporarily removed is early- to mid-successional; therefore, the replaced
16 riparian vegetation would be expected to have structural components comparable to the
17 temporarily removed vegetation within the first 5 to 10 years after the initial restoration
18 activities are complete. There are no occurrences of least Bell's vireo or yellow warbler that
19 intersect with the CM1 footprint. However, this loss would have the potential to displace
20 individuals, if present, and remove the functions and value of modeled habitat for nesting,
21 protection, or foraging. Refer to the Terrestrial Biology Map Book for a detailed view of
22 Alternative 9 construction locations. Impacts from CM1 would occur within the first 10 years of
23 Alternative 9 implementation.

- 24 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of Yolo Bypass fisheries enhancements
25 would permanently remove approximately 83 acres and temporarily remove 88 acres of
26 modeled least Bell's vireo and yellow warbler habitat in the Yolo Bypass in CZ 2. The loss is
27 expected to occur during the first 10 years of Alternative 9 implementation.
- 28 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
29 inundation would permanently remove an estimated 545 acres of modeled least Bell's vireo and
30 yellow warbler habitat.
- 31 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
32 seasonally inundated floodplain would permanently remove approximately 28 acres and
33 temporarily remove 21 acres of modeled least Bell's vireo and yellow warbler habitat. Based on
34 the riparian habitat restoration assumptions, a minimum of 3,000 acres of valley/foothill
35 riparian habitat would be restored as a component of seasonally inundated floodplain
36 restoration actions.

37 The actual number of acres of valley/foothill riparian habitat that CM4 and CM5 would restore
38 may differ from these estimates, depending on how closely the actual outcome of tidal habitat
39 restoration approximates the assumed outcome. However, riparian restoration from CM4 and
40 CM5 would increase the extent of least Bell's vireo and yellow warbler habitat within the study
41 area once the restored riparian vegetation has developed habitat functions for these species.

- 42 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
43 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
44 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
45 activity would occur along waterway margins where riparian habitat stringers exist, including

1 levees and channel banks. The improvements would occur within the study area on sections of
2 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

- 3 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
4 activities that could be implemented in protected least Bell's vireo and yellow warbler habitats
5 are expected to maintain and improve the functions of the habitat over the term of the BDCP.
6 Least Bell's vireo and yellow warbler would be expected to benefit from the increase in
7 protected habitat, which would maintain conditions favorable for future species establishment
8 in the study area. If least Bell's vireo and yellow warbler established breeding populations in
9 restored riparian habitats in the study area, occupied habitat would be monitored to determine
10 if there were a need to implement controls on brood parasites (brown-headed cowbird) or nest
11 predators. If implemented, these actions would be expected to benefit the least Bell's vireo and
12 yellow warbler by removing a potential stressor that could, if not addressed, adversely affect the
13 stability of newly established populations.

14 Habitat management- and enhancement-related activities could disturb least Bell's vireo and
15 yellow warbler nests. If either species were to nest in the vicinity of a worksite, equipment
16 operation could destroy nests, and noise and visual disturbances could lead to their
17 abandonment, resulting in mortality of eggs and nestlings. The potential for these activities to
18 result in direct mortality of least Bell's vireo or yellow warbler would be minimized with the
19 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
20 *Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
21 *Surveys and Avoid Disturbance of Nesting Birds*.

- 22 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
23 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
24 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding
25 habitat. Maintenance activities would include vegetation management, levee and structure
26 repair, and re-grading of roads and permanent work areas. These effects, however, would be
27 reduced by AMMs and conservation actions as described below.
- 28 • *Injury and Direct Mortality*: Although least Bell's vireo nesting has not been confirmed in the
29 study area, recent occurrences in the Yolo Bypass and at the San Joaquin River National Wildlife
30 Refuge suggest that the reestablishment of a breeding population is a possibility over the
31 duration of the BDCP. If present in the study area, construction -related activities would not be
32 expected to result in direct mortality of least Bell's vireo or yellow warbler because adults and
33 fledged young would be expected to avoid contact with construction and other equipment. If
34 either species were to nest in the construction area, equipment operation, noise and visual
35 disturbances could destroy nests or lead to their abandonment, resulting in mortality of eggs
36 and nestlings. These effects would be avoided and minimized with the implementation of
37 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
38 *Cuckoo*. In addition, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*
39 *and Avoid Disturbance of Nesting Birds*, would be available to address effects on nesting yellow
40 warblers.

41 The following paragraphs summarize the combined effects discussed above and describe other
42 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
43 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 3 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 5 effects of construction would not be adverse under NEPA. Alternative 9 would remove 752 acres of
 6 modeled habitat for least Bell’s vireo and yellow warbler in the study area in the near-term. These
 7 effects would result from the construction of the water conveyance facilities (CM1, 282 acres of
 8 habitat), and implementing other conservation measures (Yolo Bypass fisheries improvements
 9 [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5]—470 acres of
 10 habitat).

11 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
 12 affected and that are identified in the biological goals and objectives for least Bell’s vireo in Chapter
 13 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby
 14 successional valley/foothill riparian habitat. Using these ratios would indicate that 282 acres of
 15 valley/foothill riparian habitat should be restored/created and 282 acres should be protected to
 16 compensate for the CM1 losses of least Bell’s vireo and yellow warbler habitat. The near-term effects
 17 of other conservation actions would remove 470 acres of modeled habitat, and therefore require
 18 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using
 19 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

20 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
 21 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*
 22 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the
 23 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
 24 habitat loss on least Bell’s vireo and yellow warbler. The majority of the riparian restoration acres
 25 would occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of
 26 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3,
 27 *Conservation Strategy*). This restoration would provide the large contiguous patches needed for
 28 suitable least Bell’s vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for
 29 riparian restoration also include the restoration, maintenance and enhancement of structural
 30 heterogeneity with adequate vertical and horizontal overlap among vegetation components and
 31 over adjacent riverine channels, freshwater emergent wetlands, and grasslands (Objective
 32 VFRNC2.1). These Plan objectives represent performance standards for considering the
 33 effectiveness of CM7 restoration and CM3 protection actions. The acres of protection contained in
 34 the near-term Plan goals and the additional detail in the biological objectives for least Bell’s vireo
 35 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1, as well
 36 as mitigate the near-term effects of the other conservation measures. The restored riparian habitat
 37 could require 5 years to several decades, for ecological succession to occur and for restored riparian
 38 habitat to functionally replace habitat that has been affected. However, because the modeled habitat
 39 impacted largely consists of small patches of blackberry, willow, and riparian scrub, and because
 40 least Bell’s vireo and yellow warbler are not known to be established breeders in the study area,
 41 BDCP actions would not be expected to have an adverse population-level effect on either species.

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 45 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*

1 *Restoration of Temporarily Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-*
2 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements
3 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
4 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
5 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final
6 EIR/EIS. The yellow warbler is not a species that is covered under the BDCP. Although
7 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest
8 in the study area over the course of the BDCP), in order to have a less than adverse effect on
9 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
10 yellow warbler nests were detected and avoided. Mitigation Measure BIO-75 would be available to
11 address adverse effects on nesting yellow warblers.

12 ***Late Long-Term Timeframe***

13 The habitat model indicates that the study area supports approximately 14,850 acres of modeled
14 habitat for least Bell's vireo and yellow warbler. Alternative 9 as a whole would result in the
15 permanent loss of and temporary effects on 1,047 acres of habitat for these species during the term
16 of the Plan (7% of the total habitat in the study area). These losses would occur from the
17 construction of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries*
18 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*
19 *Restoration*. The locations of these losses would be in fragmented riparian habitat throughout the
20 study area.

21 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
22 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
23 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
24 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
25 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
26 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives
27 in the Plan for riparian restoration also include the maintenance and enhancement of structural
28 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for
29 the least Bell's vireo and yellow warbler.

30 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
31 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
32 the restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo,
33 which would also be suitable habitat for the yellow warbler.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
35 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
36 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
37 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, AMM10*
38 *Restoration of Temporarily Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-*
39 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements
40 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
41 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
42 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final
43 EIR/EIS.

1 **NEPA Effects:** The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality
 2 of these special-status species under Alternative 9 would represent an adverse effect in the absence
 3 of other conservation actions. However, these species are not established breeders in the study area
 4 and impacts would likely be limited to loss of migratory habitat. In addition, with habitat protection
 5 and restoration associated with CM3 and CM7, guided by biological goals and objectives and by
 6 *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and Monitoring,*
 7 *AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill*
 8 *Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge*
 9 *Operations Plan, AMM10 Restoration of Temporarily Affected Natural Communities, and AMM22*
 10 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,* which
 11 would be in place during all project activities, the effects of habitat loss and potential mortality on
 12 least Bell's vireo, and the effect of habitat loss on yellow warbler under Alternative 9 would not be
 13 adverse. The yellow warbler is not a species that is covered under the BDCP and potential mortality
 14 would be an adverse effect without preconstruction surveys to ensure that nests are detected and
 15 avoided. Mitigation Measure BIO-75 would be available to address this effect.

16 **CEQA Conclusion:**

17 **Near-Term Timeframe**

18 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 19 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 20 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
 21 the impacts of construction would be less than significant under CEQA. Alternative 9 would remove
 22 752 acres of modeled habitat for least Bell's vireo and yellow warbler in the study area in the near-
 23 term. These effects would result from the construction of the water conveyance facilities (CM1, 282
 24 acres of habitat), and implementing other conservation measures (Yolo Bypass fisheries
 25 improvements [CM2] tidal restoration [CM4], seasonally inundated floodplain restoration [CM5]—
 26 470 acres of habitat).

27 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
 28 affected and that are identified in the biological goals and objectives for least Bell's vireo in Chapter
 29 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of dense shrubby
 30 successional valley/foothill riparian habitat. Using these ratios would indicate that 282 acres of
 31 valley/foothill riparian habitat should be restored/created and 282 acres should be protected to
 32 compensate for the CM1 losses of least Bell's vireo and yellow warbler habitat. The near-term effects
 33 of other conservation actions would remove 470 acres of modeled habitat, and therefore require
 34 470 acres of restoration and 470 acres of protection of dense shrubby valley/foothill riparian using
 35 the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection).

36 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
 37 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*
 38 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the
 39 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
 40 habitat loss on least Bell's vireo and yellow warbler. The majority of the riparian restoration acres
 41 would occur in CZ 7 as part of a reserve system with extensive wide bands or large patches of
 42 valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3,
 43 *Conservation Strategy*). This restoration would provide the large contiguous patches needed for
 44 suitable least Bell's vireo and yellow warbler breeding habitat. Goals and objectives in the Plan for

1 riparian restoration also include the restoration, maintenance and enhancement of structural
 2 heterogeneity with adequate vertical and horizontal overlap among vegetation components and
 3 over adjacent riverine channels, freshwater emergent wetlands, and grasslands (Objective
 4 VFRNC2.1). These Plan objectives represent performance standards for considering the
 5 effectiveness of CM7 restoration and CM3 protection actions. biological goals and objectives would
 6 inform the near-term protection and restoration efforts and represent performance standards for
 7 considering the effectiveness of restoration actions. The acres of protection contained in the near-
 8 term Plan goals and the additional detail in the biological objectives for least Bell's vireo satisfy the
 9 typical mitigation ratios that would be applied to the project-level effects of CM1, as well as mitigate
 10 the near-term effects of the other conservation measures. The restored riparian habitat could
 11 require 5 years to several decades, for ecological succession to occur and for restored riparian
 12 habitat to functionally replace habitat that has been affected. However, because the modeled habitat
 13 impacted largely consists of small patches of blackberry, willow, and riparian scrub, and because
 14 least Bell's vireo and yellow warbler are not known to be established breeders in the study area,
 15 BDCP actions would not be expected to have an adverse population-level effect on either species.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
 17 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
 18 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 19 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, AMM10*
 20 *Restoration of Temporarily Affected Natural Communities, and AMM22 Suisun Song Sparrow, Yellow-*
 21 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements
 22 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
 23 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
 24 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final
 25 EIR/EIS. The yellow warbler is not a species that is covered under the BDCP. Although
 26 preconstruction surveys for least Bell's vireo may also detect yellow warblers (if they were to nest
 27 in the Plan Area over the course of the BDCP), in order to have a less than adverse effect on
 28 individuals, preconstruction surveys for noncovered avian species would be required to ensure that
 29 yellow warbler nests are detected and avoided. Mitigation Measure BIO-75 would reduce the
 30 potential impact on nesting yellow warblers to a less-than-significant impact, should they become
 31 established in the Plan Area. Considering the conservation actions described above, and AMM1-
 32 AMM-7 AMM 22, and Mitigation Measure BIO-75, Alternative 9, over the term of the BDCP would not
 33 result in a substantial adverse effect through habitat modifications and would not substantially
 34 reduce the number or restrict the range of either species. Therefore, Alternative 9 would have a less-
 35 than-significant impact on least Bell's vireo and yellow warbler.

36 ***Late Long-Term Timeframe***

37 The habitat model indicates that the study area supports approximately 14,850 acres of modeled
 38 habitat for least Bell's vireo and yellow warbler. Alternative 9 as a whole would result in the
 39 permanent loss of and temporary effects on 1,047 acres of habitat for these species during the term
 40 of the Plan (7% of the total habitat in the study area). These losses would occur from the
 41 construction of the water conveyance facilities (CM1) and from *CM2 Yolo Bypass Fisheries*
 42 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*
 43 *Restoration.* The locations of these losses would be in fragmented riparian habitat throughout the
 44 study area.

1 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
2 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
3 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
4 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
5 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
6 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). Goals and objectives
7 in the Plan for riparian restoration also include the maintenance and enhancement of structural
8 heterogeneity (Objective VFRNC2.1) which would provide suitable nesting and migratory habitat for
9 the least Bell's vireo and yellow warbler. The restored riparian habitat could require 5 years to
10 several decades, for ecological succession to occur and for restored riparian habitat to functionally
11 replace habitat that has been affected. Therefore, there would be a time-lag before the restored
12 habitat would benefit either species. However, neither species are established breeders in the study
13 area and impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow
14 warbler.

15 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
16 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
17 the restoration of 1,000 acres and the protection of 593 acres of habitat for the least Bell's vireo,
18 which would also be suitable habitat for the yellow warbler.

19 The loss of least Bell's vireo and yellow warbler habitat and potential direct mortality of these
20 special-status species under Alternative 9 would represent an adverse effect in the absence of other
21 conservation actions. However, neither species is an established breeder in the study area and
22 impacts would likely be limited to loss of migratory habitat for least Bell's vireo and yellow warbler.
23 In addition, with habitat protection and restoration associated with CM3 and CM7, guided by
24 biological goals and objectives and by *AMM1 Worker Awareness Training*, *AMM2 Construction Best*
25 *Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion*
26 *and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6*
27 *Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10 Restoration of Temporarily*
28 *Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
29 *Vireo, Western Yellow-Billed Cuckoo*, which would be in place during all project activities, the impact
30 of habitat loss and potential mortality on least Bell's vireo and the effect of habitat loss on yellow
31 warbler under Alternative 9 would be less than significant. The yellow warbler is not a species that
32 is covered under the BDCP. Although preconstruction surveys for least Bell's vireo may also detect
33 nesting yellow warblers, in order for the BDCP to have a less-than-significant impact on individuals,
34 preconstruction surveys for noncovered avian species would be required to ensure that yellow
35 warbler nests are detected and avoided. Implementation of Mitigation Measure BIO-75 would
36 reduce this potential impact on nesting yellow warblers, if present in the study area, to a less-than-
37 significant level.

38 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
39 **Disturbance of Nesting Birds**

40 To reduce impacts on nesting birds, DWR will implement the measures listed below prior to
41 construction and operations and maintenance activities.

- 42 • To the maximum extent feasible, vegetation removal and trimming will be scheduled during
43 the nonbreeding season of birds (September 1–January 31). If vegetation removal cannot be

- 1 removed in accordance with this timeframe, preconstruction/preactivity surveys for nesting
2 birds and additional protective measures will be implemented as described below.
- 3 • A qualified wildlife biologist with knowledge of the relevant species will conduct nesting
4 surveys before the start of construction. A minimum of three separate surveys will be
5 conducted within 30 days prior to construction, with the last survey within 3 days prior to
6 construction. Surveys will include a search of all suitable nesting habitat in the construction
7 area. In addition, a 500-foot radius around the construction area, where accessible, will be
8 surveyed for nesting raptors and species of special concern (except the Modesto song
9 sparrow), and an area within 50 feet of construction will be surveyed for other non-special
10 status nesting birds or other birds protected by the MBTA. If no active nests are detected
11 during these surveys, no additional measures are required.
 - 12 • If active nests are found in the survey area, no-disturbance buffers will be established
13 around the nest sites to avoid disturbance or destruction of the nest site until the end of the
14 breeding season (approximately September 1) or until a qualified wildlife biologist
15 determines that the young have fledged and moved out of the project area (this date varies
16 by species). A qualified wildlife biologist will monitor construction activities in the vicinity
17 of the nests to ensure that construction activities do not affect nest success. The extent of the
18 buffers will be determined by DWR biologists in consultation with USFWS and CDFW and
19 will depend on the level of noise or construction disturbance, line-of-sight between the nest
20 and the disturbance, ambient levels of noise and other disturbances, and other
21 topographical or artificial barriers. Suitable buffer distances may vary between species.

22 **Impact BIO-76: Fragmentation of Least Bell's Vireo and Yellow Warbler Habitat**

23 Grading, filling, contouring, and other initial ground-disturbing operations may temporarily
24 fragment modeled least Bell's vireo and yellow warbler habitat. This could temporarily reduce the
25 affected habitat's extent and functions, including exposure to cowbird parasitism, a nest parasite of
26 both species. Preconstruction surveys under *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
27 *Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, Conduct
28 Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds, would identify any
29 nesting pairs and the potential for habitat fragmentation to affect either species. If a nesting pairs of
30 either species were detected where fragmentation has occurred, nests would be monitored for edge
31 effects or other effects caused by the disturbance. The habitat would be adaptively managed to avoid
32 or minimize impacts (e.g., cowbird control) under CM11, which includes the control of nonnative
33 predators through habitat manipulation techniques or trapping to reduce nest predation.

34 **NEPA Effects:** Because there are only two recent occurrences of least Bell's vireo within the Plan
35 Area, and no occurrences of yellow warbler breeding in the Plan Area, habitat fragmentation
36 resulting from ground-disturbing operations is not expected to affect either species. If nesting pairs
37 of either species were detected where fragmentation has occurred, nests would be monitored for
38 edge effects or other effects caused by the disturbance. The habitat would be adaptively managed to
39 avoid or minimize impacts (e.g., cowbird control) under CM11. Therefore, habitat fragmentation as a
40 result of Alternative 9 implementation would not have an adverse effect on least Bell's vireo or
41 yellow warbler.

42 **CEQA Conclusion:** Because there are only two recent occurrences of least Bell's vireo within the Plan
43 Area, and no occurrences of yellow warbler breeding in the Plan Area, habitat fragmentation
44 resulting from ground-disturbing operations would not be expected to substantially modify habitat

1 or result in the direct mortality of special status species. If nesting pairs of either species were
2 detected where fragmentation has occurred, nests would be monitored for edge effects or other
3 effects caused by the disturbance. The habitat would be adaptively managed to avoid or minimize
4 impacts (e.g., cowbird control) under CM11. Therefore, habitat fragmentation as a result of
5 Alternative 9 would have a less-than-significant impact on least Bell's vireo and yellow warbler.

6 **Impact BIO-77: Effects on Least Bell's Vireo and Yellow Warbler Associated with Electrical**
7 **Transmission Facilities**

8 Both least Bell's vireo and yellow warbler typically occur in early to mid-successional riparian
9 habitat, which is used to meet all of its life requisites. Least Bell's vireo are rarely observed in open
10 habitats away from riparian vegetation. Neither species form flocks and individuals generally
11 remain at or below the riparian canopy, below the height of proposed transmission lines (see BDCP
12 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). The
13 behavior and habitat requirements of least Bell's vireo and yellow warbler make collision with the
14 proposed transmission lines unlikely. *AMM30 Transmission Line Design and Alignment Guidelines*
15 would ensure that the transmission lines, poles, and towers are designed to avoid sensitive
16 terrestrial habitats (including riparian) to the maximum extent feasible which would minimize the
17 potential for collision. Marking transmission lines with flight diverters that make the lines more
18 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
19 1995). For example, Yee (2008) estimated that marking devices in the Central Valley could reduce
20 avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new project transmission
21 lines would be fitted with flight diverters, which would substantially reduce any potential for
22 mortality of least Bell's vireo or yellow warbler individuals from powerline collisions.

23 **NEPA Effects:** Installation and presence of new transmission lines would not result in an adverse
24 effect on least Bell's vireo or yellow warbler because the probability of bird-powerline strikes is
25 unlikely due to the behavior and habitat requirements of these species. Implementation of *AMM30*
26 *Transmission Line Design and Alignment Guidelines* would avoid impacts on riparian habitat to the
27 maximum extent feasible, which would minimize the potential for collision. *AMM20 Greater Sandhill*
28 *Crane* contains the commitment to place bird strike diverters on all new powerlines, which would
29 substantially reduce the risk of mortality from bird strike for least Bell's vireo and yellow warbler as
30 a result of the project. Therefore, the construction and operation of new transmission lines would
31 not result in an adverse effect on least Bell's vireo or yellow warbler.

32 **CEQA Conclusion:** Installation and presence of new transmission lines would result in a less-than-
33 significant impact on least Bell's vireo or yellow warbler because the probability of bird-powerline
34 strikes is unlikely due to the behavior and habitat requirements of these species. Implementation of
35 *AMM30 Transmission Line Design and Alignment Guidelines* would avoid impacts on riparian habitat
36 to the maximum extent feasible, which would minimize the potential for collision. *AMM20 Greater*
37 *Sandhill Crane* contains the commitment to place bird strike diverters on all new powerlines, which
38 would substantially reduce the risk of mortality from bird strike for least Bell's vireo and yellow
39 warbler as a result of the project. Therefore, the construction and operation of new transmission
40 lines would result in a less-than-significant impact on least Bell's vireo or yellow warbler.

1 **Impact BIO-78: Indirect Effects of Plan Implementation on Least Bell's Vireo and Yellow**
2 **Warbler**

3 **Indirect Construction- and Operation-Related Effects:** If least Bell's vireo or yellow warbler were
4 to nest in or adjacent to work areas, construction and subsequent maintenance-related noise and
5 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
6 functions of suitable nesting habitat for these species. Construction noise above background noise
7 levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
8 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
9 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
10 the extent to which these noise levels could affect least Bell's vireo or yellow warbler. *AMM22 Suisun*
11 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would reduce
12 the potential for adverse effects of construction-related activities on survival and productivity of
13 nesting least Bell's vireo and a 500 foot no-disturbance buffer would be established around the
14 active nest. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
15 *Disturbance of Nesting Birds*, would be available to reduce the potential for adverse effects of
16 construction-related activities on nesting yellow warbler. The use of mechanical equipment during
17 water conveyance facilities construction could cause the accidental release of petroleum or other
18 contaminants that could affect least Bell's vireo and yellow warbler in the surrounding habitat. The
19 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an
20 adverse effect on these species. *AMM2 Construction Best Management Practices and Monitoring*
21 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff
22 from the construction area and negative effects of dust on active nests.

23 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
24 mercury in avian species, including the least Bell's vireo and yellow warbler. Marsh (tidal and
25 nontidal) and floodplain restoration have the potential to increase exposure to methylmercury.
26 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
27 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains
28 (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas could
29 increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of
30 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of
31 uncertainty with respect to species-specific effects. Increased methylmercury associated with
32 natural community and floodplain restoration could indirectly affect least Bell's vireo and yellow
33 warbler, via uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

34 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
35 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
36 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
37 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
38 adaptive management as described in CM12 would be available to address the uncertainty of
39 methylmercury levels in restored tidal marsh and potential impacts on least Bell's vireo and yellow
40 warbler.

41 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
42 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
43 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
44 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
45 2009). The effect of selenium toxicity differs widely between species and also between age and sex

1 classes within a species. In addition, the effect of selenium on a species can be confounded by
 2 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 3 2009).

4 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
 5 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
 6 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
 7 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
 8 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
 9 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
 10 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
 11 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
 12 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
 13 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
 14 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
 15 have a higher risk of selenium toxicity.

16 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 17 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 18 exacerbate bioaccumulation of selenium in avian species, including least Bell's vireo and yellow
 19 warbler. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
 20 selenium, and, therefore, increase avian exposure from ingestion of prey items with elevated
 21 selenium levels. Thus, Alternative 9 restoration activities that create newly inundated areas could
 22 increase bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of
 23 restoration). Changes in selenium concentrations are analyzed in Chapter 8, *Water Quality*, which
 24 concludes that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
 25 in substantial, long-term increases in selenium concentrations in water in the Delta under any
 26 alternative. However, it is difficult to determine whether the effects of potential increases in
 27 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)
 28 would lead to adverse effects on least Bell's vireo and yellow warbler.

29 Because of the uncertainty that exists at this programmatic level of review, there could be a
 30 substantial effect on least Bell's vireo and yellow warbler from increases in selenium associated with
 31 restoration activities. This effect would be addressed through the implementation of *AMM27*
 32 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 33 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
 34 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
 35 selenium management to reduce selenium concentrations and/or bioaccumulation would be
 36 evaluated separately for each restoration effort as part of design and implementation. This
 37 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
 38 design schedule.

39 **NEPA Effects:** Impacts of noise, the potential for hazardous spills, increased dust and sedimentation,
 40 and operations and maintenance of the water conveyance facilities on least Bell's vireo would not be
 41 adverse with the implementation of AMM1-AMM7, and *AMM22 Suisun Song Sparrow, Yellow-*
 42 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct*
 43 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
 44 address adverse effects on nesting yellow warblers.

1 The implementation of tidal natural communities restoration or floodplain restoration could result
2 in increased exposure of least Bell's vireo or yellow warbler to methylmercury, should they begin to
3 nest in the study area. However, it is unknown what concentrations of methylmercury are harmful
4 to these species. Site-specific restoration plans that address the creation and mobilization of
5 mercury, as well as monitoring and adaptive management as described in *CM12 Methylmercury*
6 *Management*, would be available to address the uncertainty of methylmercury levels in restored
7 tidal marsh and potential adverse effects of methylmercury on least Bell's vireo and yellow warbler.

8 Tidal habitat restoration could result in increased exposure of least Bell's vireo and yellow warbler
9 to selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
10 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
11 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

12 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
13 operations and maintenance of the water conveyance facilities would have a less-than-significant
14 impact on least Bell's vireo and yellow warbler with the implementation of *AMM2 Construction Best*
15 *Management Practices and Monitoring*, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least*
16 *Bell's Vireo*, *Western Yellow-Billed Cuckoo*, and Mitigation Measure BIO-75, *Conduct Preconstruction*
17 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*.

18 The implementation of tidal natural communities restoration or floodplain restoration could result
19 in increased exposure of least Bell's vireo or yellow warbler to methylmercury, should they begin to
20 nest in the study area. However, it is unknown what concentrations of methylmercury are harmful
21 to these species. Sites-specific restoration plans that address the creation and mobilization of
22 mercury, as well as monitoring and adaptive management as described in *CM12 Methylmercury*
23 *Management*, would be available to address the uncertainty of methylmercury levels in restored
24 tidal marsh and potential significant impacts on least Bell's vireo and yellow warbler.

25 Tidal habitat restoration could result in increased exposure of least Bell's vireo and yellow warbler
26 to selenium. With implementation of *AMM27 Selenium Management*, which would provide specific
27 tidal habitat restoration design elements to reduce the potential for bioaccumulation of selenium
28 and its bioavailability in tidal habitats, the impact of potential increased selenium exposure would
29 be less than significant.

30 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
31 **Disturbance of Nesting Birds**

32 See Mitigation Measure BIO-75 under Impact BIO-75.

33 **Impact BIO-79: Periodic Effects of Inundation of Least Bell's Vireo and Yellow Warbler**
34 **Habitat as a Result of Implementation of Conservation Components**

35 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
36 duration of inundation of approximately 48–85 acres of modeled least Bell's vireo and yellow
37 warbler habitat in CZ 2. No adverse effects of increased inundation frequency on least Bell's vireo,
38 yellow warbler, or their habitat would be expected, because riparian vegetation supporting habitat
39 has persisted under the existing Yolo Bypass flooding regime and changes to frequency and
40 inundation would be within the tolerance of these vegetation types.

41 Based on hypothetical floodplain restoration for *CM5 Seasonally Inundated Floodplain Restoration*,
42 construction of setback levees could result in periodic inundation of up to 148 acres of modeled

1 least Bell's vireo and yellow warbler habitat in CZ 7. Inundation of restored floodplains would not be
2 expected to affect least Bell's vireo, yellow warbler, or their habitat because the breeding period is
3 outside the period when floodplains would likely be inundated. Additionally, periodic inundation of
4 floodplains would be expected to restore a more natural flood regime in support of riparian
5 vegetation types that support least Bell's vireo and yellow warbler habitat. The overall effect of
6 seasonal inundation in existing riparian natural communities would be beneficial, because,
7 historically, flooding was the main natural disturbance regulating ecological processes in riparian
8 areas, and flooding promotes the germination and establishment of many native riparian plants.

9 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85 acres
10 (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler. However,
11 periodic inundation would not result in an adverse effect on least Bell's vireo or yellow warbler
12 because inundation would occur primarily during the nonbreeding season and would promote a
13 more natural flood regime in support of habitat for these species.

14 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of 48–85
15 acres (CM2) and 148 acres (CM5) of modeled habitat for least Bell's vireo and yellow warbler.
16 However, periodic inundation would have a less-than-significant impact on least Bell's vireo or
17 yellow warbler because inundation would occur during the nonbreeding season and would not be
18 expected to adversely modify habitat or result in direct mortality of either species. Flooding
19 promotes the germination and establishment of many native riparian plants. Therefore, the overall
20 impact of seasonal inundation in existing riparian natural communities would be beneficial for least
21 Bell's vireo and yellow warbler.

22 **Suisun Song Sparrow and Saltmarsh Common Yellowthroat**

23 This section describes the effects of Alternative 9, including water conveyance facilities construction
24 and implementation of other conservation components, on Suisun song sparrow and saltmarsh
25 common yellowthroat. The habitat model used to assess effects on Suisun song sparrow and
26 saltmarsh common yellowthroat is based on primary breeding habitat and secondary habitat.
27 Suisun song sparrow primary breeding habitat consists of all *Salicornia*-dominated tidal brackish
28 emergent wetland and all *Typha*-, *Scirpus*-, and *Juncus*-dominated tidal freshwater emergent wetland
29 in the Plan Area west of Sherman Island, with the exception that *Scirpus acutus* and *S. californicus*
30 plant communities (low marsh) and all of the plant communities listed below that occur in managed
31 wetlands were classified as secondary habitat. Upland transitional zones, providing refugia during
32 high tides, within 150 feet of the wetland edge were also included as secondary habitat. Secondary
33 habitats generally provide only a few ecological functions such as foraging (low marsh and managed
34 wetlands) or extreme high tide refuge (upland transition zones), while primary habitats provide
35 multiple functions, including breeding, effective predator cover, and valuable forage.

36 Construction and restoration associated with Alternative 9 conservation measures would result in
37 both temporary and permanent losses of Suisun song sparrow and saltmarsh common yellowthroat
38 modeled habitat as indicated in Table 12-9-34. The majority of the losses would take place over an
39 extended period of time as tidal marsh is restored in the study area. Full implementation of
40 Alternative 9 also include the following conservation actions over the term of the BDCP to benefit
41 the Suisun song sparrow and the saltmarsh common yellowthroat (BDCP Chapter 3, Section 3.3,
42 *Biological Goals and Objectives*).

- 43 • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11, including at
44 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1, TBEWNC1.2).

- Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are in the Grizzly Island Marsh Complex (Objective MWNC1.1)
- Protect at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective GNC1.4)

As explained below, with the restoration and protection of these amounts of habitat, in addition to natural community enhancement and management commitments (including *CM12 Methylmercury Management*) and implementation of AMM1–AMM7, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell’s Vireo*, *Western Yellow-Billed Cuckoo*, and mitigation to minimize potential effects, impacts on Suisun song sparrow and saltmarsh common yellowthroat would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-9-34. Changes in Suisun Song Sparrow Saltmarsh Common Yellowthroat Modeled Habitat Associated with Alternative 9 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	0	0	0	0	NA	NA
	Secondary	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2–CM18	Primary	54	55	0	0	0	0
	Secondary	1,098	3,633	0	0	0	0
Total Impacts CM2–CM18		1,152	3,633	0	0	0	0
TOTAL IMPACTS		1,152	3,688	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-80: Loss or Conversion of Habitat for and Direct Mortality of Suisun Song Sparrow and Saltmarsh Common Yellowthroat

Alternative 9 conservation measures would result in would result in the permanent loss of up to 3,688 acres of Suisun song sparrow and saltmarsh common yellowthroat habitat, which would include the conversion of 55 acres of primary habitat to secondary low marsh, and the conversion of 123 acres of secondary habitat to middle or high marsh (Table 12-9-34). The only conservation measure that would affect modeled habitat for Suisun song sparrow and saltmarsh common yellowthroat is *CM4 Tidal Natural Communities Restoration*. Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. Each of these individual activities is described below. A

1 summary statement of the combined impacts and NEPA effects and a CEQA conclusion follows the
2 individual conservation measure discussions.

- 3 • *CM4 Tidal Natural Communities Restoration*: Site preparation and inundation would
4 permanently remove approximately 3,510 acres of modeled secondary Suisun song sparrow and
5 saltmarsh common yellowthroat habitat from CZ 11 (Table 12-9-34). In addition, 55 acres of
6 primary habitat would be converted to secondary low marsh, and 123 acres of secondary
7 habitat would be converted to middle or high marsh. Most areas proposed for removal would be
8 managed wetlands that serve as relatively marginal habitat for Suisun song sparrow and
9 saltmarsh common yellowthroat, which primarily use brackish tidal wetlands. Approximately
10 2% of primary habitat for these species would be converted to foraging habitat. Full
11 implementation of CM4 would restore or create at least 6,000 acres of tidal brackish emergent
12 wetland natural community in CZ 11, which would be expected to support Suisun song sparrow
13 and saltmarsh common yellowthroat habitat. It is expected that restoring tidal wetland
14 communities that are self-sustaining and not reliant on ongoing management actions necessary
15 to maintain the existing managed wetland habitats would better ensure the long-term viability
16 of these populations. Furthermore, effects of tidal habitat restoration on sparrow and
17 yellowthroat abundance and distribution would be monitored, and the restoration of tidal
18 habitat would be sequenced and located in a manner that minimizes effects on occupied habitats
19 until functional habitats were restored (see BDCP Chapter 3, Section 3.4.5, *CM4 Tidal Natural*
20 *Communities Restoration*, and Section 3.6, *Adaptive Management and Monitoring Program*).
- 21 • *CM11 Natural Communities Enhancement and Management*: Control of nonnative Suisun song
22 sparrow and saltmarsh common yellowthroat predators, if deemed necessary, would be
23 expected to reduce predation loss of nests and, consequently, increase and maintain the
24 abundance of Suisun song sparrow and saltmarsh common yellowthroat in restored tidal
25 habitats over the term of the BDCP. Habitat management- and enhancement-related activities
26 could disturb Suisun song sparrow or saltmarsh common yellowthroat nests if they are located
27 near work sites. The potential for these activities to have an adverse effect on Suisun song
28 sparrow would be avoided and minimized through *AMM22 Suisun Song Sparrow, Yellow-*
29 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure
30 *BIO-75, Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,
31 would be available to address these effects on saltmarsh common yellowthroat. A variety of
32 *CM11 Natural Communities Enhancement and Management* habitat management actions that are
33 designed to enhance wildlife values in restored and protected tidal wetland habitats may result
34 in localized ground disturbances that could temporarily remove small amounts of Suisun song
35 sparrow and saltmarsh common yellowthroat habitat in CZ 11. Ground-disturbing activities,
36 such as removal of nonnative vegetation and road and other infrastructure maintenance
37 activities, are expected to have minor adverse effects on available species' habitat.
- 38 • *Operations and Maintenance*: Postconstruction operation and maintenance of the restoration
39 infrastructure could result in ongoing but periodic disturbances that could affect Suisun song
40 sparrow and saltmarsh common yellowthroat use of the surrounding habitat in Suisun.
41 Maintenance activities could include vegetation management, and levee repair. These effects,
42 however, would be reduced by AMMs and conservation actions as described below.
- 43 • Construction-related activities could result in nest destruction or disturbance resulting in
44 mortality of eggs and nestlings if restoration activities took place within the nesting period for
45 these species. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
46 *Yellow-Billed Cuckoo* would minimize these potential effects on Suisun song sparrow. Mitigation

1 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
2 *Birds*, would be available to address these effects on saltmarsh common yellowthroat. Grading,
3 filling, contouring, and other initial ground-disturbing operations during restoration activities
4 could temporarily fragment existing modeled tidal brackish emergent wetland habitat for
5 Suisun song sparrow and saltmarsh common yellowthroat which could temporarily reduce the
6 extent and functions of the affected habitat. These temporary effects would be minimized
7 through sequencing of restoration activities and through *AMM22 Suisun Song Sparrow, Yellow-*
8 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75.

9 The following paragraphs summarize the combined effects discussed above and describe other
10 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
11 included.

12 ***Near-Term Timeframe***

13 Under Alternative 9, there would be no impacts resulting from the construction of the water
14 conveyance facilities (CM1). However, there would be a permanent loss of 1,040 acres of modeled
15 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in
16 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging
17 habitat, and 58 acres of secondary habitat would be converted to mid to high marsh, which would
18 provide primary nesting habitat for these species. Although there would be a temporal lag in these
19 conversions, there would be no net loss of primary habitat in the near-term. These effects would
20 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun
21 Marsh in CZ 11.

22 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
23 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in
24 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
25 Using this ratio would indicate that 1,152 acres of tidal brackish emergent wetland should be
26 restored/created to compensate for the near-term losses of Suisun song sparrow and saltmarsh
27 common yellowthroat habitat.

28 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent
29 wetland and 4,800 acres of managed wetland in the Plan Area. These conservation actions are
30 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early
31 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and
32 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11
33 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh
34 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1, BDCP Chapter 3,
35 *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and
36 in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the
37 4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh
38 common yellowthroat through the enhancement of degraded areas to provide dense native
39 vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal
40 wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.
41 Larger and more interconnected patches of suitable habitat would be expected to reduce the effects
42 of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would
43 be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
44 Restoration would be sequenced over the term of the Plan and occur in a manner that would

1 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and
2 protection contained in the near-term Plan goals, and the incorporation of the additional measures
3 in the biological goals and objectives (BDCP Chapter 3) would be sufficient to mitigate the near-term
4 effects of tidal restoration.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
6 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
7 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
8 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
9 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
10 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
11 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
12 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
13 to the Final EIR/EIS. The saltmarsh common yellowthroat is not a species that is covered under the
14 BDCP. Although preconstruction surveys for Suisun song sparrow would likely also detect nesting
15 saltmarsh common yellowthroat, in order to avoid adverse effects on individuals, preconstruction
16 surveys for noncovered avian species would be required to ensure that saltmarsh common
17 yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would be available to
18 address the adverse effect of construction activities on nesting saltmarsh common yellowthroat.

19 **Late Long-Term Timeframe**

20 The habitat model indicates that the study area supports approximately 3,722 acres of primary and
21 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.
22 Alternative 9 as a whole would result in the permanent loss of 3,688 acres of habitat (15% of the
23 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*
24 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary
25 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

26 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or
27 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)
28 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse
29 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh
30 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for
31 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,
32 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to
33 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This
34 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise
35 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be
36 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more
37 interconnected patches of suitable habitat would be expected to reduce the effects of habitat
38 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be
39 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
40 Restoration would be sequenced over the term of the Plan and occur in a manner that would
41 minimize any temporary, initial loss and fragmentation of habitat.

42 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
43 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
44 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat in addition to

1 the protection of 384 acres of secondary habitat for Suisun song sparrow, which would also benefit
2 the saltmarsh common yellowthroat.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
7 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
8 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
9 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
10 which have since been updated and which are provided in Appendix 3B, *Environmental*
11 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

12 **NEPA Effects:** The loss of Suisun song sparrow and saltmarsh common yellowthroat habitat and
13 potential direct mortality of these special-status species under Alternative 9 would represent an
14 adverse effect in the absence of other conservation actions. However, with habitat protection and
15 restoration associated with CM4, with the management and enhancement actions (CM11), and with
16 the incorporation of the additional measures in the biological goals and objectives, guided by
17 AMM1–AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
18 *Yellow-Billed Cuckoo*, which would be in place throughout the construction period, the effects of
19 habitat loss and potential mortality on Suisun song sparrow would not be adverse, and the effects of
20 habitat loss and conversion on saltmarsh common yellowthroat would not be adverse under
21 Alternative 9. The saltmarsh common yellowthroat is not a species that is covered under the BDCP.
22 Although preconstruction surveys for Suisun song sparrow would likely also detect nesting
23 saltmarsh common yellowthroat, in order for the BDCP to avoid adverse effects on individuals,
24 preconstruction surveys for noncovered avian species would be required to ensure that saltmarsh
25 common yellowthroat nests are detected and avoided. Mitigation Measure BIO-75 would be
26 available to address this effect.

27 **CEQA Conclusion:**

28 **Near-Term Timeframe**

29 Under Alternative 9, there would be no impacts resulting from the construction of the water
30 conveyance facilities (CM1). However, there would be a permanent loss of 1,040 acres of modeled
31 secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat in the study area in
32 the near-term. In addition, 54 acres of primary habitat would be converted to secondary foraging
33 habitat, and 123 acres of secondary habitat would be converted to mid to high marsh, which would
34 provide primary nesting habitat for these species. Although there would be a temporal lag in these
35 conversions, there would be no net loss of primary habitat in the near-term. These effects would
36 result from implementing *CM4 Tidal Natural Communities Restoration* and would all occur in Suisun
37 Marsh in CZ 11.

38 The typical NEPA and CEQA project-level mitigation ratio for those natural communities that would
39 be affected and that are identified in the biological goals and objectives for Suisun song sparrow in
40 Chapter 3 of the BDCP would be 1:1 for restoration/creation of tidal brackish emergent habitat.
41 Using this ratio would indicate that 1,152 acres of tidal brackish emergent wetland should be
42 restored/created to mitigate the near-term losses of Suisun song sparrow and saltmarsh common
43 yellowthroat habitat.

1 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal brackish emergent
2 wetland and 4,800 acres of managed wetland in the Plan Area. These conservation actions are
3 associated with CM4 and CM3 and would occur in the same timeframe as the construction and early
4 restoration losses, thereby avoiding adverse effects of habitat loss on Suisun song sparrow and
5 saltmarsh common yellowthroat. The tidal brackish emergent wetland would be restored in CZ 11
6 among the Western Suisun/Hill Slough Marsh Complex, the Suisun Slough/Cutoff Slough Marsh
7 Complex, and the Nurse Slough/Denverton Marsh complex (Objective TBEWNC1.1, BDCP Chapter 3,
8 *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and
9 in areas that increase connectivity among protected lands (Objective TBEWNC1.4). Portions of the
10 4,800 acres of managed wetland would benefit both the Suisun song sparrow and the saltmarsh
11 common yellowthroat through the enhancement of degraded areas to provide dense native
12 vegetation, which is required for nesting sites, song perches, and refuge from predators. Tidal
13 wetlands would be restored in a mosaic of large, interconnected and biologically diverse patches.
14 Larger and more interconnected patches of suitable habitat would be expected to reduce the effects
15 of habitat fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would
16 be controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
17 Restoration would be sequenced over the term of the Plan and occur in a manner that would
18 minimize any temporary, initial loss and fragmentation of habitat. The acres of restoration and
19 protection contained in the near-term Plan goals, and the incorporation of the additional measures
20 in the biological goals and objectives (BDCP Chapter 3) would be sufficient to mitigate the near-term
21 effects of tidal restoration.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
26 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
27 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
28 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
29 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
30 to the Final EIR/EIS. The saltmarsh common yellowthroat is not a species that is covered under the
31 BDCP. Although preconstruction surveys for Suisun song sparrow would likely also detect nesting
32 saltmarsh common yellowthroat, in order to avoid adverse effects on individuals, preconstruction
33 surveys for noncovered avian species would be required to ensure that saltmarsh common
34 yellowthroat nests are detected and avoided. Implementation of Mitigation Measure BIO-75 would
35 reduce the impact of construction activities on nesting saltmarsh common yellowthroat to a less-
36 than-significant level.

37 Because the number of acres required to meet the typical mitigation ratio described above would be
38 only 3,590 acres of restored/created tidal natural communities, the 6,000 acres of tidal brackish and
39 tidal freshwater emergent wetland restoration and the 4,100 acres of managed wetland protection
40 and enhancement contained in the near-term Plan goals, and the additional detail in the biological
41 objectives for Suisun song sparrow, are more than sufficient to support the conclusion that the near-
42 term impacts of habitat loss and direct mortality of Suisun song sparrow or saltmarsh common
43 yellowthroat under Alternative 9 would be less than significant under CEQA.

1 **Late Long-Term Timeframe**

2 The habitat model indicates that the study area supports approximately 3,722 acres of primary and
3 23,986 acres of secondary habitat for Suisun song sparrow and saltmarsh common yellowthroat.
4 Alternative 9 as a whole would result in the permanent loss of 3,688 acres of habitat (15% of the
5 total habitat in the study area) from the implementation of *CM4 Tidal Natural Communities*
6 *Restoration*. Within this habitat loss, 55 acres of primary habitat would be converted to secondary
7 foraging habitat, and 123 acres of secondary habitat would be converted to primary habitat.

8 The Plan includes a commitment through *CM4 Tidal Natural Communities Restoration* to restore or
9 create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 (Objective TBEWNC1.1)
10 These tidal wetlands would be restored as a mosaic of large, interconnected and biologically diverse
11 patches, and at least 1,500 acres of restored marsh would consist of middle-and high-marsh
12 vegetation with dense, tall stands of pickleweed and bulrush cover, serving as primary habitat for
13 Suisun song sparrow and saltmarsh common yellowthroat (Objective TBEWNC1.2). In addition,
14 grasslands adjacent to restored tidal brackish emergent wetlands would be protected or restored, to
15 provide at least 200 feet of adjacent grasslands beyond the sea level rise accommodation. This
16 adjacent upland habitat would provide high tide refugia during high tide events, after sea-level rise
17 has converted the lower-level grasslands to tidal natural communities. Tidal wetlands would be
18 restored in a mosaic of large, interconnected and biologically diverse patches. Larger and more
19 interconnected patches of suitable habitat would be expected to reduce the effects of habitat
20 fragmentation that currently exist in Suisun marsh in CZ 11. Nonnative predators would be
21 controlled as needed to reduce nest predation and to help maintain species abundance (CM11).
22 Restoration would be sequenced over the term of the Plan and occur in a manner that would
23 minimize any temporary, initial loss and fragmentation of habitat.

24 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
25 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
26 the restoration of 1,500 acres of primary habitat and 4,500 acres of secondary habitat in addition to
27 the protection of 384 acres of secondary habitat for Suisun song sparrow, which would also benefit
28 the saltmarsh common yellowthroat.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
33 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
34 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
35 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
36 which have since been updated and which are provided in Appendix 3B, *Environmental*
37 *Commitments, AMMs, and CMs*, to the Final EIR/EIS. The saltmarsh common yellowthroat is not a
38 covered species under the BDCP. Although preconstruction surveys for Suisun song sparrow may
39 detect nesting saltmarsh common yellowthroat, in order for the BDCP to have a less-than-significant
40 impact on individuals, preconstruction surveys for noncovered avian species would be required to
41 ensure that saltmarsh common yellowthroat nests are detected and avoided. Implementation of
42 Mitigation Measure BIO-75 would reduce this potential impact on nesting saltmarsh common
43 yellowthroat to a less-than-significant level.

1 Considering Alternative 9's restoration provisions, which would replace low-value secondary
2 habitat with high-value tidal brackish emergent habitat, including both foraging and primary
3 habitat, and provide upland refugia for Suisun song sparrow and saltmarsh common yellowthroat,
4 the acreages of restoration would be sufficient to mitigate habitats lost to construction and
5 restoration activities. Loss of habitat or direct mortality through implementation of Alternative 9,
6 with the implementation of AMM1-AMM7, AMM22, and Mitigation Measure BIO-75, AMM1-AMM7
7 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would not
8 result in a substantial adverse effect through habitat modifications and would not substantially
9 reduce the number or restrict the range of the species. Therefore, the loss of habitat or potential
10 mortality under this alternative would have a less-than-significant impact on Suisun song sparrow
11 and saltmarsh common yellowthroat.

12 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
13 **Disturbance of Nesting Birds**

14 See Mitigation Measure BIO-75 under Impact BIO-75.

15 **Impact BIO-81: Indirect Effects of Plan Implementation on Suisun Song Sparrow and**
16 **Saltmarsh Common Yellowthroat**

17 **Indirect Construction-Related Effects:** If Suisun song sparrow or saltmarsh common yellowthroat
18 were to nest in or adjacent to work areas, construction and subsequent maintenance-related noise
19 and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
20 functions of suitable nesting habitat for these species. Suisun song sparrow and saltmarsh common
21 yellowthroat habitat adjacent to restoration work areas could be affected by such disturbances,
22 which could temporarily result in diminished use of habitat. Construction noise above background
23 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
24 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
25 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
26 the extent to which these noise levels could affect either species. If construction occurred during the
27 nesting season, these indirect effects could result in the loss or abandonment of nests and mortality
28 of any eggs and/or nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*
29 *Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
30 *Surveys and Avoid Disturbance of Nesting Birds*, would avoid the potential for adverse effects of
31 construction-related activities on survival and productivity of Suisun song sparrow and saltmarsh
32 common yellowthroat by requiring preconstruction surveys and, if nests are present, the
33 establishment of a no-disturbance buffer within 250 feet of a nest site. The use of mechanical
34 equipment during water conveyance facilities construction could cause the accidental release of
35 petroleum or other contaminants that could affect species in the surrounding habitat. The
36 inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could also have an
37 adverse effect on Suisun song sparrow and saltmarsh common yellowthroat. *AMM2 Construction*
38 *Best Management Practices and Monitoring* would minimize the likelihood of such spills and ensure
39 that measures are in place to prevent runoff from the construction area and any adverse effects of
40 dust on active nests.

41 **Salinity:** Water conveyance facilities operations would have an effect on salinity gradients in Suisun
42 Marsh; however, these effects cannot be reasonably disaggregated from effects resulting from tidal
43 habitat restoration. It is expected that the salinity of water in Suisun Marsh would generally increase
44 as a result of water conveyance facilities operations and operations of salinity control gates to mimic

1 a more natural water flow. This would likely encourage the establishment of tidal wetland plant
2 communities tolerant of more saline environments, which should have a beneficial effect on Suisun
3 song sparrow and saltmarsh common yellowthroat because their historical natural Suisun Marsh
4 habitat is brackish tidal marsh. However, the degree to which salinity changes in all tidal channels
5 and sloughs in and around Suisun Marsh would be highly variable.

6 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
7 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
8 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
9 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
10 newly inundated areas could increase bioavailability of mercury. Although tidal habitat restoration
11 might increase methylation of mercury export to other habitats, restoration is unlikely to
12 significantly increase the exposure of Suisun song sparrow or saltmarsh common yellowthroat to
13 methylmercury, as they currently reside in tidal marshes where elevated methylmercury levels
14 exist. Robinson et al. (2011) found toxic levels of methylmercury levels in song sparrow populations
15 from southern San Francisco Bay, although populations near Suisun Marsh (i.e., San Pablo and Simas
16 Creeks) were much lower. The potential mobilization or creation of methylmercury within the study
17 area varies with site-specific conditions and would need to be assessed at the project level. The
18 Suisun Marsh Plan anticipates that restored tidal wetlands would generate less methylmercury than
19 the existing managed wetlands to be restored (Bureau of Reclamation et al. 2010).

20 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
21 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
22 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
23 project-specific basis, where high potential for methylmercury production is identified that
24 restoration design and adaptive management cannot fully address while also meeting restoration
25 objectives, alternate restoration areas will be considered. CM12 would be implemented in
26 coordination with other similar efforts to address mercury in the Delta, and specifically with the
27 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
28 following actions.

- 29 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
30 mercury methylation and bioavailability
- 31 ● Define design elements that minimize conditions conducive to generation of methylmercury in
32 restored areas.
- 33 ● Define adaptive management strategies that can be implemented to monitor and minimize
34 actual postrestoration creation and mobilization of methylmercury.

35 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
36 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
37 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
38 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
39 2009). The effect of selenium toxicity differs widely between species and also between age and sex
40 classes within a species. In addition, the effect of selenium on a species can be confounded by
41 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
42 2009).

1 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
 2 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
 3 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
 4 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
 5 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
 6 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
 7 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
 8 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
 9 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
 10 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
 11 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
 12 have a higher risk of selenium toxicity.

13 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 14 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 15 exacerbate bioaccumulation of selenium in avian species, including Suisun song sparrow and
 16 saltmarsh common yellowthroat. Marsh (tidal and nontidal) and floodplain restoration have the
 17 potential to mobilize selenium, and, therefore, increase avian exposure from ingestion of prey items
 18 with elevated selenium levels. Thus, Alternative 9 restoration activities that create newly inundated
 19 areas could increase bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for
 20 details of restoration). Changes in selenium concentrations are analyzed in Chapter 8, *Water Quality*,
 21 which concludes that, relative to Existing Conditions and the No Action Alternative, CM1 would not
 22 result in substantial, long-term increases in selenium concentrations in water in the Delta under any
 23 alternative. However, it is difficult to determine whether the effects of potential increases in
 24 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)
 25 would lead to adverse effects on Suisun song sparrow and saltmarsh common yellowthroat.

26 Because of the uncertainty that exists at this programmatic level of review, there could be a
 27 substantial effect on Suisun song sparrow and saltmarsh common yellowthroat from increases in
 28 selenium associated with restoration activities. This effect would be addressed through the
 29 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
 30 restoration design elements to reduce the potential for bioaccumulation of selenium and its
 31 bioavailability in tidal habitats (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*).
 32 Furthermore, the effectiveness of selenium management to reduce selenium concentrations and/or
 33 bioaccumulation would be evaluated separately for each restoration effort as part of design and
 34 implementation. This avoidance and minimization measure would be implemented as part of the
 35 tidal habitat restoration design schedule.

36 **NEPA Effects:** Noise and visual disturbances would not have an adverse effect on Suisun song
 37 sparrow with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
 38 *Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
 39 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects of
 40 noise and visual disturbance on saltmarsh common yellowthroat. AMM1–AMM7, including *AMM2*
 41 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of spills, and
 42 ensure that measures were in place to prevent runoff from the construction area and to avoid
 43 negative effects of dust on the species.

44 Implementation of Operational Scenario A, including operation of salinity-control gates, and tidal
 45 habitat restoration would be expected to increase water salinity in Suisun Marsh, which would be

1 expected to establish tidal marsh similar to historic conditions. Tidal habitat restoration is unlikely
2 to have a substantial impact on Suisun song sparrow and saltmarsh common yellowthroat through
3 increased exposure to methylmercury, as these species currently reside in tidal marshes where
4 elevated methylmercury levels exist. However, it is unknown what concentrations of methylmercury
5 are harmful to the species and the potential for increased exposure varies substantially within the
6 study area. Implementation of CM12 which contains measures to assess the amount of mercury
7 before project development, followed by appropriate design and adaptation management, would
8 minimize the potential for increased methylmercury exposure, and would result in no adverse effect
9 on Suisun song sparrow and saltmarsh common yellowthroat.

10 Tidal habitat restoration could result in increased exposure of Suisun song sparrow and saltmarsh
11 common yellowthroat to selenium. This effect would be addressed through the implementation of
12 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
13 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
14 habitats.

15 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
16 sedimentation, and operations and maintenance of the water conveyance facilities would be less
17 than significant with the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
18 *Least Bell's Vireo, Western Yellow-Billed Cuckoo,* Mitigation Measure BIO-75, *Conduct Preconstruction*
19 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds,* and *AMM2 Construction Best*
20 *Management Practices and Monitoring.*

21 Changes in salinity gradients would be expected to have a beneficial impact on Suisun song sparrow
22 and saltmarsh common yellowthroat through the establishment of tidal marsh similar to historic
23 conditions. The implementation of tidal natural communities restoration (CM4) is unlikely to
24 significantly increase the exposure of Suisun song sparrow or saltmarsh common yellowthroat to
25 methylmercury, as they currently reside in tidal marshes where elevated methylmercury levels
26 exist. However, it is unknown what concentrations of methylmercury are harmful to these species.
27 Implementation of CM12, which contains measures to assess the amount of mercury before project
28 development, followed by appropriate design and adaptation management, would minimize the
29 potential for increased methylmercury exposure, and would result in no adverse effect on Suisun
30 song sparrow and saltmarsh common yellowthroat.

31 Tidal habitat restoration could result in increased exposure of Suisun song sparrow and saltmarsh
32 common yellowthroat to selenium. This effect would be addressed through the implementation of
33 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
34 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
35 habitats.

36 With these avoidance and minimization measures and Mitigation Measure BIO-75 in place, indirect
37 effects of Alternative 9 implementation would have a less-than-significant impact on Suisun song
38 sparrow and saltmarsh common yellowthroat.

39 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
40 **Disturbance of Nesting Birds**

41 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-82: Effects on Suisun Song Sparrow and Saltmarsh Common Yellowthroat**
2 **Associated with Electrical Transmission Facilities**

3 The range of the Suisun song sparrow extends eastward into the Plan Area to approximately Kimball
4 Island. There are several reported occurrences from Kimball Island, Browns Island, and in the
5 Suisun Marsh in the western portion of the Plan Area. The easternmost range of the saltmarsh
6 common yellowthroat also ends in Suisun Marsh. These species ranges, along with areas of suitable
7 habitat, are far from the proposed transmission line routes (BDCP Appendix 5.J, Attachment 5J.C,
8 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Location of the current
9 populations, species ranges, and suitable habitat in the plan area make collision with the proposed
10 transmission lines highly unlikely. Therefore the construction and presence of new transmission
11 lines would not have an adverse effect on Suisun song sparrow and saltmarsh common
12 yellowthroat.

13 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse
14 effect on Suisun song sparrow and saltmarsh common yellowthroat because the location of the
15 current populations, species ranges, and suitable habitat for the species make collision with the
16 proposed transmission lines highly unlikely.

17 **CEQA Conclusion:** The construction and presence of new transmission lines would not be expected
18 to have an adverse effect on Suisun song sparrow and saltmarsh common yellowthroat because the
19 location of the current populations, species ranges, and suitable habitat for the species make
20 collision with the proposed transmission lines highly unlikely. Therefore, the construction and
21 presence of new transmission lines under Alternative 9 would have a less-than-significant impact on
22 Suisun song sparrow and saltmarsh common yellowthroat

23 **Swainson's Hawk**

24 The habitat model used to assess impacts on Swainson's hawk includes plant alliances and land
25 cover types associated with Swainson's hawk nesting and foraging habitat. Construction and
26 restoration associated with Alternative 9 conservation measures would result in both temporary
27 and permanent losses of Swainson's hawk modeled habitat as indicated in Table 12-9-35. The
28 majority of the losses would take place over an extended period of time as tidal marsh is restored in
29 the study area. Although protection and restoration for the loss of nesting and foraging habitat
30 would be initiated in the same timeframe as the losses, it would take years (for foraging habitat) and
31 1 or more decades (for nesting habitat) for restored habitats to replace the functions of habitat lost.
32 This time lag between impacts and restoration of habitat function would be minimized through
33 specific requirements of *AMM18 Swainson's Hawk*, including transplanting mature trees in the near-
34 term time period. Full implementation of Alternative 9 would also include the following
35 conservation actions over the term of the BDCP to benefit the Swainson's hawk (BDCP Chapter 3,
36 Section 3.3, *Biological Goals and Objectives*).

- 37 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
38 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
39 associated with CM7)
- 40 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
41 10 (Objective VFRNC1.2, associated with CM3).
- 42 ● Plant and maintain native trees along roadsides and field borders within protected cultivated
43 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).

- 1 • Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey
2 populations throughout protected cultivated lands (Objective SH2.2, associated with CM3).
- 3 • Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,
4 VPNC2.5, and GNC2.4, associated with CM11).
- 5 • Conserve at least 1 acre of Swainson’s hawk foraging habitat for each acre of lost foraging
6 habitat (Objective SH1.1, associated with CM3).
- 7 • Protect at least 42,275 acres of cultivated lands as Swainson’s hawk foraging habitat with at
8 least 50% in very high-value habitat in CZs 2, 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated
9 with CM3).
- 10 • Of the 42,275 acres of cultivated lands protected as Swainson’s hawk foraging habitat under
11 Objective SH1.2, up to 1,500 acres can occur in CZs 5 and 6, and must have land surface
12 elevations greater than –1 foot NAVD88 (Objective SH1.3, associated with CM3).
- 13 • Protect at least 10,750 acres of grassland, vernal pool, and alkali seasonal wetland as Swainson’s
14 hawk foraging habitat (Objective SH1.4, associated with CM3).
- 15 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
16 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 17 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
18 lands within the reserve system, including isolated valley oak trees, trees and shrubs along field
19 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
20 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

21 As explained below, with the restoration or protection of these amounts of habitat, in addition to
22 management activities that would enhance habitat for the species and implementation of AMM1–
23 AMM7 and AMM18 *Swainson’s Hawk* to minimize potential effects, impacts on Swainson’s hawk
24 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-9-35. Changes in Swainson’s Hawk Modeled Habitat Associated with Alternative 9 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	32	32	29	29	NA	NA
	Foraging	373	373	2,534	2,534	NA	NA
Total Impacts CM1		405	405	2,563	2,563	NA	NA
CM2-CM18	Nesting	252	412	54	85	41-70	189
	Foraging	8,903	48,511	504	1,540	3,025-6,635	8,008
Total Impacts CM2-CM18		9,155	48,923	558	1,625	3,066-6,705	8,197
Total Nesting		284	444	83	114	41-70	189
Total Foraging		9,276	48,884	3,038	4,074	3,025-6,635	8,008
TOTAL IMPACTS		9,560	49,328	3,121	4,188	3,066-6,705	8,197

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-83: Loss or Conversion of Habitat for and Direct Mortality of Swainson’s Hawk**

5 Alternative 9 conservation measures would result in the combined permanent and temporary loss
6 of up to 53,516 modeled habitat (558 acres of nesting habitat and 52,958 acres of foraging habitat)
7 for Swainson’s hawk (Table 12-9-35). Conservation measures that would result in these losses are
8 conveyance facilities and transmission line construction, and establishment and use of borrow and
9 spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4),
10 floodplain restoration (CM5), riparian restoration, (CM7), grassland restoration (CM8), vernal pool
11 and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of
12 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which
13 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.
14 In addition, maintenance activities associated with the long-term operation of the water conveyance
15 facilities and other BDCP physical facilities could affect Swainson’s hawk modeled habitat. Each of
16 these individual activities is described below. A summary statement of the combined impacts and
17 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 water conveyance facilities
19 would result in the combined permanent and temporary loss of up to 61 acres of Swainson’s
20 hawk nesting habitat (32 acres of permanent loss and 29 acres of temporary loss). In addition,
21 2,907 acres of foraging habitat would be removed (373 acres of permanent loss, 2,534 acres of

1 temporary loss, Table 12-9-35). Activities that would impact modeled Swainson’s hawk habitat
 2 include channel dredging, intakes, fish barriers, access roads, and construction of transmission
 3 lines. Permanent losses of nesting habitat would primarily consist of channel enlargement at the
 4 Sacramento River and Meadows Slough. Temporary losses would occur primarily along Middle
 5 River between Victoria Canal and Mildred Island, where large dredging work areas and operable
 6 barrier work areas would be placed. The riparian habitat in these areas is composed of very
 7 small patches or stringers bordering waterways, which include valley oak and scrub vegetation.
 8 Permanent impacts on foraging habitat would occur from the construction of the canals in CZ 8
 9 east and south of Clifton Court Forebay and other conveyance structures in CZ 4, 5, 6, 7, and 8.
 10 Temporary impacts would primarily occur from borrow and spoil areas and temporary work
 11 areas. Impacts on foraging habitat would include the permanent loss of 1 acres and the
 12 temporary loss of 727 acres of very high-value alfalfa (Table 12-9-36). The CM1 permanent
 13 construction footprint overlaps with 3 Swainson’s hawk occurrences. Canal construction
 14 overlaps with two occurrences and channel dredging, instream island dredging, and a potential
 15 spoil area overlap with one occurrence. Thirteen Swainson’s hawk occurrences overlap with the
 16 temporary construction footprint for CM1. These impacts would consist of potential borrow and
 17 spoil areas (3 occurrences), access road work areas (8 occurrences), and work areas for
 18 dredging, a barge facility, and a siphon (one occurrence). *AMM18 Swainson’s Hawk* would
 19 require preconstruction surveys and the establishment of a no-disturbance buffer and minimize
 20 potential effects of construction on nesting Swainson’s hawks. Refer to the Terrestrial Biology
 21 Map Book for a detailed view of Alternative 9 construction locations.

22 **Table 12-9-36. Acres of Impacted Swainson’s Hawk Foraging Habitat by Value Classes**

Foraging Habitat Value Class	Cultivated Land and Other Land Cover Types	CM1 Permanent (temporary)	CM2-18 permanent (temporary)
Very high	Alfalfa hay	114 (727)	13,898 (432)
Moderate	Irrigated pasture, other hay crops, tomatoes, grain crops (wheat, barley, oats), fallow fields	145 (225)	15,136 (477)
Low	Other irrigated field and truck crops, dry pasture, grasslands, alkali seasonal wetlands, vernal pool complex, sudan	87 (907)	10,535 (349)
Very low	Safflower, sunflower, corn, grain sorghum, managed wetlands	27 (674)	8,943 (281)

- 23
- 24 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 25 would result in the combined permanent and temporary loss of up to 133 acres of nesting
 26 habitat (79 acres of permanent loss, 54 acres of temporary loss) in the Yolo Bypass in CZ 2. In
 27 addition, 1,500 acres of foraging habitat would be removed (996 acres of permanent loss, 554
 28 acres of temporary loss). Activities through CM2 could involve excavation and grading in
 29 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
 30 riparian losses would occur at the north end of Yolo Bypass where major fish passage
 31 improvements are planned. Excavation to improve water movement in the Toe Drain and in the

1 Sacramento Weir would also remove Swainson's hawk habitat. The loss is expected to occur
2 during the first 10 years of Alternative 9 implementation.

- 3 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
4 inundation would permanently remove an estimated 295 acres of Swainson's hawk nesting
5 habitat and 37,359 acres of foraging habitat. The majority of the acres lost would consist of
6 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity
7 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,
8 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
9 directly impact and fragment grassland just north of Rio Vista in and around French and
10 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
11 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
12 the northern fringes of Suisun Marsh. Impacts on foraging habitat from CM4 would consist of
13 10,757 acres of very high-value (alfalfa), 11,706 acres of moderate-value, and 7,973 acres of
14 low-value habitat (See Table 12-9-36 for land cover types classified by habitat value). Because
15 the species is highly mobile and wide-ranging, habitat fragmentation is not expected to reduce
16 the use of remaining cultivated lands or preclude access to surrounding lands. However, the
17 conversion of cultivated lands to tidal wetlands over fairly broad areas within the tidal
18 restoration footprints could result in the removal or abandonment of nesting territories that
19 occur within or adjacent to the restoration areas. Trees would not be actively removed but tree
20 mortality would be expected over time as areas became tidally inundated. Depending on the
21 extent and value of remaining habitat, this could reduce the local nesting population. There are
22 at least 27 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for
23 CM4, suggesting that numerous nest sites could be directly affected by inundation from tidal
24 restoration activities.
- 25 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
26 seasonally inundated floodplain and riparian restoration actions would remove approximately
27 69 acres of Swainson's hawk nesting habitat (38 acres of permanent loss, 31 acres of temporary
28 loss) and 2,856 acres of foraging habitat (1,820 acres of permanent loss, 1,036 acres of
29 temporary loss). These losses would be expected after the first 10 years of Alternative 9
30 implementation along the San Joaquin River and other major waterways in CZ 7.
- 31 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
32 approximately 953 acres of Swainson's hawk foraging habitat as part of tidal restoration and
33 3,991 acres as part of seasonal floodplain restoration through CM7. There are at least 27
34 Swainson's hawk nest sites that overlap with the hypothetical restoration areas for CM7.
- 35 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
36 implemented on agricultural lands and would result in the conversion of 1,849 acres of
37 Swainson's hawk agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8,
38 and 11. If agricultural lands supporting higher value foraging habitat than the restored
39 grassland were removed, there would be a loss of Swainson's hawk foraging habitat value.
- 40 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh would
41 result in the permanent removal of 1,440 acres of Swainson's hawk foraging habitat in CZ 2 and
42 CZ 4. Small patches of riparian vegetation that support Swainson's hawk nesting habitat may
43 develop along the margins of restored nontidal marsh if appropriate site conditions are present.
- 44 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
45 enhancement-related activities could disturb Swainson's hawk nests if they were present near

1 work sites. A variety of habitat management actions that are designed to enhance wildlife values
2 in BDCP-protected habitats may result in localized ground disturbances that could temporarily
3 remove small amounts of Swainson's hawk habitat and reduce the functions of habitat until
4 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
5 and road and other infrastructure maintenance, are expected to have minor effects on available
6 Swainson's hawk habitat and are expected to result in overall improvements to and
7 maintenance of habitat values over the term of the BDCP. These effects cannot be quantified, but
8 are expected to be minimal and would be avoided and minimized by the AMMs listed below.
9 CM11 would also include the construction of recreational-related facilities including trails,
10 interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal*
11 *Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms,
12 etc. would be placed on existing, disturbed areas when and where possible. However,
13 approximately 50 acres of Swainson's hawk grassland foraging habitat would be lost from the
14 construction of trails and facilities.

- 15 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
16 Swainson's hawk foraging habitat for the development of a delta and longfin smelt conservation
17 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.

18 Permanent and temporary nesting habitat losses from the above conservation measures, would
19 primarily consist of small, fragmented riparian stands. Temporarily affected nesting habitat
20 would be restored as riparian habitat within 1 year following completion of construction
21 activities. The restored riparian habitat would require 1 to several decades to functionally
22 replace habitat that has been affected and for trees to attain sufficient size and structure suitable
23 for nesting by Swainson's hawks. *AMM18 Swainson's Hawk* contains actions described below to
24 reduce the effect of temporal loss of nesting habitat, including the transplanting of mature trees
25 and planting of trees near high-value foraging habitat. The functions of cultivated lands and
26 grassland communities that provide foraging habitat for Swainson's hawk are expected to be
27 restored relatively quickly.

- 28 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
29 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
30 disturbances that could affect Swainson's hawk use of the surrounding habitat. Maintenance
31 activities would include vegetation management, levee and structure repair, and re-grading of
32 roads and permanent work areas. These effects, however, would be reduced by AMM1-AMM7
33 and *AMM18 Swainson's Hawk* in addition to conservation actions as described below.

- 34 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
35 direct mortality of adult or fledged Swainson's hawk if they were present in the study area,
36 because they would be expected to avoid contact with construction and other equipment.
37 However, if Swainson's hawk were to nest in the construction area, construction-related
38 activities, including equipment operation, noise and visual disturbances could affect nests or
39 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects
40 would be avoided and minimized with the incorporation of *AMM18 Swainson's Hawk* into the
41 BDCP.

1 The following paragraphs summarize the combined effects discussed above and describe other
 2 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
 3 included.

4 ***Near-Term Timeframe***

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 7 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
 8 the effect of construction would not be adverse under NEPA. Alternative 9 would remove 367 acres
 9 (284 permanent, 83 temporary) of Swainson’s hawk nesting habitat in the study area in the near-
 10 term. These effects would result from the construction of the water conveyance facilities (CM1, 61
 11 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,
 12 *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and
 13 *CM7 Riparian Natural Community Restoration*—306 acres). In addition, 12,314 acres of Swainson’s
 14 hawk foraging habitat would be removed or converted in the near-term (CM1, 2,907 acres; *CM2 Yolo*
 15 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally*
 16 *Inundated Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland*
 17 *Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*,
 18 *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—
 19 9,407 acres).

20 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and
 21 those that are identified in the biological goals and objectives for Swainson’s hawk in Chapter 3 of
 22 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
 23 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 61
 24 acres of nesting habitat should be restored/created and 61 acres should be protected to compensate
 25 for the CM1 losses of Swainson’s hawk nesting habitat. In addition, 2,907 acres of foraging habitat
 26 should be protected to mitigate the CM1 losses of Swainson’s hawk foraging habitat. The near-term
 27 effects of other conservation actions would remove 306 acres of modeled nesting habitat, and
 28 therefore require 306 acres of restoration and 306 acres of protection of nesting habitat. Similarly,
 29 the near-term effects of other conservation actions would remove 9,407 acres of modeled foraging
 30 habitat, and therefore require 9,407 acres of protection of foraging habitat using the same typical
 31 NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting habitat; 1:1
 32 protection for the loss of foraging habitat).

33 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
 34 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
 35 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
 36 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
 37 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3, *Description of*
 38 *Alternatives*). These conservation actions are associated with CM3, CM5, CM7, and CM8, and would
 39 occur in the same timeframe as the construction and early restoration losses.

40 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
 41 system with extensive wide bands or large patches of valley/foothill riparian natural community
 42 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
 43 restoration would expand the patches of existing riparian forest in order to support nesting habitat
 44 for the species. The distribution and abundance of potential Swainson’s hawk nest trees would be

1 increased by planting and maintaining native trees along roadsides and field borders within
 2 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small
 3 but essential nesting habitat for Swainson’s hawk associated with cultivated lands would also be
 4 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
 5 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

6 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 7 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
 8 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
 9 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
 10 provide foraging habitat for Swainson’s hawk and reduce the effects of current levels of habitat
 11 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
 12 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
 13 Foraging opportunities would also be improved by enhancing prey populations through the
 14 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
 15 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
 16 would also be protected and maintained as part of the cultivated lands reserve system which would
 17 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
 18 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
 19 components) that dry during the spring would also serve as foraging habitat for Swainson’s hawks
 20 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
 21 would inform the near-term protection and restoration efforts and represent performance
 22 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated
 23 lands that provide habitat for covered and other native wildlife species would be protected in the
 24 near-term time period (Objective CLNC1.1) A minimum of 87% of cultivated lands protected by the
 25 late long-term time period would be in very high- and high-value crop types for Swainson’s hawk
 26 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated
 27 lands protected in the near-term time period which would provide high-value habitat for Swainson’s
 28 hawk. The acres of restoration and protection contained in the near-term Plan goals and the
 29 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
 30 the project-level effects of CM1 on Swainson’s hawk foraging habitat, as well as mitigate the near-
 31 term effects of the other conservation measures.

32 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
 33 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
 34 other near-term impacts on Swainson’s hawk nesting habitat. The 800 acres of restored riparian
 35 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
 36 require one to several decades to functionally replace habitat that has been affected and for trees to
 37 attain sufficient size and structure suitable for nesting by Swainson’s hawks. This time lag between
 38 the removal and restoration of nesting habitat could have a substantial impact on Swainson’s hawk
 39 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting
 40 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
 41 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat
 42 would further reduce this limited resource and could reduce or restrict the number of active
 43 Swainson’s hawk nests within the Plan Area until restored riparian habitat is sufficiently developed.

44 *AMM18 Swainson’s Hawk* would implement a program to plant large mature trees, including
 45 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson’s hawk
 46 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)

1 within the 125-acre block are removed. These mature trees would be supplemented with additional
2 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
3 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
4 addition, at least 5 trees (five gallon container size) would be planted within the BDCP reserve
5 system for every tree removed by construction during the near-term period that was suitable for
6 nesting by Swainson's hawks (20 feet or taller). A variety of native tree species would be planted to
7 provide trees with differing growth rates, maturation, and life span. Trees would be planted within
8 the BDCP reserve system in areas that support high-value foraging habitat to increase nest sites, or
9 within riparian plantings as a component of the riparian restoration (CM5, CM7) where they are in
10 close proximity to suitable foraging habitat. Replacement trees that were incorporated into the
11 riparian restoration would not be clustered in a single region of the study area, but would be
12 distributed throughout the lands protected as foraging habitat for Swainson's hawk.

13 Swainson's hawk foraging habitat would be protected within 3 miles of a known Swainson's hawk
14 nest tree and within 50 miles of the project footprint on land not subject to threat of seasonal
15 flooding, construction disturbances, or other conditions that would reduce the foraging value of the
16 land. With this program in place, Alternative 9 would not have a substantial adverse effect on
17 Swainson's hawk in the near-term timeframe, either through direct mortality or through habitat
18 modifications. Further details of AMM18 are provided in Appendix 3B, *Environmental Commitments,*
19 *AMMs, and CMs*, of the Final EIR/EIS.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
21 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
22 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
23 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
24 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
25 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
26 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs,*
27 to the Final EIR/EIS.

28 **Late Long-Term Timeframe**

29 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of
30 modeled foraging habitat for Swainson's hawk. Alternative 9 as a whole would result in the
31 permanent loss of and temporary effects on 558 acres of potential nesting habitat (6% of the
32 potential nesting habitat in the study area) and 52,958 acres of foraging habitat (11% of the foraging
33 habitat in the study area).

34 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
35 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community*
36 *Restoration, and CM8 Grassland Natural Community Restoration,* to restore or create at least 5,000
37 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000
38 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool
39 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed
40 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
41 species (Table 3-4 in Chapter 3, *Description of Alternatives*).

42 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
43 system with extensive wide bands or large patches of valley/foothill riparian natural community
44 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian

1 restoration would expand the patches of existing riparian forest in order to support nesting habitat
2 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be
3 increased by planting and maintaining native trees along roadsides and field borders within
4 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but
5 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be
6 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
7 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

8 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
9 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
10 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
11 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
12 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat
13 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
14 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
15 Foraging opportunities would also be improved by enhancing prey populations through the
16 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
17 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would
18 also be protected and maintained as part of the cultivated lands reserve system which would
19 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
20 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
21 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks
22 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
23 would inform the near-term protection and restoration efforts and represent performance
24 standards for considering the effectiveness of restoration actions. Foraging habitat would be
25 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that
26 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which
27 would be in very high-value habitat production in CZs 1-4, 7-9, and 11 (Objective SH1.2).

28 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
32 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
33 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
34 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
35 to the Final EIR/EIS.

36 **NEPA Effects:** The loss of Swainson's hawk habitat and potential direct mortality of this special-
37 status species under Alternative 9 would represent an adverse effect in the absence of other
38 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,
39 CM9, and CM11, guided by biological goals and objectives and by AMM1-AMM7 and *AMM18*
40 *Swainson's Hawk*, which would be in place throughout the construction period, the effects of habitat
41 loss and potential mortality on Swainson's hawk under Alternative 9 would not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
6 the effect of construction would be less than significant under CEQA. Alternative 9 would remove
7 367 acres (284 permanent, 83 temporary) of Swainson's hawk nesting habitat in the study area in
8 the near-term. These effects would result from the construction of the water conveyance facilities
9 (CM1, 61 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
10 *Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*
11 *Restoration, and CM7 Riparian Natural Community Restoration—306 acres). In addition, 12,314*
12 *acres of Swainson's hawk foraging habitat would be removed or converted in the near-term (CM1,*
13 *2,907 acres; CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration,*
14 *CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community Restoration, CM8*
15 *Grassland Natural Community Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex*
16 *Restoration, CM11 Natural Communities Enhancement and Management and CM18 Conservation*
17 *Hatcheries—9,407 acres).*

18 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected and
19 those that are identified in the biological goals and objectives for Swainson's hawk in Chapter 3 of
20 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
21 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 61
22 acres of nesting habitat should be restored/created and 61 acres should be protected to compensate
23 for the CM1 losses of Swainson's hawk nesting habitat. In addition, 2,907 acres of foraging habitat
24 should be protected to mitigate the CM1 losses of Swainson's hawk foraging habitat. The near-term
25 effects of other conservation actions would remove 306 acres of modeled nesting habitat, and
26 therefore require 306 acres of restoration and 306 acres of protection of nesting habitat. Similarly,
27 the near-term effects of other conservation actions would remove 9,407 acres of modeled foraging
28 habitat, and therefore require 9,407 acres of protection of foraging habitat using the same typical
29 NEPA and CEQA ratios (1:1 restoration and 1:1 protection for the loss of nesting habitat; 1:1
30 protection for the loss of foraging habitat).

31 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
32 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
33 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
34 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
35 and protecting 15,400 acres of non-rice cultivated lands (Table 3-4 in Chapter 3, *Description of*
36 *Alternatives*). These conservation actions are associated with CM3, CM5, CM7, and CM8, and would
37 occur in the same timeframe as the construction and early restoration losses.

38 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
39 system with extensive wide bands or large patches of valley/foothill riparian natural community
40 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
41 restoration would expand the patches of existing riparian forest in order to support nesting habitat
42 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be
43 increased by planting and maintaining native trees along roadsides and field borders within
44 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small

1 but essential nesting habitat for Swainson's hawk associated with cultivated lands would also be
2 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
3 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

4 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
5 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
6 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
7 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
8 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat
9 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
10 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
11 Foraging opportunities would also be improved by enhancing prey populations through the
12 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
13 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
14 would also be protected and maintained as part of the cultivated lands reserve system which would
15 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
16 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
17 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks
18 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
19 would inform the near-term protection and restoration efforts and represent performance
20 standards for considering the effectiveness of restoration actions. At least 15,400 acres of cultivated
21 lands that provide habitat for covered and other native wildlife species would be protected in the
22 near-term time period (Objective CLNC1.1). A minimum of 87% of cultivated lands protected by the
23 late long-term time period would be in very high- and high-value crop types for Swainson's hawk
24 (Objective SH1.2). This biological objective provides an estimate for the proportion of cultivated
25 lands protected in the near-term time period which would provide high-value habitat for Swainson's
26 hawk. The acres of restoration and protection contained in the near-term Plan goals and the
27 additional detail in the biological objectives satisfy the typical mitigation that would be applied to
28 the project-level effects of CM1 on Swainson's hawk foraging habitat, as well as mitigate the near-
29 term effects of the other conservation measures.

30 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
31 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
32 other near-term impacts on Swainson's hawk nesting habitat. The 800 acres of restored riparian
33 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
34 require one to several decades to functionally replace habitat that has been affected and for trees to
35 attain sufficient size and structure suitable for nesting by Swainson's hawks. This time lag between
36 the removal and restoration of nesting habitat could have a substantial impact on Swainson's hawk
37 in the near-term time period. Nesting habitat is limited throughout much of the Plan Area, consisting
38 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
39 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat
40 would further reduce this limited resource and could reduce or restrict the number of active
41 Swainson's hawk within the Plan Area until restored riparian habitat is sufficiently developed.

42 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
43 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
44 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
45 within the 125-acre block are removed. These mature trees would be supplemented with additional
46 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The

1 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
2 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
3 system for every tree removed by construction during the near-term period that was suitable for
4 nesting by Swainson's hawks (20 feet or taller). A variety of native tree species would be planted to
5 provide trees with differing growth rates, maturation, and life span. Trees would be planted within
6 the BDCP reserve system in areas that support high-value foraging habitat to increase nest sites, or
7 within riparian plantings as a component of the riparian restoration (CM5, CM7) where they are in
8 close proximity to suitable foraging habitat. Replacement trees that are incorporated into the
9 riparian restoration would not be clustered in a single region of the Plan Area, but would be
10 distributed throughout the lands protected as foraging habitat for Swainson's hawk.

11 Swainson's hawk foraging habitat would be protected within 3 miles of a known Swainson's hawk
12 nest tree and within 50 miles of the project footprint on land not subject to threat of seasonal
13 flooding, construction disturbances, or other conditions that would reduce the foraging value of the
14 land. With this program in place, Alternative 9 would not have a substantial adverse effect on
15 Swainson's hawk in the near-term timeframe, either through direct mortality or through habitat
16 modifications. Further details of AMM18 are provided in Appendix 3B, *Environmental Commitments,*
17 *AMMs, and CMs*, of the Final EIR/EIS.

18 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
19 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
20 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
21 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.* All of
22 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
23 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
24 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs,*
25 to the Final EIR/EIS.

26 ***Late Long-Term Timeframe***

27 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of
28 modeled foraging habitat for Swainson's hawk. Alternative 9 as a whole would result in the
29 permanent loss of and temporary effects on 558 acres of potential nesting habitat (6% of the
30 potential nesting habitat in the study area) and 52,958 acres of foraging habitat (11% of the foraging
31 habitat in the study area).

32 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
33 *Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian Natural Community*
34 *Restoration, and CM8 Grassland Natural Community Restoration* to restore or create at least 5,000
35 acres and protect at least 750 acres of valley/foothill riparian natural community, protect 8,000
36 acres and restore 2,000 acres of grassland natural community, protect 600 acres of vernal pool
37 complex, protect 150 acres of alkali seasonal wetland complex, protect 8,100 acres of managed
38 wetland, and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
39 species (Table 3-4 in Chapter 3, *Description of Alternatives*).

40 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
41 system with extensive wide bands or large patches of valley/foothill riparian natural community
42 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
43 restoration would expand the patches of existing riparian forest in order to support nesting habitat
44 for the species. The distribution and abundance of potential Swainson's hawk nest trees would be

1 increased by planting and maintaining native trees along roadsides and field borders within
2 protected cultivated lands at a rate of one tree per 10 acres (Objective SH2.1). In addition, small but
3 essential nesting habitat for Swainson's hawk associated with cultivated lands would also be
4 maintained and protected such as isolated trees, tree rows along field borders or roads, or small
5 clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

6 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
7 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
8 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
9 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
10 provide foraging habitat for Swainson's hawk and reduce the effects of current levels of habitat
11 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
12 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
13 Foraging opportunities would also be improved by enhancing prey populations through the
14 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
15 cultivated lands (Objective SH2.2). Remnant patches of grassland or other uncultivated areas would
16 also be protected and maintained as part of the cultivated lands reserve system which would
17 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
18 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
19 components) that dry during the spring would also serve as foraging habitat for Swainson's hawks
20 as prey species recolonize the fields (Objective MWNC1.1). These biological goals and objectives
21 would inform the near-term protection and restoration efforts and represent performance
22 standards for considering the effectiveness of restoration actions. Foraging habitat would be
23 conserved at a ratio of 1:1 (Objective SH1.1) and at least 42,275 acres of cultivated lands that
24 provide Swainson's hawk foraging habitat would be protected by the late long-term, 50% of which
25 would be in very high-value habitat production in CZs 1-4, 7-9, and 11 (Objective SH1.2).

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
30 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
31 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
32 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
33 to the Final EIR/EIS.

34 Considering Alternative 9's protection and restoration provisions, which would provide acreages of
35 new or enhanced habitat in amounts greater than necessary to compensate for the time lag of
36 restoring riparian and foraging habitats lost to construction and restoration activities, and
37 implementation of AMM1-AMM7 and *AMM18 Swainson's Hawk*, the loss of habitat or direct
38 mortality through implementation of Alternative 9 would not result in a substantial adverse effect
39 through habitat modifications and would not substantially reduce the number or restrict the range
40 of the species. Therefore, the loss of habitat or potential mortality under this alternative would have
41 a less-than-significant impact on Swainson's hawk.

42 **Impact BIO-84: Effects on Swainson's Hawk Associated with Electrical Transmission Facilities**

43 New transmission lines would increase the risk that Swainson's hawks could be subject to power
44 line strikes, which could result in injury or mortality of Swainson's hawks. This species would be at

1 low risk of bird strike mortality based on factors assessed in the bird strike vulnerability analysis
2 (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).
3 Factors analyzed include the height of the new transmission lines and the flight behavior of the
4 species. The existing network of transmission lines in the Plan Area currently poses the same small
5 risk for Swainson's hawk, and any incremental risk associated with the new power line corridors
6 would also be expected to be low. Marking transmission lines with flight diverters that make the
7 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
8 Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian
9 mortality by 60%. All new project transmission lines would be fitted with flight diverters. Bird flight
10 diverters would make transmission lines highly visible to Swainson's hawks and would further
11 reduce any potential for powerline collisions.

12 **NEPA Effects:** New transmission lines would minimally increase the risk for Swainson's hawk power
13 line strikes. All new transmission lines constructed as a result of the project would be fitted with
14 bird diverters, which have been shown to reduce avian mortality by 60%. With implementation of
15 *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines would not
16 result in an adverse effect on Swainson's hawk.

17 **CEQA Conclusion:** New transmission lines would minimally increase the risk for Swainson's hawk
18 power line strikes. All new transmission lines constructed as a result of the project would be fitted
19 with bird diverters, which have been shown to reduce avian mortality by 60%. With implementation
20 of *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines would result
21 in a less-than-significant impact on Swainson's hawk.

22 **Impact BIO-85: Indirect Effects of Plan Implementation on Swainson's Hawk**

23 Noise and visual disturbances from the construction of water conveyance facilities and other
24 conservation measures could reduce Swainson's hawk use of modeled habitat adjacent to work
25 areas. Construction noise above background noise levels (greater than 50 dBA) could extend 1,900
26 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*
27 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there
28 are no available data to determine the extent to which these noise levels could affect Swainson's
29 hawk. Moreover, operation and maintenance of the water conveyance facilities, including the
30 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could
31 affect Swainson's hawk use of the surrounding habitat. These construction activities would include
32 water conveyance construction, tidal restoration activities, floodplain restoration, and Fremont
33 Weir/Yolo Bypass Enhancements. Swainson's hawks are seasonally abundant across much of the
34 study area wherever adequate nest trees occur within a cultivated landscape that supports suitable
35 foraging habitat. There would be a potential for noise and visual disturbances associated with BDCP
36 actions to temporarily displace Swainson's hawks and temporarily reduce the use of suitable habitat
37 adjacent to construction areas. These adverse effects would be minimized with the implementation
38 of *AMM18 Swainson's Hawk*.

39 The use of mechanical equipment during water conveyance facilities construction could cause the
40 accidental release of petroleum or other contaminants that could affect Swainson's hawk foraging in
41 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
42 suitable habitat could also have an adverse effect on these species. *AMM2 Construction Best*
43 *Management Practices and Monitoring* would minimize the likelihood of such spills and ensure that

1 measures are in place to prevent runoff from the construction area and negative effects of dust on
2 habitat.

3 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
4 could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover, operation
5 and maintenance of the water conveyance facilities, including the transmission facilities, could result
6 in ongoing but periodic postconstruction disturbances that could affect Swainson's hawk use of the
7 surrounding habitat. The effects of noise, the potential for hazardous spills, increased dust and
8 sedimentation, and operations and maintenance of the water conveyance facilities would not have
9 an adverse effect on Swainson's hawk with the implementation of AMM1-AMM7, AMM10, and
10 *AMM18 Swainson's Hawk*.

11 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
12 facilities could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover,
13 operation and maintenance of the water conveyance facilities, including the transmission facilities,
14 could result in ongoing but periodic postconstruction disturbances that could affect Swainson's
15 hawk use of the surrounding habitat. The effects of noise, the potential for hazardous spills,
16 increased dust and sedimentation, and operations and maintenance of the water conveyance
17 facilities would result in a less-than-significant impact on Swainson's hawk with the implementation
18 of AMM1-AMM7, AMM10, and *AMM18 Swainson's Hawk*.

19 **Impact BIO-86: Periodic Effects of Inundation of Swainson's Hawk Nesting and Foraging**
20 **Habitat as a Result of Implementation of Conservation Components**

21 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
22 *Enhancement*) would increase the frequency and duration of inundation on approximately 3,066-
23 6,706 acres of modeled Swainson's hawk habitat (consisting of approximately 41-70 acres of
24 nesting habitat and 3,025-6,635 acres of foraging habitat; Table 12-9-35). However, project-
25 associated inundation of areas that would not otherwise have been inundated would be expected to
26 occur in no more than 30% of all years, since Fremont Weir is expected to overtop the remaining
27 estimated 70% of all years, and during those years notch operations would not typically affect the
28 maximum extent of inundation. In more than half of all years under Existing Conditions, an area
29 greater than the project-related inundation area already inundates in the bypass. Therefore, habitat
30 conditions in the bypass would not be expected to change substantially as a result of Yolo Bypass
31 operations. However, increased duration of inundation during years of Fremont Weir operation,
32 may delay the period for which foraging habitat is available to Swainson's hawks by up to several
33 weeks.

34 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
35 *Restoration*, could result in the periodic inundation of up to approximately 8,197 acres of modeled
36 Swainson's hawk habitat (Table 12-9-35), consisting of 189 acres of nesting and 8,008 acres of
37 foraging habitat. Floodplain restoration would be expected to restore a more natural flood regime
38 and sustain riparian vegetation types that support regeneration of Swainson's hawk nesting habitat.
39 The restored floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years)
40 to areas that flood infrequently (e.g., every 10 years or more). Foraging habitat that is inundated
41 after Swainson's hawks arrive in the Central Valley in mid-March could result in a periodic loss of
42 available foraging habitat due to the reduction in available prey. Inundated habitats would be
43 expected to recover following draw-down and provide suitable foraging conditions until the

1 following inundation period. Thus, this is considered a periodic and short term effect that is unlikely
2 to affect Swainson's hawk distribution and abundance, or foraging use of the study area.

3 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
4 sites because trees in which nest sites are situated already withstand floods, the increase in
5 inundation frequency and duration is expected to remain within the range of tolerance of riparian
6 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically
7 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.
8 This would be considered a short-term effect that would not result in an adverse effect on
9 Swainson's hawk.

10 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
11 nest sites because trees in which nest sites are situated already withstand floods, the increase in
12 inundation frequency and duration is expected to remain within the range of tolerance of riparian
13 trees, and nest sites are located above floodwaters. Although foraging habitat would be periodically
14 unavailable to Swainson's hawk, inundated habitats are expected to recover following draw down.
15 This would be considered a short-term effect that would not have a significant impact on Swainson's
16 hawk.

17 **Tricolored Blackbird**

18 This section describes the effects of Alternative 9, including water conveyance facilities construction
19 and implementation of other conservation components, on tricolored blackbird. The habitat model
20 used to assess effects on tricolored blackbird is based on breeding habitat and nonbreeding habitat.
21 Although breeding colonies have been documented along the fringe of Suisun Marsh, in the Yolo
22 Bypass and along the southwestern perimeter of the study area, breeding colonies are uncommon in
23 the study area. Modeled breeding habitat includes bulrush/cattail wetlands and shrub communities
24 that may provide suitable nesting substrate, and adjacent high-value foraging areas that occur
25 within 5 miles of nesting colonies documented in the study area. The foraging component includes
26 land cover types known to support abundant insect populations such as grasslands, pasturelands
27 (including alfalfa), natural seasonal wetlands, and sunflower croplands. The Delta is recognized as a
28 major wintering area for tricolored blackbird (Hamilton 2004, Beedy 2008). Modeled nonbreeding
29 habitat includes emergent wetlands and shrub stands that provide suitable roosting habitat, as well
30 as cultivated lands and noncultivated lands that provide foods sought by tricolored blackbirds
31 during the winter. Outside of the breeding season, tricolored blackbirds are primarily granivores
32 that forage opportunistically across the Plan Area in grasslands, pasturelands, croplands, dairies,
33 and livestock feed lots. Factors considered in assessing the value of affected habitat for the
34 tricolored blackbird, include patch size, suitability of vegetation, and proximity to recorded
35 occurrences.

36 Construction and restoration associated with Alternative 9 conservation measures would result in
37 both temporary and permanent losses of tricolored blackbird modeled habitat as indicated in Table
38 12-9-37. Full implementation of Alternative 9 would also include the following conservation actions
39 over the term of the BDCP to benefit the tricolored blackbird (BDCP Chapter 3, Section 3.3, *Biological*
40 *Goals and Objectives*).

- 41 • Protect and manage at least 50 acres of occupied or recently occupied (within the last 15 years)
42 tricolored blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs
43 1, 2, 8, or 11. (Objective TRBL1.1).

- 1 ● Protect at least 26,300 acres of moderate-, high-, or very high-value cultivated lands as
2 nonbreeding foraging habitat, 50% of which is of high or very high value (Objective TRBL1.2).
- 3 ● Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat within 5 miles
4 of occupied or recently occupied (within the last 15 years) tricolored blackbird nesting habitat
5 in CZs 1, 2, 3, 4, 7, 8, or 11. At least 1,000 acres of this habitat would be within 5 miles of the
6 nesting habitat protected under Objective TRBL1.1 (Objective TRBL1.3).
- 7 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
8 lands within the reserve system, including isolated valley oak trees, trees and shrubs along field
9 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
10 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 11 ● Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least
12 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder
13 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 14 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 15 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
16 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 17 ● Increase prey abundance and accessibility for grassland-foraging species (Objectives ASWNC2.4,
18 VPNC2.5, and GNC2.4, associated with CM11).

19 As explained below, with the restoration or protection of these amounts of habitat, in addition to
20 management activities that would enhance these natural communities for the species and
21 implementation of AMM1–AMM7 and *AMM21 Tricolored Blackbird*, impacts on tricolored blackbird
22 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-37. Changes in Tricolored Blackbird Modeled Habitat Associated with Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d		
		NT	LLT ^c	NT	LLT ^c	CM2	CM5	
CM1	Breeding	Nesting	8	8	2	2	NA	NA
		Foraging - cultivated	230	230	293	293	NA	NA
		Foraging - noncultivated	55	55	71	71	NA	NA
	Non-breeding	Roosting	58	58	198	198	NA	NA
		Foraging - cultivated	36	36	1,334	1,334	NA	NA
		Foraging - noncultivated	28	28	273	273	NA	NA
Total Impacts CM1		415	415	2,171	2,171			
CM2–CM18	Breeding	Nesting	13	72	75	77	11–26	30
		Foraging - cultivated	1,657	9,525	84	359	1,837–2,598	2,124
		Foraging noncultivated	704	1,991	155	184	600–1,689	355
	Non-breeding	Roosting	570	1,642	0	1	0–4	29
		Foraging - cultivated	3,747	23,955	54	420	222–1,057	2,506
		Foraging - noncultivated	459	1,341	0	3	42–191	158
Total Impacts CM2–CM18		7,150	38,526	368	1,044			
Total Breeding		2,667	11,881	623	991			
Total Nonbreeding		4,898	27,060	1,859	2,229			
TOTAL IMPACTS		7,565	38,941	2,482	3,220			

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-87: Loss or Conversion of Habitat for and Direct Mortality of Tricolored Blackbird

Alternative 9 conservation measures would result in the permanent and temporary loss combined of up to 12,872 acres of modeled breeding habitat and up to 29,289 acres of modeled nonbreeding for tricolored blackbird (Table 12-9-37). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), marsh restoration (CM10), and construction of conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate tricolored blackbird habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure discussions.

- *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would result in the permanent loss of 293 acres of tricolored blackbird breeding habitat (8 acres nesting habitat, 230 acres of cultivated lands, and 55 acres of noncultivated lands suitable for foraging) and 122 acres of nonbreeding habitat (58 acres roosting habitat, 36 acres of cultivated lands, and 28 acres of noncultivated lands suitable for foraging; Table 12-9-37). In addition, CM1 would result in the temporary removal of 366 acres of breeding habitat (2 acres nesting habitat, 293 acres of cultivated lands, and 71 acres of noncultivated lands suitable for foraging) and 1,805 acres of nonbreeding habitat (198 acres roosting habitat, 1,334 acres of cultivated lands, and 273 acres of noncultivated lands suitable for foraging, Table 12-9-37). Habitat that would be lost is located in the central Delta, in CZs 4, 5, 6, 7, and 8. There are no occurrences of tricolored blackbird that overlap with the construction footprint for CM1. However, records exist throughout the study area. The implementation of *AMM21 Tricolored Blackbird* would require preconstruction surveys and the establishment of nodisturbance buffers and would minimize potential effects on nesting tricolored blackbirds (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 9 construction locations. Construction of CM1 would occur within the first 10 years of Alternative 9 implementation.
- *CM2 Yolo Bypass Fisheries Enhancement:* Construction activity associated with fisheries improvements in the Yolo Bypass would permanent loss of 595 acres of tricolored blackbird breeding habitat (13 acres nesting habitat, 477 acres of cultivated lands, and 105 acres of noncultivated lands suitable for foraging) and 8 acres of nonbreeding habitat (consisting entirely of roosting habitat). In addition, CM2 construction would result in the temporary removal of 314 acres of breeding habitat (75 acres nesting habitat, 84 acres of cultivated lands, and 155 acres of noncultivated lands suitable for foraging) and 54 acres of nonbreeding habitat (consisting entirely of cultivated lands). The loss is expected to occur during the first 10 years of Alternative 9 implementation.
- *CM4 Tidal Natural Communities Restoration:* Tidal natural communities restoration would result in the inundation of approximately 3,937 acres of tricolored blackbird breeding habitat (21 acres of nesting, 2,814 acres of cultivated lands, and 1,102 acres of noncultivated lands suitable for foraging) and 10,794 acres of nonbreeding habitat (1,633 acres of roosting, 18,489 acres of cultivated lands, and 672 acres of noncultivated lands suitable for foraging). An estimated 13,692 acres of the 28,424 acres to be permanently lost would be expected to convert to tidal

1 emergent wetland communities that could provide nonbreeding season roosting habitat for
 2 tricolored blackbirds, depending on future vegetation density and composition. Conversion
 3 would result in the loss of an estimated 4,316 acres of tricolored blackbird breeding habitat (34
 4 acres of nesting habitat; plus 3,635 acres of cultivated lands and 647 acres of noncultivated
 5 habitats suitable for foraging) and 9,375 acres of nonbreeding habitat (8,716 acres of cultivated
 6 lands and 659 acres of noncultivated habitats suitable for foraging). These habitat losses and
 7 conversions would occur in CZs 1, 2, 4, 5, 6, 7, 8, and 11. Although considered to be a permanent
 8 loss, due to the uncertainty of the quantity of restored suitable habitat, any areas that develop
 9 into riparian scrub-shrub could provide suitable nesting and roosting habitat for tricolored
 10 blackbird.

- 11 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction and riparian restoration
 12 associated with floodplain restoration in the south Delta (CZ 7) would result in the permanent
 13 removal of up to 554 acres of tricolored blackbird breeding habitat (4 acres of nesting habitat,
 14 503 acres of cultivated lands, and 47 acres of noncultivated habitats suitable for foraging) and
 15 656 acres of nonbreeding habitat (1 acre of roosting habitat, 652 acres of cultivated lands, and 3
 16 acres of noncultivated habitats suitable for foraging) in CZ 7. Patches of riparian scrub
 17 associated with the restoration of approximately 1,000 acres of valley/foothill riparian habitat
 18 managed as early- to mid-successional habitats (as a component of CM5) could provide suitable
 19 nesting, roosting or foraging habitat for tricolored blackbird once these restored habitats have
 20 developed habitat functions for the species.
- 21 ● *CM8 Grassland Natural Communities Restoration*: Restoration of grassland would result in the
 22 permanent removal of 1,521 acres of tricolored breeding habitat and 210 acres of nonbreeding
 23 habitat. Grassland restoration would be implemented on cultivated lands and would therefore
 24 result in the conversion of tricolored blackbird cultivated foraging habitat to high-value
 25 grassland foraging habitat in CZs 2, 4, and 5.
- 26 ● *CM10 Nontidal Marsh Restoration*: Marsh restoration activities would result in the permanent
 27 removal or conversion of approximately 568 acres of tricolored blackbird breeding habitat and
 28 945 acres of nonbreeding habitat (all cultivated lands suitable for foraging). About two-thirds of
 29 the restored nontidal marsh would be open water, and the remainder would support emergent
 30 wetland vegetation that could provide low-value roosting habitat for tricolored blackbird
 31 depending on vegetation density and composition.
- 32 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
 33 actions that are designed to enhance wildlife values in BDCP-protected habitats could result in
 34 localized ground disturbances that could temporarily remove small amounts of tricolored
 35 blackbird habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
 36 road and other infrastructure maintenance, would be expected to have minor effects on
 37 available tricolored blackbird habitat and are expected to result in overall improvements to and
 38 maintenance of tricolored blackbird habitat values over the term of the BDCP. These effects
 39 cannot be quantified, but are expected to be minimal and would be avoided and minimized by
 40 the AMMs listed below. CM11 would also include the construction of recreational-related
 41 facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities*
 42 *and Associated Federal Actions*). Trailhead facilities, signs, staging areas, picnic areas, bathrooms,
 43 etc. would be placed on existing, disturbed areas when and where possible. However,
 44 approximately 43.5 acres of breeding habitat and 6.5 acres of nonbreeding habitat (all grassland
 45 suitable for foraging) would be lost as a result of construction of trails and facilities. Impacts

1 from recreational-related facilities that would occur within the first 10 years of Alternative 9
2 implementation would include a loss of 13 acres of breeding habitat.

- 3 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
4 tricolored blackbird grassland foraging habitat in CZ 1.
- 5 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
6 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
7 disturbances that could affect tricolored blackbird use of the surrounding habitat in or adjacent
8 to work areas. Maintenance activities would include vegetation management, levee and
9 structure repair, and re-grading of roads and permanent work areas. These effects, however,
10 would be reduced by AMMs and conservation actions as described below.
- 11 • *Injury and Direct Mortality*: Operation of construction equipment may cause injury to or
12 mortality of tricolored blackbirds. Risk would be greatest to eggs and nestlings susceptible to
13 land clearing activities, nest abandonment, or increased exposure to the elements or to
14 predators. Injury to or mortality of adults and fledged juveniles would not be expected as
15 individuals would be expected to avoid contact with construction equipment. Construction
16 activities could temporarily fragment existing tricolored blackbird habitat during grading, filling,
17 contouring, and other initial ground-disturbing operations that could temporarily reduce the
18 extent and functions supported by the affected habitat. To the maximum extent practicable,
19 construction activity will be avoided up to 1,300 feet, but not less than a minimum of 250 feet,
20 from an active tricolored blackbird nesting colony. If monitoring determines an activity is
21 adversely affecting a nesting colony, construction will be modified, as practicable, by either
22 delaying construction until the colony site is abandoned or until the end of the breeding season,
23 whichever occurs first, by temporarily relocating staging areas, or temporarily rerouting access
24 to the construction site. Construction and restoration projects would also be designed, in
25 consultation with CDFW, to avoid construction activity within at least 300 feet from occupied
26 active tricolored blackbird roosting habitat. These measures to avoid injury or mortality of
27 nesting and roosting tricolored blackbirds are described in *AMM21 Tricolored Blackbird* (see
28 Appendix 3B, *Environmental Commitments, AMMs, and CMs*).

29 The following paragraphs summarize the combined effects discussed above and describe other
30 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
31 included.

32 ***Near-Term Timeframe***

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
36 effects of construction would not be adverse under NEPA. Alternative 9 would remove 3,290 acres
37 of breeding habitat (98 acres of nesting, 2,264 acres of cultivated lands, and 985 acres of
38 noncultivated lands suitable for foraging) and 6,757 acres of nonbreeding habitat (826 acres of
39 roosting, 5,171 acres of cultivated lands, and 760 acres of noncultivated lands suitable for foraging)
40 for tricolored blackbird in the study area in the near-term. These effects would result from the
41 construction of the water conveyance facilities (CM1, 659 acres of breeding, 1,927 acres of
42 nonbreeding), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
43 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*

1 *Restoration, CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres of
2 nonbreeding).

3 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and
4 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of
5 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1
6 protection for the loss of cultivated lands.

7 Using these ratios would indicate that the compensation for loss or conversion of tricolored
8 blackbird habitat from CM1 would require 10 acres of restoration and 10 acres of protection of
9 nesting habitat, 256 acres of restoration and 256 acres of protection of roosting habitat, 854 acres of
10 protection of noncultivated lands that provide foraging habitat, 523 acres of protection of cultivated
11 lands suitable for foraging during the breeding season, and 1,370 acres of cultivated lands that
12 provide foraging habitat during the nonbreeding season. The near-term effects of other
13 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting
14 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that
15 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the
16 nonbreeding season. Compensation for these losses from other conservation measures would
17 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of
18 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of
19 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands
20 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide
21 foraging habitat during the nonbreeding season. using the same typical NEPA and CEQA ratios.

22 Total compensation for near-term loss or conversion of tricolored blackbird required using the
23 typical ratios above would be 98 acres of restoration and 98 acres of protection for nesting habitat,
24 826 acres of restoration and 826 acres of protection for roosting habitat, 3,490 acres of protection of
25 noncultivated foraging habitat, 2,264 acres of protection for cultivated lands that provide foraging
26 habitat during the breeding season, and 5,171 acres of cultivated lands that provide foraging habitat
27 during the nonbreeding season.

28 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750
29 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres
30 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool
31 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of
32 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,
33 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater
34 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3,
35 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM5, CM7,
36 and CM8 and would occur in the same timeframe as the construction and early restoration losses.
37 Some proportion of these natural communities provide suitable habitat for tricolored blackbird as
38 described below.

39 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding
40 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent
41 wetland, in close association with highly productive foraging areas that support abundant insect
42 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some
43 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs
44 1, 2, 8, or 11 (see Table 12-9-38 for foraging habitat values) and would be actively managed to

1 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical
2 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*
3 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the
4 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,
5 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored
6 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of
7 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section
8 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands
9 restored in the near-term, approximately 64 acres of valley foothill riparian and 198 acres of
10 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

11 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal
12 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,
13 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial*
14 *Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the
15 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140
16 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley
17 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated
18 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of
19 valley/foothill riparian, 720 acres managed wetland).

20 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
21 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
22 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a
23 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The
24 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would
25 provide improved foraging opportunities for tricolored blackbirds during both the breeding and
26 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high
27 reproductive success in tricolored blackbirds. These natural communities are known to support
28 large insect populations, a vital food resource for successful rearing and fledging of young. Those
29 conservation lands that lie within a few miles of active nesting colonies would provide high-value
30 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*
31 *Enhancement and Management*, insect prey populations would be increased on protected lands,
32 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,
33 and GNC2.4).

34 Cultivated lands that provide habitat for covered and other native wildlife species would provide
35 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term
36 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total
37 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-
38 term. Assuming that lands would be protected proportional to the conservation objectives for
39 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat
40 consisting of cultivated lands would be protected in the near-term. These lands would be protected
41 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,
42 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late
43 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in
44 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very
45 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of
46 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the

1 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential
2 habitats for species including tricolored blackbird would also be protected that occur within the
3 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,
4 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for
5 tricolored blackbird (Objective CLNC1.3).

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
10 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
11 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
12 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
13 to the Final EIR/EIS.

14 The acres of protection and restoration contained in the near-term Plan goals, in addition to the
15 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to
16 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the
17 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands
18 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the
19 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for
20 by this acreage, and temporary impacts on grassland would be restored to preproject conditions
21 (including revegetation with native vegetation if within 1 year of completion of construction) under
22 *AMM2 Construction Best Management Practices and Monitoring*. With the enhancement of grasslands
23 described above, and the restoration of temporary habitat impacts, this difference between
24 impacted and conserved grassland acreages in the near-term time period would not result in an
25 adverse effect on tricolored blackbird.

1 **Table 12-9-38. Tricolored Blackbird Foraging Habitat Value Classes**

Foraging Habitat Value Class	Agricultural Crop Type/Habitats	
	Breeding Season ^a Foraging Habitat	Nonbreeding Season Foraging Habitat
Very high	Native pasture, nonirrigated native pasture, annual grasslands, vernal pool grasslands, alkali grasslands	Livestock feed lots
High	Sunflower, alfalfa and mixed alfalfa, mixed pasture, induced high water table native pasture, nonirrigated mixed pasture, dairies	Corn, sunflower, millet, alfalfa and mixed alfalfa, mixed pasture, native pasture, induced high water table native pasture, nonirrigated native pasture, rice, dairies, annual grasslands, vernal pool grasslands, alkali grasslands
Moderate	Miscellaneous grass pasture, fallow lands cropped within 3 years, new lands prepped for crop production, livestock feed lots	Miscellaneous grass pasture, nonirrigated mixed pasture, fallow lands cropped within 3 years, new lands prepped for crop production
Low	Wheat, mixed grain and hay, farmsteads	Wheat, oats, mixed grain and hay, farmsteads
Marginal	Rice	None
None	All remaining crop types	All remaining crop types

^a Generally March through August; occasional breeding in fall (September through November).

2

3 **Late Long-Term Timeframe**

4 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093
5 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for
6 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled
7 breeding habitat available, the study area does not currently support many nesting tricolored
8 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo
9 Bypass, and along the southwestern perimeter of the study area (BDCP, Chapter 5, *Effects Analysis*).
10 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 12,872
11 acres of breeding habitat and 29,289 acres of nonbreeding habitat for tricolored blackbird during
12 the term of the Plan (8% of the total breeding habitat in the study area and 11% of the total
13 nonbreeding habitat in the study area). The locations of these losses are described above in the
14 analyses of individual conservation measures.

15 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
16 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
17 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*
18 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
19 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
20 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
21 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that
22 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of*
23 *Alternatives*).

24 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or
25 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored

1 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11
2 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-9-
3 38. To ensure that natural community conservation benefits tricolored blackbird, the Plan further
4 specifies that cultivated lands protected for tricolored blackbird retain residual wetland, grassland
5 patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting, foraging
6 or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of moderate-, high-,
7 or very high-value cultivated lands would be conserved and managed as nonbreeding foraging
8 habitat, 50% of which would be of high- or very high-value (Objective TRBL1.2). At least 11,050
9 acres of cultivated lands managed as high to very high breeding foraging habitat would be conserved
10 within 5 miles of occupied or recently occupied (within the last 15 years) tricolored blackbird
11 nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of the loss of breeding and
12 nonbreeding habitat would be to cultivated lands that are abundant throughout the study area, so
13 the loss is not expected to adversely affect the population in the study area.

14 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
15 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
16 the protection of an estimated 46,566 acres of tricolored blackbird habitat (16,476 acres breeding
17 habitat and 31,090 acres nonbreeding habitat) and restoration of 31,001 acres of tricolored
18 blackbird habitat (2,190 acres breeding habitat and 28,811 acres nonbreeding habitat).

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
23 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
24 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
25 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
26 to the Final EIR/EIS.

27 **NEPA Effects:** The losses of tricolored blackbird habitat and potential direct mortality of a special
28 status species under Alternative 9 would represent an adverse effect in the absence of other
29 conservation actions. However, with habitat protection and restoration associated with CM3, CM4,
30 CM5, CM7, CM8, and CM11, guided by species-specific goals and objectives and by AMM1-AMM7
31 and *AMM21 Tricolored Blackbird*, which would be in place throughout the construction period, the
32 effects of habitat loss or potential mortality on tricolored blackbird would not be adverse under
33 Alternative 9.

34 **CEQA Conclusion:**

35 **Near-Term Timeframe**

36 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
37 the near-term BDCP conservation strategy has been evaluated to determine whether it would
38 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
39 effects of construction would be less than significant under CEQA. Alternative 9 would remove 3,290
40 acres of breeding habitat (98 acres of nesting, 2,264 acres of cultivated lands, and 985 acres of
41 noncultivated lands suitable for foraging) and 6,757 acres of nonbreeding habitat (826 acres of
42 roosting, 5,171 acres of cultivated lands, and 760 acres of noncultivated lands suitable for foraging)
43 for tricolored blackbird in the study area in the near-term. These effects would result from the
44 construction of the water conveyance facilities (CM1, 659 acres of breeding, 1,927 acres of

1 nonbreeding), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
2 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*
3 *Restoration, and CM7 Riparian Natural Community Restoration*—2,688 acres of breeding, 4,830 acres
4 of nonbreeding).

5 Typical NEPA and CEQA project-level mitigation ratios would be 1:1 for restoration/creation and
6 1:1 for protection for the loss of nesting and roosting wetland habitat, 2:1 protection for loss of
7 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1
8 protection for the loss of cultivated lands.

9 Using these ratios would indicate that the compensation for loss or conversion of tricolored
10 blackbird habitat from CM1 would require 10 acres of restoration and 10 acres of protection of
11 nesting habitat, 256 acres of restoration and 256 acres of protection of roosting habitat, 854 acres of
12 protection of noncultivated lands that provide foraging habitat, 523 acres of protection of cultivated
13 lands suitable for foraging during the breeding season, and 1,370 acres of cultivated lands that
14 provide foraging habitat during the nonbreeding season. The near-term effects of other
15 conservation actions would remove or convert 88 acres of nesting habitat, 570 acres of roosting
16 habitat, 619 acres of noncultivated lands suitable for foraging, 1,741 acres of cultivated lands that
17 provide foraging habitat during the breeding season, and 3,801 acres of cultivated lands during the
18 nonbreeding season. Compensation for these losses from other conservation measures would
19 therefore require 88 acres of restoration and 88 acres of protection of nesting habitat, 570 acres of
20 restoration and 570 acres of protection of roosting habitat, 1,238 acres of protection of
21 noncultivated lands that provide foraging habitat, 1,741 acres of protection of cultivated lands
22 suitable for foraging during the breeding season, and 3,801 acres of cultivated lands that provide
23 foraging habitat during the nonbreeding season. using the same typical NEPA and CEQA ratios.

24 Total compensation for near-term loss or conversion of tricolored blackbird required using the
25 typical ratios above would be 98 acres of restoration and 98 acres of protection for nesting habitat,
26 826 acres of restoration and 826 acres of protection for roosting habitat, 3,490 acres of protection of
27 noncultivated foraging habitat, 2,264 acres of protection for cultivated lands that provide foraging
28 habitat during the breeding season, and 5,171 acres of cultivated lands that provide foraging habitat
29 during the nonbreeding season.

30 The BDCP has committed to near-term goals of protecting 25 acres and restoring protecting 750
31 acres and restoring 800 acres of valley/foothill riparian natural community, protecting 2,000 acres
32 and restoring 1,140 acres of grassland natural community, protecting 400 acres of vernal pool
33 complex, protecting 120 acres of alkali seasonal wetland complex, protecting 4,800 acres of
34 managed wetland natural community, protecting 15,400 acres of non-rice cultivated lands,
35 protecting 900 acres of rice or rice equivalent habitat, restoring 8,850 acres of tidal freshwater
36 emergent wetlands and 2,000 acres of tidal brackish emergent wetlands (Table 3-4 in Chapter 3,
37 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM5, CM7,
38 and CM8 and would occur in the same timeframe as the construction and early restoration losses.
39 Some proportion of these natural communities provide suitable habitat for tricolored blackbird as
40 described below.

41 Nesting by tricolored blackbirds is currently limited by the availability of high-value breeding
42 habitat, which is represented by suitable nesting substrate, such as cattail/bulrush emergent
43 wetland, in close association with highly productive foraging areas that support abundant insect
44 prey, such as grasslands, seasonal wetlands, pasturelands, alfalfa and other hay crops, and some

1 croplands. The nesting habitat would be located within 5 miles of high-value foraging habitat in CZs
 2 1, 2, 8, or 11 (see Table 12-9-38 for foraging habitat values) and would be actively managed to
 3 maintain actively growing stands of bulrush/cattail emergent vegetation through mechanical
 4 habitat manipulation, prescribed fire, or other measures described in *CM11 Natural Communities*
 5 *Enhancement and Management*. In addition to the actively managed nesting habitat, a portion of the
 6 750 acres of protection and 800 acres of restoration of valley/foothill riparian natural community,
 7 and the restoration of 900 acres nontidal marsh would provide nesting habitat for tricolored
 8 blackbird. The Plan estimates that modeled nesting habitat in the Plan Area currently includes 8% of
 9 valley/foothill riparian and 22% of nontidal freshwater emergent marsh (BDCP Chapter 5, Section
 10 5.6.12.2, *Beneficial Effects*). Assuming similar proportions of modeled habitat on conservation lands
 11 restored in the near-term, approximately 64 acres of valley foothill riparian and 198 acres of
 12 nontidal marsh restored would provide nesting habitat for tricolored blackbird.

13 The Plan estimates that modeled roosting habitat in the Plan Area currently includes 95% of tidal
 14 freshwater emergent wetland, 57% of brackish emergent wetland, 21% of valley/foothill riparian,
 15 75% of nontidal marsh, and 15% of managed wetlands (BDCP Chapter 5, Section 5.6.12.2, *Beneficial*
 16 *Effects*). Assuming similar proportions of modeled habitat on conservation lands restored in the
 17 near-term, the restoration of approximately 8,408 acres of tidal freshwater emergent wetland, 1,140
 18 acres of tidal brackish emergent wetland, 675 acres of nontidal marsh, and 168 acres of valley
 19 foothill riparian would provide 10,391 acres of nesting habitat for tricolored blackbird. An estimated
 20 878 acres of roosting habitat would also be protected in the near-term time period (158 acres of
 21 valley/foothill riparian, 720 acres managed wetland).

22 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 23 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
 24 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) which would result in a
 25 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities. The
 26 protection and restoration of grasslands, alkali seasonal wetlands, and vernal pool complexes would
 27 provide improved foraging opportunities for tricolored blackbirds during both the breeding and
 28 nonbreeding seasons. Proximity of nesting colonies to suitable foraging habitat contributes to high
 29 reproductive success in tricolored blackbirds. These natural communities are known to support
 30 large insect populations, a vital food resource for successful rearing and fledging of young. Those
 31 conservation lands that lie within a few miles of active nesting colonies would provide high-value
 32 foraging areas to support breeding tricolored blackbirds. Under *CM11 Natural Communities*
 33 *Enhancement and Management*, insect prey populations would be increased on protected lands,
 34 further enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5,
 35 and GNC2.4).

36 Cultivated lands that provide habitat for covered and other native wildlife species would provide
 37 approximately 15,600 acres of potential foraging habitat for tricolored blackbird in the near-term
 38 (Objective CLNC1.1). Objective TRBL1.3 commits to protecting 11,050 acres (23% of the total
 39 cultivated lands commitment) of high- to very high-value breeding-foraging habitat by the late long-
 40 term. Assuming that lands would be protected proportional to the conservation objectives for
 41 covered species, approximately 3,588 acres of high- to very high-value breeding foraging habitat
 42 consisting of cultivated lands would be protected in the near-term. These lands would be protected
 43 within 5 miles of occupied or recently occupied tricolored blackbird nesting habitat in CZs 1, 2, 3, 4,
 44 7, 8 or 11. In addition, Objective TRBL1.2 states that of the cultivated lands protected in the late
 45 long-term time period, 26,300 acres (54% of all cultivated lands protected) would be maintained in
 46 moderate – high, or very high-value cultivated lands, at least 50% of which would be high- to very

1 high-value. Assuming proportional conservation in the near-term, an estimated 8,424 acres of
2 cultivated lands that provide foraging habitat for tricolored blackbird would be protected in the
3 near-term, 4,212 of which would be in high- to very high-value cultivated lands. Small but essential
4 habitats for species including tricolored blackbird would also be protected that occur within the
5 agricultural matrix. This would include the retention of wetlands, grassland patches, shrub stands,
6 and herbaceous edge habitats, which could provide suitable nesting, foraging or roosting habitat for
7 tricolored blackbird (Objective CLNC1.3).

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
12 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
13 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
14 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
15 to the Final EIR/EIS.

16 The acres of protection and restoration contained in the near-term Plan goals, in addition to the
17 detailed habitat value goals that would be applied to near-term acres, are more than sufficient to
18 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and the
19 near-term impacts from other conservation measures on nesting, roosting, and cultivated lands
20 foraging habitat. The 3,660 acres of grassland protection in the near-term are 213 acres short of the
21 2:1 protection mitigation ratio. However, the acres of permanent impact would be compensated for
22 by this acreage, and temporary impacts on grassland would be restored to preproject conditions
23 (including revegetation with native vegetation if within 1 year of completion of construction) under
24 *AMM2 Construction Best Management Practices and Monitoring*. With the enhancement of grasslands
25 described above, and the restoration of temporary habitat impacts, this difference between
26 impacted and conserved grassland acreages in the near-term time period would not result in a
27 significant impact on tricolored blackbird.

28 ***Late Long-Term Timeframe***

29 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093
30 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for
31 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled
32 breeding habitat available, the study area does not currently support many nesting tricolored
33 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo
34 Bypass, and along the southwestern perimeter of the study area (BDCP, Chapter 5, *Effects Analysis*).
35 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 12,872
36 acres of breeding habitat and 29,289 acres of nonbreeding habitat for tricolored blackbird during
37 the term of the Plan (8% of the total breeding habitat in the study area and 11% of the total
38 nonbreeding habitat in the study area). The locations of these losses are described above in the
39 analyses of individual conservation measures.

40 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
41 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
42 *Restoration*, *CM7 Riparian Natural Community Restoration*, and *CM8 Grassland Natural Community*
43 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
44 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural

1 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
2 complex, protect 8,100 acres of managed wetland, and protect 48,625 acres of cultivated lands that
3 provide suitable habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of*
4 *Alternatives*).

5 Species-specific biological goals and objectives for tricolored blackbird commit to protecting or
6 restoring at least 50 acres of occupied or recently occupied (within the last 15 years) tricolored
7 blackbird nesting habitat located within 5 miles of high-value foraging habitat in CZs 1, 2, 8, or 11
8 (Objective TRBL1.1). Foraging habitat value classes for tricolored blackbird are found in Table 12-9-
9 38. To ensure that natural community conservation benefits tricolored blackbird, the Plan further
10 specifies that cultivated lands protected for tricolored blackbird retain residual wetland, grassland
11 patches, shrub stands, and herbaceous edge habitats which may provide suitable nesting, foraging
12 or roosting habitat for the species (Objective CLNC1.3). In addition, 26,300 acres of moderate-, high-,
13 or very high-value cultivated lands would be conserved and managed as nonbreeding foraging
14 habitat, 50% of which would be of high- or very high-value (Objective TRBL1.2). At least 11,050
15 acres of cultivated lands managed as high to very high breeding foraging habitat would be conserved
16 within 5 miles of occupied or recently occupied (within the last 15 years) tricolored blackbird
17 nesting habitat in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.2). Most of the loss of breeding and
18 nonbreeding habitat would be to cultivated lands that are abundant throughout the study area, so
19 the loss is not expected to adversely affect the population in the study area.

20 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6.12.2, *Effects Analysis*) estimates
21 that the restoration and protection actions discussed above could result in the protection of an
22 estimated 46,566 acres of tricolored blackbird habitat (16,476 acres breeding habitat and 31,090
23 acres nonbreeding habitat) and restoration of 31,001 acres of tricolored blackbird habitat (2,190
24 acres breeding habitat and 28,811 acres nonbreeding habitat).

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
26 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
27 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
28 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
29 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
30 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
31 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
32 to the Final EIR/EIS. Considering these protection and restoration provisions, which would provide
33 acreages of new or enhanced habitat in amounts greater than necessary to compensate for habitats
34 lost to construction and restoration activities, and with implementation of AMM1-AMM7 and
35 *AMM21 Tricolored Blackbird*, the loss of habitat or direct mortality through the implementation of
36 Alternative 9 as a whole would not result in a substantial adverse effect through habitat
37 modifications and would not substantially reduce the number or restrict the range of the species.
38 Therefore, the alternative would have a less-than-significant impact on tricolored blackbird.

39 Other factors relevant to effects on tricolored blackbird are listed here.

- 40 ● Very little loss of nesting habitat would occur (up to 84 acres of permanent loss and 88 acres of
41 temporary loss).
- 42 ● Most of the loss of breeding and nonbreeding habitat would be to cultivated lands that are
43 abundant throughout the Plan Area, so the loss is not expected to adversely affect the population
44 in the Plan Area.

- Most temporary impacts would be to cultivated lands and grasslands that could be restored relatively quickly to suitable foraging habitat after completion of construction activities.

Considering these protection and restoration provisions, which would provide acreages of new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to construction and restoration activities, and implementation of AMM1-AMM7 and *AMM21 Tricolored Blackbird*, the loss of habitat or direct mortality through the implementation of Alternative 9 as a whole would not result in a substantial adverse effect through habitat modifications and would not substantially reduce the number or restrict the range of the species. Therefore, the alternative would have a less-than-significant impact on tricolored blackbird.

Impact BIO-88: Effects on Tricolored Blackbird Associated with Electrical Transmission Facilities

New transmission lines would increase the risk that tricolored blackbirds could be subject to power line strikes, which could result in injury or mortality of individuals. Tricolored blackbirds would have the potential to intersect the proposed transmission lines largely due to winter movements throughout the study area, when individuals are migrating in large flocks and dense fog is common in the area. Although migratory movements

and daily flights between roosting and foraging habitat make tricolored blackbird vulnerable to collision with transmission lines, daily flights associated with winter foraging likely occurs in smaller flocks at heights that are lower than the transmission lines (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Marking transmission lines with flight diverters that make the lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien 1995). For example, Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted with flight diverters, which would further reduce any potential for tricolored blackbird collision with transmission lines.

Transmission line poles and towers provide perching substrate for raptors, which are predators on tricolored blackbird. Although there is potential for transmission lines to result in increased perching opportunities for raptors and result in increased predation pressure on tricolored blackbirds, the existing network of transmission lines in the Plan Area currently poses these risks, and any incremental risk associated with the new power line corridors would not be expected to affect the study area population. Therefore, it is assumed that the increased risk of predation on tricolored blackbird from an increase in raptor perching opportunities would be minimal.

NEPA Effects: New transmission lines would increase the risk for tricolored blackbird powerline strikes, primarily during daily flights between roosting and foraging sites and during winter during migration movements. *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters on all new powerlines, which would reduce the potential impact of the construction of new transmission lines on tricolored blackbird. The increased risk of predation on tricolored blackbird from an increase in raptor perching opportunities would be minimal. Therefore, the construction and operation of new transmission lines under Alternative 9 would not result in an adverse effect on tricolored blackbird.

CEQA Conclusion: New transmission lines would increase the risk for tricolored blackbird powerline strikes, primarily during daily flights between roosting and foraging sites and during winter during migration movements. *AMM20 Greater Sandhill Crane* contains the commitment to

1 place bird strike diverters on all new powerlines, which would reduce the potential impact of the
2 construction of new transmission lines on tricolored blackbird. The increased risk of predation on
3 tricolored blackbird from an increase in raptor perching opportunities would be minimal. The
4 construction and operation of new transmission lines under Alternative 9 would not substantially
5 reduce the number or restrict the range of the species and would therefore result in a less-than-
6 significant impact on tricolored blackbird

7 **Impact BIO-89: Indirect Effects of Plan Implementation on Tricolored Blackbird**

8 **Indirect Construction- and Operation-Related Effects:** Tricolored blackbird nesting habitat
9 within the vicinity of proposed construction areas that could be indirectly affected by construction
10 activities. Construction noise above background noise levels (greater than 50 dBA) could extend
11 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D,
12 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),
13 although there are no available data to determine the extent to which these noise levels could affect
14 tricolored blackbird. Indirect effects associated with construction include noise, dust, and visual
15 disturbance caused by grading, filling, contouring, and other ground-disturbing operations outside
16 the project footprint but within 1,300 feet from the construction edge. Construction and subsequent
17 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting
18 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM21 Tricolored*
19 *Blackbird* would require preconstruction surveys, and if detected, covered activities would be
20 avoided within a minimum 250 feet of an active nesting colony and up to 1,300 feet where
21 practicable until breeding has ceased. Construction and restoration projects would also be designed,
22 in consultation with CDFW, to avoid construction activity within at least 300 feet from occupied
23 active tricolored blackbird roosting habitat. In addition, monitoring would be implemented to
24 ensure that construction does not adversely affect the nesting colony or nest site. The use of
25 mechanical equipment during water conveyance facilities construction could cause the accidental
26 release of petroleum or other contaminants that could affect tricolored blackbird in the surrounding
27 habitat. The inadvertent discharge of sediment or excessive dust adjacent to tricolored blackbird
28 habitat could also affect the species. *AMM1-AMM7*, including *AMM2 Construction Best Management*
29 *Practices and Monitoring*, would minimize the likelihood of such spills and ensure that measures are
30 in place to prevent runoff from the construction area and negative effects of dust on active nests.

31 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
32 mercury in avian species, including tricolored blackbird. Marsh (tidal and nontidal) and floodplain
33 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed
34 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to
35 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP
36 restoration activities that create newly inundated areas could increase bioavailability of mercury.

37 A detailed review of the methylmercury issues associated with implementation of the BDCP is
38 contained in Appendix 11F, *Substantive BDCP Revisions*. This review includes an overview of the
39 BDCP-related mechanisms that could result in increased mercury in the foodweb, and how exposure
40 to individual species may occur based on feeding habits and where their habitat overlaps with the
41 areas where mercury bioavailability could increase.

42 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
43 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
44 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a

1 project-specific basis, where high potential for methylmercury production is identified that
2 restoration design and adaptive management cannot fully address while also meeting restoration
3 objectives, alternate restoration areas will be considered. CM12 would be implemented in
4 coordination with other similar efforts to address mercury in the Delta, and specifically with the
5 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
6 following actions.

- 7 • Assess pre-restoration conditions to determine the risk that the project could result in increased
8 mercury methylation and bioavailability
- 9 • Define design elements that minimize conditions conducive to generation of methylmercury in
10 restored areas.
- 11 • Define adaptive management strategies that can be implemented to monitor and minimize
12 actual postrestoration creation and mobilization of methylmercury.

13 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
14 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
15 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
16 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
17 2009). The effect of selenium toxicity differs widely between species and also between age and sex
18 classes within a species. In addition, the effect of selenium on a species can be confounded by
19 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
20 2009).

21 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
22 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
23 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
24 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
25 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
26 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
27 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
28 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
29 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
30 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
31 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
32 levels of selenium have a higher risk of selenium toxicity.

33 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
34 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
35 exacerbate bioaccumulation of selenium in avian species, including tricolored blackbird. Marsh
36 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
37 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
38 BDCP restoration activities that create newly inundated areas could increase bioavailability of
39 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
40 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
41 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
42 long-term increases in selenium concentrations in water in the Delta under any alternative.
43 However, it is difficult to determine whether the effects of potential increases in selenium

1 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
2 lead to adverse effects on tricolored blackbird.

3 Because of the uncertainty that exists at this programmatic level of review, there could be a
4 substantial effect on tricolored blackbird from increases in selenium associated with restoration
5 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
6 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
7 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
8 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
9 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
10 separately for each restoration effort as part of design and implementation. This avoidance and
11 minimization measure would be implemented as part of the tidal habitat restoration design
12 schedule.

13 **NEPA Effects:** The effects of noise, potential spills of hazardous material, increased dust and
14 sedimentation, and operations and maintenance of the water conveyance facilities would not be
15 adverse with the implementation of AMM1-AMM7 and *AMM21 Tricolored Blackbird*. Tidal habitat
16 restoration could result in increased exposure of tricolored blackbird to selenium. This effect would
17 be addressed through the implementation of *AMM26, Selenium Management* which would provide
18 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
19 selenium and its bioavailability in tidal habitats. The implementation of tidal natural communities
20 restoration or floodplain restoration could result in increased exposure of tricolored blackbird to
21 methylmercury. It is unlikely that breeding tricolored blackbird would be highly susceptible to
22 methylmercury exposure because tidal wetlands are not expected to be a major foraging area for the
23 species. However, it is unknown what concentrations of methylmercury are harmful to this species
24 and the potential for increased exposure varies substantially within the study area. Implementation
25 of CM12 which contains measures to assess the amount of mercury before project development,
26 followed by appropriate design and adaptation management, would minimize the potential for
27 increased methylmercury exposure, and would result in no adverse effect on tricolored blackbird.

28 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
29 sedimentation, and operations and maintenance of the water conveyance facilities would be less
30 than significant with the implementation of *AMM21 Tricolored Blackbird* and AMM1-AMM7. Tidal
31 habitat restoration could result in increased exposure of tricolored blackbird to selenium. This
32 impact would be addressed through the implementation of *AMM26, Selenium Management* which
33 would provide specific tidal habitat restoration design elements to reduce the potential for
34 bioaccumulation of selenium and its bioavailability in tidal habitats. The implementation of tidal
35 natural communities restoration or floodplain restoration could result in increased exposure of
36 tricolored blackbird to methylmercury. It is unlikely that breeding tricolored blackbird would be
37 highly susceptible to methylmercury exposure because tidal wetlands are not expected to be a major
38 foraging area for the species. However, it is unknown what concentrations of methylmercury are
39 harmful to this species. Implementation of CM12 which contains measures to assess the amount of
40 mercury before project development, followed by appropriate design and adaptation management,
41 would minimize the potential for increased methylmercury exposure, and would result in no
42 adverse effect on tricolored blackbird.

43 Therefore, with AMM1-7, AMM21, AMM27, and CM12 in place, the indirect effects of Alternative 9
44 implementation would not result in a substantial adverse effect through habitat modification or

1 potential mortality. Therefore, the indirect effects of Alternative 9 implementation would have a
2 less-than-significant impact on tricolored blackbird.

3 **Impact BIO-90: Periodic Effects of Inundation of Tricolored Blackbird Habitat as a Result of** 4 **Implementation of Conservation Components**

5 Flooding of the Yolo Bypass (CM2) would inundate 2,447–4,312 acres of breeding habitat and 263–
6 1,252 acres of nonbreeding habitat (Table 12-9-37). Based on hypothetical floodplain restoration,
7 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in
8 periodic inundation of approximately 2,509 acres of breeding habitat (30 acres of nesting, 2,124
9 acres of cultivated lands, 355 acres of noncultivated lands suitable for foraging) and 2,694 acres of
10 nonbreeding habitat (29 acres of roosting, 2,506 acres of cultivated lands, 158 acres of noncultivated
11 lands suitable for foraging, Table 12-9-37) resulting in the temporary loss of these habitats.
12 Tricolored blackbirds are highly nomadic during the winter and would be expected to move to
13 adjacent suitable foraging habitat when the bypass is inundated, as they do under the current
14 flooding regime. However, this inundation could reduce the availability of nesting habitat during
15 years when flooding extends into the nesting season (past March). The periodic inundation of the
16 Yolo Bypass (CM2) and of other floodplains (CM5) is expected to restore a more natural flood
17 regime in support of wetland and riparian vegetation types that support nesting habitat. There
18 would be no expected adverse effect on tricolored blackbird.

19 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and
20 foraging habitat for tricolored blackbird. Periodic inundation would not result in an adverse effect
21 on tricolored blackbird because inundation is expected to take place outside of the breeding season.
22 Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly
23 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

24 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting
25 and foraging habitat for tricolored blackbird. Periodic inundation would have a less-than-significant
26 impact on tricolored blackbird because inundation is expected to take place outside of the breeding
27 season. Although foraging habitat would be temporarily unavailable, tricolored blackbirds are highly
28 nomadic in winter and wintering birds would be expected to move to adjacent foraging habitat.

29 **Western Burrowing Owl**

30 Western burrowing owl modeled habitat consisted of high- and low-value habitat for nesting and
31 foraging. High-value habitat consists of plant alliances within the grassland and vernal pool natural
32 communities and pasture. Low-value habitat includes plant alliances and crop types from managed
33 wetland, alkali seasonal wetland, and cultivated lands. Value was determined through reported
34 species use patterns from the literature.

35 Construction and restoration associated with Alternative 9 conservation measures would result in
36 both temporary and permanent losses of western burrowing owl modeled habitat as indicated in
37 Table 12-9-39. Full implementation of Alternative 9 would also include the following conservation
38 actions over the term of the BDCP to benefit the western burrowing owl (BDCP Chapter 3, Section
39 3.3, *Biological Goals and Objectives*).

- 40 • Protect at least 1,000 acres of cultivated lands in CZs 1 and 11 that support high-value
41 burrowing owl habitat and are within 0.5 mile of high-value grassland habitat or occupied low-
42 value habitat (Objective WBO1.1, associated with CM3).

- 1 • Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least
2 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder
3 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 4 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 5 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
6 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 7 • Restore or create alkali seasonal wetlands and vernal pool complex in CZs 1, 8, and/or 11 to
8 achieve no net loss of wetted acres (Objectives ASWNC1.2 and VPNC1.2, associated with CM9).
- 9 • Increase burrow availability and prey abundance and accessibility (Objectives ASWNC2.3,
10 ASWNC2.4, VPNC2.4, VPNC2.5, GNC2.3, and GNC2.4, associated with CM11).
- 11 • Protect at least 48,600 acres of cultivated lands that provide suitable habitat for covered and
12 other native wildlife species and maintain and protect the small patches of important wildlife
13 habitats associated with cultivated lands (Objectives CLNC1.1 and CLNC1.3, associated with
14 CM3).

15 As explained below, with the restoration or protection of these amounts of habitat, in addition to
16 management activities that would enhance habitat for the species and implementation of AMM1–
17 AMM7, and AMM23 *Western Burrowing Owl*, impacts on western burrowing owl would not be
18 adverse for NEPA purposes and would be less than significant for CEQA purposes.

19 **Table 12-9-39. Changes in Western Burrowing Owl Modeled Habitat Associated with Alternative 9**
20 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	87	87	407	407	NA	NA
	Low-value	298	298	2,120	2,120	NA	NA
Total Impacts CM1		385	385	2,527	2,527	NA	NA
CM2–CM18	High-value	4,487	11,570	245	328	1,390–3,303	779
	Low-value	3,527	28,506	144	971	1,522–2,927	6,162
Total Impacts CM2–CM18		8,014	40,076	389	1,299	2,912–6,230	6,941
Total High-value		4,574	11,657	652	735		
Total Low-value		3,825	28,804	2,264	3,091		
TOTAL IMPACTS		8,399	40,461	2,916	3,826		

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-91: Loss or Conversion of Habitat for and Direct Mortality of Western Burrowing**
2 **Owl**

3 Alternative 9 conservation measures would result in the combined permanent and temporary loss
4 of up to 44,287 acres of modeled habitat for western burrowing owl (of which 12,392 acres is of
5 high value and 31,895 acres is of low value, Table 12-9-39). Conservation measures that would
6 result in these losses are conveyance facilities and transmission line construction, and establishment
7 and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural*
8 *Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian Natural*
9 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM10 Nontidal Marsh*
10 *Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18 Conservation*
11 *Hatcheries*. Habitat enhancement and management activities (CM11), which include ground
12 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In
13 addition, maintenance activities associated with the long-term operation of the water conveyance
14 facilities and other BDCP physical facilities could degrade or eliminate western burrowing owl
15 habitat. Each of these individual activities is described below. A summary statement of the combined
16 impacts and NEPA effects, and a CEQA conclusion follow the individual conservation measure
17 discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would
19 result in the combined permanent and temporary loss of up to 494 acres of modeled
20 high-value western burrowing owl habitat (87 acres of permanent loss, 407 acres of temporary
21 loss) from CZs 4, 5, 6, 7, and 8. In addition, 2,418 acres of low-value burrowing owl habitat
22 would be removed (298 acres of permanent loss, 2,120 acres of temporary loss). The permanent
23 and temporary losses to habitat would occur at numerous locations where dredging,
24 construction of operable barriers and canals, and channel enlargement would be undertaken.
25 The CM1 footprint does not overlap with any western burrowing owl occurrences. However,
26 there is suitable habitat throughout the study area. Refer to the Terrestrial Biology Map Book for
27 a detailed view of Alternative 9 construction locations.
- 28 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
29 would result in the combined permanent and temporary loss of up to 1,127 acres of high-value
30 western burrowing owl habitat (882 acres of permanent loss, 245 acres of temporary loss) in
31 the Yolo Bypass in CZ 2. In addition, 242 acres of low-value habitat would be removed (98 acres
32 of permanent loss, 144 acres of temporary loss). The loss is expected to occur during the first 10
33 years of Alternative 9 implementation.
- 34 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
35 inundation would permanently remove an estimated 29,668 acres of modeled western
36 burrowing owl habitat in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. The majority of removed or converted
37 acres (19,739 acres) is composed of low-value habitat. However, 9,929 acres of high-value
38 habitat would also be lost from tidal restoration actions. Tidal restoration would directly impact
39 and fragment remaining high-value grassland habitat just north of Rio Vista in and around
40 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Tidal
41 natural community restoration efforts would impact one extant record of burrowing owl just
42 northeast of Oakley along Dutch Slough and one possibly extirpated record in Suisun Marsh.
- 43 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
44 seasonally inundated floodplain would permanently and temporarily remove approximately
45 2,504 acres of modeled western burrowing owl in CZs 2, 4, and 7. This total is comprised of

1 2,279 acres of low-value habitat. Also, 225 acres of high-value grassland habitat would be
2 removed (142 permanent, 83 temporary) consisting of small patches of habitat along the San
3 Joaquin, Old, and Middle Rivers in CZ 7.

- 4 ● *CM6 Channel Margin Enhancement*: Sites for channel margin enhancement would be located
5 along levees where western burrowing owl could be present. The species is known to use often
6 the grassland edges along canals and levees in agricultural areas. The implementation of *AMM23*
7 *Western Burrowing Owl* would reduce the potential for channel margin enhancement activities
8 to disturb owls or affect active nests.
- 9 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
10 approximately 11 acres of high-value burrowing owl habitat as part of tidal restoration. In
11 addition, 960 acres of low-value habitat would be removed as a part of tidal restoration and
12 3,991 acres would be removed as part of seasonal floodplain restoration through CM7.
- 13 ● *CM8 Grassland Natural Community Restoration*: Grassland restoration would primarily be
14 implemented on agricultural lands and would result in the permanent loss of 1,676 acres (362
15 acres of high-value and 1,314 acres of low-value) of western burrowing owl habitat. The
16 conversion of 1,676 acres of low-value habitat to high-value grassland, would temporarily
17 remove available habitat but would ultimately have a beneficial effect on the western burrowing
18 owl.
- 19 ● *CM10 Nontidal Marsh Restoration*: Implementation would result in the permanent removal of
20 159 acres of high-value and 952 acres of low-value western burrowing owl habitat.
- 21 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
22 actions that are designed to enhance wildlife values in restored or protected habitats could
23 result in localized ground disturbances that could temporarily remove small amounts of
24 western burrowing owl habitat. The burrowing owl's fossorial habits make the species more
25 sensitive to the effects of ground disturbance than other raptors. Ground-disturbing activities,
26 such as removal of nonnative vegetation and road and other infrastructure maintenance
27 activities, would be expected to have minor adverse effects on available western burrowing owl
28 habitat and would be expected to result in overall improvements to and maintenance of habitat
29 values over the term of the BDCP. CM11 would also include the construction of recreational-
30 related facilities including trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered*
31 *Activities and Associated Federal Actions*). The construction of trailhead facilities, signs, staging
32 areas, picnic areas, bathrooms, etc. would be placed on existing, disturbed areas when and
33 where possible. However, approximately 50 acres of grassland habitat would be lost from the
34 construction of trails and facilities.
- 35 Habitat management- and enhancement-related activities and equipment operation could
36 destroy nests burrows, and noise and visual disturbances could lead to their abandonment,
37 resulting in mortality of eggs and nestlings. The potential for these activities to result in nest
38 failure and mortality or other adverse effects on western burrowing owl would be avoided or
39 minimized with the incorporation of *AMM23 Western Burrowing Owl* into the BDCP which would
40 require surveys to determine presence or absence and the establishment of no-disturbance
41 buffers around active sites.
- 42 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
43 value western burrowing owl habitat for the development of a delta and longfin smelt
44 conservation hatchery in CZ 1.

- 1 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
2 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
3 disturbances that could affect western burrowing owl use of the surrounding habitat.
4 Maintenance activities would include vegetation management, levee and structure repair, and
5 re-grading of roads and permanent work areas. These effects, however, would be reduced by
6 AMMs and conservation actions as described below.
- 7 • Injury and Direct Mortality: Construction would not be expected to result in direct mortality of
8 western burrowing owl. However, if nest burrows were occupied in the vicinity of construction
9 activities, equipment operation could destroy nests and noise and visual disturbances could lead
10 to abandonment. *AMM23 Western Burrowing Owl* would ensure that preconstruction surveys
11 detected any occupied burrows and no-disturbance buffers would be implemented.

12 The following paragraphs summarize the combined effects discussed above and describe other
13 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
14 included.

15 ***Near-Term Timeframe***

16 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
17 the near-term BDCP conservation strategy has been evaluated to determine whether it would
18 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
19 effects of construction would not be adverse under NEPA. Alternative 9 would remove 5,226 acres
20 (4,574 acres permanent, 652 acres temporary) of high-value habitat for western burrowing owl in
21 the study area in the near-term. These effects would result from the construction of the water
22 conveyance facilities (CM1, 494 acres), and implementing other conservation measures (*CM2 Yolo*
23 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*
24 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*
25 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*
26 *and CM18 Conservation Hatcheries—4,732 acres*). In addition, 7,373 acres of low-value habitat
27 would be removed or converted in the near-term (CM1, 2,120 acres; *CM2 Yolo Bypass Fisheries*
28 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural Community*
29 *Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*
30 *Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management* and *CM18*
31 *Conservation Hatcheries—3,671 acres*).

32 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
33 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the
34 loss of low-value habitat would result from conversion and enhancement to high-value habitats.
35 Using these typical ratios would indicate that 988 acres should be protected to compensate for the
36 loss of high-value habitat from CM1 and that 4,836 acres should be protected to compensate for the
37 loss of low-value habitat from CM1. The near-term effects of other conservation actions would
38 require 9,464 acres of protection to compensate for the loss of high-value habitat and 3,671 acres of
39 protection to compensate for the loss of low-value habitat using the same typical NEPA and CEQA
40 ratios (2:1 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value
41 habitat).

42 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
43 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
44 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4

1 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,
 2 and CM9 and would occur in the same timeframe as the construction and early restoration losses.

3 The protection of high-value grasslands is essential in order to sustain existing western burrowing
 4 owl populations in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
 5 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
 6 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
 7 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
 8 pool natural communities which would provide habitat for western burrowing owl and reduce the
 9 effects of current levels of habitat fragmentation. This protection would not only expand the amount
 10 of protected high-value habitat in the study area, but also support existing western burrowing owl
 11 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
 12 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
 13 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
 14 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
 15 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*
 16 *Communities Enhancement and Management*, small mammal and insect prey populations would be
 17 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
 18 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected
 19 natural communities by encouraging ground squirrel occupancy and expansion through the creation
 20 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
 21 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance
 22 standards for considering the effectiveness of conservation actions.

23 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
 24 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
 25 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
 26 CM1 on western burrowing owl habitat. Some portion of the 15,400 acres of cultivated lands
 27 protected in the near-term timeframe would include high-value crop types. These acres, in addition
 28 to the management and enhancement activities that are contained in the Plan goals, would satisfy
 29 the typical mitigation ratios that would be applied to the other near-term conservation actions,
 30 providing that the 15,400 acres of cultivated lands protected in the near-term were managed in
 31 suitable crop types to compensate for the loss of high-value habitat at a ratio of 2:1. Mitigation
 32 Measure BIO-91, *Compensate for the Near-Term Loss of High-Value Burrowing Owl Habitat*, would be
 33 available to address the adverse effect of high-value habitat loss in the near-term. The acres of
 34 protection of cultivated lands would be sufficient to compensate for the loss of low-value burrowing
 35 owl habitat from CM1 and from the other near-term conservation actions.

36 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM23*
 40 *Western Burrowing Owl*. All of these AMMs include elements that avoid or minimize the risk of
 41 affecting habitats and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes
 42 the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
 43 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 **Late Long-Term Timeframe**

2 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and
 3 254,352 acres of low-value habitat for western burrowing owl. Alternative 9 as a whole would result
 4 in the permanent loss of and temporary effects on 12,392 acres of high-value habitat and 31,895
 5 acres of low value habitat over the term of the Plan. The locations of these losses are described
 6 above in the analyses of individual conservation measures.

7 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 8 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
 9 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural
 10 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
 11 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
 12 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
 13 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
 14 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
 15 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
 16 pool natural communities which would provide habitat for western burrowing owl and reduce the
 17 effects of current levels of habitat fragmentation. This protection would not only expand the amount
 18 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl
 19 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
 20 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
 21 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
 22 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
 23 cultivated lands can support breeding and wintering burrowing owls. To ensure that cultivated
 24 lands conservation benefits western burrowing owl, the Plan’s biological goals and objectives
 25 further specify that, of the cultivated lands protected in the late long-term, at least 1,000 acres
 26 would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are within
 27 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1). Under
 28 *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey
 29 populations would be increased on protected lands, enhancing the foraging value of these natural
 30 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would
 31 be increased on protected natural communities by encouraging ground squirrel occupancy and
 32 expansion through the creation of berms, mounds, edges, and through the prohibition of ground
 33 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

34 The BDCP’s beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
 35 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
 36 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-
 37 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl
 38 habitat (1,642 acres high-value and 3 acres low-value habitat).

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 43 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 44 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since

1 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
2 to the Final EIR/EIS.

3 **NEPA Effects:** The loss of western burrowing owl habitat and potential mortality of this special-
4 status species under Alternative 9 would represent an adverse effect in the absence of other
5 conservation actions. With habitat protection and restoration associated with CM3, CM8, and CM11,
6 guided by biological goals and objectives and by AMM1–AMM7 and AMM23 *Western Burrowing Owl*,
7 and with the implementation of Mitigation Measure BIO-91, *Compensate For the Near-Term Loss of*
8 *High-Value Burrowing Owl Habitat*, which would be available to guide the near-term protection and
9 management of cultivated lands, the effects of habitat loss and potential mortality on western
10 burrowing owl would not be adverse under Alternative 9.

11 **CEQA Conclusion:**

12 **Near-Term Timeframe**

13 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
14 the near-term BDCP conservation strategy has been evaluated to determine whether it would
15 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
16 effects of construction would be less than significant under CEQA. Alternative 9 would remove 5,226
17 acres (4,574 acres permanent, 652 acres temporary) of high-value habitat for western burrowing
18 owl in the study area in the near-term. These effects would result from the construction of the water
19 conveyance facilities (CM1, 494 acres), and implementing other conservation measures (CM2 *Yolo*
20 *Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian Natural*
21 *Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and Alkali*
22 *Seasonal Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and Management*
23 and CM18 *Conservation Hatcheries*—4,732 acres). In addition, 7,373 acres of low-value habitat
24 would be removed or converted in the near-term (CM1, 2,120 acres; CM2 *Yolo Bypass Fisheries*
25 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, CM7 *Riparian Natural Community*
26 *Restoration*, CM8 *Grassland Natural Community Restoration*, CM9 *Vernal Pool and Alkali Seasonal*
27 *Wetland Complex Restoration*, CM11 *Natural Communities Enhancement and Management* and CM18
28 *Conservation Hatcheries*—3,671 acres).

29 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
30 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. A proportion of the
31 loss of low-value habitat would result from conversion and enhancement to high-value habitats.
32 Using these typical ratios would indicate that 988 acres should be protected to compensate for the
33 loss of high-value habitat from CM1 and that 4,836 acres should be protected to compensate for the
34 loss of low-value habitat from CM1. The near-term effects of other conservation actions would
35 require 9,464 acres of protection to compensate for the loss of high-value habitat and 3,671 acres of
36 protection to compensate for the loss of low-value habitat using the same typical NEPA and CEQA
37 ratios (2:1 protection for the loss of high-value habitat, 1:1 protection for the loss of low-value
38 habitat).

39 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
40 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
41 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
42 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,
43 and CM9 and would occur in the same timeframe as the construction and early restoration losses.

1 The protection of high-value grasslands is essential in order to sustain existing western burrowing
 2 owl populations in the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
 3 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
 4 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
 5 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
 6 pool natural communities which would provide habitat for western burrowing owl and reduce the
 7 effects of current levels of habitat fragmentation. This protection would not only expand the amount
 8 of protected high-value habitat in the study area, but also support existing western burrowing owl
 9 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
 10 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
 11 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
 12 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
 13 cultivated lands can support breeding and wintering burrowing owls. Under *CM11 Natural*
 14 *Communities Enhancement and Management*, small mammal and insect prey populations would be
 15 increased on protected lands, enhancing the foraging value of these natural communities (Objectives
 16 ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would be increased on protected
 17 natural communities by encouraging ground squirrel occupancy and expansion through the creation
 18 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
 19 poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3). These Plan objectives represent performance
 20 standards for considering the effectiveness of conservation actions.

21 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
 22 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
 23 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
 24 CM1 on western burrowing owl habitat. Some portion of the 15,400 acres of cultivated lands
 25 protected in the near-term timeframe would include high-value crop types. These acres, in addition
 26 to the management and enhancement activities that are contained in the Plan goals, would satisfy
 27 the typical mitigation ratios that would be applied to the other near-term conservation actions,
 28 providing that the 15,400 acres of cultivated lands protected in the near-term were managed in
 29 suitable crop types to compensate for the loss of high-value habitat at a ratio of 2:1. Mitigation
 30 Measure BIO-91, *Compensate for the Near-Term Loss of High-Value Burrowing Owl Habitat*, would
 31 reduce the significant effect of high-value habitat loss in the near-term. The acres of protection of
 32 cultivated lands would be sufficient to compensate for the loss of low-value burrowing owl habitat
 33 from CM1 and from the other near-term conservation actions.

34 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 37 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM23*
 38 *Western Burrowing Owl*. All of these AMMs include elements that avoid or minimize the risk of
 39 affecting habitats and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes
 40 the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
 41 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

42 **Late Long-Term Timeframe**

43 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and
 44 254,352 acres of low-value habitat for western burrowing owl. Alternative 9 as a whole would result
 45 in the permanent loss of and temporary effects on 12,392 acres of high-value habitat and 31,895

1 acres of low value habitat over the term of the Plan. The locations of these losses are described
2 above in the analyses of individual conservation measures.

3 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
4 *Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal*
5 *Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural
6 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
7 complex and protect 48,625 acres of cultivated lands that provide suitable habitat for native wildlife
8 species (Table 3-4 in Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5,
9 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be
10 associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and
11 VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal
12 pool natural communities which would provide habitat for western burrowing owl and reduce the
13 effects of current levels of habitat fragmentation. This protection would not only expand the amount
14 of protected high-value habitat in the Plan Area, but also support existing western burrowing owl
15 populations that occur to the west of CZ 8 and in the areas surrounding CZs 1 and 11, which would
16 especially benefit declining populations in the vicinity of Suisun Marsh and San Pablo Bay. Certain
17 types of cultivated lands such as irrigated pasture, alfalfa and other hay crops, and some row crops
18 can provide foraging habitat for western burrowing owl. Under appropriate management regimes,
19 cultivated lands can support breeding and wintering burrowing owls. To ensure that cultivated
20 lands conservation benefits western burrowing owl, the Plan's biological goals and objectives
21 further specify that, of the cultivated lands protected in the late long-term, at least 1,000 acres
22 would be protected in CZs 1 and 11 that support high-value burrowing owl habitat and are within
23 0.5 miles of high-value grassland habitat or occupied low-value habitat (Objective WBO1.1). Under
24 *CM11 Natural Communities Enhancement and Management*, small mammal and insect prey
25 populations would be increased on protected lands, enhancing the foraging value of these natural
26 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). In addition, burrow availability would
27 be increased on protected natural communities by encouraging ground squirrel occupancy and
28 expansion through the creation of berms, mounds, edges, and through the prohibition of ground
29 squirrel control programs (i.e., poisoning, Objectives ASWNC2.3, VPNC2.4, GNC2.3).

30 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
31 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
32 the protection of an estimated 33,766 acres of western burrowing owl habitat (8,589 acres high-
33 value and 25,177 acres low-value habitat) and restoration of 1,645 acres of western burrowing owl
34 habitat (1,642 acres high-value and 3 acres low-value habitat).

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
36 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
37 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
38 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
39 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
40 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
41 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
42 to the Final EIR/EIS.

43 Considering Alternative 9's protection and restoration provisions, which would provide acreages of
44 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
45 construction and restoration activities, and with implementation of AMM1–AMM7, *AMM23 Western*

1 *Burrowing Owl*, and Mitigation Measure BIO-91, *Compensate for Near-Term Loss of High-Value*
2 *Western Burrowing Owl Habitat*, which would be available to guide the near-term protection and
3 management of cultivated lands, the loss of habitat and direct mortality through implementation of
4 Alternative 9 would not result in a substantial adverse effect through habitat modifications and
5 would not substantially reduce the number or restrict the range of the species. Therefore, the loss of
6 habitat or potential mortality under this alternative would have a less-than-significant impact on
7 western burrowing owl.

8 **Mitigation Measure BIO-91: Compensate for Near-Term Loss of High-Value Western**
9 **Burrowing Owl Habitat**

10 Because the BDCP lacks an acreage commitment for specific crop types that would be managed
11 within the 15,400 acres of cultivated lands protected in the near-term time period, DWR will
12 compensate for the loss of high-value burrowing owl habitat with high-value natural
13 communities or cultivated crop types a ratio of 2:1 in the near-term time period.

14 **Impact BIO-92: Effects on Western Burrowing Owl Associated with Electrical Transmission**
15 **Facilities**

16 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,
17 which could result in injury or mortality of western burrowing owl. The species is large-bodied but
18 with relatively long and rounded wings, making it moderately maneuverable. While burrowing owls
19 may nest in loose colonies, they do not flock or congregate in roosts or foraging groups. Collectively,
20 the species' keen eyesight and largely ground-based hunting behavior make it a relatively low-risk
21 species for powerline collision. While the species is not widespread in the study area, it may become
22 more widely distributed as grassland enhancement improves habitat for the species. Even so, the
23 risk of effects on the population are low, given its physical and behavioral characteristics (BDCP
24 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission*
25 *Lines*) New transmission lines would not be expected to have an adverse effect on the species.
26 Marking transmission lines with flight diverters that make the lines more visible to birds has been
27 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated
28 that marking devices in the Central Valley could reduce avian mortality by 60%. All new project
29 transmission lines would be fitted with flight diverters. Bird flight diverters would make
30 transmission lines highly visible to western burrowing owls and would further reduce any potential
31 for powerline collisions.

32 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
33 adverse effect on western burrowing owl because the risk of bird strike is considered to be minimal
34 based on the owl's physical and behavioral characteristics. All new transmission lines constructed as
35 a result of the project would be fitted with bird diverters (*AMM20 Greater Sandhill Crane*), which
36 have been shown to reduce avian mortality by 60% and which would further reduce any potential
37 for powerline collisions.

38 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
39 significant impact on western burrowing owl because the risk of bird strike is considered to be
40 minimal based on the owl's physical and behavioral characteristics. All new transmission lines
41 constructed as a result of the project would be fitted with bird diverters (*AMM20 Greater Sandhill*
42 *Crane*), which have been shown to reduce avian mortality by 60% and which would further reduce
43 any potential for powerline collisions.

1 **Impact BIO-93: Indirect Effects of Plan Implementation on Western Burrowing Owl**

2 Noise and visual disturbances associated with construction-related activities could result in
3 temporary disturbances that affect western burrowing owl use of modeled habitat adjacent to
4 proposed construction areas. Indirect effects associated with construction include noise, dust, and
5 visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations.
6 Any disturbance within 250 feet of a burrow occupied by burrowing owl during the breeding season
7 (February 1–August 31) and within 160 feet during the nonbreeding season (September 1–January
8 31) could potential displace winter owls or cause abandonment of active nests. These potential
9 effects would be minimized with the implementation of *AMM23 Western Burrowing Owl* into the
10 BDCP. *AMM23*, would require preconstruction surveys and establish no-disturbance buffers around
11 active burrows. Construction noise above background noise levels (greater than 50 dBA) could
12 extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment
13 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4),
14 although there are no available data to determine the extent to which these noise levels could affect
15 western burrowing owl.

16 The use of mechanical equipment during water conveyance facilities construction could cause the
17 accidental release of petroleum or other contaminants that could affect western burrowing owl in
18 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
19 western burrowing owl habitat could also affect the species. *AMM1–AMM7* in addition to *AMM23*
20 *Western Burrowing Owl* would minimize the likelihood of such spills from occurring and ensure that
21 measures were in place to prevent runoff from the construction area and any adverse effects of dust
22 on active nests.

23 **NEPA Effects:** Indirect effects on western burrowing owl as a result of Alternative 9 implementation
24 could have adverse effects on this species through the modification of habitat and potential for
25 direct mortality. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting
26 owls or active burrows in the high-value grassland habitat surrounding Clifton Court Forebay and
27 adjacent to work area. With the implementation of *AMM1–AMM7* and *AMM23 Western Burrowing*
28 *Owl*, the indirect effects from Alternative 9 implementation would not be adverse under NEPA.

29 **CEQA Conclusion:** Indirect effects on western burrowing owl as a result of Alternative 9
30 implementation could have significant impacts on these species through the modification of habitat
31 and potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential
32 to disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton
33 Court Forebay and adjacent to work areas. With the implementation of *AMM1–AMM7* and *AMM23*
34 *Western Burrowing Owl*, the indirect effects resulting from Alternative 9 implementation would have
35 a less-than-significant impact on western burrowing owl.

36 **Impact BIO-94: Periodic Effects of Inundation on Western Burrowing Owl Habitat as a Result**
37 **of Implementation of Conservation Components**

38 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
39 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,390–
40 3,303 acres of high-value habitat and 1,522–2,927 acres of low-value habitat (Table 12-9-39).

41 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
42 *Restoration* could result in the periodic inundation of up to approximately 6,941 acres of modeled
43 habitat (6,162 acres, of which would be low-value foraging habitat; Table 12-9-39).

1 Burrowing owls cannot use inundated areas for foraging or nesting, and increased inundation
2 frequency and duration of cultivated lands and grassland habitats may affect prey populations that
3 have insufficient time to recover following inundation events. Depending on timing, seasonal
4 inundation of western burrowing owl habitat could result in displacement from nesting burrows or
5 drowning of individuals. The potential for this effect is considered low because suitable burrow sites
6 would most likely be located along setback levees, which are expected to be subject to inundation
7 less frequently than floodplain surfaces that would be less likely to support suitable nesting
8 burrows.

9 **NEPA Effects:** The periodically inundated habitat would not be expected to have an adverse effect on
10 the population. The potential for direct mortality of western burrowing owl caused by inundation
11 would be low because the locations of burrows would likely be above elevations consistently subject
12 to inundation; therefore, the potential impact would not be adverse.

13 **CEQA Conclusion:** The potential for direct mortality of western burrowing owl caused by inundation
14 would be low because the locations of burrows would likely be above elevations consistently subject
15 to inundation. Therefore, periodic inundation would be expected to have a less-than-significant
16 impact on the population.

17 **Western Yellow-Billed Cuckoo**

18 This section describes the effects of Alternative 9, including water conveyance facilities construction
19 and implementation of other conservation components, on the western yellow-billed cuckoo. The
20 habitat model for western yellow-billed cuckoo includes potential breeding habitat, which includes
21 plant alliances from the valley/foothill riparian modeled habitat that contain a dense forest canopy
22 for foraging with understory willow for nesting, and a minimum patch size of 25 acres, and
23 migratory habitat, which includes the same plant alliances as breeding habitat without the minimum
24 25 acres patch size requirement.

25 The western yellow-billed cuckoo is uncommon in the study area at present, and the likelihood that
26 it would be found using the modeled habitat (Table 12-9-40) is low relative to more abundant
27 riparian species. Nesting of the species in the study area has not been confirmed for approximately
28 100 years. Western yellow-billed cuckoo was detected in the study area during 2009 DHCCP
29 surveys, but nesting was not confirmed and the bird is suspected to have been a migrant (Appendix
30 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). Construction
31 and restoration associated with Alternative 9 conservation measures would result in both
32 temporary and permanent losses of western yellow-billed cuckoo modeled habitat as indicated in
33 Table 12-9-40. Full implementation Alternative 9 would also include the following conservation
34 actions over the term of the BDCP to benefit the western yellow-billed cuckoo (BDCP Chapter 3,
35 Section 3.3, *Biological Goals and Objectives*).

- 36 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
37 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
38 associated with CM7).
- 39 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
40 10 (Objective VFRNC1.2, associated with CM3).
- 41 ● Maintain at least 500 acres of mature riparian forest in CZ 4 or CZ 7 (Objective VFRNC2.3,
42 associated with CM3 and CM7).

- Maintain the 500 acres of mature riparian forest (VFRNC2.3) intermixed with a portion of the early- to mid-successional riparian vegetation (VFRNC2.2) in large blocks with a minimum patch size of 50 acres and minimum width of 330 feet (Objective VFRNC2.4, associated with CM3 and CM7).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance these natural communities for the species and implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell’s Vireo*, *Western Yellow-Billed Cuckoo*, impacts on western yellow-billed cuckoo would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-9-40. Changes in Western Yellow-Billed Cuckoo Modeled Habitat Associated with Alternative 9 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Breeding	14	14	12	12	NA	NA
	Migratory	30	30	205	205	NA	NA
Total Impacts CM1		44	44	217	217	NA	NA
CM2–CM18	Breeding	29	142	5	10	11–20	17
	Migratory	278	383	83	94	37–64	125
Total Impacts CM2–CM18		307	525	88	104	48–84	142
Total Breeding		43	156	17	22	11–20	17
Total Migratory		308	413	288	299	37–64	125
TOTAL IMPACTS		351	569	305	321	48–84	142

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-95: Loss or Conversion of Habitat for and Direct Mortality of Western Yellow-Billed Cuckoo

Alternative 9 conservation measures would result in the combined permanent and temporary loss of up to 890 acres of modeled habitat for western yellow-billed cuckoo (178 acres of breeding habitat, 712 acres of migratory habitat; Table 12-9-40). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management

1 activities (CM11) which include ground disturbance or removal of nonnative vegetation, could result
 2 in local adverse habitat effects. In addition, maintenance activities associated with the long-term
 3 operation of the water conveyance facilities and other BDCP physical facilities could degrade or
 4 eliminate western yellow-billed cuckoo modeled habitat. Each of these individual activities is
 5 described below. A summary statement of the combined impacts and NEPA effects and a CEQA
 6 conclusion follow the individual conservation measure discussions.

- 7 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 water conveyance facilities
 8 would result in the combined permanent and temporary loss of up to 26 acres of breeding
 9 habitat (14 acres of permanent loss, 12 acres of temporary loss) and 235 acres of migratory
 10 habitat (30 acres of permanent loss, 205 acres of temporary loss) for western yellow-billed
 11 cuckoo (Table 12-9-40). Permanent losses would primarily consist of channel enlargement at
 12 the Sacramento River and Meadows Slough. Temporary losses would occur primarily along
 13 Middle River between Victoria Canal and Mildred Island, where large dredging work areas and
 14 operable barrier work areas would be placed. The riparian habitat in these areas is composed of
 15 very small patches or stringers bordering waterways, which are composed of valley oak and
 16 scrub vegetation. There are no extant occurrences of yellow-billed cuckoo nests in the study
 17 area. However, this loss would have the potential to displace individuals, if present, and remove
 18 the functions and value of modeled habitat for nesting, protection, or foraging. Refer to the
 19 Terrestrial Biology Map Book for a detailed view of Alternative 9 construction locations. Impacts
 20 from CM1 would occur within the first 10 years of Alternative 9 implementation.
- 21 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
 22 would result in the loss of approximately 31 acres of breeding habitat (26 acres of permanent
 23 loss and 5 acres of temporary loss) and 140 acres of migratory habitat (57 acres of permanent
 24 loss and 83 acres of temporary loss) for yellow-billed cuckoo in the Yolo Bypass in CZ 2. The loss
 25 is expected to occur during the first 10 years of Alternative 9 implementation. There are no
 26 extant occurrences of yellow-billed cuckoo nesting in the study area.
- 27 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and
 28 inundation would permanently remove an estimated 110 acres of modeled yellow-billed cuckoo
 29 breeding habitat and 310 acres of modeled migratory habitat in CZ 1, 2, 6, and 11. There are no
 30 extant nesting records of yellow-billed cuckoo in the study area. However, a yellow-billed
 31 cuckoo detection was recorded during DHCCP surveys in 2009 (Appendix 12C, *2009 to 2011 Bay
 32 Delta Conservation Plan EIR/EIS Environmental Data Report*) in CZ 5 between Twin Cities Road
 33 and Walnut Grove. These detections do not overlap with the hypothetical restoration areas for
 34 CM4.
- 35 • *CM5 Seasonally Inundated Floodplain Restoration:* Construction of setback levees to restore
 36 seasonally inundated floodplain would permanently and temporarily remove approximately 11
 37 acres of modeled yellow-billed cuckoo breeding habitat (6 acres of permanent loss and 5 acres
 38 of temporary loss) and 27 acres of migratory habitat (16 acres of permanent loss and 11 acres of
 39 temporary loss) in CZ 7. Based on the riparian habitat restoration assumptions, approximately
 40 3,000 acres of valley/foothill riparian habitat would be restored as a component of seasonally
 41 inundated floodplain restoration actions. The actual number of acres that would be restored
 42 may differ from these estimates, depending on how closely the outcome of seasonally inundated
 43 floodplain restoration approximates the assumed outcome. Once this restored riparian
 44 vegetation has developed habitat functions, a portion of it would be suitable to support western
 45 yellow-billed cuckoo habitat once the riparian vegetation has developed habitat functions for
 46 the cuckoo.

- 1 ● *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
2 activities that could be implemented in protected western yellow-billed cuckoo habitats would
3 maintain and improve the functions of the habitat over the term of the BDCP. With conditions
4 favorable for its future establishment in the study area, western yellow-billed cuckoo would be
5 expected to benefit from the increase in protected habitat. However, habitat management- and
6 enhancement-related activities could disturb western yellow-billed cuckoo nests if they were
7 present near work sites. *CM11 Natural Communities Enhancement and Management* actions
8 designed to enhance wildlife values in restored riparian habitats may result in localized ground
9 disturbances that could temporarily remove small amounts of western yellow-billed cuckoo
10 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and
11 other infrastructure maintenance activities, would be expected to have minor adverse effects on
12 available western yellow-billed cuckoo habitat and would be expected to result in overall
13 improvements and maintenance of western yellow-billed cuckoo habitat values over the term of
14 the BDCP.
- 15 ● Permanent and temporary habitat losses from the above CMs, would primarily consist of small,
16 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.
17 Temporarily affected areas would be restored as riparian habitat within 1 year following
18 completion of construction activities. Although the effects are considered temporary, the
19 restored riparian habitat would require 5 years to several decades, for ecological succession to
20 occur and for restored riparian habitat to functionally replace habitat that has been affected. The
21 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;
22 therefore, the replaced riparian vegetation would be expected to have structural components
23 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial
24 restoration activities are complete.
- 25 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
26 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
27 disturbances that could affect western yellow-billed cuckoo use of the surrounding habitat.
28 Maintenance activities would include vegetation management, levee and structure repair, and
29 re-grading of roads and permanent work areas. These effects, however, would be reduced by
30 AMMs and conservation actions as described below.
- 31 ● Injury and Direct Mortality: Western yellow-billed cuckoo nesting has not been confirmed in the
32 Delta for approximately 100 years. However, an unconfirmed breeding detection in 2009 in
33 DHCCP surveys (Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental*
34 *Data Report*) and the present of suitable habitat indicates that the species is potentially breeding
35 in the study area, or may nest there in the future. Construction-related activities would not be
36 expected to result in direct mortality of adult or fledged western yellow-billed cuckoo if they
37 were present in the study area, because they would be expected to avoid contact with
38 construction and other equipment. If western yellow-billed cuckoo were to nest in the
39 construction area, construction-related activities, including equipment operation, noise and
40 visual disturbances could destroy nests or lead to their abandonment, resulting in mortality of
41 eggs and nestlings. These effects would be avoided and minimized with the incorporation of
42 *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
43 *Cuckoo* into the BDCP.

44 The following paragraphs summarize the combined effects discussed above and describe other
45 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
46 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction is being evaluated at the project level, the near-
3 term BDCP conservation strategy has been evaluated to determine whether it would provide
4 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
5 effects of construction would not be adverse under NEPA. Alternative 9 would remove 656 acres of
6 modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects would
7 result from the construction of the water conveyance facilities (CM1, 261 acres of modeled breeding
8 and migratory habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries*
9 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain*
10 *Restoration*—395 acres of modeled breeding and migratory habitat). These habitat losses would
11 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value
12 habitat for the species.

13 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
14 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter
15 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
16 habitat. Using these ratios would indicate that 261 acres of valley/foothill riparian habitat should be
17 restored/created and 261 acres should be protected to compensate for the CM1 losses of yellow-
18 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres
19 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of
20 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
21 protection).

22 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
23 valley/foothill riparian natural community in the Plan Area (Table 3-4 in Chapter 3, *Description of*
24 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the
25 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
26 habitat loss on yellow-billed cuckoo. The majority of the riparian restoration acres would occur in
27 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill
28 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation*
29 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,
30 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal
31 overlap among vegetation components and over adjacent riverine channels, freshwater emergent
32 wetlands, and grasslands (Objective VFRNC2.1). These natural community biological goals and
33 objectives would inform the near-term protection and restoration efforts and represent
34 performance standards for considering the effectiveness of conservation actions for the species.

35 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
36 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the
37 restored riparian habitat would require several years (early-mid successional) and several decades
38 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to
39 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not
40 known to be an established breeder in the study area, the time lag in riparian restoration from BDCP
41 actions would not be expected to have an adverse population-level effect on the species. Overall,
42 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed
43 cuckoo by increasing opportunities for a breeding population to become reestablished in the study
44 area.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
5 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of
6 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
7 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
8 which have since been updated and which are provided in Appendix 3B, *Environmental*
9 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

10 **Late Long-Term Timeframe**

11 The habitat model indicates that the study area supports approximately 12,395 acres of modeled
12 breeding and migratory habitat for yellow-billed cuckoo. Alternative 9 as a whole would result in
13 the permanent loss of and temporary effects on 890 acres of modeled habitat (7% of the modeled
14 habitat in the study area). These losses would occur from the construction of the water conveyance
15 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
16 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration.* The locations of these losses
17 would be in fragmented riparian habitat throughout the study area.

18 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
19 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
20 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
21 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
22 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
23 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least
24 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This
25 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian
26 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet
27 (Objective VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.
28 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its
29 entirety the vegetative structure needed to support these species, because patch sizes may not be
30 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected
31 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11
32 would expand the patches of existing riparian forest in order to support the species should they
33 become established breeders in the study area.

34 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
35 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
36 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
38 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
39 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
40 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
41 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of
42 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
43 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,

1 which have since been updated and which are provided in Appendix 3B, *Environmental*
2 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

3 **NEPA Effects:** The loss of western yellow-billed cuckoo habitat associated with Alternative 9 would
4 represent an adverse effect in the absence of other conservation actions. The species is not an
5 established breeder in the study area and current presence is limited to migrants. In addition, the
6 habitat lost would consist of small, fragmented riparian stands that would not provide high-value
7 habitat for the species. With habitat protection and restoration associated with CM3, CM7, and
8 CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM22 Suisun Song*
9 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, which would be in
10 place throughout the construction period, the effects of habitat loss and potential mortality under
11 Alternative 9 on western yellow-billed cuckoo would not be adverse.

12 **CEQA Conclusion:**

13 **Near-Term Timeframe**

14 Because the water conveyance facilities construction is being evaluated at the project level, the near-
15 term BDCP conservation strategy has been evaluated to determine whether it would provide
16 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
17 effects of construction would be less than significant under CEQA. Alternative 9 would remove 656
18 acres of modeled habitat for yellow-billed cuckoo in the study area in the near-term. These effects
19 would result from the construction of the water conveyance facilities (CM1, 261 acres of modeled
20 breeding and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass*
21 *Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated*
22 *Floodplain Restoration*—395 acres of modeled breeding and migratory habitat). These habitat losses
23 would primarily consist of small, fragmented riparian stands in CZ 2–CZ 8 that do not provide high-
24 value habitat for the species.

25 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
26 CM1 and that are identified in the biological goals and objectives for yellow-billed cuckoo in Chapter
27 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
28 habitat. Using these ratios would indicate that 261 acres of valley/foothill riparian habitat should be
29 restored/created and 261 acres should be protected to compensate for the CM1 losses of yellow-
30 billed cuckoo habitat. The near-term effects of other conservation actions would remove 395 acres
31 of modeled habitat, and therefore require 395 acres of restoration and 395 acres of protection of
32 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
33 protection).

34 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
35 valley/foothill riparian natural community in the study area (Table 3-4 in Chapter 3, *Description of*
36 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the
37 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
38 habitat loss on yellow-billed cuckoo. The majority of the riparian restoration acres would occur in
39 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill
40 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation*
41 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,
42 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal
43 overlap among vegetation components and over adjacent riverine channels, freshwater emergent
44 wetlands, and grasslands (Objective VFRNC2.1). These natural community biological goals and

1 objectives would inform the near-term protection and restoration efforts and represent
2 performance standards for considering the effectiveness of conservation actions for the species.

3 The acres of protection contained in the near-term Plan goals satisfy the typical mitigation ratios
4 that would be applied to the project-level effects of CM1 and other near-term impacts. However, the
5 restored riparian habitat would require several years (early-mid successional) and several decades
6 (mature riparian forest), for ecological succession to occur and for restored riparian habitat to
7 functionally replace habitat that has been affected. Because the western yellow-billed cuckoo is not
8 known to be an established breeder in the study area, the time lag in riparian restoration from BDCP
9 actions would not be expected to have an adverse population-level effect on the species. Overall,
10 BDCP riparian habitat restoration actions would be expected to benefit western yellow-billed
11 cuckoo by increasing opportunities for a breeding population to become reestablished in the study
12 area.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
16 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
17 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
18 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
19 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
20 which have since been updated and which are provided in Appendix 3B, *Environmental*
21 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

22 ***Late Long-Term Timeframe***

23 The habitat model indicates that the study area supports approximately 12,395 acres of modeled
24 breeding and migratory habitat for yellow-billed cuckoo. Alternative 9 as a whole would result in
25 the permanent loss of and temporary effects on 890 acres of modeled habitat (7% of the modeled
26 habitat in the study area). These losses would occur from the construction of the water conveyance
27 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
28 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
29 would be in fragmented riparian habitat throughout the study area.

30 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
31 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
32 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
33 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
34 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
35 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). In addition, at least
36 500 acres of mature riparian forest would be maintained in CZ 4 or CZ 7 (Objective VFRNC2.3). This
37 mature, riparian forest would be mixed with a portion of the early- to mid-successional riparian
38 vegetation in large blocks with a minimum patch size of 50 acres and a minimum width of 330 feet
39 (Objectives VFRNC2.2 and VFRNC2.4), which would provide suitable nesting habitat for the cuckoo.
40 The protection of 750 acres of existing valley/foothill riparian forest in CZ 7 would not provide in its
41 entirety the vegetative structure needed to support these species, because patch sizes may not be
42 large enough to support yellow-billed cuckoo breeding habitat. However, a portion of the protected
43 habitat would provide suitable habitat for the species. Restoration actions through CM7 and CM11

1 would expand the patches of existing riparian forest in order to support the species should they
2 become established breeders in the study area.

3 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
4 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
5 the restoration of 3,397 acres and the protection of 517 acres of habitat for the yellow-billed cuckoo.

6 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
7 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
8 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
9 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
10 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of
11 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
12 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
13 which have since been updated and which are provided in Appendix 3B, *Environmental*
14 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

15 In the absence of other conservation actions, effects on western yellow-billed cuckoo from
16 Alternative 9 would represent an adverse effect as a result of habitat modification and potential for
17 direct mortality of a special-status species; however, considering Alternative 9's protection and
18 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
19 greater than necessary to compensate for the time lag of restoring habitats lost to construction and
20 restoration activities, and with implementation of AMM1–AMM7 and *AMM22 Suisun Song Sparrow,*
21 *Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,* the loss of habitat or direct
22 mortality through implementation of Alternative 9 would not result in a substantial adverse effect
23 through habitat modifications and would not substantially reduce the number or restrict the range
24 of the species. Therefore, the loss of habitat or potential mortality under this alternative would have
25 a less-than-significant impact on western yellow-billed cuckoo.

26 **Impact BIO-96: Fragmentation of Western Yellow-Billed Cuckoo Habitat as a Result of** 27 **Constructing the Water Conveyance Facilities**

28 Grading, filling, contouring, and other initial ground-disturbing operations for water conveyance
29 facilities construction may temporarily fragment modeled western yellow-billed cuckoo habitat.
30 This could temporarily reduce the extent and functions supported by the affected habitat. Because
31 western yellow-billed cuckoo is not currently known to breed in the study area, and the protection
32 and restoration of riparian habitat will expand contiguous habitat block requirements, habitat
33 fragmentation would have a, minimal effect on the species.

34 **NEPA Effects:** Fragmentation of habitat would not have an adverse effect on western yellow-billed
35 cuckoo. The habitat functions in the study area for the species would be greatly improved through
36 the implementation of CM5, which would restore and protect large contiguous patches of riparian
37 habitat.

38 **CEQA Conclusion:** Fragmentation of habitat would have a less-than-significant impact on western
39 yellow-billed cuckoo. The habitat functions in the study area for the species would be greatly
40 improved through the implementation of CM5, which would restore and protect large contiguous
41 patches of riparian habitat.

1 **Impact BIO-97: Effects on Western Yellow-Billed Cuckoo Associated with Electrical**
2 **Transmission Facilities**

3 New transmission lines would increase the risk for bird-power line strikes, which could result in
4 injury or mortality of western yellow-billed cuckoo. Because the western yellow-billed cuckoo uses
5 riparian forests to meet all of its breeding and wintering life requisites, the species remains
6 primarily within the canopy of riparian forests and rarely ventures into open spaces except during
7 migration, limiting its opportunity to encounter the proposed transmission lines. As a summer
8 resident, if the species were to occur in the study area, it would be during periods of relatively high
9 visibility and clear weather conditions, thus further reducing collision risk from daily use patterns
10 or seasonal migration flights. Finally, western yellow-billed cuckoo wing shape is characterized by
11 low wing loading and a moderate aspect ratio, making the species moderately maneuverable and
12 presumably able to avoid collisions, especially during high-visibility conditions (BDCP Appendix 5.J,
13 Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).

14 Transmission line poles and towers also provide perching substrate for raptors,
15 which are predators on western yellow-billed cuckoo. Although there is potential for transmission
16 lines to result in increased perching opportunities for raptors, the existing network of transmission
17 lines in the study area currently poses these risks and any incremental risk associated with the new
18 power line corridors would not be expected to affect the population. Because there is low
19 probability for the species to occur in the study area, any increased risk of predation risk on western
20 yellow-billed cuckoo from an increase in raptor perching opportunities would be minimal.

21 **NEPA Effects:** The risk of bird-strike is considered to be minimal based on the species' rarity in the
22 study area, its proclivity to remain in the riparian canopy, its presence in the study area during
23 periods of relative high visibility, and its overall ability to successfully negotiate around overhead
24 wires that it may encounter. Transmission line poles and towers also provide perching substrate for
25 raptors, which could result in increased predation pressure on western yellow-billed cuckoo.
26 However, because there is a low probability for the species to occur in the study area, any increased
27 risk in predation on western yellow-billed cuckoo from an increase in raptor perching opportunities
28 would be minimal. Therefore the construction and operation of new transmission lines under
29 Alternative 9 would not result in an adverse effect on western yellow-billed cuckoo.

30 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
31 significant impact on western yellow-billed cuckoo because the risk of bird-strike is considered to
32 be minimal based on the species' rarity in the study area, its proclivity to remain in the riparian
33 canopy, its presence during periods of relative high visibility, and its overall ability to successfully
34 negotiate around overhead wires that it may encounter. Transmission line poles and towers also
35 provide perching substrate for raptors, which could result in increased predation pressure on
36 western yellow-billed cuckoo. Transmission line poles and towers also provide perching substrate
37 for raptors, which could result in increased predation pressure on western yellow-billed cuckoo.
38 However, because there is a low probability for the species to occur in the study area, any increased
39 risk in predation on western yellow-billed cuckoo from an increase in raptor perching opportunities
40 would be minimal. Therefore, the construction and operation of new transmission lines under
41 Alternative 9 would result in a less-than-significant impact on western yellow-billed cuckoo.

1 **Impact BIO-98: Indirect Effects of Plan Implementation on Western Yellow-Billed Cuckoo**

2 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
3 with construction-related activities could result in temporary disturbances that affect western
4 yellow-billed cuckoo use of modeled habitat adjacent to proposed construction areas. Construction
5 noise above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from
6 the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*
7 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no
8 available data to determine the extent to which these noise levels could affect western yellow-billed
9 cuckoo. Indirect effects associated with construction include noise, dust, and visual disturbance
10 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
11 footprint but within 1,300 feet from the construction edge. If western yellow-billed cuckoo were to
12 nest in or adjacent to work areas, construction and subsequent maintenance-related noise and
13 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
14 functions of suitable nesting habitat for these species. These potential effects would be minimized
15 with incorporation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
16 *Yellow-Billed Cuckoo* into the BDCP. The use of mechanical equipment during water conveyance
17 facilities construction could cause the accidental release of petroleum or other contaminants that
18 could affect western yellow-billed cuckoo in the surrounding habitat. The inadvertent discharge of
19 sediment or excessive dust adjacent to western yellow-billed cuckoo habitat could also affect the
20 species. AMM1–AMM7, including *AMM2 Construction BMPs and Monitoring*, in addition to *AMM22*
21 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would
22 minimize the likelihood of such spills and ensure that measures were in place to prevent runoff from
23 the construction area and any adverse effects of dust on active nests.

24 **Methylmercury Exposure:** Western yellow-billed cuckoo modeled habitat includes primarily
25 middle marsh habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is
26 also used if it is of high value, and low marsh provides foraging habitat for the species. Cuckoos are a
27 top predator in the benthic food chain; they forage by probing their beaks into the mud (Zembal and
28 Fancher 1988) and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects
29 (Eddleman and Conway 1998).

30 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
31 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
32 species would overestimate the effects on western yellow-billed cuckoo. Organisms feeding within
33 pelagic-based (algal) foodwebs have been found to have higher concentrations of methylmercury
34 than those in benthic or epibenthic foodwebs; this has been attributed to food chain length and
35 dietary segregation (Grimaldo et al. 2009).

36 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
37 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
38 Thus, Alternative 9 restoration activities that create newly inundated areas could increase
39 bioavailability of mercury. Concentrations of methylmercury known to be toxic to bird embryos
40 have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003);
41 however, currently, it is unknown how much of the sediment-derived methylmercury enters the
42 food chain in Suisun Marsh or what tissue concentrations are actually harmful to the western
43 yellow-billed cuckoo. In general, the highest methylation rates are associated with high tidal
44 marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers
45 et al. 2008). In Suisun Marsh, the conversion of managed wetlands to tidal wetlands is expected to

1 result in an overall reduction in mercury methylation. Due to the complex and very site-specific
2 factors that determine if mercury becomes mobilized into the foodweb, *CM12 Methylmercury*
3 *Management* is included to provide for site-specific evaluation for each restoration project. If a
4 project is identified where there is a high potential for methylmercury production that could not be
5 fully addressed through restoration design and adaptive management, alternate restoration areas
6 would be considered. CM12 would be implemented in coordination with other similar efforts to
7 address mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis
8 Section. This conservation measure would include the following actions.

- 9 • Assess pre-restoration conditions to determine the risk that the project could result in increased
10 mercury methylation and bioavailability.
- 11 • Define design elements that minimize conditions conducive to generation of methylmercury in
12 restored areas.
- 13 • Define adaptive management strategies that can be implemented to monitor and minimize
14 actual postrestoration creation and mobilization of methylmercury.

15 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
16 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
17 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
18 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
19 2009). The effect of selenium toxicity differs widely between species and also between age and sex
20 classes within a species. In addition, the effect of selenium on a species can be confounded by
21 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
22 2009).

23 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
24 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
25 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
26 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
27 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
28 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
29 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
30 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
31 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
32 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
33 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
34 have a higher risk of selenium toxicity.

35 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
36 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
37 exacerbate bioaccumulation of selenium in avian species, including western yellow-billed cuckoo.
38 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
39 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
40 Alternative 9 restoration activities that create newly inundated areas could increase bioavailability
41 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
42 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
43 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
44 increases in selenium concentrations in water in the Delta under any alternative. However, it is

1 difficult to determine whether the effects of potential increases in selenium bioavailability
2 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
3 effects on western yellow-billed cuckoo.

4 Because of the uncertainty that exists at this programmatic level of review, there could be a
5 substantial effect on western yellow-billed cuckoo from increases in selenium associated with
6 restoration activities. This effect would be addressed through the implementation of *AMM27*
7 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
8 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
9 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
10 selenium management to reduce selenium concentrations and/or bioaccumulation would be
11 evaluated separately for each restoration effort as part of design and implementation. This
12 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
13 design schedule.

14 **NEPA Effects:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 9
15 implementation could have adverse effects on the species through the modification of habitat and
16 potential for direct mortality. Restoration actions that would create tidal marsh could provide
17 biogeochemical conditions for methylation of mercury in the newly inundated soils. There is
18 potential for increased exposure of the western yellow-billed cuckoo foodweb to methylmercury in
19 these areas, with the level of exposure dependent on the amounts of mercury available in the soils
20 and the biogeochemical conditions. However, the conversion of managed wetlands to tidal wetlands
21 in Suisun Marsh would be expected to reduce the overall production of methylmercury, resulting in
22 a net benefit to species. Implementation of CM12, which contains measures to assess the amount of
23 mercury before project development, followed by appropriate design and adaptation management,
24 would minimize the potential for increased methylmercury exposure, and would result in no
25 adverse effect on the species.

26 Tidal habitat restoration could result in increased exposure of western yellow-billed cuckoo to
27 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
28 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
29 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

30 Because of the species' minimal presence in the study area, and with the incorporation of AMM1–
31 AMM7, *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
32 *Cuckoo*, and *AMM27 Selenium Management* into the BDCP, indirect effects would not have an adverse
33 effect on western yellow-billed cuckoo. **CEQA Conclusion:** Indirect effects on western yellow-billed
34 cuckoo as a result of Alternative 9 implementation could have a significant impact on the species
35 from modification of habitat. Restoration actions that would create tidal marsh could provide
36 biogeochemical conditions for methylation of mercury in the newly inundated soils. There is
37 potential for increased exposure of the western yellow-billed cuckoo foodweb to methylmercury in
38 these areas, with the level of exposure dependent on the amounts of mercury available in the soils
39 and the biogeochemical conditions. However, the conversion of managed wetlands to tidal wetlands
40 in Suisun Marsh would be expected to reduce the overall production of methylmercury, resulting in
41 a net benefit to species. Implementation of CM12, which contains measures to assess the amount of
42 mercury before project development, followed by appropriate design and adaptation management,
43 would minimize the potential for increased methylmercury exposure, and would result in no
44 adverse effect on the species.

1 Tidal habitat restoration could result in increased exposure of western yellow-billed cuckoo to
2 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
3 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
4 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

5 With the incorporation of AMM1–AMM7, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least*
6 *Bell's Vireo*, *Western Yellow-Billed Cuckoo*, and *AMM27 Selenium Management* into the BDCP, indirect
7 effects as a result of Alternative 9 implementation would have a less-than-significant impact on
8 western yellow-billed cuckoo.

9 **Impact BIO-99: Periodic Effects of Inundation of Western Yellow-Billed Cuckoo Habitat as a** 10 **Result of Implementation of Conservation Components**

11 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
12 duration of inundation of approximately 11–20 acres of modeled western yellow-billed cuckoo
13 breeding habitat and 37–64 acres of modeled migratory habitat. No adverse effects of increased
14 inundation frequency on western yellow-billed cuckoo or its habitat are expected because the
15 cuckoo breeding period is outside the period the weir would be operated. In addition, riparian
16 vegetation supporting habitat has persisted under the existing Yolo Bypass flooding regime, and
17 changes to frequency and inundation would be within the tolerance of these vegetation types.

18 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
19 inundation of up to 142 acres of modeled western yellow-billed cuckoo habitat (17 acres of breeding
20 habitat, 125 acres of migratory habitat). Inundation of restored floodplains is not expected to affect
21 western yellow-billed cuckoo or its habitat adversely because the cuckoo breeding period is outside
22 the period the floodplains would likely be inundated, and periodic inundation of floodplains is
23 expected to restore a more natural flood regime in support of riparian vegetation types that provide
24 nesting and migratory habitat for western yellow-billed cuckoo. The overall effect of seasonal
25 inundation in existing riparian natural communities is likely to be beneficial for western yellow-
26 billed cuckoo, because, historically, flooding was the main natural disturbance regulating ecological
27 processes in riparian areas, and flooding promotes the germination and establishment of many
28 native riparian plants.

29 **NEPA Effects:** Periodic effects of inundation would not have an adverse on yellow-billed cuckoo if
30 they were to establish as breeders in the study area, because flooding is expected to occur outside of
31 the breeding season.

32 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on
33 yellow-billed cuckoos if they were to establish as breeders in the study area, because flooding is
34 expected to occur outside of the breeding season.

35 **White-Tailed Kite**

36 The habitat model used to assess impacts on white-tailed kite includes breeding habitat and foraging
37 habitat. Most white-tailed kites in the Sacramento Valley are found in oak and cottonwood riparian
38 forests, valley oak woodlands, or other groups of trees and are usually associated with compatible
39 foraging habitat for the species in patches greater than 1,500 square meters (Erichsen et al. 1996).
40 Modeled foraging habitat for white-tailed kite consists of pasture and hay crops, compatible row and
41 grain crops and natural vegetation such as seasonal wetlands and annual grasslands (Erichsen et al.
42 1995).

1 Construction and restoration associated with Alternative 9 conservation measures would result in
2 both temporary and permanent losses of white-tailed kite modeled habitat as indicated in Table 12-
3 9-41. The majority of the losses would take place over an extended period of time as tidal marsh is
4 restored in the study area. Although restoration for the loss of nesting and foraging habitat would be
5 initiated in the same timeframe as the losses, it could take one or more decades (for nesting habitat)
6 for restored habitats to replace the functions of habitat lost. This time lag between impacts and
7 restoration of habitat function would be minimized by specific requirements of *AMM39 White-Tailed*
8 *Kite*, including the planting of mature trees in the near-term time period. Full implementation of
9 Alternative 9 would also include the following biological objectives over the term of the BDCP to
10 benefit the white-tailed kite (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 11 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
12 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
13 associated with CM7).
- 14 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
15 10 (Objective VFRNC1.2, associated with CM3).
- 16 • Protect at least 8,000 acres of grassland with at least 2,000 acres protected in CZ 1, at least 1,000
17 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder distributed
18 among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 19 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 20 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
21 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 22 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
23 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 24 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
25 VPNC2.5, and GNC2.4, associated with CM11).
- 26 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
27 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 28 • Plant and maintain native trees along roadsides and field borders within protected cultivated
29 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 30 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
31 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
32 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
33 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 34 • Establish 20- to 30- foot-wide hedgerows along fields and roadsides to promote prey
35 populations throughout protected cultivated lands (Objective SH2.2, associated with CM3).

36 As explained below, with the restoration or protection of these amounts of habitat, in addition to
37 management activities that would enhance these natural communities for the species and
38 implementation of AMM1–AMM7 and *AMM39 White-Tailed Kite*, impacts on white-tailed kite would
39 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-9-41. Changes in White-Tailed Kite Modeled Habitat Associated with Alternative 9 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	43	43	89	89	NA	NA
	Foraging	374	374	2,542	2,542	NA	NA
Total Impacts CM1		417	417	2,631	2,631		
CM2-CM18	Nesting	312	507	88	121	48-82	230
	Foraging	8,723	52,675	516	1,484	3,030-6,651	7,402
Total Impacts CM2-CM18		9,035	53,182	604	1,605	3,078-6,733	7,632
Total Nesting		355	550	177	210	48-82	230
Total Foraging		9,097	53,049	3,058	4,026	3,030-6,651	7,402
TOTAL IMPACTS		9,452	53,599	3,235	4,236	3,078-6,733	7,632

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-100: Loss or Conversion of Habitat for and Direct Mortality of White-Tailed Kite**

5 Alternative 9 conservation measures would result in the combined permanent and temporary loss
6 of up to 57,835 acres of modeled habitat for white-tailed kite (760 acres of nesting habitat, 57,075
7 acres foraging habitat; Table 12-9-41). Conservation measures that would result in these losses are
8 conveyance facilities and transmission line construction, and establishment and use of borrow and
9 spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4),
10 floodplain restoration (CM5), riparian habitat restoration, (CM7), grassland restoration (CM8),
11 vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of
12 conservation hatcheries (CM18). Habitat enhancement and management activities (CM11), which
13 include ground disturbance or removal of nonnative vegetation, could result in local habitat effects.
14 In addition, maintenance activities associated with the long-term operation of the water conveyance
15 facilities and other BDCP physical facilities could affect white-tailed kite modeled habitat. Each of
16 these individual activities is described below. A summary statement of the combined impacts and
17 NEPA effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 water conveyance facilities
19 would result in the combined permanent and temporary loss of up to 132 acres of white-tailed
20 kite nesting habitat (43 acres of permanent loss and 89 acres of temporary loss). In addition,
21 2,916 acres of foraging habitat would be removed (374 acres of permanent loss, 2,542 acres of

1 temporary loss, Table 12-9-41). Activities that would impact modeled White-tailed kite habitat
 2 include channel dredging, intakes, fish barriers, access roads, and construction of transmission
 3 lines. Permanent losses of nesting habitat would primarily consist of channel enlargement at the
 4 Sacramento River and Meadows Slough. Temporary losses would occur primarily along Middle
 5 River between Victoria Canal and Mildred Island, where large dredging work areas and operable
 6 barrier work areas would be placed. The riparian habitat in these areas is composed of very
 7 small patches or stringers bordering waterways, which include valley oak and scrub vegetation.
 8 Permanent impacts on foraging habitat would occur from the construction of the canals in CZ 8
 9 east and south of Clifton Court Forebay and other conveyance structures in CZs 4, 5, 6, 7, and 8.
 10 Temporary impacts would primarily occur from borrow and spoil areas and temporary work
 11 areas. The CM1 footprint does not overlap with any occurrences of white-tailed kite. However,
 12 the implementation of *AMM39 White-Tailed Kite* would minimize effects on white-tailed kites if
 13 they were to nest within or adjacent to the construction footprint. Refer to the Terrestrial
 14 Biology Map Book for a detailed view of Alternative 9 construction locations.

- 15 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 16 would result in the combined permanent and temporary loss of up to 170 acres of nesting
 17 habitat (82 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2. In
 18 addition, 1,525 acres of foraging habitat would be removed (1,008 acres of permanent loss, 516
 19 acres of temporary loss). Activities through CM2 could involve excavation and grading in
 20 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
 21 riparian losses would occur at the north end of Yolo Bypass where major fish passage
 22 improvements are planned. Excavation to improve water movement in the Toe Drain and in the
 23 Sacramento Weir would also remove white-tailed kite habitat. The loss is expected to occur
 24 during the first 10 years of Alternative 9 implementation.
- 25 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 26 inundation would permanently remove an estimated 383 acres of white-tailed kite nesting
 27 habitat and 41,625 acres of foraging habitat. The majority of the acres lost would consist of
 28 cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity
 29 of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh,
 30 and along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
 31 directly impact and fragment grassland just north of Rio Vista in and around French and
 32 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
 33 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
 34 the northern fringes of Suisun Marsh. The conversion of cultivated lands to tidal wetlands over
 35 fairly broad areas within the tidal restoration footprints could result in the removal or
 36 abandonment of nesting territories that occur within or adjacent to the restoration areas. Trees
 37 would not be actively removed but tree mortality would be expected over time as areas became
 38 tidally inundated. Depending on the extent and value of remaining habitat, this could reduce the
 39 local nesting population.
- 40 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 41 seasonally inundated floodplain and riparian restoration actions would remove approximately
 42 75 acres of white-tailed kite nesting habitat (42 acres of permanent loss, 33 acres of temporary
 43 loss) and 2,675 acres of foraging habitat (1,706 acres of permanent loss, 968 acres of temporary
 44 loss). These losses would be expected after the first 10 years of Alternative 9 implementation
 45 along the San Joaquin River and other major waterways in CZ 7.

- 1 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
2 approximately 971 acres of white-tailed kite foraging habitat as part of tidal restoration and
3 3,991 acres as part of seasonal floodplain restoration through CM7.
- 4 ● *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
5 implemented on agricultural lands and would result in the conversion of 1,849 acres of white-
6 tailed kite agricultural foraging habitat to grassland foraging habitat in CZs 1, 2, 4, 5, 7, 8, and 11.
7 If agricultural lands supporting higher value foraging habitat than the restored grassland were
8 removed, there would be a loss of white-tailed kite foraging habitat value.
- 9 ● *CM10 Nontidal Marsh Restoration*: Restoration and creation of nontidal freshwater marsh
10 (CM10) would result in the permanent conversion of 1,440 acres of cultivated lands to nontidal
11 marsh in CZ 2 and CZ 4. This would not result in a loss of foraging habitat as both natural
12 communities are foraging habitat for white-tailed kite. Small patches of riparian vegetation that
13 support White-tailed kite nesting habitat may develop along the margins of restored nontidal
14 marsh restoration would also provide foraging habitat for the species.
- 15 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
16 enhancement-related activities could disturb white-tailed kite nests if they were present near
17 work sites. A variety of habitat management actions that are designed to enhance wildlife values
18 in BDCP-protected habitats may result in localized ground disturbances that could temporarily
19 remove small amounts of white-tailed kite habitat and reduce the functions of habitat until
20 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
21 and road and other infrastructure maintenance, are expected to have minor effects on available
22 white-tailed kite habitat and are expected to result in overall improvements to and maintenance
23 of habitat values over the term of the BDCP. These effects cannot be quantified, but are expected
24 to be minimal and would be avoided and minimized by the AMMs listed below. CM11 would also
25 include the construction of recreational-related facilities including trails, interpretive signs, and
26 picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The
27 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be
28 placed on existing, disturbed areas when and where possible. However, approximately 50 acres
29 of white-tailed kite grassland foraging habitat would be lost from the construction of trails and
30 facilities.
- 31 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
32 white-tailed kite foraging habitat for the development of a delta and longfin smelt conservation
33 hatchery in CZ 1. The loss is expected to occur during the first 10 years of Plan implementation.
34 Permanent and temporary white-tailed kite nesting habitat losses from the above conservation
35 measures, would primarily consist of small, fragmented riparian stands. Temporarily affected
36 nesting habitat would be restored as riparian habitat within 1 year following completion of
37 construction activities. The restored riparian habitat would require 1 to several decades to
38 functionally replace habitat that has been affected and for trees to attain sufficient size and
39 structure suitable for nesting by white-tailed kite. *AMM39 White-Tailed Kite* contains actions
40 described below to reduce the effect of temporal loss of nesting habitat, including the
41 transplanting of mature trees and planting of trees near high-value foraging habitat. The
42 functions of agricultural and grassland communities that provide foraging habitat for white-
43 tailed kite are expected to be restored relatively quickly.
- 44 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
45 water conveyance facilities and restoration infrastructure could result in ongoing but periodic

1 disturbances that could affect white-tailed kite use of the surrounding habitat. Maintenance
2 activities would include vegetation management, levee and structure repair, and re-grading of
3 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7
4 and *AMM39 White-Tailed Kite* in addition to conservation actions as described below.

- 5 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
6 direct mortality of adult or fledged white-tailed kite if they were present in the study area,
7 because they would be expected to avoid contact with construction and other equipment.
8 However, if white-tailed kite were to nest in the construction area, construction-related
9 activities, including equipment operation, noise and visual disturbances could affect nests or
10 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects
11 would be avoided and minimized with the incorporation of *AMM39 White-Tailed Kite* into the
12 BDCP.

13 The following paragraphs summarize the combined effects discussed above and describe other
14 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
15 included.

16 ***Near-Term Timeframe***

17 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
18 the near-term BDCP conservation strategy has been evaluated to determine whether it would
19 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
20 the effect of construction would not be adverse under NEPA. Alternative 9 would remove 532 acres
21 (355 acres of permanent loss, 177 acres of temporary loss) of white-tailed kite nesting habitat in the
22 study area in the near-term. These effects would result from the construction of the water
23 conveyance facilities (CM1, 132 acres), and implementing other conservation measures (*CM2 Yolo*
24 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
25 *Inundated Floodplain Restoration*—400 acres). In addition, 12,155 acres of white-tailed kite foraging
26 habitat would be removed or converted in the near-term (CM1, 2,916 acres; *CM2 Yolo Bypass*
27 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*
28 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*
29 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*
30 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—9,239
31 acres).

32 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
33 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of
34 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
35 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that
36 132 acres of nesting habitat should be restored/created and 132 acres should be protected to
37 mitigate the CM1 losses of white-tailed kite nesting habitat. In addition, 2,916 acres should be
38 protected to compensate for the CM1 losses of white-tailed kite foraging habitat. The near-term
39 effects of other conservation actions would remove 400 acres of modeled nesting habitat, and
40 therefore require 400 acres of restoration and 400 acres of protection of nesting habitat. Similarly,
41 the near-term effects of other conservation actions would result in the loss or conversion of 9,239
42 acres of modeled foraging habitat, and therefore require 9,239 acres of protection of foraging
43 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection of
44 nesting habitat; 1:1 for restoration and 1:1 for protection of foraging habitat).

1 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
2 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
3 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
4 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
5 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
6 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of*
7 *Alternatives*). These conservation actions are associated with CM3, CM4, CM7, and CM8 and would
8 occur in the same timeframe as the construction and early restoration losses.

9 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
10 system with extensive wide bands or large patches of valley/foothill riparian natural community
11 (Objectives VFRNC1.1 and VFRNC1.2, BDCP Chapter 3, *Conservation Strategy*). Riparian restoration
12 would expand the patches of existing riparian forest in order to support nesting habitat for the
13 species. White-tailed kite is excluded from narrow bands of riparian vegetation by Swainson's
14 hawks and therefore requires wide patches of nesting habitat where its range overlaps with
15 Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees would be
16 increased by planting and maintaining native trees along roadsides and field borders within
17 protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition, small
18 but essential nesting habitat associated with cultivated lands would also be maintained and
19 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
20 farmyards or at rural residences (Objective CLNC1.3).

21 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
22 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
23 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
24 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
25 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
26 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
27 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
28 Foraging opportunities would also be improved by enhancing prey populations through the
29 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
30 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
31 would also be protected and maintained as part of the cultivated lands reserve system which would
32 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
33 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
34 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
35 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres
36 of tidal natural communities, including transitional uplands would provide high-value foraging
37 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for
38 covered and other native wildlife species would be protected in the near-term time period
39 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection
40 and restoration efforts and represent performance standards for considering the effectiveness of
41 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
42 and the additional detail in the biological objectives satisfy the typical mitigation that would be
43 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate
44 the near-term effects of the other conservation measures.

45 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
46 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and

1 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian
2 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
3 require one to several decades to functionally replace habitat that has been affected and for trees to
4 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between
5 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite
6 in the near-term time period. Nesting habitat is limited throughout much of the study area,
7 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
8 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
9 habitat would further reduce this limited resource and could reduce or restrict the number of active
10 white-tailed kite nests within the study area until restored riparian habitat is sufficiently developed.

11 *AMM39 White-Tailed Kite* would implement a program to plant large mature trees, including
12 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
13 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
14 within the 125-acre block are removed. These mature trees would be supplemented with additional
15 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
16 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
17 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
18 system for every tree 20 feet or taller removed by construction during the near-term period. A
19 variety of native tree species would be planted to provide trees with differing growth rates,
20 maturation, and life span. Trees would be planted within the BDCP reserve system in areas that
21 support high value foraging habitat to increase nest sites, or within riparian plantings as a
22 component of the riparian restoration (CM5, CM7) where they are in close proximity to suitable
23 foraging habitat. Replacement trees that were incorporated into the riparian restoration would not
24 be clustered in a single region of the study area, but would be distributed throughout the lands
25 protected as foraging habitat for white-tailed kite. With this program in place, Alternative 9 would
26 not have a substantial adverse effect on white-tailed kite in the near-term timeframe, either through
27 direct mortality or through habitat modifications. Further details of AMM39 are provided in
28 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
33 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
34 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
35 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
36 to the Final EIR/EIS.

37 ***Late Long-Term Timeframe***

38 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres
39 of modeled foraging habitat for white-tailed kite. Alternative 9 as a whole would result in the
40 permanent loss of and temporary effects on 760 acres of potential nesting habitat (5% of the
41 potential nesting habitat in the study area) and the loss or conversion of 57,075 acres of foraging
42 habitat (11% of the foraging habitat in the study area). The locations of these losses are described
43 above in the analyses of individual conservation measures.

1 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
2 *Restoration, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*
3 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Community*
4 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
5 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
6 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
7 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that
8 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal
9 wetlands (Table 3-4 in Chapter 3, *Description of Alternatives*).

10 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
11 system with extensive wide bands or large patches of valley/foothill riparian natural community
12 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
13 restoration would expand the patches of existing riparian forest in order to support nesting habitat
14 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
15 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
16 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
17 would be increased by planting and maintaining native trees along roadsides and field borders
18 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
19 small but essential nesting habitat associated with cultivated lands would also be maintained and
20 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
21 farmyards or at rural residences (Objective CLNC1.3).

22 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
23 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
24 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
25 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
26 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
27 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
28 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
29 Foraging opportunities would also be improved by enhancing prey populations through the
30 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
31 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
32 would also be protected and maintained as part of the cultivated lands reserve system which would
33 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
34 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
35 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
36 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least
37 65,000 acres of tidal natural communities, including transitional uplands would provide high-value
38 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide
39 foraging habitat for white-tailed kite would be protected by the late long-term time period
40 (Objective CLNC1.1).

41 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
42 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
43 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration
44 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
8 to the Final EIR/EIS.

9 **NEPA Effects:** The loss of white-tailed kite habitat and potential direct mortality of this special-
10 status species under Alternative 9 would represent an adverse effect in the absence of other
11 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,
12 CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM39 White-*
13 *Tailed Kite*, which would be in place throughout the construction period, the effects of habitat loss
14 and potential mortality on white-tailed kite under Alternative 9 would not be adverse.

15 **CEQA Conclusion:**

16 **Near-Term Timeframe**

17 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
18 the near-term BDCP conservation strategy has been evaluated to determine whether it would
19 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
20 the effect of construction would be less than significant under CEQA. Alternative 9 would remove
21 532 acres (355 acres of permanent loss, 177 acres of temporary loss) of white-tailed kite nesting
22 habitat in the study area in the near-term. These effects would result from the construction of the
23 water conveyance facilities (CM1, 132 acres), and implementing other conservation measures (*CM2*
24 *Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
25 *Inundated Floodplain Restoration*—400 acres). In addition, 12,155 acres of white-tailed kite foraging
26 habitat would be removed or converted in the near-term (CM1, 2,916 acres; *CM2 Yolo Bypass*
27 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*
28 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*
29 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*
30 *Natural Communities Enhancement and Management*, and *CM18 Conservation Hatcheries*—9,239
31 acres).

32 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
33 CM1 and that are identified in the biological goals and objectives for white-tailed kite in Chapter 3 of
34 the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
35 for nesting habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that
36 132 acres of nesting habitat should be restored/created and 132 acres should be protected to
37 mitigate the CM1 losses of white-tailed kite nesting habitat. In addition, 2,916 acres should be
38 protected to compensate for the CM1 losses of white-tailed kite foraging habitat. The near-term
39 effects of other conservation actions would remove 400 acres of modeled nesting habitat, and
40 therefore require 400 acres of restoration and 400 acres of protection of nesting habitat. Similarly,
41 the near-term effects of other conservation actions would result in the loss or conversion of 9,239
42 acres of modeled foraging habitat, and therefore require 9,239 acres of protection of foraging
43 habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for protection of
44 nesting habitat; 1:1 for restoration and 1:1 for protection of foraging habitat).

1 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
2 valley/foothill riparian natural community, protecting 2,000 acres and restoring 1,140 acres of
3 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
4 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
5 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
6 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of*
7 *Alternatives*). These conservation actions are associated with CM3, CM4, CM7, and CM8 and would
8 occur in the same timeframe as the construction and early restoration losses.

9 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
10 system with extensive wide bands or large patches of valley/foothill riparian natural community
11 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
12 restoration would expand the patches of existing riparian forest in order to support nesting habitat
13 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
14 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
15 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
16 would be increased by planting and maintaining native trees along roadsides and field borders
17 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
18 small but essential nesting habitat associated with cultivated lands would also be maintained and
19 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
20 farmyards or at rural residences (Objective CLNC1.3).

21 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
22 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
23 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
24 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
25 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
26 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
27 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
28 Foraging opportunities would also be improved by enhancing prey populations through the
29 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
30 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
31 would also be protected and maintained as part of the cultivated lands reserve system which would
32 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
33 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
34 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
35 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of 19,150 acres
36 of tidal natural communities, including transitional uplands would provide high-value foraging
37 habitat for the white-tailed kite. At least 15,400 acres of cultivated lands that provide habitat for
38 covered and other native wildlife species would be protected in the near-term time period
39 (Objective CLNC1.1). These biological goals and objectives would inform the near-term protection
40 and restoration efforts and represent performance standards for considering the effectiveness of
41 restoration actions. The acres of restoration and protection contained in the near-term Plan goals
42 and the additional detail in the biological objectives satisfy the typical mitigation that would be
43 applied to the project-level effects of CM1 on white-tailed kite foraging habitat, as well as mitigate
44 the near-term effects of the other conservation measures.

45 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
46 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and

1 other near-term impacts on white-tailed kite nesting habitat. The 800 acres of restored riparian
 2 habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but would
 3 require one to several decades to functionally replace habitat that has been affected and for trees to
 4 attain sufficient size and structure suitable for nesting by white-tailed kites. This time lag between
 5 the removal and restoration of nesting habitat could have a substantial impact on white-tailed kite
 6 in the near-term time period. Nesting habitat is limited throughout much of the study area,
 7 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
 8 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
 9 habitat would further reduce this limited resource and could reduce or restrict the number of active
 10 white-tailed kite nests within the study area until restored riparian habitat is sufficiently developed.

11 *AMM39 White-Tailed Kite* would implement a program to plant large mature trees, including
 12 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
 13 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
 14 within the 125-acre block are removed. These mature trees would be supplemented with additional
 15 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
 16 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
 17 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
 18 system for every tree 20 feet or taller removed by construction during the near-term period. A
 19 variety of native tree species would be planted to provide trees with differing growth rates,
 20 maturation, and life span. Trees would be planted within the BDCP reserve system in areas that
 21 support high-value foraging habitat to increase nest sites, or within riparian plantings as a
 22 component of the riparian restoration (CM5, CM7) where they are in close proximity to suitable
 23 foraging habitat. Replacement trees that were incorporated into the riparian restoration would not
 24 be clustered in a single region of the study area, but would be distributed throughout the lands
 25 protected as foraging habitat for white-tailed kite. With this program in place, Alternative 9 would
 26 not have a substantial adverse effect on white-tailed kite in the near-term timeframe, either through
 27 direct mortality or through habitat modifications. Further details of AMM39 are provided in
 28 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

29 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 30 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 31 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 32 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 33 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 34 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 35 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 36 to the Final EIR/EIS.

37 ***Late Long-Term Timeframe***

38 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres
 39 of modeled foraging habitat for white-tailed kite. Alternative 9 as a whole would result in the
 40 permanent loss of and temporary effects on 760 acres of potential nesting habitat (5% of the
 41 potential nesting habitat in the study area) and the loss or conversion of 57,075 acres of foraging
 42 habitat (11% of the foraging habitat in the study area).

43 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 44 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*

1 *Restoration, CM7 Riparian Natural Community Restoration, and CM8 Grassland Natural Community*
2 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
3 riparian natural community, protect 8,000 acres and restore 2,000 acres of grassland natural
4 community, protect 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland
5 complex, protect 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that
6 provide suitable habitat for native wildlife species, and restore at least 65,000 acres of tidal
7 wetlands (Table 3-4 in Chapter 3, *Description of Alternatives*).

8 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
9 system with extensive wide bands or large patches of valley/foothill riparian natural community
10 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
11 restoration would expand the patches of existing riparian forest in order to support nesting habitat
12 for the species. White-tailed kite is excluded from narrow bands of riparian vegetation by
13 Swainson's hawks and therefore requires wide patches of nesting habitat where its range overlaps
14 with Swainson's hawk. The distribution and abundance of potential white-tailed kite nest trees
15 would be increased by planting and maintaining native trees along roadsides and field borders
16 within protected cultivated lands at a rate of one tree per 10 acres (Objective SWHA2.1). In addition,
17 small but essential nesting habitat associated with cultivated lands would also be maintained and
18 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
19 farmyards or at rural residences (Objective CLNC1.3).

20 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
21 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
22 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
23 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
24 provide foraging habitat for white-tailed kite and reduce the effects of current levels of habitat
25 fragmentation. Small mammal populations would also be increased on protected lands, enhancing
26 the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
27 Foraging opportunities would also be improved by enhancing prey populations through the
28 establishment of 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
29 cultivated lands (Objective SWHA2.2). Remnant patches of grassland or other uncultivated areas
30 would also be protected and maintained as part of the cultivated lands reserve system which would
31 provide additional foraging habitat and a source of rodent prey that could recolonize cultivated
32 fields (Objective CLNC1.3). The protection of managed wetlands (including upland grassland
33 components) that dry during the spring would also serve as foraging habitat for white-tailed kite as
34 prey species recolonize the fields (Objective MWNC1.1). In addition, the restoration of at least
35 65,000 acres of tidal natural communities, including transitional uplands would provide high-value
36 foraging habitat for the white-tailed kite. At least 45,405 acres of cultivated lands that provide
37 foraging habitat for white-tailed kite would be protected by the late long-term time period
38 (Objective CLNC1.1).

39 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
40 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
41 the restoration of 3,800 acres and the protection of 570 acres of nesting habitat and the restoration
42 of 49,875 acres and the protection of 2,050 acres of foraging habitat for white-tailed kite.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
44 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
45 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
2 *these AMMs include elements that would avoid or minimize the risk of affecting individuals and*
3 *species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since*
4 *been updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs,*
5 *to the Final EIR/EIS.*

6 In the absence of other conservation actions, the effects on white-tailed kite habitat from Alternative
7 9 would represent an adverse effect as a result of habitat modification and potential for direct
8 mortality of a special status species; however, considering Alternative 9's protection and restoration
9 provisions, which would provide acreages of new or enhanced habitat in amounts greater than
10 necessary to compensate for the time lag of restoring riparian and foraging habitats lost to
11 construction and restoration activities, and with implementation of AMM1–AMM7 and AMM39
12 *White-Tailed Kite*, the loss of habitat or direct mortality through implementation of Alternative 9
13 would not result in a substantial adverse effect through habitat modifications and would not
14 substantially reduce the number or restrict the range of the species. In particular, 95% of the loss of
15 foraging habitat effects involve the conversion from one habitat type to another form of suitable
16 foraging habitat. Therefore, the loss of habitat or potential mortality under this alternative would
17 have a less-than-significant impact on white-tailed kite.

18 **Impact BIO-101: Effects on White-Tailed Kite Associated with Electrical Transmission** 19 **Facilities**

20 There are several known occurrences of nesting white-tailed kite within 5 miles of the proposed
21 transmission line alignment. While white-tailed kite flight behavior puts them regularly within the
22 range of heights proposed for the new transmission lines (50 to 110 feet), their keen vision and high
23 maneuverability substantially reduce powerline collision risk for the species. Like other diurnal
24 raptors, white-tailed kites have highly developed eyesight (Jones et al. 2007), allowing them to
25 detect small prey while hunting from relatively high altitudes. Keen eyesight also allows for
26 detection and avoidance of other aerial objects, including above-ground utility lines. Like many
27 other falcons, the white-tailed kite has long, narrow, tapered wings and body size that allow for
28 efficient soaring flight and highly developed aerial maneuverability. White-tailed kite are at low risk
29 of bird strike mortality from the construction of new transmission lines based on its general
30 maneuverability, its keen eyesight, and lack of flocking behavior (BDCP Appendix 5.J, Attachment
31 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).
32 Marking transmission lines with flight diverters that make the lines more visible to birds has been
33 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated
34 that marking devices in the Central Valley could reduce avian mortality by 60%. With the
35 implementation of AMM20 *Greater Sandhill Crane*, all new transmission lines would be fitted with
36 flight diverters, which would substantially reduce any risk of collision with lines.

37 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
38 adverse effect because the risk of bird strike is considered to be minimal based on the species'
39 general maneuverability, keen eyesight, and lack of flocking behavior. In addition, AMM20 *Greater*
40 *Sandhill Crane* contains the commitment to place bird strike diverters on all new powerlines, which
41 would eliminate or nearly eliminate the risk of mortality from bird strike for white-tailed kite as a
42 result of the project. Therefore, the construction and operation of new transmission lines under
43 Alternative 9 would not result in an adverse effect on white-tailed kite.

1 **CEQA Conclusion:** The construction and presence of new transmission lines would not represent a
 2 significant impact because the risk of bird strike is considered to be minimal based on the species'
 3 general maneuverability, keen eyesight, and lack of flocking behavior. In addition, *AMM20 Greater*
 4 *Sandhill Crane* contains the commitment to place bird strike diverters on all new powerlines, which
 5 would eliminate or nearly eliminate the risk of mortality from bird strike for white-tailed kite as a
 6 result of the project. Therefore, the construction and operation of new transmission lines under
 7 Alternative 9 would result in a less-than-significant impact on white-tailed kite.

8 **Impact BIO-102: Indirect Effects of Plan Implementation on White-Tailed Kite**

9 White-tailed kite nesting habitat within the vicinity of proposed construction areas could be
 10 indirectly affected by construction activities. Construction noise above background noise levels
 11 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
 12 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
 13 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
 14 which these noise levels could affect white-tailed kite. Indirect effects associated with construction
 15 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
 16 disturbing operations outside the project footprint but within 1,300 feet from the construction edge.
 17 If white-tailed kite were to nest in or adjacent to work areas, construction and subsequent
 18 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting
 19 behaviors, and reduce the functions of suitable nesting habitat for these species. *AMM39 White-*
 20 *Tailed Kite* would require preconstruction surveys, and if detected, 200-yard no-disturbance buffers
 21 would be established around active nests. The use of mechanical equipment during water
 22 conveyance facilities construction could cause the accidental release of petroleum or other
 23 contaminants that could affect white-tailed kite in the surrounding habitat. The inadvertent
 24 discharge of sediment or excessive dust adjacent to white-tailed kite habitat could also affect the
 25 species. *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*,
 26 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff
 27 from the construction area and negative effects of dust on active nests.

28 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
 29 mercury in avian species, including white-tailed kite. Marsh (tidal and nontidal) and floodplain
 30 restoration also have the potential to increase exposure to methylmercury. Mercury is transformed
 31 into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to
 32 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP
 33 restoration activities that create newly inundated areas could increase bioavailability of mercury
 34 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Increased methylmercury
 35 associated with natural community and floodplain restoration may indirectly affect white-tailed kite
 36 (see BDCP Appendix 5.D, *Contaminants*). However, the potential mobilization or creation of
 37 methylmercury within the study area varies with site-specific conditions and would need to be
 38 assessed at the project level. *CM12 Methylmercury Management* includes provisions for project-
 39 specific Mercury Management Plans. Site-specific restoration plans that address the creation and
 40 mobilization of mercury, as well as monitoring and adaptive management as described in *CM12*
 41 would be available to address the uncertainty of methylmercury levels in restored tidal marsh and
 42 potential impacts on white-tailed kite.

43 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 44 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 45 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,

1 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
2 2009). The effect of selenium toxicity differs widely between species and also between age and sex
3 classes within a species. In addition, the effect of selenium on a species can be confounded by
4 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
5 2009).

6 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
7 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
8 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
9 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
10 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
11 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
12 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
13 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
14 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
15 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
16 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
17 levels of selenium have a higher risk of selenium toxicity.

18 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
19 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
20 exacerbate bioaccumulation of selenium in avian species, including white-tailed kite. Marsh (tidal
21 and nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore
22 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP
23 restoration activities that create newly inundated areas could increase bioavailability of selenium
24 (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium
25 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
26 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
27 increases in selenium concentrations in water in the Delta under any alternative. However, it is
28 difficult to determine whether the effects of potential increases in selenium bioavailability
29 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
30 effects on white-tailed kite.

31 Because of the uncertainty that exists at this programmatic level of review, there could be a
32 substantial effect on white-tailed kite from increases in selenium associated with restoration
33 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
34 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
35 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
36 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
37 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
38 separately for each restoration effort as part of design and implementation. This avoidance and
39 minimization measure would be implemented as part of the tidal habitat restoration design
40 schedule.

41 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
42 could reduce white-tailed kite use of modeled habitat adjacent to work areas. Moreover, operation
43 and maintenance of the water conveyance facilities, including the transmission facilities, could result
44 in ongoing but periodic postconstruction disturbances that could affect white-tailed kite use of the
45 surrounding habitat. Noise, potential spills of hazardous materials, increased dust and

1 sedimentation, and operations and maintenance of the water conveyance facilities under Alternative
 2 9 would not have an adverse effect on white-tailed kite with the implementation of AMM1–AMM7
 3 and *AMM39 White-Tailed Kite*. Tidal habitat restoration could result in increased exposure of white-
 4 tailed kite to selenium. This effect would be addressed through the implementation of *AMM26*,
 5 *Selenium Management* which would provide specific tidal habitat restoration design elements to
 6 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
 7 indirect effects associated with noise and visual disturbances, potential spills of hazardous material,
 8 and increased exposure to selenium from Alternative 9 implementation would not have an adverse
 9 effect on white-tailed kite. Tidal habitat restoration is unlikely to have an adverse effect on white-
 10 tailed kite through increased exposure to methylmercury, as kites currently forage in tidal marshes
 11 where elevated methylmercury levels exist. However, it is unknown what concentrations of
 12 methylmercury are harmful to the species and the potential for increased exposure varies
 13 substantially within the study area. Site-specific restoration plans in addition to monitoring and
 14 adaptive management, described in *CM12 Methylmercury Management*, would address the
 15 uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning phase of
 16 marsh restoration would be the appropriate place to assess the potential for risk of methylmercury
 17 exposure for white-tailed kite, once site specific sampling and other information could be developed.

18 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
 19 operations and maintenance of the water conveyance facilities under Alternative 9 would have a
 20 less-than-significant impact on white-tailed kite with the implementation of *AMM39 White-Tailed*
 21 *Kite*, and AMM1–AMM7. Tidal habitat restoration could result in increased exposure of white-tailed
 22 kite to selenium. This effect would be addressed through the implementation of *AMM26*, *Selenium*
 23 *Management* which would provide specific tidal habitat restoration design elements to reduce the
 24 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
 25 implementation of tidal natural communities restoration or floodplain restoration could result in
 26 increased exposure of white-tailed kite to methylmercury. However, it is unknown what
 27 concentrations of methylmercury are harmful to this species. *CM12 Methylmercury Management*
 28 includes provisions for project-specific Mercury Management Plans. Site-specific restoration plans
 29 that address the creation and mobilization of mercury, as well as monitoring and adaptive
 30 management as described in *CM12*, would better inform potential impacts and address the
 31 uncertainty of methylmercury levels in restored tidal marsh in the study area on white-tailed kite.
 32 With these measures in place, the indirect effects associated with noise and visual disturbances,
 33 potential spills of hazardous material, and increased exposure to selenium from Alternative 9
 34 implementation would have a less-than-significant impact on white-tailed kite.

35 **Impact BIO-103: Periodic Effects of Inundation of White-Tailed Kite Habitat as a Result of**
 36 **Implementation of Conservation Components**

37 Flooding of the Yolo Bypass from Fremont Weir operations (related to *CM2 Yolo Bypass Fisheries*
 38 *Enhancement*) would increase the frequency and duration of inundation on approximately 48–82
 39 acres of modeled white-tailed kite nesting habitat and 3,030–6,651 acres of modeled white-tailed
 40 kite foraging habitat (Table 12-9-41). During inundation years, affected cultivated lands and
 41 grassland would not be available as foraging habitat until prey populations have re-inhabited
 42 inundated areas. This would result in temporary periodic reduction in availability of foraging
 43 habitat. If late-season Fremont Weir operations were to preclude the planting of some crop types,
 44 there could be a further loss of foraging habitat value if the crop type that would have been planted
 45 would provide greater foraging habitat value than the fallowed fields. No known white-tailed kite

1 nest sites would be affected, and increased periodic flooding is not expected to cause any adverse
2 effect on nest sites that may be within the inundation area because existing trees already withstand
3 floods in the area, the increase in inundation frequency and duration is expected to remain within
4 the range of tolerance of riparian trees, and any nest sites would be located above floodwaters.

5 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
6 inundation of up to approximately 230 acres of modeled white-tailed kite nesting habitat and 7,402
7 acres of modeled white-tailed kite foraging habitat (Table 12-9-41). Inundation of foraging habitat
8 could result in a periodic reduction of available foraging habitat due to the reduction in available
9 prey. Following draw-down, inundated habitats are expected to recover and provide suitable
10 foraging conditions until the following inundation period. Thus, this is considered a periodic impact
11 that is unlikely to affect white-tailed kite distribution and abundance, or foraging use of the study
12 area.

13 Periodic inundation of floodplains (through CM2 and CM5) would be expected to restore a more
14 natural flood regime in support of riparian vegetation types that support white-tailed kite nesting
15 habitat. No adverse effects of inundation on white-tailed kite riparian habitat are expected because
16 valley/foothill riparian vegetation is expected to benefit from seasonal inundation.

17 **NEPA Effects:** Although foraging habitat would be periodically unavailable to white-tailed kite
18 because of CM2 and CM5 implementation, inundated habitats are expected to recover following
19 draw-down. Any effects are considered short-term and would not result in an adverse effect.

20 **CEQA Conclusion:** Although foraging habitat would be periodically unavailable to white-tailed kite
21 because of CM2 and CM5 implementation, inundated habitats are expected to recover following
22 draw-down. Any effects are considered short-term and would be expected to have a less-than-
23 significant impact on white-tailed kite.

24 **Yellow-Breasted Chat**

25 Yellow-breasted chat modeled habitat includes suitable nesting and migratory habitat as those plant
26 alliances from the valley/foothill riparian modeled habitat that contain a shrub component and an
27 overstory component. Primary nesting and migratory habitat is qualitatively distinguished from
28 secondary habitat in Delta areas as those plant associations that support a greater percentage of a
29 suitable shrub cover, particularly blackberry, and California wild rose, and have an open to
30 moderately dense overstory canopy, using data from Hickson and Keeler-Wolf (2007). No
31 distinction is made between primary and secondary habitat for Suisun Marsh/Yolo Basin habitats
32 because supporting information is lacking. For this reason, the effects analysis only provides the
33 breakdown between primary and secondary habitat in the habitat loss totals and associated tables,
34 and does not provide this breakdown in the text by activity or effect type.

35 Construction and restoration associated with Alternative 9 conservation measures would result in
36 both temporary and permanent losses of yellow-breasted chat modeled habitat as indicated in Table
37 12-9-42. Full implementation of Alternative 9 would also include the following conservation actions
38 over the term of the BDCP to benefit the yellow-breasted chat (BDCP Chapter 3, Section 3.3,
39 *Biological Goals and Objectives*).

- 40 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
41 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
42 associated with CM7).

- 1 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
- 2 10 (Objective VFRNC1.2, associated with CM3).
- 3 • Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal
- 4 overlap among vegetation components and over adjacent riverine channels, freshwater
- 5 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM7).
- 6 • Maintain at least 1,000 acres of early- to mid-successional vegetation with a well-developed
- 7 understory of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2,
- 8 associated with CM7).

9 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 10 management activities that would enhance these natural communities for the species and
 11 implementation of AMM1–AMM7 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least*
 12 *Bell's Vireo, Western Yellow-Billed Cuckoo*, impacts on yellow-breasted chat would not be adverse for
 13 NEPA purposes and would be less than significant for CEQA purposes.

14 **Table 12-9-42. Changes in Yellow-Breasted Chat Modeled Habitat Associated with Alternative 9**
 15 **(acres)^a**

Conservation Measure ^b	Nesting and Migratory Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Primary	31	31	63	63	NA	NA
	Secondary	18	18	171	171	NA	NA
	Suisun Marsh/ Upper Yolo Bypass	0	0	0	0	NA	NA
Total Impacts CM1		49	49	234	234	NA	NA
CM2–CM18	Primary	96	214	58	73	19–38	92
	Secondary	209	357	0	6	6–18	56
	Suisun Marsh/ Upper Yolo Bypass	76	85	29	29	23–32	0
Total Impacts CM2–CM18		381	656	87	108	48–88	148
Total Primary		127	245	121	136		
Total Secondary		227	375	171	177		
Total Suisun Marsh/Upper Yolo Bypass		76	85	29	29		
TOTAL IMPACTS		430	705	321	342		

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-104: Loss or Conversion of Habitat for and Direct Mortality of Yellow-Breasted**
2 **Chat**

3 Alternative 9 conservation measures would result in the combined permanent and temporary loss
4 of up to 1,047 acres of modeled habitat for yellow-breasted chat (Table 12-9-42). Conservation
5 measures that would result in these losses are conveyance facilities and transmission line
6 construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries
7 improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5). Habitat
8 enhancement and management activities (CM11) which include ground disturbance or removal of
9 nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities
10 associated with the long-term operation of the water conveyance facilities and other BDCP physical
11 facilities could degrade or eliminate yellow-breasted chat habitat. Each of these individual activities
12 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA
13 conclusion follow the individual conservation measure discussions.

- 14 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would
15 result in the combined permanent and temporary loss of up to 283 acres of modeled yellow-
16 breasted chat habitat (94 acres of primary nesting habitat, 189 acres of secondary habitat) from
17 CZs 4, 5, 6, 7, and 8 (Table 12-9-42). Most of the permanent loss would occur as wider and
18 deeper channels are dredged in Middle River and Victoria Canal, and as operable barriers and
19 new Sacramento River diversions are constructed in various waterways across the Delta.
20 Temporary losses of habitat would occur primarily along Middle River between Victoria Canal
21 and Mildred Island, where large dredging work areas and operable barrier work areas would be
22 placed. Some of this vegetation may be temporarily removed as dredging progresses, while
23 other areas could remain in place but be temporarily affected by sedimentation and equipment
24 movement associated with dredging. The CM1 construction footprint overlaps with 6
25 occurrences of yellow-breasted chat. Six occurrences detected on inchannel islands (south of
26 Mildred Island) intersect with temporary dredging work areas, and 3 intersect with a temporary
27 operable barrier work area on north Mandeville Island. Preconstruction surveys under *AMM22*
28 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*
29 would minimize potential effects on nesting yellow-breasted chat in the study area. Refer to the
30 Terrestrial Biology Map Book for a detailed view of Alternative 9 construction locations.
- 31 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
32 would permanently remove approximately 83 acres and temporarily remove 88 acres of yellow-
33 breasted chat habitat in the Yolo Bypass in CZ 2. The loss is expected to occur during the first 10
34 years of Alternative 9 implementation.
- 35 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and
36 inundation would permanently remove an estimated 545 acres of modeled yellow-breasted chat
37 habitat in CZ 1, 2, 6, and 11. This total is composed of an estimated 182 acres of primary nesting
38 and migratory habitat, 349 acres of secondary nesting and migratory habitat, and 14 acres of
39 nesting and migratory habitat in the Suisun Marsh and upper Yolo Bypass areas.
- 40 • *CM5 Seasonally Inundated Floodplain Restoration:* Construction of setback levees to restore
41 seasonally inundated floodplain would permanently and temporarily remove approximately 49
42 acres of modeled yellow-breasted chat habitat in CZ 7. This total is comprised of 28 acres of
43 primary nesting and migratory habitat and 21 acres of secondary nesting and migratory habitat.
44 Based on the riparian habitat restoration assumptions, approximately 3,000 acres of
45 valley/foothill riparian habitat would be restored as a component of seasonally inundated

1 floodplain restoration actions. The actual number of acres that would be restored may differ
2 from these estimates, depending on how closely the outcome of seasonally inundated floodplain
3 restoration approximates the assumed outcome. Once this restored riparian vegetation has
4 developed habitat functions, a portion of it would be suitable to support yellow-breasted chat
5 habitat.

- 6 • *CM11 Natural Communities Enhancement and Management*: Habitat protection and management
7 activities that could be implemented in protected yellow-breasted chat habitats would be
8 expected to maintain and improve the functions of the habitat over the term of the BDCP.
9 Yellow-breasted chat would be expected to benefit from the increase in protected habitat, which
10 would maintain conditions favorable for the chat's use of the study area.

11 Habitat management- and enhancement-related activities could disturb yellow-breasted chat
12 nests if they are present near work sites. Equipment operation could destroy nests, and noise
13 and visual disturbances could lead to their abandonment, resulting in mortality of eggs and
14 nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*
15 *Billed Cuckoo* would ensure that these activities do not result in direct mortality of yellow-
16 breasted chat or other adverse effects.

17 Occupied habitat would be monitored to determine if there is a need to implement controls on
18 brood parasites (brown-headed cowbird) or nest predators. If implemented, these actions
19 would be expected to benefit the yellow-breasted chat by removing a potential stressor that
20 could, if not addressed, adversely affect the stability of newly established populations.

21 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*
22 *and Management* that are designed to enhance wildlife values in restored riparian habitats may
23 result in localized ground disturbances that could temporarily remove small amounts of yellow-
24 breasted chat habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
25 road and other infrastructure maintenance activities, are expected to have minor adverse effects
26 on available yellow-breasted chat habitat and are expected to result in overall improvements to
27 and maintenance of yellow-breasted chat habitat values over the term of the BDCP.

- 28 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
29 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
30 disturbances that could affect least Bell's vireo and yellow warbler use of the surrounding
31 habitat. Maintenance activities would include vegetation management, levee and structure
32 repair, and re-grading of roads and permanent work areas. These effects, however, would be
33 reduced by AMMs and conservation actions as described below.
- 34 • *Injury and Direct Mortality*: Construction is not expected to result in direct mortality of yellow-
35 breasted chat because adults and fledged young are expected to occur only in very small
36 numbers and, if present, would avoid contact with construction and other equipment. If yellow-
37 breasted chat were to nest in the vicinity of construction activities, equipment operation could
38 destroy nests and noise and visual disturbances could lead to nest abandonment. *AMM22 Suisun*
39 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would avoid
40 and minimize this effect.
- 41 • *Permanent and temporary habitat losses* from the above CMs, would primarily consist of small,
42 fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species.
43 Temporarily affected areas would be restored as riparian habitat within 1 year following
44 completion of construction activities. Although the effects are considered temporary, the

1 restored riparian habitat would require 5 years to several decades, for ecological succession to
2 occur and for restored riparian habitat to functionally replace habitat that has been affected. The
3 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;
4 therefore, the replaced riparian vegetation would be expected to have structural components
5 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial
6 restoration activities are complete.

7 The following paragraphs summarize the combined effects discussed above and describe other
8 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
9 included.

10 ***Near-Term Timeframe***

11 Because the water conveyance facilities construction is being evaluated at the project level, the near-
12 term BDCP conservation strategy has been evaluated to determine whether it would provide
13 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
14 effects of construction would not be adverse under NEPA. Alternative 9 would remove 751 acres of
15 modeled habitat for yellow-breasted chat in the study area in the near-term. These effects would
16 result from the construction of the water conveyance facilities (CM1, 283 acres of modeled nesting
17 and migratory habitat), and implementing other conservation measures (CM2 *Yolo Bypass Fisheries*
18 *Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally Inundated Floodplain*
19 *Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses would
20 primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-value
21 habitat for the species.

22 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
23 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter
24 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
25 habitat. Using these ratios would indicate that 283 acres of valley/foothill riparian habitat should be
26 restored/created and 283 acres should be protected to compensate for the CM1 losses of yellow-
27 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres
28 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of
29 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
30 protection).

31 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
32 valley/foothill riparian natural community in the study area (Table 3-4 in Chapter 3, *Description of*
33 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the
34 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
35 habitat loss on yellow-breasted chat. The majority of the riparian restoration acres would occur in
36 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill
37 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*
38 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,
39 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal
40 overlap among vegetation components and over adjacent riverine channels, freshwater emergent
41 wetlands, and grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural
42 habitat requirements, so only the early- to mid-successional portions of the restored and protected
43 riparian natural would be expected to provide suitable habitat characteristics for the species. These
44 natural community biological goals and objectives would inform the near-term protection and

1 restoration efforts and represent performance standards for considering the effectiveness of
2 conservation actions for the species.

3 The acres of protection contained in the near-term Plan goals and the additional detail in the
4 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be
5 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other
6 conservation measures. The restored riparian habitat could require 5 years to several decades, for
7 ecological succession to occur and for restored riparian habitat to functionally replace habitat that
8 has been affected. However, because the modeled habitat impacted largely consists of small patches
9 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have an adverse
10 population-level effect on the species in the near-term time period.

11 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
12 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
13 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
14 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
15 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
16 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
17 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
18 which have since been updated and which are provided in Appendix 3B, *Environmental*
19 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

20 ***Late Long-Term Timeframe***

21 The habitat model indicates that the study area supports approximately 14,547 acres of modeled
22 nesting and migratory habitat for yellow-breasted chat. Alternative 9 as a whole would result in the
23 permanent loss of and temporary effects on 1,047 acres of modeled habitat (7% of the modeled
24 habitat in the study area). These losses would occur from the construction of the water conveyance
25 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
26 *Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
27 would be in fragmented riparian habitat throughout the study area.

28 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
29 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
30 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
31 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
32 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
33 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted
34 chat has specific structural habitat requirements, so only the early- to mid-successional portions of
35 the restored and protected riparian natural would be expected to provide suitable habitat
36 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to
37 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to
38 natural erosion and deposition, which would provide conditions conducive to the establishment of
39 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if
40 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted
41 population in the study area, a cowbird control program would be implemented through *CM11*
42 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian
43 restoration also include the maintenance and enhancement of structural heterogeneity (Objective
44 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

1 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
2 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
3 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted
4 chat.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
6 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
7 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
8 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
9 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
10 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
11 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
12 which have since been updated and which are provided in Appendix 3B, *Environmental*
13 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

14 **NEPA Effects:** The loss of yellow-breasted chat habitat and potential direct mortality of this special-
15 status species would represent an adverse effect in the absence of other conservation actions. The
16 restored riparian habitat would require 5 years to several decades for ecological succession to occur
17 and for restored riparian habitat to functionally replace habitat that has been affected. However, the
18 habitat that would be lost consists of small, fragmented riparian stands that do not provide high-
19 value habitat for the species. And because the nesting and migratory habitat that would be lost is
20 small relative to the species range throughout California and North America, BDCP actions would
21 not be expected to have an adverse population-level effect on the species. With habitat protection
22 and restoration associated with CM3, CM7, and CM11, guided by biological goals and objectives and
23 by *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and*
24 *Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*,
25 *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*,
26 *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
27 *Vireo, Western Yellow-Billed Cuckoo*, which would be in place throughout the construction period,
28 the effects of habitat loss and potential mortality on yellow-breasted chat under Alternative 9 would
29 not be adverse.

30 **CEQA Conclusion:**

31 **Near-Term Timeframe**

32 Because the water conveyance facilities construction is being evaluated at the project level, the near-
33 term BDCP conservation strategy has been evaluated to determine whether it would provide
34 sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that the
35 impact of construction would be less than significant under CEQA. Alternative 9 would remove 751
36 acres of modeled habitat for yellow-breasted chat in the study area in the near-term. These effects
37 would result from the construction of the water conveyance facilities (CM1, 283 acres of modeled
38 nesting and migratory habitat), and implementing other conservation measures (*CM2 Yolo Bypass*
39 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated*
40 *Floodplain Restoration*—468 acres of modeled nesting and migratory habitat). These habitat losses
41 would primarily consist of small, fragmented riparian stands in CZ 2-CZ 8 that do not provide high-
42 value habitat for the species.

43 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
44 CM1 and that are identified in the biological goals and objectives for yellow-breasted chat in Chapter

1 3 of the BDCP would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian
2 habitat. Using these ratios would indicate that 283 acres of valley/foothill riparian habitat should be
3 restored/created and 283 acres should be protected to compensate for the CM1 losses of yellow-
4 breasted chat habitat. The near-term effects of other conservation actions would remove 468 acres
5 of modeled habitat, and therefore require 468 acres of restoration and 468 acres of protection of
6 valley/foothill riparian using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
7 protection).

8 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
9 valley/foothill riparian natural community in the study area (Table 3-4 in Chapter 3, *Description of*
10 *Alternatives*). These conservation actions are associated with CM3 and CM7 and would occur in the
11 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
12 habitat loss on yellow-breasted chat. The majority of the riparian restoration acres would occur in
13 CZ 7 as part of a reserve system with extensive wide bands or large patches of valley/foothill
14 riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation*
15 *Strategy*). Goals and objectives in the Plan for riparian restoration also include the restoration,
16 maintenance and enhancement of structural heterogeneity with adequate vertical and horizontal
17 overlap among vegetation components and over adjacent riverine channels, freshwater emergent
18 wetlands, and grasslands (Objective VFRNC2.1). The yellow-breasted chat has specific structural
19 habitat requirements, so only the early- to mid-successional portions of the restored and protected
20 riparian natural would be expected to provide suitable habitat characteristics for the species. These
21 natural community biological goals and objectives would inform the near-term protection and
22 restoration efforts and represent performance standards for considering the effectiveness of
23 conservation actions for the species.

24 The acres of protection contained in the near-term Plan goals and the additional detail in the
25 biological objectives for yellow-breasted chat satisfy the typical mitigation ratios that would be
26 applied to the project-level effects of CM1, as well as mitigate the near-term effects of the other
27 conservation measures. The restored riparian habitat could require 5 years to several decades, for
28 ecological succession to occur and for restored riparian habitat to functionally replace habitat that
29 has been affected. However, because the modeled habitat impacted largely consists of small patches
30 of blackberry, willow, and riparian scrub, BDCP actions would not be expected to have a significant
31 population-level impact on the species in the near-term time period.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
36 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
37 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
38 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
39 which have since been updated and which are provided in Appendix 3B, *Environmental*
40 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

41 **Late Long-Term Timeframe**

42 The habitat model indicates that the study area supports approximately 14,547 acres of modeled
43 nesting and migratory habitat for yellow-breasted chat. Alternative 9 as a whole would result in the
44 permanent loss of and temporary effects on 1,047 acres of modeled habitat (7% of the modeled

1 habitat in the study area). These losses would occur from the construction of the water conveyance
2 facilities (CM1) and from *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
3 *Restoration, and CM5 Seasonally Inundated Floodplain Restoration*. The locations of these losses
4 would be in fragmented riparian habitat throughout the study area.

5 The Plan includes conservation commitments through *CM7 Riparian Natural Community Restoration*
6 and *CM3 Natural Communities Protection and Restoration* to restore or create at least 5,000 acres
7 and protect at least 750 acres of valley/foothill riparian woodland. Of the 5,000 acres of restored
8 riparian natural communities, a minimum of 3,000 acres of valley/foothill riparian would be
9 restored within the seasonally inundated floodplain, and 1,000 acres would be managed as dense
10 early to mid-successional riparian forest (Objectives VFRNC1.1 and VFRNC1.2). The yellow-breasted
11 chat has specific structural habitat requirements, so only the early- to mid-successional portions of
12 the restored and protected riparian natural would be expected to provide suitable habitat
13 characteristics for the species. Fluvial disturbance in restored riparian floodplains would help to
14 maintain early- to mid-successional vegetation. The resulting riparian systems would be subject to
15 natural erosion and deposition, which would provide conditions conducive to the establishment of
16 dense willow stands that are preferred by yellow-breasted chat for nesting. In addition, if
17 monitoring determined that cowbird parasitism was having an effect on the yellow-breasted
18 population in the study area, a cowbird control program would be implemented through *CM11*
19 *Natural Communities Enhancement and Management*. Goals and objectives in the Plan for riparian
20 restoration also include the maintenance and enhancement of structural heterogeneity (Objective
21 VFRNC2.1) which would provide suitable habitat for yellow-breasted chat.

22 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
23 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
24 the restoration of 2,683 acres and the protection of 594 acres of habitat for the yellow-breasted
25 chat.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
27 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
28 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
29 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM22*
30 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
31 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
32 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
33 which have since been updated and which are provided in Appendix 3B, *Environmental*
34 *Commitments, AMMs, and CMs*, to the Final EIR/EIS.

35 In the absence of other conservation actions, the effects on yellow-breasted chat habitat from
36 Alternative 9 would represent an adverse effect as a result of habitat modification and potential for
37 direct mortality of special-status species. Considering these protection and restoration provisions,
38 which would provide acreages of new or enhanced habitat in amounts suitable to compensate for
39 habitats lost to construction and restoration activities, and with implementation of AMM1-AMM7
40 and AMM22 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
41 *Cuckoo*, the loss of habitat or direct mortality through implementation of Alternative 9 would not
42 result in a substantial adverse effect through habitat modifications and would not substantially
43 reduce the number or restrict the range of the species. Therefore, the loss of habitat or potential
44 mortality under this alternative would have a less-than-significant impact on yellow-breasted chat.

1 **Impact BIO-105: Fragmentation of Yellow-Breasted Chat Habitat as a Result of Constructing**
2 **the Water Conveyance Facilities**

3 Grading, filling, contouring, and other initial ground-disturbing activities for water conveyance
4 facilities construction may temporarily fragment modeled yellow-breasted chat habitat. This could
5 temporarily reduce the extent of and functions supported by the affected habitat. Because of the
6 current infrequent occurrence and small numbers of yellow-breasted chat in the Plan Area, and
7 because *CM5 Seasonally Inundated Floodplain Restoration* would restore and protect contiguous
8 high-value riparian habitat in CZ 7, any such habitat fragmentation is expected to have no or
9 minimal effect on the species.

10 **NEPA Effects:** Temporary fragmentation of habitat would not result in an adverse effect on yellow-
11 breasted chat. The habitat functions for the species would be significantly improved through the
12 implementation of CM5, which would restore and protect large contiguous patches of riparian
13 habitat.

14 **CEQA Conclusion:** Temporary fragmentation of habitat would have a less-than-significant impact on
15 yellow-breasted chat. The habitat functions for the species would be significantly improved through
16 the implementation of CM5, which would restore and protect large contiguous patches of riparian
17 habitat.

18 **Impact BIO-106: Effects on Yellow-Breasted Chat Associated with Electrical Transmission**
19 **Facilities**

20 Yellow-breasted chats are migratory and usually arrive at California breeding grounds in April from
21 their wintering grounds in Mexico and Guatemala. Departure for wintering grounds occurs from
22 August to September. These are periods of relative high visibility when the risk of powerline
23 collisions will be low. The species' small, relatively maneuverable body; its foraging behavior; and its
24 presence in the Plan Area during the summer contribute to a low risk of collision with the proposed
25 transmission lines (BDCP Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP*
26 *Transmission Lines*). Marking transmission lines with flight diverters that make the lines more
27 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
28 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
29 by 60%. All new project transmission lines would be fitted with flight diverters. Bird flight diverters
30 would further reduce any potential for powerline collisions.

31 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
32 adverse effect on yellow-breasted chat because the risk of bird strike is considered to be minimal
33 based on the species' small, relatively maneuverable body; its foraging behavior; and its presence in
34 the Plan Area during the summer during periods of high visibility. Under *AMM20 Greater Sandhill*
35 *Crane*, all new project transmission lines would be fitted with bird diverters, which would further
36 reduce any potential for powerline collisions.

37 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
38 significant impact on yellow-breasted chat because the risk of bird strike is considered to be
39 minimal based on the species' small, relatively maneuverable body; its foraging behavior; and its
40 presence in the Plan Area during the summer during periods of high visibility. Under *AMM20 Greater*
41 *Sandhill Crane*, all new project transmission lines would be fitted with bird diverters, which would
42 further reduce any potential for powerline collisions.

1 **Impact BIO-107: Indirect Effects of Plan Implementation on Yellow-Breasted Chat**

2 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
 3 with construction-related activities could result in temporary disturbances that affect yellow-
 4 breasted chat use of modeled habitat adjacent to proposed construction areas. Construction noise
 5 above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge
 6 of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*
 7 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to
 8 determine the extent to which these noise levels could affect yellow-breasted chat. Indirect effects
 9 associated with construction include noise, dust, and visual disturbance caused by grading, filling,
 10 contouring, and other ground-disturbing operations outside the project footprint but within 1,300
 11 feet from the construction edge. If yellow-breasted chat were to nest in or adjacent to work areas,
 12 construction and subsequent maintenance-related noise and visual disturbances could mask calls,
 13 disrupt foraging and nesting behaviors, and reduce the functions of suitable nesting habitat for these
 14 species. These potential effects would be minimized with incorporation of *AMM22 Suisun Song*
 15 *Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* into the BDCP, which
 16 would ensure 250 foot no-disturbance buffers were established around active nests. The use of
 17 mechanical equipment during water conveyance facilities construction could cause the accidental
 18 release of petroleum or other contaminants that could affect yellow-breasted chat in the
 19 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to yellow-
 20 breasted chat habitat could also affect the species. *AMM1-AMM7*, including *AMM2 Construction Best*
 21 *Management Practices and Monitoring*, in addition to *AMM22 Suisun Song Sparrow, Yellow-Breasted*
 22 *Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would minimize the likelihood of such spills
 23 from occurring and ensure that measures were in place to prevent runoff from the construction area
 24 and any adverse effects of dust on active nests. If present, yellow-breasted chat individuals could be
 25 temporarily affected by noise and visual disturbances adjacent to water conveyance construction
 26 sites, reducing the use of an estimated 59 acres of modeled primary nesting and migratory habitat
 27 and 119 acres of secondary nesting and migratory habitat. *AMM22 Suisun Song Sparrow, Yellow-*
 28 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would avoid and minimize this effect
 29 on the species.

30 **Methylmercury Exposure:** Yellow-breasted chat modeled habitat includes primarily middle marsh
 31 habitat with select emergent wetland plant alliances in Suisun Marsh. High marsh is also used if it is
 32 of high value, and low marsh provides foraging habitat for the species. Chats are a top predator in
 33 the benthic food chain; they forage by probing their beaks into the mud (Zembal and Fanher 1988)
 34 and prey primarily on mussels, spiders, seeds and hulls of cordgrass, and insects (Eddleman and
 35 Conway 1998).

36 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
 37 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
 38 species would overestimate the effects on yellow-breasted chat. Organisms feeding within pelagic-
 39 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
 40 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
 41 segregation (Grimaldo et al. 2009).

42 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
 43 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
 44 Thus, Alternative 9 restoration activities that create newly inundated areas could increase
 45 bioavailability of mercury. Concentrations of methylmercury known to be toxic to bird embryos

1 have been found in the eggs of San Francisco Bay clapper rails (Schwarzbach and Adelsbach 2003);
 2 however, currently, it is unknown how much of the sediment-derived methylmercury enters the
 3 food chain in Suisun Marsh or what tissue concentrations are actually harmful to the yellow-
 4 breasted chat. In general, the highest methylation rates are associated with high tidal marshes that
 5 experience intermittent wetting and drying and associated anoxic conditions (Alpers et al. 2008). In
 6 Suisun Marsh, the conversion of managed wetlands to tidal wetlands is expected to result in an
 7 overall reduction in mercury methylation. Due to the complex and very site-specific factors that
 8 determine if mercury becomes mobilized into the foodweb, *CM12 Methylmercury Management* is
 9 included to provide for site-specific evaluation for each restoration project. If a project is identified
 10 where there is a high potential for methylmercury production that could not be fully addressed
 11 through restoration design and adaptive management, alternate restoration areas would be
 12 considered. CM12 would be implemented in coordination with other similar efforts to address
 13 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
 14 conservation measure would include the following actions.

- 15 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
 16 mercury methylation and bioavailability.
- 17 ● Define design elements that minimize conditions conducive to generation of methylmercury in
 18 restored areas.
- 19 ● Define adaptive management strategies that can be implemented to monitor and minimize
 20 actual postrestoration creation and mobilization of methylmercury.

21 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 22 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 23 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 24 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 25 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 26 classes within a species. In addition, the effect of selenium on a species can be confounded by
 27 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 28 2009).

29 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
 30 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
 31 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
 32 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
 33 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
 34 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
 35 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
 36 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
 37 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
 38 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
 39 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
 40 have a higher risk of selenium toxicity.

41 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 42 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 43 exacerbate bioaccumulation of selenium in avian species, including yellow-breasted chat. Marsh
 44 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,

1 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
2 Alternative 9 restoration activities that create newly inundated areas could increase bioavailability
3 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
4 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
5 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
6 increases in selenium concentrations in water in the Delta under any alternative. However, it is
7 difficult to determine whether the effects of potential increases in selenium bioavailability
8 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
9 effects on yellow-breasted chat.

10 Because of the uncertainty that exists at this programmatic level of review, there could be a
11 substantial effect on yellow-breasted chat from increases in selenium associated with restoration
12 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
13 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
14 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
15 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
16 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
17 separately for each restoration effort as part of design and implementation. This avoidance and
18 minimization measure would be implemented as part of the tidal habitat restoration design
19 schedule.

20 **NEPA Effects:** The potential for noise and visual disturbance, hazardous spills, increased dust and
21 sedimentation, and the potential impacts of operations and maintenance of the water conveyance
22 facilities would not result in an adverse effect on yellow-breasted chat with the incorporation of
23 *AMM1–AMM7* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
24 *Yellow-Billed Cuckoo* into the BDCP.

25 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
26 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
27 the yellow-breasted chat foodweb to methylmercury in these areas, with the level of exposure
28 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
29 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
30 to reduce the overall production of methylmercury, resulting in a net benefit to species.
31 Implementation of *CM12*, which contains measures to assess the amount of mercury before project
32 development, followed by appropriate design and adaptation management, would minimize the
33 potential for increased methylmercury exposure, and would result in no adverse effect on the
34 species.

35 Tidal habitat restoration could result in increased exposure of yellow-breasted chat to selenium.
36 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
37 would provide specific tidal habitat restoration design elements to reduce the potential for
38 bioaccumulation of selenium and its bioavailability in tidal habitats.

39 **CEQA Conclusion:** The potential for noise and visual disturbance, hazardous spills, increased dust
40 and sedimentation, and the potential impacts of operations and maintenance of the water
41 conveyance facilities would have a less-than-significant impact on yellow-breasted chat with the
42 incorporation of *AMM1–AMM7*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
43 *Vireo, Western Yellow-Billed Cuckoo* into the BDCP.

1 Restoration actions that would create tidal marsh could provide biogeochemical conditions for
2 methylation of mercury in the newly inundated soils. There is potential for increased exposure of
3 the yellow-breasted chat foodweb to methylmercury in these areas, with the level of exposure
4 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
5 However, the conversion of managed wetlands to tidal wetlands in Suisun Marsh would be expected
6 to reduce the overall production of methylmercury, resulting in a net benefit to species.
7 Implementation of CM12, which contains measures to assess the amount of mercury before project
8 development, followed by appropriate design and adaptation management, would minimize the
9 potential for increased methylmercury exposure, and would result in no adverse effect on the
10 species.

11 Tidal habitat restoration could result in increased exposure of yellow-breasted chat to selenium.
12 With implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
13 restoration design elements to reduce the potential for bioaccumulation of selenium and its
14 bioavailability in tidal habitats, the impact of potential increased exposure to selenium would be less
15 than significant.

16 **Impact BIO-108: Periodic Effects of Inundation of Yellow-Breasted Chat Habitat as a Result of**
17 **Implementation of Conservation Components**

18 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
19 duration of inundation of approximately 48–88 acres of modeled yellow-breasted chat nesting and
20 migratory habitat. No adverse effects of increased inundation frequency on yellow-breasted chat or
21 its habitat are expected because the chat breeding period is outside the period the weir would be
22 operated. Moreover, riparian vegetation supporting habitat has persisted under the existing Yolo
23 Bypass flooding regime, and changes to frequency and inundation would be within the tolerance of
24 these vegetation types.

25 Based on hypothetical floodplain restoration, CM5 could result in periodic inundation of up to 148
26 acres of modeled yellow-breasted chat habitat. Inundation of restored floodplains is not expected to
27 affect yellow-breasted chat or its habitat because the chat breeding period is outside the period the
28 floodplains would likely be inundated. In addition, providing for periodic inundation of floodplains
29 is expected to restore a more natural flood regime in support of riparian vegetation types that
30 provide nesting and migratory habitat for yellow-breasted chat. The overall effect of seasonal
31 inundation in existing riparian natural communities is likely to be beneficial because, historically,
32 flooding was the main natural disturbance regulating ecological processes in riparian areas, and
33 flooding promotes the germination and establishment of many native riparian plants.

34 **NEPA Effects:** Increases in the frequency and duration of Yolo Bypass flooding and CM5 floodplain
35 restoration would be expected to create more natural flood regimes that would support riparian
36 habitat, which would not result in an adverse effect on yellow breasted chat.

37 **CEQA Conclusion:** Periodic inundation would have a less-than-significant impact on yellow-breasted
38 chat because inundation would occur outside of the breeding season and would not be expected to
39 adversely modify habitat or result in direct mortality of the species. Flooding promotes the
40 germination and establishment of many native riparian plants. Therefore, the overall impact of
41 seasonal inundation would be beneficial for yellow-breasted chat.

1 Cooper's Hawk and Osprey

2 This section describes the effects of Alternative 9, including water conveyance facilities construction
3 and implementation of other conservation components, on Cooper's hawk and osprey. Although
4 osprey often nest on manmade structures such as telephone poles, and Cooper's hawk will nest in
5 more developed landscapes, modeled breeding habitat for these species is restricted to
6 valley/foothill riparian forest.

7 Construction and restoration associated with Alternative 9 conservation measures would result in
8 both temporary and permanent losses of Cooper's hawk and osprey modeled habitat as indicated in
9 Table 12-9-43. The majority of the losses would take place over an extended period of time as tidal
10 marsh is restored in the study area. Although restoration for the loss of nesting habitat would be
11 initiated in the same timeframe as the losses, it could take one or more decades for restored habitats
12 to replace the functions of habitat lost. This time lag between impacts and restoration of habitat
13 function would be minimized by specific requirements of *AMM18 Swainson's Hawk*, including the
14 planting of mature trees in the near-term time period. Full implementation of Alternative 9 would
15 include the following conservation actions over the term of the BDCP that would also benefit
16 Cooper's hawk and osprey (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 17 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
18 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
19 associated with CM7)
- 20 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
21 10 (Objective VFRNC1.2, associated with CM3).
- 22 • Plant and maintain native trees along roadsides and field borders within protected cultivated
23 lands at a rate of one tree per 10 acres (Objective SH2.1, associated with CM11).
- 24 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
25 lands within the reserve system including isolated valley oak trees, trees and shrubs along field
26 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
27 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

28 As explained below, with the acres of restoration or protection included in the Plan, in addition to
29 management activities to enhance natural communities for species and implementation of AMM1-
30 AMM7, *AMM18 Swainson's Hawk*, and Mitigation Measure BIO-75, impacts on Cooper's hawk and
31 osprey would not be adverse for NEPA purposes and would be less than significant for CEQA
32 purposes.

1 **Table 12-9-43. Changes in Cooper’s Hawk and Osprey Modeled Habitat Associated with**
2 **Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	43	43	89	89	NA	NA
Total Impacts CM1		43	43	89	89	NA	NA
CM2–CM18	Nesting	312	507	88	121	48–82	230
Total Impacts CM2–CM18		312	507	88	121	48–82	230
TOTAL IMPACTS		355	550	177	210	48–82	230

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-109: Loss or Conversion of Habitat for and Direct Mortality of Cooper’s Hawk and**
5 **Osprey**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss
7 of up to 760 acres of modeled nesting habitat for Cooper’s hawk and osprey (Table 12-9-43).
8 Conservation measures that would result in these losses are *CM1 Water Facilities and Operations*
9 (which would involve conveyance facilities and transmission line construction, and establishment
10 and use of borrow and spoil areas), Yolo Bypass fisheries improvements (CM2), tidal habitat
11 restoration (CM4), and floodplain restoration (CM5). Habitat enhancement and management
12 activities (CM11), which include ground disturbance or removal of nonnative vegetation, could
13 result in local adverse habitat effects. In addition, maintenance activities associated with the long-
14 term operation of the water conveyance facilities and other BDCP physical facilities could affect
15 Cooper’s hawk and osprey modeled habitat. Each of these individual activities is described below. A
16 summary statement of the combined impacts and NEPA and CEQA conclusions follows the
17 individual conservation measure discussions.

- 18 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 water conveyance facilities
19 would result in the combined permanent and temporary loss of up to 132 acres of modeled
20 Cooper’s hawk and osprey habitat (Table 12-9-43). Of the 132 acres of modeled habitat that
21 would be removed for the construction of the conveyance facilities, 43 acres would be a
22 permanent loss and 89 acres would be a temporary loss of habitat. Activities that would impact
23 nesting habitat include channel dredging, intakes, fish barriers, access roads, and construction of
24 transmission lines. Of the 132 acres of nesting habitat that would be removed for the
25 construction of the conveyance facilities, 43 acres would be a permanent loss and 89 acres
26 would be a temporary loss of habitat. Permanent losses would primarily consist of channel

1 enlargement at the Sacramento River and Meadows Slough. Temporary losses would occur
 2 primarily along Middle River between Victoria Canal and Mildred Island, where large dredging
 3 work areas and operable barrier work areas would be placed. The riparian habitat in these areas
 4 is composed of very small patches or stringers bordering waterways, which are composed of
 5 valley oak and scrub vegetation. There are no occurrences of Cooper’s hawk or osprey that
 6 overlap with the construction footprint for CM1. Mitigation Measure BIO-75, *Conduct*
 7 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would require
 8 preconstruction surveys and the establishment of no-disturbance buffers and would be
 9 available to address potential effects on cooper’s hawk and osprey if either species were to nest
 10 in or adjacent to the construction footprint. Refer to the Terrestrial Biology Map Book for a
 11 detailed view of Alternative 9 construction locations. Impacts from CM1 would occur within the
 12 first 10 years of Alternative 9 implementation.

- 13 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 14 would result in the combined permanent and temporary loss of up to 170 acres of Cooper’s
 15 hawk and osprey nesting habitat (82 acres of permanent loss, 88 acres of temporary loss) in the
 16 Yolo Bypass in CZ 2. Activities through CM2 could involve excavation and grading in
 17 valley/foothill riparian areas to improve passage of fish through the bypasses. Most of the
 18 riparian losses would occur at the north end of Yolo Bypass where major fish passage
 19 improvements are planned. Excavation to improve water movement in the Toe Drain and in the
 20 Sacramento Weir would also remove potential Cooper’s hawk and osprey habitat. The loss is
 21 expected to occur during the first 10 years of Alternative 9 implementation.
- 22 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration could permanently
 23 remove up to 383 acres of potential Cooper’s hawk and osprey nesting habitat. Trees would not
 24 be actively removed but tree mortality would be expected over time as areas became tidally
 25 inundated.
- 26 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 27 seasonally inundated floodplain and riparian restoration actions would remove approximately
 28 75 acres of Cooper’s hawk and osprey nesting habitat (42 acres of permanent loss, 33 acres of
 29 temporary loss). These losses would be expected after the first 10 years of Alternative 9
 30 implementation along the San Joaquin River and other major waterways in CZ 7.
- 31 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
 32 enhancement-related activities could disturb Cooper’s hawk and osprey nests if they were
 33 present near work sites. A variety of habitat management actions included in *CM11 Natural*
 34 *Communities Enhancement and Management* that are designed to enhance wildlife values in
 35 BDCP-protected habitats may result in localized ground disturbances that could temporarily
 36 remove small amounts of Cooper’s hawk and osprey habitat and reduce the functions of habitat
 37 until restoration is complete. Ground-disturbing activities, such as removal of nonnative
 38 vegetation and road and other infrastructure maintenance, are expected to have minor effects
 39 on available Cooper’s hawk and osprey habitat and are expected to result in overall
 40 improvements to and maintenance of habitat values over the term of the BDCP. These effects
 41 cannot be quantified, but are expected to be minimal and would be avoided and minimized by
 42 the AMMs listed below.

43 Permanent and temporary habitat losses from the above conservation measures would
 44 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored
 45 as riparian habitat within 1 year following completion of construction activities. Although the

1 effects are considered temporary, the restored riparian habitat would require 1 to several
2 decades to functionally replace habitat that has been affected and for trees to attain sufficient
3 size and structure suitable for nesting by Cooper's hawk or osprey. *AMM18 Swainson's Hawk*
4 contains actions described below to reduce the effect of temporal loss of nesting habitat,
5 including the transplanting of mature trees.

- 6 • **Operations and Maintenance:** Postconstruction operation and maintenance of the above-ground
7 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
8 disturbances that could affect Cooper's hawk or osprey use of the surrounding habitat.
9 Maintenance activities would include vegetation management, levee and structure repair, and
10 re-grading of roads and permanent work areas. These effects, however, would be reduced by
11 AMM1–AMM7 and conservation actions as described below.
- 12 • **Injury and Direct Mortality:** Construction-related activities would not be expected to result in
13 direct mortality of adult or fledged Cooper's hawk or osprey if they were present in the Plan
14 Area, because they would be expected to avoid contact with construction and other equipment.
15 If Cooper's hawk or osprey were to nest in the construction area, construction-related activities,
16 including equipment operation, noise and visual disturbances could affect nests or lead to their
17 abandonment, potentially resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
18 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
19 be available to address these effects on Cooper's hawk and osprey.

20 The following paragraphs summarize the combined effects discussed above and describe other
21 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
22 included.

23 ***Near-Term Timeframe***

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
27 effect of construction would not be adverse under NEPA. Alternative 9 would remove 532 acres
28 (355 acres of permanent loss, 177 acres of temporary loss) of Cooper's hawk and osprey nesting
29 habitat in the study area in the near-term. These effects would result from the construction of the
30 water conveyance facilities (CM1, 132 acres), and implementing other conservation measures (*CM2*
31 *Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally*
32 *Inundated Floodplain Restoration*—400 acres of habitat).

33 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
34 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.
35 Using these ratios would indicate that 132 acres of nesting habitat should be restored/created and
36 132 acres should be protected to compensate for the CM1 losses of modeled Cooper's hawk and
37 osprey habitat. In addition, the near-term effects of other conservation actions would remove 400
38 acres of modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of
39 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios.

40 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
41 valley/foothill riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*).
42 These conservation actions are associated with CM3, and CM7 and would occur in the same
43 timeframe as the construction and early restoration losses. The majority of riparian protection and

1 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
2 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP
3 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing
4 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would
5 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within
6 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in
7 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of
8 potential nest trees would be increased by planting and maintaining native trees along roadsides
9 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective
10 SWHA2.1).

11 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
12 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
13 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored
14 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but
15 would require one to several decades to functionally replace habitat that has been affected and for
16 trees to attain sufficient size and structure suitable for nesting by these species. This time lag
17 between the removal and restoration of nesting habitat could have a substantial impact on nesting
18 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,
19 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
20 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
21 habitat would further reduce this limited resource and could reduce or restrict the number of active
22 nests within the study area until restored riparian habitat is sufficiently developed.

23 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
24 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
25 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
26 within the 125-acre block are removed. These mature trees would be supplemented with additional
27 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
28 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
29 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
30 system for every tree 20 feet or taller removed by construction during the near-term period. A
31 variety of native tree species would be planted to provide trees with differing growth rates,
32 maturation, and life span. Trees would be planted within the BDCP reserve system in areas that
33 support high-value Swainson's hawk foraging habitat to increase nest sites, or within riparian
34 plantings as a component of the riparian restoration (CM5, CM7). Replacement trees that were
35 incorporated into the riparian restoration would not be clustered in a single region of the study
36 area, but would be distributed throughout the conserved lands. Further details of AMM18 are
37 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

38 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
41 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
42 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
43 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
44 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
45 to the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. In
46 order for the BDCP to avoid an adverse effect on individuals, preconstruction surveys for

1 noncovered avian species would be required to ensure that active nests are detected and avoided.
2 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
3 *Nesting Birds*, would be available to address this adverse effect.

4 **Late Long-Term Timeframe**

5 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk
6 and osprey. Alternative 9 as a whole would result in the permanent loss of and temporary effects on
7 760 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

8 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
9 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*
10 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
11 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of
12 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with
13 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives
14 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would
15 expand the patches of existing riparian forest in order to support nesting habitat for riparian
16 species. The Plan's objectives would also benefit Cooper's hawk and osprey by protecting small but
17 essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,
18 and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition, the
19 distribution and abundance of potential nest trees would be increased by planting and maintaining
20 native trees along roadsides and field borders within protected cultivated lands at a rate of one tree
21 per 10 acres (Objective SWHA2.1).

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
26 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
27 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
28 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
29 to the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. In
30 order for the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
31 noncovered avian species would be required to ensure that active nests are detected and avoided.
32 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
33 *Nesting Birds*, would be available to address this adverse effect.

34 **NEPA Effects:** The loss of Cooper's hawk and osprey habitat and potential direct mortality of these
35 special-status species under Alternative 9 would represent an adverse effect in the absence of other
36 conservation actions. However, with habitat protection and restoration associated with CM3, CM5,
37 CM7, guided by biological goals and objectives and by AMM1-AMM7 and *AMM18 Swainson's Hawk*,
38 which would be in place throughout the construction period, the effects of habitat loss on Cooper's
39 hawk and osprey under Alternative 9 would not be adverse. Cooper's hawk and osprey are not
40 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
41 preconstruction surveys for noncovered avian species would be required to ensure that nests are
42 detected and avoided. Mitigation Measure BIO-75 would be available to address this effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
4 the near-term BDCP conservation strategy has been evaluated to determine whether it would
5 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
6 effect of construction would not be adverse under NEPA. Alternative 9 would remove 532 acres
7 (355 acres of permanent loss, 177 acres of temporary loss) of Cooper's hawk and osprey nesting
8 habitat in the study area in the near-term. These effects would result from the construction of the
9 water conveyance facilities (CM1, 132 acres), and implementing other conservation measures (CM2
10 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*
11 *Inundated Floodplain Restoration*—400 acres of habitat).

12 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
13 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat
14 Using these ratios would indicate that 132 acres of nesting habitat should be restored/created and
15 132 acres should be protected to compensate for the CM1 losses of modeled Cooper's hawk and
16 osprey habitat. In addition, the near-term effects of other conservation actions would remove 400
17 acres of modeled breeding habitat, and therefore require 400 acres of restoration and 400 acres of
18 protection of modeled Cooper's hawk and osprey using the same typical NEPA and CEQA ratios.

19 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of
20 valley/foothill riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*).
21 These conservation actions are associated with CM3, and CM7 and would occur in the same
22 timeframe as the construction and early restoration losses. The majority of riparian protection and
23 restoration acres would occur in CZ 7 as part of a reserve system with extensive wide bands or large
24 patches of valley/foothill riparian natural community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP
25 Chapter 3, *Conservation Strategy*). Riparian restoration would expand the patches of existing
26 riparian forest in order to support nesting habitat for riparian species. The Plan's objectives would
27 also benefit Cooper's hawk and osprey by protecting small but essential habitats that occur within
28 cultivated lands, such as tree rows along field borders or roads, and small clusters of trees in
29 farmyards or rural residences (Objective CLNC1.3). In addition, the distribution and abundance of
30 potential nest trees would be increased by planting and maintaining native trees along roadsides
31 and field borders within protected cultivated lands at a rate of one tree per 10 acres (Objective
32 SWHA2.1).

33 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
34 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
35 other near-term impacts on Cooper's hawk and osprey nesting habitat. The 800 acres of restored
36 riparian habitat would be initiated in the near-term to offset the loss of modeled nesting habitat, but
37 would require one to several decades to functionally replace habitat that has been affected and for
38 trees to attain sufficient size and structure suitable for nesting by these species. This time lag
39 between the removal and restoration of nesting habitat could have a substantial impact on nesting
40 raptors in the near-term time period. Nesting habitat is limited throughout much of the study area,
41 consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders,
42 roadside trees, and ornamental trees near rural residences. The removal of nest trees or nesting
43 habitat would further reduce this limited resource and could reduce or restrict the number of active
44 nests within the study area until restored riparian habitat is sufficiently developed.

1 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
 2 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
 3 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
 4 within the 125-acre block are removed. These would be supplemented with additional saplings and
 5 would be expected to reduce the temporal effects of loss of nesting habitat. The plantings would
 6 occur prior to or concurrent with (in the case of transplanting) the loss of trees. In addition, at least
 7 five trees (5-gallon container size) would be planted within the BDCP reserve system for every tree
 8 20 feet or taller removed by construction during the near-term period. A variety of native tree
 9 species would be planted to provide trees with differing growth rates, maturation, and life span.
 10 Trees would be planted within the BDCP reserve system in areas that support high-value Swainson's
 11 hawk foraging habitat to increase nest sites, or within riparian plantings as a component of the
 12 riparian restoration (CM5, CM7). Replacement trees that were incorporated into the riparian
 13 restoration would not be clustered in a single region of the study area, but would be distributed
 14 throughout the conserved lands. Further details of AMM18 are provided in Appendix 3B,
 15 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

16 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 17 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 18 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 19 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 20 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 21 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 22 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 23 to the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. In
 24 order for the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
 25 noncovered avian species would be required to ensure that active nests are detected and avoided.
 26 Implementation of Mitigation Measure BIO-75 would reduce the potential impact on nesting
 27 Cooper's hawk and osprey to a less-than-significant level.

28 ***Late Long-Term Timeframe***

29 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk
 30 and osprey. Alternative 9 as a whole would result in the permanent loss of and temporary effects on
 31 760 acres of potential nesting habitat (5% of the potential nesting habitat in the study area).

32 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 33 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*
 34 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
 35 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of
 36 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with
 37 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives
 38 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would
 39 expand the patches of existing riparian forest in order to support nesting habitat for riparian
 40 species. The Plan's objectives would also benefit Cooper's hawk and osprey by protecting small but
 41 essential habitats that occur within cultivated lands, such as tree rows along field borders or roads,
 42 and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition, the
 43 distribution and abundance of potential nest trees would be increased by planting and maintaining
 44 native trees along roadsides and field borders within protected cultivated lands at a rate of one tree
 45 per 10 acres (Objective SWHA2.1).

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
8 to the Final EIR/EIS. Cooper's hawk and osprey are not species that are covered under the BDCP. In
9 order for the BDCP to have a less-than-significant impact on individuals, preconstruction surveys for
10 noncovered avian species would be required to ensure that active nests are detected and avoided.
11 Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
12 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

13 Considering Alternative 9's protection and restoration provisions, which would provide acreages of
14 new or enhanced habitat in amounts greater than necessary to compensate for the time lag of
15 restoring riparian habitats lost to construction and restoration activities, and with implementation
16 of AMM1-AMM7, *AMM18 Swainson's Hawk*, and Mitigation Measure BIO-75, the loss of habitat or
17 direct mortality through implementation of Alternative 9 would not result in a substantial adverse
18 effect through habitat modifications and would not substantially reduce the number or restrict the
19 range of Cooper's hawk and osprey. Therefore, the loss of habitat or potential mortality under this
20 alternative would have a less-than-significant impact on Cooper's hawk and osprey.

21 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
22 **Disturbance of Nesting Birds**

23 See Mitigation Measure BIO-75 under Impact BIO-75.

24 **Impact BIO-110: Effects on Cooper's Hawk and Osprey Associated with Electrical**
25 **Transmission Facilities**

26 New transmission lines would increase the risk for bird-power line strikes, which could result in
27 injury or mortality of Cooper's hawk and osprey. However, the flight behavior of these species, their
28 keen vision, and high maneuverability substantially reduce the risk of powerline collisions. The
29 existing network of transmission lines in the project area currently poses the same small risk for
30 Cooper's hawk and osprey, and any incremental risk associated with the new power line corridors
31 would also be expected to be low. Marking transmission lines with flight diverters that make the
32 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
33 Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian
34 mortality by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission
35 lines would be fitted with flight diverters, which would further reduce any risk of collision with
36 lines.

37 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
38 adverse effect because the risk of bird strike is considered to be minimal based on the flight
39 behavior, the general maneuverability, and keen eyesight of Cooper's hawk and osprey. In addition,
40 *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters on all new
41 powerlines, which would further reduce any risk of mortality from bird strike for Cooper's hawk
42 and osprey as a result of the project. Therefore, the construction and operation of new transmission
43 lines under Alternative 9 would not result in an adverse effect on Cooper's hawk and osprey.

1 **CEQA Conclusion:** The construction and presence of new transmission lines would not represent an
2 adverse effect because the risk of bird strike is considered to be minimal based on the flight
3 behavior, the general maneuverability, and keen eyesight of Cooper's hawk and osprey. In addition,
4 *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters on all new
5 powerlines, which would further reduce any risk of mortality from bird strike for Cooper's hawk
6 and osprey as a result of the project. Therefore, the construction and operation of new transmission
7 lines under Alternative 9 would result in a less-than-significant impact on Cooper's hawk and
8 osprey.

9 **Impact BIO-111: Indirect Effects of Plan Implementation on Cooper's Hawk and Osprey**

10 **Indirect Construction- and Operation-Related Effects:** Construction noise above background
11 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
12 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
13 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
14 the extent to which these noise levels could affect Cooper's hawk or osprey. If Cooper's hawk or
15 osprey were to nest in or adjacent to work areas, construction and subsequent maintenance-related
16 noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce
17 the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct*
18 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid the
19 potential for adverse effects of construction-related activities on survival and productivity of nesting
20 Cooper's hawk and osprey. The use of mechanical equipment during water conveyance facilities
21 construction could cause the accidental release of petroleum or other contaminants that could affect
22 Cooper's hawk and osprey in the surrounding habitat. The inadvertent discharge of sediment or
23 excessive dust adjacent to suitable habitat could also have an adverse effect on these species.
24 *AMM1-AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*, would
25 minimize the likelihood of such spills and ensure that measures are in place to prevent runoff from
26 the construction area and negative effects of dust on active nests.

27 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
28 mercury in avian species, including Cooper's hawk and osprey. Future operational impacts under
29 CM1 were analyzed using a DSM-2 based model to assess potential effects on mercury concentration
30 and bioavailability resulting from proposed flows. Subsequently, a regression model was used to
31 estimate fish-tissue concentrations under these future operational conditions (evaluated starting
32 operations or ESO). Results indicated that changes in total mercury levels in water and fish tissues
33 due to ESO were insignificant (see BDCP Appendix 5.D, Tables 5D.4-3, 5D.4-4, and 5D.4-5).

34 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to
35 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
36 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
37 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas
38 could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of
39 restoration). Species sensitivity to methylmercury differs widely and there is a large amount of
40 uncertainty with respect to species-specific effects. Increased methylmercury associated with
41 natural community and floodplain restoration could indirectly affect cooper's hawk and osprey, via
42 uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

43 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
44 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*

1 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
2 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
3 adaptive management as described in CM12 would be available to address the uncertainty of
4 methylmercury levels in restored tidal marsh and potential impacts on cooper's hawk and osprey.

5 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
6 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
7 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
8 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
9 2009). The effect of selenium toxicity differs widely between species and also between age and sex
10 classes within a species. In addition, the effect of selenium on a species can be confounded by
11 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
12 2009).

13 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
14 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
15 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
16 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
17 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
18 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
19 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
20 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
21 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
22 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
23 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
24 have a higher risk of selenium toxicity.

25 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
26 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
27 exacerbate bioaccumulation of selenium in avian species, including Cooper's hawk and osprey.
28 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
29 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
30 Alternative 9 restoration activities that create newly inundated areas could increase bioavailability
31 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
32 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
33 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
34 increases in selenium concentrations in water in the Delta under any alternative. However, it is
35 difficult to determine whether the effects of potential increases in selenium bioavailability
36 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
37 effects on Cooper's hawk and osprey.

38 Because of the uncertainty that exists at this programmatic level of review, there could be a
39 substantial effect on Cooper's hawk and osprey from increases in selenium associated with
40 restoration activities. This effect would be addressed through the implementation of *AMM27*
41 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
42 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
43 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
44 selenium management to reduce selenium concentrations and/or bioaccumulation would be
45 evaluated separately for each restoration effort as part of design and implementation. This

1 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
2 design schedule.

3 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
4 could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas. Moreover,
5 operation and maintenance of the water conveyance facilities, including the transmission facilities,
6 could result in ongoing but periodic postconstruction disturbances that could affect Cooper's hawk
7 and osprey use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
8 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse
9 effects on nesting individuals in addition to AMM1–AMM7.

10 The implementation of tidal natural communities restoration or floodplain restoration could result
11 in increased exposure of Cooper's hawk or osprey to methylmercury, through the ingestion of fish or
12 small mammals in tidally restored areas. However, it is currently unknown what concentrations of
13 methylmercury are harmful to these species and the potential for increased exposure varies
14 substantially within the study area. Site-specific restoration plans that address the creation and
15 mobilization of mercury, as well as monitoring and adaptive management as described in CM12
16 would better inform potential impacts and address the uncertainty of methylmercury levels in
17 restored tidal marsh in the study area on cooper's hawk and osprey. The site-specific planning phase
18 of marsh restoration would be the appropriate place to assess the potential for risk of
19 methylmercury exposure for Cooper's hawk and osprey, once site specific sampling and other
20 information could be developed.

21 Tidal habitat restoration could result in increased exposure of Cooper's hawk and osprey to
22 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
23 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
24 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

25 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
26 facilities could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas.
27 Moreover, operation and maintenance of the water conveyance facilities, including the transmission
28 facilities, could result in ongoing but periodic postconstruction disturbances that could affect
29 Cooper's hawk and osprey use of the surrounding habitat. Noise, the potential for hazardous spills,
30 increased dust and sedimentation, and operations and maintenance of the water conveyance
31 facilities under Alternative 9 would have a less-than-significant impact on Cooper's hawk and osprey
32 with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
33 *Surveys and Avoid Disturbance of Nesting Birds*, and AMM1–AMM7.

34 The implementation of tidal natural communities restoration or floodplain restoration could result
35 in increased exposure of Cooper's hawk or osprey to methylmercury through the ingestion of fish or
36 small mammals in restored tidal areas. However, it is currently unknown what concentrations of
37 methylmercury are harmful to these species. Site-specific restoration plans that address the creation
38 and mobilization of mercury, as well as monitoring and adaptive management as described in CM12,
39 would address the uncertainty of methylmercury levels in restored tidal marsh in the study area and
40 better inform potential impacts on Cooper's hawk and osprey.

41 Tidal habitat restoration could result in increased exposure of Cooper's hawk and osprey to
42 selenium. With implementation of *AMM27 Selenium Management*, which would provide specific tidal
43 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its

1 bioavailability in tidal habitats, the impact of potential increased exposure to selenium would be less
2 than significant.

3 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
4 **Disturbance of Nesting Birds**

5 See Mitigation Measure BIO-75 under Impact BIO-75.

6 **Impact BIO-112: Periodic Effects of Inundation of Cooper's Hawk and Osprey Nesting Habitat**
7 **as a Result of Implementation of Conservation Components**

8 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
9 duration of inundation of approximately 48–82 acres of modeled Cooper's hawk and osprey
10 breeding habitat. However, increased periodic flooding is not expected to cause any adverse effect on
11 breeding habitat because trees in which nest sites are situated already withstand floods, the
12 increase in inundation frequency and duration is expected to remain within the range of tolerance of
13 riparian trees, and nest sites are located above floodwaters.

14 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
15 inundation of up to 230 acres of breeding habitat for Cooper's hawk and osprey. The overall effect of
16 seasonal inundation in existing riparian natural communities is likely to be beneficial for these
17 species, because, historically, flooding was the main natural disturbance regulating ecological
18 processes in riparian areas, and flooding promotes the germination and establishment of many
19 native riparian plants.

20 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
21 sites because trees in which nest sites are situated already withstand floods, the increase in
22 inundation frequency and duration is expected to remain within the range of tolerance of riparian
23 trees, and nest sites are located above floodwaters. Therefore, increased duration and inundation
24 from CM2 and CM5 would not have an adverse effect on Cooper's hawk and osprey.

25 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
26 nest sites because trees in which nest sites are situated already withstand floods, the increase in
27 inundation frequency and duration is expected to remain within the range of tolerance of riparian
28 trees, and nest sites are located above floodwaters. Therefore, increased duration and inundation
29 from CM2 and CM5 would have a less-than-significant impact on Cooper's hawk and osprey.

30 **Golden Eagle and Ferruginous Hawk**

31 Modeled foraging habitat for these species consists of grassland, alkali seasonal wetland, vernal pool
32 complex, alfalfa, grain and hay, pasture, and idle cropland throughout the study area.

33 Construction and restoration associated with Alternative 9 conservation measures would result in
34 both temporary and permanent losses of golden eagle and ferruginous hawk modeled foraging
35 habitat as indicated in Table 12-9-44. Full implementation of Alternative 9 would include the
36 following conservation actions over the term of the BDCP that would benefit golden eagle and
37 ferruginous hawk (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 38 • Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least
39 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder
40 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).

- 1 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 2 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
- 3 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 4 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
- 5 VPNC2.5, and GNC2.4, associated with CM11).
- 6 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
- 7 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 8 • Within the 48,625 acres of protected cultivated lands, protect at least 42,275 acres of cultivated
- 9 lands as Swainson’s hawk foraging habitat with at least 50% in very high-value habitat in CZs 2,
- 10 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

11 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 12 management activities to enhance natural communities for species and implementation of AMM1–
 13 AMM7, impacts on golden eagle and ferruginous hawk would not be adverse for NEPA purposes and
 14 would be less than significant for CEQA purposes.

15 **Table 12-9-44. Changes in Golden Eagle and Ferruginous Hawk Habitat Associated with**
 16 **Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Foraging	318	318	1,281	1,281	NA	NA
Total Impacts CM1		318	318	1,281	1,281	NA	NA
CM2–CM18	Foraging	5,450	26,198	376	893	1,158–3,650	3,823
Total Impacts CM2–CM18		5,450	26,198	376	893	1,158–3,650	3,823
TOTAL IMPACTS		5,768	26,516	1,657	2,174	1,158–3,650	3,823

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

17

18 **Impact BIO-113: Loss or Conversion of Habitat for and Direct Mortality of Golden Eagle and**
 19 **Ferruginous Hawk**

20 Alternative 9 conservation measures would result in the combined permanent and temporary loss
 21 of up to 28,690 acres of modeled foraging habitat for golden eagle and ferruginous hawk (26,516
 22 acres of permanent loss and 2,174 acres of temporary loss, Table 12-9-44). Conservation measures
 23 that would result in these losses are conveyance facilities and transmission line construction, and

1 establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2),
 2 tidal habitat restoration (CM4), floodplain restoration (CM5), riparian restoration (CM7), grassland
 3 restoration (CM8), vernal pool and wetland restoration (CM9), nontidal marsh restoration (CM10),
 4 and construction of conservation hatcheries (CM18). The majority of habitat loss (20,880 acres)
 5 would result from CM4. Habitat enhancement and management activities (CM11), which include
 6 ground disturbance or removal of nonnative vegetation, and the construction of recreational trails,
 7 signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities
 8 associated with the long-term operation of the water conveyance facilities and other BDCP physical
 9 facilities could degrade or eliminate foraging habitat for both species. Each of these individual
 10 activities is described below. A summary statement of the combined impacts and NEPA effects, and a
 11 CEQA conclusion follows the individual conservation measure discussions.

- 12 ● *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would
 13 result in the combined permanent and temporary loss of up to 427 acres of modeled golden
 14 eagle and ferruginous hawk foraging habitat (83 acres of permanent loss, 344 acres of
 15 temporary loss) from CZ 4, 5, 6, 7, and 8. The permanent and temporary losses to habitat would
 16 occur at numerous locations where dredging, construction of operable barriers and canals, and
 17 channel enlargement would be undertaken. The CM1 construction footprint does not overlap
 18 with any occurrences of golden eagle or ferruginous hawk. Refer to the Terrestrial Biology Map
 19 Book for a detailed view of Alternative 9 construction locations. Impacts from CM1 would occur
 20 within the first 10 years of Alternative 9 implementation.
- 21 ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
 22 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
 23 golden eagle and ferruginous hawk foraging habitat (898 acres of permanent loss, 376 acres of
 24 temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of
 25 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass
 26 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.
 27 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland
 28 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10
 29 years of Alternative 9 implementation.
- 30 ● *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and
 31 inundation would permanently remove an estimated 20,880 acres of modeled golden eagle and
 32 ferruginous hawk habitat. The majority of the acres lost would consist of cultivated lands in CZs
 33 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache Slough, on
 34 Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow
 35 bands adjacent to waterways in the South Delta ROA. Tidal restoration would directly impact
 36 and fragment grassland just north of Rio Vista in and around French and Prospect Islands, and in
 37 an area south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex
 38 habitat would likely occur in the south end of the Yolo Bypass and on the northern fringes of
 39 Suisun Marsh.
- 40 ● *CM5 Seasonally Inundated Floodplain Restoration:* Construction of setback levees to restore
 41 seasonally inundated floodplain would permanently and temporarily remove approximately
 42 1,450 acres of modeled golden eagle and ferruginous hawk foraging habitat (933 permanent,
 43 517 temporary). These losses would be expected after the first 10 years of Alternative 9
 44 implementation along the San Joaquin River and other major waterways in CZ 7.

- 1 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
2 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
3 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
4 would be restored after the construction periods. Grassland restoration would be implemented
5 on agricultural lands that also provide foraging habitat for golden eagle and ferruginous hawk
6 and would result in the conversion of 837 acres of cultivated lands to grassland.
- 7 ● *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
8 removal of 705 acres of golden eagle and ferruginous hawk foraging habitat.
- 9 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
10 actions included in CM11 that are designed to enhance wildlife values in restored or protected
11 habitats could result in localized ground disturbances that could temporarily remove small
12 amounts of golden eagle and ferruginous hawk foraging habitat. Ground-disturbing activities,
13 such as removal of nonnative vegetation and road and other infrastructure maintenance
14 activities, would be expected to have minor adverse effects on available habitat for these
15 species. CM11 would also include the construction of recreational-related facilities including
16 trails, interpretive signs, and picnic tables (BDCP Chapter 4, *Covered Activities and Associated*
17 *Federal Actions*). The construction of trailhead facilities, signs, staging areas, picnic areas,
18 bathrooms, etc. would be placed on existing, disturbed areas when and where possible.
19 However, approximately 50 acres of grassland habitat would be lost from the construction of
20 trails and facilities.
- 21 ● *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
22 modeled golden eagle and ferruginous hawk foraging habitat for the development of a delta and
23 longfin smelt conservation hatchery in CZ 1.
- 24 ● *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
25 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
26 disturbances that could affect golden eagle and ferruginous hawk use of the surrounding habitat.
27 Maintenance activities would include vegetation management, levee and structure repair, and
28 re-grading of roads and permanent work areas. These effects, however, would be reduced by
29 AMM1–AMM7 and conservation actions as described below.
- 30 ● *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
31 golden eagle and ferruginous hawk because foraging individuals would be expected to
32 temporarily avoid the increased noise and activity associated with construction areas.

33 The following paragraphs summarize the combined effects discussed above and describe other
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
35 included.

36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would
39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
40 effects of construction would not be adverse under NEPA. Alternative 9 would remove 7,425 acres
41 (5,768 permanent, 1,657 temporary) of modeled golden eagle and ferruginous hawk foraging
42 habitat in the study area in the near-term. These effects would result from the construction of the
43 water conveyance facilities (CM1, 1,599 acres), and implementing other conservation measures

1 (CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian
2 Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and
3 Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and
4 Management and CM18 Conservation Hatcheries—5,826 acres).

5 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
6 would be 2:1 for protection of habitat. Using this ratio would indicate that 3,198 acres should be
7 protected to compensate for the CM1 losses of 1,599 acres of golden eagle and ferruginous hawk
8 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of
9 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous
10 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

11 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
12 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
13 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
14 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,
15 and CM9 and would occur in the same timeframe as the construction and early restoration losses
16 thereby avoiding adverse effects of habitat loss on golden eagle and ferruginous hawk foraging in
17 the study area. Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11
18 (Objectives GNC1.1 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with
19 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would
20 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural
21 communities which would expand golden eagle and ferruginous hawk foraging habitat and reduce
22 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
23 *Enhancement and Management*, insect and mammal prey populations would be increased on
24 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
25 VPNC2.5, and GNC2.4). Burrow availability would be increased on protected natural communities by
26 encouraging ground squirrel occupancy and expansion through the creation of berms, mounds,
27 edges, and through the prohibition of ground squirrel control programs (i.e., poisoning).

28 Cultivated lands that provide habitat for covered and other native wildlife species would provide
29 approximately 15,400 acres of potential foraging habitat for golden eagle and ferruginous hawk
30 (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time
31 period would be in alfalfa and pasture crop types (very high- and high-value crop types) for
32 Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.
33 This biological objective provides an estimate for the high proportion of cultivated lands protected
34 in the near-term time period which would be suitable for golden eagle and ferruginous hawk.

35 The acres of restoration and protection contained in the near-term Plan goals and the additional
36 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
37 level effects of CM1 on golden eagle and ferruginous hawk, as well as mitigate the near-term effects
38 of the other conservation measures with the consideration that some portion of the 15,400 acres of
39 cultivated lands protected in the near-term timeframe would be managed in suitable crop types to
40 compensate for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-113, *Compensate for the*
41 *Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat* would be available to
42 address the adverse effect of habitat loss in the near-term.

43 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
44 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
45 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
 2 *these AMMs include elements that would avoid or minimize the risk of affecting individuals and*
 3 *species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since*
 4 *been updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs,*
 5 *to the Final EIR/EIS.*

6 ***Late Long-Term Timeframe***

7 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 28,690
 8 acres of modeled golden eagle and ferruginous hawk foraging habitat during the term of the Plan.
 9 The locations of these losses are described above in the analyses of individual conservation
 10 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
 11 *Protection and Restoration, CM8 Grassland Natural Community Restoration, and CM9 Vernal Pool and*
 12 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
 13 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
 14 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
 15 for native wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*). Grassland restoration
 16 and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland
 17 protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland
 18 complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of
 19 grassland, alkali seasonal wetland, and vernal pool natural communities which would expand
 20 foraging habitat for golden eagle and ferruginous hawk and reduce the effects of current levels of
 21 habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect and
 22 small mammal prey populations would be increased on protected lands, enhancing the foraging
 23 value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow
 24 availability would be increased on protected natural communities by encouraging ground squirrel
 25 occupancy and expansion through the creation of berms, mounds, edges, and through the
 26 prohibition of ground squirrel control programs (i.e., poisoning). Cultivated lands that provide
 27 habitat for covered and other native wildlife species would provide approximately 15,400 acres of
 28 potential habitat for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 42,275
 29 acres of cultivated lands protected would be in alfalfa and pasture crop types (very high- and high-
 30 value crop types) for Swainson's hawk (Objective SH1.2) which are also suitable for golden eagle
 31 and ferruginous hawk.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
 33 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
 34 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 35 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
 36 *these AMMs include elements that would avoid or minimize the risk of affecting individuals and*
 37 *species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since*
 38 *been updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs,*
 39 *to the Final EIR/EIS.*

40 ***NEPA Effects:*** The loss of golden eagle and ferruginous hawk habitat and potential mortality of these
 41 special-status species under Alternative 9 would represent an adverse effect in the absence of other
 42 conservation actions. With habitat protection and restoration associated with CM3, CM8, CM9, and
 43 CM11, guided by biological goals and objectives and AMM1–AMM7, which would be in place
 44 throughout the construction period, and with implementation of Mitigation Measure BIO-113,
 45 *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat, the*

1 effects of habitat loss and potential direct mortality on golden eagle and ferruginous hawk under
2 Alternative 9 would not be adverse.

3 **CEQA Conclusion:**

4 **Near-Term Timeframe**

5 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
6 the near-term BDCP conservation strategy has been evaluated to determine whether it would
7 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
8 effects of construction would be less than significant under CEQA. Alternative 9 would remove 7,425
9 acres (5,768 permanent, 1,657 temporary) of modeled golden eagle and ferruginous hawk foraging
10 habitat in the study area in the near-term. These effects would result from the construction of the
11 water conveyance facilities (CM1, 1,599 acres), and implementing other conservation measures
12 (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM7 Riparian*
13 *Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9 Vernal Pool and*
14 *Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities Enhancement and*
15 *Management and CM18 Conservation Hatcheries—5,826 acres).*

16 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
17 would be 2:1 for protection of habitat. Using this ratio would indicate that 3,198 acres should be
18 protected to compensate for the CM1 losses of 1,599 acres of golden eagle and ferruginous hawk
19 foraging habitat. The near-term effects of other conservation actions would remove 5,826 acres of
20 modeled habitat, and therefore require 11,652 acres of protection of golden eagle and ferruginous
21 hawk habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

22 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
23 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
24 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
25 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
26 in the same timeframe as the construction and early restoration losses thereby avoiding significant
27 impacts of habitat loss on golden eagle and ferruginous hawk foraging in the study area. Grassland
28 restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and
29 GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and alkali
30 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
31 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
32 expand golden eagle and ferruginous hawk foraging habitat and reduce the effects of current levels
33 of habitat fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect
34 and mammal prey populations would be increased on protected lands, enhancing the foraging value
35 of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability
36 would be increased on protected natural communities by encouraging ground squirrel occupancy
37 and expansion through the creation of berms, mounds, edges, and through the prohibition of ground
38 squirrel control programs (i.e., poisoning). Cultivated lands that provide habitat for covered and
39 other native wildlife species would provide approximately 15,400 acres of potential foraging habitat
40 for golden eagle and ferruginous hawk (Objective CLNC1.1). Approximately 87% of cultivated lands
41 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-
42 and high-value crop types) for Swainson's hawk (Objective SH1.2) which are also suitable for golden
43 eagle and ferruginous hawk. This biological objective provides an estimate for the high proportion of

1 cultivated lands protected in the near-term time period which would be suitable for golden eagle
2 and ferruginous hawk.

3 These Plan objectives represent performance standards for considering the effectiveness of
4 conservation actions. The acres of restoration and protection contained in the near-term Plan goals
5 and the additional detail in the biological objectives satisfy the typical mitigation that would be
6 applied to the project-level effects of CM1 on golden eagle and ferruginous hawk, as well as mitigate
7 the near-term effects of the other conservation measures with the consideration that some portion
8 of the 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in
9 suitable crop types to compensate for the loss of habitat at a ratio of 2:1. The implementation of
10 Mitigation Measure BIO-113, *Compensate for the Near-Term Loss of Golden Eagle and Ferruginous*
11 *Hawk Foraging Habitat* would reduce the impact of habitat loss in the near-term to a less-than-
12 significant level.

13 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
14 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
15 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
16 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
17 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
18 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
19 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
20 to the Final EIR/EIS.

21 **Late Long-Term Timeframe**

22 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 28,690
23 acres of modeled golden eagle and ferruginous hawk foraging habitat during the term of the Plan.
24 The locations of these losses are described above in the analyses of individual conservation
25 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
26 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
27 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
28 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
29 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
30 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would
31 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,
32 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives
33 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal
34 wetland, and vernal pool natural communities which would expand foraging habitat for golden eagle
35 and ferruginous hawk and reduce the effects of current levels of habitat fragmentation. Under *CM11*
36 *Natural Communities Enhancement and Management*, insect and small mammal prey populations
37 would be increased on protected lands, enhancing the foraging value of these natural communities
38 (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Burrow availability would be increased on protected
39 natural communities by encouraging ground squirrel occupancy and expansion through the creation
40 of berms, mounds, edges, and through the prohibition of ground squirrel control programs (i.e.,
41 poisoning). Cultivated lands that provide habitat for covered and other native wildlife species would
42 provide approximately 15,400 acres of potential habitat for golden eagle and ferruginous hawk
43 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa
44 and pasture crop types. These are very high- and high-value crop types for Swainson's hawk
45 (Objective SH1.2) which are also suitable for golden eagle and ferruginous hawk.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
8 to the Final EIR/EIS.

9 In the absence of other conservation actions, the effects on golden eagle and ferruginous hawk
10 foraging habitat would represent an adverse effect as a result of habitat modification and potential
11 for direct mortality of special-status species; however, considering Alternative 9's protection and
12 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
13 suitable to compensate for habitats lost to construction and restoration activities, and with the
14 implementation of AMM1–AMM7, and Mitigation Measure BIO-113, *Compensate for the Near-Term*
15 *Loss of Golden Eagle and Ferruginous Hawk Foraging Habitat*, the loss of habitat or direct mortality
16 through implementation of Alternative 9 would not result in a substantial adverse effect through
17 habitat modifications and would not substantially reduce the number or restrict the range of either
18 species. Therefore, the loss of habitat or potential mortality under this alternative would have a less-
19 than-significant impact on golden eagle and ferruginous hawk.

20 **Mitigation Measure BIO-113: Compensate for the Near-Term Loss of Golden Eagle and** 21 **Ferruginous Hawk Foraging Habitat**

22 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
23 crops, or alfalfa to provide golden eagle and ferruginous hawk foraging habitat such that the
24 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of
25 2:1. Additional grassland protection, enhancement, and management may be substituted for the
26 protection of high-value cultivated lands.

27 **Impact BIO-114: Effects on Golden Eagle and Ferruginous Hawk Associated with Electrical** 28 **Transmission Facilities**

29 Golden eagle and ferruginous hawk would be at low risk of bird strike mortality from the
30 construction of new transmission lines based on their maneuverability, their keen eyesight, their
31 lack of flocking behavior, and other factors assessed in the bird strike vulnerability analysis (BDCP
32 Appendix 5.J, Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP*
33 *Transmission Lines*). Marking transmission lines with flight diverters that make the lines more
34 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
35 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
36 by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines
37 would be fitted with flight diverters, which would substantially reduce any potential for powerline
38 collisions.

39 **NEPA Effects:** Golden eagle and ferruginous hawk are already at a low risk of bird strike mortality
40 based on their general maneuverability, keen eyesight and lack of flocking behavior. All new
41 transmission lines constructed as a result of the project would be fitted with bird diverters, which
42 have been shown to reduce avian mortality by 60%. With implementation of *AMM20 Greater*

1 *Sandhill Crane*, the construction and operation of transmission lines would not result in an adverse
2 effect on golden eagle and ferruginous hawk.

3 **CEQA Conclusion:** Golden eagle and ferruginous hawk are already at a low risk of bird strike
4 mortality based on their general maneuverability, keen eyesight and lack of flocking behavior. All
5 new transmission lines constructed as a result of the project would be fitted with bird diverters,
6 which have been shown to reduce avian mortality by 60%. With implementation of *AMM20 Greater*
7 *Sandhill Crane*, the construction and operation of transmission lines would result in a less-than-
8 significant impact on golden eagle and ferruginous hawk.

9 **Impact BIO-115: Indirect Effects of Plan Implementation on Golden Eagle and Ferruginous**
10 **Hawk**

11 **Indirect Construction- and Operation-Related Effects:** Construction- and subsequent
12 maintenance-related noise and visual disturbances could disrupt foraging, and reduce the functions
13 of suitable foraging habitat for golden eagle and ferruginous hawk. Construction noise above
14 background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of
15 construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*
16 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to
17 determine the extent to which these noise levels could affect golden eagle or ferruginous hawk.
18 Indirect effects associated with construction include noise, dust, and visual disturbance caused by
19 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical
20 equipment during water conveyance facilities construction could cause the accidental release of
21 petroleum or other contaminants that could affect these species or their prey in the surrounding
22 habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
23 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment
24 or excessive dust adjacent to golden eagle and ferruginous hawk grassland habitat could also have a
25 negative effect on the species. However, AMM1–AMM7 would also ensure that measures would be in
26 place to prevent runoff from the construction area and the negative effects of dust on wildlife
27 adjacent to work areas.

28 **NEPA Effects:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative 9
29 implementation could have adverse effects on these species through the modification of habitat.
30 With the incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 9
31 implementation would not have an adverse effect on golden eagle and ferruginous hawk.

32 **CEQA Conclusion:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative 9
33 implementation could have a significant impact on the species from modification of habitat. With the
34 incorporation of AMM1–AMM7 into the BDCP, indirect effects as a result of Alternative 9
35 implementation would have a less-than-significant impact on golden eagle and ferruginous hawk.

36 **Impact BIO-116: Periodic Effects of Inundation on Golden Eagle and Ferruginous Hawk**
37 **Habitat as a Result of Implementation of Conservation Components**

38 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
39 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–
40 3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat (Table 12-9-44).

1 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
2 *Restoration* could result in the periodic inundation of up to approximately 3,823 acres of modeled
3 habitat (Table 12-9-44).

4 Golden eagles and ferruginous hawks would not likely use inundated areas for foraging, and
5 increased inundation frequency and duration of inundation of grassland habitats may affect prey
6 populations that have insufficient time to recover following inundation events. However,
7 periodically inundated habitat would not be expected to have an adverse effect on local or migratory
8 golden eagles or the wintering ferruginous hawk population in the area.

9 **NEPA Effects:** Implementation of CM2 would increase the frequency and duration of inundation on
10 approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging habitat. In
11 addition, implementation of CM5 could result in the periodic inundation of up to 3,823 acres of
12 modeled habitat. However, periodic inundation would not be expected to have an adverse effect on
13 the wintering golden eagle or ferruginous hawk populations in the study area.

14 **CEQA Conclusion:** Implementation of CM2 would increase the frequency and duration of inundation
15 on approximately 1,158–3,650 acres of modeled golden eagle and ferruginous hawk foraging
16 habitat. In addition, implementation of CM5 could result in the periodic inundation of up to 3,823
17 acres of modeled habitat. However, periodic inundation would be expected to have a less-than-
18 significant impact on the golden eagle and ferruginous hawk populations in the study area.

19 **Cormorants, Herons and Egrets**

20 This section describes the effects of Alternative 9, including water conveyance facilities construction
21 and implementation of other conservation components, on double-crested cormorant, great blue
22 heron, great egret, snowy egret, and black-crowned night heron. Modeled breeding habitat for these
23 species consists of valley/foothill riparian forest.

24 Construction and restoration associated with Alternative 9 conservation measures would result in
25 both temporary and permanent losses of cormorant, heron, and egret modeled habitat as indicated
26 in Table 12-9-45. The majority of the losses would take place over an extended period of time as
27 tidal marsh is restored in the study area. Although restoration for the loss of nesting habitat would
28 be initiated in the same timeframe as the losses, it could take one or more decades for restored
29 habitats to replace the functions of lost habitat. This time lag between impacts and restoration of
30 habitat function would be minimized by specific requirements of *AMM18 Swainson's Hawk*, including
31 the planting of mature trees in the near-term time period. Full implementation of Alternative 9
32 would include the following conservation actions over the term of the BDCP that would also benefit
33 cormorants, herons, and egrets (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 34 ● Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
35 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
36 associated with CM7).
- 37 ● Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
38 10 (Objective VFRNC1.2, associated with CM3).
- 39 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
40 lands within the reserve system, including isolated valley oak trees, trees and shrubs along field
41 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
42 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).

1 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 2 management activities to enhance natural communities for species and implementation of AMM1–
 3 AMM7, *AMM18 Swainson’s Hawk*, and Mitigation Measures BIO-75 and BIO-117, impacts on
 4 cormorants, herons, and egrets would not be adverse for NEPA purposes and would be less than
 5 significant for CEQA purposes.

6 **Table 12-9-45. Changes in Cormorant, Heron and Egret Modeled Habitat Associated with**
 7 **Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting (Rookeries)	61	61	248	248	NA	NA
Total Impacts CM1		61	61	248	248	NA	NA
CM2–CM18	Nesting (Rookeries)	387	684	88	123	51–92	266
Total Impacts CM2–CM18		387	684	88	123	51–92	266
TOTAL IMPACTS		448	745	336	371	51–92	266

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

8

9 **Impact BIO-117: Loss or Conversion of Nesting Habitat for and Direct Mortality of**
 10 **Cormorants, Herons and Egrets**

11 Alternative 9 conservation measures would result in the combined permanent and temporary loss
 12 of up to 1,116 acres of modeled habitat (745 acres of permanent loss, 371 acres of temporary loss)
 13 for double-crested cormorant, great blue heron, great egret, snowy egret, and black-crowned night
 14 heron (Table 12-9-45). Conservation measures that would result in these losses are *CM1 Water*
 15 *Facilities and Operation* (which would involve conveyance facilities and transmission line
 16 construction, and establishment and use of borrow and spoil areas), *CM2 Yolo Bypass Fisheries*
 17 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
 18 *Restoration*. Habitat enhancement and management activities (CM11), which include ground
 19 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In
 20 addition, maintenance activities associated with the long-term operation of the water conveyance
 21 facilities and other BDCP physical facilities could degrade or eliminate cormorant, heron, and egret
 22 modeled habitat. Each of these individual activities is described below. A summary statement of the
 23 combined impacts, NEPA effects, and a CEQA conclusion follow the individual conservation measure
 24 discussions.

- 1 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 water conveyance facilities
2 would result in the combined permanent and temporary loss of up to 309 acres of modeled
3 Cormorant, heron, and egret habitat (Table 12-9-45). Of the 309 acres of modeled habitat that
4 would be removed for the construction of the conveyance facilities, 61 acres would be a
5 permanent loss and 248 acres would be a temporary loss of habitat. Permanent losses would
6 primarily consist of channel enlargement at the Sacramento River and Meadows Slough.
7 Temporary losses would occur primarily along Middle River between Victoria Canal and
8 Mildred Island, where large dredging work areas and operable barrier work areas would be
9 placed. The riparian habitat in these areas is composed of very small patches or stringers
10 bordering waterways, which are composed of valley oak and scrub vegetation. Impacts from
11 CM1 would occur within the first 10 years of Alternative 9 implementation.

12 The primary impact of concern regarding double-crested cormorant, great blue heron, great
13 egret, snowy egret, and black-crowned night heron is the loss of existing known nest trees, and
14 other large trees associated with known nest sites. The CM1 footprint overlaps with one great
15 blue heron rookery on an instream island northeast of Woodward Island. This rookery
16 occurrence was recorded in 2000 by the CNDDDB and was recorded again during DHCCP surveys
17 in 2009. The CM1 footprint includes dredging of Middle River and inchannel island dredging
18 that would remove the island on which the rookery is located. In addition, the rookery could be
19 indirectly affected by the barge facility work area and dredging work area to the west on
20 Woodward Island. Because the species is highly traditional in their use of rookeries, the
21 establishment of new nest sites is unpredictable. Therefore to avoid adverse effects on great
22 blue herons (and cormorants, herons, and egrets, should future surveys detect additional
23 rookeries), this rookery would have to be avoided. Mitigation Measure BIO-75, *Conduct*
24 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation
25 Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to address this adverse effect
26 on great blue herons. Refer to the Terrestrial Biology Map Book for a detailed view of
27 Alternative 9 construction locations.

- 28 • *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
29 would result in the combined permanent and temporary loss of up to 177 acres of nesting
30 habitat (89 acres of permanent loss, 88 acres of temporary loss) in the Yolo Bypass in CZ 2.
31 Activities through CM2 could involve excavation and grading in valley/foothill riparian areas to
32 improve passage of fish through the bypasses. Most of the riparian losses would occur at the
33 north end of Yolo Bypass where major fish passage improvements are planned. Excavation to
34 improve water movement in the Toe Drain and in the Sacramento Weir would also remove
35 potential nesting habitat. The loss is expected to occur during the first 10 years of Alternative 9
36 implementation.

- 37 • *CM4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and
38 inundation would permanently remove an estimated 552 acres of nesting habitat for
39 cormorants, herons and egrets. Trees would not be actively removed but tree mortality would
40 be expected over time as areas became tidally inundated. Depending on the extent and value of
41 remaining habitat, this could reduce use of these habitats by these species. There is one CNDDDB
42 occurrence of a great blue heron rookery that overlaps with the hypothetical restoration
43 footprint for tidal restoration. The occurrence is on Decker Island and tidal restoration could
44 potentially impact the nest trees from inundation. This potential effect would need to be
45 addressed within the project-specific analysis for tidal restoration projects.

- 1 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
2 seasonally inundated floodplain would permanently remove approximately 43 acres and
3 temporarily remove approximately 35 acres of potential cormorants, heron, and egret nesting
4 habitat. These losses would be expected after the first 10 years of Alternative 9 implementation
5 along the San Joaquin River and other major waterways in CZ 7.

- 6 ● *CM11 Natural Communities Enhancement and Management*: Habitat management- and
7 enhancement-related activities could disturb cormorant, heron, and egret nests if they were
8 present near work sites. A variety of habitat management actions included in CM11 that are
9 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground
10 disturbances that could temporarily remove small amounts of cormorant, heron, and egret
11 habitat and reduce the functions of habitat until restoration is complete. Ground-disturbing
12 activities, such as removal of nonnative vegetation and road and other infrastructure
13 maintenance, are expected to have minor effects on available habitat for these species and are
14 expected to result in overall improvements to and maintenance of habitat values over the term
15 of the BDCP. These effects cannot be quantified, but are expected to be minimal and would be
16 avoided and minimized by the AMMs listed below.

- 17 ● Permanent and temporary habitat losses from the above conservation measures would
18 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored
19 as riparian habitat within 1 year following completion of construction activities. Although the
20 effects are considered temporary, the restored riparian habitat would require years to several
21 decades to functionally replace habitat that has been affected and for trees to attain sufficient
22 size and structure for established rookeries. *AMM18 Swainson's Hawk* contains actions described
23 below to reduce the effect of temporal loss of mature riparian habitat, including the
24 transplanting of mature trees.

- 25 ● Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
26 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
27 disturbances that could affect use of the surrounding habitat by cormorants, herons or egrets.
28 Maintenance activities would include vegetation management, levee and structure repair, and
29 re-grading of roads and permanent work areas. These effects, however, would be reduced by
30 AMMs and conservation actions as described below.

- 31 ● The primary impact of concern regarding double-crested cormorant, great blue heron, great
32 egret, snowy egret, and black-crowned night heron is the loss of existing known nest trees, and
33 other large trees associated with known nest sites. Because these species are highly traditional
34 in their use of rookeries, the establishment of new nest sites is unpredictable. To avoid adverse
35 effects on these species, existing known nest sites would have to be avoided. Mitigation Measure
36 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and
37 Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to address these
38 potential effects on cormorants, herons, and egrets.

- 39 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in
40 direct mortality of adult or fledged double-crested cormorant, great blue heron, great egret,
41 snowy egret, and black-crowned night heron if they were present in the Plan Area, because they
42 would be expected to avoid contact with construction and other equipment. If birds were to nest
43 in the construction area, construction-related activities, including equipment operation, noise
44 and visual disturbances could affect nests including any nests that are built on the ground (e.g.
45 Cormorant nests that have been built on the ground after nest trees fall over or die from stress

1 and guano produced by a rookery) or lead to their abandonment, potentially resulting in
2 mortality of eggs and nestlings. Mitigation Measures BIO-75 and BIO-117 would be available to
3 address these effects on cormorants, herons, and egrets.

4 The following paragraphs summarize the combined effects discussed above and describe other
5 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
6 included.

7 ***Near-Term Timeframe***

8 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
9 the near-term BDCP conservation strategy has been evaluated to determine whether it would
10 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
11 effects of construction would not be adverse under NEPA. Alternative 9 would remove 784 acres of
12 nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These effects
13 would result from the construction of the water conveyance facilities (CM1, 309 acres of nesting
14 habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,
15 *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain Restoration*—
16 475 acres of nesting habitat).

17 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
18 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for
19 breeding habitat. Using these ratios would indicate that 309 acres of breeding habitat should be
20 restored/created and 309 acres should be protected to compensate for the CM1 losses of modeled
21 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions
22 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of
23 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the
24 same typical NEPA and CEQA ratios.

25 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
26 system with extensive wide bands or large patches of valley/foothill riparian natural community
27 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
28 restoration would expand the patches of existing riparian forest in order to support nesting habitat
29 for these species. In addition, small but essential nesting habitat associated with cultivated lands
30 would also be maintained and protected such as isolated trees, tree rows along field borders or
31 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

32 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
33 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
34 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored
35 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but
36 would require years to several decades to functionally replace habitat that has been affected and for
37 trees to attain sufficient size and structure suitable for established rookeries. This time lag between
38 the removal and restoration of nesting habitat could have a substantial impact on cormorants,
39 herons and egrets in the near-term time period.

40 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
41 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
42 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
43 within the 125-acre block are removed. These mature trees would be supplemented with additional

1 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
 2 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
 3 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
 4 system for every tree 20 feet or taller removed by construction during the near-term period. A
 5 variety of native tree species would be planted to provide trees with differing growth rates,
 6 maturation, and life span. Replacement trees that were incorporated into the riparian restoration
 7 would not be clustered in a single region of the study area, but would be distributed throughout
 8 protected lands. Further details of AMM18 are provided in Appendix 3B, *Environmental*
 9 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 14 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 15 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 16 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 17 to the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
 18 black-crowned night heron are not species that are covered under the BDCP. For the BDCP to avoid
 19 adverse effects on individuals, existing nests and rookeries would have to be avoided. Mitigation
 20 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
 21 *Birds*, and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to address
 22 adverse effects on nesting cormorants, herons, and egrets.

23 ***Late Long-Term Timeframe***

24 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting
 25 habitat for cormorants, herons, and egrets. Alternative 9 as a whole would result in the permanent
 26 loss of and temporary effects on 1,116 acres of potential breeding habitat (6% of the potential
 27 breeding habitat in the study area).

28 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
 29 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*
 30 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
 31 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of
 32 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with
 33 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives
 34 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would
 35 expand the patches of existing riparian forest in order to support nesting habitat for riparian
 36 species. The Plan's objectives would also benefit cormorants, herons, and egrets by protecting small
 37 but essential habitats that occur within cultivated lands, such as tree rows along field borders or
 38 roads, and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition,
 39 the distribution and abundance of potential nest trees would be increased by planting and
 40 maintaining native trees along roadsides and field borders within protected cultivated lands at a
 41 rate of one tree per 10 acres (Objective SWHA2.1).

42 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 43 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 44 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
2 *these AMMs include elements that would avoid or minimize the risk of affecting individuals and*
3 *species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since*
4 *been updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs,*
5 *of the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and*
6 *black-crowned night heron are not species that are covered under the BDCP. These species are*
7 *highly traditional in their use of nest sites, and, in order for the BDCP to avoid a significant impact on*
8 *individuals, preconstruction surveys would be required to ensure that nests are detected and any*
9 *direct and indirect impacts on rookeries are avoided. Mitigation Measure BIO-75, Conduct*
10 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds and Mitigation Measure*
11 *BIO-117, Avoid Impacts on Rookeries, would be available to address adverse effects on nesting*
12 *cormorants, herons, and egrets.*

13 **NEPA Effects:** The loss of cormorant, heron, and egret habitat and potential direct mortality of these
14 special-status species under Alternative 9 would represent an adverse effect in the absence of other
15 conservation actions. With habitat protection and restoration associated with CM3, CM5, CM7, CM8,
16 CM9, and CM11, guided by biological goals and objectives and by AMM1–AMM7 and *AMM18*
17 *Swainson’s Hawk*, which would be in place throughout the construction period, the effects of habitat
18 loss and potential mortality on cormorants, herons, and egrets under Alternative 9 would not be
19 adverse. Double-crested cormorant, great blue heron, great egret, snowy egret, and black-crowned
20 night heron are not species that are covered under the BDCP. Preconstruction surveys for
21 noncovered species would be required for the BDCP to avoid an adverse effect on individuals.
22 Mitigation Measure BIO-75 and Mitigation Measure BIO-117 would be available to address effects
23 on nesting cormorants, herons, and egrets.

24 **CEQA Conclusion:**

25 **Near-Term Timeframe**

26 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
27 the near-term BDCP conservation strategy has been evaluated to determine whether it would
28 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
29 effects of construction would be less than significant under NEPA. Alternative 9 would remove 784
30 acres of nesting habitat for cormorants, herons, and egrets in the study area in the near-term. These
31 effects would result from the construction of the water conveyance facilities (CM1, 309 acres of
32 nesting habitat), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
33 *Enhancement, CM4 Tidal Natural Communities Restoration, and CM5 Seasonally Inundated Floodplain*
34 *Restoration—475 acres of nesting habitat).*

35 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
36 CM1 would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for
37 breeding habitat. Using these ratios would indicate that 309 acres of breeding habitat should be
38 restored/created and 309 acres should be protected to compensate for the CM1 losses of modeled
39 cormorant, heron, and egret habitat. In addition, the near-term effects of other conservation actions
40 would remove 475 acres of modeled breeding habitat, and therefore require 475 acres of
41 restoration and 475 acres of protection of modeled cormorant, heron, and egret habitat using the
42 same typical NEPA and CEQA ratios.

43 The majority of riparian protection and restoration acres would occur in CZ 7 as part of a reserve
44 system with extensive wide bands or large patches of valley/foothill riparian natural community

1 (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian
2 restoration would expand the patches of existing riparian forest in order to support nesting habitat
3 for these species. In addition, small but essential nesting habitat associated with cultivated lands
4 would also be maintained and protected such as isolated trees, tree rows along field borders or
5 roads, or small clusters of trees in farmyards or at rural residences (Objective CLNC1.3).

6 The 750 acres of protection and 800 acres of restoration contained in the near-term Plan goals
7 satisfy the typical mitigation ratios that would be applied to the project-level effects of CM1 and
8 other near-term impacts on cormorant, heron, and egret nesting habitat. The 800 acres of restored
9 riparian habitat would be initiated in the near-term to offset the loss of potential nesting habitat, but
10 would require years to several decades to functionally replace habitat that has been affected and for
11 trees to attain sufficient size and structure suitable for established rookeries. This time lag between
12 the removal and restoration of nesting habitat could have a substantial impact on cormorants,
13 herons and egrets in the near-term time period.

14 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
15 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
16 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
17 within the 125-acre block are removed. These mature trees would be supplemented with additional
18 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
19 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
20 addition, at least five trees (5-gallon container size) would be planted within the BDCP reserve
21 system for every tree 20 feet or taller removed by construction during the near-term period. A
22 variety of native tree species would be planted to provide trees with differing growth rates,
23 maturation, and life span. Replacement trees that were incorporated into the riparian restoration
24 would not be clustered in a single region of the study area, but would be distributed throughout
25 protected lands. Further details of AMM18 are provided in Appendix 3B, *Environmental*
26 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
31 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
32 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
33 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
34 to the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
35 black-crowned night heron are not species that are covered under the BDCP. For the BDCP to avoid a
36 significant impact on individuals, preconstruction surveys for noncovered avian species would be
37 required to ensure that nests are detected and avoided. Implementation of Mitigation Measure BIO-
38 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and
39 Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would reduce this potential impact to a
40 less-than-significant level.

41 **Late Long-Term Timeframe**

42 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting
43 habitat for cormorants, herons, and egrets. Alternative 9 as a whole would result in the permanent

1 loss of and temporary effects on 1,116 acres of potential breeding habitat (5% of the potential
2 breeding habitat in the study area).

3 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
4 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, and *CM7 Riparian Natural Community*
5 *Restoration* to restore or create at least 5,000 acres and protect at least 750 acres of valley/foothill
6 riparian natural community (Table 3-4 in Chapter 3, *Description of Alternatives*). The majority of
7 riparian protection and restoration acres would occur in CZ 7 as part of a reserve system with
8 extensive wide bands or large patches of valley/foothill riparian natural community (Objectives
9 VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*). Riparian restoration would
10 expand the patches of existing riparian forest in order to support nesting habitat for riparian
11 species. The Plan's objectives would also benefit cormorants, herons, and egrets by protecting small
12 but essential habitats that occur within cultivated lands, such as tree rows along field borders or
13 roads, and small clusters of trees in farmyards or rural residences (Objective CLNC1.3). In addition,
14 the distribution and abundance of potential nest trees would be increased by planting and
15 maintaining native trees along roadsides and field borders within protected cultivated lands at a
16 rate of one tree per 10 acres (Objective SWHA2.1).

17 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
18 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
19 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
20 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
21 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
22 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
23 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
24 to the Final EIR/EIS. Double-crested cormorant, great blue heron, great egret, snowy egret, and
25 black-crowned night heron are not species that are covered under the BDCP. These species are
26 highly traditional in their use of nest sites and, for the BDCP to avoid a significant impact on
27 individuals, preconstruction surveys would be required to ensure that nests are detected and any
28 direct and indirect impacts on rookeries are avoided. Implementation of Mitigation Measure BIO-75,
29 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation
30 Measure BIO-117, *Avoid Impacts on Rookeries*, would reduce this potential impact to a less-than-
31 significant level.

32 In the absence of other conservation actions, effects on nesting cormorants, herons, and egrets
33 would represent an adverse effect as a result of habitat modification and potential for direct
34 mortality of special-status species. This impact would be considered significant. Considering
35 Alternative 9's protection and restoration provisions, which would provide acreages of new or
36 enhanced habitat in amounts sufficient to compensate for the loss of riparian habitats lost to
37 construction and restoration activities, and considering implementation of AMM1-AMM7,
38 Mitigation Measure BIO-75, and Mitigation Measure BIO-117, the loss of habitat or direct mortality
39 through implementation of Alternative 9 would not result in a substantial adverse effect through
40 habitat modifications and would not substantially reduce the number or restrict the range of
41 cormorants, herons, and egrets. Therefore, the loss of habitat and potential mortality under this
42 alternative would have a less-than-significant impact on cormorants, herons, and egrets.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 See Mitigation Measure BIO-75 under Impact BIO-75.

4 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

5 Hérons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries):
6 therefore, DWR will avoid all direct and indirect impacts on rookeries.

7 **Impact BIO-118: Effects Associated with Electrical Transmission Facilities on Cormorants,**
8 **Hérons and Egrets**

9 New transmission lines would increase the risk for bird-power line strikes, which could result in
10 injury or mortality of cormorants, herons and egrets. New transmission lines would increase the
11 risk for bird-power line strikes. Waterbirds have a higher susceptibility to collisions than passerines,
12 raptors, and other birds. Marking transmission lines with flight diverters that make the lines more
13 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
14 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
15 by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines
16 constructed as a result of the project would be fitted with flight diverters, which would reduce bird
17 strike risk of cormorants, herons, and egrets.

18 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
19 could result in injury or mortality of cormorants, herons, and egrets. The implementation of *AMM20*
20 *Greater Sandhill Crane* would require the installation of bird flight diverters on all new transmission
21 lines, which could reduce bird strike risk of cormorants, herons, and egrets by 60%. With the
22 installation of bird flight diverters, the construction and operation of new transmission lines under
23 Alternative 9 would not result in an adverse effect on cormorants, herons, and egrets.

24 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
25 could result in injury or mortality of cormorants, herons, and egrets. The implementation of *AMM20*
26 *Greater Sandhill Crane* would require the installation of bird flight diverters on all new transmission
27 lines, which could reduce bird strike risk of cormorants, herons, and egrets by 60%. With the
28 installation of bird flight diverters, the construction and operation of new transmission lines under
29 Alternative 9 would result in a less-than-significant impact on cormorants, herons, and egrets.

30 **Impact BIO-119: Indirect Effects of Plan Implementation on Cormorants, Herons and Egrets**

31 **Indirect Construction- and Operation-Related Effects:** Construction noise above background
32 noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction
33 activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
34 *Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to determine
35 the extent to which these noise levels could affect cormorants, herons, or egrets. If cormorants,
36 herons or egrets were to nest in or adjacent to work areas, construction and subsequent
37 maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting
38 behaviors, and reduce the functions of suitable nesting habitat for these species. Mitigation Measure
39 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
40 avoid the potential for adverse effects of construction-related activities on survival and productivity
41 of nesting cormorants, herons or egrets. The use of mechanical equipment during water conveyance

1 facilities construction could cause the accidental release of petroleum or other contaminants that
2 could affect cormorants, herons or egrets in the surrounding habitat. The inadvertent discharge of
3 sediment or excessive dust adjacent to suitable habitat could also have an adverse effect on these
4 species. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
5 would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff
6 from the construction area and negative effects of dust on active nests.

7 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
8 mercury in avian species, including cormorants, herons or egrets.

9 A detailed review of the methylmercury issues associated with implementation of the BDCP is
10 contained in Appendix 11F, *Substantive BDCP Revisions*. This review includes an overview of the
11 BDCP-related mechanisms that could result in increased mercury in the foodweb, and how exposure
12 to individual species may occur based on feeding habits and where their habitat overlaps with the
13 areas where mercury bioavailability could increase. Mercury is transformed into the more
14 bioavailable form of methylmercury in aquatic systems, especially areas subjected to regular
15 wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Bioaccumulation of
16 methylmercury varies by species as there are taxonomic differences in rates of detoxification within
17 the liver (Eagles-Smith et al. 2009). Organisms feeding within pelagic-based (algal) foodwebs have
18 been found to have higher concentrations of methylmercury than those in benthic or epibenthic
19 foodwebs; this has been attributed to food chain length and dietary segregation (Grimaldo et al.
20 2009). That is, the pelagic food chain tends to be longer than the benthic food chain, which allows
21 for greater biomagnification of methylmercury in top predators. Also, there is less prey diversity at
22 the top of the pelagic food chain than in the benthic food chain; pelagic top predators eat smaller fish
23 and little else, while benthic top predators consume a variety of organisms, many of which are lower
24 in the food chain than fishes and thus have less potential for methylmercury biomagnification.

25 Largemouth bass was used as a surrogate species for analysis (Appendix 11F, *Substantive BDCP*
26 *Revisions*) and the modeled effects of mercury concentrations from changes in water operations
27 under CM1 on largemouth bass did not differ substantially from existing conditions; therefore,
28 results also indicate that cormorant, heron, and egret tissue concentrations would not measurably
29 increase as a result of CM1 implementation.

30 Marsh (tidal and nontidal) and floodplain restoration have the potential to increase exposure to
31 methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in
32 aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and
33 flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create newly inundated areas
34 could increase bioavailability of mercury. Species sensitivity to methylmercury differs widely and
35 there is a large amount of uncertainty with respect to species-specific effects. Increased
36 methylmercury associated with natural community and floodplain restoration could indirectly effect
37 on cormorants, herons or egrets, via uptake in lower trophic levels (as described in BDCP Appendix
38 5.D, *Contaminants*). Mercury is generally elevated throughout the Delta, and restoration of the lower
39 potential areas in total may result in generalized, very low level increases of mercury. Given that
40 some species have elevated mercury tissue levels pre-BDCP, these low level increases could result in
41 some level of effects. Restoration in Suisun Marsh would convert managed wetlands to tidal
42 wetlands, which would be expected to result in an overall reduction in mercury methylation.

43 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
44 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*

1 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
2 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
3 adaptive management as described in CM12 would be available to address the uncertainty of
4 methylmercury levels in restored tidal marsh and potential impacts on cormorants, herons or
5 egrets.

6 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
7 the foodweb, *CM12 Methylmercury Management* is included to provide for site-specific evaluation for
8 each restoration project. On a project-specific basis, where high potential for methylmercury
9 production is identified that restoration design and adaptive management cannot fully address
10 while also meeting restoration objectives, alternate restoration areas would be considered. CM12
11 would be implemented in coordination with other similar efforts to address mercury in the Delta,
12 and specifically with the DWR Mercury Monitoring and Analysis Section. This conservation measure
13 would include the following actions.

- 14 • Assess pre-restoration conditions to determine the risk that the project could result in increased
15 mercury methylation and bioavailability
- 16 • Define design elements that minimize conditions conducive to generation of methylmercury in
17 restored areas.
- 18 • Define adaptive management strategies that can be implemented to monitor and minimize
19 actual postrestoration creation and mobilization of methylmercury.

20 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
21 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
22 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
23 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
24 2009). The effect of selenium toxicity differs widely between species and also between age and sex
25 classes within a species. In addition, the effect of selenium on a species can be confounded by
26 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
27 2009).

28 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
29 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
30 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
31 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
32 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
33 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
34 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
35 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
36 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
37 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
38 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
39 levels of selenium have a higher risk of selenium toxicity.

40 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
41 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
42 exacerbate bioaccumulation of selenium in avian species, including cormorants, herons, and egrets.
43 Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and
44 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,

1 BDCP restoration activities that create newly inundated areas could increase bioavailability of
2 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
3 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
4 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
5 long-term increases in selenium concentrations in water in the Delta under any alternative.
6 However, it is difficult to determine whether the effects of potential increases in selenium
7 bioavailability associated with restoration-related conservation measures (CM4–CM5) would lead to
8 adverse effects on cormorants, herons, and egrets.

9 Because of the uncertainty that exists at this programmatic level of review, there could be a
10 substantial effect on cormorants, herons, and egrets from increases in selenium associated with
11 restoration activities. This effect would be addressed through the implementation of *AMM27*
12 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
13 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats.
14 Furthermore, the effectiveness of selenium management to reduce selenium concentrations and/or
15 bioaccumulation would be evaluated separately for each restoration effort as part of design and
16 implementation. This avoidance and minimization measure would be implemented as part of the
17 tidal habitat restoration design schedule.

18 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
19 could reduce cormorant, heron, and egret use of modeled habitat adjacent to work areas. Moreover,
20 operation and maintenance of the water conveyance facilities, including the transmission facilities,
21 could result in ongoing but periodic postconstruction disturbances that could affect cormorant,
22 heron, and egret use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
23 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*
24 *Impacts on Rookeries*, would be available to address adverse effects on nesting individuals in
25 addition to AMM1–AMM7. Tidal habitat restoration could result in increased exposure of
26 cormorants, herons, and egrets to selenium. This effect would be addressed through the
27 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
28 restoration design elements to reduce the potential for bioaccumulation of selenium and its
29 bioavailability in tidal habitats. The implementation of tidal natural communities restoration or
30 floodplain restoration could result in increased exposure of cormorants, herons or egrets to
31 methylmercury through the ingestion of fish in restored tidal areas. However, it is unknown what
32 concentrations of methylmercury are harmful to these species and the potential for increased
33 exposure varies substantially within the study area. Implementation of CM12 which contains
34 measures to assess the amount of mercury before project development, followed by appropriate
35 design and adaptation management, would minimize the potential for increased methylmercury
36 exposure, and would result in no adverse effect on cormorants, herons, and egrets.

37 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
38 sedimentation, and operations and maintenance of the water conveyance facilities would

39 represent an adverse effect in the absence of other conservation actions. This impact would be
40 significant. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
41 *Disturbance of Nesting Birds*, Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, and AMM1–
42 AMM7, would reduce this impact to a less-than-significant level.

43 Tidal habitat restoration could result in increased exposure of cormorants, herons, and egrets to
44 selenium which could result in mortality of special-status species. This effect would be addressed

1 through the implementation of *AMM27 Selenium Management*, which would provide specific tidal
2 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its
3 bioavailability in tidal habitats. With implementation of AMM27, potential for increased selenium
4 exposure would result in no adverse effect on the species.

5 The implementation of tidal natural communities restoration or floodplain restoration could result
6 in increased exposure of cormorants, herons or egrets to methylmercury, through the ingestion of
7 fish in tidally restored areas. However, it is unknown what concentrations of methylmercury are
8 harmful to these species. Implementation of CM12 which contains measures to assess the amount of
9 mercury before project development, followed by appropriate design and adaptation management,
10 would minimize the potential for increased methylmercury exposure, and would result in no
11 adverse effect on the species.

12 With AMM1-7, AMM27, and CM12 in place, in addition to the implementation of Mitigation Measure
13 BIO-75 and BIO-117 measures in place, indirect effects of plan implementation would not result in a
14 substantial adverse effect on cormorants, herons, and egrets through habitat modification or
15 potential mortality. Therefore, the indirect effects of Alternative 9 implementation would have a
16 less-than-significant impact on cormorants, herons, and egrets.

17 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
18 **Disturbance of Nesting Birds**

19 See Mitigation Measure BIO-75 under Impact BIO-75.

20 **Measure BIO-117: Avoid Impacts on Rookeries**

21 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);
22 therefore, DWR will avoid all direct and indirect impacts on rookeries.

23 **Impact BIO-120: Periodic Effects of Inundation on Cormorants, Herons and Egrets as a Result**
24 **of Implementation of Conservation Components**

25 Flooding of the Yolo Bypass from Fremont Weir operations (CM2) would increase the frequency and
26 duration of inundation of approximately 51–92 acres of modeled breeding habitat for cormorants,
27 herons and egrets. However, increased periodic flooding is not expected to cause any adverse effect
28 on breeding habitat because trees in which nest sites are situated already withstand floods, the
29 increase in inundation frequency and duration is expected to remain within the range of tolerance of
30 riparian trees, and nest sites are located above floodwaters.

31 Based on hypothetical floodplain restoration, CM5 implementation could result in periodic
32 inundation of up to 266 acres of breeding habitat for cormorants, herons and egrets. The overall
33 effect of seasonal inundation in existing riparian natural communities is likely to be beneficial for
34 these species, because, historically, flooding was the main natural disturbance regulating ecological
35 processes in riparian areas, and flooding promotes the germination and establishment of many
36 native riparian plants.

37 **NEPA Effects:** Increased periodic flooding would not be expected to cause any adverse effect on nest
38 sites because trees in which nest sites are situated already withstand floods, the increase in
39 inundation frequency and duration is expected to remain within the range of tolerance of riparian
40 trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic

1 inundation from CM2 and CM5 would not result in an adverse effect on cormorants, herons and
2 egrets.

3 **CEQA Conclusion:** Increased periodic flooding would not be expected to cause any adverse effect on
4 nest sites because trees in which nest sites are situated already withstand floods, the increase in
5 inundation frequency and duration is expected to remain within the range of tolerance of riparian
6 trees, and nest sites are located above floodwaters. Therefore, increased duration of periodic
7 inundation from CM2 and CM5 would have a less-than-significant impact on cormorants, herons and
8 egrets.

9 **Short-Eared Owl and Northern Harrier**

10 Modeled habitat for short-eared owl and northern harrier consists of tidal brackish and freshwater
11 emergent wetland, nontidal freshwater perennial emergent wetland, other natural seasonal
12 wetland, grassland, and selected cultivated lands (grain and hay crops, pasture [including alfalfa],
13 rice, truck, nursery, and berry crops [including tomatoes and melons], beets, and idle lands).

14 Construction and restoration associated with Alternative 9 conservation measures would result in
15 both temporary and permanent losses of modeled habitat for short-eared owl and northern harrier
16 as indicated in Table 12-9-46. Full implementation of Alternative 9 would include the following
17 conservation actions over the term of the BDCP that would benefit short-eared owl and northern
18 harrier (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 19 • Restore or create at least 6,000 acres of tidal brackish emergent wetland in CZ 11 including at
20 least 1,500 acres of middle and high marsh (Objectives TBEWNC1.1 and TBEWNC1.2, associated
21 with CM4).
- 22 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
23 and/or 7 (Objective TFEWNC1.2, associated with CM4).
- 24 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
25 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
26 associated with CM10).
- 27 • Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least
28 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder
29 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 30 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 31 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
32 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 33 • Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
34 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 35 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
36 VPNC2.5, and GNC2.4, associated with CM11).

37 As explained below, with the restoration or protection of these amounts of habitat, in addition to
38 management activities that would enhance habitat for these species and implementation of AMM1–
39 AMM7, *AMM27 Selenium Management* and Mitigation Measure BIO-75, impacts on short-eared owl
40 and northern harrier would not be adverse for NEPA purposes and would be less than significant for
41 CEQA purposes.

1 **Table 12-9-46. Changes in Short-Eared Owl and Northern Harrier Modeled Habitat Associated with**
2 **Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting and Foraging	419	419	1,468	1,468	NA	NA
Total Impacts CM1		419	419	1,468	1,468	NA	NA
CM2–CM18	Nesting and Foraging	12,281	46,700	471	1,224	2,926–8,060	5,978
Total Impacts CM2–CM18		12,281	46,700	471	1,224	2,926–8,060	5,978
TOTAL IMPACTS		12,700	47,119	1,939	2,692	2,926–8,060	5,978

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3 **Impact BIO-121: Loss or Conversion of Habitat for and Direct Mortality of Short-Eared Owl**
4 **and Northern Harrier**

5 Alternative 9 conservation measures would result in the combined permanent and temporary loss
6 of up to 34,689 acres of modeled habitat for short-eared owl and northern harrier (of which 32,369
7 acres would be a permanent loss and 2,320 acres would be a temporary loss of habitat, Table 12-9-
8 46). Conservation measures that would result in these losses are conveyance facilities and
9 transmission line construction, and establishment and use of borrow and spoil areas (CM1), Yolo
10 Bypass improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5),
11 grassland restoration (CM8), vernal pool and wetland restoration (CM9), marsh restoration (CM10)
12 and construction of conservation hatcheries (CM18). The majority of habitat loss would result from
13 CM4. Habitat enhancement and management activities (CM11), which would include ground
14 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In
15 addition, maintenance activities associated with the long-term operation of the water conveyance
16 facilities and other BDCP physical facilities could degrade or eliminate short-eared owl and northern
17 harrier modeled habitat. Each of these individual activities is described below. A summary
18 statement of the combined impacts and NEPA effects, and a CEQA conclusion follow the individual
19 conservation measure discussions.

- 20 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would
21 result in the combined permanent and temporary loss of up to 1,887 acres of modeled short-
22 eared owl and northern harrier habitat (419 acres of permanent loss, 1,468 acres of temporary
23 loss) from CZs 4, 5, 6, 7, and 8. The majority of habitat removed would be grassland and
24 cultivated lands. However, fringes of tidal freshwater emergent wetland along channels and

1 island edges would also be impacted from construction activities. There are no occurrences of
2 nesting short-eared owl and northern harrier that overlap with the construction footprint of
3 CM1. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
4 *Disturbance of Nesting Birds*, would require preconstruction surveys and the establishment of
5 no-disturbance buffers and would be available to address potential effects on short-eared owls
6 and northern harriers if they were to nest in or adjacent to construction activities. Refer to the
7 Terrestrial Biology Map Book for a detailed view of Alternative 9 construction locations. Impacts
8 from CM1 would occur within the first 10 years of Alternative 9 implementation.

- 9 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
10 would permanently remove 1,021 acres of modeled short-eared owl and northern harrier
11 habitat in the Yolo Bypass in CZ 2. In addition, 471 acres of habitat would be temporarily
12 removed. The impact would primarily consist of loss of acreages of pastures. The conversion is
13 expected to occur during the first 10 years of Alternative 9 implementation.
- 14 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
15 inundation would permanently remove an estimated 39,017 acres of modeled short-eared owl
16 and northern harrier habitat. The majority of the losses would be managed wetlands and
17 cultivated lands in CZs 1, 2, 4, 5, 6, 7, 8, 10, and 11. Tidal restoration actions through CM4 would
18 restore an estimated 55,000 acres of tidal natural communities. These restored wetland areas
19 could provide suitable nesting habitat for short-eared owl and northern harrier. Consequently,
20 although existing nesting habitat for short-eared owl and northern harrier would be removed,
21 restoration of wetland habitats is expected to benefit marsh associated ground nesting birds by
22 increasing the extent and value of their nesting habitat. Grizzley Island supports the only known
23 resident population of short-eared owls in the Suisun Marsh and Sacramento-San Joaquin River
24 Delta (Roberson 2008). Grizzley Island does not overlap with the hypothetical footprint for CM4.
25 However, this is an important breeding area for short-eared owl and if restoration footprints
26 were changed during the implementation process of BDCP to overlap with this area, the effects
27 on breeding short-eared owls could likely be adverse. Future NEPA and CEQA analysis would be
28 conducted for restoration projects under BDCP and if restoration was proposed to occur outside
29 of the hypothetical footprints used for this programmatic analysis, potential impacts on these
30 species would be captured in the project-level analysis (Appendix 3B, *Environmental*
31 *Commitments, AMMs, and CMs*).
- 32 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
33 seasonally inundated floodplain would permanently and temporarily remove approximately
34 2,086 acres of modeled short-eared owl and northern harrier habitat (1,332 permanent, 754
35 temporary). These losses would be expected to occur along the San Joaquin River and other
36 major waterways in CZ 7.
- 37 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
38 approximately 623 acres of short-eared owl and northern harrier habitat as part of tidal
39 restoration and 2,479 acres of habitat as part of seasonal floodplain restoration.
- 40 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
41 implemented on agricultural lands and would result in the conversion of 1,066 acres of
42 cultivated lands to grassland in CZs 1, 2, 4, 5, 7, 8, and 11. The resulting 2,000 acres of grassland
43 would provide habitat for short-eared owl and northern harrier.
- 44 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
45 actions included in CM11 that are designed to enhance wildlife values in restored or protected

1 habitats could result in localized ground disturbances that could temporarily remove small
2 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
3 vegetation and road and other infrastructure maintenance activities, would be expected to have
4 minor adverse effects on available habitat and would be expected to result in overall
5 improvements to and maintenance of habitat values over the term of the BDCP. Habitat
6 management- and enhancement-related activities could short-eared owl and northern harrier
7 nests. If either species were to nest in the vicinity of a worksite, equipment operation could
8 destroy nests, and noise and visual disturbances could lead to their abandonment, resulting in
9 mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
10 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize these effects.

- 11 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of short-
12 eared owl and northern harrier habitat for the development of a delta and longfin smelt
13 conservation hatchery in CZ 1. The loss is expected to occur during the first 10 years of
14 Alternative 9 implementation.
- 15 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
16 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
17 disturbances that could affect short-eared owl and northern harrier use of the surrounding
18 habitat. Maintenance activities would include vegetation management, levee and structure
19 repair, and re-grading of roads and permanent work areas. These effects, however, would be
20 reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as described
21 below.
- 22 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
23 direct mortality of adult or fledged short-eared owl and northern harrier if they were present in
24 the Plan Area, because they would be expected to avoid contact with construction and other
25 equipment. If either species were to nest in the construction area, construction-related
26 activities, including equipment operation, noise and visual disturbances could destroy nests or
27 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
28 75 would be available to minimize these effects.

29 The following paragraphs summarize the combined effects discussed above and describe other
30 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
31 included.

32 ***Near-Term Timeframe***

33 Because the water conveyance facilities construction is being evaluated at the project level, the near-
34 term BDCP conservation strategy has been evaluated to determine whether it would provide
35 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
36 construction would not be adverse under NEPA. Alternative 9 would remove 14,639 acres of
37 modeled habitat (12,700 permanent, 1,939 temporary) for short-eared owl and northern harrier in
38 the study area in the near-term. These effects would result from the construction of the water
39 conveyance facilities (CM1, 1,887 acres), and implementing other conservation measures (*CM2 Yolo*
40 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally*
41 *Inundated Floodplain Restoration*, *CM7, Riparian Natural Community Restoration*, *CM8 Grassland*
42 *Natural Community Restoration*, *CM10 Nontidal Marsh Restoration*, and *CM18 Conservation*
43 *Hatcheries*—12,752 acres).

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
2 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios
3 would indicate that 1,887 acres of habitat should be restored and 1,887 acres should be protected to
4 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term
5 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore
6 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern
7 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
8 protection).

9 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
10 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
11 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
12 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
13 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3, *Description of*
14 *Alternatives*). These conservation actions are associated with CM3, CM4, and CM8 and would occur
15 in the same timeframe as the construction and early restoration losses. The acres of protection and
16 restoration contained in the near-term Plan goals satisfy the typical mitigation ratios that would be
17 applied to the project-level effects of CM1 and the effects from other near-term restoration actions.

18 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
19 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
20 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
21 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
22 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
23 of current levels of habitat fragmentation. Small mammal populations would also be increased on
24 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
25 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
26 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
27 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
28 other uncultivated areas would also be protected and maintained as part of the cultivated lands
29 reserve system which would provide additional foraging habitat and a source of rodent prey that
30 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
31 (including upland grassland components) would preserve habitat for short-eared owl and northern
32 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
33 objective would focus on highly degraded areas in order to provide the greatest possible level of
34 enhancement benefit to the managed wetland natural community and associated species. Managed
35 wetland protection and enhancement would be concentrated in Suisun Marsh, which currently
36 supports a high concentration of nesting short-eared owls on Grizzley Island.

37 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would
38 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and
39 northern harrier nest in tidal brackish and freshwater emergent wetland, nontidal freshwater
40 perennial emergent wetland, managed wetland, other natural seasonal wetland, grassland, alkali
41 seasonal wetland, vernal pool complex, and selected cultivated lands, which includes alfalfa,
42 irrigated pasture, and other grain fields. At least 15,400 acres of cultivated lands that provide
43 habitat for covered and other native wildlife species would be protected in the near-term time
44 period (Objective CLNC1.1). A minimum of 87% of cultivated lands protected by the late long-term
45 time period would be in alfalfa, irrigated pasture, and other hay crops (Objective SH1.2). This
46 biological objective provides an estimate for the proportion of cultivated lands protected in the

1 near-term time period which would provide suitable nesting and foraging habitat for short-eared
2 owl and northern harrier. These biological goals and objectives would inform the near-term
3 protection and restoration efforts and represent performance standards for considering the
4 effectiveness of restoration actions.

5 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
6 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
7 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
8 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
9 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
10 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
11 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
12 to the Final EIR/EIS.

13 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP
14 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would
15 be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
16 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
17 address this adverse effect.

18 **Late Long-Term Timeframe**

19 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting
20 and foraging habitat for short-eared owl and northern harrier. Alternative 9 as a whole would result
21 in the permanent loss of and temporary effects on 49,811 acres of modeled short-eared owl and
22 northern harrier habitat during the term of the Plan (12% of the modeled habitat in the study area).
23 The locations of these losses are described above in the analyses of individual conservation
24 measures.

25 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
26 *Restoration*, *CM4 Tidal Natural Communities Restoration*, and *CM8 Grassland Natural Community*
27 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
28 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect
29 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable
30 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in
31 Chapter 3).

32 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
33 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
34 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
35 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
36 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
37 of current levels of habitat fragmentation. Small mammal populations would also be increased on
38 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
39 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
40 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
41 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
42 other uncultivated areas would also be protected and maintained as part of the cultivated lands
43 reserve system which would provide additional foraging habitat and a source of rodent prey that
44 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands

1 (including upland grassland components) would preserve habitat for short-eared owl and northern
 2 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
 3 objective would focus on highly degraded areas in order to provide the greatest possible level of
 4 enhancement benefit to the managed wetland natural community and associated species. Managed
 5 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
 6 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the
 7 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time
 8 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands
 9 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared
 10 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated
 11 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected
 12 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated
 13 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 18 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 19 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 20 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 21 to the Final EIR/EIS. Short-eared owl and northern harrier are not species that are covered under
 22 the BDCP. In order for the BDCP to avoid an adverse effect on individuals, preconstruction surveys
 23 for noncovered avian species would be required to ensure that active nests are detected and
 24 avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
 25 *Disturbance of Nesting Birds*, would be available to address this effect.

26 **NEPA Effects:** The loss of short-eared owl and northern harrier habitat and potential direct
 27 mortality of these special-status species under Alternative 9 would represent an adverse effect in
 28 the absence of other conservation actions. With habitat protection and restoration associated with
 29 CM3, CM8, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would
 30 be in place throughout the construction period, the effects of short-eared owl and northern harrier
 31 habitat loss resulting from Alternative 9 would not be adverse. Short-eared owl and northern
 32 harrier are not covered species under the BDCP, and preconstruction surveys for noncovered avian
 33 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75
 34 would be available to address the adverse effect of direct mortality on short-eared owl and northern
 35 harrier.

36 **CEQA Conclusion:**

37 **Near-Term Timeframe**

38 Because the water conveyance facilities construction is being evaluated at the project level, the near-
 39 term BDCP conservation strategy has been evaluated to determine whether it would provide
 40 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
 41 construction would be less than significant under CEQA. Alternative 9 would remove 14,639 acres of
 42 modeled habitat (12,700 permanent, 1,939 temporary) for short-eared owl and northern harrier in
 43 the study area in the near-term. These effects would result from the construction of the water
 44 conveyance facilities (CM1, 1,887 acres), and implementing other conservation measures (*CM2 Yolo*

1 *Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally*
2 *Inundated Floodplain Restoration, CM7, Riparian Natural Community Restoration, CM8 Grassland*
3 *Natural Community Restoration, CM10 Nontidal Marsh Restoration, and CM18 Conservation*
4 *Hatcheries—12,752 acres).*

5 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
6 CM1 would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these typical ratios
7 would indicate that 1,887 acres of habitat should be restored and 1,887 acres should be protected to
8 compensate for the CM1 losses of short-eared owl and northern harrier habitat. The near-term
9 effects of other conservation actions would remove 12,752 acres of modeled habitat, and therefore
10 require 12,752 acres of restoration and 12,752 acres of protection of short-eared owl and northern
11 harrier habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1 for
12 protection).

13 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
14 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
15 alkali seasonal wetland complex, protecting 4,800 acres of managed wetland natural community,
16 protecting 15,400 acres of non-rice cultivated lands, protecting 900 acres of rice or rice equivalent
17 habitat, and restoring 19,150 acres of tidal wetlands (Table 3-4 in Chapter 3). These conservation
18 actions are associated with CM3, CM4, and CM8 and would occur in the same timeframe as the
19 construction and early restoration losses. The acres of protection and restoration contained in the
20 near-term Plan goals satisfy the typical mitigation ratios that would be applied to the project-level
21 effects of CM and the effects from other near-term restoration actions.

22 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
23 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
24 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
25 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
26 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
27 of current levels of habitat fragmentation. Small mammal populations would also be increased on
28 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
29 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey
30 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
31 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
32 other uncultivated areas would also be protected and maintained as part of the cultivated lands
33 reserve system which would provide additional foraging habitat and a source of rodent prey that
34 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
35 (including upland grassland components) would preserve habitat for short-eared owl and northern
36 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
37 objective would focus on highly degraded areas in order to provide the greatest possible level of
38 enhancement benefit to the managed wetland natural community and associated species. Managed
39 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
40 high concentration of nesting short-eared owls on Grizzley Island.

41 The restoration of 19,150 acres of tidal natural communities, including transitional uplands would
42 provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared owl and
43 northern harrier nest in tidal brackish and freshwater emergent wetland, nontidal freshwater
44 perennial emergent wetland, managed wetland, other natural seasonal wetland, grassland, alkali
45 seasonal wetland, vernal pool complex, and selected cultivated lands, which includes alfalfa,

1 irrigated pasture, and other grain fields. At least 15,400 acres of cultivated lands that provide
2 habitat for covered and other native wildlife species would be protected in the near-term time
3 period (Objective CLNC1.1). A minimum of 87% of cultivated lands protected by the late long-term
4 time period would be in alfalfa, irrigated pasture, and other hay crops (Objective SH1.2). This
5 biological objective provides an estimate for the proportion of cultivated lands protected in the
6 near-term time period which would provide suitable nesting and foraging habitat for short-eared
7 owl and northern harrier. These biological goals and objectives would inform the near-term
8 protection and restoration efforts and represent performance standards for considering the
9 effectiveness of restoration actions.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
11 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
12 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
13 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
14 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
15 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
16 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
17 to the Final EIR/EIS.

18 The short-eared owl and the northern harrier are not covered species under the BDCP. For the BDCP
19 to avoid adverse effects on individuals, preconstruction surveys for noncovered avian species would
20 be required to ensure that nests are detected and avoided. The implementation of Mitigation
21 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
22 *Birds*, would reduce this potential impact to a less-than-significant level.

23 **Late Long-Term Timeframe**

24 Based on modeled habitat, the study area supports approximately 406,784 acres of modeled nesting
25 and foraging habitat for short-eared owl and northern harrier. Alternative 9 as a whole would result
26 in the permanent loss of and temporary effects on 49,811 acres of modeled short-eared owl and
27 northern harrier habitat during the term of the Plan (12% of the modeled habitat in the study area).
28 The locations of these losses are described above in the analyses of individual conservation
29 measures.

30 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
31 *Restoration*, *CM4 Tidal Natural Communities Restoration*, and *CM8 Grassland Natural Community*
32 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
33 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex, protect
34 8,100 acres of managed wetland, protect 48,625 acres of cultivated lands that provide suitable
35 habitat for native wildlife species, and restore at least 65,000 acres of tidal wetlands (Table 3-4 in
36 Chapter 3).

37 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
38 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
39 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
40 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
41 provide nesting and foraging habitat for short-eared owl and northern harrier and reduce the effects
42 of current levels of habitat fragmentation. Small mammal populations would also be increased on
43 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
44 VPNC2.5, and GNC2.4). Foraging opportunities would also be improved by enhancing prey

1 populations through the establishment of 20- to 30-foot-wide hedgerows along field borders and
 2 roadsides within protected cultivated lands (Objective SWHA2.2). Remnant patches of grassland or
 3 other uncultivated areas would also be protected and maintained as part of the cultivated lands
 4 reserve system which would provide additional foraging habitat and a source of rodent prey that
 5 could recolonize cultivated fields (Objective CLNC1.3). The protection of managed wetlands
 6 (including upland grassland components) would preserve habitat for short-eared owl and northern
 7 harrier (Objective MWNC1.1). Protection and enhancement of managed wetlands to meet this
 8 objective would focus on highly degraded areas in order to provide the greatest possible level of
 9 enhancement benefit to the managed wetland natural community and associated species. Managed
 10 wetland protection and enhancement would be concentrated in Suisun Marsh, which supports a
 11 high concentration of nesting short-eared owls on Grizzley Island. At least 1,500 acres of the
 12 managed wetlands would be protected and enhanced on Grizzley Island by the late long-term time
 13 period. The restoration of 19,150 acres of tidal natural communities, including transitional uplands
 14 would provide nesting and foraging habitat for short-eared owl and northern harrier. Short-eared
 15 owl and northern harrier nest in open habitats within cultivated lands including alfalfa, irrigated
 16 pasture, and other grain fields. A minimum of 87% of the 48,625 acres of cultivated lands protected
 17 by the late long-term time period (Objective CLNC1.1) would be managed in alfalfa, irrigated
 18 pasture, and other hay crops (Objective SH1.2) which are compatible crop types for these species.

19 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 23 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 24 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 25 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 26 to the Final EIR/EIS. Short-eared owl and northern harrier are not species that are covered under
 27 the BDCP. In order for the BDCP to have a less-than-significant impact on individuals,
 28 preconstruction surveys for noncovered avian species would be required to ensure that active nests
 29 are detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*
 30 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be reduce the impact to a less-
 31 than-significant level.

32 In the absence of other conservation actions, effects on short-eared owl and northern harrier would
 33 represent an adverse effect as a result of habitat modification and potential for direct mortality of
 34 special-status species. This impact would be considered significant. Considering these protection
 35 and restoration provisions, which would provide acreages of new high-value or enhanced habitat in
 36 amounts suitable to compensate for habitats lost to construction and restoration activities, and with
 37 the implementation of AMM1–AMM7, and Mitigation Measure BIO-75, the loss of habitat or direct
 38 mortality through implementation of Alternative 9 would not result in a substantial adverse effect
 39 through habitat modifications and would not substantially reduce the number or restrict the range
 40 of short-eared owl and northern harrier. Therefore, the loss of habitat or potential mortality under
 41 this alternative would have a less-than-significant impact on short-eared owl and northern harrier.

42 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
 43 **Disturbance of Nesting Birds**

44 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-122: Effects on Short-Eared Owl and Northern Harrier Associated with Electrical**
2 **Transmission Facilities**

3 New transmission lines would increase the risk that short-eared owl and northern harrier could be
4 subject to power line strikes, which could result in injury or mortality of these species. Short-eared
5 owl and northern harrier would be at low risk of bird strike mortality based on their keen eyesight
6 and largely ground-based foraging behavior (BDCP Appendix 5.J, Attachment 5.J-2, *Memorandum:*
7 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). The existing network of
8 transmission lines in the project area currently poses the same small risk for these species, and any
9 incremental risk associated with the new power line corridors would also be expected to be low.
10 Marking transmission lines with flight diverters that make the lines more visible to birds has been
11 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated
12 that marking devices in the Central Valley could reduce avian mortality by 60%. With the
13 implementation of *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted
14 with flight diverters, which would further reduce any bird strike risk of short-eared owl and
15 northern harrier.

16 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
17 adverse effect on short-eared owl or northern harrier because the risk of bird strike is considered to
18 be low for both species based on their keen eyesight and behavioral characteristics. New
19 transmission lines would minimally increase the risk for short-eared owl and northern harrier
20 power line strikes. All new transmission lines constructed as a result of the project would be fitted
21 with bird diverters (*AMM20 Greater Sandhill Crane*), which have been shown to reduce avian
22 mortality by 60% and which would further reduce any potential for powerline collisions. Therefore,
23 the construction and operation of transmission lines under Alternative 9 would not result in an
24 adverse effect on short-eared owl or northern harrier.

25 **CEQA Conclusion:** The construction and presence of new transmission lines would not result in a
26 significant impact on short-eared owl or northern harrier because the risk of bird strike is
27 considered to be low for both species based on their keen eyesight and behavioral characteristics.
28 New transmission lines would minimally increase the risk for short-eared owl and northern harrier
29 power line strikes. All new transmission lines constructed as a result of the project would be fitted
30 with bird diverters (*AMM20 Greater Sandhill Crane*), which have been shown to reduce avian
31 mortality by 60% and which would further reduce any potential for powerline collisions. Therefore,
32 the construction and operation of transmission lines under Alternative 9 would result in a less-than-
33 significant impact on short-eared owl or northern harrier.

34 **Impact BIO-123: Indirect Effects of Plan Implementation on Short-Eared Owl and Northern**
35 **Harrier**

36 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
37 with construction-related activities could result in temporary disturbances that affect short-eared
38 owl and northern harrier use of modeled habitat. Construction noise above background noise levels
39 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
40 (BDCP Appendix 5.J, Attachment 5.J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
41 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
42 which these noise levels could affect short-eared owl or northern harrier. Indirect effects associated
43 with construction include noise, dust, and visual disturbance caused by grading, filling, contouring,
44 and other ground-disturbing operations. Construction-related noise and visual disturbances could

1 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could
2 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*
3 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse
4 effects on active nests. The use of mechanical equipment during water conveyance construction
5 could cause the accidental release of petroleum or other contaminants that could affect these
6 species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best*
7 *Management Practices and Monitoring*, would minimize the likelihood of such spills from occurring.
8 The inadvertent discharge of sediment or excessive dust adjacent to short-eared owl and northern
9 harrier could also have a negative effect on these species. AMM1–AMM7 would ensure that
10 measures are in place to prevent runoff from the construction area and the negative effects of dust
11 on wildlife adjacent to work areas.

12 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
13 mercury in avian species, including short-eared owl and northern harrier. Marsh (tidal and nontidal)
14 and floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
15 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
16 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
17 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
18 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity
19 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-
20 specific effects. Increased methylmercury associated with natural community and floodplain
21 restoration could indirectly affect short-eared owl and northern harrier, via uptake in lower trophic
22 levels (as described in BDCP Appendix 5.D, *Contaminants*).

23 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
24 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
25 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
26 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
27 adaptive management as described in CM12 would be available to address the uncertainty of
28 methylmercury levels in restored tidal marsh and potential impacts on short-eared owl and
29 northern harrier.

30 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
31 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
32 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
33 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
34 2009). The effect of selenium toxicity differs widely between species and also between age and sex
35 classes within a species. In addition, the effect of selenium on a species can be confounded by
36 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
37 2009).

38 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
39 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
40 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
41 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
42 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
43 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
44 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
45 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are

1 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 2 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
 3 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 4 levels of selenium have a higher risk of selenium toxicity.

5 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 6 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
 7 exacerbate bioaccumulation of selenium in avian species, including short-eared owl and northern
 8 harrier. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
 9 selenium, and therefore increase avian exposure from ingestion of prey items with elevated
 10 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase
 11 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).
 12 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was
 13 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
 14 in substantial, long-term increases in selenium concentrations in water in the Delta under any
 15 alternative. However, it is difficult to determine whether the effects of potential increases in
 16 selenium bioavailability associated with restoration-related conservation measures (CM4 and CM5)
 17 would lead to adverse effects on short-eared owl and northern harrier.

18 Because of the uncertainty that exists at this programmatic level of review, there could be a
 19 substantial effect on short-eared owl and northern harrier from increases in selenium associated
 20 with restoration activities. This effect would be addressed through the implementation of *AMM27*
 21 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 22 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
 23 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
 24 selenium management to reduce selenium concentrations and/or bioaccumulation would be
 25 evaluated separately for each restoration effort as part of design and implementation. This
 26 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
 27 design schedule.

28 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
 29 could reduce short-eared owl and northern harrier use of modeled habitat adjacent to work areas.
 30 Moreover, operation and maintenance of the water conveyance facilities, including the transmission
 31 facilities, could result in ongoing but periodic postconstruction disturbances that could affect short-
 32 eared owl and northern harrier use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*
 33 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
 34 address adverse effects on nesting individuals in addition to AMM1–AMM7. Tidal habitat restoration
 35 could result in increased exposure of short-eared owl and northern harrier to selenium. This effect
 36 would be addressed through the implementation of *AMM27 Selenium Management*, which would
 37 provide specific tidal habitat restoration design elements to reduce the potential for
 38 bioaccumulation of selenium and its bioavailability in tidal habitats.

39 Tidal habitat restoration is unlikely to have an adverse effect on short-eared owl and northern
 40 harrier through increased exposure to methylmercury, as these species currently nest and forage in
 41 tidal marshes where elevated methylmercury levels exist. However, it is unknown what
 42 concentrations of methylmercury are harmful to the species and the potential for increased
 43 exposure varies substantially within the study area. Site-specific restoration plans in addition to
 44 monitoring and adaptive management, described in CM12 *Methylmercury Management*, would
 45 address the uncertainty of methylmercury levels in restored tidal marsh. The site-specific planning

1 phase of marsh restoration would be the appropriate place to assess the potential for risk of
2 methylmercury exposure for short-eared owl and northern harrier, once site specific sampling and
3 other information could be developed.

4 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
5 operations and maintenance of the water conveyance facilities would have a less-than-significant
6 impact on short-eared owl and northern harrier with the implementation of Mitigation Measure
7 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and
8 AMM1–AMM7. Tidal habitat restoration is unlikely to have a significant impact on short-eared owl
9 and northern harrier through increased exposure to methylmercury, as these species currently nest
10 and forage in tidal marshes where elevated methylmercury levels exist. However, it is unknown
11 what concentrations of methylmercury are harmful to these species. Site-specific restoration plans
12 that address the creation and mobilization of mercury, as well as monitoring and adaptive
13 management as described in CM12 would better inform potential impacts and address the
14 uncertainty of methylmercury levels in restored tidal marsh in the study area. Tidal habitat
15 restoration could result in increased exposure of short-eared owl and northern harrier to selenium.
16 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
17 would provide specific tidal habitat restoration design elements to reduce the potential for
18 bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of
19 Alternative 9 implementation would result in a less-than-significant impact on short-eared owl and
20 northern harrier.

21 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
22 **Disturbance of Nesting Birds**

23 See Mitigation Measure BIO-75 under Impact BIO-75.

24 **Impact BIO-124: Periodic Effects of Inundation on Short-Eared Owl and Northern Harrier as a**
25 **Result of Implementation of Conservation Components**

26 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
27 *Enhancement*) would increase the frequency and duration of inundation on approximately 2,926–
28 8,060 acres of modeled short-eared owl and northern harrier habitat (Table 12-9-46).

29 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
30 *Restoration* could result in the periodic inundation of up to approximately 5,978 acres of modeled
31 habitat (Table 12-9-46), the majority of which would be pasture and other cultivated lands.

32 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
33 season due to periodic inundation. However, inundation would occur during the nonbreeding
34 season and would not be expected to have an adverse effect on either species.

35 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on short-
36 eared owl and northern harrier because inundation is expected to occur prior to the breeding
37 season.

38 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on short-
39 eared owl and northern harrier because inundation is expected to occur prior to the breeding
40 season.

1 **Redhead and Tule Greater White-Fronted Goose**

2 Impacts, relevant protection and restoration actions, and mitigation requirements under CEQA are
3 discussed for these species in the *General Terrestrial Biology Effects* section under Impacts BIO-178
4 through BIO-183. Further details of the methods of analysis for waterfowl and shorebirds can be
5 found in the *BDCP Waterfowl and Shorebird Effects Analysis* (Ducks Unlimited 2013).

6 **Mountain Plover**

7 This section describes the effects of Alternative 9, including water conveyance facilities construction
8 and implementation of other conservation components, on mountain plover. Modeled habitat for
9 mountain plover consists of grassland, alkali seasonal wetland, vernal pool complex, alfalfa, grain
10 and hay, pasture, and idle cropland throughout the study area.

11 Construction and restoration associated with Alternative 9 conservation measures would result in
12 both temporary and permanent losses of modeled habitat for mountain plover as indicated in Table
13 12-9-47. Full implementation of Alternative 9 would include the following biological objectives over
14 the term of the BDCP that would benefit the mountain plover (BDCP Chapter 3, Section 3.3,
15 *Biological Goals and Objectives*).

- 16 • Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least
17 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder
18 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 19 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 20 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
21 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 22 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
23 VPNC2.5, GNC2.4, associated with CM11).
- 24 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
25 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 26 • Within the 48,625 acres of protected cultivated lands, protect at least 42,275 acres of cultivated
27 lands as Swainson's hawk foraging habitat with at least 50% in very high-value habitat in CZs 2,
28 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).

29 As explained below, with the restoration or protection of these amounts of habitat, in addition to
30 management activities that would enhance these natural communities for the species, impacts on
31 mountain plover would not be adverse for NEPA purposes and would be less than significant for
32 CEQA purposes.

1 **Table 12-9-47. Changes in Mountain Plover Modeled Habitat Associated with Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Wintering	318	318	1,281	1,281	NA	NA
Total Impacts CM1		318	318	1,281	1,281	NA	NA
CM2–CM18	Wintering	5,450	26,198	376	893	1,158–3,650	3,823
Total Impacts CM2–CM18		5,450	26,198	376	893	1,158–3,650	3,823
TOTAL IMPACTS		5,768	26,516	1,657	2,174	1,158–3,650	3,823

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-125: Loss or Conversion of Habitat for and Direct Mortality of Mountain Plover**

4 Alternative 9 conservation measures would result in the combined permanent and temporary loss
 5 of up to 28,690 acres of modeled habitat for mountain plover (25,516 acres of permanent loss and
 6 2,174 of temporary loss, Table 12-9-47). Conservation measures that would result in these losses
 7 are conveyance facilities and transmission line construction, and establishment and use of borrow
 8 and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat restoration (CM4),
 9 floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), vernal pool
 10 and wetland restoration (CM9), nontidal marsh restoration (CM10), and construction of
 11 conservation hatcheries (CM18). The majority of habitat loss (20,880 acres) would result from CM4.
 12 Habitat enhancement and management activities (CM11), which include ground disturbance or
 13 removal of nonnative vegetation, and the construction of recreational trails, signs, and facilities,
 14 could result in local adverse habitat effects. In addition, maintenance activities associated with the
 15 long-term operation of the water conveyance facilities and other BDCP physical facilities could
 16 degrade or eliminate mountain plover modeled wintering habitat. Each of these individual activities
 17 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA
 18 conclusion follows the individual conservation measure discussions.

- 19 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would
 20 result in the combined permanent and temporary loss of up to 1,559 acres of modeled mountain
 21 plover habitat (318 acres of permanent loss, 1,281 acres of temporary loss) from CZ 4, 5, 6, and
 22 8. These losses would occur at numerous locations where dredging, construction of operable
 23 barriers and canals, and channel enlargement would be undertaken. Other impacts would occur
 24 from potential borrow and spoil sites, access roads, barge unloading facilities, and intake and
 25 fish screen construction areas. There are no CNDDDB occurrences of mountain plover that
 26 intersect with the CM1 footprint. However, the study area does overlap with the species' winter

1 range, and there are occurrences west and north of the study area. Refer to the Terrestrial
2 Biology Map Book for a detailed view of Alternative 9 construction locations. Impacts from CM1
3 would occur within the first 10 years of Alternative 9 implementation.

- 4 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
5 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
6 mountain plover wintering habitat (898 acres of permanent loss, 376 acres of temporary loss) in
7 the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of grassland and pasture.
8 Most of the grassland losses would occur at the north end of the bypass below Fremont Weir,
9 along the Toe Drain/Tule Canal, and along the west side channels. Realignment of Putah Creek
10 could also involve excavation and grading in alkali seasonal wetland complex habitat as a new
11 channel is constructed. The loss is expected to occur during the first 10 years of Alternative 9
12 implementation.
- 13 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
14 inundation would permanently remove an estimated 20,880 acres of modeled mountain plover
15 habitat. The majority of the acres lost would consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or
16 7. Grassland losses would likely occur in the vicinity of Cache Slough, on Decker Island in the
17 West Delta ROA, on the upslope fringes of Suisun Marsh, and along narrow bands adjacent to
18 waterways in the South Delta ROA. Tidal restoration would directly impact and fragment
19 grassland just north of Rio Vista in and around French and Prospect Islands, and in an area
20 south of Rio Vista around Threemile Slough. Losses of alkali seasonal wetland complex habitat
21 would likely occur in the south end of the Yolo Bypass and on the northern fringes of Suisun
22 Marsh.
- 23 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
24 seasonally inundated floodplain would permanently and temporarily remove approximately
25 1,450 acres of modeled mountain plover habitat (933 permanent, 517 temporary). These losses
26 would be expected after the first 10 years of Alternative 9 implementation along the San Joaquin
27 River and other major waterways in CZ 7.
- 28 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
29 approximately 370 acres of mountain plover wintering habitat as part of tidal restoration and
30 1,489 acres of habitat as part of seasonal floodplain restoration.
- 31 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
32 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
33 result from implementation of CM8 and CM9 in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
34 would be restored after the construction periods. Grassland restoration would be implemented
35 on agricultural lands that also provide wintering habitat for mountain plover and would result
36 in the conversion of 837 acres of cultivated lands to grassland.
- 37 ● *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
38 removal of 705 acres of mountain plover habitat.
- 39 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
40 actions included in CM11 that are designed to enhance wildlife values in restored or protected
41 habitats could result in localized ground disturbances that could temporarily remove small
42 amounts of mountain plover habitat. Ground-disturbing activities, such as removal of nonnative
43 vegetation and road and other infrastructure maintenance activities, would be expected to have
44 minor adverse effects on available mountain plover habitat. CM11 would also include the

1 construction of recreational-related facilities including trails, interpretive signs, and picnic
2 tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The construction of
3 trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be placed on existing,
4 disturbed areas when and where possible. However, approximately 50 acres of grassland
5 habitat would be lost from the construction of trails and facilities.

- 6 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
7 modeled mountain plover habitat for the development of a delta and longfin smelt conservation
8 hatchery in CZ 1.
- 9 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
10 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
11 disturbances that could affect mountain plover use of the surrounding habitat. Maintenance
12 activities would include vegetation management, levee and structure repair, and re-grading of
13 roads and permanent work areas. These effects, however, would be reduced by AMM1–
14 AMM7 and conservation actions as described below.
- 15 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
16 mountain plover because foraging individuals would be expected to temporarily avoid the
17 increased noise and activity associated with construction areas.

18 The following paragraphs summarize the combined effects discussed above and describe other
19 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
20 included.

21 ***Near-term Timeframe***

22 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
23 the near-term BDCP conservation strategy has been evaluated to determine whether it would
24 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
25 effects of construction would not be adverse under NEPA. Alternative 9 would remove 7,425 acres
26 (5,768 permanent, 1,657 temporary) of modeled mountain plover wintering habitat in the study
27 area in the near-term. These effects would result from the construction of the water conveyance
28 facilities (CM1, 1,599 acres), and implementing other conservation measures (*CM2 Yolo Bypass*
29 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*
30 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*
31 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*
32 and *CM18 Conservation Hatcheries*—5,826 acres).

33 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
34 would be 2:1 for protection of habitat. Using this ratio would indicate that 3,198 acres should be
35 protected to compensate for the CM1 losses of 1,599 acres of mountain plover wintering habitat.
36 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,
37 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical
38 NEPA and CEQA ratio (2:1 for protection).

39 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
40 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
41 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
42 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,
43 and CM9 and would occur in the same timeframe as the construction and early restoration losses

1 thereby avoiding adverse effects of habitat loss on mountain plover wintering in the study area.
 2 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
 3 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
 4 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
 5 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
 6 would expand mountain plover wintering habitat and reduce the effects of current levels of habitat
 7 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
 8 populations would be increased on protected lands, enhancing the foraging value of these natural
 9 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat
 10 for covered and other native wildlife species would provide approximately 15,400 acres of potential
 11 wintering habitat for mountain plover (Objective CLNC1.1). Approximately 87% of cultivated lands
 12 protected by the late long-term time period would be in alfalfa and pasture crop types (very high-
 13 and high-value crop types) for Swainson’s hawk (Objective SH1.2) which are also modeled habitat
 14 for wintering mountain plover. This biological objective provides an estimate for the high
 15 proportion of cultivated lands protected in the near-term time period which would be suitable for
 16 mountain plover.

17 The acres of restoration and protection contained in the near-term Plan goals and the additional
 18 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
 19 level effects of CM1 on mountain plover, as well as mitigate the near-term effects of the other
 20 conservation measures with the consideration that some portion of the 15,400 acres of cultivated
 21 lands protected in the near-term timeframe would be managed in suitable crop types to compensate
 22 for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-125, *Compensate for the Near-Term*
 23 *Loss of Mountain Plover Wintering Habitat*, would be available to address the adverse effect of
 24 habitat loss in the near-term.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 26 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 27 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 28 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 29 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 30 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 31 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 32 to the Final EIR/EIS.

33 ***Late Long-Term Timeframe***

34 Based on the habitat model, the study area supports approximately 269,411 acres of potential
 35 habitat for mountain plover. Alternative 9 as a whole would result in the permanent loss of and
 36 temporary effects on 28,690 acres of modeled mountain plover wintering habitat during the term of
 37 the Plan. The locations of these losses are described above in the analyses of individual conservation
 38 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
 39 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
 40 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
 41 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
 42 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
 43 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would
 44 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,
 45 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives

1 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal
 2 wetland, and vernal pool natural communities which would expand habitat for mountain plover and
 3 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
 4 *Enhancement and Management*, insect prey populations would be increased on protected lands,
 5 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
 6 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would
 7 provide approximately 15,400 acres of potential wintering habitat for mountain plover (Objective
 8 CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture
 9 crop types (very high- and high-value crop types) for Swainson’s hawk (Objective SH1.2) which
 10 would also provide potential wintering habitat for mountain plover. The Plan also includes
 11 commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best*
 12 *Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion*
 13 *and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6*
 14 *Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements
 15 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
 16 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
 17 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS.

18 **NEPA Effects:** The loss of mountain plover habitat and potential mortality of this special-status
 19 species under Alternative 9 would represent an adverse effect in the absence of other conservation
 20 actions. However, with habitat protection and restoration associated with CM3, CM8, CM9, and
 21 CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in place
 22 throughout the construction period, and with implementation of Mitigation Measure BIO-125,
 23 *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, the effects of habitat loss
 24 and potential for direct mortality on mountain plover under Alternative 9 would not be adverse.

25 **CEQA Conclusion:**

26 **Near-Term Timeframe**

27 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 28 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 29 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 30 effects of construction would be less than significant under CEQA. Alternative 9 would remove 7,425
 31 acres (5,768 permanent, 1,657 temporary) of modeled mountain plover wintering habitat in the
 32 study area in the near-term. These effects would result from the construction of the water
 33 conveyance facilities (CM1, 1,599 acres), and implementing other conservation measures (*CM2 Yolo*
 34 *Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM7 Riparian Natural*
 35 *Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9 Vernal Pool and Alkali*
 36 *Seasonal Wetland Complex Restoration*, *CM11 Natural Communities Enhancement and Management*
 37 and *CM18 Conservation Hatcheries*—5,826 acres).

38 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
 39 would be 2:1 for protection of habitat. Using this ratio would indicate that 3,198 acres should be
 40 protected to compensate for the CM1 losses of 1,599 acres of mountain plover wintering habitat.
 41 The near-term effects of other conservation actions would remove 5,826 acres of modeled habitat,
 42 and therefore require 11,652 acres of protection of mountain plover habitat using the same typical
 43 NEPA and CEQA ratio (2:1 for protection).

1 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
 2 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
 3 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
 4 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
 5 in the same timeframe as the construction and early restoration losses thereby avoiding significant
 6 impacts of habitat loss on mountain plover. Grassland restoration and protection would occur in CZs
 7 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8, and 11
 8 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1
 9 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal wetland, and
 10 vernal pool natural communities which would expand wintering habitat for mountain plover and
 11 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
 12 *Enhancement and Management*, insect prey populations would be increased on protected lands,
 13 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
 14 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would
 15 provide approximately 15,400 acres of potential wintering habitat for mountain plover (Objective
 16 CLNC1.1). Approximately 87% of cultivated lands protected by the late long-term time period would
 17 be in alfalfa and pasture crop types (very high- and high-value crop types) for Swainson's hawk
 18 (Objective SH1.2) which would also provide potential habitat for mountain plover wintering in the
 19 study area. This biological objective provides an estimate for the high proportion of cultivated lands
 20 protected in the near-term time period which would provide habitat for mountain plover.

21 These Plan objectives represent performance standards for considering the effectiveness of
 22 conservation actions. The acres of restoration and protection contained in the near-term Plan goals
 23 and the additional detail in the biological objectives satisfy the typical mitigation that would be
 24 applied to the project-level effects of CM1 on mountain plover, as well as mitigate the near-term
 25 effects of the other conservation measures with the consideration that some portion of the 15,400
 26 acres of cultivated lands protected in the near-term timeframe would be managed in suitable crop
 27 types to compensate for the loss of habitat at a ratio of 2:1. The implementation of Mitigation
 28 Measure BIO-125, *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, would
 29 reduce the impact of habitat loss in the near-term to a less-than-significant level.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 31 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 32 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 33 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 34 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 35 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 36 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 37 to the Final EIR/EIS.

38 ***Late Long-Term Timeframe***

39 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 28,690
 40 acres of mountain plover habitat during the term of the Plan (11% of the total habitat in the study
 41 area). The locations of these losses are described above in the analyses of individual conservation
 42 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
 43 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
 44 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
 45 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali

1 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
2 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would
3 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,
4 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives
5 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal
6 wetland, and vernal pool natural communities which would expand wintering habitat for mountain
7 plover and reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural*
8 *Communities Enhancement and Management*, insect prey populations would be increased on
9 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
10 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife
11 species would provide approximately 15,400 acres of potential habitat for mountain plover
12 (Objective CLNC1.1). Approximately 42,275 acres of cultivated lands protected would be in alfalfa
13 and pasture crop types (very high- and high-value crop types) for Swainson's hawk (Objective
14 SH1.2) which would also provide habitat for mountain plover.

15 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
16 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
17 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
18 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
19 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
20 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
21 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
22 to the Final EIR/EIS.

23 Considering Alternative 9's protection and restoration provisions, which would provide acreages of
24 new or enhanced habitat in amounts suitable to compensate for habitats lost to construction and
25 restoration activities, and with the implementation of AMM1-AMM7 and Mitigation Measure BIO-
26 125, *Compensate for the Near-Term Loss of Mountain Plover Wintering Habitat*, the loss of habitat or
27 direct mortality through implementation of Alternative 9 would not result in a substantial adverse
28 effect through habitat modifications and would not substantially reduce the number or restrict the
29 range of mountain plover. Therefore, the loss of habitat or potential mortality under this alternative
30 would have a less-than-significant impact on mountain plover.

31 **Mitigation Measure BIO-125: Compensate for the Near-Term Loss of Mountain Plover** 32 **Wintering Habitat**

33 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
34 crops, or alfalfa to provide habitat for mountain plover such that the total acres of high-value
35 habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1. Additional grassland
36 protection, enhancement, and management may be substituted for the protection of high-value
37 cultivated lands.

38 **Impact BIO-126: Effects on Mountain Plover Associated with Electrical Transmission** 39 **Facilities**

40 Mountain plovers congregate in flocks during the winter and travel between grasslands and
41 cultivated lands that provide foraging habitat for the species. This flocking behavior puts them at
42 risk of collisions with powerlines. However, plovers exhibit low wing loading and high aspect-ratio
43 wings and as a result can maneuver relatively quickly around an obstacle such as a transmission

1 line. Their wing structure and design allows for rapid flight and quick, evasive actions. Marking
2 transmission lines with flight diverters that make the lines more visible to birds has been shown to
3 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
4 marking devices in the Central Valley could reduce avian mortality by 60%. Plovers are primarily
5 visual foragers and therefore, the risk for collision would be further reduced by *AMM20 Greater*
6 *Sandhill Crane*, which would require the installation of bird flight diverters on all new transmission
7 lines in the study area.

8 **NEPA Effects:** New transmission lines are not expected to have an adverse effect on mountain plover
9 because the probability of bird-powerline strikes is highly unlikely because of plovers' flight
10 behaviors. The implementation of *AMM20 Greater Sandhill Crane* would require the installation of
11 bird flight diverters on all new transmission lines, which would further reduce any potential for
12 mortality. Therefore, the construction and operation of new transmission lines under Alternative 9
13 would not result in an adverse effect on mountain plover.

14 **CEQA Conclusion:** New transmission lines would have a less-than-significant impact on mountain
15 plover because the probability of bird-powerline strikes is highly unlikely because of plovers' flight
16 behaviors. The implementation of *AMM20 Greater Sandhill Crane* would require the installation of
17 bird flight diverters on all new transmission lines, which would further reduce any potential for
18 mortality. Therefore, the construction and operation of new transmission lines under Alternative 9
19 would result in a less-than-significant impact on mountain plover.

20 **Impact BIO-127: Indirect Effects of Operations and Maintenance of Water Conveyance** 21 **Facilities on Mountain Plover**

22 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt
23 foraging, and reduce the functions of suitable foraging habitat for mountain plover. Construction
24 noise above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from
25 the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*
26 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no
27 available data to determine the extent to which these noise levels could affect mountain plover.
28 Indirect effects associated with construction include noise, dust, and visual disturbance caused by
29 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical
30 equipment during water conveyance facilities construction could cause the accidental release of
31 petroleum or other contaminants that could affect these species or their prey in the surrounding
32 habitat. AMM1-AMM7 would minimize the likelihood of such spills from occurring. The inadvertent
33 discharge of sediment or excessive dust adjacent to mountain plover grassland habitat could also
34 have a negative effect on the species. However, AMM1-AMM7 would also ensure that measures
35 would be in place to prevent runoff from the construction area and the negative effects of dust on
36 wildlife adjacent to work areas.

37 **NEPA Effects:** Indirect effects on mountain plover as a result of Alternative 9 implementation could
38 have adverse effects on the species through the modification of habitat. With the With the
39 implementation of AMM1-AMM7, indirect effects as a result of Alternative 9 implementation would
40 not have an adverse effect mountain plover.

41 **CEQA Conclusion:** Indirect effects on mountain plover as a result of Alternative 9 implementation
42 could have a significant impact on the species from modification of habitat. With the implementation
43 of AMM1-AMM7, indirect effects as a result of Alternative 9 implementation would have a less-than-
44 significant impact on mountain plover.

1 **Impact BIO-128: Periodic Effects of Inundation on Mountain Plover as a Result of**
2 **Implementation of Conservation Components**

3 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
4 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–
5 3,650 acres of modeled mountain plover wintering habitat (Table 12-9-47). Based on hypothetical
6 footprints, implementation of *CM5 Seasonally Inundated Floodplain Restoration*, could result in the
7 periodic inundation of up to approximately 3,823 acres of modeled mountain plover habitat (Table
8 12-9-47).

9 **NEPA Effects:** Implementation of CM2 and CM5 would periodically inundate suitable mountain
10 plover foraging habitat. However, effects of periodic inundation would not have an adverse effect on
11 mountain plover because birds would be expected to move to adjacent foraging habitat.

12 **CEQA Conclusion:** Implementation of CM2 and CM5 would periodically inundate suitable mountain
13 plover foraging habitat. However, effects of periodic inundation would have a less-than-significant
14 impact on mountain plover because birds would be expected to move to adjacent foraging habitat.

15 **Black Tern**

16 This section describes the effects of Alternative 9, including water conveyance facilities construction
17 and implementation of other conservation components, on black tern. Modeled nesting habitat for
18 black tern in the study area is currently limited to rice in CZ 2.

19 Construction and restoration associated with Alternative 9 conservation measures would result in
20 both temporary and permanent losses of modeled habitat for black tern as indicated in Table 12-9-
21 48. Full implementation of Alternative 9 would include the following biological objectives over the
22 term of the BDCP that would benefit the black tern (BDCP Chapter 3, Section 3.3, *Biological Goals*
23 *and Objectives*).

- 24 • Protect 700 acres of cultivated lands, with at least 500 acres consisting of rice land, to expand
25 upon and buffer newly restored/created nontidal perennial habitat in CZ 2, (Objective GGS2.3,
26 associated with CM3).
- 27 • Protect up to 1,700 acres of rice land or equivalent habitat (e.g., perennial wetland) in the Yolo
28 Bypass if this portion meets the criteria specified in CM3, *Reserve Design Requirements by*
29 *Species*, for giant garter snake. Any remaining acreage (from a total 2,740-acre commitment) will
30 consist of rice land or equivalent-value habitat outside the Yolo Bypass in CZs 1, 2, 4, or 5
31 (Objective GGS3.1, associated with CM3).
- 32 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
33 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 34 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
35 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
36 associated with CM10).

37 As explained below, with the restoration and protection of these amounts of habitat, in addition to
38 management activities that would enhance this habitat for the species and implementation of
39 AMM1–AMM7 and Mitigation Measure BIO-75, impacts on black tern would not be adverse for NEPA
40 purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-48. Changes in Black Tern Modeled Habitat Associated with Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2–CM18	Nesting	306	490	1	1	791–1,582	0
Total Impacts CM2–CM18		306	490	1	1	791–1,582	0
TOTAL IMPACTS		306	490	1	1	791–1,582	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-129a: Loss or Conversion of Habitat for and Direct Mortality of Black Tern**

4 Alternative 9 conservation measures would result in the permanent loss of up to 491 acres of
 5 modeled nesting habitat for black tern, consisting of freshwater wetlands and rice in CZ 2 (Table 12-
 6 9-48). Conservation measures that would result in these losses are Yolo Bypass fisheries
 7 improvements (CM2), tidal habitat restoration (CM4), grassland restoration (CM8) and nontidal
 8 marsh restoration (CM10). Each of these individual activities is described below. A summary
 9 statement of the combined impacts and NEPA effects, and a CEQA conclusion follows the individual
 10 conservation measure discussions.

- 11 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 12 would permanently remove 31 acres of modeled black tern habitat in the Yolo Bypass in CZ 2. In
 13 addition, 1 acre of habitat would be temporarily removed. The loss is expected to occur during
 14 the first 10 years of Alternative 9 implementation.
- 15 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 16 inundation would permanently remove an estimated 199 acres of modeled black tern habitat in
 17 CZ 2.
- 18 • *CM8 Grassland Natural Community Restoration*: Restoration of grassland is expected to be
 19 implemented on agricultural lands and would result in the conversion of 52 acres of rice lands
 20 to grassland in CZ 2 by the late-long time period. An estimated 30 acres of impact would occur in
 21 the first 10 years.
- 22 • *CM10 Nontidal Marsh Restoration*: Implementation of *CM10* would result in the permanent
 23 removal of 208 acres of black tern nesting habitat in in CZ 2. An estimated 46 acres would be
 24 removed in the first 10 years.

1 *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
2 actions that are designed to enhance wildlife values in restored or protected habitats could
3 result in localized ground disturbances that could temporarily remove small amounts of
4 modeled habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road
5 and other infrastructure maintenance activities, would be expected to have minor adverse
6 effects on available habitat and would be expected to result in overall improvements to and
7 maintenance of habitat values over the term of the BDCP. Habitat management- and
8 enhancement-related activities could disturb nesting black terns if they were to nest in the
9 vicinity of a worksite. Equipment operation could destroy nests, and noise and visual
10 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings. The
11 potential for these activities to result in direct mortality of black tern would be minimized with
12 the implementation of and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
13 *Surveys and Avoid Disturbance of Nesting Birds*.

- 14 ● Operations and Maintenance: Postconstruction operation and maintenance of the restoration
15 infrastructure could result in ongoing but periodic disturbances that could affect black tern
16 nesting adjacent to maintenance areas. Maintenance activities would include vegetation
17 management, levee and structure repair, and re-grading of roads and permanent work areas.
18 These effects, however, would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and
19 conservation actions as described below.
- 20 ● Injury and Direct Mortality: Construction-related activities would not be expected to result in
21 direct mortality of adult or fledged black tern individuals if they were present in the study area,
22 because they would be expected to avoid contact with construction and other equipment. If
23 black tern were to nest in the construction area, construction-related activities, including
24 equipment operation, noise and visual disturbances could destroy nests or lead to their
25 abandonment, resulting in mortality of eggs and nestlings. These effects would be avoided and
26 minimized with the implementation of Mitigation Measure BIO-75.
- 27 ● Late season flooding in the Yolo Bypass could result in the loss of rice (nesting habitat for black
28 tern) by precluding the preparation and planting of rice fields. The methods for estimating loss
29 of rice in the bypass and results are provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation*
30 *of BDCP Impact on Giant Garter Snake Summer Foraging Habitat in the Yolo Bypass*. This analysis
31 concludes that the estimated loss of rice could be up to 1,662 acres by the late long-term
32 timeframe. This potential impact is further described under Impact BIO-129c below.

33 The following paragraphs summarize the combined effects discussed above and describe other
34 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
35 included.

36 ***Near-Term Timeframe***

37 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
38 the near-term BDCP conservation strategy has been evaluated to determine whether it would
39 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
40 effects of construction would not be adverse under NEPA. There would be no impacts on black tern
41 nesting habitat resulting from the construction of the water conveyance facilities (CM1). However,
42 there would be a loss of 307 acres of modeled nesting habitat for black tern in the study area in the
43 near-term. These effects would result from implementing *CM2 Yolo Bypass Fisheries Enhancements*,

1 *CM4 Tidal Natural Communities Restoration, CM8 Grassland Natural Community Restoration and*
2 *CM10 Nontidal Marsh Restoration.*

3 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection and 1:1
4 restoration for the loss of black tern habitat. Using this ratio would indicate that 307 acres of rice
5 lands and/or freshwater wetlands should be protected and 307 acres should be restored in CZ 2 to
6 compensate for the losses of black tern nesting habitat.

7 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or
8 equivalent habitat and restoring 8,850 acres of tidal freshwater emergent wetland (see Table 3-4 in
9 Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3 and CM4
10 and would occur in the same timeframe as the early restoration losses. The BDCP also contains
11 objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to protect up to
12 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets the criteria
13 specified in CM3, *Reserve Design Requirements by Species* for giant garter snake, Objectives GGS2.3
14 and GGS 3.1) by the late long-term time period. The tidal freshwater emergent wetland would be
15 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*
16 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that
17 increase connectivity among protected lands (Objective TFEWNC2.2).

18 These objectives would inform the near-term protection actions, and therefore some portion of the
19 200 acres of rice and 700 acres of rice or equivalent habitat and the 8,850 acres of tidal freshwater
20 emergent wetland would be expected to be restored in CZ 2. However, there is no near-term acreage
21 commitment in the plan that is specific to CZ 2. In order to avoid an adverse effect on black tern from
22 habitat loss, protection and restoration of 307 acres of rice and/or freshwater wetlands would need
23 to occur in CZ 2 in the near-term timeframe. Mitigation Measure BIO-129a, *Compensate for Loss of*
24 *Black Tern Nesting Habitat*, would be available to address this adverse effect.

25 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
26 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
27 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
28 *Countermeasure Plan, and AMM6 Disposal and Reuse of Spoils*. All of these AMMs include elements
29 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
30 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
31 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS. Black
32 tern is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
33 preconstruction surveys for noncovered avian species would be required to ensure that nests are
34 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
35 *Avoid Disturbance of Nesting Birds*, would be available to address this adverse effect.

36 **Late Long-Term Timeframe**

37 Alternative 9 as a whole would result in the permanent loss of 491 acres of modeled black tern
38 nesting habitat during the term of the Plan. This impact would result from the removal or
39 conversion of rice and freshwater wetlands in CZ 2. The Plan includes conservation commitments
40 through *CM3 Natural Communities Protection and Restoration* to protect 500 acres of rice lands (see
41 Table 3-4 in Chapter 3, *Description of Alternatives*) and up to 1,700 acres of rice lands or equivalent
42 habitat for the giant garter snake (Objective GGS3.1) in CZ 2. The nesting habitat for black tern in the
43 northern part of the study area has largely been reduced to rice lands, and these acres would
44 provide protected nesting habitat for the species. The Plan also includes conservation commitments

1 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
2 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1).

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils*. All of these AMMs include elements
7 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
8 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
9 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS. Black
10 tern is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
11 preconstruction surveys for noncovered avian species would be required to ensure that nests are
12 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
13 *Avoid Disturbance of Nesting Birds*, would be available to address this effect.

14 **NEPA Effects:** The loss of black tern nesting habitat and potential for mortality of this special-status
15 species under Alternative 9 would represent an adverse effect in the absence of other conservation
16 actions. With habitat protection associated with CM3, guided by biological goals and objectives and
17 AMM1–AMM6, which would be in place throughout the construction period, the effects of habitat
18 loss under Alternative 9 would not be adverse under NEPA. Black tern is not a covered species
19 under the BDCP and potential mortality would be an adverse effect without preconstruction surveys
20 to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*
21 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this effect.

22 **CEQA Conclusion:**

23 **Near-Term Timeframe**

24 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
25 the near-term BDCP conservation strategy has been evaluated to determine whether it would
26 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
27 effects of construction would be less than significant under CEQA. There would be no impacts on
28 black tern nesting habitat resulting from the construction of the water conveyance facilities (CM1).
29 However, there would be a loss of 307 acres of modeled nesting habitat for black tern in the study
30 area in the near-term. These effects would result from implementing *CM2 Yolo Bypass Fisheries*
31 *Enhancements*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*
32 *Restoration* and *CM10 Nontidal Marsh Restoration*.

33 The typical NEPA and CEQA project-level mitigation ratio would be 1:1 protection and 1:1
34 restoration for the loss of black tern nesting habitat. Using this ratio would indicate that 307 acres of
35 rice lands and/or freshwater wetlands should be protected and 307 acres should be restored in CZ 2
36 to mitigate the losses of black tern nesting habitat.

37 The BDCP has committed to near-term goals of protecting 200 acres of rice and 700 acres of rice or
38 equivalent habitat and restoring 8,850 acres of tidal freshwater emergent wetland (see
39 Table 3-4 in Chapter 3 *Description of Alternatives*). These conservation actions are associated with
40 CM3 and CM4 and would occur in the same timeframe as the early restoration losses. The BDCP also
41 contains objectives for the giant garter snake to protect at least 500 acres of rice in CZ 2 and to
42 protect up to 1,700 acres of rice land or equivalent habitat in the Yolo Bypass (if this portion meets
43 the criteria specified in CM3, *Reserve Design Requirements by Species* for giant garter snake,

Objectives GGS2.3 and GGS 3.1) by the late long-term time period. The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that increase connectivity among protected lands (Objective TFEWNC2.2).

These objectives would inform the near-term protection actions, and therefore some portion of the 200 acres of rice and 700 acres of rice or equivalent habitat and the 8,850 acres of tidal freshwater emergent wetland would be expected to be restored and protected in CZ 2. However, there is no near-term acreage commitment in the plan that is specific to CZ 2. In order to compensate for black tern habitat loss, the protection and restoration of 307 acres of rice or freshwater wetlands would need to occur in CZ 2 in the near-term timeframe. Mitigation Measure BIO-129a, *Compensate for Loss of Black Tern Nesting Habitat*, would reduce this potential impact to a less-than-significant level.

The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils*. All of these AMMs include elements that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS. Black tern is not a covered species under the BDCP. For the BDCP to have a less-than-significant impact on individuals, preconstruction would be required to ensure that nests are detected and avoided. In the absence of other conservation actions, effects on black tern would represent an adverse effect as a result of habitat modification and potential for direct mortality of a special-status species. This impact would be significant. However, the BDCP has committed to habitat protection, restoration, management and enhancement activities described above. As outlined in BDCP Chapter 3, Section 3.4, *Conservation Measures*, natural community restoration and protection are planned so that they keep pace with project impacts. Thus, there would be minimal lag time between impacts and those measures designed to offset those impacts on natural communities and the species that use them. In addition, implementation of *AMM1-AMM7*, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-129a, *Compensate for Loss of Black Tern Nesting Habitat*, which would require 1:1 protection of habitat in CZ 2 in the near-term time frame, would reduce this potential impact to a less-than-significant level.

Late Long-Term Timeframe

Alternative 9 as a whole would result in the permanent loss of 491 acres of modeled black tern nesting habitat during the term of the Plan. This impact would result from the removal or conversion of rice and freshwater wetlands in CZ 2. The Plan includes conservation commitments through *CM3 Natural Communities Protection and Restoration* to protect 500 acres of rice lands (see Table 3-4 in Chapter 3, *Description of Alternatives*) and up to 1,700 acres of rice lands or equivalent habitat for the giant garter snake (Objective GGS3.1) in CZ 2. The nesting habitat for black tern in the northern part of the study area has largely been reduced to rice lands, and these acres would provide protected nesting habitat for the species. The Plan also includes conservation commitments through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1).

The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils*. All of these AMMs include elements
2 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
3 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
4 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS. Black
5 tern is not a covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
6 preconstruction surveys for noncovered avian species would be required to ensure that nests are
7 detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*
8 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would identify any nesting terns during
9 preconstruction surveys and ensure that active nests are avoided, which would reduce the potential
10 impact on nesting black tern to a less-than-significant level.

11 In the absence of other conservation actions, effects on black tern would represent an adverse effect
12 as a result of habitat modification and potential for direct mortality of special-status species. This
13 impact would be significant. Considering these protection provisions, which would provide acreages
14 of new or enhanced habitat in amounts greater than necessary to compensate for habitats lost to
15 construction and restoration activities, loss of habitat or direct mortality through implementation of
16 Alternative 9 would not result in a substantial adverse effect through habitat modifications and
17 would not substantially reduce the number or restrict the range of the species. Therefore, the
18 alternative would have a less-than-significant impact on black tern.

19 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
20 **Disturbance of Nesting Birds**

21 See Mitigation Measure BIO-75 under Impact BIO-75.

22 **Mitigation Measure BIO-129a: Compensate for loss of black tern nesting habitat**

23 Because there is no near-term acreage commitment associated with the protection of rice in CZ
24 2, BDCP proponents must protect rice at a 1:1 ratio for each acre of rice impacted in CZ 2.

25 **Impact BIO-129b: Indirect Effects of Plan Implementation on Black Tern**

26 If black terns were to nest in or adjacent to work areas, construction and subsequent maintenance-
27 related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and
28 reduce the functions of suitable nesting habitat for these species. Mitigation Measure BIO-75,
29 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid
30 the potential for adverse effects of construction-related activities on survival and productivity of
31 nesting black terns. The use of mechanical equipment during restoration activities could cause the
32 accidental release of petroleum or other contaminants that could affect black terns in the
33 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable
34 habitat could also have an adverse effect on these species. AMM1–AMM7, including *AMM2*
35 *Construction Best Management Practices and Monitoring*, would minimize the likelihood of such
36 spills and ensure that measures are in place to prevent runoff from the construction area and
37 negative effects of dust on active nests.

38 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
39 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
40 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
41 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
42 2009). The effect of selenium toxicity differs widely between species and also between age and sex

1 classes within a species. In addition, the effect of selenium on a species can be confounded by
2 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
3 2009).

4 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
5 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
6 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
7 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
8 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
9 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
10 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
11 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
12 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
13 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
14 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
15 levels of selenium have a higher risk of selenium toxicity.

16 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
17 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
18 exacerbate bioaccumulation of selenium in avian species, including black tern. Marsh (tidal and
19 nontidal) and floodplain restoration have the potential to mobilize selenium, and therefore increase
20 avian exposure from ingestion of prey items with elevated selenium levels. Thus, BDCP restoration
21 activities that create newly inundated areas could increase bioavailability of selenium (see BDCP
22 Chapter 3, *Conservation Strategy*, for details of restoration). Changes in selenium concentrations
23 were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to Existing
24 Conditions and the No Action Alternative, CM1 would not result in substantial, long-term increases
25 in selenium concentrations in water in the Delta under any alternative. However, it is difficult to
26 determine whether the effects of potential increases in selenium bioavailability associated with
27 restoration-related conservation measures (CM4 and CM5) would lead to adverse effects on black
28 tern.

29 Because of the uncertainty that exists at this programmatic level of review, there could be an effect
30 on black tern from increases in selenium associated with restoration activities. This effect would be
31 addressed through the implementation of *AMM27 Selenium Management*, which would provide
32 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
33 selenium and its bioavailability in tidal habitats (see Appendix 3B, *Environmental Commitments*,
34 *AMMs, and CMs*). Furthermore, the effectiveness of selenium management to reduce selenium
35 concentrations and/or bioaccumulation would be evaluated separately for each restoration effort as
36 part of design and implementation. This avoidance and minimization measure would be
37 implemented as part of the tidal habitat restoration design schedule.

38 **NEPA Effects:** Noise and visual disturbances from the construction of conservation components
39 could affect black tern use of modeled habitat adjacent to work areas. Moreover, the use of
40 mechanical equipment for the construction of conservation components could cause the accidental
41 release of petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust
42 adjacent to suitable habitat. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct Preconstruction*
43 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse
44 effects on nesting individuals. Tidal habitat restoration could result in increased exposure of black
45 tern to selenium. This effect would be addressed through the implementation of *AMM27 Selenium*

1 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
2 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

3 **CEQA Conclusion:** Noise and visual disturbances from the construction of conservation components
4 could affect black tern use of modeled habitat adjacent to work areas. Moreover, the use of
5 mechanical equipment for the construction of conservation components could cause the accidental
6 release of petroleum or other contaminants, or the inadvertent discharge of sediment or excess dust
7 adjacent to suitable habitat which could result in potential mortality of a special-status species.
8 These impacts would be significant. AMM1–AMM7, and Mitigation Measure BIO-75, *Conduct*
9 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce these
10 impacts to a less-than-significant level. Tidal habitat restoration could result in increased exposure
11 of black tern to selenium, which could result in the mortality of a special-status species. This impact
12 would be significant. This effect would be addressed through the implementation of AMM27
13 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
14 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats. With
15 AMM27 in place, potential effects of increased exposure of black tern to selenium would be reduced
16 to a less-than-significant impact.

17 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
18 **Disturbance of Nesting Birds**

19 See Mitigation Measure BIO-75 under Impact BIO-75

20 **Impact BIO-129c: Periodic Effects of Inundation on Black Tern Nesting Habitat as a Result of**
21 **Implementation of Conservation Components**

22 Flooding of the Yolo Bypass would inundate 791–1,582 acres of suitable black tern nesting habitat
23 (land currently managed as rice in CZ 2). Inundation would occur during the nonbreeding season
24 but could reduce the availability of nesting habitat during years that flooding extends into the
25 nesting season (past March). Extended inundation of the Yolo Bypass would not be expected to
26 affect black tern nesting habitat. However, if periodic inundation took land out of rice production,
27 this could have an adverse effect on black tern nesting habitat. Late season flooding in the Yolo
28 Bypass could result in the loss of rice (nesting habitat for black tern) by precluding the preparation
29 and planting of rice fields. The methods for estimating loss of rice in the bypass and results are
30 provided in BDCP Appendix 5.J, Attachment 5J.E, *Estimation of BDCP Impact on Giant Garter Snake*
31 *Summer Foraging Habitat in the Yolo Bypass*. This analysis concludes that the estimated loss of rice
32 could be up to 1,662 acres by the late long-term timeframe. The BDCP has committed to protect,
33 restore and/or create up to 1,700 acres of rice in the Yolo Bypass (Objective GGS3.1). These acres of
34 rice would be protected in areas that are less susceptible to inundation, which would benefit the
35 black tern during years in which the magnitude and duration of inundation were increased.

36 **NEPA Effects:** Flooding of the Yolo Bypass is not expected to adversely affect nesting habitat for
37 black tern. However, if flooding were to extend into the nesting season or were to significantly
38 reduce rice production it could also reduce suitable black tern nesting habitat. This potential effect
39 would not be adverse with the creation and/or protection of 1,700 acres of rice in CZ 2 under
40 Objective GGS3.1 in the BDCP.

1 **CEQA Conclusion:** Flooding of the Yolo Bypass is not expected to have a significant impact on
2 nesting habitat for black tern. However, if flooding were to extend into the nesting season or were to
3 significantly reduce rice production it could also reduce suitable black tern nesting habitat. This
4 potential impact would be reduced to less than significant by the creation and/or protection of
5 1,700 acres of rice in CZ 2 under Objective GGS3.1 in the BDCP.

6 **California Horned Lark and Grasshopper Sparrow**

7 The primary impact of concern for grasshopper sparrow and California horned lark would be the
8 loss of breeding habitat in the study area, which consists of grassland, vernal pool complex, and
9 alkali seasonal wetland natural communities and selected cultivated lands including grain and hay
10 crops and pasture. Construction and restoration associated with Alternative 9 conservation
11 measures would result in both temporary and permanent losses of modeled breeding habitat for
12 California horned lark and grasshopper sparrow as indicated in Table 12-9-49. Full implementation
13 of Alternative 9 would include the following biological objectives over the term of the BDCP that
14 would benefit the California horned lark and the grasshopper sparrow (BDCP Chapter 3, Section 3.3,
15 *Biological Goals and Objectives*).

- 16 ● Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least
17 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder
18 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 19 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 20 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
21 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 22 ● Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
23 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 24 ● Within the 48,625 acres of protected cultivated lands, protect at least 42,275 acres of cultivated
25 lands as Swainson's hawk foraging habitat with at least 50% in very high-value habitat in CZs 2,
26 3, 4, 5, 7, 8, 9, and 11 (Objective SH1.2, associated with CM3).
- 27 ● Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
28 VPNC2.5, and GNC2.4, associated with CM11).

29 As explained below, with the restoration or protection of these amounts of habitat, in addition to
30 management activities that would enhance habitat for these species, and implementation of AMM1-
31 AMM7 and Mitigation Measure BIO-75, impacts on California horned lark and grasshopper sparrow
32 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-49. Changes in California Horned Lark and Grasshopper Sparrow Modeled Habitat**
2 **Associated with Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Breeding	318	318	1,281	1,281	NA	NA
Total Impacts CM1		318	318	1,281	1,281	NA	NA
CM2–CM18	Breeding	5,450	26,198	376	893	777–2,423	3,823
Total Impacts CM2–CM18		5,450	26,198	376	893	777–2,423	3,823
TOTAL IMPACTS		5,768	26,516	1,657	2,174	777–2,423	3,823

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-130: Loss or Conversion of Habitat for and Direct Mortality of California Horned**
5 **Lark and Grasshopper Sparrow**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss
7 of up to 28,690 acres of modeled breeding habitat for California horned lark and grasshopper
8 sparrow (26,516 acres of permanent loss, 2,174 acres of temporary loss, Table 12-9-49).

9 Conservation measures that would result in these losses are conveyance facilities and transmission
10 line construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass fisheries
11 improvements (CM2), tidal habitat restoration (CM4), floodplain restoration (CM5), riparian
12 restoration (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9),
13 nontidal marsh restoration (CM10), and construction of conservation hatcheries (CM18). The
14 majority of habitat loss (20,880 acres) would result from CM4. Habitat enhancement and
15 management activities (CM11), which include ground disturbance or removal of nonnative
16 vegetation, and the construction of recreational trails, signs, and facilities, could result in local
17 adverse habitat effects. In addition, maintenance activities associated with the long-term operation
18 of the water conveyance facilities and other BDCP physical facilities could degrade or eliminate
19 California horned lark and grasshopper sparrow modeled habitat. Each of these individual activities
20 is described below. A summary statement of the combined impacts and NEPA effects, and a CEQA
21 conclusion follow the individual conservation measure discussions.

- 22 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would
23 result in the combined permanent and temporary loss of up to 1,599 acres of potential California
24 horned lark and grasshopper sparrow habitat (318 acres of permanent loss, 1,281 acres of
25 temporary loss) from CZ 4, 5, 6, 7, and 8. These losses would occur at numerous locations where
26 dredging, construction of operable barriers and canals, and channel enlargement would be

1 undertaken. Other impacts would occur from potential borrow and spoil sites, access roads,
2 barge unloading facilities, and intake and fish screen construction areas. Grasshopper sparrows
3 were detected in DHCCP surveys south of Byron Highway in CZ 8 (1 occurrence) and in the
4 Stone Lakes NWR (6 occurrences). However, the CM1 footprint does not overlap with any
5 grasshopper sparrow or California horned lark occurrences. However, Mitigation Measure BIO-
6 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
7 require preconstruction surveys and the establishment of no-disturbance buffers and would be
8 available to address potential effects on California horned larks and grasshopper sparrows if
9 they were to nest in or adjacent to construction areas. Refer to the Terrestrial Biology Map Book
10 for a detailed view of Alternative 9 construction locations. Impacts from CM1 would occur
11 within the first 10 years of Alternative 9 implementation.

- 12 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
13 would result in the combined permanent and temporary loss of up to 1,274 acres of modeled
14 California horned lark and grasshopper sparrow habitat (898 acres of permanent loss, 376 acres
15 of temporary loss) in the Yolo Bypass in CZ 2. Impacted habitat would consist primarily of
16 grassland and pasture. Most of the grassland losses would occur at the north end of the bypass
17 below Fremont Weir, along the Toe Drain/Tule Canal, and along the west side channels.
18 Realignment of Putah Creek could also involve excavation and grading in alkali seasonal wetland
19 complex habitat as a new channel is constructed. The loss is expected to occur during the first 10
20 years of Alternative 9 implementation.
- 21 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
22 inundation would permanently remove an estimated 20,880 acres of modeled California horned
23 lark and grasshopper sparrow habitat. The majority of the acres lost would consist of cultivated
24 lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the vicinity of Cache
25 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and
26 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
27 directly impact and fragment grassland just north of Rio Vista in and around French and
28 Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses of alkali
29 seasonal wetland complex habitat would likely occur in the south end of the Yolo Bypass and on
30 the northern fringes of Suisun Marsh.
- 31 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
32 seasonally inundated floodplain would permanently and temporarily remove approximately
33 1,450 acres of modeled California horned lark and grasshopper sparrow nesting habitat (933
34 permanent, 517 temporary). These losses would be expected after the first 10 years of
35 Alternative 9 implementation along the San Joaquin River and other major waterways in CZ 7.
- 36 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
37 approximately 370 acres of California horned lark and grasshopper sparrow nesting habitat as
38 part of tidal restoration and 1,489 acres as part of seasonal floodplain restoration.
- 39 ● *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
40 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
41 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
42 would be restored after the construction periods. Grassland restoration would be implemented
43 on agricultural lands that also provide nesting habitat for California horned lark and
44 grasshopper sparrow and would result in the conversion of 837 acres of cultivated lands to
45 grassland.

- 1 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
2 removal of 705 acres of California horned lark and grasshopper sparrow nesting habitat.
- 3 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
4 actions included in CM11 that are designed to enhance wildlife values in restored or protected
5 habitats could result in localized ground disturbances that could temporarily remove small
6 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
7 vegetation and road and other infrastructure maintenance activities, would be expected to have
8 minor adverse effects on available habitat and would be expected to result in overall
9 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would
10 also include the construction of recreational-related facilities including trails, interpretive signs,
11 and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The
12 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be
13 placed on existing, disturbed areas when and where possible. However, approximately 50 acres
14 of grassland habitat would be lost from the construction of trails and facilities.
- 15 Habitat management- and enhancement-related activities could disturb California horned lark
16 and grasshopper sparrow nests. If either species were to nest in the vicinity of a worksite,
17 equipment operation could destroy nests, and noise and visual disturbances could lead to their
18 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct*
19 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available
20 to address these effects.
- 21 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of
22 modeled California horned lark and grasshopper sparrow habitat for the development of a delta
23 and longfin smelt conservation hatchery in CZ 1.
- 24 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
25 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
26 disturbances that could affect California horned lark and grasshopper sparrow use of the
27 surrounding habitat. Maintenance activities would include vegetation management, levee and
28 structure repair, and re-grading of roads and permanent work areas. These effects, however,
29 would be reduced by AMM1–AMM7, Mitigation Measure BIO-75, and conservation actions as
30 described below.
- 31 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
32 direct mortality of adult or fledged California horned lark and grasshopper sparrow if they were
33 present in the Plan Area, because they would be expected to avoid contact with construction and
34 other equipment. If either species were to nest in the construction area, construction-related
35 activities, including equipment operation, noise and visual disturbances could destroy nests or
36 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
37 75 would be available to address these effects.

38 The following paragraphs summarize the combined effects discussed above and describe other
39 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
40 included.

41 ***Near-Term Timeframe***

42 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
43 the near-term BDCP conservation strategy has been evaluated to determine whether it would

1 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
2 effects of construction would not be adverse under NEPA. Alternative 9 would remove 7,425 acres
3 (5,768 permanent, 1,657 temporary) of modeled breeding habitat for California horned lark and
4 grasshopper sparrow in the study area in the near-term. These effects would result from the
5 construction of the water conveyance facilities (CM1, 1,599 acres), and implementing other
6 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
7 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*
8 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*
9 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

10 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
11 would be 2:1 for protection of habitat. Using this ratio would indicate that 3,198 acres should be
12 protected to compensate for the CM1 losses of 1,599 acres of California horned lark and
13 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove
14 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California
15 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio
16 (2:1 for protection).

17 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
18 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
19 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
20 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,
21 and CM9 and would occur in the same timeframe as the construction and early restoration losses
22 thereby avoiding adverse effects of habitat loss on California horned lark and grasshopper sparrow.
23 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
24 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
25 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
26 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
27 would expand breeding habitat for California horned lark and grasshopper sparrow and reduce the
28 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*
29 *and Management*, insect prey populations would be increased on protected lands, enhancing the
30 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).
31 Cultivated lands that provide habitat for covered and other native wildlife species would provide
32 approximately 15,400 acres of potential nesting habitat for California horned lark and grasshopper
33 sparrow (Objective CLNC1.1). Approximately 87% of cultivated lands protected by the late long-
34 term time period would be in alfalfa and pasture crop types (very high- and high-value crop types)
35 for Swainson's hawk (Objective SH1.2) which would also provide potential nesting habitat for
36 California horned lark and grasshopper sparrow. This biological objective provides an estimate for
37 the high proportion of cultivated lands protected in the near-term time period which would provide
38 nesting habitat for California horned lark and grasshopper sparrow.

39 The acres of restoration and protection contained in the near-term Plan goals and the additional
40 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
41 level effects of CM1 on California horned lark and grasshopper sparrow, as well as mitigate the near-
42 term effects of the other conservation measures with the consideration that some portion of the
43 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in suitable
44 crop types to compensate for the loss of habitat at a ratio of 2:1. Mitigation Measure BIO-130,
45 *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper Sparrow Habitat*,
46 would be available to address the adverse effect of habitat loss in the near-term.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
8 to the Final EIR/EIS.

9 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the
10 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
11 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-
12 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
13 available to address this adverse effect.

14 **Late Long-Term Timeframe**

15 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 28,690
16 acres of modeled California horned lark and grasshopper sparrow habitat during the term of the
17 Plan. The locations of these losses are described above in the analyses of individual conservation
18 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
19 *Protection and Restoration, CM8 Grassland Natural Community Restoration, and CM9 Vernal Pool and*
20 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
21 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
22 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
23 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would
24 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,
25 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives
26 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal
27 wetland, and vernal pool natural communities which would expand breeding habitat for California
28 horned lark and grasshopper sparrow and reduce the effects of current levels of habitat
29 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
30 populations would be increased on protected lands, enhancing the foraging value of these natural
31 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat
32 for covered and other native wildlife species would provide approximately 15,400 acres of potential
33 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).
34 Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture crop types.
35 These are very high- and high-value crop types for Swainson's hawk (Objective SH1.2) and would
36 provide potential nesting habitat for California horned lark and grasshopper sparrow.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
38 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
39 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
40 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
41 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
42 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
43 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
44 to the Final EIR/EIS. California horned lark and grasshopper sparrow are not covered species under
45 the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for

1 noncovered avian species would be required to ensure that nests are detected and avoided.
2 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
3 *Nesting Birds*, would be available to address this adverse effect.

4 **NEPA Effects:** The loss of California horned lark and grasshopper sparrow habitat and potential
5 mortality of these special-status species under Alternative 9 would represent an adverse effect in
6 the absence of other conservation actions. With habitat protection and restoration associated with
7 CM3, CM8, CM9, and CM11, guided by biological goals and objectives and AMM1–AMM7, which
8 would be in place throughout the construction period, and with Mitigation Measure BIO-130,
9 *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper Sparrow Habitat*, the
10 effects of habitat loss under Alternative 9 on California horned lark and grasshopper sparrow would
11 not be adverse under NEPA. California horned lark and grasshopper sparrow are not covered
12 species under the BDCP, and potential mortality would be an adverse effect without preconstruction
13 surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75 would be
14 available to address this effect.

15 **CEQA Conclusion:**

16 **Near-Term Timeframe**

17 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
18 the near-term BDCP conservation strategy has been evaluated to determine whether it would
19 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
20 effects of construction would be less than significant under CEQA. Alternative 9 would remove 7,425
21 acres (5,768 permanent, 1,657 temporary) of modeled breeding habitat for California horned lark
22 and grasshopper sparrow in the study area in the near-term. These effects would result from the
23 construction of the water conveyance facilities (CM1, 1,599 acres), and implementing other
24 conservation measures (*CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities*
25 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*
26 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*
27 *Communities Enhancement and Management and CM18 Conservation Hatcheries—5,826 acres).*

28 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
29 would be 2:1 for protection of habitat. Using this ratio would indicate that 3,198 acres should be
30 protected to compensate for the CM1 losses of 1,599 acres of California horned lark and
31 grasshopper sparrow habitat. The near-term effects of other conservation actions would remove
32 5,826 acres of modeled habitat, and therefore require 11,652 acres of protection of California
33 horned lark and grasshopper sparrow nesting habitat using the same typical NEPA and CEQA ratio
34 (2:1 for protection).

35 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
36 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
37 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
38 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
39 in the same timeframe as the construction and early restoration losses thereby avoiding significant
40 impacts on California horned lark and grasshopper sparrow. Grassland restoration and protection
41 would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in
42 CZs 1, 8, and 11 would be associated with vernal pool and alkali seasonal wetland complexes
43 (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali
44 seasonal wetland, and vernal pool natural communities which would expand breeding habitat for

1 California horned lark and grasshopper sparrow and reduce the effects of current levels of habitat
2 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
3 populations would be increased on protected lands, enhancing the foraging value of these natural
4 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat
5 for covered and other native wildlife species would provide approximately 15,400 acres of potential
6 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).
7 Approximately 87% of cultivated lands protected by the late long-term time period would be in
8 alfalfa and pasture crop types (very high- and high-value crop types) for Swainson's hawk (Objective
9 SH1.2) which would also provide potential nesting habitat for California horned lark and
10 grasshopper sparrow. This biological objective provides an estimate for the high proportion of
11 cultivated lands protected in the near-term time period which would provide nesting habitat for
12 California horned lark and grasshopper sparrow.

13 The acres of restoration and protection contained in the near-term Plan goals and the additional
14 detail in the biological objectives satisfy the typical mitigation that would be applied to the project-
15 level effects of CM1 on California horned lark and grasshopper sparrow, as well as mitigate the near-
16 term effects of the other conservation measures with the consideration that some portion of the
17 15,400 acres of cultivated lands protected in the near-term timeframe would be managed in suitable
18 crop types to compensate for the loss of habitat at a ratio of 2:1. Implementation of Mitigation
19 Measure BIO-130, *Compensate for the Near-Term Loss of California Horned Lark and Grasshopper*
20 *Sparrow Habitat*, would reduce the impact of habitat loss in the near-term to a less-than-significant
21 level.

22 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
26 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
27 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
28 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
29 to the Final EIR/EIS.

30 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the
31 BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian
32 species would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-
33 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
34 reduce this potential impact to a less-than-significant level.

35 **Late Long-Term Timeframe**

36 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 28,690
37 acres of modeled California horned lark and grasshopper sparrow habitat during the term of the
38 Plan. The locations of these losses are described above in the analyses of individual conservation
39 measures. The Plan includes conservation commitments through *CM3 Natural Communities*
40 *Protection and Restoration*, *CM8 Grassland Natural Community Restoration*, and *CM9 Vernal Pool and*
41 *Alkali Seasonal Wetland Complex Restoration* to protect 8,000 acres and restore 2,000 acres of
42 grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of alkali
43 seasonal wetland complex and protect 48,625 acres of cultivated lands that provide suitable habitat
44 for native wildlife species (Table 3-4 in Chapter 3). Grassland restoration and protection would
45 occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZs 1, 8,

1 and 11 would be associated with vernal pool and alkali seasonal wetland complexes (Objectives
2 ASWNC1.1 and VPNC1.1) and would result in a contiguous matrix of grassland, alkali seasonal
3 wetland, and vernal pool natural communities which would expand breeding habitat for California
4 horned lark and grasshopper sparrow and reduce the effects of current levels of habitat
5 fragmentation. Under *CM11 Natural Communities Enhancement and Management*, insect prey
6 populations would be increased on protected lands, enhancing the foraging value of these natural
7 communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Cultivated lands that provide habitat
8 for covered and other native wildlife species would provide approximately 15,400 acres of potential
9 nesting habitat for California horned lark and grasshopper sparrow (Objective CLNC1.1).
10 Approximately 42,275 acres of cultivated lands protected would be in alfalfa and pasture crop types
11 (very high- and high-value crop types) for Swainson's hawk (Objective SH1.2) which would also
12 provide potential nesting habitat for California horned lark and grasshopper sparrow. The Plan also
13 includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2 Construction Best*
14 *Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion*
15 *and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6*
16 *Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of these AMMs include elements
17 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
18 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
19 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS.
20 California horned lark and grasshopper sparrow are not covered species under the BDCP. For the
21 BDCP to avoid significant impacts on individuals, preconstruction surveys for noncovered avian
22 species would be required to ensure that nests are detected and avoided. Implementation of
23 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
24 *Nesting Birds*, would reduce this impact to a less-than-significant level.

25 Considering Alternative 9's protection and restoration provisions, which would provide acreages of
26 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
27 construction and restoration activities, and with the implementation of AMM1–AMM7, Mitigation
28 Measure BIO-75, and Mitigation Measure BIO-130, *Compensate for the Near-Term Loss of California*
29 *Horned Lark and Grasshopper Sparrow Habitat*, the loss of habitat or direct mortality through
30 implementation of Alternative 9 would not result in a substantial adverse effect through habitat
31 modifications and would not substantially reduce the number or restrict the range of California
32 horned lark and grasshopper sparrow. Therefore, the loss of habitat or potential mortality under
33 this alternative would have a less-than-significant impact on California horned lark and grasshopper
34 sparrow.

35 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
36 **Disturbance of Nesting Birds**

37 See Mitigation Measure BIO-75 under Impact BIO-75.

38 **Mitigation Measure BIO-130: Compensate for the Near-Term Loss of California Horned**
39 **Lark and Grasshopper Sparrow Habitat**

40 DWR will manage and protect sufficient acres of cultivated lands such as pasture, grain and hay
41 crops, or alfalfa to provide California horned lark and grasshopper sparrow habitat such that the
42 total acres of habitat impacted in the near-term timeframe are mitigated at a ratio of 2:1
43 protection. Additional grassland protection, enhancement, and management may be substituted
44 for the protection of cultivated lands.

1 **Impact BIO-131: Effects on California Horned Lark and Grasshopper Sparrow Associated with**
2 **Electrical Transmission Facilities**

3 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,
4 which could result in injury or mortality of grasshopper sparrow and California horned lark. The
5 potential for this risk, is considered minimal based on the flight behaviors of each species.
6 Transmission line poles and towers also provide perching substrate for raptors, which could result
7 in increased predation pressure. However, this would be expected to have few adverse effects on the
8 grasshopper sparrow and California horned lark local populations.

9 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
10 could result in injury or mortality of grasshopper sparrow and California horned lark. With the
11 implementation of *AMM20 Greater Sandhill Crane*, the effect of new transmission lines on California
12 horned lark and grasshopper sparrow would not be adverse.

13 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
14 could result in injury or mortality of grasshopper sparrow and California horned lark. With the
15 incorporation of *AMM20 Greater Sandhill Crane*, new transmission lines would have a less-than-
16 significant impact on grasshopper sparrow and California horned lark.

17 **Impact BIO-132: Indirect Effects of Plan Implementation on Grasshopper Sparrow and**
18 **California Horned Lark**

19 Noise and visual disturbances associated with construction-related activities could result in
20 temporary disturbances that affect California horned lark and grasshopper sparrow use of modeled
21 habitat. Construction noise above background noise levels (greater than 50 dBA) could extend 1,900
22 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect*
23 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there
24 are no available data to determine the extent to which these noise levels could affect California
25 horned lark or grasshopper sparrow. Indirect effects associated with construction include noise,
26 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
27 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
28 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
29 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
30 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use
31 of mechanical equipment during water conveyance construction could cause the accidental release
32 of petroleum or other contaminants that could affect these species or their prey in the surrounding
33 habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
34 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment
35 or excessive dust adjacent to grasshopper sparrow and California horned lark habitat could also
36 have a negative effect on these species. AMM1–AMM7 would ensure that measures are in place to
37 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to
38 work areas.

39 **NEPA Effects:** Indirect effects on California horned lark and grasshopper sparrow as a result of
40 Alternative 9 implementation could have adverse effects on these species through the modification
41 of habitat and potential direct mortality. California horned lark and grasshopper sparrow are not
42 covered species under the BDCP, and potential mortality would be an adverse effect without
43 preconstruction surveys to ensure that nests are detected and avoided. In conjunction with AMM1–

1 AMM7, Mitigation Measure BIO-75 *Conduct Preconstruction Nesting Bird Surveys and Avoid*
2 *Disturbance of Nesting Birds*, would be available to address this adverse effect.

3 **CEQA Conclusion:** Indirect effects on grasshopper sparrow and California horned lark as a result of
4 constructing the water conveyance facilities could have a significant impact on these species. The
5 incorporation of AMM1–AMM7 into the BDCP and the implementation of Mitigation Measure BIO-
6 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
7 reduce this impact to a less-than-significant level.

8 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
9 **Disturbance of Nesting Birds**

10 See Mitigation Measure BIO-75 under Impact BIO-75.

11 **Impact BIO-133: Periodic Effects of Inundation on Grasshopper Sparrow and California**
12 **Horned Lark as a Result of Implementation of Conservation Components**

13 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
14 *Enhancement*) would increase the frequency and duration of inundation on approximately 1,158–
15 3,650 acres of modeled California horned lark and grasshopper sparrow habitat (Table 12-9-49).

16 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
17 *Restoration* could result in the periodic inundation of up to approximately 3,823 acres of modeled
18 habitat (Table 12-9-49).

19 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
20 season due to periodic inundation. However, inundation would occur during the nonbreeding
21 season and would not be expected to have an adverse effect on either species.

22 **NEPA Effects:** Periodic inundation of floodplains would not have adverse effects on grasshopper
23 sparrow or California horned lark because inundation is expected to occur prior to the breeding
24 season.

25 **CEQA Conclusion:** Periodic inundation of floodplains would not have a significant impact on
26 grasshopper sparrow or California horned lark because inundation is expected to occur prior to the
27 breeding season.

28 **Least Bittern and White-Faced Ibis**

29 This section describes the effects of Alternative 9, including water conveyance facilities construction
30 and implementation of other conservation components, on least bittern and white-faced ibis.
31 Modeled breeding habitat for least bittern and white-faced ibis consists of tidal freshwater and
32 nontidal freshwater emergent wetlands, managed wetlands, and other natural seasonal wetlands in
33 CZs 2, 4, and 11. Construction and restoration associated with Alternative 9 conservation measures
34 would result in both temporary and permanent losses of modeled habitat for least bittern and
35 white-faced ibis as indicated in Table 12-9-50. Full implementation of Alternative 9 would include
36 the following biological objectives over the term of the BDCP that would benefit least bittern and
37 white-faced ibis (BDCP Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 38 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
39 and/or 7 (Objective TFEWNC1.1, associated with CM4).

- Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1, associated with CM10).
- Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance habitat for these species, and implementation of AMM1–AMM7, *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on least bittern and white-faced ibis would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-9-50. Changes in Least Bittern and White-Faced Ibis Modeled Habitat Associated with Alternative 9 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	1	1	0	0	NA	NA
Total Impacts CM1		1	1	0	0	NA	NA
CM2–CM18	Nesting	5,134	13,063	45	45	961–2,672	NA
Total Impacts CM2–CM18		5,134	13,063	45	45	961–2,672	NA
TOTAL IMPACTS		5,135	13,064	45	45	961–2,672	NA

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-134: Loss or Conversion of Habitat for and Direct Mortality of Least Bittern and White-Faced Ibis

Alternative 9 conservation measures would result in the combined permanent and temporary loss and conversion of up to 13,109 acres of modeled habitat for least bittern and white-faced ibis (13,064 acres of permanent loss and conversion and 45 of temporary loss, Table 12-9-50). Conservation measures that would result in these losses are conveyance facilities and transmission line construction, and establishment and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries Enhancement*, and *CM4 Tidal Natural Communities Restoration*. Habitat enhancement and management activities (CM11), which would include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical

1 facilities could degrade or eliminate least bittern and white-faced ibis habitat. Each of these
2 individual activities is described below. A summary statement of the combined impacts, NEPA
3 effects, and a CEQA conclusion follow the individual conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would
5 result in the permanent loss of 1 acre of modeled least bittern and white-faced ibis habitat from
6 CZ 4. This loss would occur from the fringes of tidal freshwater emergent wetland along
7 channels and island edges that would be impacted from channel dredging activities. The
8 construction footprint for CM1 does not overlap with any occurrences of least bittern or white-
9 faced ibis. The Refer to the Terrestrial Biology Map Book for a detailed view of Alternative 9
10 construction locations. Impacts from CM1 would occur within the first 10 years of Alternative 9
11 implementation.
- 12 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
13 would permanently remove 55 acres of modeled least bittern and white-faced ibis habitat in the
14 Yolo Bypass in CZ 2. In addition, 45 acres of habitat would be temporarily removed. The loss is
15 expected to occur during the first 10 years of Alternative 9 implementation.
- 16 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
17 inundation would permanently remove an estimated 13,008 acres of modeled least bittern and
18 white-faced ibis habitat in CZ 2, 4, and 11 by the late long-term time period.
- 19 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
20 actions included in *CM11 Natural Communities Enhancement and Management* that are designed
21 to enhance wildlife values in restored or protected habitats could result in localized ground
22 disturbances that could temporarily remove small amounts of least bittern and white-faced ibis
23 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and
24 other infrastructure maintenance activities, would be expected to have minor adverse effects on
25 available least bittern and white-faced ibis habitat.
- 26 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
27 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
28 disturbances that could affect least bittern and white-faced ibis use of the surrounding habitat.
29 Maintenance activities would include vegetation management, levee and structure repair, and
30 re-grading of roads and permanent work areas. These effects, however, would be reduced by
31 AMM1-AMM7 described below and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
32 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to further reduce
33 potential effects.
- 34 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
35 direct mortality of least bittern and white-faced ibis because adults and fledged young would be
36 expected to avoid contact with construction and other equipment. However, if either species
37 were to nest in the construction area, equipment operation, noise and visual disturbances could
38 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings.
39 Mitigation Measure BIO-75 would be available to address these effects.

40 The following paragraphs summarize the combined effects discussed above and describe other
41 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
42 included.

1 **Near-Term Timeframe**

2 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
3 the near-term BDCP conservation strategy has been evaluated to determine whether it would
4 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
5 effects of construction would not be adverse under NEPA. Alternative 9 would remove 5,180 acres
6 of modeled habitat for least bittern and white-faced ibis in the study area in the near-term (5,135
7 acres of permanent loss, and 45 acres of temporary loss). These effects would result from the
8 construction of the water conveyance facilities (CM1, 1 acre), and the implementation of other
9 conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration [CM4]
10 5,179 acres).

11 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
12 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using
13 these ratios would indicate that 1 acre of habitat should be restored and 1 acre of habitat should be
14 protected to compensate for the CM1 losses of 1 acre of least bittern and white-faced ibis habitat.
15 The near-term effects of other conservation actions would remove 5,179 acres of modeled habitat,
16 and therefore require 5,179 acres of restoration and 5,179 acres of protection of least bittern and
17 white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1
18 for protection).

19 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
20 wetland and protecting and enhancing 4,800 acres of managed wetland in the Plan Area (Table 3-4
21 in Chapter 3, *Biological Goals and Objectives*). These conservation actions are associated with CM4
22 and CM3 and would occur in the same timeframe as the construction and early restoration losses,
23 thereby avoiding adverse effects of habitat loss on least bittern and white-faced ibis. The tidal
24 freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1
25 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates topographic
26 heterogeneity and in areas that increase connectivity among protected lands (Objective
27 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and
28 would benefit these species through the enhancement of degraded areas (such as areas of bare
29 ground or marsh where the predominant vegetation consists of invasive species such as perennial
30 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
31 (Objective MWNC1.1). In addition, at least 400 acres of nontidal marsh would be created, some of
32 which would provide nesting habitat for least bittern and white-faced ibis. These Plan objectives
33 represent performance standards for considering the effectiveness of restoration and protection
34 actions. The acres of restoration and protection contained in the near-term Plan goals satisfy the
35 typical mitigation that would be applied to the project-level effects of CM1, as well as mitigate the
36 near-term effects of the other conservation measures.

37 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
38 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
39 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
40 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
41 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
42 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
43 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
44 *AMMs, and CMs*, to the Final EIR/EIS. Least bittern and white-faced ibis are not covered species

1 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
2 noncovered avian species would be required to ensure that nests are detected and avoided.

3 **Late Long-Term Timeframe**

4 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 13,109
5 acres (13,064 acres of permanent loss, 45 acres of temporary loss) of least bittern and white-faced
6 ibis habitat during the term of the Plan. The locations of these losses are described above in the
7 analyses of individual conservation measures. The Plan includes conservation commitments
8 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal
9 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200
10 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres
11 of managed wetland would be protected and enhanced in CZ 11.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
16 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
17 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
18 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
19 *AMMs, and CMs*, to the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
20 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
21 noncovered avian species would be required to ensure that nests are detected and avoided.

22 **NEPA Effects:** The loss of least bittern and white-faced ibis habitat and potential mortality of these
23 special-status species under Alternative 9 would represent an adverse effect in the absence of other
24 conservation actions. However, with the habitat protection and restoration associated with CM3,
25 CM4, CM6, CM7, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which
26 would be in place throughout the construction period, the effects of habitat loss on least bittern and
27 white-faced ibis would not be adverse under Alternative 9. Least bittern and white-faced ibis are not
28 covered species under the BDCP, and the potential for mortality would be an adverse effect without
29 preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75
30 would be available to address this effect.

31 **CEQA Conclusion:**

32 **Near-Term Timeframe**

33 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
34 the near-term BDCP conservation strategy has been evaluated to determine whether it would
35 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
36 impacts of construction would be less than significant under CEQA. Alternative 9 would remove
37 1,580 acres of modeled habitat for least bittern and white-faced ibis in the study area in the near-
38 term (5,135 acres of permanent loss, and 45 acres of temporary loss). These effects would result
39 from the construction of the water conveyance facilities (CM1, 1 acre), and the implementation of
40 other conservation measures (Yolo Bypass fisheries enhancement [CM2], and tidal restoration
41 [CM4] 5,179 acres).

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
 2 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using
 3 these ratios would indicate that 1 acre of habitat should be restored and 1 acre of habitat should be
 4 protected to compensate for the CM1 losses of 1 acre of least bittern and white-faced ibis habitat.
 5 The near-term effects of other conservation actions would remove 5,179 acres of modeled habitat,
 6 and therefore require 5,179 acres of restoration and 5,179 acres of protection of least bittern and
 7 white-faced ibis habitat using the same typical NEPA and CEQA ratios (1:1 for restoration and 1:1
 8 for protection).

9 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal freshwater emergent
 10 wetland and 4,800 acres of managed wetland in the Plan Area (Table 3-4 in Chapter 3, *Description of*
 11 *Alternatives*). These conservation actions are associated with CM4 and CM3 and would occur in the
 12 same timeframe as the construction and early restoration losses, thereby avoiding adverse effects of
 13 habitat loss on least bittern and white-faced ibis. The tidal freshwater emergent wetland would be
 14 restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1 in BDCP Chapter 3, *Conservation*
 15 *Strategy*) and would be restored in a way that creates topographic heterogeneity and in areas that
 16 increase connectivity among protected lands (Objective TFEWNC2.2). The 4,800 acres of managed
 17 wetland would be protected and enhanced in CZ 11 and would benefit these species through the
 18 enhancement of degraded areas (such as areas of bare ground or marsh where the predominant
 19 vegetation consists of invasive species such as perennial pepperweed) to vegetation such as
 20 pickleweed-alkali heath-American bulrush plant associations (Objective MWNC1.1). In addition, at
 21 least 400 acres of nontidal marsh would be created, some of which would provide nesting habitat
 22 for least bittern and white-faced ibis. These Plan objectives represent performance standards for
 23 considering the effectiveness of restoration and protection actions. The acres of restoration and
 24 protection contained in the near-term Plan goals satisfy the typical mitigation that would be applied
 25 to the project-level effects of CM1, as well as mitigate the near-term effects of the other conservation
 26 measures.

27 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 31 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
 32 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
 33 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
 34 *AMMs, and CMs*, of the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
 35 under the BDCP. For the BDCP to have a less-than-significant impact on individuals, preconstruction
 36 surveys would be required to ensure that nests were detected and avoided. Implementation of
 37 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
 38 *Nesting Birds*, would reduce the potential impact on nesting least bittern and white-faced ibis to a
 39 less-than-significant level.

40 **Late Long-Term Timeframe**

41 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 13,109
 42 acres (13,064 acres of permanent loss, 45 acres of temporary loss) of least bittern and white-faced
 43 ibis habitat during the term of the Plan. The locations of these losses are described above in the
 44 analyses of individual conservation measures. The Plan includes conservation commitments
 45 through *CM4 Tidal Natural Communities Restoration* to restore or create at least 24,000 acres of tidal

1 freshwater emergent wetland in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1). In addition, 1,200
2 acres of nontidal marsh would be created through *CM10 Nontidal Marsh Restoration* and 8,100 acres
3 of managed wetland would be protected and enhanced in CZ 11.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
8 these AMMs include elements that avoid or minimize the risk of affecting individuals and species
9 habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
10 have since been updated and which are provided in Appendix 3B, *Environmental Commitments,*
11 *AMMs, and CMs*, to the Final EIR/EIS. Least bittern and white-faced ibis are not covered species
12 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
13 noncovered avian species would be required to ensure that nests were detected and avoided.
14 Implementation of Mitigation Measure BIO-75 would reduce the potential impact on nesting least
15 bittern and white-faced ibis and to a less-than-significant level.

16 Considering these protection and restoration provisions, which would provide acreages of new
17 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction
18 and restoration activities, and with the implementation of AMM1–AMM7, and Mitigation Measure
19 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, the loss
20 of habitat or direct mortality through implementation of Alternative 9 would not result in a
21 substantial adverse effect through habitat modifications and would not substantially reduce the
22 number or restrict the range of least bittern and white-faced ibis. Therefore, the loss of habitat or
23 potential mortality under this alternative would have a less-than-significant impact on least bittern
24 and white-faced ibis.

25 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
26 **Disturbance of Nesting Birds**

27 See Mitigation Measure BIO-75 under Impact BIO-75.

28 **Impact BIO-135: Effects on Least Bittern and White-Faced Ibis Associated with Electrical**
29 **Transmission Facilities**

30 New transmission lines would increase the risk for bird-power line strikes, which could result in
31 injury or mortality of least bittern and white-faced ibis. Waterbirds have a higher susceptibility to
32 collisions than passerines, raptors, and other birds. Bitterns and ibises have a high wing loading/low
33 aspect ratio which limits their maneuverability and make them more vulnerable to collisions rather
34 than more agile species (see BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions*
35 *at Proposed BDCP Powerlines*). Marking transmission lines with flight diverters that make the lines
36 more visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
37 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
38 by 60%. All new project transmission lines would be fitted with flight diverters, which would reduce
39 bird strike risk of least bittern and white-faced ibis.

40 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
41 could result in injury or mortality of least bittern and white-faced ibis. Bitterns and ibises have a
42 high wing loading/low aspect ratio which limits their maneuverability and make them more
43 vulnerable to collisions rather than more agile species. The implementation of *AMM20 Greater*

1 *Sandhill Crane* would require the installation of bird flight diverters on all new transmission lines,
2 which could reduce bird strike risk of least bittern and white-faced ibis by 60%. With the installation
3 of bird flight diverters, the construction and operation of new transmission lines under Alternative 9
4 would not result in an adverse effect on least bittern and white-faced ibis.

5 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
6 could result in injury or mortality of least bittern and white-faced ibis. Bitterns and ibises have a
7 high wing loading/low aspect ratio which limits their maneuverability and make them more
8 vulnerable to collisions rather than more agile species. The implementation of *AMM20 Greater*
9 *Sandhill Crane* would require the installation of bird flight diverters on all new transmission lines,
10 which could reduce bird strike risk of least bittern and white-faced ibis by 60%. With the installation
11 of bird flight diverters, the construction and operation of new transmission lines under Alternative 9
12 would result in a less-than-significant impact on least bittern and white-faced ibis.

13 **Impact BIO-136: Indirect Effects of Plan Implementation on Least Bittern and White-Faced** 14 **Ibis**

15 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
16 with construction-related activities could result in temporary disturbances that affect least bittern
17 and white-faced ibis use of modeled habitat. Construction noise above background noise levels
18 (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities
19 (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
20 *Facility on Sandhill Crane*, Table 4), although there are no available data to determine the extent to
21 which these noise levels could affect least bittern or white-faced ibis. Indirect effects associated with
22 construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and
23 other ground-disturbing operations. Construction-related noise and visual disturbances could
24 disrupt nesting and foraging behaviors, and reduce the functions of suitable habitat which could
25 result in an adverse effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction*
26 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize effects
27 on active nests. The use of mechanical equipment during water conveyance construction could
28 cause the accidental release of petroleum or other contaminants that could affect these species or
29 their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best*
30 *Management Practices and Monitoring*, would minimize the likelihood of such spills from occurring.
31 The inadvertent discharge of sediment or excessive dust adjacent to least bittern and white-faced
32 ibis could also have a negative effect on these species. AMM1–AMM7 would ensure that measures
33 are in place to prevent runoff from the construction area and the negative effects of dust on wildlife
34 adjacent to work areas.

35 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
36 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
37 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
38 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
39 newly inundated areas could increase bioavailability of mercury (see Chapter 3, *Conservation*
40 *Strategy*, of the BDCP for details of restoration). Species sensitivity to methylmercury differs widely
41 and there is a large amount of uncertainty with respect to species-specific effects. A detailed review
42 of the methylmercury issues associated with implementation of the BDCP is contained in Appendix
43 11F, *Substantive BDCP Revisions*. The review includes an overview of the BDCP-related mechanisms
44 that could result in increased mercury in the foodweb, and how exposure to individual species may
45 occur based on feeding habits and where their habitat overlaps with the areas where mercury

1 bioavailability could increase. Increased methylmercury associated with natural community and
2 floodplain restoration could indirectly affect least bittern and white-faced ibis, via uptake in lower
3 trophic levels (as described in Appendix 11F, *Substantive BDCP Revisions*).

4 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
5 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
6 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
7 project-specific basis, where high potential for methylmercury production is identified that
8 restoration design and adaptive management cannot fully address while also meeting restoration
9 objectives, alternate restoration areas would be considered. CM12 would be implemented in
10 coordination with other similar efforts to address mercury in the Delta, and specifically with the
11 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
12 following actions.

- 13 • Assess pre-restoration conditions to determine the risk that the project could result in increased
14 mercury methylation and bioavailability
- 15 • Define design elements that minimize conditions conducive to generation of methylmercury in
16 restored areas.
- 17 • Define adaptive management strategies that can be implemented to monitor and minimize
18 actual postrestoration creation and mobilization of methylmercury.

19 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
20 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
21 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
22 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
23 2009). The effect of selenium toxicity differs widely between species and also between age and sex
24 classes within a species. In addition, the effect of selenium on a species can be confounded by
25 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
26 2009).

27 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
28 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
29 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
30 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
31 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
32 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
33 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
34 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
35 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
36 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
37 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
38 levels of selenium have a higher risk of selenium toxicity.

39 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
40 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
41 exacerbate bioaccumulation of selenium in avian species, including least bittern and white-faced
42 ibis. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium,
43 and therefore increase avian exposure from ingestion of prey items with elevated selenium levels.
44 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of

1 selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
2 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
3 relative to Existing Conditions and the No Action Alternative, CM1 would not result in substantial,
4 long-term increases in selenium concentrations in water in the Delta under any alternative.
5 However, it is difficult to determine whether the effects of potential increases in selenium
6 bioavailability associated with restoration-related conservation measures (CM4 and CM5) would
7 lead to adverse effects on least bittern and white-faced ibis.

8 Because of the uncertainty that exists at this programmatic level of review, there could be a
9 substantial effect on least bittern and white-faced ibis from increases in selenium associated with
10 restoration activities. This effect would be addressed through the implementation of *AMM27*
11 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
12 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
13 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
14 selenium management to reduce selenium concentrations and/or bioaccumulation would be
15 evaluated separately for each restoration effort as part of design and implementation. This
16 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
17 design schedule.

18 **NEPA Effects:** Indirect effects on least bittern and white-faced ibis as a result of constructing the
19 water conveyance facilities could have adverse effects on these species in the absence of other
20 conservation actions. However, the implementation of AMM1–AMM7 would help to reduce this
21 effect. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
22 *Disturbance of Nesting Birds*, would also be available to address the adverse indirect effects of
23 construction on active nests. Tidal habitat restoration could result in increased exposure of least
24 bittern and white-faced ibis to selenium. This effect would be addressed through the
25 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
26 restoration design elements to reduce the potential for bioaccumulation of selenium and its
27 bioavailability in tidal habitats.

28 Increased methylmercury associated with natural community and floodplain restoration could
29 indirectly affect least bittern and white-faced ibis, via uptake in lower trophic levels (as described in
30 BDCP Appendix 5.D, *Contaminants*). However, it is unknown what concentrations of methylmercury
31 are harmful to the species, and the potential for increased exposure varies substantially within the
32 study area. Implementation of CM12 which contains measures to assess the amount of mercury
33 before project development, followed by appropriate design and adaptation management, would
34 minimize the potential for increased methylmercury exposure, and would result in no adverse effect
35 on least bittern and white-faced ibis.

36 **CEQA Conclusion:** Indirect effects

37 of noise and visual disturbance, in addition to the potential for hazardous spills or increased dust on
38 least bittern and white-faced ibis and their habitat as a result of plan implementation would
39 represent a substantial adverse effect in the absence of other conservation actions. This impact
40 would be significant. The incorporation of AMM1–AMM7 into the BDCP and the implementation of
41 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
42 *Nesting Birds*, would reduce this impact to a less-than-significant level.

43 Tidal habitat restoration could result in increased exposure of least bittern and white-faced ibis to
44 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*

1 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
2 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. The
3 implementation of tidal natural communities restoration or floodplain restoration could result in
4 increased exposure of least bittern and white-faced ibis to methylmercury in restored tidal areas.
5 However, it is unknown what concentrations of methylmercury are harmful to these species and the
6 potential for increased exposure varies substantially within the study area. Implementation of CM12
7 which contains measures to assess the amount of mercury before project development, followed by
8 appropriate design and adaptation management, would minimize the potential for increased
9 methylmercury exposure, and would result in no adverse effect on least bittern and white-faced ibis.

10 Indirect effects of plan implementation would represent an adverse effect on least bittern and
11 white-faced ibis in the absence of other conservation measures. This would be a significant impact.
12 With AMM1-7, *AMM27 Selenium Management*, and CM12 in place, and with the implementation of
13 Mitigation Measure BIO-75, indirect effects of plan implementation would not result in a substantial
14 adverse effect through habitat modifications and would not substantially reduce the number or
15 restrict the range of either species. Therefore, the indirect effects of Alternative 9 plan
16 implementation would have a less-than-significant impact on least bittern and white-faced ibis.

17 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
18 **Disturbance of Nesting Birds**

19 See Mitigation Measure BIO-75 under Impact BIO-75.

20 **Impact BIO-137: Periodic Effects of Inundation on Least Bittern and White-Faced Ibis as a**
21 **Result of Implementation of Conservation Components**

22 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
23 *Enhancement*) would increase the frequency and duration of inundation on approximately 961-
24 2,672 acres of modeled least bittern and white-faced ibis habitat (Table 12-9-50). However, no
25 adverse effects of increased inundation frequency on nesting habitat would be expected because
26 wetland vegetation has persisted under the existing Yolo Bypass flooding regime, and changes to
27 frequency and inundation are within the tolerance of these vegetation types. Inundation would
28 occur in the nonbreeding season and wetlands supporting habitat would not be expected to be
29 affected by flood flows.

30 **NEPA Effects:** Periodic inundation of Yolo Bypass would not be expected to have adverse effects on
31 least bittern or white-faced ibis because wetland vegetation has persisted under the existing Yolo
32 Bypass flooding regime, and changes to frequency and inundation are within the tolerance of these
33 vegetation types.

34 **CEQA Conclusion:** Periodic inundation of Yolo Bypass would not be expected to have a significant
35 impact on least bittern or white-faced ibis because wetland vegetation has persisted under the
36 existing Yolo Bypass flooding regime, and changes to frequency and inundation are within the
37 tolerance of these vegetation types.

38 **Loggerhead Shrike**

39 Modeled habitat for loggerhead shrike includes both high-value and low-value modeled habitat.
40 High-value habitat includes grassland, vernal pool complex and alkali seasonal wetland natural
41 communities in addition to cultivated lands, including pasture and grain and hay crops. Breeding

1 shrikes require shrubs and tall trees for perching and nest placement, and are generally associated
2 with riparian edge grasslands (Humple 2008) or cultivated lands with associated trees and shrubs.
3 Loggerhead shrike modeled habitat is overestimated because the model does not differentiate
4 between lands with or without associated nesting vegetation. Low-value habitat includes row crops
5 such as truck and berry crops and field crops that are not considered to be valuable habitat for the
6 species but which were included in the model because they may provide foraging opportunities.

7 Construction and restoration associated with Alternative 9 conservation measures would result in
8 both temporary and permanent losses of modeled habitat for loggerhead shrike as indicated in
9 Table 12-9-51. Full implementation of Alternative 9 would include the following biological
10 objectives over the term of the BDCP that would benefit loggerhead shrike (BDCP Chapter 3, Section
11 3.3, *Biological Goals and Objectives*).

- 12 • Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least
13 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder
14 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 15 • Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 16 • Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
17 complex in CZs 1, 8, and/or 11 (Objectives ASWNC1.1 and VPNC1.1, associated with CM3).
- 18 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
19 VPNC2.5, and GNC2.4, associated with CM11).
- 20 • Protect at least 48,625 acres of cultivated lands that provide suitable habitat for covered and
21 other native wildlife species (Objective CLNC1.1, associated with CM3).
- 22 • Maintain and protect the small patches of important wildlife habitats that occur in cultivated
23 lands within the reserve system, including isolated valley oak trees, trees and shrubs along field
24 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
25 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3 and CM11).
- 26 • Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
27 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated
28 with CM11).

29 As explained below, with the restoration or protection of these amounts of habitat, in addition to
30 management activities that would enhance habitat for the species, and implementation of AMM1–
31 AMM7 and Mitigation Measure BIO-75, impacts on loggerhead shrike would not be adverse for
32 NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-9-51. Changes in Loggerhead Shrike Modeled Habitat Associated with Alternative 9**
2 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	High-value	318	318	1,281	1,281	NA	NA
	Low-value	55	55	1,231	1,231	NA	NA
Total Impacts CM1		373	373	2,512	2,512	NA	NA
CM2-CM18	High-value	5,450	26,198	376	893	777-2,423	3,823
	Low-value	1,801	17,575	97	624	672-1,996	4,315
Total Impacts CM2-CM18		7,251	43,723	474	1,517	1,830-5,646	8,138
Total High-value		5,768	26,516	1,657	2,174		
Total Low-value		1,856	17,630	1,328	1,855		
TOTAL IMPACTS		7,624	44,096	2,986	4,029		

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-138: Loss or Conversion of Modeled Habitat for and Direct Mortality of**
5 **Loggerhead Shrike**

6 Alternative 9 conservation measures would result in the combined permanent loss or conversion
7 and temporary loss of up to 48,125 acres of modeled habitat for loggerhead shrike (28,690 acres of
8 which would be high-value habitat, Table 12-9-51). Conservation measures that would result in
9 these losses are conveyance facilities and transmission line construction, and establishment and use
10 of borrow and spoil areas (CM1), Yolo Bypass fisheries improvements (CM2), tidal habitat
11 restoration (CM4), floodplain restoration (CM5), channel margin enhancement (CM6), riparian
12 restoration, (CM7), grassland restoration (CM8), vernal pool and wetland restoration (CM9),
13 nontidal marsh restoration (CM10), natural communities enhancement and management (CM11)
14 and construction of conservation hatcheries (CM18). The majority of habitat loss (33,244 acres)
15 would result from CM4. Habitat enhancement and management activities (CM11), which include
16 ground disturbance or removal of nonnative vegetation, and the construction of recreational trails,
17 signs, and facilities, could result in local adverse habitat effects. In addition, maintenance activities
18 associated with the long-term operation of the water conveyance facilities and other BDCP physical
19 facilities could degrade or eliminate loggerhead shrike modeled habitat. Each of these individual
20 activities is described below. A summary statement of the combined impacts and NEPA effects, and a
21 CEQA conclusion follow the individual conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would
2 result in the combined permanent and temporary loss of up to 1,599 acres of high-value
3 loggerhead shrike habitat (318 acres of permanent loss, 1,281 acres of temporary loss). In
4 addition, 1,286 acres of low-value habitat would be removed (55 acres of permanent loss or
5 conversion, 1,231 acres of temporary loss or conversion, Table 12-9-51). These losses would
6 occur at numerous locations where dredging, construction of operable barriers and canals, and
7 channel enlargement would be undertaken. Other impacts would occur from potential borrow
8 and spoil sites, access roads, barge unloading facilities, and intake and fish screen construction
9 areas. Temporarily affected areas (grassland, cultivated lands, and associated shrubs or trees)
10 would be restored within 1 year following completion of construction activities as described in
11 *AMM10 Restoration of Temporarily Affected Natural Communities*.

12 Loggerhead shrikes nest in high abundance in shrubs associated with the grasslands to the
13 south and to the west of Clifton Court Forebay. The CM1 construction footprint for the canal that
14 would be constructed south of the Clifton Court Forebay overlaps with two loggerhead shrike
15 occurrences. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
16 *Disturbance of Nesting Birds*, would require preconstruction surveys and the establishment of
17 no-disturbance buffers and would be available to address potential effects on nesting
18 loggerhead shrikes. Refer to the Terrestrial Biology Map Book for a detailed view of Alternative
19 9 construction locations. Construction of the water conveyance facilities would occur in the
20 near-term timeframe.

- 21 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
22 would result in the combined permanent and temporary loss of up to 1,274 acres of high-value
23 loggerhead shrike habitat (898 acres of permanent loss, 376 acres of temporary loss) in the Yolo
24 Bypass in CZ 2. In addition, 182 acres of low-value habitat would be removed (85 acres of
25 permanent loss, 97 acres of temporary loss). The loss is expected to occur during the first 10
26 years of Alternative 9 implementation.

- 27 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
28 inundation would permanently remove an estimated 20,880 acres of high-value loggerhead
29 shrike habitat and 12,364 acres of low-value habitat. The majority of the acres lost would
30 consist of cultivated lands in CZs 1, 2, 4, 5, 6, and/or 7. Grassland losses would likely occur in the
31 vicinity of Cache Slough, on Decker Island in the West Delta ROA, on the upslope fringes of
32 Suisun Marsh, and along narrow bands adjacent to waterways in the South Delta ROA. Tidal
33 restoration would directly impact and fragment grassland just north of Rio Vista in and around
34 French and Prospect Islands, and in an area south of Rio Vista around Threemile Slough. Losses
35 of alkali seasonal wetland complex habitat would likely occur in the south end of the Yolo
36 Bypass and on the northern fringes of Suisun Marsh.

- 37 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
38 seasonally inundated floodplain would permanently and temporarily remove approximately
39 1,450 acres of high-value loggerhead shrike habitat (933 permanent, 517 temporary). These
40 losses would be expected after the first 10 years of Alternative 9 implementation along the San
41 Joaquin River and other major waterways in CZ 7.

- 42 • *CM7 Riparian Natural Community Restoration*: Riparian restoration would permanently remove
43 approximately 370 acres of high-value loggerhead shrike habitat as part of tidal restoration and
44 1,489 acres as part of seasonal floodplain restoration. In addition, 503 acres of low-value habitat

1 would be removed as a part of tidal restoration and 1,971 acres would be removed as part of
2 seasonal floodplain restoration through CM7.

3 • *CM8 Grassland Natural Community Restoration and CM9 Vernal Pool and Alkali Seasonal Wetland*
4 *Complex Restoration*: Temporary construction-related disturbance of grassland habitat would
5 result from implementation of CM8 and CM9 in in CZs 1, 2, 4, 5, 7, 8, and 11. However, all areas
6 would be restored after the construction periods. Grassland restoration would be implemented
7 on agricultural lands that also provide habitat for loggerhead shrike and would result in the
8 conversion of 1,849 acres of cultivated lands to high-value grassland.

9 • *CM10 Nontidal Marsh Restoration*: Implementation of CM10 would result in the permanent
10 removal of 705 acres of high-value loggerhead shrike habitat and 735 acres of low-value
11 loggerhead shrike habitat.

12 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
13 actions included in CM11 that are designed to enhance wildlife values in restored or protected
14 habitats could result in localized ground disturbances that could temporarily remove small
15 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
16 vegetation and road and other infrastructure maintenance activities, would be expected to have
17 minor adverse effects on available habitat and would be expected to result in overall
18 improvements to and maintenance of habitat values over the term of the BDCP. CM11 would
19 also include the construction of recreational-related facilities including trails, interpretive signs,
20 and picnic tables (BDCP Chapter 4, *Covered Activities and Associated Federal Actions*). The
21 construction of trailhead facilities, signs, staging areas, picnic areas, bathrooms, etc. would be
22 placed on existing, disturbed areas when and where possible. However, approximately 50 acres
23 of grassland habitat would be lost from the construction of trails and facilities.

24 Habitat management- and enhancement-related activities could disturb loggerhead shrike nests.
25 If the species were to nest in the vicinity of a worksite, equipment operation could destroy nests
26 if shrubs and trees in grasslands or cultivated lands were removed, and noise and visual
27 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings.
28 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
29 *of Nesting Birds*, would be available to address these effects.

30 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of high-
31 value loggerhead shrike habitat for the development of a delta and longfin smelt conservation
32 hatchery in CZ 1. Hatchery construction is expected to occur within the first 10 years of Plan
33 implementation.

34 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
35 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
36 disturbances that could affect loggerhead shrike use of the surrounding habitat. Maintenance
37 activities would include vegetation management, levee and structure repair, and re-grading of
38 roads and permanent work areas. These effects, however, would be reduced by AMM1–AMM7,
39 Mitigation Measure BIO-75, and conservation actions as described below.

40 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
41 direct mortality of adult or fledged loggerhead shrike if they were present in the Plan Area,
42 because they would be expected to avoid contact with construction and other equipment. If
43 either species were to nest in the construction area, construction-related activities, including
44 equipment operation, noise and visual disturbances could destroy nests or lead to their

1 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be
2 available to address these potential effects.

3 The following paragraphs summarize the combined effects discussed above and describe other
4 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
5 included.

6 ***Near-Term Timeframe***

7 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
8 the near-term BDCP conservation strategy has been evaluated to determine whether it would
9 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
10 effects of construction would not be adverse under NEPA. Alternative 9 would remove 7,425 acres
11 (5,768 permanent, 1,657 temporary) of high-value habitat for loggerhead shrike in the study area in
12 the near-term. These effects would result from the construction of the water conveyance facilities
13 (CM1, 1,599 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
14 *Enhancement, CM4 Tidal Natural Communities Restoration, CM5 Seasonally Inundated Floodplain*
15 *Restoration, CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community*
16 *Restoration, CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural*
17 *Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—5,826 acres). In
18 addition, 3,184 acres of low-value habitat would be removed or converted in the near-term (CM1,
19 1,286 acres; *CM2 Yolo Bypass Fisheries Enhancement, CM4 Tidal Natural Communities Restoration,*
20 *CM7 Riparian Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM9*
21 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration, CM11 Natural Communities*
22 *Enhancement and Management* and *CM18 Conservation Hatcheries*—1,898 acres).

23 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
24 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 3,198 acres
25 should be protected to compensate for the loss of high-value habitat from CM1. The near-term
26 effects of other conservation actions would require 11,652 acres of protection to compensate for the
27 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the
28 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a
29 large proportion of the low-value habitat would result from the conversion and enhancement to
30 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively
31 quickly after completion of construction.

32 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
33 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
34 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
35 in Chapter 3, *Description of Alternatives*). These conservation actions are associated with CM3, CM8,
36 and CM9 and would occur in the same timeframe as the construction and early restoration losses.

37 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
38 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
39 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
40 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
41 create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce the
42 effects of current levels of habitat fragmentation. Under *CM11 Natural Communities Enhancement*
43 *and Management*, insect prey populations would be increased on protected lands, enhancing the
44 foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4).

1 Cultivated lands that provide habitat for covered and other native wildlife species would provide
2 approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective
3 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and
4 protect small patches of trees and shrubs within cultivated lands that would maintain foraging
5 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows
6 along field borders and roadsides within protected cultivated lands would also provide high-value
7 nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to near-term goals
8 of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural community.
9 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
10 late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
11 *Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
12 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
13 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
14 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
15 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
16 nesting habitat for loggerhead shrike. These Plan objectives represent performance standards for
17 considering the effectiveness of conservation actions.

18 The combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex,
19 and alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
20 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
21 CM1 and other near-term effects on loggerhead shrike high-value habitat with the consideration
22 that some portion of the 15,400 acres of cultivated lands protected in the near-term timeframe
23 would include suitable high-value crop types for loggerhead shrike. Sufficient acreage of the
24 protected cultivated lands would need to be managed in pasture, alfalfa, or grain and hay crops such
25 that the near-term impacts on high-value habitat were compensated for at a ratio of 2:1. Mitigation
26 Measure BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*,
27 would be available to address the adverse effect of near-term high-value habitat loss. With the
28 management and enhancement of cultivated lands including insect prey enhancement through CM3
29 and CM11, the protection of shrubs and establishment of hedgerows within protected cultivated
30 lands would compensate for any potential effect from the loss of low-value loggerhead shrike
31 foraging habitat.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
36 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
37 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
38 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
39 to the Final EIR/EIS.

40 The loggerhead shrike is not a covered species under the BDCP. For the BDCP to avoid an adverse
41 effect on individuals, preconstruction surveys for noncovered avian species would be required to
42 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*
43 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this
44 adverse effect.

1 **Late Long-Term Timeframe**

2 Alternative 9 as a whole would result in the combined permanent of and temporary effects on
3 28,690 acres of high-value habitat and 19,485 acres of low-value loggerhead shrike habitat over the
4 term of the Plan. The locations of these losses are described above in the analyses of individual
5 conservation measures. The Plan includes conservation commitments through *CM3 Natural*
6 *Communities Protection and Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8*
7 *Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*
8 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
9 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex and protect
10 48,625 acres of cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in
11 Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11
12 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, 8, and 11 would be associated with
13 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would
14 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural
15 communities which would create larger, more expansive patches of high-value habitat for
16 loggerhead shrike and reduce the effects of current levels of habitat fragmentation. Under *CM11*
17 *Natural Communities Enhancement and Management*, insect prey populations would be increased on
18 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
19 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife
20 species would provide approximately 48,625 acres of potential high-value habitat for loggerhead
21 shrike (Objective CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to
22 maintain and protect small patches of trees and shrubs within cultivated lands that would maintain
23 foraging perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide
24 hedgerows along field borders and roadsides within protected cultivated lands would also provide
25 high-value nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to
26 near-term goals of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural
27 community. Riparian areas would be restored, maintained, and enhanced to provide a mix of early-,
28 mid- and late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
29 *Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
30 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
31 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
32 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
33 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
34 nesting habitat for loggerhead shrike.

35 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
36 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
37 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
38 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
39 *Affected Natural Communities*. All of these AMMs include elements that would avoid or minimize the
40 risk of affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C
41 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
42 *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS. The loggerhead shrike is not a
43 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
44 preconstruction surveys for noncovered avian species would be required to ensure that nests are
45 detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
46 *Avoid Disturbance of Nesting Birds*, would be available to address this effect.

1 **NEPA Effects:** The loss of loggerhead shrike habitat and potential mortality of this special-status
 2 species under Alternative 9 would represent an adverse effect in the absence of other conservation
 3 actions. With habitat protection and restoration associated with CM3, CM8, CM9, and CM11, guided
 4 by biological goals and objectives and by AMM1–AMM6, *AMM10 Restoration of Temporarily Affected*
 5 *Natural Communities*, and *AMM18 Swainson’s Hawk*, and with implementation of Mitigation Measure
 6 BIO-138, *Compensate for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*, which would
 7 be available to guide the near-term protection and management of cultivated lands, the effects of
 8 habitat loss on loggerhead shrike under Alternative 9 would not be adverse. Loggerhead shrike is
 9 not a covered species under the BDCP, and potential mortality would be an adverse effect without
 10 preconstruction surveys to ensure that nests are detected and avoided. Mitigation Measure BIO-75,
 11 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
 12 available to address this effect.

13 **CEQA Conclusion:**

14 **Near-Term Timeframe**

15 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 16 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 17 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 18 effects of construction would be less than significant under CEQA. Alternative 9 would remove 7,425
 19 acres (5,768 permanent, 1,657 temporary) of high-value habitat for loggerhead shrike in the study
 20 area in the near-term. These effects would result from the construction of the water conveyance
 21 facilities (CM1, 1,599 acres), and implementing other conservation measures (*CM2 Yolo Bypass*
 22 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated*
 23 *Floodplain Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural*
 24 *Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11*
 25 *Natural Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—5,826
 26 acres). In addition, 3,184 acres of low-value habitat would be removed or converted in the near-
 27 term (CM1, 1,286 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities*
 28 *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community*
 29 *Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM11 Natural*
 30 *Communities Enhancement and Management* and *CM18 Conservation Hatcheries*—1,898 acres).

31 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
 32 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 3,198 acres
 33 should be protected to compensate for the loss of high-value habitat from CM1. The near-term
 34 effects of other conservation actions would require 11,652 acres of protection to compensate for the
 35 loss of high-value shrike habitat using the same typical NEPA and CEQA ratio (2:1 protection for the
 36 loss of high-value habitat). The loss of low-value habitat would not require mitigation because a
 37 large proportion of the low-value habitat would result from the conversion and enhancement to
 38 high-value habitats. In addition, temporary impacts on cultivated lands would be restored relatively
 39 quickly after completion of construction.

40 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
 41 grassland natural community, protecting 400 acres of vernal pool complex, protecting 120 acres of
 42 alkali seasonal wetland complex, and protecting 15,400 acres of non-rice cultivated lands (Table 3-4
 43 in Chapter 3). These conservation actions are associated with CM3, CM8, and CM9 and would occur
 44 in the same timeframe as the construction and early restoration losses.

1 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
2 and GNC1.2). Grassland protection in CZs 1, 8, and 11 would be associated with vernal pool and
3 alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a
4 contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which
5 would create larger, more expansive patches of high-value habitat for loggerhead shrike and reduce
6 the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*
7 *Enhancement and Management*, insect prey populations would be increased on protected lands,
8 enhancing the foraging value of these natural communities (Objectives ASWNC2.4, VPNC2.5, and
9 GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife species would
10 provide approximately 15,400 acres of potential high-value habitat for loggerhead shrike (Objective
11 CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to maintain and
12 protect small patches of trees and shrubs within cultivated lands that would maintain foraging
13 perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide hedgerows
14 along field borders and roadsides within protected cultivated lands would also provide high-value
15 nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to near-term goals
16 of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural community.
17 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
18 late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
19 *Swainson's Hawk* includes a measure to plant large mature trees, including transplanting trees
20 scheduled for removal. Trees would be planted in areas that support high-value Swainson's hawk
21 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian
22 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
23 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
24 nesting habitat for loggerhead shrike. These Plan objectives represent performance standards for
25 considering the effectiveness of conservation actions.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
30 *Affected Natural Communities*. All of these AMMs include elements that would avoid or minimize the
31 risk of affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C
32 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
33 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

34 In the absence of other conservation actions, the effects on loggerhead shrike habitat would
35 represent an adverse effect as a result of habitat modification and potential direct mortality of a
36 special-status species. This impact would be significant. Loggerhead shrike is not a covered species
37 under the BDCP. For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for
38 noncovered avian species would be required to ensure that nests are detected and avoided. The
39 combined acres of restoration and protection of 3,660 acres of grassland, vernal pool complex, and
40 alkali seasonal wetland contained in the near-term Plan goals and the additional detail in the
41 biological objectives satisfy the typical mitigation that would be applied to the project-level effects of
42 CM1 and other near-term effects on loggerhead shrike high-value habitat with the consideration
43 that some portion of the 15,400 acres of cultivated lands protected in the near-term timeframe
44 would include suitable high-value crop types for loggerhead shrike. Sufficient acreage of the
45 protected cultivated lands would need to be managed in pasture, alfalfa, or grain and hay crops such
46 that the near-term impacts on high-value habitat were compensated for at a ratio of 2:1. The

1 implementation of Mitigation Measure BIO-138, *Compensate for the Near-Term Loss of High-Value*
 2 *Loggerhead Shrike Habitat*, would reduce the impact of near-term high-value habitat loss to a less-
 3 than-significant level.

4 With the acres of habitat protection and restoration described above, in addition to Mitigation
 5 Measure BIO-138, *Compensate for the Near-term Loss of High-Value Loggerhead Shrike Habitat*,
 6 Alternative 9 would not result in a substantial adverse effect through loss of high-value habitat. The
 7 management and enhancement of cultivated lands including insect prey enhancement through CM3
 8 and CM11, the protection of shrubs and establishment of hedgerows within protected cultivated
 9 lands would compensate for any potential substantial impact from the loss of low-value loggerhead
 10 shrike foraging habitat. In addition, AMM1–AMM7, and implementation of Mitigation Measure BIO-
 11 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would avoid
 12 potentially significant impacts on nesting individuals. With these measures in place, Alternative 9
 13 would not result in a substantial adverse effect through habitat modification and would not
 14 substantially reduce the number or restrict the range of either species. Therefore, Alternative 9
 15 would have a less-than-significant impact on loggerhead shrike.

16 ***Late Long-Term Timeframe***

17 Alternative 9 as a whole would result in the combined permanent of and temporary effects on
 18 28,690 acres of high-value habitat and 19,485 acres of low-value loggerhead shrike habitat over the
 19 term of the Plan. The locations of these losses are described above in the analyses of individual
 20 conservation measures. The Plan includes conservation commitments through *CM3 Natural*
 21 *Communities Protection and Restoration*, *CM7, Riparian Natural Community Restoration*, *CM8*
 22 *Grassland Natural Community Restoration*, and *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*
 23 *Restoration* to protect 8,000 acres and restore 2,000 acres of grassland natural community, protect
 24 600 acres of vernal pool complex, protect 150 acres of alkali seasonal wetland complex and protect
 25 48,625 acres of cultivated lands that provide suitable habitat for native wildlife species (Table 3-4 in
 26 Chapter 3). Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11
 27 (Objectives GNC1.1 and GNC1.2). Grassland protection in CZ 1, 8, and 11 would be associated with
 28 vernal pool and alkali seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would
 29 result in a contiguous matrix of grassland, alkali seasonal wetland, and vernal pool natural
 30 communities which would create larger, more expansive patches of high-value habitat for
 31 loggerhead shrike and reduce the effects of current levels of habitat fragmentation. Under *CM11*
 32 *Natural Communities Enhancement and Management*, insect prey populations would be increased on
 33 protected lands, enhancing the foraging value of these natural communities (Objectives ASWNC2.4,
 34 VPNC2.5, and GNC2.4). Cultivated lands that provide habitat for covered and other native wildlife
 35 species would provide approximately 48,625 acres of potential high-value habitat for loggerhead
 36 shrike (Objective CLNC1.1). In addition, there is a commitment in the plan (Objective CLNC1.3) to
 37 maintain and protect small patches of trees and shrubs within cultivated lands that would maintain
 38 foraging perches and nesting habitat for the species. The establishment of 20- to 30-foot-wide
 39 hedgerows along field borders and roadsides within protected cultivated lands would also provide
 40 high-value nesting habitat for loggerhead shrike (Objective SH2.2). The BDCP has committed to
 41 near-term goals of protecting 750 acres and restoring 800 acres of valley/foothill riparian natural
 42 community. Riparian areas would be restored, maintained, and enhanced to provide a mix of early-,
 43 mid- and late-successional habitat types with a well-developed understory of dense shrubs. *AMM18*
 44 *Swainson’s Hawk* includes a measure to plant large mature trees, including transplanting trees
 45 scheduled for removal. Trees would be planted in areas that support high-value Swainson’s hawk
 46 foraging habitat within or adjacent to conserved cultivated lands, or as a component of the riparian

1 restoration where they are in close proximity to suitable foraging habitat. Locating tree plantings
2 and riparian restoration adjacent to Swainson's hawk foraging habitat would also provide suitable
3 nesting habitat for loggerhead shrike.

4 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
5 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
6 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
7 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
8 *Affected Natural Communities*. All of these AMMs include elements that would avoid or minimize the
9 risk of affecting individuals and species habitats adjacent to work areas. BDCP Appendix 3.C
10 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
11 *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS. The loggerhead shrike is not a
12 covered species under the BDCP. For the BDCP to avoid an adverse effect on individuals,
13 preconstruction surveys for noncovered avian species would be required to ensure that nests are
14 detected and avoided. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*
15 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this potential impact to a
16 less-than-significant level.

17 In the absence of other conservation actions, the effects on loggerhead shrike habitat would
18 represent an adverse effect as a result of habitat modification and potential direct mortality of a
19 special-status species. This impact would be significant. Considering Alternative 9's protection and
20 restoration provisions, which would provide acreages of new high-value or enhanced habitat in
21 amounts suitable to compensate for habitats lost to construction and restoration activities, and with
22 the implementation of AMM1-AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
23 *Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-138, *Compensate*
24 *for the Near-Term Loss of High-Value Loggerhead Shrike Habitat*, the loss of habitat or direct
25 mortality through implementation of Alternative 9 would not result in a substantial adverse effect
26 through habitat modifications and would not substantially reduce the number or restrict the range
27 of loggerhead shrike. Therefore, the loss of habitat or potential mortality under this alternative
28 would have a less-than-significant impact on loggerhead shrike.

29 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
30 **Disturbance of Nesting Birds**

31 See Mitigation Measure BIO-75 under Impact BIO-75.

32 **Mitigation Measure BIO-138: Compensate for the Near-Term Loss of High-Value**
33 **Loggerhead Shrike Habitat**

34 Because the BDCP does not include acreage commitments for the protection of crop types in the
35 near-term time period, DWR will manage and protect sufficient acres of cultivated lands such as
36 pasture, grain and hay crops, or alfalfa as high-value loggerhead shrike habitat such that the
37 total acres of high-value habitat impacted in the near-term timeframe are mitigated at a ratio of
38 2:1. Additional grassland protection, enhancement, and management may be substituted for the
39 protection of high-value cultivated lands.

1 **Impact BIO-139: Effects on Loggerhead Shrike Associated with Electrical Transmission**
2 **Facilities**

3 Loggerhead shrike's small, relatively maneuverable body, its lack of flocking behavior, and its
4 diurnal foraging behavior contribute to a low risk of collision with the proposed transmission lines.
5 Marking transmission lines with flight diverters that make the lines more visible to birds has been
6 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). For example, Yee
7 (2008) estimated that marking devices in the Central Valley could reduce avian mortality by 60%.
8 As described in *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted
9 with flight diverters, which would substantially reduce any potential for mortality of loggerhead
10 shrike individuals from powerline collisions.

11 **NEPA Effects:** Loggerhead shrike's small, relatively maneuverable body, its lack of flocking behavior,
12 and its diurnal foraging behavior contribute to a low risk of collision with the proposed
13 transmission lines. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird
14 strike diverters on all new transmission lines, which would substantially reduce the risk of bird
15 strike for loggerhead shrike as a result of the project. Therefore, the construction and operation of
16 new transmission lines under Alternative 9 would not result in an adverse effect on loggerhead
17 shrike.

18 **CEQA Conclusion:** Loggerhead shrike's small, relatively maneuverable body, its lack of flocking
19 behavior, and its diurnal foraging behavior contribute to a low risk of collision with the proposed
20 transmission lines. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird
21 strike diverters on all new transmission lines, which would substantially reduce the risk of bird
22 strike for loggerhead shrike as a result of the project. Therefore, the construction and operation of
23 new transmission lines under Alternative 9 would result in a less-than-significant impact on
24 loggerhead shrike.

25 **Impact BIO-140: Indirect Effects of Plan Implementation on Loggerhead Shrike**

26 Noise and visual disturbances associated with construction-related activities could result in
27 temporary disturbances that affect loggerhead shrike use of modeled habitat. Construction noise
28 above background noise levels (greater than 50 dBA) could extend 1,900 to 5,250 feet from the edge
29 of construction activities (BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of*
30 *the BDCP Conveyance Facility on Sandhill Crane*, Table 4), although there are no available data to
31 determine the extent to which these noise levels could affect loggerhead shrike. Indirect effects
32 associated with construction include noise, dust, and visual disturbance caused by grading, filling,
33 contouring, and other ground-disturbing operations. Construction-related noise and visual
34 disturbances could disrupt nesting and foraging behaviors, and reduce the functions of suitable
35 habitat which could result in an adverse effect on these species. Indirect effects from construction of
36 the new forebay in CZ 8 could result in substantial effects on active loggerhead shrike nests. DHCCP
37 surveys in 2009 detected 10 nest sites south-west of the Clifton Court Forebay (Appendix 12C, *2009*
38 *to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*) and the large expanses of
39 grassland in CZ 8 provide high-value nesting habitat for the species. Mitigation Measure BIO-75,
40 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
41 available to minimize adverse effects on active nests. The use of mechanical equipment during water
42 conveyance facilities construction could cause the accidental release of petroleum or other
43 contaminants that could affect these species or their prey in the surrounding habitat. AMM1-AMM7,
44 including *AMM2 Construction Best Management Practices and Monitoring*, would minimize the

1 likelihood of such spills. The inadvertent discharge of sediment or excessive dust adjacent to
2 loggerhead shrike nesting habitat could also have a negative effect on these species. AMM1–
3 AMM7 would ensure that measures are in place to prevent runoff from the construction area and the
4 negative effects of dust on wildlife adjacent to work areas.

5 **NEPA Effects:** Indirect effects on loggerhead shrike as a result of Alternative 9 implementation could
6 have adverse effects on the species through the modification of habitat and potential for direct
7 mortality. The loggerhead shrike is not a covered species under the BDCP, and the potential for
8 mortality would be an adverse effect without preconstruction surveys to ensure that nests are
9 detected and avoided. Construction of the new forebay in CZ 8 would have the potential to disrupt
10 nesting loggerhead shrikes in the highly suitable habitat surrounding Clifton Court Forebay and
11 adjacent to work areas. In conjunction with AMM1–AMM7, Mitigation Measure BIO-75, *Conduct*
12 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
13 address this adverse effect.

14 **CEQA Conclusion:** Indirect effects on loggerhead shrike as a result of Alternative 9 implementation
15 could have a significant impact on the species. Construction of the new forebay in CZ 8 would have
16 the potential to disrupt nesting loggerhead shrikes in the highly suitable habitat surrounding Clifton
17 Court Forebay and adjacent to work areas. The incorporation of AMM1–AMM7 into the BDCP and
18 the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
19 *Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

20 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
21 **Disturbance of Nesting Birds**

22 See Mitigation Measure BIO-75 under Impact BIO-75.

23 **Impact BIO-141: Periodic Effects of Inundation on Loggerhead Shrike as a Result of**
24 **Implementation of Conservation Components**

25 Flooding of the Yolo Bypass from Fremont Weir operations (*CM2 Yolo Bypass Fisheries*
26 *Enhancement*) would increase the frequency and duration of inundation on 1,830–5,646 acres of
27 modeled loggerhead shrike habitat (consisting of approximately 777–2,423 acres of high-value
28 habitat; Table 12-9-51).

29 Based on hypothetical footprints, implementation of *CM5 Seasonally Inundated Floodplain*
30 *Restoration* could result in the periodic inundation of up to approximately 8,138 acres of modeled
31 habitat (Table 12-9-51), consisting of 3,823 acres of high-value and 4,315 acres of low-value habitat.

32 Reduced foraging habitat availability may be expected during the fledgling period of the nesting
33 season due to periodic inundation. However, increased frequency and duration of inundation would
34 occur during the nonbreeding season.

35 **NEPA Effects:** Periodic inundation of floodplains would not result in an adverse effect on loggerhead
36 shrike from the modification of habitat. Reduced foraging habitat availability may be expected
37 during the fledgling period of the nesting season due to periodic inundation. However, increased
38 frequency and duration of inundation would occur during the nonbreeding season.

39 **CEQA Conclusion:** Periodic inundation of floodplains would result in a less-than-significant impact
40 on loggerhead shrike from the modification of habitat. Reduced foraging habitat availability may be

1 expected during the fledgling period of the nesting season due to periodic inundation. However,
2 increased frequency and duration of inundation would occur during the nonbreeding season.

3 **Song Sparrow “Modesto” Population**

4 The Modesto song sparrow is common and ubiquitous throughout the study area, excluding CZ 11,
5 and modeled habitat for the species includes managed wetlands, tidal freshwater emergent, nontidal
6 freshwater emergent, and valley/foothill riparian vegetation communities.

7 Construction and restoration associated with Alternative 9 conservation measures would result in
8 both temporary and permanent removal of Modesto song sparrow habitat in the quantities
9 indicated in Table 12-9-52. Full implementation of Alternative 9 would include the following
10 biological objectives over the term of the BDCP that would benefit Modesto song sparrow (BDCP
11 Chapter 3, Section 3.3, *Biological Goals and Objectives*).

- 12 • Restore or create at least 5,000 acres of valley/foothill riparian natural community, with at least
13 3,000 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1,
14 associated with CM7).
- 15 • Protect at least 750 acres of existing valley/foothill riparian natural community in CZ 7 by year
16 10 (Objective VFRNC1.2, associated with CM3).
- 17 • Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
18 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 19 • Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
20 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
21 associated with CM10).
- 22 • Create 500 acres of managed wetlands in CZs 3, 4, 5, or 6 (Objectives GSHC1.3 and GSHC1.4,
23 associated with CM10).
- 24 • Increase prey availability and accessibility for grassland-foraging species (Objectives ASWNC2.4,
25 VPNC2.5, and GNC2.4, associated with CM11).
- 26 • Maintain and protect the small patches of important wildlife habitats that occur in cultivated
27 lands within the reserve system, including isolated valley oak trees, trees and shrubs along field
28 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
29 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 30 • Establish 20- to 30-foot-wide hedgerows along field borders and roadsides within protected
31 cultivated lands at a minimum rate of 400 linear feet per 100 acres (Objective SH2.2, associated
32 with CM3).

33 As explained below, with the restoration or protection of these amounts of habitat, in addition to
34 implementation of AMMs and Mitigation Measure BIO-75, impacts on Modesto song sparrow would
35 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-9-52. Changes in Modesto Song Sparrow Modeled Habitat Associated with Alternative 9 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	133	133	418	418	NA	NA
Total Impacts CM1		133	133	418	418	NA	NA
CM2–CM18	Nesting	2,444	3,253	133	169	81–158	284
Total Impacts CM2–CM18		2,444	3,253	133	169	81–158	284
TOTAL IMPACTS		2,2,577	3,386	551	587	81–158	284

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

4 **Impact BIO-142: Loss or Conversion of Habitat for and Direct Mortality of Modesto Song**
5 **Sparrow**

6 Alternative 9 conservation measures would result in the combined permanent and temporary loss
7 of up to 3,973 acres of modeled habitat for Modesto song sparrow (of which 3,386 acres would be a
8 permanent loss and 587 acres would be a temporary loss of habitat, Table 12-9-52). Conservation
9 measures that would result in these losses are conveyance facilities and transmission line
10 construction, and establishment and use of borrow and spoil areas (CM1), Yolo Bypass
11 improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5). Habitat
12 enhancement and management activities (CM11), which would include ground disturbance and
13 removal of nonnative vegetation, could result in local adverse habitat effects. In addition,
14 maintenance activities associated with the long-term operation of the water conveyance facilities
15 and other BDCP physical facilities could degrade or eliminate Modesto song sparrow modeled
16 habitat. Each of these individual activities is described below. A summary statement of the combined
17 impacts and NEPA effects, and a CEQA conclusion follows the individual conservation measure
18 discussions.

- 19 • *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would
20 result in the combined permanent and temporary loss of up to 551 acres of modeled Modesto
21 song sparrow habitat (133 acres of permanent loss, 418 acres of temporary loss) from CZ 4, 5, 6,
22 7, and 8. Most of the permanent loss would occur as wider and deeper channels are dredged in
23 Middle River and Victoria Canal, and as operable barriers and new Sacramento River diversions
24 are constructed in various waterways across the Delta. Temporary losses of habitat would occur
25 primarily along Middle River between Victoria Canal and Mildred Island, where large dredging
26 work areas and operable barrier work areas would be placed. Some of this vegetation may be

1 temporarily removed as dredging progresses, while other areas could remain in place but be
 2 temporarily affected by sedimentation and equipment movement associated with dredging. The
 3 Modesto song sparrow is ubiquitous throughout the study area. The CM1 construction footprint
 4 of permanent impacts overlaps with 63 occurrences of Modesto song sparrow. Permanent
 5 impacts include the construction of the canal south of Clifton Court Forebay, channel dredging,
 6 instream island dredging, and channel enlargement in Middle River and Victoria Canal, an
 7 operable barrier, and a fish screen area. The CM1 footprint of temporary impacts overlaps with
 8 102 occurrences of Modesto song sparrow and the majority of these impacts would be a result
 9 of dredging work areas. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
 10 *Surveys and Avoid Disturbance of Nesting Birds*, would require preconstruction surveys and the
 11 establishment of no-disturbance buffers and would be available to address potential effects on
 12 nesting Modesto song sparrows. Refer to the Terrestrial Biology Map Book for a detailed view of
 13 Alternative 9 construction locations. Construction of the water conveyance facilities would
 14 occur in the near-term timeframe.

- 15 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
 16 would permanently remove 143 acres of modeled Modesto song sparrow habitat in the Yolo
 17 Bypass in CZ 2. In addition, 133 acres of habitat would be temporarily removed. These losses
 18 would occur in the near-term timeframe and primarily consist of valley/foothill riparian natural
 19 community and managed wetland. The loss is expected to occur during the first 10 years of
 20 Alternative 9 implementation.
- 21 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
 22 inundation would result in the conversion of an estimated loss of 3,066 acres of modeled
 23 Modesto song sparrow habitat by the late long-term timeframe.
- 24 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
 25 seasonally inundated floodplain would permanently and temporarily remove approximately 80
 26 acres of modeled Modesto song sparrow habitat (44 permanent, 36 temporary). These losses
 27 would be expected to occur along the San Joaquin River and other major waterways in CZ 7. The
 28 BDCP is expected to restore approximately 5,000 acres of valley/foothill riparian natural
 29 community. These lands would be managed as a mosaic of seral stages, age classes, and plant
 30 heights, some of which would provide suitable nesting habitat for Modesto song sparrow.
- 31 ● *CM6 Channel Margin Enhancement*: Channel margin habitat enhancement could result in
 32 removal of small amounts of valley/foothill riparian habitat along 20 miles of river and sloughs.
 33 The extent of this loss cannot be quantified at this time, but the majority of the enhancement
 34 activity would occur along waterway margins where riparian habitat stringers exist, including
 35 levees and channel banks. The improvements would occur within the study area on sections of
 36 the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
 37 Some of the restored riparian habitat in the channel margin would be expected to support
 38 nesting habitat for Modesto song sparrow.
- 39 ● *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
 40 actions included in *CM11 Natural Communities Enhancement and Management* that are designed
 41 to enhance wildlife values in restored or protected habitats could result in localized ground
 42 disturbances that could temporarily remove small amounts of modeled habitat. Ground-
 43 disturbing activities, such as removal of nonnative vegetation and road and other infrastructure
 44 maintenance activities, would be expected to have minor adverse effects on available habitat

1 and would be expected to result in overall improvements to and maintenance of habitat values
2 over the term of the BDCP.

3 Habitat management- and enhancement-related activities could affect Modesto song sparrow
4 nests. If the individuals were to nest in the vicinity of a worksite, equipment operation could
5 destroy nests, and noise and visual disturbances could lead to their abandonment, resulting in
6 mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
7 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address these effects.

- 8 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
9 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
10 disturbances that could affect Modesto song sparrow use of the surrounding habitat.
11 Maintenance activities would include vegetation management, levee and structure repair, and
12 re-grading of roads and permanent work areas. These effects, however, would be reduced by
13 AMMs, and conservation actions as described below.
- 14 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
15 direct mortality of adult or fledged Modesto song sparrow if they were present in the Plan Area,
16 because they would be expected to avoid contact with construction and other equipment. If
17 either species were to nest in the construction area, construction-related activities, including
18 equipment operation, noise and visual disturbances could destroy nests or lead to their
19 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be
20 available to address these effects.

21 The following paragraphs summarize the combined effects discussed above and describe other
22 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA conclusions are also
23 included.

24 ***Near-Term Timeframe***

25 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
26 the near-term BDCP conservation strategy has been evaluated to determine whether it would
27 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
28 effects of construction would not be adverse under NEPA. Alternative 9 would remove 3,128 acres
29 of modeled habitat (2,557 permanent, 551 temporary) for Modesto song sparrow in the study area
30 in the near-term. These effects would result from the construction of the water conveyance facilities
31 (CM1, 551 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries*
32 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated Floodplain*
33 *Restoration—2,577 acres*).

34 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
35 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios
36 would indicate that 551 acres of suitable habitat should be restored/created and 551 acres should
37 be protected to compensate for the CM1 losses of 551 acres of Modesto song sparrow habitat. The
38 near-term effects of other conservation actions would remove 2,577 acres of modeled habitat, and
39 therefore require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song
40 sparrow habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1
41 for protection).

42 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
43 valley/foothill riparian natural community, restoring 2,000 acres of tidal freshwater emergent

1 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the
 2 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are
 3 associated with CM3, CM4, CM7, and CM10 and would occur in the same timeframe as the
 4 construction and early restoration losses, thereby avoiding adverse effects of habitat loss on
 5 Modesto song sparrow. The majority of the riparian restoration acres would occur in CZ 7 as part of
 6 a reserve system with extensive wide bands or large patches of valley/foothill riparian natural
 7 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and
 8 would provide suitable Modesto song sparrow nesting habitat. The tidal freshwater emergent
 9 wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be
 10 restored in a way that creates topographic heterogeneity and in areas that increase connectivity
 11 among protected lands (Objective TFEWNC2.2). The nontidal marsh restoration would occur in
 12 CZs 2, 4, and/or 5, and the managed wetland restoration would occur in CZs 3, 4, 5, or 6. Both the
 13 nontidal marsh and managed wetland restoration are associated with CM10 and would provide
 14 nesting habitat for Modesto song sparrow.

15 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated
 16 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands
 17 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field
 18 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).
 19 The management of protected grasslands to increase insect prey through techniques such as the
 20 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
 21 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
 22 standards for considering the effectiveness of conservation actions. The acres of restoration and
 23 protection contained in the near-term Plan goals and the additional detail in the biological objectives
 24 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
 25 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

26 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
 27 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
 28 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
 29 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
 30 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 31 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 32 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 33 to the Final EIR/EIS.

34 Modesto song sparrow is not a covered species under the BDCP. For the BDCP to avoid an adverse
 35 effect on individuals, preconstruction surveys for noncovered avian species would be required to
 36 ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*
 37 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this
 38 adverse effect.

39 **Late Long-Term Timeframe**

40 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 3,973 acres
 41 (3,386 acres of permanent loss, 587 acres of temporary loss) of modeled Modesto song sparrow
 42 habitat during the term of the Plan. The locations of these losses are described above in the analyses
 43 of individual conservation measures. The Plan includes conservation commitments through *CM3*
 44 *Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities Restoration*, and

1 *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of the valley/foothill
 2 riparian natural community, restore 24,000 acres of tidal freshwater emergent wetland, restore 500
 3 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the Plan Area (Table 3-4 in
 4 Chapter 3, *Description of Alternatives*). Additional acres of valley/foothill riparian habitat would be
 5 restored as a component of channel margin enhancement actions (CM6) along 20 miles of river and
 6 slough channels in the Delta, some of which would be expected to support nesting habitat for
 7 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of
 8 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,
 9 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives
 10 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the
 11 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would
 12 provide suitable nesting habitat for Modesto song sparrow.

13 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
 14 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas
 15 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh
 16 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in
 17 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with
 18 CM10 and would provide nesting habitat for Modesto song sparrow.

19 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands
 20 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective
 21 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and
 22 roadsides, which would provide additional habitat for the species (Objective SH2.2). The
 23 management of protected grasslands to increase insect prey through techniques such as the
 24 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
 25 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
 26 standards for considering the effectiveness of conservation actions. The acres of restoration and
 27 protection contained in the near-term Plan goals and the additional detail in the biological objectives
 28 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
 29 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

30 The Plan also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
 31 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
 32 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
 33 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan*. All of
 34 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
 35 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
 36 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
 37 to the Final EIR/EIS. Modesto song sparrow is not a covered species under the BDCP. For the BDCP
 38 to avoid an adverse effect on individuals, preconstruction surveys for noncovered avian species
 39 would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75,
 40 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
 41 available to address this adverse effect.

42 **NEPA Effects:** The loss of Modesto song sparrow habitat and potential mortality of this special-
 43 status species under Alternative 9 would represent an adverse effect in the absence of other
 44 conservation actions. With habitat protection and restoration associated with CM3, CM4, CM6, CM7,
 45 and CM11, guided by biological goals and objectives and by AMM1–AMM7, which would be in place

1 throughout the construction period, the effects of habitat loss on Modesto song sparrow under
 2 Alternative 9 would not be adverse. The Modesto song sparrow is not a covered species under the
 3 BDCP, and potential mortality would be an adverse effect without preconstruction surveys to ensure
 4 that nests are detected and avoided. Mitigation Measure BIO-75 would be available to address this
 5 effect.

6 **CEQA Conclusion:**

7 **Near-Term Timeframe**

8 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
 9 the near-term BDCP conservation strategy has been evaluated to determine whether it would
 10 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
 11 effects of construction would be less than significant under CEQA. Alternative 9 would remove 3,128
 12 acres of modeled habitat (2,557 permanent, 551 temporary) for Modesto song sparrow in the study
 13 area in the near-term. These effects would result from the construction of the water conveyance
 14 facilities (CM1, 551 acres), and implementing other conservation measures (*CM2 Yolo Bypass*
 15 *Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5 Seasonally Inundated*
 16 *Floodplain Restoration—2,577 acres*).

17 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
 18 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios
 19 would indicate that 551 acres of suitable habitat should be restored/created and 551 acres should
 20 be protected to compensate for the CM1 losses of 551 acres of Modesto song sparrow habitat. The
 21 near-term effects of other conservation actions would remove 2,577 acres of modeled habitat, and
 22 therefore require 2,577 acres of restoration/creation and 2,577 acres of protection of Modesto song
 23 sparrow habitat using the same typical NEPA and CEQA ratios (1:1 for restoration/creation and 1:1
 24 for protection).

25 The BDCP has committed to near-term goals of protecting 750 acres and restoring 800 acres of the
 26 valley/foothill riparian natural community, restoring 2,000 acres of tidal freshwater emergent
 27 wetland, restoring 500 acres of managed wetland, and restoring 400 acres of nontidal marsh in the
 28 Plan Area (Table 3-4 in Chapter 3, *Description of Alternatives*). These conservation actions are
 29 associated with CM3, CM4, CM7, and CM10 and would occur in the same timeframe as the
 30 construction and early restoration losses, thereby avoiding a significant impact of habitat loss on
 31 Modesto song sparrow. The majority of the riparian restoration acres would occur in CZ 7 as part of
 32 a reserve system with extensive wide bands or large patches of valley/foothill riparian natural
 33 community (Objectives VFRNC1.1 and VFRNC1.2 in BDCP Chapter 3, *Conservation Strategy*) and
 34 would provide suitable Modesto song sparrow nesting habitat. The tidal freshwater emergent
 35 wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective TFEWNC1.1) and would be
 36 restored in a way that creates topographic heterogeneity and in areas that increase connectivity
 37 among protected lands (Objective TFEWNC2.2). The nontidal marsh restoration would occur in
 38 CZs 2, 4, and/or 5, and the managed wetland restoration would occur in CZs 3, 4, 5, or 6. Both the
 39 nontidal marsh and managed wetland restoration are associated with CM10 and would provide
 40 nesting habitat for Modesto song sparrow.

41 The Plan also includes commitments to protect patches of important wildlife habitat on cultivated
 42 lands such as trees and shrubs along borders and roadside, riparian corridors, and wetlands
 43 (Objective CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field
 44 borders and roadsides, which would provide additional habitat for the species (Objective SH2.2).

1 The management of protected grasslands to increase insect prey through techniques such as the
2 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
3 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
4 standards for considering the effectiveness of conservation actions. The acres of restoration and
5 protection contained in the near-term Plan goals and the additional detail in the biological objectives
6 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
7 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
12 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
13 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
14 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
15 to the Final EIR/EIS. Modesto song sparrow is not a covered species under the BDCP. For the BDCP
16 to have a less-than-significant impact on individuals, preconstruction surveys for noncovered avian
17 species would be required to ensure that nests were detected and avoided. Implementation of
18 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
19 *Nesting Birds*, would reduce this impact to a less-than-significant level.

20 **Late Long-Term Timeframe**

21 Alternative 9 as a whole would result in the permanent loss of and temporary effects on 3,973 acres
22 (3,386 acres of permanent loss, 587 acres of temporary loss) of modeled Modesto song sparrow
23 habitat during the term of the Plan. The locations of these losses are described above in the analyses
24 of individual conservation measures. The Plan includes conservation commitments through *CM3*
25 *Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities Restoration*, and
26 *CM10 Nontidal Marsh Restoration* to protect 750 acres and restore 5,000 acres of the valley/foothill
27 riparian natural community, restore 24,000 acres of tidal freshwater emergent wetland, restore 500
28 acres of managed wetland, and restore 1,200 acres of nontidal marsh in the Plan Area (Table 3-4 in
29 Chapter 3, *Description of Alternatives*). Additional acres of valley/foothill riparian habitat would be
30 restored as a component of channel margin enhancement actions (CM6) along 20 miles of river and
31 slough channels in the Delta, some of which would be expected to support nesting habitat for
32 Modesto song sparrow. Of the 5,000 acres of restored riparian natural communities, a minimum of
33 3,000 acres of valley/foothill riparian would be restored within the seasonally inundated floodplain,
34 and 1,000 acres would be managed as dense early to mid-successional riparian forest (Objectives
35 VFRNC1.1 and VFRNC1.2). Goals and objectives in the Plan for riparian restoration also include the
36 maintenance and enhancement of structural heterogeneity (Objective VFRNC2.1) which would
37 provide suitable nesting habitat for Modesto song sparrow.

38 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
39 TFEWNC1.1) and would be restored in a way that creates topographic heterogeneity and in areas
40 that increase connectivity among protected lands (Objective TFEWNC2.2). The nontidal marsh
41 restoration would occur in CZs 2, 4, and/or 5, and the managed wetland restoration would occur in
42 CZs 3, 4, 5, or 6. Both the nontidal marsh and managed wetland restoration are associated with
43 CM10 and would provide nesting habitat for Modesto song sparrow.

1 The Plan includes commitments to protect patches of important wildlife habitat on cultivated lands
2 such as trees and shrubs along borders and roadside, riparian corridors, and wetlands (Objective
3 CLNC1.3). In addition, 20- to 30-foot-wide hedgerows would be established along field borders and
4 roadsides, which would provide additional habitat for the species (Objective SH2.2). The
5 management of protected grasslands to increase insect prey through techniques such as the
6 avoidance of use of pesticides (Objectives ASWNC2.4, VPNC2.5, and GNC2.4) would provide further
7 benefits to foraging Modesto song sparrows. These Plan objectives represent performance
8 standards for considering the effectiveness of conservation actions. The acres of restoration and
9 protection contained in the near-term Plan goals and the additional detail in the biological objectives
10 satisfy the typical mitigation that would be applied to the project-level effects of CM1 on Modesto
11 song sparrow, as well as mitigate the near-term effects of the other conservation measures.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
16 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
17 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
18 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
19 to the Final EIR/EIS. Modesto song sparrow is not a covered species under the BDCP. For the BDCP
20 to minimize direct mortality of individuals, preconstruction surveys for noncovered avian species
21 would be required to ensure that nests are detected and avoided. Implementation of Mitigation
22 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
23 *Birds*, would reduce this impact to a less-than-significant level.

24 Considering Alternative 9's protection and restoration provisions, which would provide acreages of
25 new high-value or enhanced habitat in amounts suitable to compensate for habitats lost to
26 construction and restoration activities, and with the implementation of AMM1-AMM7 and
27 Mitigation Measure BIO-75, the loss of habitat or direct mortality through implementation of
28 Alternative 9 would not result in a substantial adverse effect through habitat modifications and
29 would not substantially reduce the number or restrict the range of Modesto song sparrow.
30 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-
31 significant impact on Modesto song sparrow.

32 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
33 **Disturbance of Nesting Birds**

34 See Mitigation Measure BIO-75 under Impact BIO-75.

35 **Impact BIO-143: Effects on Modesto Song Sparrow Associated with Electrical Transmission**
36 **Facilities**

37 New transmission lines would increase the risk for bird-power line strikes, which could result in
38 injury or mortality of Modesto song sparrow. Existing lines currently pose this risk for Modesto song
39 sparrow and the incremental increased risk from the construction of new transmission lines is not
40 expected to adversely affect the population.

41 **NEPA Effects:** The incremental increased risk of bird-powerline strikes from the construction of new
42 transmission lines would not adversely affect the Modesto song sparrow population.

1 **CEQA Conclusion:** The incremental increased risk of bird-powerline strikes from the construction of
2 new transmission lines would have a less-than-significant impact on the Modesto song sparrow
3 population.

4 **Impact BIO-144: Indirect Effects of Plan Implementation on Modesto Song Sparrow**

5 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
6 with construction-related activities could result in temporary disturbances that affect Modesto song
7 sparrow use of modeled habitat. Construction noise above background noise levels (greater than 50
8 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP Appendix 5.J,
9 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
10 *Crane*, Table 4), although there are no available data to determine the extent to which these noise
11 levels could affect Modesto song sparrow. Indirect effects associated with construction include
12 noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
13 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and
14 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse
15 effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
16 *Avoid Disturbance of Nesting Birds*, would be available to minimize effects on active nests. The use of
17 mechanical equipment during water conveyance construction could cause the accidental release of
18 petroleum or other contaminants that could affect these species or their prey in the surrounding
19 habitat. AMM1–AMM7 including *AMM2 Construction Best Management Practices and Monitoring*
20 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment
21 or excessive dust adjacent to Modesto song sparrow could also have a negative effect on these
22 species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the
23 construction area and the negative effects of dust on wildlife adjacent to work areas.

24 **Methylmercury Exposure:** Marsh (tidal and nontidal) and floodplain restoration have the potential
25 to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of
26 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
27 tidal marshes and flood plains (Alpers et al. 2008). Thus, BDCP restoration activities that create
28 newly inundated areas could increase bioavailability of mercury (see BDCP Chapter 3, *Conservation*
29 *Strategy*, for details of restoration). Species sensitivity to methylmercury differs widely and there is
30 a large amount of uncertainty with respect to species-specific effects. Increased methylmercury
31 associated with natural community and floodplain restoration could indirectly affect Modesto song
32 sparrow, via uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

33 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
34 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
35 *Management* contains provisions for project-specific Mercury Management Plans. Site-specific
36 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
37 adaptive management as described in CM12 would be available to address the uncertainty of
38 methylmercury levels in restored tidal marsh and potential impacts on Modesto song sparrow.

39 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
40 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
41 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
42 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
43 2009). The effect of selenium toxicity differs widely between species and also between age and sex
44 classes within a species. In addition, the effect of selenium on a species can be confounded by

1 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
2 2009).

3 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
4 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
5 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
6 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
7 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
8 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
9 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
10 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
11 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
12 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
13 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
14 have a higher risk of selenium toxicity.

15 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
16 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
17 exacerbate bioaccumulation of selenium in avian species, including Modesto song sparrow. Marsh
18 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
19 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
20 Alternative 9 restoration activities that create newly inundated areas could increase bioavailability
21 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
22 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
23 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
24 increases in selenium concentrations in water in the Delta under any alternative. However, it is
25 difficult to determine whether the effects of potential increases in selenium bioavailability
26 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
27 effects on Modesto song sparrow.

28 Because of the uncertainty that exists at this programmatic level of review, there could be a
29 substantial effect on Modesto song sparrow from increases in selenium associated with restoration
30 activities. This effect would be addressed through the implementation of *AMM27 Selenium*
31 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
32 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
33 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
34 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
35 separately for each restoration effort as part of design and implementation. This avoidance and
36 minimization measure would be implemented as part of the tidal habitat restoration design
37 schedule.

38 **NEPA Effects:** Indirect effects on Modesto song sparrow as a result of constructing the Alternative 9
39 water conveyance facilities could adversely affect individuals in the absence of other conservation
40 actions. The incorporation of AMM1–AMM7 into the BDCP and the implementation of Mitigation
41 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
42 *Birds*, would minimize this adverse effect.

43 The implementation of tidal natural communities restoration or floodplain restoration could result
44 in increased exposure of Modesto song sparrow to methylmercury. However, it is unknown what

1 concentrations of methylmercury are harmful to the species and the potential for increased
2 exposure varies substantially within the study area. Site-specific restoration plans that address the
3 creation and mobilization of mercury, as well as monitoring and adaptive management as described
4 in *CM12 Methylmercury Management* would address the potential impacts of methylmercury levels
5 in restored tidal marsh in the study area. The site-specific planning phase of marsh restoration
6 would be the appropriate place to assess the potential for risk of methylmercury exposure for
7 Modesto song sparrow, once site specific sampling and other information could be developed.

8 Tidal habitat restoration could result in increased exposure of Modesto song sparrow to selenium.
9 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
10 would provide specific tidal habitat restoration design elements to reduce the potential for
11 bioaccumulation of selenium and its bioavailability in tidal habitats.

12 **CEQA Conclusion:** Indirect effects on Modesto song sparrow as a result of constructing the water
13 conveyance facilities could have a significant impact on these species. The incorporation of AMM1-
14 AMM7 into the BDCP and the implementation of Mitigation Measure BIO-75, *Conduct*
15 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this
16 impact to a less-than-significant level.

17 The implementation of tidal natural communities restoration or floodplain restoration could result
18 in increased exposure of Modesto song sparrow to methylmercury. However, it is unknown what
19 concentrations of methylmercury are harmful to the species. Site-specific restoration plans that
20 address the creation and mobilization of mercury, as well as monitoring and adaptive management
21 as described in *CM12 Methylmercury Management* would address the potential impacts of
22 methylmercury levels in restored tidal marsh in the study area.

23 Tidal habitat restoration could result in increased exposure of Modesto song sparrow to selenium.
24 With implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
25 restoration design elements to reduce the potential for bioaccumulation of selenium and its
26 bioavailability in tidal habitats, the impact of potential increased exposure to selenium would be less
27 than significant.

28 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
29 **Disturbance of Nesting Birds**

30 See Mitigation Measure BIO-75 under Impact BIO-75.

31 **Impact BIO-145: Periodic Effects of Inundation on Modesto Song Sparrow as a Result of**
32 **Implementation of Conservation Components**

33 Flooding of the Yolo Bypass (CM2) would inundate 81–158 acres of modeled Modesto song sparrow
34 habitat. However, inundation would occur during the nonbreeding season. Reduced foraging habitat
35 availability would be expected during the fledgling period of the nesting season due to periodic
36 inundation.

37 Based on hypothetical floodplain restoration, construction of setback levees from seasonally
38 inundated floodplain restoration (CM5) could result in periodic inundation of up to approximately
39 284 acres of Modesto song sparrow modeled habitat (Table 12-9-52).

40 The periodic inundation of the Yolo Bypass (CM2) and of seasonal floodplains (CM5) is expected to
41 restore a more natural flood regime in support of wetland and riparian vegetation types that

1 support Modesto song sparrow habitat, but may reduce the availability of nesting habitat during
2 years when flooding extends into the nesting season (past March).

3 **NEPA Effects:** Periodic effects of inundation would not result in an adverse effect on Modesto song
4 sparrow because increased frequency and duration of inundation would be expected to restore a
5 more natural flood regime in support of wetland and riparian vegetation types that support Modesto
6 song sparrow habitat.

7 **CEQA Conclusion:** Periodic effects of inundation would have a less-than-significant impact on
8 Modesto song sparrow because increased frequency and duration of inundation would be expected
9 to restore a more natural flood regime in support of wetland and riparian vegetation types that
10 support Modesto song sparrow habitat.

11 **Bank Swallow**

12 Bank swallows nest in colonies along rivers, streams, or other water and require fine textured sandy
13 soils in vertical banks to create their burrows. There is little suitable habitat for bank swallow in the
14 study area because most of the erodible banks have been stabilized with of levee revetment. The
15 placement of rock revetment prevents the lateral migration of rivers, removing the natural river
16 process that creates vertical banks through erosion (Bank Swallow Technical Advisory Committee
17 2013, Stillwater Sciences 2007). An estimated 70–90% of the bank swallow population in California
18 nests along the Sacramento and Feather Rivers upstream of the study area (Bank Swallow Technical
19 Advisory Committee 2013). However, there are three CNDDDB records of bank swallow colonies in
20 the study area: two in CZ 2 north of Fremont Weir, and one in CZ 5 on Brannan Island, just west of
21 Twitchell Island.

22 The closest natural community to represent modeled habitat for bank swallow is valley foothill
23 riparian. Although there are impacts to the valley foothill riparian natural community along the
24 northeast corner of Clifton Court Forebay, at the intermediate forebay, and on Boulidin Island, it is
25 highly unlikely that the habitat in these locations is suitable for bank swallow (alluvial soils that
26 form steep, eroded banks that have not been stabilized with levee revetment). Reusable tunnel
27 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that the
28 substrate would provide suitable nesting habitat for the species. However, if reusable tunnel
29 material areas were to become suitable for swallows over time, Mitigation Measure BIO-146 *Active
30 Bank Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized,*
31 would avoid impacts on nesting bank swallows by requiring surveys to be conducted prior to the
32 removal of reusable tunnel material. Construction and restoration associated with Alternative 9
33 conservation measures would not result in any direct loss of modeled habitat for bank swallow
34 (Table 12-9-53). However, indirect effects of noise and visual disturbance from *CM2 Yolo Bypass
35 Fisheries Enhancement* and *CM4 Tidal Natural Communities Restoration* could impact bank swallow
36 colonies if they are present near work areas. In addition, there is uncertainty with respect to how
37 water flows upstream of the study area would affect bank swallow habitat. As explained below,
38 impacts on bank swallow under Alternative 9 would not be adverse for NEPA purposes and would
39 be less than significant for CEQA purposes with the implementation of mitigation measures to
40 monitor colonies and address the uncertainty of upstream operations on the species.

1 **Table 12-9-53. Changes in Bank Swallow Modeled Habitat Associated with Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Breeding	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0	NA	NA
CM2–CM18	Breeding	0	0	0	0	0	0
Total Impacts CM2–CM18		0	0	0	0	0	0
TOTAL IMPACTS		0	0	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-146: Indirect Effects of Implementation of Conservation Components on Bank**
4 **Swallow**

5 Noise and visual disturbances during restoration activities from *CM2 Yolo Bypass Fisheries*
6 *Enhancement*, and *CM4 Tidal Natural Communities Restoration* including operation of earthmoving
7 equipment and human activities at work sites, could result in temporary disturbances that cause
8 bank swallow to abandon active nest burrows adjacent to construction areas. Bank swallow colonies
9 with occupied burrows have been recorded in CZ 2 and CZ 5 and construction-related disturbances
10 could result in an adverse effect on individuals. Various activities related to *CM11 Natural*
11 *Communities Enhancement and Management* could also have indirect impacts on bank swallow.

12 **NEPA Effects:** Construction activities associated with habitat restoration could adversely affect bank
13 swallow colonies in the absence of other measures. Noise and visual disturbances could result in
14 adverse effects on bank swallows if active colonies were present within 500 feet of work areas.
15 Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and Indirect Effects on*
16 *Bank Swallow Will Be Minimized*, would be available to address this effect.

17 **CEQA Conclusion:** Construction activities associated with habitat restoration could result in a
18 significant impact on bank swallow colonies in the absence of other measures. Noise and visual
19 disturbances could result in significant impacts on bank swallows if active colonies were present
20 within 500 feet of work areas. Implementation of Mitigation Measure BIO-146, *Active Bank Swallow*
21 *Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would reduce this
22 impact to a less-than-significant level.

1 **Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect**
2 **Effects on Bank Swallow Will Be Minimized**

3 To the extent practicable, BDCP proponents will not construct conservation components during
4 the bank swallow nesting season (April 1 through August 31). If restoration activities cannot be
5 avoided during nesting season, a qualified biologist will conduct preconstruction surveys to
6 determine if active bank swallow nesting colonies are present within 500 feet of work areas. If
7 no active nesting colonies are present, no further mitigation is required. Reusable tunnel
8 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that
9 the substrate would provide suitable nesting habitat for the species. However, reusable tunnel
10 material sites could become suitable for swallows over time. Surveys of reusable tunnel material
11 areas that have been present for at least 1 year, allowing the substrate to stabilize, will be
12 conducted prior to the removal of reusable tunnel material.

13 If active colonies are detected, DWRs will establish a nondisturbance buffer (determined by
14 DWR in consultation with CDFW and the Bank Swallow Technical Advisory Committee) around
15 the colony during the breeding season. In addition, a qualified biologist will monitor any active
16 colony within 500 feet of construction to ensure that construction activities do not affect nest
17 success.

18 **Impact BIO-147: Effects of Upstream Reservoir and Water Conveyance Facilities Operations**
19 **on Bank Swallow**

20 Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes
21 with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the
22 species is loss of nesting habitat from the placement of rock revetment for levee stabilization.
23 Because of this limited available habitat, and the reduction of natural river process, the species is
24 highly sensitive to 1) reductions in winter flows which are necessary to erode banks for habitat
25 creation, and 2) high flows during the breeding season. The potential impacts of changes in
26 upstream flows during the breeding season on bank swallows are the flooding of active burrows and
27 destruction of burrows from increased bank sloughing. Bank swallows arrive in California and begin
28 to excavate their burrows in March, and the peak egg-laying occurs during April and May (Bank
29 Swallow Technical Advisory Committee 2013). Therefore, increases in flows after March when the
30 swallows have nested and laid eggs in the burrows could result in the loss of nests. On the
31 Sacramento River, breeding season flows between 14,000 and 30,000 cfs have been associated with
32 localized bank collapses, which resulted in partial or complete colony failure (Stillwater Sciences
33 2007).

34 The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations
35 on the Sacramento River (Sacramento River at Keswick, Sacramento River upstream of Red Bluff,
36 Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-
37 flow channel at Thermalito Dam, and Feather River at the confluence with the Sacramento River).
38 Flows were estimated for wet years, above normal years, below normal years, dry years, and critical
39 years. An average also was estimated (see Chapter 5, Section 5.3.1, *Methods for Analysis*, for a
40 description of the model).

41 On the Sacramento River at the Keswick and Red Bluff gauges, mean monthly flows under
42 Alternative 9 could increase between April and August in average water years based on modeling
43 assumptions (Table 1 in Section 11C.9.1.1 and Table 3 Section 11C.9.1.2 of Appendix 11C, *CALSIM II*
44 *Model Results Utilized in the Fish Analysis*) which could lead to inundation of active colonies.

1 However, model outputs indicate that the flows under Existing Conditions and the predicted flows in
2 the late long-term without the project (NAA) show increases in flows during the breeding season
3 (April through August) in these water year types. Similar trends are shown for the Feather River
4 (Table 15 in Section 11C.9.1.8 and Table 17 in Section 11C.9.1.9 of Appendix 11C, *CALSIM II Model*
5 *Results Utilized in the Fish Analysis*). In addition, at the Keswick flow gauge on the Sacramento River
6 in above normal water years (Table 1 in Section 11C.9.1.1 of Appendix 11C, *CALSIM II Model Results*
7 *Utilized in the Fish Analysis*) flows are predicted to be greater than 14,000 cfs during the breeding
8 season, which could lead to bank collapse. However, flows of this height are recorded under Existing
9 Conditions at this flow gauge and are also predicted for the late long-term without the project
10 (NAA).

11 **NEPA Effects:** High spring flows on the Sacramento and Feather Rivers may already be impacting
12 bank swallow colonies during the breeding season, and predicted flows under Alternative 9 would
13 not differ substantially from those under the No Action Alternative. However, because of the
14 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding
15 the potential for and magnitude of effects on bank swallow from changes in upstream operations.
16 Soil type, high winter flows, and low spring flows all contribute to successful nesting of bank
17 swallow, and even moderate changes in seasonal flows could have an adverse effect on breeding
18 success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate*
19 *Winter and Spring Flows Upstream of the Study Area*, would be available to address the uncertainty of
20 potential adverse effects of upstream operations on bank swallow.

21 **CEQA Conclusion:** High spring flows on the Sacramento and Feather Rivers may already be
22 impacting bank swallow colonies the breeding season, and predicted flows under Alternative 9
23 would not differ substantially from those under Existing Conditions. However, because of the
24 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding
25 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.
26 There are many variables that dictate suitable habitat for the species that cannot be clearly
27 quantified, and seasonal changes in flow could increase or decrease suitable habitat for bank
28 swallow depending on soil type and location of current colonies. Implementation of Mitigation
29 Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of*
30 *the Study Area*, would address this potential significant impact and further determine if additional
31 mitigation is required for bank swallow.

32 **Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and**
33 **Spring Flows Upstream of the Study Area**

34 To address the uncertainty of the impact of upstream spring flows on existing bank swallow
35 habitat, DWR will continue to support annual monitoring¹ of existing colonies upstream of the
36 study area. DWR will collect data to be used for quantifying the magnitude of flows that would
37 result in loss of active nest sites or degradation of available nesting habitat, and the extent to
38 which changes in SWP operations attributable solely to the California WaterFix are the cause of
39 such impacts. If DWR determines that changes in SWP operations attributable solely to the

¹ Bank swallow colonies have historically been and are currently monitored by DWR, USFWS, and CDFW in association with the Bank Swallow Technical Advisory Committee, which is a diverse coalition of state and federal agency and nongovernmental organization personnel, created in response to the continued decline of bank swallow populations on the Sacramento River.

1 California WaterFix have caused loss of active nest sites or degradation of available nesting
2 habitat, replacement habitat will be established at a minimum of 2:1 for the length of bank
3 habitat affected. Replacement habitat will consist of removing bank revetment to create habitat
4 for bank swallow at a location subject to CDFW approval (Bank Swallow Technical Advisory
5 Committee 2013).

6 **Yellow-Headed Blackbird**

7 The habitat model used to assess impacts on yellow-headed blackbird consists of nesting habitat
8 and foraging habitat. Modeled nesting habitat includes tidal freshwater emergent wetland, other
9 natural seasonal wetland, nontidal freshwater perennial emergent wetland, and managed wetland.
10 Modeled foraging habitat for yellow-headed blackbird consists of cultivated lands and noncultivated
11 land cover types known to support abundant insect populations, including corn, pasture, and
12 feedlots.

13 Construction and restoration associated with Alternative 9 conservation measures would result in
14 both temporary and permanent losses of yellow-headed blackbird modeled habitat as indicated in
15 Table 12-9-54. Full implementation of Alternative 9 would include the following biological
16 objectives over the term of the BDCP that would benefit yellow-headed blackbird (BDCP Chapter 3,
17 Section 3.3, *Biological Goals and Objectives*).

- 18 ● Restore or create at least 24,000 acres of tidal freshwater emergent wetland in CZs 1, 2, 4, 5, 6,
19 and/or 7 (Objective TFEWNC1.1, associated with CM4).
- 20 ● Create at least 1,200 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
21 and nontidal freshwater emergent wetland natural communities (Objective NFEW/NPANC1.1,
22 associated with CM10).
- 23 ● Protect and enhance at least 8,100 acres of managed wetland, at least 1,500 acres of which are
24 in the Grizzly Island Marsh Complex (Objective MWNC1.1, associated with CM3).
- 25 ● Protect at least 8,000 acres of grassland, with at least 2,000 acres protected in CZ 1, at least
26 1,000 acres protected in CZ 8, at least 2,000 acres protected in CZ 11, and the remainder
27 distributed among CZs 1, 2, 4, 5, 7, 8, and 11 (Objective GNC1.1, associated with CM3).
- 28 ● Restore at least 2,000 acres of grasslands (Objective GNC1.2, associated with CM8).
- 29 ● Protect at least 150 acres of alkali seasonal wetland and at least 600 acres of existing vernal pool
30 complex in CZs 1, 8, and/or 11 (Objective ASWNC1.1, Objective VPNC1.1, associated with CM3).
- 31 ● Maintain and protect the small patches of important wildlife habitats that occur in cultivated
32 lands within the reserve system, including isolated valley oak trees, trees and shrubs along field
33 borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
34 grasslands, ponds, and wetlands (Objective CLNC1.3, associated with CM3).
- 35 ● Protect at least 11,050 acres of high- to very high-value breeding-foraging habitat (Table 12-9-
36 38) in CZs 1, 2, 3, 4, 7, 8, or 11 (Objective TRBL1.3, associated with CM3).
- 37 ● Increase prey abundance and accessibility for grassland-foraging species (Objective GNC2.4,
38 associated with CM11).

39 As explained below, with the restoration or protection of these amounts of habitat, in addition to
40 management activities to enhance habitats for the species, and implementation of AMM1–AMM7,

1 *AMM27 Selenium Management*, and Mitigation Measure BIO-75, impacts on yellow-headed blackbird
2 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

3 **Table 12-9-54. Changes in Yellow-Headed Blackbird Modeled Habitat Associated with**
4 **Alternative 9**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Nesting	72	72	169	169	NA	NA
	Foraging	327	327	1,288	1,288	NA	NA
Total Impacts CM1		399	399	1,457	1,457	NA	NA
CM2-CM18	Nesting	5,814	13,902	45	46	961-2,678	18
	Foraging	5,612	26,673	376	905	368-1,476	2,701
Total Impacts CM2-CM18		11,426	40,575	421	951	1,495-4,394	2,719
Total Nesting		5,886	13,974	214	215	961-2,678	18
Total Foraging		5,939	27,000	1,664	2,193	368-1,476	2,701
TOTAL IMPACTS		11,825	40,974	4,878	2,408	1,495-4,394	2,719

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

5

6 **Impact BIO-148: Loss of Habitat for and Direct Mortality of Yellow-Headed Blackbird**

7 Alternative 9 conservation measures would result in the combined permanent and temporary loss
8 of up to 43,382 acres of suitable habitat for yellow-headed blackbird (14,189 acres of nesting habitat
9 and 29,193 acres foraging habitat; Table 12-9-54). Conservation measures that would result in these
10 losses are conveyance facilities and transmission line construction, and establishment and use of
11 borrow and spoil areas (CM1), Yolo Bypass improvements (CM2), tidal habitat restoration (CM4),
12 floodplain restoration (CM5), riparian restoration (CM7), grassland restoration (CM8), marsh
13 restoration (CM10), and construction of conservation hatcheries (CM18). Habitat enhancement and
14 management activities (CM11) which include ground disturbance or removal of nonnative
15 vegetation could result in local adverse habitat effects. In addition, maintenance activities associated
16 with the long-term operation of the water conveyance facilities and other BDCP physical facilities
17 could degrade or eliminate yellow-headed blackbird suitable habitat. Each of these individual
18 activities is described below. A summary statement of the combined impacts and NEPA effects, and a
19 CEQA conclusion follow the individual conservation measure discussions.

- 1 ● *CM1 Water Facilities and Operation:* Construction of Alternative 9 water conveyance facilities
2 would result in the combined permanent and temporary loss of up to 241 acres of yellow-
3 headed blackbird nesting habitat (72 acres of permanent loss and 169 acres of temporary loss).
4 In addition, 1,615 acres of foraging habitat would be removed (327 acres of permanent loss,
5 1,288 acres of temporary loss, Table 12-9-54). Impacts from CM1 would occur in the central
6 delta in CZ 4, 5, 6, 7, and 8. Most of the loss of nesting habitat would occur at the channel
7 dredging sites within the Middle River and Victoria Canal. Middle River dredging would occur
8 from Victoria Canal north to Mildred Island, while Victoria Canal dredging would extend from
9 Middle River westward to Old River. Smaller areas would be permanently lost at operable
10 barrier sites adjacent to Middle River and San Joaquin River. impacts on foraging habitat would
11 occur from the construction of the canals in CZ 8 east and south of Clifton Court Forebay and
12 other conveyance structures in CZ 4, 5, 6, 7, and 8. Temporary impacts would primarily occur
13 from borrow and spoil areas and temporary work areas. There are no occurrences of yellow-
14 headed blackbird that overlap with the construction footprint for CM1. Mitigation Measure BIO-
15 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
16 be available to address potential effects on yellow-headed blackbirds if they were to nest in or
17 adjacent to construction areas. Refer to the Terrestrial Biology Map Book for a detailed view of
18 Alternative 9 construction locations. Impacts from CM1 would occur within the first 10 years of
19 Alternative 9 implementation.
- 20 ● *CM2 Yolo Bypass Fisheries Enhancement:* Construction of the Yolo bypass fisheries enhancement
21 (CM2) would result in the permanent removal of 29 acres of breeding habitat and 113 acres of
22 nonbreeding habitat for yellow-headed blackbird. In addition, CM2 would result in the
23 temporary loss of 43 acres of breeding habitat for the species. Impacts from CM2 would
24 primarily occur in the near-term timeframe.
- 25 ● *CM4 Tidal Natural Communities Restoration:* Site preparation and inundation from CM4 would
26 permanently remove or convert an estimated 4,801 acres of breeding habitat. In addition, 3,282
27 acres of non-breeding habitat would be lost or converted as a result of tidal restoration.
28 However, the resulting 65,000 acres of tidal natural communities would also provide habitat for
29 the species, 24,000 acres of which would be tidal freshwater natural communities providing
30 breeding habitat for yellow-headed blackbird.
- 31 ● *CM5 Seasonally Inundated Floodplain Restoration/CM7: Riparian Natural Community Restoration:*
32 Construction of setback levees to restore seasonally inundated floodplain and riparian
33 restoration actions (CM5) would permanently and temporarily remove approximately 2,477
34 acres of suitable yellow-headed blackbird habitat consisting of 2 acres of breeding habitat and
35 2,475 acres of nonbreeding habitat.
- 36 ● *CM8 Grassland Natural Community Restoration:* Restoration of grassland is expected to be
37 implemented on agricultural lands and would result in the conversion of 230 acres of yellow-
38 headed blackbird agricultural foraging habitat to grassland foraging habitat in CZs 1, 8, and/or
39 11. If agricultural lands supporting higher value foraging habitat than the restored grassland
40 were removed, there would be a loss of yellow-headed blackbird foraging habitat value. CM8
41 would result in the restoration of 2,000 acres of grassland foraging habitat in the Plan Area.
- 42 ● *CM10 Nontidal Marsh Restoration:* Restoration and creation of nontidal freshwater marsh would
43 result in the permanent conversion of 133 acres of cultivated lands foraging habitat to nontidal
44 marsh in CZ 2 and CZ 4. Yellow-headed blackbird nesting habitat may develop along the margins
45 of restored nontidal marsh and restoration would also provide foraging habitat for the species.

- 1 • *CM11 Natural Communities Enhancement and Management*: Habitat management- and
2 enhancement-related activities could disturb yellow-headed blackbird nests if they were
3 present near work sites. A variety of habitat management actions included in CM11 that are
4 designed to enhance wildlife values in BDCP-protected habitats may result in localized ground
5 disturbances that could temporarily remove small amounts of yellow-headed blackbird habitat
6 and reduce the functions of habitat until restoration is complete. Ground-disturbing activities,
7 such as removal of nonnative vegetation and road and other infrastructure maintenance, would
8 be expected to have minor effects on available yellow-headed blackbird habitat. These effects
9 cannot be quantified, but are expected to be minimal and would be avoided and minimized by
10 the AMMs listed below.
- 11 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
12 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
13 disturbances that could affect yellow-headed blackbird use of the surrounding habitat.
14 Maintenance activities would include vegetation management, levee and structure repair, and
15 re-grading of roads and permanent work areas. These effects, however, would be reduced by
16 AMMs and conservation actions as described below.
- 17 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
18 direct mortality of adult or fledged yellow-headed blackbird if they were present in the Plan
19 Area, because they would be expected to avoid contact with construction and other equipment.
- 20 • If yellow-headed blackbird were to nest in the construction area, construction-related activities,
21 including equipment operation, noise and visual disturbances could destroy nests or lead to
22 their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75,
23 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
24 available to address these adverse effects on yellow-headed blackbird.

25 The following paragraphs summarize the combined effects discussed above and describe other
26 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
27 also included.

28 ***Near-Term Timeframe***

29 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
30 the near-term BDCP conservation strategy has been evaluated to determine whether it would
31 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
32 effects of construction would not be adverse under NEPA. Alternative 9 would remove 6,100 acres
33 (5,886 acres of permanent loss, 214 acres of temporary loss) of yellow-headed blackbird nesting
34 habitat in the study area in the near-term. These effects would result from the construction of the
35 water conveyance facilities (CM1, 241 acres), and implementing other conservation measures (CM2
36 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal Natural Communities Restoration*, and CM5 *Seasonally*
37 *Inundated Floodplain Restoration*—5,859 acres). In addition, 7,603 acres (5,939 acres of permanent
38 loss, 1,664 acres of temporary loss) of yellow-headed blackbird foraging habitat would be removed
39 or converted in the near-term (CM1, 1,615 acres; CM2 *Yolo Bypass Fisheries Enhancement*, CM4 *Tidal*
40 *Natural Communities Restoration*, CM5 *Seasonally Inundated Floodplain Restoration*, CM7 *Riparian*
41 *Natural Community Restoration*, CM8 *Grassland Natural Community Restoration*, CM10 *Nontidal*
42 *Marsh Restoration*, and CM18 *Conservation Hatcheries*—5,988 acres).

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
2 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection
3 of foraging habitat. Using these ratios would indicate that 241 acres of nesting habitat should be
4 restored/created and 241 acres should be protected to compensate for the CM1 losses of yellow-
5 headed blackbird nesting habitat. In addition, 1,615 acres of foraging habitat should be protected to
6 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of
7 other conservation actions would require 5,859 acres each of restoration and protection of breeding
8 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA
9 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

10 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
11 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of
12 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,
13 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland
14 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3,
15 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM8, and
16 CM10 and would occur in the same timeframe as the construction and early restoration losses.

17 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
18 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
19 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
20 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and
21 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas
22 of bare ground or marsh where the predominant vegetation consists of invasive species such as
23 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant
24 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be
25 created, some of which would provide nesting habitat for the species.

26 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
27 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
28 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
29 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
30 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
31 abundance would also be increased on protected lands, enhancing the foraging value of these
32 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
33 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
34 hedgerows along field borders and roadsides within protected cultivated lands (Objective
35 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
36 wetlands would also be protected and maintained as part of the cultivated lands reserve system
37 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

38 At least 15,600 acres of cultivated lands that provide habitat for covered and other native wildlife
39 species would be protected in the near-term time period (Objective CLNC1.1), much of which would
40 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection
41 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the
42 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed
43 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

44 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
45 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*

1 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
2 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan. All of*
3 *these AMMs include elements that would avoid or minimize the risk of affecting individuals and*
4 *species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since*
5 *been updated and which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs,*
6 *to the Final EIR/EIS.*

7 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
8 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
9 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
10 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
11 address this adverse effect.

12 **Late Long-Term Timeframe**

13 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres
14 of modeled foraging habitat for yellow-headed blackbird. Alternative 9 as a whole would result in
15 the permanent loss of and temporary effects on 14,189 acres of potential nesting habitat (17% of the
16 potential nesting habitat in the study area) and the loss or conversion of 29,193 acres of foraging
17 habitat (9% of the foraging habitat in the study area). The locations of these losses are described
18 above in the analyses of individual conservation measures.

19 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
20 *Restoration, CM4 Tidal Natural Communities Restoration, CM8 Grassland Natural Community*
21 *Restoration, and CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of
22 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,
23 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres
24 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of
25 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable
26 habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*).

27 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
28 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
29 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
30 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit
31 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground
32 or marsh where the predominant vegetation consists of invasive species such as perennial
33 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
34 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of
35 which would provide nesting habitat for the species.

36 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
37 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
38 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
39 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
40 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
41 abundance would also be increased on protected lands, enhancing the foraging value of these
42 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
43 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
44 hedgerows along field borders and roadsides within protected cultivated lands (Objective

1 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
2 wetlands would also be protected and maintained as part of the cultivated lands reserve system
3 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the
4 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time
5 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types
6 for tricolored blackbird (BDCP Chapter 3, Table 3.3-6). These crop types include pasture, sunflower,
7 alfalfa, and other crop types that would provide high-value foraging habitat for yellow-headed
8 blackbird.

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
13 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
14 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
15 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
16 to the Final EIR/EIS.

17 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
18 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
19 required to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct*
20 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
21 address this adverse effect.

22 **NEPA Effects:** The loss of yellow-headed blackbird habitat and potential direct mortality of this
23 special-status species associated with Alternative 9 would represent an adverse effect in the
24 absence of other conservation actions. With habitat protection and restoration associated with CM3,
25 CM4, CM8, CM10, and CM11, guided by biological goals and objectives and by AMM1–AMM7, which
26 would be in place throughout the construction phase, the effects of habitat loss would not be
27 adverse under Alternative 9. The yellow-headed blackbird is not a covered species under the BDCP.
28 For the BDCP to avoid an adverse effect on individuals, preconstruction surveys for noncovered
29 avian species would be required to ensure that nests are detected and avoided. Mitigation Measure
30 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
31 be available to address this effect.

32 **CEQA Conclusion:**

33 **Near-Term Timeframe**

34 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
35 the near-term BDCP conservation strategy has been evaluated to determine whether it would
36 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
37 effects of construction would be less than significant under CEQA. Alternative 9 would remove 6,100
38 acres (5,886 acres of permanent loss, 214 acres of temporary loss) of yellow-headed blackbird
39 nesting habitat in the study area in the near-term. These effects would result from the construction
40 of the water conveyance facilities (CM1, 241 acres), and implementing other conservation measures
41 (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal Natural Communities Restoration*, and *CM5*
42 *Floodplain Restoration*—5,859 acres). In addition, 7,603 acres (5,939 acres of permanent loss, 1,664
43 acres of temporary loss) of yellow-headed blackbird foraging habitat would be removed or
44 converted in the near-term (CM1, 1,615 acres; *CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal*

1 *Natural Communities Restoration, CM5 Seasonally Inundated Floodplain Restoration, CM7 Riparian*
2 *Natural Community Restoration, CM8 Grassland Natural Community Restoration, CM10 Nontidal*
3 *Marsh Restoration, and CM18 Conservation Hatcheries—,988,985 acres).*

4 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
5 CM1 would be 1:1 for restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection
6 of foraging habitat. Using these ratios would indicate that 241 acres of nesting habitat should be
7 restored/created and 241 acres should be protected to compensate for the CM1 losses of yellow-
8 headed blackbird nesting habitat. In addition, 1,615 acres of foraging habitat should be protected to
9 compensate for the CM1 losses of yellow-headed blackbird foraging habitat. The near-term effects of
10 other conservation actions would require 5,859 acres each of restoration and protection of breeding
11 habitat and 5,988 acres of protection of foraging habitat using the same typical NEPA and CEQA
12 ratios (1:1 for restoration and 1:1 for protection of nesting and 1: protection of foraging habitat).

13 The BDCP has committed to near-term goals of restoring 8,850 acres of tidal freshwater emergent
14 wetland, protecting 4,800 acres of managed wetland, protecting 25 acres and restoring 900 acres of
15 nontidal marsh, protecting 2,000 acres and restoring 1,140 acres of grassland natural community,
16 protecting 400 acres of vernal pool complex, protecting 120 acres of alkali seasonal wetland
17 complex, and protecting 15,600 acres of cultivated lands in the Plan Area (Table 3-4 in Chapter 3,
18 *Description of Alternatives*). These conservation actions are associated with CM3, CM4, CM8, and
19 CM10 and would occur in the same timeframe as the construction and early restoration losses.

20 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
21 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
22 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
23 TFEWNC2.2). The 4,800 acres of managed wetland would be protected and enhanced in CZ 11 and
24 would benefit yellow-headed blackbird through the enhancement of degraded areas (such as areas
25 of bare ground or marsh where the predominant vegetation consists of invasive species such as
26 perennial pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant
27 associations (Objective MWNC1.1). In addition, at least 900 acres of nontidal marsh would be
28 created, some of which would provide nesting habitat for the species.

29 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
30 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
31 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
32 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would
33 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
34 abundance would also be increased on protected lands, enhancing the foraging value of these
35 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
36 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
37 hedgerows along field borders and roadsides within protected cultivated lands (Objective
38 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
39 wetlands would also be protected and maintained as part of the cultivated lands reserve system
40 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3).

41 At least 15,400 acres of cultivated lands that provide habitat for covered and other native wildlife
42 species would be protected in the near-term time period (Objective CLNC1.1), much of which would
43 provide foraging habitat for yellow-headed blackbird. The acres of restoration and protection
44 contained in the near-term Plan goals and the additional detail in the biological objectives satisfy the

1 typical mitigation that would be applied to the project-level effects of CM1 on yellow-headed
2 blackbird habitat, as well as mitigate the near-term effects of the other conservation measures.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
7 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
8 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
9 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
10 to the Final EIR/EIS.

11 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
12 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
13 required to ensure that nests are detected and avoided. The implementation of Mitigation Measure
14 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
15 reduce potential impacts on nesting yellow-headed blackbird to a less-than-significant level.

16 **Late Long-Term Timeframe**

17 The study area supports approximately 82,005 acres of modeled nesting habitat and 333,956 acres
18 of modeled foraging habitat for yellow-headed blackbird. Alternative 9 as a whole would result in
19 the permanent loss of and temporary effects on 14,189 acres of potential nesting habitat (17% of the
20 potential nesting habitat in the study area) and the loss or conversion of 29,193 acres of foraging
21 habitat (9% of the foraging habitat in the study area). The locations of these losses are described
22 above in the analyses of individual conservation measures.

23 The Plan includes conservation commitments through *CM3 Natural Communities Protection and*
24 *Restoration*, *CM4 Tidal Natural Communities Restoration*, *CM8 Grassland Natural Community*
25 *Restoration*, and *CM10 Nontidal Marsh Restoration* to protect and enhance at least 8,100 acres of
26 managed wetland, restore or create at least 24,000 acres of tidal freshwater emergent wetland,
27 create or restore at least 1,200 acres of nontidal marsh, protect 8,000 acres and restore 2,000 acres
28 of grassland natural community, protect 600 acres of vernal pool complex, protect 150 acres of
29 alkali seasonal wetland complex, and protect 48,625 acres of cultivated lands that provide suitable
30 habitat for native wildlife species (Table 3-4 in Chapter 3, *Description of Alternatives*).

31 The tidal freshwater emergent wetland would be restored in CZs 1, 2, 4, 5, 6, and/or 7 (Objective
32 TFEWNC1.1 in BDCP Chapter 3, *Conservation Strategy*) and would be restored in a way that creates
33 topographic heterogeneity and in areas that increase connectivity among protected lands (Objective
34 TFEWNC2.2). The managed wetland would be protected and enhanced in CZ 11 and would benefit
35 yellow-headed blackbird through the enhancement of degraded areas (such as areas of bare ground
36 or marsh where the predominant vegetation consists of invasive species such as perennial
37 pepperweed) to vegetation such as pickleweed-alkali heath-American bulrush plant associations
38 (Objective MWNC1.1). In addition, at least 1,200 acres of nontidal marsh would be created, some of
39 which would provide nesting habitat for the species.

40 Grassland restoration and protection would occur in CZs 1, 2, 4, 5, 7, 8, and 11 (Objectives GNC1.1
41 and GNC1.2) Grassland protection in CZ 1, 8, and 11 would be associated with vernal pool and alkali
42 seasonal wetland complexes (Objectives ASWNC1.1 and VPNC1.1) and would result in a contiguous
43 matrix of grassland, alkali seasonal wetland, and vernal pool natural communities which would

1 provide grassland foraging habitat for yellow-headed blackbird. Insect prey availability and
2 abundance would also be increased on protected lands, enhancing the foraging value of these
3 natural communities (Objectives ASWNC2.4, VPNC2.5, and GNC2.4). Foraging opportunities would
4 also be improved by enhancing prey populations through the establishment of 20- to 30-foot-wide
5 hedgerows along field borders and roadsides within protected cultivated lands (Objective
6 SWHA2.2). Within the cultivated lands, important wildlife habitat such as grasslands, ponds, and
7 wetlands would also be protected and maintained as part of the cultivated lands reserve system
8 which would provide additional habitat for yellow-headed blackbird (Objective CLNC1.3). Of the
9 48,625 acres of cultivated lands that would be protected and enhanced by the late long-term time
10 period (Objective CLNC1.1), 26,300 acres would be managed in moderate to high-value crop types
11 for tricolored blackbird (BDCP Chapter 3, Table 3.3-6). These crop types include pasture, sunflower,
12 alfalfa, and other crop types that would provide high-value foraging habitat for yellow-headed
13 blackbird.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
18 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
19 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
20 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
21 to the Final EIR/EIS.

22 The yellow-headed blackbird is not a covered species under the BDCP. For the BDCP to avoid an
23 adverse effect on individuals, preconstruction surveys for noncovered avian species would be
24 required to ensure that nests are detected and avoided. Implementation of Mitigation Measure BIO-
25 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
26 reduce this impact to a less-than-significant level.

27 In the absence of other conservation actions, the effects on yellow-headed blackbird habitat would
28 represent an adverse effect as a result of habitat modification and potential direct mortality of a
29 special-status species. This impact would be significant. Considering Alternative 9's protection and
30 restoration provisions, which would provide acreages of new or enhanced habitat in amounts
31 necessary to compensate for habitat lost to construction and restoration activities, and with the
32 implementation of AMM1-AMM7 and Mitigation Measure BIO-75, the loss of habitat or direct
33 mortality through implementation of Alternative 9 would not result in a substantial adverse effect
34 through habitat modifications and would not substantially reduce the number or restrict the range
35 of either species. Therefore, the loss of habitat or potential mortality under this alternative would
36 have a less-than-significant impact on yellow-headed blackbird.

37 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
38 **Disturbance of Nesting Birds**

39 See Mitigation Measure BIO-75 under Impact BIO-75.

40 **Impact BIO-149: Effects on Yellow-Headed Blackbird Associated with Electrical Transmission**
41 **Facilities**

42 Yellow-headed blackbirds are colonial and have the potential to collide with the proposed
43 transmission lines when migrating in large flocks. However, similar to tricolored blackbird behavior,

1 daily flights associated with foraging likely occur in smaller flocks at heights that are lower than the
 2 transmission lines (BDCP Appendix 5.J, Attachment 5.J-2, *Memorandum: Analysis of Potential Bird*
 3 *Collisions at Proposed BDCP Transmission Lines*). Marking transmission lines with flight diverters
 4 that make the lines more visible to birds has been shown to reduce the incidence of bird mortality
 5 (Brown and Drewien 1995). For example, Yee (2008) estimated that marking devices in the Central
 6 Valley could reduce avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new
 7 project transmission lines would be fitted with flight diverters, which would reduce the potential for
 8 yellow-headed blackbird collision with transmission lines. Transmission line poles and towers also
 9 provide perching substrate for raptors, which are predators on yellow-headed blackbird. Although
 10 there is potential for transmission lines to result in increased perching opportunities for raptors and
 11 result in increased predation pressure on yellow-headed blackbirds, the existing network of
 12 transmission lines in the study area currently poses this risk for yellow-headed blackbirds, and any
 13 incremental risk associated with the new transmission line corridors would not be expected to
 14 affect the study area population. Therefore, it is assumed that the increased risk in predation on
 15 yellow-headed blackbird from an increase in raptor perching opportunities would be minimal.

16 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
 17 could result in injury or mortality of yellow-headed blackbird. *AMM20 Greater Sandhill Crane*
 18 contains the commitment to place bird strike diverters on all new powerlines, which would reduce
 19 the potential impact of the construction of new transmission lines on yellow-headed blackbird. The
 20 increased risk in predation on yellow-headed blackbird from an increase in raptor perching
 21 opportunities would be minimal. Therefore, the construction and operation of new transmission
 22 lines under Alternative 9 would not result in an adverse effect on yellow-headed blackbird.

23 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
 24 could result in injury or mortality of yellow-headed blackbird. *AMM20 Greater Sandhill Crane*
 25 contains the commitment to place bird strike diverters on all new powerlines, which would reduce
 26 the potential impact of the construction of new transmission lines on yellow-headed blackbird. The
 27 increased risk of predation on yellow-headed blackbird from an increase in raptor perching
 28 opportunities would be minimal. The construction and operation of new transmission lines under
 29 Alternative 9 would not substantially reduce the number or restrict the range of the species and
 30 would therefore result in a less-than-significant impact on yellow-headed blackbird.

31 **Impact BIO-150: Indirect Effects of Plan Implementation on Yellow-Headed Blackbird**

32 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
 33 with construction-related activities could result in temporary disturbances that affect yellow-
 34 headed blackbird use of suitable habitat. Construction noise above background noise levels (greater
 35 than 50 dBA) could extend 1,900 to 5,250 feet from the edge of construction activities (BDCP
 36 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*
 37 *Sandhill Crane*, Table 4), although there are no available data to determine the extent to which these
 38 noise levels could affect yellow-headed blackbird. Indirect effects associated with construction
 39 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
 40 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and
 41 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse
 42 effect on these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
 43 *Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests.
 44 The use of mechanical equipment during water conveyance construction could cause the accidental
 45 release of petroleum or other contaminants that could affect the species in the surrounding habitat.

1 The inadvertent discharge of sediment or excessive dust adjacent to yellow-headed blackbird
2 habitat could also have a negative effect on the species. Where nests are located above open water,
3 impacts of contamination, dust, and sediment in water could impact fledglings directly, or affect
4 aquatic insect prey, which is important for feeding young. AMM1–AMM7 would minimize the
5 likelihood of spills from occurring and ensure that measures are in place to prevent runoff from the
6 construction area and the negative effects of dust on wildlife adjacent to work areas.

7 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
8 mercury in avian species, including yellow-headed blackbird. Marsh (tidal and nontidal) and
9 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
10 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
11 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
12 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
13 mercury (see Chapter 3, *Conservation Strategy*, of the BDCP for details of restoration). Species
14 sensitivity to methylmercury differs widely and there is a large amount of uncertainty with respect
15 to species-specific effects. A detailed review of the methylmercury issues associated with
16 implementation of the BDCP is contained in Appendix 11F, *Substantive BDCP Revisions*. The review
17 includes an overview of the BDCP-related mechanisms that could result in increased mercury in the
18 foodweb, and how exposure to individual species may occur based on feeding habits and where
19 their habitat overlaps with the areas where mercury bioavailability could increase. Increased
20 methylmercury associated with natural community and floodplain restoration could indirectly affect
21 yellow-headed blackbird, via uptake in lower trophic levels (as described in Appendix 5.D,
22 *Contaminants*, of the BDCP).

23 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
24 the foodweb, *CM12 Methylmercury Management* (as revised in Appendix 11F, *Substantive BDCP*
25 *Revisions*) is included to provide for site-specific evaluation for each restoration project. On a
26 project-specific basis, where high potential for methylmercury production is identified that
27 restoration design and adaptive management cannot fully address while also meeting restoration
28 objectives, alternate restoration areas would be considered. CM12 would be implemented in
29 coordination with other similar efforts to address mercury in the Delta, and specifically with the
30 DWR Mercury Monitoring and Analysis Section. This conservation measure would include the
31 following actions.

- 32 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
33 mercury methylation and bioavailability
- 34 ● Define design elements that minimize conditions conducive to generation of methylmercury in
35 restored areas.
- 36 ● Define adaptive management strategies that can be implemented to monitor and minimize
37 actual postrestoration creation and mobilization of methylmercury.

38 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
39 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
40 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
41 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
42 2009). The effect of selenium toxicity differs widely between species and also between age and sex
43 classes within a species. In addition, the effect of selenium on a species can be confounded by

1 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
2 2009).

3 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
4 2009, Ohlendorf and Heinz 2009), and selenium concentration in species differs by the trophic level
5 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
6 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
7 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
8 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies
9 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
10 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
11 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
12 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
13 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
14 have a higher risk of selenium toxicity.

15 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
16 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
17 exacerbate bioaccumulation of selenium in avian species, including yellow-headed blackbird. Marsh
18 (tidal and nontidal) and floodplain restoration have the potential to mobilize selenium, and,
19 therefore, increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
20 Alternative 9 restoration activities that create newly inundated areas could increase bioavailability
21 of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Changes in
22 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
23 Existing Conditions and the No Action Alternative, CM1 would not result in substantial, long-term
24 increases in selenium concentrations in water in the Delta under any alternative. However, it is
25 difficult to determine whether the effects of potential increases in selenium bioavailability
26 associated with restoration-related conservation measures (CM4 and CM5) would lead to adverse
27 effects on yellow-headed blackbird.

28 Because of the uncertainty that exists at this programmatic level of review, there could be a
29 substantial effect on yellow-headed blackbird from increases in selenium associated with
30 restoration activities. This effect would be addressed through the implementation of *AMM27*
31 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
32 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
33 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
34 selenium management to reduce selenium concentrations and/or bioaccumulation would be
35 evaluated separately for each restoration effort as part of design and implementation. This
36 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
37 design schedule.

38 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
39 could reduce yellow-headed blackbird use of modeled habitat adjacent to work areas. Moreover,
40 operation and maintenance of the water conveyance facilities, including the transmission facilities,
41 could result in ongoing but periodic postconstruction disturbances that could affect yellow-headed
42 blackbird use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
43 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse
44 effects on nesting individuals in addition to AMM1–AMM7.

1 The implementation of tidal natural communities restoration or floodplain restoration could result
2 in increased exposure of yellow-headed blackbird to methylmercury, in restored tidal areas.
3 However, it is unknown what concentrations of methylmercury are harmful to these species and the
4 potential for increased exposure varies substantially within the study area. Implementation of CM12
5 which contains measures to assess the amount of mercury before project development, followed by
6 appropriate design and adaptation management, would minimize the potential for increased
7 methylmercury exposure, and would result in no adverse effect on yellow-headed blackbird.

8 Tidal habitat restoration could result in increased exposure of yellow-headed blackbird to selenium.
9 This effect would be addressed through the implementation of *AMM27 Selenium Management*, which
10 would provide specific tidal habitat restoration design elements to reduce the potential for
11 bioaccumulation of selenium and its bioavailability in tidal habitats.

12 **CEQA Conclusion:** In the absence of other conservation actions, noise and visual disturbance, the
13 potential for hazardous spills, increased dust and sedimentation, and operations and maintenance of
14 the water conveyance facilities under Alternative 9 would represent an adverse effect. This impact
15 would be significant. The implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*
16 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and AMM1–AMM7, would reduce this
17 impact to a less-than-significant level.

18 The implementation of tidal natural communities restoration or floodplain restoration could result
19 in increased exposure of yellow-headed blackbird to methylmercury in restored tidal areas.
20 However, it is unknown what concentrations of methylmercury are harmful to these species and the
21 potential for increased exposure varies substantially within the study area. Implementation of CM12
22 which contains measures to assess the amount of mercury before project development, followed by
23 appropriate design and adaptation management, would minimize the potential for increased
24 methylmercury exposure, and would result in no adverse effect on yellow-headed blackbird.

25 Tidal habitat restoration could result in increased exposure of yellow-headed blackbird to
26 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
27 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
28 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

29 Indirect effects of plan implementation would represent an adverse effect on yellow-headed
30 blackbird in the absence of other conservation measures. This would be a significant impact. With
31 AMM1-7, AMM27, and CM12 in place, and with the implementation of Mitigation Measure BIO-75,
32 indirect effects of plan implementation would not result in a substantial adverse effect through
33 habitat modifications and would not substantially reduce the number or restrict the range of the
34 species. Therefore, indirect effects of plan implementation would have a less-than-significant impact
35 on yellow-headed blackbird.

36 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
37 **Disturbance of Nesting Birds**

38 See Mitigation Measure BIO-75 under Impact BIO-75.

39 **Impact BIO-151: Periodic Effects of Inundation of Yellow-Headed Blackbird Nesting Habitat**
40 **as a Result of Implementation of Conservation Components**

41 Flooding of the Yolo Bypass (CM2) would inundate 961–2,678 acres of nesting habitat and 368–
42 2,678 acres of foraging habitat (Table 12-9-54). Based on hypothetical floodplain restoration,

1 construction of setback levees for *CM5 Seasonally Inundated Floodplain Restoration* could result in
2 periodic inundation of approximately 18 acres of nesting habitat and 2,701 acres of nonbreeding
3 habitat (Table 12-9-54) resulting in the temporary loss of these habitats. Foraging yellow-headed
4 blackbirds would be expected to move to adjacent suitable foraging habitat when the bypass is
5 inundated, as they do under the current flooding regime. However, this inundation could reduce the
6 availability of nesting habitat during years when flooding extends into the nesting season (past
7 March). The periodic inundation of the Yolo Bypass (CM2) and of other floodplains (CM5) is
8 expected to restore a more natural flood regime in support of wetland and riparian vegetation types
9 that support nesting habitat.

10 **NEPA Effects:** Implementation of CM2 and CM5 would result in periodic inundation of nesting and
11 foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-significant
12 impact on yellow-headed blackbird because inundation is expected to take place outside of the
13 breeding season, and although foraging habitat may be temporarily unavailable, birds would be
14 expected to move to adjacent foraging habitat.

15 **CEQA Conclusion:** Implementation of CM2 and CM5 would result in periodic inundation of nesting
16 and foraging habitat for yellow-headed blackbird. Periodic inundation would have a less-than-
17 significant impact on yellow-headed blackbird because inundation is expected to take place outside
18 of the breeding season, and although foraging habitat would be temporarily unavailable, birds
19 would be expected to move to adjacent foraging habitat.

20 **Riparian Brush Rabbit**

21 The habitat model used to assess effects on the riparian brush rabbit consists of 38 vegetation
22 associations within the valley/foothill riparian natural community and adjacent grasslands. The
23 vegetation associations were selected based on a review of understory and overstory composition
24 from Hickson and Keeler-Wolf (2007) and species habitat requirements.

25 Just until recently, the only known naturally occurring populations of riparian brush rabbits were
26 confined to Caswell Memorial State Park (MSP), a 258-acre park supporting riparian oak woodland
27 on the Stanislaus River immediately southeast of the study area, and in the south Delta southwest of
28 Lathrop, which is within the study area (Williams and Basey 1986; Williams et al. 2002) (Figure 12-
29 46). On October 11, 2012 a single female riparian brush rabbit was captured near Durham Ferry
30 Road in riparian habitat along the San Joaquin River between Caswell MSP and Lathrop (Bradbury
31 pers. comm.). This is only the second naturally occurring population documented outside of Caswell
32 MSP. Factors considered in assessing the value of adversely affected habitat for riparian brush
33 rabbit, to the extent information was available, included size and degree of isolation of habitat
34 patches, proximity to recorded species occurrences, and adjacency to conserved lands.

35 Construction and restoration associated with Alternative 9 conservation measures would result in
36 both temporary and permanent losses of riparian brush rabbit modeled habitat as indicated in Table
37 12-9-55. Full implementation of Alternative 9 would also include biological objectives over the term
38 of the BDCP to benefit the riparian brush rabbit (BDCP Chapter 3, *Conservation Strategy*). The
39 conservation strategy for the riparian brush rabbit, with conservation principles involves
40 protecting, restoring or creating, and maintaining habitat and corridors near the largest remaining
41 fragments of habitat and extant populations; providing high-water refugia from flooding; and
42 managing feral predators (dogs and cats) in areas occupied by the species. The conservation
43 measures that would be implemented to achieve the biological goals and objectives are summarized
44 below.

- 1 ● Provide a range of elevations in restored floodplains that transition from frequently flooded
2 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a
3 range of habitat conditions, upland habitat values, and refugia from flooding during most flood
4 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 5 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
6 between existing conservation lands (Objective L1.6, associated with CM3).
- 7 ● Allow floods to promote fluvial processes, such that bare mineral soils are available for natural
8 recolonization of vegetation, desirable natural community vegetation is regenerated, and
9 structural diversity is promoted, or implement management actions that mimic those natural
10 disturbances (Objective L2.1, associated with CM3, CM5, and CM11).
- 11 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to
12 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
13 associated with CM3–CM8, and CM11).
- 14 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with at least 3,000
15 acres occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated
16 with CM3 and CM7).
- 17 ● Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
18 (Objective VFRNC1.2, associated with CM3).
- 19 ● Maintain 1,000 acres of early- to mid-successional vegetation with a well-developed understory
20 of dense shrubs on restored seasonally inundated floodplain (Objective VFRNC2.2, associated
21 with CM5, CM7, and CM11).
- 22 ● Of the 750 acres of protected valley/foothill riparian natural community protected under
23 Objective VFRNC1.2, protect at least 200 acres of suitable riparian brush rabbit habitat (defined
24 in CM7 Riparian Natural Community Restoration) that is occupied by the species or contiguous
25 with occupied habitat (Objective RBR1.1, associated with 3).
- 26 ● Of the 1,000 acres of early- to midsuccessional riparian habitat maintained under VFRNC2.2,
27 maintain at least 800 acres within the range of the riparian brush rabbit (CZ 7), in areas that are
28 adjacent to or that facilitate connectivity with occupied or potentially occupied habitat
29 (Objective RBR1.2, associated with CM3, CM7, and CM11).
- 30 ● Of the 5,000 acres of valley/foothill riparian natural community restored under Objective
31 VFRNC1.1, restore/create and maintain at least 300 acres of early- to mid-successional riparian
32 habitat that meets the ecological requirements of the riparian brush rabbit and that is within or
33 adjacent to or that facilitates connectivity with existing occupied or potentially occupied habitat
34 (Objective 1.3, associated with CM3, CM7, and CM11).
- 35 ● Create and maintain high-water refugia in the 300 acres of restored riparian brush rabbit
36 habitat and the 200 acres of protected riparian brush rabbit habitat, through the retention,
37 construction and/or restoration of high-ground habitat on mounds, berms, or levees, so that
38 refugia are no further apart than 66 feet (Objective RBR1.4, associated with CM7 and CM11).
- 39 ● In protected riparian areas that are occupied by riparian brush rabbit, monitor for and control
40 nonnative predators that are known to prey on riparian brush rabbit (Objective RBR1.5,
41 associated with CM11).

- Of the 8,000 acres of grasslands protected under Objective GNC1.1 and the 2,000 acres of grasslands restored under Objective GNC1.2, protect or restore grasslands on the landward side of levees adjacent to restored floodplain to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6m, associated with CM3 and CM8).

As explained below, with the restoration and protection of these amounts of habitat, in addition to implementation of the AMMs to reduce potential effects, impacts on riparian brush rabbit would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-9-55. Changes in Riparian Brush Rabbit Modeled Habitat Associated with Alternative 9 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	8	8	6	6	NA	NA
	Grassland	58	58	139	139	NA	NA
Total Impacts CM1		66	66	145	145		
CM2–CM18	Riparian	0	62	0	35	0	264
	Grassland	0	44	0	20	0	423
Total Impacts CM2–CM18		0	106	0	55	0	687
TOTAL IMPACTS		66	172	145	200	0	687

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

Impact BIO-152: Loss or Conversion of Habitat for and Direct Mortality of Riparian Brush Rabbit

- Alternative 9 conservation measures would result in the permanent loss of up to 111 acres of riparian habitat and 261 acres of associated grassland habitat for the riparian brush rabbit in the study area (Table 12-9-55). The hypothetical footprint for levee construction overlaps with one occurrence record for riparian brush rabbit, south of the Interstate 5/Interstate 205 interchange. Conservation measures resulting in permanent habitat loss include conveyance facilities construction (CM1), tidal natural communities restoration (CM4), and floodplain restoration (CM5). Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation measure discussions.

- 1 • *CM1 Water Facilities and Operation*: Development of Alternative 9 water conveyance facilities
2 would result in the permanent removal of approximately 8 acres of riparian habitat and 58 acres
3 of associated grassland habitat and in the temporary removal of 6 acres of riparian habitat and
4 139 acres of grassland habitat for riparian brush rabbit in CZ 8 (Table 12-9-55). The riparian
5 habitat that would be removed is of low value for the riparian brush rabbit as is consists of
6 several small, isolated patches surrounded by agricultural lands northeast of Clifton Court
7 Forebay. The associated grasslands are also of low-quality for the species: They consist of long,
8 linear strips that abut riparian habitat, but extend several miles from the riparian habitat and,
9 therefore, provide few if any opportunities for adjacent cover. Trapping efforts conducted for
10 the riparian brush rabbit in this area were negative (BDCP Appendix 3.E, *Conservation Principles*
11 *for the Riparian Brush Rabbit and Riparian Woodrat*). Refer to the Terrestrial Biology Map Book
12 for a detailed view of Alternative 9 construction locations.
- 13 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
14 inundation would permanently remove approximately 19 acres of riparian habitat and 18 acres
15 of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late long-term. The
16 riparian habitat that would be removed consists of relatively small and isolated patches along
17 canals and irrigation ditches surrounded by agricultural lands in the Union Island and Roberts
18 Island areas, and several small patches along the San Joaquin River. The habitat that would be
19 removed is not adjacent to any existing conserved lands, and is several miles north and
20 northeast of the northernmost riparian brush rabbit record located northeast of Paradise Cut
21 (Williams et al. 2002). Although the final footprint for tidal natural communities restoration
22 would differ from the hypothetical footprint, compliance monitoring would be implemented to
23 ensure that acreage limits are not exceeded, and the measures described in *AMM25 Riparian*
24 *Woodrat and Riparian Brush Rabbit* require that tidal natural communities restoration avoid
25 removal of any habitat occupied by the riparian brush rabbit.
- 26 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
27 restoration would result in the permanent removal of approximately 43 acres of riparian habitat
28 and 26 acres of associated grassland habitat for the riparian brush rabbit in CZ 7 in the late long-
29 term. Levee construction would also result in the temporary removal of 35 acre riparian habitat
30 and 20 acres of grassland habitat for the riparian brush rabbit. Although the effects are
31 considered temporary, 5 years to several decades may be required for ecological succession to
32 occur and for restored riparian habitat to replace the function of habitat that has been affected.
- 33 The value of this habitat for riparian brush rabbit is high: although it consists of small patches
34 and narrow bands of riparian vegetation, these areas are in proximity to, or contiguous with,
35 habitat with recorded occurrences of riparian brush rabbit. The hypothetical footprint for levee
36 construction overlaps with one occurrence record for riparian brush rabbit, south of the
37 Interstate 5/Interstate 205 interchange.
- 38 Although the final floodplain restoration design would differ from the hypothetical footprint
39 used for this effects analysis, restoration of the river floodplain in CZ 7 would be targeted in the
40 general area of the riparian brush rabbit population. Implementation of adaptive management
41 described in *AMM25* would ensure that riparian brush rabbit habitat permanently removed as a
42 result of floodplain restoration does not exceed the maximum allowable habitat loss for this
43 species.

1 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
2 actions included in CM11 that are designed to enhance wildlife values in BDCP protected
3 habitats may result in localized ground disturbances that could temporarily remove small
4 amounts of riparian brush rabbit habitat. Enhancement and management actions in riparian
5 brush rabbit habitat within the reserve system may include invasive plant removal, planting and
6 maintaining vegetation to improve and sustain habitat characteristics for the species, and
7 creating and maintaining flood refugia. These activities are expected to have minor adverse
8 effects on available riparian brush rabbit habitat and are expected to result in overall
9 improvements to and maintenance of riparian brush rabbit habitat values over the term of the
10 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
11 and minimized through the AMMs listed below.

12 Passive recreation in the reserve system could result in disturbance of individual riparian brush
13 rabbits foraging in the ecotone between riparian and adjacent open habitats. However, *AMM37*
14 *Recreation* limits trail development adjacent to riparian corridors within the range of the
15 riparian brush rabbit. With this minimization measure in place, recreation-related effects on the
16 riparian brush rabbit are expected to be minimal.

17 • *Operations and maintenance*: Ongoing maintenance of BDCP facilities are not expected to
18 adversely affect the riparian brush rabbit because the species is not expected to occur in the
19 vicinity of proposed facilities.

20 • *Injury and direct mortality*: Water conveyance facility construction is not is not likely to result in
21 injury or mortality of individual riparian brush rabbit because the species is not likely to be
22 present in the areas that would be affected by this activity, based on live trapping results (BDCP
23 Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Tidal
24 natural communities restoration would not result in injury or mortality of the riparian brush
25 rabbit because tidal natural communities restoration projects would be designed to avoid
26 occupied riparian brush rabbit habitat and, if that is not possible, rabbits would be trapped and
27 relocated as described in AMM25 (see Appendix 3B, *Environmental Commitments, AMMs, and*
28 *CMs*). Activities associated with construction of setback levees for floodplain restoration could
29 result in injury or mortality of riparian brush rabbits: however, preconstruction surveys,
30 construction monitoring, and other measures would be implemented to avoid and minimize
31 injury or mortality of this species during construction (AMM25).

32 The following paragraphs summarize the combined effects discussed above and describe other
33 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
34 also included.

35 ***Near-Term Timeframe***

36 Because the water conveyance facilities construction (CM1) is being evaluated at the project level,
37 the near-term BDCP conservation strategy has been evaluated to determine whether it would
38 provide sufficient habitat protection or restoration in an appropriate timeframe to ensure that the
39 effects of construction would not be adverse under NEPA.

40 Alternative 9 would result in permanent and temporary effects combined on 14 acres of riparian
41 habitat and 197 acres of grassland habitat for riparian brush rabbit in the near-term as a result of
42 construction of the water conveyance facilities (CM1). The habitat would be lost in the
43 valley/foothill riparian and grassland natural communities. Most of the near-term loss of riparian
44 brush rabbit habitat would be in an area the species is unlikely to occupy in CZ 8. Habitat loss in CZ

1 7, in areas known or likely to be occupied, would occur during the early long-term and late long-
2 term timeframes. Riparian restoration would be phased to minimize temporal habitat loss. There
3 would be no near-term losses from CM2–CM18.

4 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
5 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of
6 the BDCP would be 1:1 for restoration and protection of the valley/foothill riparian natural
7 community, and 2:1 for protection of grassland. Using these ratios would indicate that 14 acres of
8 riparian habitat should be restored, 14 acres of riparian habitat should be protected, and 394 acres of
9 grassland should be protected for riparian brush rabbit to mitigate near-term losses.

10 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1) and
11 an unknown number of associated acres of grassland and protection of 750 acres of riparian
12 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in
13 Chapter 3, *Description of Alternatives*). In addition, the species-specific biological goals and
14 objectives (Objectives RBR1.1–RBR1.6) would inform the near-term protection and restoration
15 efforts. The natural community restoration and protection activities are expected to be concluded
16 during the first 10 years of Plan implementation, which is close enough in time to the occurrence of
17 impacts to constitute adequate mitigation for NEPA purposes. These commitments are more than
18 sufficient to support the conclusion that the near-term effects of Alternative 9 would be not be
19 adverse under NEPA, because the number of acres required to meet the typical ratios described
20 above would be 14 acres of riparian habitat restored, 14 acres protected, and 394 acres of grassland
21 protected.

22 The plan also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
23 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
24 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
25 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
26 *Restoration of Temporarily Affected Natural Communities*, *AMM25 Riparian Woodrat and Riparian*
27 *Brush Rabbit*, and *AMM37 Recreation*. These AMMs contain elements that avoid or minimize the risk
28 of BDCP activities affecting habitats and species adjacent to work areas and storage sites. BDCP
29 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
30 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS.

31 **Late Long-Term Timeframe**

32 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of
33 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 9 a whole
34 would result in permanent and temporary effects combined on 111 acres of modeled riparian
35 habitat and 261 acres of modeled grassland habitat for riparian brush rabbit, representing 4% and
36 8% of the riparian and grassland modeled habitat. The BDCP would restore 5,000 acres and protect
37 750 acres of valley/foothill riparian natural community, a portion of which is expected to consist of
38 suitable riparian brush rabbit habitat (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2
39 requires that at least 800 acres of early- to midsuccessional riparian natural community be
40 conserved in CZ 7, in areas that are adjacent to or that facilitate connectivity with existing occupied
41 or potentially occupied habitat. This would consist of 200 acres of protected habitat (Objective
42 RBR1.1) and 600 acres of restored habitat. The 800 acres to be conserved would consist of early
43 successional riparian vegetation suitable for riparian brush rabbit. The conserved habitat would
44 also be part of a larger, more contiguous, and less patchy area of protected and restored riparian

1 natural community than what currently exists in CZ 7 and would be contiguous with existing
2 modeled riparian brush rabbit habitat. The species-specific objectives further require that the 200
3 acres of protected riparian habitat (Objective RBR1.4) and at least 300 acres of the restored riparian
4 habitat (Objective RBR1.3) meet more specific ecological requirements of riparian brush rabbit,
5 including large patches of dense riparian brush; ecotonal edges that transition from brush species to
6 grasses and forbs, scaffolding plants to support vines that grow above flood levels; a tree canopy
7 that is open, if present; and high-ground refugia from flooding. In protected riparian areas that are
8 occupied by riparian brush rabbit, nonnative predators that are known to prey on riparian brush
9 rabbit would be monitored and controlled (Objective RBR1.5).

10 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the BDCP
11 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation
12 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide
13 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood
14 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would
15 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands
16 on the landward side of levees adjacent to restored floodplain would be restored or protected as
17 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

18 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as
19 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to
20 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently
21 flooded areas would provide refuge for the riparian brush rabbit during most years. The BDCP
22 would also create and maintain mounds, levee sections, or other high areas in restored and
23 protected riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia
24 for the riparian brush rabbit (BDCP Appendix 3.F, *Conservation Principles for the Riparian Brush
25 Rabbit and Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian
26 brush rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas
27 that are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

28 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and
29 Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
30 restoration of valley/foothill riparian and grassland that could overlap with the species model,
31 would result in the restoration of 800 acres of riparian and 79 acres of grassland modeled habitat
32 for riparian brush rabbit. In addition, protection of valley/foothill riparian and grassland could
33 overlap with the species model and would result in the protection of 200 acres of riparian and 317
34 acres of grassland riparian brush rabbit modeled habitat.

35 **NEPA Effects:** In the near-term, the loss of riparian brush rabbit habitat under Alternative 9 would
36 not be adverse because there is little likelihood of riparian brush rabbits being present and the
37 BDCP has committed to protecting and restoring the acreage required to meet the typical mitigation
38 ratios described above. In the late long-term, the losses of riparian brush rabbit riparian and
39 grassland habitat associated with Alternative 9, in the absence of other conservation actions, would
40 represent an adverse effect as a result of habitat modification and potential direct mortality of a
41 special-status species. However, with habitat protection and restoration associated with the
42 conservation components, guided by landscape-scale goals and objectives and by AMM1–AMM6,
43 AMM10, AMM25, and AMM37, the effects of Alternative 9 as a whole on riparian brush rabbit would
44 not be adverse.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction is being evaluated at the project level, the near-
4 term BDCP conservation strategy has been evaluated to determine whether it would provide
5 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
6 construction would be less than significant under CEQA.

7 Alternative 9 would result in permanent and temporary effects combined on 14 acres of riparian
8 habitat and 197 acres of grassland habitat for riparian brush rabbit in the near-term as a result of
9 construction of the water conveyance facilities (CM1). The habitat would be lost in the
10 valley/foothill riparian and grassland natural communities. Most of the near-term loss of riparian
11 brush rabbit habitat would be in an area unlikely to be occupied by the species in CZ 8. Habitat loss
12 in CZ 7, in areas known or likely to be occupied, would occur during the early long-term and late
13 long-term timeframes. Riparian restoration would be phased to minimize temporal habitat loss.
14 There would be no near-term losses resulting from CM2–CM18.

15 Typical CEQA project-level mitigation ratios for those natural communities that would be affected
16 and that are identified in the biological goals and objectives for riparian brush rabbit in Chapter 3 of
17 the BDCP would be 1:1 for restoration and protection of the valley/foothill riparian natural
18 community, and 2:1 for protection of grassland. Using these ratios would indicate that 14 acres of
19 riparian habitat should be restored, 14 acres of riparian habitat should protected, and 394 acres of
20 grassland should be protected for riparian brush rabbit to mitigate CM1 losses.

21 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
22 and an unknown number of associated acres of grassland and protection of 750 acres of riparian
23 (Objective VFRNC1.2) with an unknown number of associated acres of grassland (Table 3-4 in
24 Chapter 3, *Description of Alternatives*). In addition, the species-specific biological goals and
25 objectives (RBR1.1–RBR1.6) would inform the near-term protection and restoration efforts. The
26 natural community restoration and protection activities are expected to be concluded during the
27 first 10 years of Plan implementation, which is close enough in time to the occurrence of impacts to
28 constitute adequate mitigation for CEQA purposes. These commitments are more than sufficient to
29 support the conclusion that the near-term effects of Alternative 9 would be less than significant
30 under CEQA, because the number of acres required to meet the typical ratios described above would
31 be 14 acres or riparian habitat protected, 14 acres of riparian habitat restored, and 394 acres of
32 grassland habitat protected.

33 The plan also contains commitments to implement AMM1–AMM7, AMM10, AMM25, and AMM37.
34 These AMMs contain elements that avoid or minimize the risk of BDCP activities affecting habitats
35 and species adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since been
36 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to
37 the Final EIR/EIS.

38 **Late Long-Term Timeframe**

39 There are 6,012 acres of modeled riparian brush rabbit habitat in the Plan Area, consisting of
40 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 9 would
41 result in permanent and temporary effects combined on 111 acres of modeled riparian habitat and
42 261 acres of modeled grassland habitat for riparian brush rabbit, representing 4% and 8% of the
43 riparian and grassland modeled habitat.

1 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
2 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
3 (Objectives VFRNC1.1 and VFRNC1.2). Objective RBR1.2 requires that at least 800 acres of early- to
4 midsuccessional riparian natural community be conserved in CZ 7, in areas that are adjacent to or
5 that facilitate connectivity with existing occupied or potentially occupied habitat. This would consist
6 of 200 acres of protected habitat (Objective RBR1.1) and 600 acres of restored habitat. The 800
7 acres to be conserved would consist of early successional riparian vegetation suitable for riparian
8 brush rabbit. The conserved habitat would also be part of a larger, more contiguous, and less patchy
9 area of protected and restored riparian natural community than what currently exists in CZ 7 and
10 would be contiguous with existing modeled riparian brush rabbit habitat. The species-specific
11 objectives further require that the 200 acres of protected riparian habitat (Objective RBR1.4) and at
12 least 300 acres of the restored riparian habitat (Objective RBR1.3) meet more specific ecological
13 requirements of riparian brush rabbit, including large patches of dense riparian brush; ecotonal
14 edges that transition from brush species to grasses and forbs, scaffolding plants to support vines
15 that grow above flood levels; a tree canopy that is open, if present; and high-ground refugia from
16 flooding. In protected riparian areas that are occupied by riparian brush rabbit, nonnative predators
17 that are known to prey on riparian brush rabbit would be monitored and controlled (Objective
18 RBR1.5).

19 In addition to restoration and protection of riparian habitat for the riparian brush rabbit, the BDCP
20 would protect, and, if necessary, create or restore grasslands adjacent to suitable riparian vegetation
21 in areas outside the floodplain levees (Objective RBR1.6). These grasslands are expected to provide
22 additional foraging opportunities for the riparian brush rabbit and upland refugia during flood
23 events. The actual acreage of grassland to be restored or protected for riparian brush rabbit would
24 depend on site-specific needs adjacent to restored and protected riparian habitat (CM3). Grasslands
25 on the landward side of levees adjacent to restored floodplain would be restored or protected as
26 needed to provide flood refugia and foraging habitat for riparian brush rabbit (Objective RBR1.6).

27 In addition to grasslands protected and restored outside the levees for riparian brush rabbit as
28 needed, the floodplains would transition from areas that flood frequently (e.g., every 1 to 2 years) to
29 areas that flood infrequently (e.g., every 10 years or more) (Objective L1.5): these infrequently
30 flooded areas would provide refuge for the riparian brush rabbit during most years. The BDCP
31 would also create and maintain mounds, levee sections, or other high areas in restored and
32 protected riparian areas (Objective RBR1.4) that are designed specifically to provide flood refugia
33 for the riparian brush rabbit (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush
34 Rabbit and Riparian Woodrat*). Additionally, nonnative predators that are known to prey on riparian
35 brush rabbit (e.g., feral dogs and cats) would be monitored in protected and restored riparian areas
36 that are occupied by riparian brush rabbit (Objective RBR1.5), and controlled as needed (CM11).

37 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and
38 Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
39 restoration of valley/foothill riparian and grassland that could overlap with the species model,
40 would result in the restoration of 800 acres of riparian and 79 acres of grassland modeled habitat
41 for riparian brush rabbit. In addition, protection of valley/foothill riparian and grassland could
42 overlap with the species model and would result in the protection of 200 acres of riparian and 317
43 acres of grassland riparian brush rabbit modeled habitat.

44 Only a small proportion of the lost habitat would be considered occupied and of high-value.
45 Alternative 9 conservation measures provide for large acreages of riparian brush rabbit riparian and

1 grassland habitat to be protected and restored, and the BDCP includes AMM1–AMM7, AMM10,
2 AMM25, and AMM37, which are directed at minimizing or avoiding potential effects during
3 construction and operation of the conservation measures. Overall, the BDCP would provide a
4 substantial net benefit to the riparian brush rabbit through the increase in available habitat and
5 habitat in protected status. These protected areas would be managed to support the species.

6 Considering the habitat restoration and protection associated with CM3, CM7, CM8 and CM11,
7 guided by species-specific goals and objectives and by AMM1–AMM7, AMM10, AMM25, and AMM37,
8 the temporary and permanent losses of riparian and grassland habitat and potential direct mortality
9 of riparian brush rabbit as a result of implementing Alternative 9 would not represent a substantial
10 adverse effect through habitat modifications and would not substantially reduce the number or
11 restrict the range of the species. The loss of habitat and potential mortality of riparian brush rabbits
12 would be a less-than-significant impact under CEQA.

13 **Impact BIO-153: Indirect Effects of Plan Implementation on Riparian Brush Rabbit**

14 Noise, lighting, and visual disturbance adjacent to construction activities could indirectly affect the
15 use of modeled riparian brush rabbit riparian habitat and of associated grassland habitat in the
16 study area. These construction activities would include water conveyance (including transmission
17 line) construction in CZ 8, tidal natural communities restoration construction, and construction of
18 setback levees. Water conveyance construction would potentially affect acres of adjacent riparian
19 habitat and of associated grassland habitat: this construction would occur in CZ 8 where there is
20 suitable habitat for the species but surveys by ESRP did not indicate the species is present in this
21 area;; therefore, the potential for adverse noise and visual effects from conveyance facility
22 construction would be minimal. Tidal natural communities restoration construction would also
23 potentially affect adjacent riparian habitat and associated grassland habitat for this species:
24 however, adverse effects on the species are unlikely because tidal natural communities restoration
25 projects would be sited to avoid areas occupied by riparian brush rabbit. The activity most likely to
26 result in noise, lighting, and visual disturbance to riparian brush rabbit is the construction of setback
27 levees for floodplain restoration, which would take place in CZ 7, where the species is known to
28 occur. The use of mechanical equipment during construction might cause the accidental release of
29 petroleum or other contaminants that would affect the riparian brush rabbit in adjacent habitat, if
30 the species is present.

31 **NEPA Effects:** Implementation of AMM1–AMM7, AMM10, AMM25, and AMM37 as part of
32 implementing Alternative 9 would avoid the potential for substantial adverse effects on riparian
33 brush rabbits, either indirectly or through habitat modifications or result in a substantial reduction
34 in numbers or a restriction in the range of riparian brush rabbits. Therefore, indirect effects of
35 Alternative 9 would not have an adverse effect on riparian brush rabbit.

36 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
37 as construction-related noise, lighting, and visual disturbances could affect riparian brush rabbit in
38 riparian and grassland habitats. The use of mechanical equipment during construction could cause
39 the accidental release of petroleum or other contaminants that could affect riparian brush rabbit.
40 The inadvertent discharge of sediment or excessive dust adjacent to riparian brush rabbit habitat
41 could also have a negative effect on the species. With implementation of AMM1–AMM7, AMM10,
42 AMM25, and AMM37 as part of Alternative 9, the BDCP would avoid the potential for substantial
43 adverse effects on riparian brush rabbits, either indirectly or through habitat modifications and
44 would not result in a substantial reduction in numbers or a restriction in the range of riparian brush

1 rabbits. Indirect effects of Alternative 9 would have a less-than-significant impact on riparian brush
2 rabbit.

3 **Impact BIO-154: Periodic Effects of Inundation of Riparian Brush Rabbit Habitat as a Result of**
4 **Implementation of Conservation Components**

5 *CM5 Seasonally Inundated Floodplain Restoration* is the only covered activity expected to result in
6 periodic inundation of riparian brush rabbit habitat. This activity would periodically inundate
7 approximately 264 acres of riparian habitat (9% of riparian habitat in the Plan Area) and 423 acres
8 of associated grassland habitat (14% of associated grassland habitat in the Plan Area) for the
9 riparian brush rabbit. The area between existing levees that would be breached and the newly
10 constructed setback levees would be inundated through seasonal flooding. The potentially
11 inundated areas consist of high-value habitat for the species: although they consist of small patches
12 and narrow bands of riparian vegetation, many of these areas are in proximity to, or contiguous
13 with, habitat with recorded occurrences of riparian brush rabbit. The restored floodplain would
14 include a range of elevations from lower lying areas that flood frequently (e.g., every 1 to 2 years) to
15 higher elevation areas that flood infrequently (e.g., every 10 years or more).

16 Seasonal flooding in restored floodplains can result in injury or mortality of individuals if riparian
17 brush rabbits occupy these areas and cannot escape flood waters. One recorded occurrence of
18 riparian brush rabbit (Williams et al. 2002), just west of Stewart Road in Mossdale, is in the area that
19 would be seasonally flooded based on the hypothetical restoration footprint.

20 **NEPA Effects:** Floodplain restoration under CM5 would periodically affect only a small proportion of
21 the modeled riparian brush rabbit habitat in the study area. The adverse effects of periodic
22 inundation on the riparian brush rabbit would be minimized through construction and maintenance
23 of flood refugia to allow riparian brush rabbits to escape inundation. Therefore, implementing
24 Alternative 9, including AMM1–AMM7, AMM10, AMM25, and AMM37, would not be expected to
25 result in substantial adverse effects on riparian brush rabbit, either directly or through habitat
26 modifications and would not result in a substantial reduction in numbers or a restriction in the
27 range of riparian brush rabbits. Therefore, Alternative 9 would not adversely affect the species.

28 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect only a small
29 proportion of the modeled riparian brush rabbit habitat in the study area. The overall effect of
30 seasonal inundation on existing riparian natural communities may instead be beneficial. Historically,
31 flooding was the main natural disturbance regulating ecological processes in riparian areas, and
32 flooding promotes the germination and establishment of many native riparian plants. In the late
33 long-term, seasonal inundation in areas currently occupied by riparian vegetation may contribute to
34 the establishment of high-value habitat for covered riparian species, such as the riparian brush
35 rabbit. Long-term management of riparian areas would ensure that refugia also exist along the
36 edges of seasonally inundated habitat.

37 The adverse effects of periodic inundation on the riparian brush rabbit would be minimized through
38 construction and maintenance of flood refugia to allow riparian brush rabbits to escape inundation.
39 Therefore, implementing Alternative 9, including AMM1–AMM7, AMM10, AMM25, and AMM37,
40 would not be expected to result in substantial adverse effects on riparian brush rabbit, either
41 directly or through habitat modifications and would not result in a substantial reduction in numbers
42 or a restriction in the range of riparian brush rabbits. Periodic inundation of riparian and grassland
43 habitat for riparian brush rabbit under Alternative 9 would have a less-than-significant impact on
44 the species.

1 **Riparian Woodrat**

2 The habitat model used to assess effects for the riparian woodrat consists of selected plant alliances
3 from the valley/foothill riparian natural community, geographically constrained to the south Delta
4 portion of the BDCP area in CZ 7, south of State Route 4 and Old River Pipeline along the Stanislaus,
5 San Joaquin, Old, and Middle Rivers. Valley/foothill riparian areas along smaller drainages (Paradise
6 Cut, Tom Paine Slough), and some larger streams in the northern portion of CZ 7 were excluded
7 from the riparian woodrat habitat model due to a lack of trees or riparian corridors that were too
8 narrow. Factors considered in assessing the value of affected habitat for the riparian woodrat, to the
9 extent that information is available, include habitat patch size and connectivity.

10 The riparian woodrat is not known to occur in the study area. The only verified extant population of
11 riparian woodrats rangewide is 2 miles east of the southern end of the study area in Caswell
12 Memorial State Park along the Stanislaus River (Williams 1986:1–112; 1993). Riparian woodrat may
13 occur in small patches of valley oak riparian forest along the San Joaquin River from the southern tip
14 of the study area north to approximately the Interstate 5 overcrossing near Lathrop (Figure 12-47).
15 Construction and restoration associated with Alternative 9 conservation measures would result in
16 both temporary and permanent losses of riparian woodrat modeled habitat as indicated in Table 12-
17 9-56. Tidal habitat restoration, floodplain restoration, and protection and management of natural
18 communities could affect modeled riparian woodrat habitat. However, because the species is not
19 known to occur in the study area it is not expected to be affected by BDCP actions unless the species
20 were to establish in the study area over the term of the BDCP. Full implementation of Alternative 9
21 would also include biological objectives over the term of the BDCP to benefit the riparian woodrat
22 (BDCP Chapter 3, *Conservation Strategy*). The conservation strategy for the riparian woodrat
23 involves providing opportunities for population expansion into the Plan Area from adjacent lands to
24 the south and southeast. The strategy focuses on restoring and maintaining suitable habitat at the
25 southernmost end of CZ 7, providing connectivity with existing populations to the south and
26 southeast, and creating and maintaining flood refugia. This conservation approach is consistent with
27 the recovery plan (U.S. Fish and Wildlife Service 1998) and conservation principles (BDCP Appendix
28 3.E). The conservation measures that would be implemented to achieve the biological goals and
29 objectives are summarized below.

- 30 ● Provide a range of elevations in restored floodplains that transition from frequently flooded
31 (e.g., every 1 to 2 years) to infrequently flooded (e.g., every 10 years or more) areas to provide a
32 range of habitat conditions, upland habitat values, and refugia from flooding during most flood
33 events (Objective L1.5, associated with CM3, CM5, and CM8).
- 34 ● Increase the size and connectivity of the reserve system by acquiring lands adjacent to and
35 between existing conservation lands (Objective L1.6, associated with CM3).
- 36 ● Protect and improve habitat linkages that allow terrestrial covered and other native species to
37 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
38 associated with CM3–CM8, and CM11).
- 39 ● Restore or create 5,000 acres of valley/foothill riparian natural community, with 3,000 acres
40 occurring on restored seasonally inundated floodplain (Objective VFRNC1.1, associated with
41 CM3 and CM7).
- 42 ● Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
43 (Objective VFRNC1.2, associated with CM3).

- 1 • Restore, maintain and enhance structural heterogeneity with adequate vertical and horizontal
2 overlap among vegetation components and over adjacent riverine channels, freshwater
3 emergent wetlands, and grasslands (Objective VFRNC2.1, associated with CM5, CM7, and CM11).
- 4 • Of the 5,000 acres of valley/foothill riparian natural community restored under Objective
5 VFRNC1.1, restore/create and maintain 300 acres riparian habitat in CZ 7 that meets the
6 ecological requirements of the riparian woodrat (i.e., dense willow understory and oak
7 overstory) and that is adjacent to or facilitates connectivity with existing occupied or potentially
8 occupied habitat (Objective RW1.1, associated with CM3, CM7, CM11).
- 9 • Provide and maintain high-water refugia in the 300 acres of riparian woodrat habitat restored
10 under Objective RW1.1 through the retention, construction, and/or restoration of high-ground
11 habitat on mounds, berms, or levees, so that refugia are no further apart than 67 feet (Objective
12 RW1.2, associated with CM7 and CM11).

13 As explained below, with the restoration and protection of these amounts of habitat, in addition to
14 implementation of the AMMs to reduce potential effects, impacts on riparian woodrat would not be
15 adverse for NEPA purposes and would be less than significant for CEQA purposes.

16 **Table 12-9-56. Changes in Riparian Woodrat Modeled Habitat Associated with Alternative 9**
17 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Riparian	2	2	1	1	NA	NA
Total Impacts CM1		2	2	1	1	NA	NA
CM2–CM18	Riparian	0	51	0	33	0	203
Total Impacts CM2–CM18		0	51	0	33	0	203
TOTAL IMPACTS		2	53	1	34	0	203

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

18

19 **Impact BIO-155: Loss or Conversion of Habitat for and Direct Mortality of Riparian Woodrat**

20 Alternative 9 conservation measures would result in the permanent loss of up to 53 acres of habitat
21 and temporary loss of up to 34 acres of habitat for riparian woodrat (Table 12-9-56). Construction
22 of Alternative 9 water conveyance facilities (CM1) would not affect modeled habitat; however, tidal
23 natural communities restoration (CM4) and seasonally inundated floodplain restoration (CM5)
24 would remove habitat. Each of these individual activities is described below. A summary statement

1 of the combined impacts and NEPA effects and a CEQA conclusion follow the individual conservation
2 measure discussions.

- 3 • *CM1 Water Facilities and Operation*: Development of Alternative 9 water conveyance facilities
4 would result in the permanent and temporary removal of approximately 3 acres of modeled
5 habitat for riparian woodrat in CZ 8 (Table 12-9-56). The modeled habitat that would be
6 removed is of low value for the riparian woodrat as it consists of several small, isolated patches
7 surrounded by agricultural lands northeast of Clifton Court Forebay in CZ 8. Trapping efforts
8 conducted for the riparian woodrat in this area were negative (BDCP Appendix 3.E, *Conservation*
9 *Principles for the Riparian Brush Rabbit and Riparian Woodrat*). Refer to the Terrestrial Biology
10 Map Book for a detailed view of Alternative 9 construction locations.
- 11 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
12 inundation would permanently remove approximately 10 acres of modeled habitat for the
13 riparian woodrat in CZ 7. This habitat is of low value, consisting of a small, isolated patch
14 surrounded by agricultural lands, and the species has a relatively low likelihood of being present
15 in these areas. The measures described in *AMM25 Riparian Woodrat and Riparian Brush Rabbit*,
16 require that tidal natural communities restoration avoid removal of any habitat occupied by the
17 riparian woodrat as determined by presence/absence surveys. Because the estimates of habitat
18 loss due to tidal inundation are based on projections of where restoration may occur, actual
19 habitat loss is expected to be lower because sites would be selected to minimize effects on
20 riparian woodrat.
- 21 • *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
22 restoration would result in the permanent removal of approximately 41 acres of modeled
23 habitat for the riparian woodrat in CZ 7. The value of this habitat for riparian woodrat is
24 moderate. Although the habitat consists of small patches and narrow bands of riparian
25 vegetation and no riparian woodrats have been detected in CZ 7, the riparian patches are in proximity
26 to each other along the San Joaquin River. There are two species occurrences immediately south
27 of CZ 7, one of which is less than 1.5 mile from the southernmost patch of riparian habitat
28 potentially affected by levee construction.

29 The final floodplain restoration design would differ from the hypothetical footprint used for this
30 effects analysis. However, monitoring and adaptive management described in *CM11 Natural*
31 *Communities Enhancement and Management* and *AMM25 Riparian Woodrat and Riparian Brush*
32 *Rabbit* would ensure that riparian woodrat habitat permanently removed as a result of
33 floodplain restoration does not exceed the amount estimated based on the hypothetical
34 footprint. Habitat loss is expected to be lower than 41 acres because sites would be selected and
35 restoration designed to minimize effects on the riparian woodrat. If natural flooding is
36 insufficient to maintain appropriate riparian woodrat vegetation structure, the vegetation
37 would be actively managed to provide suitable habitat structure as described in *CM11 Natural*
38 *Communities Enhancement and Management*.

39 Levee construction would also result in the temporary removal of 33 acres of modeled habitat
40 for the riparian woodrat. Although the effects are considered temporary, 5 years to several
41 decades may be required for ecological succession to occur and for restored riparian habitat to
42 replace the function of habitat that has been affected.

- 43 • *CM11 Natural Communities Enhancement and Management*: A variety of habitat management
44 actions included in CM11 that are designed to enhance wildlife values in BDCP protected
45 habitats may result in localized ground disturbances that could temporarily remove small

1 amounts of riparian woodrat habitat. Enhancement and management actions in riparian
2 woodrat habitat within the reserve system may include invasive plant removal, planting and
3 maintaining vegetation to improve and sustain habitat characteristics for the species, and
4 creating and maintaining flood refugia. These activities are expected to have minor adverse
5 effects on available riparian woodrat habitat and are expected to result in overall improvements
6 to and maintenance of riparian woodrat habitat values over the term of the BDCP. These effects
7 cannot be quantified, but are expected to be minimal and would be avoided and minimized
8 through the AMMs listed below.

- 9 • Operations and maintenance: The only ongoing effects on the riparian woodrat are those
10 potentially resulting from habitat enhancement and management activities. Enhancement and
11 management actions in riparian woodrat habitat within the reserve system may include invasive
12 plant removal, planting and maintaining vegetation to improve and sustain habitat
13 characteristics for the species, and creating and maintaining flood refugia. These activities may
14 result in harassment of riparian woodrats through noise and visual disturbance which would be
15 minimized with implementation of AMM1–AMM7, AMM10, and AMM25.
- 16 • Injury and direct mortality: Construction vehicle activity is not likely to result in injury or
17 mortality of individual riparian woodrats because the species is not likely to be present in the
18 areas that would be affected by this activity, based on live trapping results (BDCP Appendix 3.E,
19 *Conservation Principles for the Riparian Woodrat and Riparian Brush Rabbit*). Tidal natural
20 communities restoration would not result in injury or mortality of the riparian woodrats
21 because under AMM25 tidal natural communities restoration projects would be designed to
22 avoid occupied riparian woodrat habitat and if that is not possible to trap and relocate the
23 species. Activities associated with construction of setback levees for floodplain restoration could
24 result in injury or mortality of riparian woodrats; however, preconstruction surveys,
25 construction monitoring, and other measures would be implemented under AMM25 to avoid
26 and minimize injury or mortality of this species during construction, as described in Appendix
27 3B, *Environmental Commitments, AMMs, and CMs*. If occupied riparian woodrat habitat cannot be
28 avoided, mortality would be avoided through implementation of a trapping and relocation
29 program. The program would be developed in coordination with USFWS, and relocation would
30 be to a site approved by USFWS prior to construction activities.

31 The following paragraphs summarize the combined effects discussed above and describe other
32 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
33 also included.

34 ***Near-Term Timeframe***

35 Because water conveyance facilities construction is being evaluated at the project level, the near-
36 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
37 protection or restoration in an appropriate timeframe to ensure that the construction effects would
38 not be adverse under NEPA.

39 Alternative 9 would result in permanent and temporary effects on 3 acres of modeled habitat for
40 riparian woodrat in the near-term as a result of construction of the water conveyance facilities
41 (CM1). The habitat would be lost in the valley/foothill riparian. All the near-term loss of riparian
42 woodrat habitat would result from CM1 conveyance facility construction in CZ 8, and would occur in
43 an area not likely to be occupied by the species. Habitat loss in CZ 7, in areas known or likely to be
44 occupied, would occur during the early long-term and late long-term implementation periods.

1 Riparian restoration would be phased to minimize temporal habitat loss. There would be no near-
2 term losses from CM2–CM18.

3 Typical NEPA project-level mitigation ratios for these natural communities that would be affected
4 and that are identified in the biological goals and objectives for riparian woodrat in Chapter 3 of the
5 BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural
6 community. Using these ratios would indicate that 3 acres of riparian habitat should be restored and
7 3 acres of riparian habitat should be protected for riparian woodrat for near-term losses.

8 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
9 and protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3, *Description of*
10 *Alternatives*). In addition, the species-specific biological goals and objectives (RW1.1 and RW1.2)
11 would inform the near-term protection and restoration efforts. The natural community restoration
12 and protection activities are expected to be concluded during the first 10 years of Plan
13 implementation, which is close enough in time to the occurrence of impacts to constitute adequate
14 mitigation for NEPA purposes. These commitments are more than sufficient to support the
15 conclusion that the near-term effects of Alternative 9 would be not be adverse under NEPA, because
16 no riparian woodrat habitat would be lost and there is only limited potential for minor adverse
17 effects on woodrats or its habitat from implementation of CM11.

18 These effects cannot be quantified, but are expected to be minimal and would be avoided and
19 minimized through the BDCP's commitment to *AMM1 Worker Awareness Training*, *AMM2*
20 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
21 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
22 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
23 *Restoration of Temporarily Affected Natural Communities*, and *AMM25 Riparian Woodrat and*
24 *Riparian Brush Rabbit*. BDCP Appendix 3.C describes the AMMs, which have since been updated and
25 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final
26 EIR/EIS.

27 **Late Long-Term Timeframe**

28 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.
29 Alternative 9 as a whole would result in the permanent loss of and temporary removal of 87 acres of
30 modeled habitat for riparian woodrat habitat. None of this habitat is considered occupied.

31 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
32 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
33 (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of riparian
34 habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow
35 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing
36 occupied or potentially occupied habitat to be restored in CZ 7. The conserved habitat would also be
37 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural
38 community than what currently exists in CZ 7 and would be contiguous with existing modeled
39 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of
40 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,
41 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural
42 community would provide riparian woodrat habitat proportional to the amount of modeled habitat
43 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area
44 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community

1 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is
2 comparable to or of higher value than existing modeled grassland habitat. All riparian protection
3 would occur during the near-term period, to offset early riparian losses.

4 The BDCP would also create and maintain mounds, levee sections, or other high areas in restored
5 and protected riparian areas (Objective RW1.2) that are designed specifically to provide flood
6 refugia for the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush*
7 *Rabbit and Riparian Woodrat*). In addition, the restored floodplains would transition from areas that
8 flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or
9 more) (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian
10 woodrat during most years.

11 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
12 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
13 restoration of valley/foothill riparian that could overlap with the species model, would result in the
14 restoration of 300 acres of modeled habitat for riparian woodrat. In addition, protection of
15 valley/foothill riparian could overlap with the species model and would result in the protection of
16 90 acres riparian woodrat modeled habitat.

17 Although there are no records of occurrences of the riparian woodrat in the study area, habitat
18 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase
19 opportunities for northward expansion of the species into the study area. Implementation of
20 Alternative 9 conservation measures is not expected to adversely affect the riparian woodrat for the
21 following reasons.

- 22 • There are no riparian woodrat occurrences in the Plan Area.
- 23 • The habitat that would be removed consists of small patches that are of moderate value for the
24 species.
- 25 • The habitat that would be removed permanently is a small proportion of the total habitat in the
26 Plan Area (2%).
- 27 • Avoidance and minimization measures would be implemented to avoid injury or mortality of
28 riparian woodrats, and to minimize loss of occupied habitat.
- 29 • Floodplain restoration would be designed to provide flood refugia so that flooding would not
30 adversely affect any riparian woodrats that occupy restored floodplains.

31 **NEPA Effects:** Alternative 9 would provide a substantial benefit to the riparian woodrat through the
32 net increase in available habitat and a net increase of habitat in protected status. These protected
33 areas would be managed and monitored to support the species. The habitat that Alternative 9 would
34 affect is currently unoccupied, and habitat removal is not expected to result in a discernible change
35 in the abundance or distribution of riparian woodrats if they occupy study area habitats. Should the
36 species be detected in the study area, implementation of AMM1-AMM7, AMM10, and AMM25 would
37 avoid and minimize the effects of conservation component construction and implementation.
38 Therefore, the loss of habitat and potential mortality of individuals would not have an adverse effect
39 on riparian woodrat.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because water conveyance facilities construction is being evaluated at the project level, the near-
4 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
5 protection or restoration in an appropriate timeframe to ensure that the construction impacts
6 would be less than significant for CEQA purposes.

7 Alternative 9 would result in permanent and temporary effects on 3 acres of modeled habitat for
8 riparian woodrat in the near-term as a result of construction of the water conveyance facilities
9 (CM1). The habitat would be lost in the valley/foothill riparian. All the near-term loss of riparian
10 woodrat habitat would result from CM1 conveyance facility construction in CZ 8, and would occur in
11 an area not likely to be occupied by the species. Habitat loss in CZ 7, in areas known or likely to be
12 occupied, would occur during the early long-term and late long-term implementation periods.
13 Riparian restoration would be phased to minimize temporal habitat loss. There would be no near-
14 term losses from CM2–CM18.

15 Typical CEQA project-level mitigation ratios for these natural communities that would be affected
16 and that are identified in the biological goals and objectives for riparian woodrat in Chapter 3 of the
17 BDCP would be 1:1 for restoration and 1:1 for protection of the valley/foothill riparian natural
18 community. Using these ratios would indicate that 3 acres of riparian habitat should be restored and
19 3 acres of riparian habitat should be protected for riparian woodrat for near-term losses.

20 The BDCP has committed to near-term restoration of 800 acres of riparian (Objective VFRNC1.1)
21 and protection of 750 acres of riparian (Objective VFRNC1.2) (Table 3-4 in Chapter 3, *Description of*
22 *Alternatives*). In addition, the species-specific biological goals and objectives (RW1.1 and RW1.2)
23 would inform the near-term protection and restoration efforts. The natural community restoration
24 and protection activities are expected to be concluded during the first 10 years of Plan
25 implementation, which is close enough in time to the occurrence of impacts to constitute adequate
26 mitigation for CEQA purposes. The Plan also contains commitments to implement AMM1–AMM7,
27 AMM10, and AMM25, which contain elements that avoid or minimize the risk of affected habitats
28 and species adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since been
29 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to
30 the Final EIR/EIS.

31 These commitments are more than sufficient to support the conclusion that the near-term effects of
32 Alternative 9 would be less than significant under CEQA, because no riparian woodrat habitat would
33 be lost and there is only limited potential for minor adverse effects on woodrats or its habitat from
34 implementation of CM11.

35 **Late Long-Term Timeframe**

36 The study area supports approximately 2,166 acres of modeled riparian woodrat habitat.
37 Alternative 9 as a whole would result in the permanent loss of and temporary removal of 87 acres of
38 modeled habitat for riparian woodrat habitat. None of this habitat is considered occupied.

39 The BDCP would restore 5,000 acres and protect 750 acres of valley/foothill riparian natural
40 community, a portion of which is expected to consist of suitable riparian brush rabbit habitat
41 (Objectives VFRNC1.1 and VFRNC1.2). Objective RW1.1 requires at least 300 acres of riparian
42 habitat that meets the ecological requirements of the riparian woodrat (e.g., dense willow

1 understory and oak overstory) and that is adjacent to or facilitates connectivity with existing
2 occupied or potentially occupied habitat to be restored in CZ 7. The conserved habitat would also be
3 part of a larger, more contiguous, and less patchy area of protected and restored riparian natural
4 community than what currently exists in CZ 7 and would be contiguous with existing modeled
5 riparian woodrat habitat. The species-specific objective further requires that the 300 acres of
6 restored riparian habitat meet more specific ecological requirements of riparian woodrat (e.g.,
7 dense willow understory and oak overstory). Additionally, assuming the protected riparian natural
8 community would provide riparian woodrat habitat proportional to the amount of modeled habitat
9 in this natural community in the Plan Area (12% of the riparian natural community in the Plan Area
10 is modeled riparian woodrat habitat), the protection of 750 acres of riparian natural community
11 (CM3) would provide an estimated 90 acres of protected riparian woodrat habitat that is
12 comparable to or of higher value than existing modeled grassland habitat. All riparian protection
13 would occur during the near-term period, to offset early riparian losses.

14 The BDCP would also create and maintain mounds, levee sections, or other high areas in restored
15 and protected riparian areas (Objective RW1.2) that are designed specifically to provide flood
16 refugia for the riparian woodrat (BDCP Appendix 3.E, *Conservation Principles for the Riparian Brush*
17 *Rabbit and Riparian Woodrat*). In addition, the restored floodplains would transition from areas that
18 flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently (e.g., every 10 years or
19 more) (Objective L1.5): these infrequently flooded areas would provide refuge for the riparian
20 woodrat during most years.

21 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
22 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
23 restoration of valley/foothill riparian that could overlap with the species model, would result in the
24 restoration of 300 acres of modeled habitat for riparian woodrat. In addition, protection of
25 valley/foothill riparian could overlap with the species model and would result in the protection of
26 90 acres riparian woodrat modeled habitat.

27 Although there are no records of occurrences of the riparian woodrat in the study area, habitat
28 restoration in CZ 7, in the vicinity of occurrences south of the study area, would increase
29 opportunities for northward expansion of the species into the study area. Implementation of
30 Alternative 9 conservation measures is not expected to adversely affect the riparian woodrat for the
31 following reasons.

- 32 ● There are no riparian woodrat occurrences in the Plan Area.
- 33 ● The habitat that would be removed consists of small patches that are of moderate value for the
34 species.
- 35 ● The habitat that would be removed permanently is a small proportion of the total habitat in the
36 Plan Area (2%).
- 37 ● Avoidance and minimization measures would be implemented to avoid injury or mortality of
38 riparian woodrats, and to minimize loss of occupied habitat.
- 39 ● Floodplain restoration would be designed to provide flood refugia so that flooding would not
40 adversely affect any riparian woodrats that occupy restored floodplains.

41 Alternative 9 would provide a substantial benefit to the riparian woodrat through the net increase in
42 available habitat and a net increase of habitat in protected status. These protected areas would be
43 managed and monitored to support the species. The affected habitat is currently unoccupied and

1 habitat removal is not expected to result in a discernible change in the abundance or distribution of
2 riparian woodrats if they occupy study area habitats. Should the species be detected in the study
3 area, implementation of AMM1–AMM7, AMM10, and AMM25 would avoid and minimize the effects
4 of conservation component construction and implementation. Therefore, the loss of habitat and
5 potential mortality of individuals under Alternative 9 would not have a significant impact on
6 riparian woodrat.

7 **Impact BIO-156: Indirect Effects of Plan Implementation on Riparian Woodrat**

8 Noise, lighting, and visual disturbance adjacent to construction activities could indirectly affect the
9 use of modeled habitat for riparian woodrat. These effects are related construction activities
10 associated with water conveyance construction, tidal natural communities restoration construction,
11 and construction of setback levees. Indirect effects on the species from construction associated with
12 tidal natural communities restoration are unlikely because tidal natural communities restoration
13 projects would be sited to avoid areas occupied by riparian woodrat (AMM25). The activity most
14 likely to result in noise, lighting, and visual disturbance to riparian woodrat would be the
15 construction of setback levees. These adverse effects would be minimized through implementation
16 of AMM1–AMM7, AMM10, and AMM25.

17 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 9
18 would avoid the potential for substantial adverse effects on riparian woodrats, either indirectly or
19 through habitat modifications or result in a substantial reduction in numbers or a restriction in the
20 range of riparian woodrats. Therefore, indirect effects of Alternative 9 would not have an adverse
21 effect on riparian woodrat.

22 **CEQA Conclusion:** Should the species be detected in the study area, indirect effects of conservation
23 measure construction and implementation could impact riparian woodrat and its habitat. AMM1–
24 AMM7, AMM10, and AMM25 would avoid and minimize the impact.

25 **Impact BIO-157: Periodic Effects of Inundation of Riparian Woodrat Habitat as a Result of** 26 **Implementation of Conservation Components**

27 *CM5 Seasonally inundated floodplain restoration* is the only covered activity expected to result in
28 periodic inundation of riparian woodrat habitat. Floodplain restoration would result in periodic
29 inundation of up to 203 acres of riparian woodrat habitat (9% of the riparian woodrat habitat in the
30 Plan Area). The area between existing levees that would be breached and the newly constructed
31 setback levees would be inundated through seasonal flooding. The potentially inundated areas
32 consist of moderate-value habitat for the species. Although the habitat consists of small patches and
33 narrow bands of riparian vegetation and no riparian woodrats have detected in CZ 7, the riparian
34 patches are in proximity to each other along the San Joaquin River and there are two species
35 occurrences immediately south of CZ 7, one of which is less than 1 mile from the southernmost
36 patch of riparian habitat potentially affected by levee construction. The restored floodplains would
37 transition from areas that flood frequently (e.g., every 1 to 2 years) to areas that flood infrequently
38 (e.g., every 10 years or more).

39 **NEPA Effects:** Alternative 9's periodic inundation of 203 acres of riparian habitat is not expected to
40 result in substantial adverse effects on riparian woodrat, either directly or through habitat
41 modifications and would not result in a substantial reduction in numbers or a restriction in the
42 range of riparian woodrat. The effects of periodic inundation on the riparian woodrat would be
43 minimized through construction and maintenance of flood refugia to allow riparian woodrats to

1 escape inundation. Therefore, the periodic inundation of riparian woodrat habitat would not
2 adversely affect the species under Alternative 9.

3 **CEQA Conclusion:** Floodplain restoration under CM5 would periodically affect a total of 203 acres of
4 riparian habitat for riparian woodrat, representing 9% of the 2,166 acres of modeled riparian
5 woodrat habitat in the study area. The impact of periodic inundation on the riparian woodrat would
6 be minimized through construction and maintenance of flood refugia to allow riparian woodrats to
7 escape inundation, as described in AMM25. Implementation of CM5 would not be expected to result
8 in significant impacts on riparian woodrat, either directly or through habitat modifications, and
9 would not result in a substantial reduction in numbers or a restriction in the range of riparian
10 woodrats. Periodic inundation of riparian woodrat habitat under Alternative 9 would have a less-
11 than-significant impact.

12 **Salt Marsh Harvest Mouse**

13 The habitat model used to assess effects for the salt marsh harvest mouse includes six habitat types:
14 primary tidal marsh habitat, secondary tidal marsh habitat (low marsh), secondary upland habitat
15 adjacent to tidal marsh habitat, primary habitat within managed wetlands, secondary habitat within
16 managed wetlands (dominated by plants characteristic of low marsh), and upland habitats within
17 managed wetland boundaries. The tidal and managed wetland habitats were discriminated
18 recognizing that regardless of habitat value, managed wetlands are at high risk of catastrophic
19 flooding and have lower long-term conservation value than tidal wetlands.

20 Construction and restoration associated with Alternative 9 conservation measures would result in
21 effects to modeled salt marsh harvest mouse habitat, which would include permanent losses and
22 habitat conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species
23 post-restoration) as indicated in Table 12-9-57. All of the effects to the species would take place
24 over an extended period of time as tidal marsh is restored in the Plan Area. Full implementation of
25 Alternative 9 would also include the following conservation actions over the term of the BDCP to
26 benefit salt marsh harvest mouse (BDCP Chapter 3, *Conservation Strategy*).

- 27 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with
28 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California
29 (Objective TBEWNC1.1, associated with CM4)
- 30 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500
31 acres of middle and high marsh (primary salt marsh harvest mouse habitat) to contribute to
32 total (existing and restored) acreage targets for each complex as specified in the final Recovery
33 Plan for Tidal Marsh Ecosystems of Northern and Central California (Objective TBEWNC1.2,
34 associated with CM4).
- 35 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
36 natural community within the reserve system (Objective TBEWNC2.1).
- 37 ● Protect and enhance at least 1,500 acres of managed wetland in Grizzly Island Marsh Complex
38 for the benefit of salt marsh harvest mouse (Objective MWNC1.1, associated with CM3).
- 39 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide
40 at least 200 feet of adjacent grasslands beyond the sea level rise accommodation area (Objective
41 GNC1.4, associated with CM3 and CM8).

- Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of restored or created middle and high marsh as defined in the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California (Objective SMHM1.1).
- Provide viable habitat areas for salt marsh harvest mouse within the 1,500 acres of managed wetland protected and enhanced in the Grizzly Island Marsh Complex as defined in the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California, and increase population levels above the current baseline (Objective SMHM1.2).

As explained below, with the restoration or protection of these amounts of habitat, impacts on the salt marsh harvest mouse would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-9-57. Changes in Salt Marsh Harvest Mouse Modeled Habitat Associated with Alternative 9 (acres)^a

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
CM2–CM18	TBEW Primary	64	67	0	0	0	0
	TBEW Secondary	0	0	0	0	0	0
	Upland Secondary	8	9	0	0	0	0
	MW Wetland Primary	1,913	5,323	0	0	0	0
	MW Wetland Secondary	315	807	0	0	0	0
	MW Upland	165	762	0	0	0	0
Total Impacts CM2–CM18		2,465	6,968	0	0	0	0
TOTAL IMPACTS		2,645	6,968	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

TBEW = tidal brackish emergent wetland

MW = managed wetland

NT = near-term

LLT = late long-term

NA = not applicable

1 **Impact BIO-158: Loss or Conversion of Habitat for and Direct Mortality of Salt Marsh Harvest**
2 **Mouse**

3 BDCP tidal restoration (CM4) would be the only conservation measure resulting in effects on salt
4 marsh harvest mouse habitat. Habitat enhancement and management activities (CM11), which
5 include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat
6 effects. Each of these activities is described in detail below. A summary statement of the combined
7 impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 8 • *CM4 Tidal Natural Communities Restoration* would result in effects to 6,968 acres of salt marsh
9 harvest mouse modeled habitat, which would include 5,376 acres of permanent losses and
10 1,592 acres of habitat conversions. Salt marsh harvest mouse may be displaced temporarily from
11 areas of converted habitat but these areas would ultimately provide suitable habitat for the
12 species. However, 1,058 of these acres would be downgraded from primary habitat (67 acres of
13 primary tidal brackish emergent wetland and 991 acres of primary managed wetland) to
14 secondary tidal brackish emergent wetland. The hypothetical restoration footprints in Suisun
15 Marsh overlap with 13 CNDDDB records for salt marsh harvest mouse (California Department of
16 Fish and Wildlife 2013); however, the BDCP's conservation actions assume that all suitable
17 habitat in Suisun Marsh is occupied by the species.
- 18 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the
19 restoration of at least 1,500 acres of tidal brackish emergent wetland would be managed to
20 provide viable habitat for salt marsh harvest mouse and the protection of 1,500 acres of
21 managed wetland specifically to be managed for salt marsh harvest mouse. A variety of habitat
22 management actions included in *CM11 Natural Communities Enhancement and Management* that
23 are designed to enhance and manage these areas for salt marsh harvest mouse and may result in
24 localized ground disturbances that could temporarily remove small amounts of salt marsh
25 harvest mouse habitat. The restoration of tidal brackish emergent wetlands, the protection of
26 managed wetlands, and the protection and/or restoration of grasslands within 200 feet of
27 restored salt marsh harvest mouse habitat would also have enhancement and management
28 actions that would include invasive species control, nonnative wildlife control, and vegetation
29 management. Ground-disturbing activities, such as removal of nonnative vegetation are
30 expected to have minor effects on habitat and are expected to result in overall improvements to
31 and maintenance of salt marsh harvest mouse habitat values over the term of the BDCP. These
32 effects cannot be quantified, but are expected to be minimal and would be avoided and
33 minimized by the AMMs listed below.
- 34 • *Injury and Direct Mortality*: The use of heavy equipment and handtools may result in injury or
35 mortality to salt marsh harvest mouse during restoration, enhancement, and management
36 activities. However, preconstruction surveys, construction monitoring, and other measures
37 would be implemented to avoid and minimize injury or mortality of this species during these
38 activities, as required by the AMMs listed below.

39 The following paragraphs summarize the combined effects discussed above and describe other
40 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
41 also included.

42 ***Near-Term Timeframe***

43 The near-term BDCP conservation strategy has been evaluated to determine whether it would
44 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that

1 the effects of near-term covered activities would not be adverse under NEPA. Alternative 9 would
2 affect 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the near-term.
3 These effects include 1,517 acres of permanent loss and 948 acres of converted habitat. Most of the
4 habitat converted would be from primary habitats (599 acres consisting of 64 acres of tidal brackish
5 emergent wetland and 534 acres of managed wetland) to secondary tidal brackish emergent
6 wetland.

7 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
8 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,
9 and the protection and enhancement of 1,500 acres of managed wetlands for salt marsh harvest
10 mouse. Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to
11 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of
12 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation
13 value than tidal wetlands. The species-specific biological goals and objectives would inform the
14 near-term protection and restoration efforts. These Plan goals represent performance standards for
15 considering the effectiveness of restoration actions. The acres of protection and restoration
16 contained in the near-term Plan goals would keep pace with the loss of habitat and effects to salt
17 marsh harvest mouse.

18 Other factors relevant to effects on salt marsh harvest mouse are listed here.

- 19 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
20 wetlands as noted in the specie's draft recovery plan because the conversion of managed
21 wetland to tidal marsh would be gradual. Tidal marsh restoration is often accomplished by
22 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest
23 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided
24 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a
25 prolonged period (sometimes a decade or more) in which resident mice populations are
26 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these
27 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for
28 restoration of tidal wetlands through the conversion of managed wetlands. These plans are
29 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse
30 habitat from a variety of factors, including flooding from levee failure and cessation of active
31 management (which is often necessary to maintain habitat values in managed wetlands).
32 Therefore, the temporary effects under BDCP would be consistent with those deemed
33 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
34 Restoration in Suisun Marsh would be carefully phased over time to offset adverse effects of
35 restoration as it occurs. This phasing would ensure that temporal loss as a result of tidal natural
36 communities restoration does not adversely affect the salt marsh harvest mouse population,
37 ensure that short-term population loss is relatively small and incremental, and maintain local
38 source populations to recolonize newly restored areas. The tidal restoration projects in Suisun
39 Marsh would be implemented in 150-acre or greater patches that provide viable habitat areas
40 for the salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan
41 (U.S. Fish and Wildlife Service 2010).
- 42 • The salt marsh harvest mouse population would be monitored during the phasing process (see
43 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure
44 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
45 Section 3.6).

- 1 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
2 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
3 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
4 forage and cover.

5 Because there would be no project-level impacts on salt marsh harvest mouse resulting from CM1,
6 the analysis of the effects and conservation actions does not include a comparison with standard
7 ratios used for project-level NEPA analyses.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
11 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
12 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
13 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
14 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

15 **Late Long-Term Timeframe**

16 Based on modeled habitat, the study area supports approximately 35,588 acres of salt marsh
17 harvest mouse modeled habitat. Alternative 9 as a whole would result in effects to 6,968 acres of
18 saltmarsh harvest mouse modeled habitat over the term of the Plan, which would include 5,376
19 acres of permanent losses and 1,592 acres of habitat conversions. These effects (loss and
20 conversion) would be on 20% of the modeled habitat in the study area. Most of these effects (99%)
21 would be to managed wetlands, which though are known to be occupied by salt marsh harvest
22 mouse are at high risk of catastrophic flooding and have a lower long-term conservation value than
23 tidal wetlands (U.S. Fish and Wildlife Service 2010). Effects on up to 20% of the species' habitat in
24 the Plan Area may diminish the salt marsh harvest mouse population in the Plan Area and result in
25 reduced genetic diversity, thereby putting the local population at risk of local extirpation due to
26 random environmental fluctuations or catastrophic events. This effect is expected to be greatest if
27 large amounts of habitat are removed at one time in Suisun Marsh and are not effectively restored
28 for many years, and if there are no adjacent lands with salt marsh harvest mouse populations to
29 recolonize restored areas.

30 The Plan includes a commitment to restore or create 6,000 acres of tidal brackish emergent wetland,
31 1,500 acres of which would target middle and high marsh habitat (primary habitat for salt marsh
32 harvest mouse) (TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4), the protection of 6,500
33 acres of managed wetlands, 1,500 acres of which would be specifically managed for salt marsh
34 harvest mouse (SMHM1.2 and MWNC1.1, associated with CM3), and the protection and/or
35 restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration) to
36 provide upland refugia for salt marsh harvest mouse (GNC1.4, associated with CM3 and CM8). Other
37 factors relevant to effects on salt marsh harvest mouse include:

- 38 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
39 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the
40 conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is
41 often accomplished by breaching levees and converting diked nontidal marsh currently
42 occupied by salt marsh harvest mouse populations to tidal wetlands, their historic condition.
43 Conversion of these subsided areas requires sedimentation and accretion over time to restore
44 marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident

1 mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service
2 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan
3 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.
4 These plans are based on the premise that managed wetlands are at high risk of loss of salt
5 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and
6 cessation of active management (which is often necessary to maintain habitat values in managed
7 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed
8 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.

- 9 ● In order to ensure that temporal loss as a result of tidal natural communities restoration does
10 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh
11 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure
12 that short-term population loss is relatively small and incremental, and maintain local source
13 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh
14 would be implemented in 150-acre or greater patches that provide viable habitat areas for the
15 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish
16 and Wildlife Service 2010).
- 17 ● The salt marsh harvest mouse population would be monitored during the phasing process (see
18 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure
19 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
20 Section 3.6).
- 21 ● The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
22 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
23 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
24 forage and cover.
- 25 ● The habitat that would be restored and protected would consist of large blocks of contiguous
26 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
27 vegetation suitable for the species. This would provide greater habitat connectivity and greater
28 habitat value, which is expected to accommodate larger populations and to therefore increase
29 population resilience to random environmental events and climate change.

30 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
31 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
32 the restoration of 6,046 acres and the protection of 1,550 acres of modeled habitat for salt marsh
33 harvest mouse.

34 **NEPA Effects:** In the absence of other conservation actions, the effects on salt marsh harvest mouse
35 habitat from Alternative 9 would represent an adverse effect as a result of habitat modification and
36 potential direct mortality of a special-status species. However, the BDCP has committed to habitat
37 protection, restoration, management, and enhancement associated with CM3, CM4, CM8, and CM11.
38 This habitat protection, restoration, management, and enhancement would be guided by species-
39 specific goals and objectives and by AMM1–AMM5 and AMM26, which would be in place throughout
40 the construction period. Considering these commitments, losses and conversions of salt marsh
41 harvest mouse habitat and potential mortality of individuals in the near-term and late long-term
42 under Alternative 9 would not be an adverse effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 The near-term BDCP conservation strategy has been evaluated to determine whether it would
4 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
5 the effects of near-term covered activities would be less than significant under CEQA. Alternative 9
6 would affect 2,465 acres of salt marsh harvest mouse modeled habitat in the study area in the near-
7 term. These effects include 1,517 acres of permanent loss and 948 acres of converted habitat. Most
8 of the habitat converted would be to primary habitats (599 acres consisting of 64 acres of tidal
9 brackish emergent wetland and 534 acres of managed wetland) to secondary tidal brackish
10 emergent wetland.

11 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
12 wetland, the protection and/or restoration of grasslands within 200 feet of restored tidal wetlands,
13 and the protection and enhancement of 3,200 acres of managed wetlands for salt marsh harvest
14 mouse. Though there would be a net loss of modeled habitat, nearly all of these losses (97%) are to
15 managed wetlands, which according to the U.S. Fish and Wildlife Service are at high risk of
16 catastrophic flooding (U.S. Fish and Wildlife Service 2010) and have lower long-term conservation
17 value than tidal wetlands. The species-specific biological goals and objectives would inform the
18 near-term protection and restoration efforts. These Plan goals represent performance standards for
19 considering the effectiveness of restoration actions. The acres of protection and restoration
20 contained in the near-term Plan goals would keep pace with the loss of habitat and effects to salt
21 marsh harvest mouse habitat.

22 Other factors relevant to effects on salt marsh harvest mouse are listed here.

- 23 ● Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
24 wetlands as noted in the specie's draft recovery plan because the conversion of managed
25 wetland to tidal marsh occurs be gradual. Tidal marsh restoration is often accomplished by
26 breaching levees and converting diked nontidal marsh currently occupied by salt marsh harvest
27 mouse populations to tidal wetlands, their historic condition. Conversion of these subsided
28 areas requires sedimentation and accretion over time to restore marsh plains, resulting in a
29 prolonged period (sometimes a decade or more) in which resident mice populations are
30 displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service 2010). Despite these
31 temporary adverse effects, the draft recovery plan and Suisun Marsh Plan advocate strongly for
32 restoration of tidal wetlands through the conversion of managed wetlands. These plans are
33 based on the premise that managed wetlands are at high risk of loss of salt marsh harvest mouse
34 habitat from a variety of factors, including flooding from levee failure and cessation of active
35 management (which is often necessary to maintain habitat values in managed wetlands).
36 Therefore, the temporary effects under BDCP would be consistent with those deemed
37 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.
- 38 ● To ensure that temporal loss as a result of tidal natural communities restoration does not
39 adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh would be
40 carefully phased over time to offset adverse effects of restoration as it occurs, ensure that short-
41 term population loss is relatively small and incremental, and maintain local source populations
42 to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh would be
43 implemented in 150-acre or greater patches that provide viable habitat areas for the salt marsh

1 harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish and Wildlife
2 Service 2010).

- 3 • The salt marsh harvest mouse population would be monitored during the phasing process (see
4 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure
5 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
6 Section 3.6).
- 7 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
8 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
9 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
10 forage and cover.

11 Because there would be no project level impacts on salt marsh harvest mouse resulting from CM1,
12 the analysis of the effects and conservation actions does not include a comparison with standard
13 ratios used for project level CEQA analyses.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
17 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
18 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
19 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
20 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

21 These commitments are more than sufficient to support the conclusion that the near-term effects of
22 Alternative 9 would be less than significant under CEQA.

23 **Late Long-Term Timeframe**

24 Based on modeled habitat, the study area supports approximately 35,588 acres of salt marsh
25 harvest mouse modeled habitat. Alternative 9 as a whole would result in effects to 6,968 acres of
26 saltmarsh harvest mouse modeled habitat over the term of the Plan, which would include 5,376
27 acres of permanent losses and 1,592 acres of habitat conversions. The Plan includes a commitment
28 to restore or create 6,000 acres of tidal brackish emergent wetland, 1,500 acres of which would
29 target middle and high marsh habitat (primary habitat for salt marsh harvest mouse) (TBEWNC1.1,
30 TBEWNC1.2, SMHM1.1, associate with CM4); the protection of 6,500 acres of managed wetlands,
31 1,500 acres of which would be specifically managed for salt marsh harvest mouse (SMHM1.2 and
32 MWNC1.1, associated with CM3), and the protection and/or restoration of grassland adjacent to
33 tidal restoration (areas within 200 feet of tidal restoration) to provide upland refugia for salt marsh
34 harvest mouse (GNC1.4, associated with CM3 and CM8). Other factors relevant to effects on salt
35 marsh harvest mouse include:

- 36 • Tidal restoration actions would not immediately displace salt marsh harvest mouse in managed
37 wetlands as noted in the draft recovery plan for salt marsh harvest mouse because the
38 conversion of managed wetland to tidal marsh would be gradual. Tidal marsh restoration is
39 often accomplished by breaching levees and converting diked nontidal marsh currently
40 occupied by salt marsh harvest mouse populations to tidal wetlands, their historic condition.
41 Conversion of these subsided areas requires sedimentation and accretion over time to restore
42 marsh plains, resulting in a prolonged period (sometimes a decade or more) in which resident
43 mice populations are displaced by uninhabitable aquatic areas (U.S. Fish and Wildlife Service

1 2010). Despite these temporary adverse effects, the draft recovery plan and Suisun Marsh Plan
2 advocate strongly for restoration of tidal wetlands through the conversion of managed wetlands.
3 These plans are based on the premise that managed wetlands are at high risk of loss of salt
4 marsh harvest mouse habitat from a variety of factors, including flooding from levee failure and
5 cessation of active management (which is often necessary to maintain habitat values in managed
6 wetlands). Therefore, the temporary effects under BDCP are consistent with those deemed
7 acceptable in the draft recovery plan for salt marsh harvest mouse and the Suisun Marsh Plan.

- 8 • In order to ensure that temporal loss as a result of tidal natural communities restoration does
9 not adversely affect the salt marsh harvest mouse population, restoration in Suisun Marsh
10 would be carefully phased over time to offset adverse effects of restoration as it occurs, ensure
11 that short-term population loss is relatively small and incremental, and maintain local source
12 populations to recolonize newly restored areas. The tidal restoration projects in Suisun Marsh
13 would be implemented in 150-acre or greater patches that provide viable habitat areas for the
14 salt marsh harvest mouse habitat consistent with the draft tidal marsh recovery plan (U.S. Fish
15 and Wildlife Service 2010).
- 16 • The salt marsh harvest mouse population would be monitored during the phasing process (see
17 BDCP Chapter 3, Section 3.4.4.3.4.), and adaptive management would be applied to ensure
18 maintenance of the population as described in the BDCP (BDCP Chapter 3, Section 3.4.4.4 and
19 Section 3.6).
- 20 • The BDCP commits to manage reserve areas so that perennial pepperweed cover is no more
21 than 10% in tidal brackish emergent wetlands (Objective TBEWNC2.1), which would benefit
22 pickleweed production in the marsh. Salt marsh harvest mouse depends on pickleweed for
23 forage and cover.
- 24 • The habitat that would be restored and protected would consist of large blocks of contiguous
25 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
26 vegetation suitable for the species. This would provide greater habitat connectivity and greater
27 habitat value, which is expected to accommodate larger populations and to therefore increase
28 population resilience to random environmental events and climate change.

29 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
30 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
31 the restoration of 6,046 acres and the protection of 1,550 acres of modeled habitat for salt marsh
32 harvest mouse.

33 Alternative 9 would result in substantial modifications to salt marsh harvest mouse habitat in the
34 absence of other conservation actions. However, with habitat protection, restoration, management,
35 and enhancement associated with CM3, CM4, CM8 and CM11, guided by species-specific goals and
36 objectives and by AMM1-AMM5 and AMM26, which would be in place throughout the construction
37 period, Alternative 9 over the term of the BDCP would not result in a substantial adverse effect
38 through habitat modifications and would not substantially reduce the number or restrict the range
39 of the species. Therefore, the alternative would have a less-than-significant impact on salt marsh
40 harvest mouse.

41 **Impact BIO-159: Indirect Effects of Plan Implementation on Salt Marsh Harvest Mouse**

42 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),
43 and management and enhancement activities (CM11) could result in temporary noise and visual

1 disturbances to salt marsh harvest mouse occurring within 100 feet of these areas over the term of
2 the BDCP. These potential effects would be minimized or avoided through AMM1–AMM5, and
3 AMM26, which would be in effect throughout the term of the Plan.

4 The use of mechanical equipment during the implementation of the conservation measures could
5 cause the accidental release of petroleum or other contaminants that could affect salt marsh harvest
6 mouse and its habitat. The inadvertent discharge of sediment could also have a negative effect on
7 the species and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would
8 ensure measures are in place to prevent runoff from the construction area and potential effects of
9 sediment on salt marsh harvest mouse.

10 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
11 mercury. In general, the highest methylation rates are associated with high tidal marshes that
12 experience intermittent wetting and drying and associated anoxic conditions (Alpers et al. 2008).
13 High tidal marsh is considered to be primary habitat for salt marsh harvest mouse and thus the
14 species could be exposed to methyl mercury in tidal restoration areas. Salt marsh harvest mouse
15 may be exposed to elemental mercury by feeding on pickleweed, which is found concentrated in the
16 distal tips of pickleweed leaves (Yee et. al., 2008). Though elemental mercury is less bioavailable
17 than methylmercury, studies have shown that mercury can become methylated in the anaerobic
18 portions of the intestinal tract (Rudd et al. 1980, Rieder et al. 2013) and could thus become a
19 pathway for salt marsh harvest exposure to methylmercury. A study of small mammals residing in
20 pickleweed around the San Francisco Bay showed an absence of salt marsh harvest mouse where
21 mercury concentrations measured in house mice (*Mus musculus*) livers were $\geq 0.19 \mu\text{g/g}$ (dry
22 weight) (Clark et al. 1992). Clark et al (1992) also report that the lack of salt marsh harvest mouse at
23 these locations are not the result of undetected habitat differences or are by chance. Clarke et al
24 (1992) suggest that the absence of salt marsh harvest mouse at certain locations may be associated
25 with higher amounts of mercury and polychlorinated biphenyls (PCBs); however, because their
26 study didn't analyze contaminants in salt marsh harvest mouse and because (at that time) there was
27 no data in the literature on contaminants in harvest mice, they could not make conclusions on these
28 associations. Currently, it is unknown what the exact exposure pathways are or what tissue
29 concentrations are harmful to the salt marsh harvest mouse.

30 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
31 under the plan would generate less methylmercury than the existing managed wetlands. The
32 potential for salt marsh harvest mouse exposure to methyl mercury in Suisun Marsh may decrease
33 in the long term because the creation of tidal brackish emergent wetland would predominantly
34 result from the conversion of managed wetlands. *CM12 Methylmercury Management* includes
35 provisions for project-specific Mercury Management Plans. Along with avoidance and minimization
36 measures and adaptive management and monitoring, CM12 could reduce the effects of
37 methylmercury on salt marsh harvest mouse resulting from BDCP tidal restoration.

38 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 9
39 would avoid and minimize indirect effects on salt marsh harvest mouse. These AMMs would also
40 avoid and minimize effects that could substantially reduce the number of salt marsh harvest mouse,
41 or restrict the species' range. Therefore, the indirect effects of Alternative 9 would not have an
42 adverse effect on salt marsh harvest mouse.

43 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could
44 impact salt marsh harvest mouse within 100 feet of these disturbances. The use of mechanical

1 equipment during construction could cause the accidental release of petroleum or other
2 contaminants that could impact salt marsh harvest mouse and its habitat. The inadvertent discharge
3 of sediment adjacent to salt marsh harvest mouse habitat could also impact the species. With
4 implementation of AMM1–AMM5 and AMM26 as part of Alternative 9 construction, operation and
5 maintenance, the BDCP would avoid the potential for substantial adverse effects on salt marsh
6 harvest mouse, either indirectly or through habitat modifications, in that the BDCP would not result
7 in a substantial reduction in numbers or a restriction in the range of salt marsh harvest mouse. The
8 indirect effects of Alternative 9 would have a less-than-significant impact on salt marsh harvest
9 mouse.

10 Salt marsh harvest mouse could experience indirect effects from increased exposure to
11 methylmercury as a result of tidal habitat restoration (CM4). With implementation of CM12, the
12 potential indirect effects of methylmercury would not result in a substantial reduction in numbers
13 or a restriction in the range of salt marsh harvest mouse, and, therefore, would have a less-than-
14 significant impact on the species.

15 **Suisun Shrew**

16 Primary Suisun shrew habitat consists of all *Salicornia*-dominated natural seasonal wetlands and
17 certain *Scirpus* and *Typha* communities found within Suisun Marsh only. Low marsh dominated by
18 *Schoenoplectus acutus* and *S. californicus* and upland transitional zones within 150 feet of the tidal
19 wetland edge were classified separately as secondary habitat because they are used seasonally
20 (Hays and Lidicker 2000). All managed wetlands were excluded from the habitat model.
21 Construction and restoration associated with Alternative 9 conservation measures would result in
22 effects to modeled Suisun shrew habitat, which would include permanent losses and habitat
23 conversions (i.e., existing habitat converted to greater or lesser valued habitat for the species post-
24 restoration) as indicated in Table 12-9-58. All of the effects on the species would take place over an
25 extended period of time as tidal marsh is restored in the Plan Area. Full implementation of
26 Alternative 9 would also include the following conservation actions over the term of the BDCP to
27 benefit Suisun shrew (BDCP Chapter 3, *Conservation Strategy*).

- 28 ● Restore or create 6,000 acres of tidal brackish emergent wetland in CZ 11 to be consistent with
29 the final Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California
30 (TBEWNC1.1, associated with CM4)
- 31 ● Within the 6,000 acres of tidal brackish emergent wetland restored or created, distribute 1,500
32 acres of middle and high marsh (primary Suisun shrew habitat) to contribute to total (existing
33 and restored) acreage targets for each complex as specified in the final Recovery Plan for Tidal
34 Marsh Ecosystems of Northern and Central California (TBEWNC1.2, associated with CM4).
- 35 ● Limit perennial pepperweed to no more than 10% cover in the tidal brackish emergent wetland
36 natural community within the reserve system (TBEWNC2.1).
- 37 ● Protect or restore grasslands adjacent to restored tidal brackish emergent wetlands to provide at
38 least 200 feet of adjacent grasslands beyond the sea level rise accommodation area, which
39 provides refugia during high tides (GNC1.4, associated with CM3 and CM8).

40 As explained below, with the restoration or protection of these amounts of habitat, impacts on the
41 Suisun shrew would not be adverse for NEPA purposes and would be less than significant for CEQA
42 purposes.

1 **Table 12-9-58. Changes in Suisun Shrew Modeled Habitat Associated with Alternative 9 (acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	(CM1 Outside of species range)	0	0	0	0	NA	NA
Total Impacts CM1		0	0	0	0		
CM2–CM18	Primary	58	60	0	0	0	0
	Secondary	47	342	0	0	0	0
Total Impacts CM2–CM18		105	401	0	0	0	0
TOTAL IMPACTS		105	401	0	0	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

2

3 **Impact BIO-160: Loss or Conversion of Habitat for and Direct Mortality of Suisun shrew**

4 BDCP tidal restoration (CM4) would be the only conservation measure resulting in loss of habitat to
5 Suisun shrew. Habitat enhancement and management activities (CM11), which include ground
6 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. Each of
7 these activities is described in detail below. A summary statement of the combined impacts and
8 NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 9 • *CM4 Tidal Natural Communities Restoration* would result in effects to 401 acres of Suisun shrew
10 modeled habitat, which would include 377 acres of permanent losses and 24 acres of habitat
11 conversions. Suisun shrew may be displaced temporarily from areas of converted habitat but
12 would ultimately provide suitable habitat for the species. However, all 24 acres would be
13 converted from secondary to primary habitat and therefore over would be a net benefit to the
14 species. The hypothetical restoration footprints overlap with two CNDDDB records for Suisun
15 shrew (California Department of Fish and Wildlife 2013).
- 16 • *CM11 Natural Communities Enhancement and Management*: As described in the BDCP, the
17 restoration of at least 6,000 acres of tidal brackish emergent wetland would be managed to
18 provide habitat for covered species, including Suisun shrew. A variety of habitat management
19 actions included in *CM11 Natural Communities Enhancement and Management* that are designed
20 to enhance and manage these areas may result in localized ground disturbances that could
21 temporarily remove small amounts of Suisun shrew habitat. The areas of grasslands that would
22 be protected and/or restored within 200 feet of restored tidal marsh would also have
23 enhancement and management actions that would include invasive species control, nonnative
24 wildlife control, and vegetation management. Ground-disturbing activities, such as removal of

1 nonnative vegetation are expected to have minor effects on habitat and are expected to result in
2 overall improvements to and maintenance of Suisun shrew habitat values over the term of the
3 BDCP. These effects cannot be quantified, but are expected to be minimal and would be avoided
4 and minimized by the AMMs listed below.

- 5 • Injury and Direct Mortality: The use of heavy equipment and handtools may result in injury or
6 mortality to Suisun shrew during restoration, enhancement, and management activities.
7 However, preconstruction surveys, construction monitoring, and other measures would be
8 implemented to avoid and minimize injury or mortality of this species during these activities, as
9 required by the AMMs listed below.

10 The following paragraphs summarize the combined effects discussed above and describe other
11 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
12 also included.

13 ***Near-Term Timeframe***

14 The near-term BDCP conservation strategy has been evaluated to determine whether it would
15 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
16 the effects of near-term covered activities would not be adverse under NEPA. Alternative 9 would
17 affect 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These effects
18 include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary habitat
19 being converted to primary habitat.

20 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
21 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal
22 wetlands, of which approximately 150 feet of this area would benefit the species. These Plan goals
23 represent performance standards for considering the effectiveness of restoration actions. The acres
24 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-
25 term Plan goals would keep pace with the loss of habitat and effects to Suisun shrew.

26 Other factors relevant to effects on Suisun shrew are listed below.

- 27 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
28 loss of habitat and habitat fragmentation.
- 29 • The habitat that would be restored and protected would consist of large blocks of contiguous
30 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
31 vegetation suitable for the species. This would provide greater habitat connectivity and greater
32 habitat value and quantity, with is expected to accommodate larger populations and to therefore
33 increase population resilience to random environmental events and climate change.
- 34 • The amount of tidal habitat restored in the near term (2,000 acres) greatly exceeds the amount
35 permanently lost (105 acres).

36 Because there would be no project level impacts on Suisun shrew from CM1, the analysis of the
37 effects and conservation actions does not include a comparison to standard ratios used for project
38 level NEPA analyses.

39 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*

1 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
2 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
3 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
4 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

5 **Late Long-Term Timeframe**

6 Based on modeled habitat, the study area supports approximately 7,515 acres of Suisun shrew
7 modeled habitat. Alternative 9 as a whole would result in effects on 401 acres of Suisun shrew
8 modeled habitat over the term of the Plan, which would include 377 acres of permanent losses and
9 24 acres of habitat conversions (roughly 5% of the habitat in the study area).

10 The Plan includes a commitment to restore or create 6,000 acres of tidal brackish emergent wetland,
11 1,500 acres of which would target middle and high marsh habitat (primary habitat for Suisun
12 shrew) (Objectives TBEWNC1.1, TBEWNC1.2, SMHM1.1, associated with CM4) and the protection
13 and/or restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal
14 restoration, of which approximately 150 feet would likely benefit the species) to provide upland
15 refugia for Suisun shrew (Objectives GNC1.4, associated with CM3 and CM8). Other factors relevant
16 to effects on Suisun shrew are listed below.

- 17 ● Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
18 loss of habitat and habitat fragmentation.
- 19 ● The habitat that would be restored and protected would consist of large blocks of contiguous
20 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
21 vegetation suitable for the species. This would provide greater habitat connectivity and greater
22 habitat value and quantity, with is expected to accommodate larger populations and to therefore
23 increase population resilience to random environmental events and climate change.

24 The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost and
25 converted (401 acres). The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on*
26 *Covered Wildlife and Plant Species*) estimates that the restoration and protection actions discussed
27 above could result in the restoration of 6,006 acres and the protection of 232 acres of modeled
28 habitat for Suisun shrew.

29 **NEPA Effects:** In the absence of other conservation actions, the effects on Suisun shrew habitat from
30 Alternative 9 would represent an adverse effect as a result of habitat modification and potential for
31 direct mortality of a special-status species. However, the BDCP has committed to habitat protection,
32 restoration, management, and enhancement with CM3, CM4, CM8, and CM11. This habitat
33 protection, restoration, management, and enhancement would be guided by biological goals and
34 objectives and by AMM1–AMM5 and AMM26, which would be in place throughout the construction
35 period. Considering these commitments, losses and conversions of Suisun shrew habitat and
36 potential mortality of individuals in the near-term and late long-term under Alternative 9 would not
37 be an adverse effect.

38 **CEQA Conclusion:**

39 **Near-Term Timeframe**

40 The near-term BDCP conservation strategy has been evaluated to determine whether it would
41 provide sufficient habitat protection and/or restoration in an appropriate timeframe to ensure that
42 the effects of near-term covered activities would be less than significant under CEQA. Alternative 9

1 would affect 105 acres of Suisun shrew modeled habitat in the study area in the near-term. These
2 effects include 90 acres of permanent loss and 15 acres of converted habitat, which is all secondary
3 habitat being converted to primary habitat.

4 The BDCP has committed to near-term goals of restoring 2,000 acres of tidal brackish emergent
5 wetland and the protection and/or restoration of grasslands within 200 feet of restored tidal
6 wetlands, of which approximately 150 feet of this area would benefit the species. These Plan goals
7 represent performance standards for considering the effectiveness of restoration actions. The acres
8 of tidal restoration and the commitment to protection of adjacent uplands contained in the near-
9 term Plan goals would keep pace with the loss of habitat and effects to Suisun shrew.

10 Other factors relevant to effects on Suisun shrew are listed below.

- 11 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
12 loss of habitat and habitat fragmentation.
- 13 • The habitat that would be restored and protected would consist of large blocks of contiguous
14 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
15 vegetation suitable for the species. This would provide greater habitat connectivity and greater
16 habitat value and quantity, with is expected to accommodate larger populations and to therefore
17 increase population resilience to random environmental events and climate change.
- 18 • The amount of tidal habitat restored in the near term (2,000 acres) greatly exceeds the amount
19 permanently lost (105 acres).

20 Because there are no project level impacts on Suisun shrew from CM1, the analysis of the effects and
21 conservation actions does not include a comparison with standard ratios used for project level NEPA
22 analyses.

23 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
24 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
25 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
26 *Countermeasure Plan*, and *AMM26 Salt Marsh Harvest Mouse and Suisun Shrew*. All of these AMMs
27 include elements that avoid or minimize the risk of affecting habitats and species adjacent to work
28 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
29 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

30 These commitments are more than sufficient to support the conclusion that the near-term effects of
31 Alternative 9 would be less than significant under CEQA.

32 **Late Long-Term Timeframe**

33 Based on modeled habitat, the study area supports approximately 7,515 acres of Suisun shrew
34 modeled habitat. Alternative 9 as a whole would result in effects to 401 acres of Suisun shrew
35 modeled habitat over the term of the Plan, which would include 377 acres of permanent losses and
36 24 acres of habitat conversions (roughly 5% of the habitat in the study area). The Plan includes a
37 commitment to restore or create 6,000 acres of tidal brackish emergent wetland, 1,500 acres of
38 which would target middle and high marsh habitat (primary habitat for Suisun shrew) (Objectives
39 TBEWNC1.1, TBEWNC1.2, and SMHM1.1, associated with CM4), and the protection and/or
40 restoration of grassland adjacent to tidal restoration (areas within 200 feet of tidal restoration, of
41 which approximately 150 feet of this area would benefit the species) to provide upland refugia for

1 Suisun shrew (Objective GNC1.4, associated with CM3 and CM8). Other factors relevant to effects on
2 Suisun shrew are listed below.

- 3 • Restoration would be sequenced and oriented in a manner that minimizes any temporary, initial
4 loss of habitat and habitat fragmentation.
- 5 • The habitat that would be restored and protected would consist of large blocks of contiguous
6 tidal brackish emergent wetland that has a large proportion of pickleweed-dominated
7 vegetation suitable for the species. This would provide greater habitat connectivity and greater
8 habitat value and quantity, with is expected to accommodate larger populations and to therefore
9 increase population resilience to random environmental events and climate change.
- 10 • The amount of tidal habitat restored (6,000 acres) greatly exceeds the amount permanently lost
11 and converted (401 acres).

12 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
13 *Plant Species*) estimates that the restoration and protection actions discussed above could result in
14 the restoration of 6,006 acres and the protection of 232 acres of modeled habitat for Suisun shrew.

15 Alternative 9 would result in substantial modifications to Suisun shrew habitat in the absence of
16 other conservation actions. However, with habitat protection, restoration, management, and
17 enhancement associated with CM3, CM4, CM8, and CM11, guided by species-specific goals and
18 objectives and by AMM1–AMM5, and AMM26, which would be in place throughout the construction
19 period, Alternative 9 over the term of the BDCP would not result in a substantial adverse effect
20 through habitat modifications and would not substantially reduce the number or restrict the range
21 of the species. Therefore, the alternative would have a less-than-significant impact on Suisun shrew.

22 **Impact BIO-161: Indirect Effects of Plan Implementation on Suisun Shrew**

23 Construction/disturbance activities associated tidal restoration (CM4), grassland restoration (CM8),
24 and management and enhancement activities (CM11) could result in temporary noise and visual
25 disturbances to Suisun shrew occurring within 100 feet of these areas over the term of the BDCP.
26 These potential effects would be minimized or avoided through AMM1–AMM5, and AMM26, which
27 would be in effect throughout the term of the Plan.

28 The use of mechanical equipment during the implementation of the conservation measures could
29 cause the accidental release of petroleum or other contaminants that could affect Suisun shrew and
30 its habitat. The inadvertent discharge of sediment could also have a negative effect on the species
31 and its habitat. AMM1–AMM5 would minimize the likelihood of such spills and would ensure
32 measures are in place to prevent runoff from the construction area and potential effects of sediment
33 on Suisun shrew.

34 Tidal marsh restoration has the potential to increase Suisun shrew's exposure to mercury. Mercury
35 is transformed into the more bioavailable form of methylmercury under anaerobic conditions,
36 which in the environment typically occurs in sediments subjected to regular wetting and drying
37 such as tidal marshes and flood plains. Thus, BDCP restoration activities that create newly
38 inundated areas could increase bioavailability of mercury. In general, the highest methylation rates
39 are associated with high tidal marshes that experience intermittent wetting and drying and
40 associated anoxic conditions (Alpers et al. 2008). High and mid tidal marsh is considered to be
41 primary habitat for Suisun shrew and thus the species could be exposed to methylmercury in tidal
42 restoration areas. Suisun shrew could be exposed to methylmercury by feeding on marsh

1 invertebrates that may bioaccumulate methylmercury from marsh sediments. Toxic concentrations
2 of methylmercury have been found in the kidneys of shrews that inhabit contaminated sites and
3 forage on earthworms and other prey that live within contaminated sediments (Talmage and
4 Walton 1993; Hinton and Veiga 2002).

5 The Suisun Marsh Plan (Bureau of Reclamation et al. 2010) anticipates that tidal wetlands restored
6 under the plan would generate less methylmercury than the existing managed wetlands. The
7 potential for Suisun shrew exposure to methyl mercury in Suisun Marsh may decrease in the long
8 term because the creation of tidal brackish emergent wetland would predominantly result from the
9 conversion of managed wetlands. *CM12 Methylmercury Management* includes provisions for project-
10 specific Mercury Management Plans. Along with avoidance and minimization measures and adaptive
11 management and monitoring, CM12 could reduce the effects of methylmercury on Suisun shrew
12 resulting from BDCP tidal restoration.

13 **NEPA Effects:** Implementation of the AMMs listed above as part of implementing Alternative 9
14 would avoid and minimize the potential for substantial adverse effects on Suisun shrew, either
15 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that
16 could substantially reduce the number of Suisun shrew, or restrict the species' range. Therefore, the
17 indirect effects of Alternative 9 would not have an adverse effect on Suisun shrew.

18 **CEQA Conclusion:** Indirect effects from construction-related noise and visual disturbances could
19 impact Suisun shrew within 100 feet of these disturbances. The use of mechanical equipment during
20 construction could cause the accidental release of petroleum or other contaminants that could
21 impact Suisun shrew and its habitat. The inadvertent discharge of sediment adjacent to Suisun
22 shrew habitat could also impact the species. With implementation of AMM1-AMM5, and AMM26 as
23 part of Alternative 9 construction, operation and maintenance, the BDCP would avoid the potential
24 for substantial adverse effects on Suisun shrew, either indirectly or through habitat modifications, in
25 that the BDCP would not result in a substantial reduction in numbers or a restriction in the range of
26 Suisun shrew. The indirect effects of Alternative 9 would have a less-than-significant impact on
27 Suisun shrew.

28 Suisun shrew could experience indirect effects from increased exposure to methylmercury as a
29 result of tidal habitat restoration (CM4). With implementation of CM12, the potential indirect effects
30 of methylmercury would not result in a substantial reduction in numbers or a restriction in the
31 range of Suisun shrew, and, therefore, would have a less-than-significant impact on the species.

32 **San Joaquin Kit Fox and American Badger**

33 Within the study area, the modeled habitat for the San Joaquin kit fox and potential habitat for the
34 American badger is restricted to 5,327 acres of grassland habitat west of Clifton Court Forebay along
35 the study area's southwestern edge, in CZ 7-CZ 10. The study area represents the extreme
36 northeastern corner of the San Joaquin kit fox's range in California, which extends westward and
37 southward from the study area border. The northern range of the San Joaquin kit fox (including the
38 study area) was most likely marginal habitat historically and has been further degraded due to
39 development pressures, habitat loss, and fragmentation (Clark et al. 2007). CNDDDB (California
40 Department of Fish and Wildlife 2013) reports eight occurrences of San Joaquin kit foxes along the
41 extreme western edge of the Plan Area within CZ 8, south of Brentwood (Figure 12-49). However,
42 Clark et al. (2007) provide evidence that a number of CNDDDB occurrences in the northern portion of
43 the species' range may be coyote pups misidentified as San Joaquin kit foxes. Smith et al. (2006)
44 suggest that the northern range may possibly be a population sink for the San Joaquin kit fox. There

1 are five American badger records in the study area (California Department of Fish and Wildlife
2 2013). Two are from 1938 and no longer extant. The remaining three are all located in CZ 8, west of
3 Clifton Court Forebay.

4 Construction and restoration associated with Alternative 9 conservation measures would result in
5 both temporary and permanent losses of San Joaquin kit and American badger habitat (Table 12-9-
6 59). Grassland restoration, and protection and management of natural communities could affect
7 modeled San Joaquin kit fox habitat and potential American badger habitat. Full implementation of
8 Alternative 9 would also include biological objectives over the term of the BDCP to benefit the San
9 Joaquin kit fox which would also benefit American badger which uses similar habitat (BDCP Chapter
10 3, *Conservation Strategy*). The conservation strategy for the San Joaquin kit fox involves protecting
11 and enhancing habitat in the northern extent of the species' range to increase the likelihood that San
12 Joaquin kit fox may reside and breed in the Plan Area; and providing connectivity to habitat outside
13 the Plan Area. The conservation measures that would be implemented to achieve the biological goals
14 and objectives are summarized below.

- 15 • Protect and improve habitat linkages that allow terrestrial covered and other native species to
16 move between protected habitats within and adjacent to the Plan Area (Objective L3.1,
17 associated with CM3-8, and CM11).
- 18 • Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
19 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
- 20 • Restore or create alkali seasonal wetlands in CZ 1, CZ 8, and/or CZ 11 (up to 72 acres of alkali
21 seasonal wetland complex restoration) (Objective ASWNC1.2, associated with CM3 and CM9).
- 22 • Protect 600 acres of existing vernal pool complex in CZ 1, CZ 8, and/or CZ 11, primarily in core
23 vernal pool recovery areas identified in the Recovery Plan for Vernal Pool Ecosystems of
24 California and Southern Oregon (U.S. Fish and Wildlife Service 2005) (Objective VPNC1.1,
25 associated with CM3).
- 26 • Restore vernal pool complex in CZ 1, CZ 8, and/or CZ 11 to achieve no net loss of vernal pool
27 acreage (up to 67 acres of vernal pool complex restoration) (Objective VPNC1.2, associated with
28 CM3 and CM9).
- 29 • Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
- 30 • Restore 2,000 acres of grasslands to connect fragmented patches of protected grassland
31 (Objective GNC1.2, associated with CM3 and CM8).
- 32 • Increase burrow availability for burrow-dependent species in grasslands surrounding alkali
33 seasonal wetlands within restored and protected alkali seasonal wetland complex (Objective
34 ASWNC2.3, associated with CM11).
- 35 • Increase prey, especially small mammals and insects, for grassland-foraging species in
36 grasslands surrounding alkali seasonal wetlands within restored and protected alkali seasonal
37 wetland complex (Objective ASWNC2.4, associated with CM11).
- 38 • Increase burrow availability for burrow-dependent species in grasslands surrounding vernal
39 pools within restored and protected vernal pool complex (Objective VPNC2.4, associated with
40 CM11).

- 1 • Increase prey, especially small mammals and insects, for grassland-foraging species in
2 grasslands surrounding vernal pools within restored and protected vernal pool complex
3 (Objective VPNC2.5, associated with CM11).
- 4 • Increase burrow availability for burrow-dependent species (Objective GNC2.3, associated with
5 CM11).
- 6 • Increase prey abundance and accessibility, especially small mammals and insects, for grassland-
7 foraging species (Objective GNC2.4, associated with CM11).

8 As explained below, with the restoration and protection of these amounts of habitat, in addition to
9 implementation of AMMs to reduce potential effects, impacts on San Joaquin kit fox and American
10 badger would not be adverse for NEPA purposes and would be less than significant for CEQA
11 purposes.

12 **Table 12-9-59. Changes in San Joaquin Kit Fox Modeled Habitat Associated with Alternative 9**
13 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Grassland	15	15	10	10	NA	NA
Total Impacts CM1		15	15	10	10		
CM2–CM18	Grassland	3	8	0	0	0	0
Total Impacts CM2–CM18		3	8	0	0	0	0
TOTAL IMPACTS		18	23	10	10	0	0

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only.

NT = near-term

LLT = late long-term

NA = not applicable

14

15 **Impact BIO-162: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Kit Fox**
16 **and American Badger**

17 Alternative 9 conservation measures would result in the permanent and temporary loss combined
18 of 33 acres of modeled habitat for the San Joaquin kit fox (Table 12-9-59). Because American badger
19 uses grasslands for denning and foraging and may occupy the same range as the San Joaquin kit fox
20 in the project area, effects on are anticipated to be the same as those described for San Joaquin kit
21 fox. There are no San Joaquin kit fox and no American badger occurrences that overlap with the Plan
22 footprint. Construction of Alternative 9 water conveyance facilities (CM1) and recreation facilities
23 (CM11) would remove habitat. Habitat enhancement and management activities (CM11) could
24 result in local adverse effects on species. In addition, construction vehicle activity could cause injury
25 or mortality of San Joaquin kit foxes and badgers. Each of these individual activities is described

1 below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion
2 follow the individual conservation measure discussions.

- 3 • *CM1 Water Facilities and Operation*: Construction of the conveyance facilities would result in the
4 permanent loss of approximately 15 acres and the temporary loss of 10 acres of modeled San
5 Joaquin kit fox habitat and American badger habitat. This habitat is located in areas of
6 naturalized grassland in a highly disturbed or modified setting on lands immediately adjacent to
7 Clifton Court Forebay, in CZ 8.
- 8 • *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails
9 and recreational staging areas would result in the permanent removal of 8 acres of San Joaquin
10 kit fox modeled habitat and American badger potential habitat. *AMM24 San Joaquin Kit Fox*,
11 would be implemented to ensure that San Joaquin kit fox dens are avoided, as described in
12 Appendix 3B, *Environmental Commitments, AMMs, and CMs*. Mitigation Measure BIO-162:
13 *Conduct Preconstruction Survey for American Badger* would be implemented to ensure that
14 American badger dens are avoided.

15 Passive recreation in the reserve system could result in disturbance of San Joaquin kit foxes and
16 American badgers at their den site. Natal and pupping dens would be particularly vulnerable to
17 human disturbance. Additionally, disease could be transmitted from domestic dogs that enter
18 the reserve system with recreational users. However, *AMM37 Recreation* and Mitigation
19 Measure BIO-162 would prohibit construction of new trails within 250 feet of active San Joaquin
20 kit fox and American badger dens. Existing trails would be closed within 250 feet of active
21 natal/pupping dens until young have vacated, and within 50 feet of other active dens. No dogs
22 would be allowed on reserve units with active San Joaquin kit fox and American badger
23 populations. Rodent control would be prohibited even on grazed or equestrian access areas with
24 San Joaquin kit fox or American badger populations. *AMM37* measures to protect San Joaquin kit
25 fox would also benefit American badger if present. With these restrictions, recreation-related
26 effects on San Joaquin kit fox and American badger are expected to be minimal.

27 The BDCP would require the protection of grasslands in large patch sizes connected to existing
28 large areas of grassland, habitat corridors and transition habitat areas to improve the ecological
29 functions of the grasslands necessary to support the San Joaquin kit fox. American badger is
30 expected to benefit in a similar fashion.

31 The BDCP would require the enhancement and management of these protected existing
32 grasslands and restored grasslands to improve their function as a natural community of plants
33 and wildlife and for associated covered species, including San Joaquin kit fox and American
34 badger. The BDCP also includes actions to improve rodent prey availability.

35 However, management activities could result in injury or mortality of San Joaquin kit fox or
36 American badger if individuals were present in work sites or if dens were located in the vicinity
37 of habitat management work sites. A variety of habitat management actions included in *CM11*
38 that are designed to enhance wildlife values on protected lands may result in localized ground
39 disturbances that could temporarily remove small amounts of San Joaquin kit fox and American
40 badger habitat near Clifton Court Forebay, in CZ 8. Ground-disturbing activities, such as removal
41 of nonnative vegetation and road and other infrastructure maintenance activities, are expected
42 to have minor effects on available habitat and are expected to result in overall improvements to
43 and maintenance of San Joaquin kit fox and badger habitat values over the term of the BDCP.
44 These effects cannot be quantified, but are expected to be minimal and would be avoided and

1 minimized through the AMMs and mitigation measures listed below. These AMMs and
2 mitigation measures would remain in effect throughout the BDCP's construction phase.

- 3 • Operations and maintenance: Ongoing maintenance of BDCP facilities would be expected to have
4 little if any adverse effect on San Joaquin kit fox or American badger. Postconstruction
5 operations and maintenance of the above-ground water conveyance facilities and restoration
6 infrastructure could result in ongoing but periodic disturbances that could affect either species'
7 use of the surrounding habitat near Clifton Court Forebay, in CZ 8. Maintenance activities would
8 include vegetation management, levee and structure repair, and regrading of roads and
9 permanent work areas. These effects, however, would be minimized with implementation of
10 AMM1-AMM6, AMM10, and AMM24 and with preconstruction surveys for the American badger,
11 as required by Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American*
12 *Badger*.
- 13 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
14 either species. If San Joaquin kit fox or American badger reside where activities take place (most
15 likely in the vicinity of Clifton Court Forebay, in CZ 8), the operation of equipment for land
16 clearing, construction, operations and maintenance, and restoration, enhancement, and
17 management activities could result in injury to or mortality of either species. Measures would be
18 implemented to avoid and minimize injury to or mortality of these species as described in
19 AMM1-AMM6, AMM10, and AMM24 (see Appendix 3B, *Environmental Commitments, AMMs, and*
20 *CMs*) and Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American Badger*.

21 The following paragraphs summarize the combined effects discussed above and describe other
22 BDCP conservation actions that offset or avoid these effects. NEPA effects and a CEQA conclusion are
23 also included.

24 ***Near-Term Timeframe***

25 Because water conveyance facilities construction is being evaluated at the project level, the near-
26 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
27 protection or restoration in an appropriate timeframe to ensure that the construction effects would
28 not be adverse under NEPA.

29 Under Alternative 9 there would be a loss of 28 acres of San Joaquin kit fox modeled habitat and
30 American badger habitat from CM1 (25 acres) and CM11 (3 acres).

31 Typical NEPA project-level mitigation ratio for the natural community that would be affected and
32 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3 of the
33 BDCP would be 2:1 for protection of grassland. Using this ratio would indicate that 56 acres of
34 grassland should be protected for San Joaquin kit fox to mitigate near-term losses.

35 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective
36 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland
37 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal
38 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000
39 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities
40 are expected to be concluded during the first 10 years of Plan implementation, which is close
41 enough in time to the occurrence of impacts to constitute adequate mitigation for NEPA purposes.
42 These commitments are more than sufficient to support the conclusion that the near-term effects of

1 Alternative 9 would be not be adverse under NEPA, because the number of acres required to meet
2 the typical ratios described above would be only 56 acres of grassland protected.

3 The effects on San Joaquin kit fox and American badger habitat from Alternative 9 as a whole would
4 represent an adverse effect as a result of habitat modification of a special-status species and
5 potential for direct mortality in the absence of other conservation actions. However, the effects of
6 Alternative 9 would be not be adverse with habitat protection, restoration, and management and
7 enhancement in addition to implementation of *AMM1 Worker Awareness Training*, *AMM2*
8 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
9 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
10 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
11 *Natural Communities*, *AMM24 San Joaquin Kit Fox*, and *AMM37 Recreation*. These AMMs include
12 elements that avoid or minimize the risk of construction activity affecting habitat and species
13 adjacent to work areas and storage sites. Remaining effects would be addressed by implementation
14 of Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American Badger*. BDCP
15 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
16 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

17 **Late Long-Term Timeframe**

18 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 9 as a
19 whole would result in the permanent loss of and temporary effects to 33 acres of modeled habitat
20 for San Joaquin kit fox and potential habitat for American badger representing less than 1% of the
21 modeled habitat.

22 With full implementation of the BDCP, at least 1,000 acres of grassland would be protected in CZ 8,
23 where the San Joaquin kit fox and American badger is most likely to occur if present in the Plan Area.
24 Additionally, a portion of the 2,000 acres of grassland restoration would likely occur in CZ 8.
25 Assuming the restored grasslands would provide suitable San Joaquin kit fox habitat proportional to
26 the amount of modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in
27 the Plan Area consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored
28 grasslands would be suitable for both species (6.6% of 2,000 acres).

29 Because San Joaquin kit fox home ranges are large (ranging from around 1 to 12 square miles; see
30 BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the conservation of the
31 species. Grasslands would be acquired for protection in locations that provide connectivity to
32 existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining San Joaquin kit
33 fox habitat within and adjacent to the Plan Area. Connectivity to occupied habitat adjacent to the
34 Plan Area would help ensure the movement of San Joaquin kit foxes and American badger, if present,
35 to larger habitat patches outside of the Plan Area in Contra Costa County. Grassland protection
36 would focus in particular on acquiring the largest remaining contiguous patches of unprotected
37 grassland habitat, which are located south of SR 4 in CZ 8 (BDCP Appendix 2.A). This area connects
38 to over 620 acres of existing habitat that was protected under the East Contra Costa County
39 HCP/NCCP.

40 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to
41 increase mammal burrows, which could benefit the San Joaquin kit fox and American badger by
42 increasing potential den sites, which are a limiting factor for the San Joaquin kit fox in the northern
43 portion of its range (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective
44 GNC2.3, Objective GNC2.4). These management and enhancement actions are expected to benefit the

1 San Joaquin kit fox as well as the American badger by increasing the habitat value of the protected
2 and restoration grasslands.

3 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the
4 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this
5 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches
6 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool
7 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in
8 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities
9 construction.

10 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
11 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
12 restoration of grassland and vernal pool that could overlap with the species model, would result in
13 the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In addition, protection of
14 grassland and vernal pool complex could overlap with the species model and would result in the
15 protection of 1,011 acres of modeled habitat for San Joaquin kit fox. These restoration and
16 protection actions would also benefit the American badger.

17 **NEPA Effects:** In the absence of other conservation actions, the effects on San Joaquin kit fox and
18 American badger habitat from Alternative 9 would represent an adverse effect as a result of habitat
19 modification and potential direct mortality of special-status species. However, with habitat
20 protection, restoration, management, and enhancement associated with CM3, CM8, and CM11, and
21 guided by AMM1–AMM6, AMM10, AMM24, and AMM37, which would be in effect during the
22 construction period, and with implementation of Mitigation Measure BIO-162, *Conduct*
23 *Preconstruction Survey for American Badger*, the effects of Alternative 9 as a whole on San Joaquin kit
24 fox and American badger would not be adverse under NEPA.

25 **CEQA Conclusion:**

26 **Near-Term Timeframe**

27 Because water conveyance facilities construction (CM1) is being evaluated at the project level, the
28 near-term BDCP strategy has been analyzed to determine whether it would provide sufficient
29 habitat protection or restoration in an appropriate timeframe to ensure that the construction
30 impacts would be less than significant under CEQA.

31 Under Alternative 9 there would be a loss of 28 acres of San Joaquin kit fox modeled habitat and
32 American badger habitat from CM1 (25 acres) and CM11 (3 acres).

33 Typical CEQA project-level mitigation ratio for the natural community that would be affected and
34 that is identified in the biological goals and objectives for San Joaquin kit fox in Chapter 3 of the
35 BDCP would be 2:1 for protection of grassland. Using this ratio would indicate that 56 acres of
36 grassland should be protected for San Joaquin kit fox and American badger to mitigate near-term
37 losses.

38 The BDCP has committed to near-term restoration of 58 acres of alkali seasonal wetland (Objective
39 ASWNC1.2), 40 acres of vernal pool complex (Objective VPNC1.2), and 1,140 acres of grassland
40 (Objective GNC1.2). In addition, there would be near-term protection of 120 acres of alkali seasonal
41 wetland (Objective ASWNC1.1), 400 acres of vernal pool complex (Objective VPNC1.1), and 2,000
42 acres of grassland (Objective GNC1.1). The natural community restoration and protection activities

1 are expected to be concluded during the first 10 years of Plan implementation, which is close
2 enough in time to the occurrence of impacts to constitute adequate mitigation for CEQA purposes.
3 These commitments are more than sufficient to support the conclusion that the near-term effects of
4 Alternative 9 would not be significant under CEQA, because the number of acres required to meet
5 the typical ratios described above would be only 56 acres of grassland protected.

6 The BDCP also contains commitments to implement AMM1–AMM6, AMM10, AMM24, and AMM37
7 which include elements that avoid or minimize the risk of construction activity impacting habitat
8 and species adjacent to work areas and storage sites. Remaining effects would be addressed by
9 implementation of Mitigation Measure BIO-162. BDCP Appendix 3.C describes the AMMs, which
10 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
11 *AMMs, and CMs*, to the Final EIR/EIS.

12 These commitments are more than sufficient to support the conclusion that the near-term effects of
13 Alternative 9 on San Joaquin kit fox and American badger would be less than significant under CEQA,
14 because the number of acres required to meet the typical ratios described above would be only 56
15 acres of grassland protected

16 **Late Long-Term Timeframe**

17 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 9 as a
18 whole would result in the permanent loss of and temporary effects to 33 acres of modeled habitat
19 for San Joaquin kit fox and potential habitat for American badger representing less than 1% of the
20 modeled habitat.

21 With full implementation of the BDCP, at least 1,000 acres of grassland would be protected in CZ 8,
22 where the San Joaquin kit fox and American badger are most likely to occur if present in the Plan
23 Area. Additionally, a portion of the 2,000 acres of grassland restoration would likely occur in CZ 8.
24 Assuming the restored grasslands would provide suitable San Joaquin kit fox habitat proportional to
25 the amount of modeled habitat in this natural community in the Plan Area (6.8% of the grasslands in
26 the Plan Area consist of modeled San Joaquin kit fox habitat), an estimated 132 acres of restored
27 grasslands would be suitable for the species (6.6% of 2,000 acres).

28 Because San Joaquin kit fox home ranges are large (ranging from around 1 to 12 square miles; see
29 BDCP Appendix 2.A, *Covered Species Accounts*), habitat connectivity is key to the conservation of the
30 species. Grasslands would be acquired for protection in locations that provide connectivity to
31 existing protected breeding habitats in CZ 8 (Objective L3.1) and to other adjoining San Joaquin kit
32 fox and American badger habitat within and adjacent to the Plan Area. Connectivity to occupied
33 habitat adjacent to the Plan Area would help ensure the movement of San Joaquin kit foxes and
34 American badgers, if present, to larger habitat patches outside of the Plan Area in Contra Costa
35 County. Grassland protection would focus in particular on acquiring the largest remaining
36 contiguous patches of unprotected grassland habitat, which are located south of SR 4 in CZ 8 (BDCP
37 Appendix 2.A). This area connects to over 620 acres of existing habitat that was protected under the
38 East Contra Costa County HCP/NCCP.

39 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to
40 increase mammal burrows, which could benefit the San Joaquin kit fox and American badger by
41 increasing potential den sites, which are a limiting factor for the San Joaquin kit fox in the northern
42 portion of its range (Objectives ASWNC2.3, ASWNC2.4, VPNC2.4, Objective VPNC2.5, Objective
43 GNC2.3, Objective GNC2.4). These management and enhancement actions are expected to benefit the

1 San Joaquin kit fox as well as the American badger by increasing the habitat value of the protected
2 and restoration grasslands.

3 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the
4 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this
5 species. The BDCP's commitment to protect the largest remaining contiguous habitat patches
6 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool
7 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in
8 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities
9 construction.

10 The BDCP's beneficial effects analysis (BDCP Chapter 5, Section 5.6, *Effects on Covered Wildlife and*
11 *Plant Species*) estimates that the restoration and protection actions discussed above, as well as the
12 restoration of grassland and vernal pool that could overlap with the species model, would result in
13 the restoration of 131 acres of modeled habitat for San Joaquin kit fox. In addition, protection of
14 grassland and vernal pool complex could overlap with the species model and would result in the
15 protection of 1,011 acres of modeled habitat for San Joaquin kit fox. These restoration and
16 protection actions would also benefit the American badger.

17 In the absence of other conservation actions, the effects on San Joaquin kit fox and American badger
18 habitat from Alternative 9 would represent a significant impact as a result of habitat modification
19 and potential direct mortality of a special-status species. However, with habitat protection,
20 restoration, management, and enhancement associated with CM3, CM8, and CM11, and guided by
21 AMM1-AMM6, AMM10, AMM24, and AMM37, which would be in place throughout the time period
22 of construction, and with implementation of Mitigation Measure BIO-162, the impact of Alternative
23 9 as a whole on San Joaquin kit fox and American badger would be less than significant.

24 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

25 A qualified biologist provided by DWR will survey for American badger concurrent with the
26 preconstruction survey for San Joaquin kit fox and burrowing owl. If badgers are detected, the
27 biologist will passively relocate badgers out of the work area prior to construction if feasible. If
28 an active den is detected within the work area, DWR will establish a suitable buffer distance and
29 avoid the den until the qualified biologist determines the den is no longer active. Dens that are
30 determined to be inactive by the qualified biologist will be collapsed by hand to prevent
31 occupation of the den between the time of the survey and construction activities. In addition,
32 ground disturbance within project-related conservation areas within 50 feet of active American
33 badger dens would be prohibited. Existing trails would be closed within 250 feet of active
34 natal/pupping dens until young have vacated, and within 50 feet of other active dens. No dogs
35 would be allowed on conservation areas with active American badger populations. Rodent
36 control would be prohibited on areas with American badger populations to ensure rodent prey
37 availability. Mitigation Measure BIO-162 is applicable to all ground-disturbing activities related
38 to construction, restoration, and operations and maintenance.

39 **Impact BIO-163: Indirect Effects of Plan Implementation on San Joaquin Kit Fox and** 40 **American Badger**

41 Noise and visual disturbances outside the project footprint but within 250 feet of construction
42 activities could temporarily affect modeled San Joaquin kit fox habitat and potential American
43 badger. Water conveyance facilities operations and maintenance activities would include vegetation

1 and weed control, rodent control, canal maintenance, infrastructure and road maintenance, levee
2 maintenance, and maintenance and upgrade of electrical systems. Because operations and
3 maintenance are covered activities rodent control would be prohibited in areas with San Joaquin kit
4 fox or American badger populations to ensure rodent prey availability. While maintenance activities
5 are not expected to remove San Joaquin kit fox and badger habitat, operation of equipment could
6 disturb small areas of vegetation around maintained structures and could result in injury or
7 mortality of individual foxes and badgers, if present. Given the remote likelihood of active San
8 Joaquin kit fox or badger dens in the vicinity of the conveyance facility, the potential for this effect is
9 small and would further be minimized with the implementation of seasonal no-disturbance buffers
10 around occupied dens, if any, and other measures as described in AMM24 and Mitigation Measure
11 BIO-162.

12 **NEPA Effects:** Implementation of the AMMs listed above and Mitigation Measure BIO-162, *Conduct*
13 *Preconstruction Survey for American Badger*, would avoid the potential for substantial adverse
14 effects on San Joaquin kit fox or American badger, either indirectly or through habitat modifications.
15 These measures would also avoid and minimize effects that could substantially reduce the number
16 of San Joaquin kit fox or American badger, or restrict either species' range. Therefore, the indirect
17 effects of Alternative 9 would not have an adverse effect on San Joaquin kit fox or American badger.

18 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
19 as construction-related noise and visual disturbances could impact San Joaquin kit fox and American
20 badger. With implementation of AMM1–AMM6, AMM10, AMM24, and AMM37 as part of Alternative
21 9 construction, operation, and maintenance, the BDCP would avoid the potential for significant
22 adverse effects on either species, either indirectly or through habitat modifications, and would not
23 result in a substantial reduction in numbers or a restriction in the range of either species. In
24 addition, Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American Badger*, would
25 reduce the impact of indirect effects of Alternative 9 on American badger to a less-than-significant
26 level.

27 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

28 Please see Mitigation Measure BIO-162 under Impact BIO-162.

29 **San Joaquin Pocket Mouse**

30 Habitat for this species consists of the grassland natural community throughout the Plan Area. The
31 species requires friable soils for burrowing. Construction and restoration associated with
32 Alternative 9 conservation measures would result in both temporary and permanent losses of San
33 Joaquin pocket mouse habitat as indicated in Table 12-9-60. Full implementation of Alternative 9
34 would also include the following conservation actions over the term of the BDCP that would likely
35 benefit San Joaquin pocket mouse.

- 36 ● Protect 8,000 acres of grasslands (GNC1.1, associated with CM3).
- 37 ● Restore 2,000 acres of grasslands to connect fragmented patches of protected grasslands
38 (GNC1.2, associated with CM8).
- 39 ● Restore and sustain a mosaic of grassland vegetation alliances, reflecting localized water
40 availability, soil chemistry, soil texture, topography, and disturbance regimes, with
41 consideration of historical states (GNC2.1).

1 As explained below, with the restoration or protection of these amounts of habitat, impacts on San
2 Joaquin pocket mouse would not be adverse for NEPA purposes and would be less than significant
3 for CEQA purposes.

4 **Table 12-9-60. Changes in San Joaquin Pocket Mouse Habitat Associated with Alternative 9**
5 **(acres)^a**

Conservation Measure ^b	Habitat Type	Permanent		Temporary		Periodic ^d	
		NT	LLT ^c	NT	LLT ^c	CM2	CM5
CM1	Grassland	82	82	344	344	NA	NA
Total Impacts CM1		82	82	344	344		
CM2-CM18	Grassland	889	2,057	239	273	385-1,277	514
Total Impacts CM2-CM18		889	2,057	239	273	385-1,277	514
TOTAL IMPACTS		971	2,139	583	617	385-1,277	514

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP’s near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^d Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as a range based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

6

7 **Impact BIO-164: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Pocket**
8 **Mouse**

9 Alternative 9 conservation measures would result in the combined permanent and temporary loss
10 of up to 2,756 acres of habitat for San Joaquin pocket mouse (of which 2,139 acres would be a
11 permanent loss and 617 acres would be a temporary loss of habitat, Table 12-9-60). Conservation
12 measures that would result in these losses are conveyance facilities and transmission line
13 construction, and establishment and use of borrow and spoil areas (CM1), *CM2 Yolo Bypass Fisheries*
14 *Enhancement*, *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain*
15 *Restoration*, *CM7 Riparian Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal*
16 *Wetland Complex Restoration*, *CM10 Nontidal Marsh Restoration*, *CM11 Natural Communities*
17 *Enhancement and Management*, and *CM18 Conservation Hatcheries*. The majority of habitat loss
18 would result from CM4. Habitat enhancement and management activities (CM11), which include
19 ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.
20 In addition, maintenance activities associated with the long-term operation of the water conveyance
21 facilities and other BDCP physical facilities could degrade or eliminate San Joaquin pocket mouse
22 habitat. Each of these individual activities is described below. A summary statement of the combined
23 impacts and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 24 • *CM1 Water Facilities and Operation*: Construction of Alternative 9 conveyance facilities would
25 result in the combined permanent and temporary loss of up to 426 acres of potential San

1 Joaquin pocket mouse habitat (82 acres of permanent loss, 344 acres of temporary loss) in CZ 5,
2 CZ 6, and CZ 8. The majority of grassland that would be removed would be on the existing levees
3 along the conveyance route. These areas represent poor-value habitat for the species because
4 most of these areas consists of narrow strips of grass that are often managed to remove
5 burrowing species.

- 6 ● *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo bypass fisheries enhancement
7 (CM2) would permanently remove 388 acres of potential San Joaquin pocket mouse habitat in
8 the Yolo Bypass in CZ 2. In addition, 239 acres would be temporarily removed. Most of the
9 grassland losses would occur at the north end of the bypass below Fremont Weir, along the Toe
10 Drain/Tule Canal, and along the west side channels.
- 11 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration (CM4) site preparation
12 and inundation would permanently remove an estimated 1,122 acres of potential San Joaquin
13 pocket mouse habitat. The majority of the losses would likely occur in the vicinity of Cache
14 Slough, on Decker Island in the West Delta ROA, on the upslope fringes of Suisun Marsh, and
15 along narrow bands adjacent to waterways in the South Delta ROA. Tidal restoration would
16 directly impact and fragment remaining grassland just north of Rio Vista in and around French
17 and Prospect Islands, and in an area south of Rio Vista around Threemile Slough.
- 18 ● *CM5 Seasonally Inundated Floodplain Restoration*: Construction of setback levees to restore
19 seasonally inundated floodplain (CM5) would permanently and temporarily remove
20 approximately 85 acres of San Joaquin pocket mouse habitat (51 permanent, 34 temporary).
21 These losses would be expected to occur along the San Joaquin River and other major
22 waterways in CZ 7.
- 23 ● *CM7 Riparian Natural Community Restoration*: Riparian restoration would impact 410 acres of
24 grasslands, primarily in CZ 7, as part of tidal natural communities restoration (11 acres) and
25 seasonal floodplain restoration (399 acres).
- 26 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Up to 10 acres of grassland
27 would be permanently converted to vernal pool complex. The vernal pool and alkali seasonal
28 wetland restoration would leave intact the grasslands surrounding the vernal pools. Temporary
29 construction-related disturbance of grassland habitat would result from implementation of *CM9*
30 in CZ 1, CZ 8, and CZ 11. However, all areas would be restored to their original or higher value
31 habitat after the construction periods.
- 32 ● *CM11 Natural Communities Enhancement and Management*: The creation of recreational trails
33 and recreational staging areas would result in the permanent removal of 50 acres of grassland.
34 The protection of 8,000 acres of grassland for covered species is also expected to benefit San
35 Joaquin pocket mouse by protecting existing habitats from potential loss or degradation that
36 otherwise could occur with future changes in existing land use. Habitat management and
37 enhancement-related activities could cause disturbance to or direct mortality of San Joaquin
38 pocket mouse if the species is present near work areas.

39 A variety of habitat management actions included in *CM11 Natural Communities Enhancement*
40 *and Management* that are designed to enhance wildlife values in restored or protected habitats
41 could result in localized ground disturbances that could temporarily remove small amounts of
42 San Joaquin pocket mouse habitat. Ground-disturbing activities, such as removal of nonnative
43 vegetation and road and other infrastructure maintenance activities, would be expected to have
44 minor adverse effects on habitat and would be expected to result in overall improvements to

1 and maintenance of habitat values over the term of the BDCP. Noise and visual disturbance from
2 management-related equipment operation could temporarily displace individuals or alter the
3 behavior of the species if adjacent to work areas. With full implementation of the BDCP,
4 enhancement and management actions designed for western burrowing owl would also be
5 expected to benefit these species. San Joaquin pocket mouse would benefit particularly from
6 protection of grassland habitat against potential loss or degradation that otherwise could occur
7 with future changes in existing land use.

- 8 • *CM18 Conservation Hatcheries*: Implementation of CM18 would remove up to 35 acres of San
9 Joaquin pocket mouse habitat.
- 10 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
11 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
12 disturbances that could affect San Joaquin pocket mouse use of the surrounding habitat.
13 Maintenance activities would include vegetation management, levee and structure repair, and
14 re-grading of roads and permanent work areas. These effects, however, would be reduced by
15 AMMs and conservation actions as described below.
- 16 • *Injury and Direct Mortality*: Construction could result in direct mortality of San Joaquin pocket
17 mouse if present in construction areas.

18 The following paragraphs summarize the combined effects discussed above and describe other
19 BDCP conservation actions that offset or avoid these effects. NEPA and CEQA impact conclusions are
20 also included.

21 ***Near-Term Timeframe***

22 Because the water conveyance facilities construction is being evaluated at the project level, the near-
23 term BDCP conservation strategy has been evaluated to determine whether it would provide
24 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the effects of
25 construction would not be adverse under NEPA. Alternative 9 would remove 1,554 acres of San
26 Joaquin pocket mouse habitat (971 permanent, 583 temporary) in the study area in the near-term.
27 These effects would result from the construction of the water conveyance facilities (CM1, 426 acres),
28 and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*, *CM4 Tidal*
29 *Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7 Riparian*
30 *Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*,
31 *CM11 Natural Communities Enhancement and Management*, and *CM18 Conservation Hatcheries*—
32 1,128 acres).

33 Typical NEPA project-level mitigation ratios for those natural communities affected by CM1 would
34 be 2:1 protection of grassland habitat. Using these typical ratios would indicate that 852 acres of
35 grassland natural communities should be protected to mitigate the CM1 losses of 426 acres of San
36 Joaquin pocket mouse habitat. The near-term effects of other conservation actions would remove
37 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of San Joaquin
38 pocket mouse habitat using the same typical NEPA and CEQA ratios (2:1 for protection).

39 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
40 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and
41 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,
42 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and
43 reduce the effects of current levels of habitat fragmentation. Under *CM11 Natural Communities*

1 *Enhancement and Management*, San Joaquin pocket mouse would likely benefit from the
2 management of the grasslands for general wildlife benefit.

3 These natural community biological goals and objectives would inform the near-term protection and
4 restoration efforts and represent performance standards for considering the effectiveness of
5 restoration actions for the species. The acres of protection and restoration contained in the near-
6 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level
7 effects of CM1.

8 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
9 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
10 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
11 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
12 *Affected Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of
13 affecting habitats and species adjacent to work areas and RTM storage sites. BDCP Appendix 3.C
14 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
15 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

16 **Late Long-Term Timeframe**

17 Based on the habitat model, the study area supports approximately 78,047 acres of potential habitat
18 for San Joaquin pocket mouse. Alternative 9 as a whole would result in the permanent loss of and
19 temporary effects to 2,756 acres of grasslands that could be suitable for San Joaquin pocket mouse
20 (4% of the habitat in the study area). The locations of these losses are described above in the
21 analyses of individual conservation measures. The Plan includes a commitment to restore or create
22 2,000 acres of grassland in CZ 1, 8 and 11 (Objective GNC1.2) and to protect 8,000 acres of grassland
23 (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000 acres
24 protected in CZ 11, and the remainder distributed throughout CZ 1, 2, 4, 5, 7, 8, and 11 in the study
25 area) (Objective GNC1.1). The Plan's commitment to restore grasslands such that they connect
26 fragmented patches of already protected grasslands (Objective GNC1.2) would improve habitat
27 connectivity and dispersal abilities of San Joaquin pocket mouse within and outside of the plan area.
28 All protected habitat would be managed under *CM11 Natural Communities Enhancement and*
29 *Management*.

30 **NEPA Effects:** In the near-term, the loss of San Joaquin pocket mouse habitat and potential for direct
31 mortality would not be adverse because the BDCP has committed to protecting and restoring an
32 acreage that would meet the typical mitigation ratios described above. In the absence of other
33 conservation actions, the effects on San Joaquin pocket mouse habitat and potential mortality of a
34 special-status species resulting from Alternative 9 would represent an adverse effect in the late
35 long-term. However, the BDCP has committed to habitat protection and restoration associated with
36 CM3, CM8, and CM11. This habitat protection and restoration would be guided by biological goals
37 and objectives and by AMM1–AMM6 and AMM10, which would be in place throughout the
38 construction period. Considering these commitments, losses of San Joaquin pocket mouse habitat
39 and potential mortality under Alternative 9 would not be an adverse effect.

1 **CEQA Conclusion:**

2 **Near-Term Timeframe**

3 Because the water conveyance facilities construction is being evaluated at the project level, the near-
4 term BDCP conservation strategy has been evaluated to determine whether it would provide
5 sufficient habitat protection or restoration in an appropriate timeframe to ensure that the impacts of
6 construction would be less than significant. Alternative 9 would remove 1,554 acres of modeled
7 (971 permanent, 583 temporary) habitat for San Joaquin pocket mouse in the study area in the near-
8 term. These effects would result from the construction of the water conveyance facilities (CM1, 426
9 acres), and implementing other conservation measures (*CM2 Yolo Bypass Fisheries Enhancement*,
10 *CM4 Tidal Natural Communities Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM7*
11 *Riparian Natural Community Restoration*, *CM9 Vernal Pool and Alkali Seasonal Wetland Complex*
12 *Restoration*, *CM11 Natural Communities Enhancement and Management*, and *CM18 Conservation*
13 *Hatcheries*—1,128 acres).

14 The typical CEQA project-level mitigation ratios for those natural communities affected by CM1
15 would be 2:1 protection of grassland habitat. Using this ratio would indicate that 852 acres of
16 grassland natural communities should be protected to mitigate the CM1 losses of 426 acres of San
17 Joaquin pocket mouse habitat. The near-term effects of other conservation actions would remove
18 1,128 acres of modeled habitat, and therefore require 2,256 acres of protection of San Joaquin
19 pocket mouse habitat using the same typical NEPA and CEQA ratio (2:1 for protection).

20 The BDCP has committed to near-term goals of protecting 2,000 acres and restoring 1,140 acres of
21 grassland natural community in CZ 1, CZ 2, CZ 4, CZ 5, CZ 7, CZ 8, and CZ 11. The protection and
22 restoration of grasslands, would result in a contiguous matrix of grassland, alkali seasonal wetland,
23 and vernal pool natural communities which would expand habitat for San Joaquin pocket mouse and
24 reduce the effects of current levels of habitat fragmentation. Under CM11 Natural Communities
25 Enhancement and Management, San Joaquin pocket mouse would likely benefit from the
26 management of the grasslands for general wildlife benefit.

27 These natural community biological goals and objectives would inform the near-term protection and
28 restoration efforts and represent performance standards for considering the effectiveness of
29 restoration actions for the species. The acres of protection and restoration contained in the near-
30 term Plan goals would satisfy the typical mitigation ratios that would be applied to the project-level
31 effects of CM1.

32 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
35 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
36 *Affected Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of
37 affecting habitats and species adjacent to work areas and RTM storage sites. BDCP Appendix 3.C
38 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
39 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

40 These commitments are more than sufficient to support the conclusion that the near-term effects of
41 Alternative 9 would be less than significant under CEQA.

1 **Late Long-Term Timeframe**

2 Based on the habitat model, the study area supports approximately 78,047 acres of potential habitat
3 for San Joaquin pocket mouse. Alternative 9 as a whole would result in the permanent loss of and
4 temporary impacts on 2,756 acres of grasslands that could be suitable for San Joaquin pocket mouse
5 (4% of the habitat in the study area). The locations of these losses are described above in the
6 analyses of individual conservation measures. The Plan includes a commitment to restore or create
7 2,000 acres of grassland in CZ 1, 8 and 11 (Objective GNC1.2) and to protect 8,000 acres of grassland
8 (with at least 2,000 acres protected in CZ 1, at least 1,000 acres in CZ 8, at least 2,000 acres
9 protected in CZ 11, and the remainder distributed throughout CZ 1, 2, 4, 5, 7, 8, and 11 in the study
10 area) (Objective GNC1.1). The Plan's commitment to restore grasslands such that they connect
11 fragmented patches of already protected grasslands (Objective GNC1.2) would improve habitat
12 connectivity and dispersal abilities of San Joaquin pocket mouse within and outside of the plan area.
13 All protected habitat would be managed under *CM11 Natural Communities Enhancement and*
14 *Management*.

15 Considering these protection and restoration provisions, which would provide acreages of new
16 high-value or enhanced habitat in amounts suitable to compensate for habitats lost to construction
17 and restoration activities, and with implementation of AMM1–AMM6 and AMM10, the loss of habitat
18 or direct mortality through implementation of Alternative 9 would not result in a substantial
19 adverse effect through habitat modifications and would not substantially reduce the number or
20 restrict the range of San Joaquin pocket mouse. Therefore, the loss of habitat or potential mortality
21 under this alternative would have a less-than-significant impact on San Joaquin pocket mouse.

22 **Impact BIO-165: Indirect Effects of Plan Implementation on San Joaquin Pocket Mouse**

23 Construction activities associated with water conveyance facilities, conservation components and
24 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
25 conveyance facilities, including the transmission facilities, could result in ongoing periodic
26 postconstruction disturbances and noise with localized effects on San Joaquin kit pocket mouse and
27 its habitat over the term of the BDCP. These potential effects would be minimized and avoided
28 through AMM1–AMM6, and AMM10, which would be in effect throughout the plan's construction
29 phase.

30 Water conveyance facilities operations and maintenance activities would include vegetation and
31 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
32 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance
33 activities are not expected to remove pocket mouse habitat, operation of equipment could disturb
34 small areas of vegetation around maintained structures and could result in injury or mortality of
35 individual pocket mice, if present.

36 **NEPA Effects:** Implementation of the AMMs listed above would avoid the potential for substantial
37 adverse effects on San Joaquin pocket mouse, either indirectly or through habitat modifications.
38 These measures would also avoid and minimize effects that could substantially reduce the number
39 of San Joaquin pocket mouse, or restrict the species' range. Therefore, the indirect effects of
40 Alternative 9 would not have an adverse effect on San Joaquin pocket mouse.

41 **CEQA Conclusion:** Indirect effects from conservation measure operations and maintenance as well
42 as construction-related noise and visual disturbances could impact San Joaquin pocket mouse. With
43 implementation of AMM1–AMM6 and AMM10, as part of Alternative 9 construction, operation, and

1 maintenance, the BDCP would avoid the potential for significant adverse effects on either species,
2 either indirectly or through habitat modifications, and would not result in a substantial reduction in
3 numbers or a restriction in the range of the species. Therefore, the indirect effects under this
4 alternative would have a less-than-significant impact on San Joaquin pocket mouse.

5 **Special-Status Bat Species**

6 Special-status bat species with potential to occur in the study area employ varied roost strategies,
7 from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as
8 tunnels, buildings, and bridges. Various roost strategies could include night roosts, maternity roosts,
9 migration stopover, or hibernation. The habitat types used to assess effects for special-status bats
10 roosting habitat includes valley/foothill riparian natural community, developed lands and
11 landscaped trees, including eucalyptus, palms and orchards. Potential foraging habitat includes all
12 riparian habitat types, cultivated lands, developed lands, grasslands, and wetlands.

13 There is potential for at least thirteen different bat species to be present in the study area (Figure
14 12-51), including four California species of special concern and nine species ranked from low to
15 moderate priority by the Western Bat Working Group (Table 12A-2 in Appendix 12A, *Special-Status
16 Species with Potential to Occur in the Study Area*). In 2009, DHCCP conducted a large-scale effort that
17 involved habitat assessments, bridge surveys, and passive acoustic monitoring surveys for bats (see
18 Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report* for
19 details on methods and results).

20 The majority of the parcels assessed during field surveys contained bat foraging and roosting
21 features and were considered highly suitable habitat. At the time of the 2009 field surveys, DWR
22 biologists initially identified 145 bridges in their survey area. Eleven of the 145 bridges were not
23 accessible and thirteen were determined to not be suitable for bats. Evidence of bat presence was
24 observed at six of the bridges and bat sign (guano, urine staining, odor, or vocalizations) was
25 observed at 26 of the bridges. biologists observed Mexican free-tailed bats at four of the bridges and
26 unidentified species at the remaining two bridges. One of these bridges, over the Yolo Causeway,
27 was used by approximately 10,000 Mexican free-tailed bats, indicating a maternity roost. A second
28 roost site of about 50 individuals was observed under a bridge in eastern Solano County.

29 The remaining 89 bridges contained structural features that were considered conducive to
30 maternity, solitary, day and/or night roosting. Night roosts may have crevices and cracks but more
31 often have box beams or other less protected roosting spots where bats rest temporarily while
32 feeding. Day roosts are commonly found in bridges with expansion joints, crevices, or cracks where
33 bats are protected from predators and weather. Seventeen bridges in the survey area had no
34 potential for roosting because they lacked surface features from which bats could hang and offered
35 no protection from weather or predators.

36 Construction and restoration associated with Alternative 9 conservation measures would result in
37 both temporary and permanent losses of foraging and roosting habitat for special-status bats as
38 indicated in Table 12-4-61. Protection and restoration for special-status bat species focuses on
39 habitats and does not include manmade structures such as bridges. The conservation measures that
40 would be implemented to achieve the biological goals and objectives that would also benefit special-
41 status bats are summarized below.

- 1 ● Protect or restore 142,200 acres of high-value natural communities (Objective L1.1, associated
2 with CM3). This objective includes protecting and restoring a variety of habitat types described
3 below (BDCP Chapter 3, Table 3.3-4).
 - 4 ○ Protect 150 acres of alkali seasonal wetland in CZ 1, CZ 8, and/or CZ 11 among a mosaic of
5 protected grasslands and vernal pool complex (Objective ASWNC1.1, associated with CM3).
 - 6 ○ Protect 600 acres of existing vernal pool complex (Objective VPNC1.1, associated with CM3).
 - 7 ○ Protect 8,000 acres of grassland (Objective GNC1.1, associated with CM3).
 - 8 ○ Protect 8,100 acres of managed wetland (Objective MWNC1.1, associated with CM3 and
9 CM11).
 - 10 ○ Protect 48,625 acres of cultivated lands (Objective CLNC1.1, associated with CM3 and
11 CM11).
 - 12 ○ Protect, restore, or create 2,740 acres of rice land or equivalent habitat type for the giant
13 garter snake (Objective GGS3.1, associated with CM3, CM4, and CM10).
 - 14 ○ Restore 2,000 acres of grasslands to connect fragmented patches of protected (Objective
15 GNC1.2, associated with CM3 and 8).
 - 16 ○ Restore 67 acres of vernal pool complex (Objective VPNC1.2, associated with CM3 and 9).
 - 17 ○ Restore and protect 65,000 acres of tidal natural communities (Objective L1.2, associated
18 with CM2, 3, and 4).
 - 19 ○ Restore or create 5,000 acres of valley/foothill riparian natural community (Objective
20 VFRNC1.1, associated with CM3 and CM7).
 - 21 ○ Protect 750 acres of existing valley/foothill riparian natural community in CZ 7 by year 10
22 (Objective VFRNC1.2, associated with CM3).

23 As explained below, with the restoration and protection of these amounts of habitat, in addition to
24 mitigation measures to reduce potential effects, impacts on special-status bats would not be adverse
25 for NEPA purposes and would be less than significant for CEQA purposes.

1
2

Table 12-9-61. Changes in Special-Status Bat Roosting and Foraging Habitat Associated with Alternative 9^a

Conservation Measure ^b	Habitat Type ^c	Permanent		Temporary		Periodic ^e	
		NT	LLT ^d	NT	LLT ^d	CM2	CM5
CM1	Roosting	74	74	284	284	NA	NA
	Foraging	1,289	1,289	3,583	3,583	NA	NA
Total Impacts CM1		1,363	1,363	3,867	3,867	NA	NA
CM2-CM18	Roosting	524	1,570	167	212	324	411
	Foraging	14,497	60,399	773	2,126	21,265	10,137
Total Impacts CM2-CM18		15,021	61,969	940	2,338	21,589	10,548
TOTAL IMPACTS		16,384	65,391	4,807	6,205	21,589	10,548

^a See Appendix 12E for a detailed breakdown of conservation measure effects over the BDCP's near-term and late long-term timeframes.

^b See discussion below for a description of applicable CMs.

^c Affected roosting habitat acreages include valley/foothill riparian habitat, developed lands, and orchards. An unknown number of buildings, bridges, tunnels, and individual trees could also be affected but were not included in this analysis. Foraging habitat includes all natural communities, cultivated lands, and developed lands in the study area. Foraging habitat effects for CM2-CM18 were not considered adverse as they reflect a conversion from one foraging habitat type (mostly cultivated lands) to another foraging habitat (wetlands).

^d LLT acreages are a summation of effects that would occur in the near-term, early long-term and late long-term timeframes. The LLT acreages represent the total amount of habitat that would be affected over the 50-year life of the BDCP and do not reflect habitat increases that would result from restoration, creation and protection activities.

^e Periodic effects were estimated for the late long-term only. CM2 periodic impacts are presented as the maximum possible based on different flow regimes at the proposed notch in Fremont Weir.

NT = near-term

LLT = late long-term

NA = not applicable

3

Impact BIO-166: Loss or Conversion of Habitat for and Direct Mortality of Special-Status Bats

Alternative 9 conservation measure CM1 would result in the permanent and temporary loss combined of up to 358 acres of roosting habitat and 4,872 acres of foraging habitat for special-status bats in the study area. DWR identified 12 bridges that could be affected by Alternative 9 construction in CM1. Conservation measures Fremont Weir/Yolo Bypass improvements (CM2), tidal habitat restoration (CM4), and floodplain restoration (CM5) and would result in the permanent and temporary loss of 1,782 acres of roosting habitat and the conversion of approximately 65,525 acres of foraging habitat from mostly cultivated lands and managed wetlands to tidal and nontidal wetlands. Habitat enhancement and management activities (CM11) could result in local adverse effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other BDCP physical facilities could affect special-status bat habitat. A summary of combined impacts and NEPA effects and a CEQA conclusion follows the individual conservation measure discussions.

- *CM1 Water Facilities and Operation:* Construction of Alternative 9 conveyance facilities would result in the permanent loss of approximately 74 acres of roosting habitat and 1,289 acres of

17
18

1 foraging habitat in the study area. Development of the water conveyance facilities would also
2 result in the temporary removal of up to 284 acres of roosting habitat and up to 3,583 acres of
3 foraging habitat for special-status bats in the study area (Table 12-9-61). DWR identified twelve
4 bridges within the area of channel dredging, fish screen, and operable barrier that provide
5 potential roosting habitat that could be affected by construction for CM1. Two of these bridges
6 had positive sign for bats.

- 7 ● *CM2 Yolo Bypass Fisheries Enhancement*: Improvements in the Yolo Bypass would result in the
8 conversion of approximately 2,025 acres of foraging habitat into wetlands that could still be
9 used by bats for foraging. CM2 would also result in the permanent removal of 89 acres and
10 temporary removal of 167 acres of roosting habitat for special-status bats. The maternity colony
11 of Mexican free-tailed bats located at both ends of the Yolo Causeway bridge could also be
12 affected during construction for CM2. Implementation of Mitigation Measure BIO-166, *Conduct*
13 *Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, would ensure that
14 improvements in the Yolo Bypass avoid effects on roosting special-status bats.
- 15 ● *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration site preparation and
16 inundation would result in the conversion of approximately 56,810 acres of foraging habitat into
17 wetlands that could still be used by bats for foraging. Approximately 1,425 acres of roosting
18 habitat for special-status bats would permanently affected. This habitat is of low value,
19 consisting of a small, isolated patch surrounded by cultivated lands, and the species has a
20 relatively low likelihood of being present in these areas. The roosting habitat that would be
21 removed consists of relatively small and isolated patches along canals and irrigation ditches
22 surrounded by cultivated lands in the Union Island and Roberts Island areas, and several small
23 patches along the San Joaquin River. Mitigation Measure BIO-166, *Conduct Preconstruction*
24 *Surveys for Roosting Bats and Implement Protective Measures*, described below, requires that
25 tidal natural communities restoration avoid effects on roosting special-status bats.
- 26 ● *CM5 Seasonally Inundated Floodplain Restoration*: Levee construction associated with floodplain
27 restoration would result in the conversion of an estimated 3,690 acres of foraging habitat into
28 wetlands that could still be used by bats for foraging. CM5 would also result in the permanent
29 removal of 57 acres and temporary removal of 45 acres of roosting habitat for special-status
30 bats in the study area.
- 31 ● *CM11 Natural Communities Enhancement and Management*: Implementation of Alternative 9
32 would result in an overall benefit to special-status bats within the study area through protection
33 and restoration of their foraging and roosting habitats. The majority of affected acres would
34 convert agricultural land to natural communities with higher potential foraging and roosting
35 value, such as riparian, tidal and nontidal wetlands, and periodically inundated lands. Restored
36 foraging habitats primarily would replace agricultural lands. Restored habitats are expected to
37 be of higher function because the production of flying insect prey species is expected to be
38 greater in restored wetlands and uplands on which application of pesticides would be reduced
39 relative to affected agricultural habitats. Noise and visual disturbances during implementation
40 of riparian habitat management actions could result in temporary disturbances that, if bat roost
41 sites are present, could cause temporary abandonment of roosts. This effect would be
42 minimized with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction*
43 *Surveys for Roosting Bats and Implement Protective Measures*.
- 44 ● *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have
45 little if any adverse effect on special-status bats. Postconstruction operation and maintenance of

1 the above-ground water conveyance facilities and restoration infrastructure could result in
2 ongoing but periodic disturbances that could affect special-status bat use of the surrounding
3 habitat in the Yolo Bypass, the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ
4 4, CZ 5, CZ 6, CZ 7, and CZ 8). Maintenance activities would include vegetation management,
5 levee and structure repair, and regrading of roads and permanent work areas. These effects,
6 however, would be minimized with implementation of the mitigation measures described
7 below.

- 8 • Injury and direct mortality: In addition, to habitat loss and conversion, construction activities,
9 such as grading, the movement of construction vehicles or heavy equipment, and the installation
10 of water conveyance facilities components and new transmission lines, may result in the direct
11 mortality, injury, or harassment of roosting special-status bats. Construction activities related to
12 conservation components could have similar affects. Preconstruction surveys would be
13 conducted and if roosting or maternity sites are detected, seasonal restrictions would be placed
14 while bats are present, as described below in the mitigation measures.

15 The following paragraphs summarize the combined effects discussed above and describe other
16 BDCP conservation actions that offset or avoid these effects. NEPA effects and CEQA conclusions are
17 also included.

18 ***Near-Term Timeframe***

19 Because water conveyance facilities construction is being evaluated at the project level, the near-
20 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
21 protection or restoration in an appropriate timeframe to ensure that the construction effects would
22 not be adverse under NEPA. Because the majority of affected acres would convert agricultural land
23 to natural communities with higher potential foraging and roosting value, such as riparian, tidal and
24 nontidal wetlands, and periodically inundated lands this analysis focuses only on losses to roosting
25 habitat for CM1, CM2, and CM4 in the near-term.

26 Alternative 9 would permanently or temporarily affect 1,049 acres of roosting habitat for special-
27 status bats in the near-term as a result of implementing CM1 (358 acres roosting habitat), CM2
28 (256 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur
29 in the late long-term. Only 784 acres of the 1,049 acres of roosting habitat losses would be in
30 valley/foothill riparian habitat.

31 Typical NEPA project-level mitigation ratios for those natural communities that would be affected
32 for roosting habitat would be 1:1 for restoration and protection of the valley/foothill riparian
33 natural community. Using these ratios would indicate that 784 acres of riparian habitat should be
34 restored and 784 acres of riparian habitat should be protected.

35 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status
36 bats within the study area through protection and restoration of their foraging and roosting habitats
37 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and
38 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities
39 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and
40 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging
41 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective
42 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and
43 Objective GNC1.1.). Restored foraging habitats would replace primarily cultivated lands. Restored

1 habitats are expected to be of higher function because the production of flying insect prey species is
2 expected to be greater in restored wetlands and uplands on which application of pesticides would
3 be reduced relative to affected agricultural habitats. Conservation components in the near-term
4 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 9. In
5 addition, activities associated with natural communities enhancement and protection and with
6 ongoing facilities operations and maintenance could affect special-status bat use of surrounding
7 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,
8 described below, requires preconstruction surveys to reduce these effects.

9 The BDCP also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
13 *Affected Natural Communities*. These AMMs include elements that avoid or minimize the risk of
14 construction activity affecting habitat and species adjacent to work areas and storage sites. BDCP
15 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
16 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final EIR/EIS.

17 **Late Long-Term Timeframe**

18 Alternative 9 as a whole would affect 2,140 acres of roosting habitat (Table 12-9-61). Because the
19 majority of affected acres would convert agricultural land to natural communities with higher
20 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically
21 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5
22 in the late long-term.

23 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-
24 status bats within the study area through protection and restoration of approximately 142,200 acres
25 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to
26 protect the highest quality natural communities and covered species habitat in the Plan Area to
27 optimize the ecological value of the reserve system for conserving covered species and native
28 biodiversity. The target for total protected and restored acreage is based on the sum of all natural
29 community acreage targets. Achieving this objective is intended to protect and restore natural
30 communities, species-specific habitat elements, and species diversity on a landscape-scale.,
31 Achieving this objective is also intended to conserve representative natural and seminatural
32 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired
33 ecosystem function, and biological diversity.

34 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and
35 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging
36 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,
37 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,
38 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored
39 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of
40 higher function because the production of flying insect prey species is expected to be greater in
41 restored wetlands and uplands on which application of pesticides would be reduced relative to
42 affected agricultural habitats.

43 Should any of the special-status bat species be detected roosting in the study area, construction of
44 water conveyance facilities and restoration activities would have an adverse effect on roosting

1 special-status bats. Noise and visual disturbances and the potential for injury or mortality of
2 individuals associated within implementation of the restoration activities on active roosts would be
3 minimized with implementation of Mitigation BIO-166, *Conduct Preconstruction Surveys for Roosting*
4 *Bats and Implement Protective Measures*. Conservation components would sufficiently offset the
5 adverse effects resulting from late long-term effects from CM1, CM2, CM4, and CM5.

6 **NEPA Effects:** In the near-term the losses of roosting habitat for special-status bats associated with
7 implementing Alternative 9 are not expected to result in substantial adverse effects on special-status
8 bats, either directly or through habitat modifications, and would not result in a substantial reduction
9 in numbers or a restriction in the range of special-status bats because the BDCP has committed to
10 protecting the acreage required to meet the typical mitigation ratios described above. In the late
11 long-term, the losses of roosting habitat for special-status bats associated with Alternative 9, in the
12 absence of other conservation actions, would represent an adverse effect as a result of habitat
13 modification and potential direct mortality of a special-status species. However, with habitat
14 protection and restoration associated with the conservation components, guided by landscape-scale
15 goals and objectives and by AMM1–AMM6 and AMM10, and with implementation of Mitigation
16 Measure BIO-166, the effects of Alternative 9 as a whole on special-status bats would not be adverse

17 **CEQA Conclusion:**

18 **Near-Term Timeframe**

19 Because water conveyance facilities construction is being evaluated at the project level, the near-
20 term BDCP strategy has been analyzed to determine whether it would provide sufficient habitat
21 protection or restoration in an appropriate timeframe to ensure that the construction effects would
22 be less than significant for CEQA purposes. Because the majority of affected acres would convert
23 agricultural land to natural communities with higher potential foraging and roosting value, such as
24 riparian, tidal and nontidal wetlands, and periodically inundated lands this analysis focuses only on
25 losses to roosting habitat for CM1, CM2, and CM4 in the near-term.

26 Alternative 9 would permanently or temporarily affect 1,049 acres of roosting habitat for special-
27 status bats in the near-term as a result of implementing CM1 (358 acres roosting habitat), CM2 (256
28 acres roosting habitat), and CM4 (435 acres roosting habitat). Effects from CM5 would all occur in
29 the late long-term. Only 784 acres of the 1,049 acres of roosting habitat losses would be in
30 valley/foothill riparian habitat Typical CEQA project-level mitigation ratios for those natural
31 communities that would be affected for roosting habitat would be 1:1 for restoration and protection
32 of the valley/foothill riparian natural community. Using these ratios would indicate that 784 acres of
33 riparian habitat should be restored and 784 acres of riparian habitat should be protected.

34 Implementation of BDCP actions in the near-term would result in an overall benefit to special-status
35 bats within the study area through protection and restoration of their foraging and roosting habitats
36 (Objective L1.1). BDCP actions in the near-term would restore 800 acres of riparian roosting and
37 foraging habitat (Objective VFRNC1.1) and 21,288 acres of foraging habitat in natural communities
38 and developed lands (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, and
39 Objective L2.11). In addition, the BDCP would protect 750 acres of riparian roosting and foraging
40 habitat (Objective VFRNC1.2) and 41,445 acres of foraging habitat (Objective L1.1, Objective
41 ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1, Objective GGS3.1, and
42 Objective GNC1.1.). Restored foraging habitats would replace primarily cultivated lands. Restored
43 habitats are expected to be of higher function because the production of flying insect prey species is
44 expected to be greater in restored wetlands and uplands on which application of pesticides would

1 be reduced relative to affected agricultural habitats. Conservation components in the near-term
2 would sufficiently offset the adverse effects resulting from near-term effects from Alternative 9. In
3 addition, activities associated with natural communities enhancement and protection and with
4 ongoing facilities operations and maintenance could affect special-status bat use of surrounding
5 habitat and could result in harassment, injury or mortality of bats. Mitigation Measure BIO-166,
6 described below, requires preconstruction surveys to reduce these impacts to a less-than-significant
7 level.

8 The permanent loss of roosting habitat from Alternative 9 would be mitigated through
9 implementation of Mitigation Measure BIO-166, which would ensure there is no significant impact
10 under CEQA on roosting special-status bats, either directly or through habitat modifications and no
11 substantial reduction in numbers or a restriction in the range of special-status bats. The BDCP also
12 contains commitments to implement AMM1–AMM6 and AMM10. These AMMs include elements that
13 avoid or minimize the risk of construction activity affecting habitat and species adjacent to work
14 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
15 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to the Final
16 EIR/EIS.

17 **Late Long-Term Timeframe**

18 Alternative 9 as a whole would affect 2,140 acres of roosting habitat (Table 12-9-61). Because the
19 majority of affected acres would convert agricultural land to natural communities with higher
20 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and periodically
21 inundated lands this analysis focuses only on losses to roosting habitat for CM1, CM2, CM4, and CM5
22 in the late long-term.

23 Implementation of BDCP actions in the late long-term would result in an overall benefit to special-
24 status bats within the study area through protection and restoration of approximately 142,200 acres
25 of their foraging and roosting habitats (Objective L1.1). Achieving this objective is intended to
26 protect the highest quality natural communities and covered species habitat in the Plan Area to
27 optimize the ecological value of the reserve system for conserving covered species and native
28 biodiversity. The target for total protected and restored acreage is based on the sum of all natural
29 community acreage targets. Achieving this objective is intended to protect and restore natural
30 communities, species-specific habitat elements, and species diversity on a landscape-scale.,
31 Achieving this objective is also intended to conserve representative natural and seminatural
32 landscapes in order to maintain the ecological integrity of large habitat blocks, including desired
33 ecosystem function, and biological diversity.

34 BDCP actions in the late long-term would restore and protect 5,750 acres of riparian roosting and
35 foraging habitat (Objective VFRNC1.1 and Objective VFRNC1.2), and 136,450 acres of foraging
36 habitat (Objective L1.1, Objective GNC1.2, Objective VPNC1.2, Objective L1.2, Objective L2.11,
37 Objective L1.1, Objective ASWNC1.1, Objective VPNC1.1, Objective MWNC1.1, Objective CLNC1.1,
38 Objective GGS3.1, and Objective GNC1.1,) in natural communities and developed lands. Restored
39 foraging habitats would replace primarily cultivated lands. Restored habitats are expected to be of
40 higher function because the production of flying insect prey species is expected to be greater in
41 restored wetlands and uplands on which application of pesticides would be reduced relative to
42 affected agricultural habitats. Should any of the special-status bat species roost in the study area,
43 construction of water conveyance facilities and restoration activities could have an adverse effect on
44 roosting special-status bats. Noise and visual disturbances and the potential for injury or mortality

1 of individuals associated within implementation of construction activities would be minimized with
2 implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats*
3 *and Implement Protective Measures*. Conservation components would sufficiently offset the adverse
4 effects resulting from late long-term effects from CM1, CM2, CM4, and CM5.

5 The permanent loss of roosting habitat from Alternative 9 would be mitigated through
6 implementation of Mitigation Measure BIO-166, which would ensure that there would be no
7 significant impact on roosting special-status bats, either directly or through habitat modifications,
8 and that there would be no substantial reduction in numbers or a restriction in the range of special-
9 status bats. Therefore, Alternative 9 would not result in a significant impact on special-status bats
10 under CEQA.

11 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and** 12 **Implement Protective Measures**

13 The following measure was designed to avoid and minimize adverse direct and indirect effects
14 on special-status bats. However, baseline data are not available or are limited on how bats use
15 the study area, and on individual numbers of bats and how they vary seasonally. Therefore, it is
16 difficult to determine if there would be a substantial reduction in species numbers. Bat species
17 with potential to occur in the study area employ varied roost strategies, from solitary roosting in
18 foliage of trees to colonial roosting in trees and artificial structures, such as buildings and
19 bridges. Daily and seasonal variations in habitat use are common. To obtain the highest
20 likelihood of detection, preconstruction bat surveys will be conducted by DWR and will include
21 these components.

- 22 • Identification of potential roosting habitat within project footprint.
- 23 • Daytime search for bats and bat sign in and around identified habitat.
- 24 • Evening emergence surveys at potential day-roost sites, using night-vision goggles and/or
25 active full-spectrum acoustic monitoring where species identification is sought.
- 26 • Passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from
27 dusk to dawn over multiple nights.
- 28 • Additional on-site night surveys as needed following passive acoustic detection of special
29 status bats to determine nature of bat use of the structure in question (e.g., use of structure
30 as night roost between foraging bouts).
- 31 • Qualified biologists will have knowledge of the natural history of the species that could
32 occur in the study area and experience using full-spectrum acoustic equipment. During
33 surveys, biologists will avoid unnecessary disturbance of occupied roosts.

34 ***Preconstruction Bridges and Other Structure Surveys***

35 Before work begins on the bridge/structure, qualified biologists will conduct a daytime search for
36 bat sign and evening emergence surveys to determine if the bridge/structure is being used as a
37 roost. Biologists conducting daytime surveys would listen for audible bat calls and would use naked
38 eye, binoculars, and a high-powered spotlight to inspect expansion joints, weep holes, and other
39 bridge features that could house bats. Bridge surfaces and the ground around the bridge/structure
40 would be surveyed for bat sign, such as guano, staining, and prey remains.

1 Evening emergence surveys will consist of at least one biologist stationed on each side of the
2 bridge/structure watching for emerging bats from a half hour before sunset to 1–2 hours after
3 sunset for a minimum of two nights within the season that construction would be taking place.
4 Night-vision goggles and/or full-spectrum acoustic detectors shall be used during emergence
5 surveys to assist in species identification. All emergence surveys would be conducted during
6 favorable weather conditions (calm nights with temperatures conducive to bat activity and no
7 precipitation predicted).

8 Additionally, passive monitoring with full-spectrum bat detectors will be used to assist in
9 determining species present. A minimum of four nights of acoustic monitoring surveys will be
10 conducted within the season that the construction would be taking place. If site security allows,
11 detectors should be set to record bat calls for the duration of each night. To the extent possible, all
12 monitoring will be conducted during favorable weather conditions (calm nights with temperatures
13 conducive to bat activity and no precipitation predicted). The biologists will analyze the bat call data
14 using appropriate software and prepare a report with the results of the surveys. If acoustic data
15 suggest that bats may be using the bridge/structure as a night roost, biologists will conduct a night
16 survey from 1–2 hours past sunset up to 6 hours past sunset to determine if the bridge is serving as
17 a colonial night roost.

18 If suitable roost structures would be removed, additional surveys may be required to determine
19 how the structure is used by bats, whether it is as a night roost, maternity roosts, migration
20 stopover, or for hibernation.

21 ***Preconstruction Tree Surveys***

22 If tree removal or trimming is necessary, qualified biologists will examine trees to be removed or
23 trimmed for suitable bat roosting habitat. High-value habitat features (large tree cavities, basal
24 hollows, loose or peeling bark, larger snags, palm trees with intact thatch, etc.) will be identified and
25 the area around these features searched for bats and bat sign (guano, culled insect parts, staining,
26 etc.). Riparian woodland, orchards, and stands of mature broadleaf trees should be considered
27 potential habitat for solitary foliage roosting bat species.

28 If bat sign is detected, biologists will conduct evening visual emergence survey of the source habitat
29 feature, from a half hour before sunset to 1–2 hours after sunset for a minimum of two nights within
30 the season that construction would be taking place. Methodology should follow that described above
31 for the bridge emergence survey.

32 Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector will
33 be used to assist in determining species present. These surveys would be conducted in coordination
34 with the acoustic monitoring conducted for the bridge/structure.

35 ***Protective Measures for Bats using Bridges/Structures and Trees***

36 Avoidance and minimization measures shall be necessary if it is determined that bats are using the
37 bridge/structure or trees as roost sites and/or sensitive bats species are detected during acoustic
38 monitoring. Appropriate measures will be determined by DWR in consultation with CDFW and
39 shall include, as applicable, measures listed below.

- 40 • Ensure that bats are protected from noise, vibrations, and light that result from construction
41 activities associated with water conveyance facilities, conservation components and ongoing
42 habitat enhancement, as well as operations and maintenance of above-ground water

- 1 conveyance facilities, including the transmission facilities. This would be accomplished by
2 either directing noise barriers and lights inward from the disturbance or ensuring that the
3 disturbances do not extend more than 300 feet from the point source.
- 4 ● Disturbance of the bridge will be avoided between March 1 and October 31 (the maternity
5 period) to avoid impacts on reproductively active females and dependent young.
 - 6 ● Installation of exclusion devices from March 1 through October 31 to preclude bats from
7 occupying the bridge during construction. Exclusionary devices will only be installed by or
8 under the supervision of an experienced bat biologist.
 - 9 ● Tree removal will be avoided between April 15 and September 15 (the maternity period for
10 bats that use trees) to avoid impacts on pregnant females and active maternity roosts
11 (whether colonial or solitary).
 - 12 ● Tree removal will be conducted between September 15 and October 31 to the maximum
13 extent feasible, which corresponds to a time period when bats would not likely have entered
14 winter hibernation and would not be caring for flightless young. If weather conditions
15 remain conducive to regular bat activity beyond October 31, later tree removal may be
16 considered in consultation with CDFW.
 - 17 ● Trees will be removed in pieces, rather than felling the entire tree.
 - 18 ● If a maternity roost is located, whether solitary or colonial, that roost will remain
19 undisturbed with a buffer as determined in consultation with CDFW until September 15 or
20 until a qualified biologist has determined the roost is no longer active.
 - 21 ● If a non-maternity roost is found, that roost will be avoided to the maximum extent feasible
22 and an appropriate buffer established in consultation with CDFW. Every effort would be
23 made to avoid the roost to the maximum extent feasible, as methods to evict bats from trees
24 are largely untested. However, if the roost cannot be avoided, eviction will be attempted and
25 procedures designed in consultation with CDFW to reduce the likelihood of mortality of
26 evicted bats. In all cases:
 - 27 ○ Eviction will not occur before September 15th and will match the timeframe for tree
28 removal approved by CDFW.
 - 29 ○ Qualified biologists will carry out or oversee the eviction tasks and monitor the tree
30 trimming/removal.
 - 31 ○ Eviction will take place late in the day or in the evening to reduce the likelihood of
32 evicted bats falling prey to diurnal predators.
 - 33 ○ Eviction will take place during weather and temperature conditions conducive to bat
34 activity.
 - 35 ○ Special-status bat roosts will not be disturbed.
- 36 Eviction procedures shall include but are not limited to:
- 37 ○ Pre-eviction surveys to obtain data to inform the eviction approach and subsequent
38 mitigation requirements. Relevant data may include the species, sex, reproductive status
39 and/or number of bats using the roost, and roost conditions themselves such as
40 temperature and dimensions. Surveys may include visual emergence, night vision,
41 acoustic, and/or capture.

- 1 ○ Structural changes may be made to the roost, performed without harming bats, such
2 that the conditions in the roost are undesirable to roosting bats and the bats leave on
3 their own (e.g., open additional portals so that temperature, wind, light and
4 precipitation regime in the roost change).
- 5 ○ Non-injurious harassment at the roost site to encourage bats to leave on their own, such
6 as ultrasound deterrents or other sensory irritants.
- 7 ● Prior to removal/trimming, after other eviction efforts have been attempted, any confirmed
8 roost tree would be shaken, repeatedly struck with a heavy implement such as an axe and
9 several minutes should pass before felling trees or trimming limbs to allow bats time to
10 arouse and leave the tree. The biologists should search downed vegetation for dead and
11 injured bats. The presence of dead or injured bats will be reported to CDFW.

12 Compensatory mitigation for the loss of roosting habitat will also be determined through
13 consultation with CDFW and may include the construction and installation of suitable
14 replacement habitat onsite. Depending on the species and type of roost lost, various roost
15 replacement habitats have met with some success (e.g., bat houses, “bat bark,” planting
16 cottonwood trees, leaving palm thatch in place rather than trimming). The creation of natural
17 habitat onsite is generally preferable to artificial.

18 Artificial roosts are often unsuccessful, and care must be taken to determine as closely as
19 possible the conditions in the natural roost to be replaced. Even with such care, artificial habitat
20 may fail. Several artificial roosts have been highly successful in replacing bridge roost habitat
21 when incorporated into new bridge designs. “Bat bark” has been successfully used by Arizona
22 Department of Game and Fish to create artificial crevice-roosting bat habitat mounted on pine
23 trees (Mering and Chambers 2012: 765). Bat houses have at best an inconsistent track record
24 but information is mounting on how to create successful houses. There is no single protocol or
25 recipe for bat-house success. Careful study of the roost requirements of the species in question;
26 the particular conditions at the lost roost site including temperature, orientation of the
27 openings, airflow, internal dimensions and structures (cavity vs. crevice, etc.) should increase
28 the chances of designing a successful replacement.

29 Restoring riparian woodland with plantings shows signs of success in Colorado. Western red bat
30 activity has been positively correlated with increased vegetation and tree growth, canopy
31 complexity and restoration acreage at cottonwood-willow restoration sites along the Lower
32 Colorado River (Broderick 2012: 39). These complex woodland areas would ultimately provide
33 a wider range of bat species with preferred roost types, including both foliage-roosting and
34 crevice-/cavity-roosting bats.

35 **Impact BIO-167: Indirect Effects of Plan Implementation on Special-Status Bats**

36 Construction activities associated with water conveyance facilities, conservation components and
37 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
38 conveyance facilities, including the transmission facilities, could result in ongoing periodic
39 disturbances from light, vibrations, and noise with localized effects on special-status bats and their
40 roosting habitat over the term of the BDCP.

41 Water conveyance facilities operations and maintenance activities would include vegetation and
42 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
43 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance

1 activities are not expected to remove special-status bat habitat, operation of equipment could
2 disturb small areas of vegetation around maintained structures and could result in disturbances to
3 roosting bats, if present. Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting*
4 *Bats and Implement Protective Measures*, is available to address these adverse effects.

5 Increased exposure to methylmercury associated with tidal natural community's restoration would
6 potentially indirectly affect special-status bat species. *CM12 Methylmercury Management* describes
7 the process by which tidal natural communities restoration may increase methyl mercury levels in
8 wetlands in the study area. Mercury has been found in high concentrations in some bat species, such
9 as the Indiana bat. Many bat species forage heavily on aquatic insects, which might result in rapid
10 bioaccumulation (Evers et al. 2012). Measures described in *CM12 Methylmercury Management* are
11 expected to reduce the effects of methylmercury on special-status bat species resulting from BDCP
12 tidal natural community's restoration.

13 **NEPA Effects:** Implementation of the Mitigation Measure BIO-166 for special-status bats would
14 avoid the potential for substantial adverse effects on roosting special-status bats, either indirectly or
15 through habitat modifications. This mitigation measure would also avoid and minimize effects that
16 could substantially reduce the number of special-status bats, or restrict species' range. Therefore,
17 the indirect effects of Alternative 9 would not have an adverse effect on special-status bats.

18 **CEQA Conclusion:** Indirect effects from conservation components operations and maintenance as
19 well as construction-related noise and visual disturbances could have a significant impact on
20 special-status bat species, either indirectly or through habitat modifications. Mitigation Measure
21 BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*,
22 would reduce this impact to a less-than-significant level and ensure Alternative 9 would not result in
23 a substantial reduction in numbers or a restriction in the range of species.

24 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
25 **Implement Protective Measures**

26 See Mitigation Measure BIO-166 under Impact BIO-166.

27 **Impact BIO-168: Periodic Effects of Inundation of Special-Status Bat Habitat as a Result of**
28 **Implementation of Conservation Components**

29 Flooding of the Yolo Bypass from *CM2 Yolo Bypass Fisheries Enhancement* would periodically affect
30 324 acres of roosting habitat and 21,265 acres of foraging habitat for special-status bats in the study
31 area (Table 12-9-61).

32 *CM5 Seasonally Inundated Floodplain Restoration* would periodically inundate up to 411 acres of
33 roosting habitat and 10,137 acres of foraging habitat for special-status bats (Table 12-9-61).
34 Potential roosting trees are likely to be retained within seasonally flooded areas, although high
35 velocity flooding could uproot some trees. Seasonal flooding would not adversely affect foraging
36 habitat for the species. The overall effect of seasonal inundation in existing riparian natural
37 communities may instead be beneficial. Historically, flooding was the main natural disturbance
38 regulating ecological processes in riparian areas, and flooding promotes the germination and
39 establishment of many native riparian plants. In the late long-term, seasonal inundation in areas
40 currently occupied by riparian vegetation may contribute to the establishment of high-value habitat
41 for special-status bats that use riparian habitats.

1 **NEPA Effects:** Periodic effects on roosting and foraging habitat for special-status bats associated
2 with implementing Alternative 9 are not expected to result in substantial adverse effects on special-
3 status bats, either directly or through habitat modifications and would not result in a substantial
4 reduction in numbers or a restriction in the range of special-status bats. Mitigation Measure BIO-
5 166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, is
6 available to address any effects of periodic inundation on special-status bats and roosting habitat.
7 Therefore, Alternative 9 would not adversely affect the species.

8 **CEQA Conclusion:** Periodic inundation under CM2 and floodplain restoration under CM5 would
9 periodically affect foraging and roosting habitat for special-status bats in the study area. Any impact
10 of periodic inundation on special-status bats would be mitigated through implementation of
11 Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement*
12 *Protective Measures*, which would ensure there is no significant impact on roosting special-status
13 bats, either directly or through habitat modifications and no substantial reduction in numbers or a
14 restriction in the range of special-status bats.

15 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
16 **Implement Protective Measures**

17 See Mitigation Measure BIO-166 under Impact BIO-166.

18 **Plant Species**

19 The effects of constructing the water conveyance facilities under Alternative 9 would be
20 substantially different than under any of the other alternatives. However, effects of implementing
21 habitat restoration would be the same as under Alternative 1A.

22 **Vernal Pool Plants**

23 Five covered plant species and 12 noncovered special-status plant species occur in vernal pools in
24 the study area (Tables 12-2, 12-3, summarized in Table 12-9-62). The vernal pool habitat model
25 used for the impact analysis was based on vegetation types and associations from various data sets
26 which were used to create maps showing the distribution of vernal pool habitat in the study area
27 according to three habitat types in which the species are known to occur, including vernal pool
28 complex and degraded vernal pool complex, and alkali seasonal wetland habitat. Vernal pool
29 complex habitat consists of vernal pools and uplands that display characteristic vernal pool and
30 swale visual signatures that have not been significantly impacted by agricultural or development
31 practices. Degraded vernal pool complex habitat consists of habitat that ranges from areas with
32 vernal pool and swale visual signatures that display clear evidence of significant disturbance due to
33 plowing, discing, or leveling to areas with clearly artificial basins such as shallow agricultural
34 ditches, depressions in fallow fields, and areas of compacted soils in pastures. Because wetlands in
35 the degraded vernal pool complex are inundated during the wet season and may have historically
36 been located in or near areas with natural vernal pool complex, they may support individuals or
37 small populations of species that are found in vernal pools and swales. However, they do not possess
38 the full complement of ecosystem and community characteristics of natural vernal pools, swales and
39 their associated uplands and they are generally ephemeral features that are eliminated during the
40 course of normal agricultural practices. A small amount of alkali seasonal wetland habitat was
41 included in the model because alkaline vernal pools are also present in some areas mapped as alkali
42 seasonal wetland.

1 Because each of the vernal pool species addressed in this EIR/EIS have specific microhabitat
2 affinities, and because vernal pool habitat within the study area is highly heterogeneous with
3 respect to habitat parameters such as soil type and pool depth, the vernal pool habitat model greatly
4 overestimates the extent of habitat in the study area occupied by each species. However, the vernal
5 pool habitat model is likely to encompass all or most of the potential area within which special-
6 status vernal pool plant species would occur. Therefore, it is not likely to underestimate the extent
7 of occupied habitat or to underestimate the effects of Alternative 9.

8 Full implementation of Alternative 9 would include the following conservation actions over the term
9 of the BDCP to benefit covered vernal pool plants (BDCP Chapter 3, Section 3.3, *Biological Goals and*
10 *Objectives*).

- 11 • Protect two currently unprotected occurrences of alkali milk-vetch in the Altamont Hills or
12 Jepson Prairie core recovery areas (Objective VPP1.1, associated with CM3).
- 13 • Maintain no net loss of Heckard's peppergrass in Conservation Zones 1, 8, or 11 within
14 restoration sites or within the area of affected tidal range of restoration projects (Objective
15 VPP1.2, associated with CM3 and CM9).

16 The restoration activities covered under Alternative 9 could have impacts on special-status vernal
17 pool plants. No modeled habitat and no known occurrences of the 17 vernal pool plants are within
18 the proposed footprint for the Alternative 9 water conveyance facilities. Modeled vernal pool habitat
19 would be affected by tidal habitat restoration, although no known occurrences of 17 vernal pool
20 plants are within the hypothetical footprint for restoration activities. Table 12-9-62 summarizes the
21 acreage of modeled vernal pool habitat in the study area, the number of occurrences of each special-
22 status vernal pool plant in the study area, and the potential effects.

1 **Table 12-9-62. Summary of Impacts on Vernal Pool Plants under Alternative 9**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Modeled Habitat					
Vernal pool complex	9,557	1			Habitat loss from tidal habitat restoration
Degraded vernal pool complex	2,576	370			Habitat loss from tidal habitat restoration
Alkali Seasonal Wetland	188	0			None
Total	12,321	372			
Covered Species					
Alkali milk-vetch			16	0	None
Dwarf downingia			12	0	None
Boggs Lake hedge-hyssop			1	0	None
Legenere			8	0	None
Heckard's peppergrass			4 ^a	0	None
Noncovered Species					
Ferris' milk-vetch			6	0	None
Vernal pool smallscale			2	0	None
Hogwallow starfish			0	0	None
Ferris' goldfields			4	0	None
Contra Costa goldfields			7	0	None
Cotula-leaf navarretia			5	0	None
Baker's navarretia			3	0	None
Colusa grass			1	0	None
Bearded popcorn-flower			5	0	None
Delta woolly marbles			3	0	None
Saline clover			9	0	None
Solano grass			1	0	None

^a One additional occurrence is in alkali seasonal wetlands.

2

3 **Impact BIO-169: Effects on Habitat and Populations of Vernal Pool Plants**

4 Alternative 9 could affect habitat for special-status vernal pool plants. The individual effects of each
5 relevant conservation measure are addressed below. A summary statement of the combined impacts
6 and NEPA and CEQA conclusions follows the individual conservation measure discussions.

- 7
- 8
- 9
- 10
- 11
- *CM1 Water Facilities and Operation*: No modeled habitat and no known occurrences of the 17 vernal pool plants are within the proposed footprint for the Alternative 9 water conveyance facilities. Therefore, under Alternative 9, construction and operation of the water conveyance facilities would not affect the five covered vernal pool plant or the 12 noncovered special-status plants.

- 1 • *CM2 Yolo Bypass Fisheries Enhancement*: No modeled vernal pool habitat and no known
2 occurrences of the 17 vernal pool plants are within the hypothetical footprint for construction
3 or operation of the Yolo Bypass fisheries enhancements. Therefore, construction and operation
4 of the Yolo Bypass fisheries enhancements would not affect the covered or noncovered vernal
5 pool plants.
- 6 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit covered
7 vernal pool plants by protecting 600 acres of vernal pool complex in CZs 1, 8, and 11 (Objective
8 VPNC1.1). The protected vernal pool habitat would be managed and enhanced to sustain
9 populations of native vernal pool species. These benefits also would accrue to any noncovered
10 vernal pool plants occurring in the protected vernal pool complex.
- 11 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would result in the
12 inundation of 372 acres of vernal pool complex and would, therefore, potentially affect special-
13 status vernal pool plants. However, no known occurrences of covered and noncovered vernal
14 pool plants would be affected. Most of this modeled habitat (370 acres) consists of degraded
15 vernal pool habitat that is unlikely to contain special-status plants. In addition, 257.8 acres of
16 critical habitat for Contra Costa goldfields could be affected.
- 17 • *CM5 Seasonally Inundated Floodplain Restoration*: No vernal pool habitat or occurrences of
18 special-status vernal pool plants are present within areas proposed for floodplain restoration.
19 Therefore, floodplain restoration and construction of new floodplain levees would have no
20 impacts on covered and noncovered vernal pool plants.
- 21 • *CM6 Channel Margin Enhancement*: No vernal pool habitat or occurrences of special-status
22 vernal pool plants are present within areas proposed for channel margin habitat enhancement.
23 Therefore, channel margin habitat enhancement would have no impacts on covered and
24 noncovered vernal pool plants.
- 25 • *CM7 Riparian Natural Community Restoration*: No vernal pool habitat or occurrences of special-
26 status vernal pool plants are present within areas proposed for riparian habitat enhancement.
27 Therefore, riparian habitat enhancement would have no impacts on covered and noncovered
28 vernal pool plants.
- 29 • *CM8 Grassland Natural Community Restoration*: Although the vernal pool complex habitat
30 includes grassland matrix within which the vernal pools occur, grassland restoration activities
31 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands
32 that are not included within vernal pool complex habitat. Therefore, grassland communities
33 restoration would have no impacts on covered and noncovered vernal pool plants.
- 34 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: If, through unforeseen
35 circumstances, BDCP activities result in the net loss of vernal pool habitat, CM9 would be
36 implemented to compensate for that loss. Because vernal pool complex restoration would focus
37 on habitat that had been cleared and leveled but maintained an intact duripan or claypan, the
38 likelihood of affecting any special-status vernal pool plants would be low. However, vernal pool
39 restoration could adversely affect remnant populations of special-status vernal pool plants or
40 affect vernal pool habitat adjacent to the restoration areas.
- 41 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
42 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid vernal pool
43 habitat and would have no impacts on covered and noncovered vernal pool plants.

1 • *Avoidance and Minimization Measures:* Effects on covered vernal pool plants potentially
2 resulting from implementation of CM4 would be avoided or minimized though *AMM11 Covered*
3 *Plant Species, AMM2 Construction Best Management Practices and Monitoring, AMM12 Vernal*
4 *Pool Crustaceans, and AMM37 Recreation.* AMM11 prohibits ground disturbance or hydrologic
5 disturbance within 250 feet of existing vernal pools. In addition, AMM11 specifies that
6 individual projects be designed to avoid critical habitat for listed plant and wildlife vernal pool
7 species. AMM12 limits the direct removal of vernal pool crustacean habitat to no more than 10
8 wetted acres and the indirect effect to no more than 20 wetted acres through the life of the Plan.
9 AMM12 also requires that that tidal natural communities restoration or other ground-disturbing
10 covered activities in Conservation Zones 1 and 11 will not result in the adverse modification of
11 primary constituent elements of critical habitat for vernal pool fairy shrimp, conservancy fairy
12 shrimp, and vernal pool tadpole shrimp. These protections would also apply to critical habitat
13 for Contra Costa goldfields, where it overlaps with critical habitat for these vernal pool
14 crustaceans. AMM37 requires that new recreation trails avoid populations of covered vernal
15 pool plants.

16 In addition, the BDCP includes species-specific goals to benefit covered vernal pool plants. This
17 includes protecting two occurrences of alkali milk-vetch (Objective VPP1.1) and requiring no net
18 loss of Heckard's peppergrass (Objective VPP1.2).

19 In summary, no adverse effects on covered special-status vernal pool plants would be expected from
20 implementing Alternative 9. No known occurrences of 17 special-status vernal pool plants would be
21 affected. Beneficial effects on special-status vernal pool plants could occur by protecting 600 acres
22 of vernal pool complex in CZs 1, 8, and 11 and by protecting occurrences of alkali milk-vetch.

23 The GIS analysis estimated that up to 371 acres of vernal pool complex could be adversely affected
24 by covered activities under Alternative 9. However, the actual effect on habitat for special-status
25 vernal pool plants is expected to be much less than the estimated impact because the BDCP limits
26 the total loss of wetted vernal pool habitat resulting from specific projects to 10 acres
27 (approximately 67 acres of vernal pool complex) over the permit term (AMM12). At the proposed
28 restoration ratios of 1:1 (prior to impact) and 1.5:1 (concurrent with impact), between 67 and 100.5
29 acres of vernal pool complex restoration would be required to compensate for the loss of modeled
30 habitat for special-status vernal pool plants (Objective VPNC1.2, associated with CM9). This would
31 be consistent with typical NEPA and CEQA project-level mitigation ratios for vernal pool impacts.
32 The limitation on the loss of wetted vernal pool habitat will constrain the implementation of tidal
33 restoration projects that are adjacent to vernal pool complex, which could affect the feasibility of
34 restoring 65,000 acres of tidal habitat (Objective TPANC1.1, associated with CM4).

35 **NEPA Effects:** Implementation of the BDCP under Alternative 9 would not have an adverse effect on
36 threatened and endangered vernal pool plant species.

37 **CEQA Conclusion:** Because loss of modeled habitat for vernal pool plant species would be offset
38 through restoration, and because impacts on occurrences of special-status vernal pool plants would
39 be avoided, implementation of Alternative 9 would not result in a reduction in the range or numbers
40 of 17 covered and noncovered special-status vernal pool plants in the study area. Therefore, impacts
41 on special-status vernal pool plants be less than significant. No mitigation is required.

1 **Alkali Seasonal Wetland Plants**

2 Five covered species and three noncovered plants occur in alkali seasonal wetlands in the study area
3 (Tables 12-2, 12-3, summarized in Table 12-9-63). Alkali seasonal wetland habitat was modeled
4 separately for four covered plant species occurring in seasonal alkali wetlands.

5 The San Joaquin spearscale habitat model approximated the distribution of suitable San Joaquin
6 spearscale habitat in the study area according to the species' preferred habitat types, intersected
7 with soil series and slope position. Historical and current records of San Joaquin spearscale in the
8 study area indicate that its current distribution is limited to alkaline soil areas with shallow basin or
9 swale microtopography along the western border. The vegetation cover of the alkaline soils is
10 typically a combination of alkaline soil-adapted species and annual grasses, including annual
11 ryegrass and Mediterranean barley. Habitat types used for the model included alkali seasonal
12 wetlands, vernal pool complex, and grasslands. Soil series used in the model consisted of either clays
13 or clay loams with alkaline horizons. San Joaquin spearscale typically occurs in swales or in level
14 terrain but occasionally occurs on the lower slopes adjacent to streams or swales or where seeps are
15 present. Because some of the soil series with which San Joaquin spearscale is associated can occur
16 on hillsides, slope was used to limit the extent of the model to the toe of the slope where these soils
17 occur by excluding areas with slope greater than 1%. Land uses that are incompatible with the
18 species' habitat requirements, such as modeled habitat polygons falling on leveled or developed
19 lands, were removed from the model.

20 Modeled habitat for brittlescale was mapped as hydrologic features such as stream corridors and
21 playa pools located on alluvium associated with the Montezuma Block along the western boundary
22 of the study area or on alluvium associated with tertiary formations located along the southwest
23 boundary of the study area. Stream corridors (intermittent and perennial) that intersected these
24 geologic units were selected and truncated at the point at which they encountered the upper
25 elevation of intertidal marsh. The corridors were buffered 50 feet (15.2 meters) on either side of
26 their centerlines to capture the estimated maximum extent of alluvium deposits in proximity to the
27 streams. Mapped habitat that was occupied by urban or intensive agricultural uses was removed
28 from the model.

29 The habitat model for heartscale was based on the species distribution in the study area (Solano and
30 Yolo Counties) and on the soil types and plant communities within which it occurs. Potential habitat
31 was determined by intersecting the GIS coverage for three parameters: 1) Yolo and Solano County
32 boundaries; 2) Solano, Pescadero, and Willows soils; and 3) grassland, alkali seasonal wetland, and
33 vernal pool complex natural communities. The model excluded areas that have been developed or
34 cultivated, i.e., where the topography, soils, and hydrology have been substantially altered.

35 Delta button-celery habitat was modeled as alkali seasonal wetland complex, vernal pool complex,
36 other natural seasonal wetland, and grassland occurring on Brentwood, Grangerville, Marcuse,
37 Solano, and Vernalis soil map units within the San Joaquin Basin (i.e., south of the mainstem San
38 Joaquin River). For this species, land cover north of the Discovery Bay area where intensive
39 agriculture was classified as annual grassland were manually deleted from the area of predicted
40 habitat. Additionally, other areas of potential habitat that have been developed were also manually
41 deleted.

42 Full implementation of Alternative 9 would include the following conservation actions over the term
43 of the BDCP to benefit covered alkali seasonal wetland plants (BDCP Chapter 3, Section 3.3,
44 *Biological Goals and Objectives*).

- 1 • Of the 150 acres of alkali seasonal wetland complex protected under Objective ASWNC1.1, 600
2 acres of vernal pool complex protected under Objective VPNC1.1, and 8,000 acres of grassland
3 natural community protected under Objective GNC1.1, protect at least 75 acres of suitable
4 brittlescale habitat and 75 acres of suitable heartscale habitat in Conservation Zones 1, 8, or 11
5 (Objective BRIT/HART/SJSC1.1, associated with CM3).
- 6 • Protect two currently unprotected occurrences of San Joaquin spearscale in Conservation Zones
7 1, 8, or 11 (Objective BRIT/HART/SJSC1.2, associated with CM3).
- 8 No adverse effects on Delta button celery, crownscale, palmate-bracted bird’s-beak or recurved
9 larkspur would be expected. Table 12-9-63 summarizes the acreage of modeled alkali seasonal
10 wetland habitat in the study area and the number of occurrences of each special-status alkali
11 seasonal wetland plant in the study area.

12 **Table 12-9-63. Summary of Impacts on Seasonal Alkali Wetland Plants under Alternative 9**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
San Joaquin spearscale modeled habitat	14,933	680			Habitat loss from tidal habitat restoration, Yolo Bypass fisheries enhancements, and levee construction
Brittlescale modeled habitat	451	4			Habitat loss from tidal habitat restoration
Heartscale modeled habitat	6,528	306			Habitat loss from tidal habitat restoration and Yolo Bypass fisheries enhancements
Delta button celery modeled habitat	3,330 ^a	0			None
Alkali seasonal wetlands	3,273	72			Habitat loss from tidal habitat restoration and Yolo Bypass fisheries enhancements
Covered Species					
San Joaquin spearscale			19	1	Population loss from tidal habitat restoration
Brittlescale			8	0	None
Heartscale			3	0	None
Delta button celery			1 ^b	0	None
Heckard’s peppergrass			1 ^c	1	Population loss from tidal habitat restoration
Noncovered Species					
Crownscale			17	0	None
Palmate-bracted bird’s-beak			1	0	None
Recurved larkspur			4	0	None
^a A portion of this acreage consists of riparian habitat.					
^b A second occurrence in study area is in riparian habitat.					
^c Four additional occurrences of Heckard’s peppergrass are associated with vernal pools.					

1 **Impact BIO-170: Effects on Habitat and Populations of Alkali Seasonal Wetland Plants**

2 Alternative 9 would have adverse effects on modeled seasonal alkali wetland habitat for San Joaquin
3 spearscale, brittlescale, and heartscale. It could also have adverse effects on occurrences of San
4 Joaquin spearscale and Heckard's peppergrass.

5 The individual effects of each relevant conservation measure are addressed below. A summary
6 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
7 conservation measure discussions.

- 8 • *CM1 Water Facilities and Operation*: No alkali seasonal wetland habitat or occurrences of special-
9 status alkali seasonal wetland plants are present within areas proposed for construction of the
10 water facilities or channel dredging. Therefore, construction and operation of the water
11 conveyance facilities would have no impacts on covered and noncovered alkali seasonal wetland
12 plant species.
- 13 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries
14 improvements would permanently remove 56 acres of modeled habitat for San Joaquin
15 spearscale. No known occurrences of San Joaquin spearscale would be affected. No modeled
16 habitat and no known occurrences of the seven other alkali seasonal wetland plants are within
17 the hypothetical footprint for construction or operation of the Yolo Bypass fisheries
18 enhancements.
- 19 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to benefit alkali
20 seasonal wetland plants by protecting 150 acres of alkali seasonal wetland in Conservation
21 Zones 1, 8, and/or 11. The protected alkali seasonal wetland habitat would be managed and
22 enhanced to sustain populations of native plant species.
- 23 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration is expected to convert
24 alkali seasonal wetlands on the margins of tidal wetlands to freshwater or brackish tidal marsh.
25 Tidal habitat restoration would convert 680 acres of modeled habitat for San Joaquin spearscale
26 to tidal marsh. Tidal habitat restoration would permanently remove 4 acres of modeled habitat
27 for brittlescale in CZ 1 near Lindsey Slough and in CZ 11 near Nurse Slough; however, the BDCP
28 would allow up to 50 acres of modeled habitat to be converted to tidal wetlands. Tidal habitat
29 restoration would remove 306 acres of modeled habitat for heartscale in CZ 1 in the vicinity of
30 Jepson Prairie and in CZ 11 adjacent to Suisun Marsh. The extent to which the modeled habitat is
31 actually occupied by these species is not known; modeled habitat is assumed to encompass all
32 potential habitat for a species and may therefore overestimate the area actually occupied. Tidal
33 habitat restoration could adversely affect an occurrence of Heckard's peppergrass at Hass
34 Slough and an occurrence of San Joaquin spearscale at Main Prairie, both in CZ 1. These
35 occurrences are based on historic records, and the whether or not the populations still exist is
36 not known. In each case, the loss of modeled habitat and occurrences for covered species would
37 be adverse effects. Delta button celery, crownscale, palmate-bracted bird's-beak, and recurved
38 larkspur would not be affected by tidal habitat restoration.
- 39 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
40 would result in the removal of 2 acres of modeled habitat for San Joaquin spearscale. No known
41 occurrences of San Joaquin spearscale would be affected. No other alkali seasonal wetland
42 habitat or occurrences of special-status alkali seasonal wetland plants are present within areas
43 proposed for floodplain restoration. Therefore, floodplain restoration and construction of new

1 floodplain levees would have no impacts on covered and noncovered alkali seasonal wetland
2 plants.

- 3 • *CM6 Channel Margin Enhancement*: No alkali seasonal wetland habitat or occurrences of special-
4 status alkali seasonal wetland plants are present within areas proposed for channel margin
5 habitat enhancement. Therefore, channel margin habitat enhancement would have no impacts
6 on covered and noncovered alkali seasonal wetland plants.
- 7 • *CM7 Riparian Natural Community Restoration*: No alkali seasonal wetland habitat or occurrences
8 of special-status alkali seasonal wetland plants are present within areas proposed for riparian
9 habitat enhancement. Therefore, riparian habitat enhancement would have no impacts on
10 covered and noncovered alkali seasonal wetland plants.
- 11 • *CM8 Grassland Natural Community Restoration*: Although the alkali seasonal wetland habitat
12 includes the grassland matrix within which the wetlands occur, grassland restoration activities
13 would take place in non-grasslands (ruderal habitat, cultivated land) or degraded grasslands
14 that are not included within alkali seasonal wetland habitat. Therefore, grassland communities
15 restoration would have no impacts on covered and noncovered alkali seasonal wetland plants.
- 16 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Although some vernal pools
17 are alkaline, alkali seasonal wetlands in the study area consist of alkali grassland, alkali meadow,
18 or iodine bush scrub. Therefore, vernal pool restoration would avoid alkali seasonal wetland
19 habitat and would have no impacts on covered and noncovered alkali seasonal wetland plants.
20 In addition, the BDCP would compensate for the loss of alkali seasonal wetlands from other CMs
21 by restoring or creating 72 acres of alkali seasonal wetlands in Conservation Zones 1, 8, or 11 to
22 achieve no net loss of this habitat.
- 23 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
24 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid alkali
25 seasonal wetland habitat and would have no impacts on covered and noncovered alkali seasonal
26 wetland plants.
- 27 • *Avoidance and Minimization Measures*: Effects on special-status alkali seasonal wetland plants
28 potentially resulting from implementation of CM4 would be avoided or minimized through
29 *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and Monitoring*,
30 and *AMM37 Recreation*. Under AMM11, surveys for covered plant species would be performed
31 during the planning phase of projects, and any impacts on populations of covered species would
32 be avoided through project design or subsequently minimized through AMM2. In addition,
33 AMM11 prohibits ground disturbance or hydrologic disturbance within 250 feet of existing
34 vernal pools, which would protect those species with modeled habitat that includes vernal pool
35 complex. Occurrences of covered species in vernal pools near tidal wetlands would not be
36 affected by tidal habitat restoration where critical habitat for vernal pool species is present and
37 would be avoided under AMM11. AMM37 requires that new recreation trails avoid populations
38 of covered alkali seasonal wetland plants.

39 In summary, one historic occurrence of Heckard's peppergrass and one historic occurrence of San
40 Joaquin spearscale could be affected by tidal restoration activities, if those occurrences still exist.
41 AMM11 would be implemented to avoid an adverse effect on the Heckard's peppergrass and San
42 Joaquin spearscale occurrences.

1 The primary effect of Alternative 9 on special-status alkali seasonal wetland plants would be the loss
 2 of potential (i.e., modeled) habitat for San Joaquin spearscale, brittlescale, heartscale, and Delta
 3 button-celery. Approximately 72 acres of this habitat loss would be alkali seasonal wetlands. The
 4 actual effect on modeled habitat for alkali seasonal wetland plants is expected to be somewhat less
 5 than the estimated impact because some of this habitat is composed of vernal pool complex, and the
 6 BDCP limits the total loss of wetted vernal pool habitat to 10 acres (approximately 67 acres of vernal
 7 pool complex) over the permit term (AMM12). Loss of modeled habitat would be compensated for
 8 by restoring or creating vernal pool complex, alkali seasonal wetlands, and grasslands, in proportion
 9 to the amount of each habitat removed. At the proposed restoration ratios of 1:1 (prior to impact)
 10 and 1.5:1 (concurrent with impact), between 67 and 100.5 acres of vernal pool complex restoration
 11 would be required to compensate for the loss of modeled habitat composed of vernal pool complex
 12 (Objective VPNC1.2, associated with CM9). Approximately 72 acres of alkali seasonal wetlands
 13 would be restored (Objective ASWC1.2, associated with CM9). Loss of modeled habitat composed of
 14 grasslands would be compensated for by restoring grassland habitat on a 1:1 basis (Objective
 15 GNC1.1, associated with CM8). These compensation levels would be consistent with typical NEPA
 16 and CEQA project-level mitigation ratios for impacts on vernal pools, alkali seasonal wetlands, and
 17 grasslands.

18 Alternative 9 would have a small beneficial effect on special-status alkali seasonal wetland plants by
 19 protecting 150 acres of alkali seasonal wetland habitat. The BDCP also includes the species-specific
 20 goals that 75 acres of the protected alkali seasonal wetland habitat would be modeled habitat for
 21 brittlescale and heartscale (Objective BRIT/HART/SJSC1.1) and that 2 occurrences of San Joaquin
 22 spearscale would be protected (Objective BRIT/HART/SJSC1.2). The benefits of habitat protection
 23 and management also would accrue to any noncovered alkali seasonal wetland plants occurring in
 24 the protected habitat.

25 **NEPA Effects:** Under Alternative 9, loss of modeled habitat for alkali seasonal wetland plant species
 26 would be offset through restoration of grassland, vernal pool, and alkali seasonal wetland habitat
 27 (CM8, CM9), and impacts on one occurrence of San Joaquin spearscale and one occurrence of
 28 Heckard's peppergrass would be avoided through AMM11. With avoidance and habitat restoration,
 29 these effects would not be adverse.

30 **CEQA Conclusion:** Because loss of modeled habitat for alkali seasonal wetland plant species would
 31 be offset through restoration, and because impacts on occurrences of covered alkali seasonal
 32 wetland plants would be avoided, impacts on alkali seasonal wetlands as a result of implementing
 33 Alternative 9, would not result in substantially reducing the number or restricting the range of five
 34 covered and three noncovered plant species, and this impact would be less than significant. No
 35 mitigation is required.

36 **Grassland Plants**

37 One covered plant and 11 noncovered special-status plants occur in grasslands in the study area
 38 (Tables 12-2, 12-3, summarized in Table 12-9-64). The only covered plant species occurring in
 39 grassland is Carquinez goldenbush. Carquinez goldenbush modeled habitat included hydrological
 40 features such as stream corridors on alluvium derived from the Montezuma Formation. Stream
 41 corridors (intermittent and perennial) that intersected these geologic units were selected and
 42 truncated at the point at which they encountered the upper elevation of intertidal marsh. The
 43 corridors were buffered 50 feet (15 meters) on either side in an effort to capture the estimated
 44 maximum extend of alluvium deposits in close proximity to the actual rivers/streams.

1 Full implementation of Alternative 9 would include the following conservation actions over the term
2 of the BDCP to benefit covered grassland plants (BDCP Chapter 3, Section 3.3, *Biological Goals and*
3 *Objectives*).

- 4 • Protect three unprotected occurrences of the Carquinez goldenbush in Conservation Zones 1
5 and/or 11 (Objective CGB1.1, associated with CM3).
- 6 • Maintain and enhance occupied Carquinez goldenbush habitat to slow erosion and reverse
7 degradation from livestock grazing (Objective CGB1.2, associated with CM11).

8 Of 78,047 acres of grasslands in the study area, Alternative 9 would adversely affect 2,706 acres
9 under Alternative 9, including 4 acres that are modeled habitat for Carquinez goldenbush. For 10 of
10 the plants, no known occurrences would be affected. One of five Parry's rough tarplant occurrences
11 in the study area could be affected by Alternative 9. Table 12-9-64 summarizes the acreage of
12 grassland habitat in the study area and the number of occurrences of each special-status grassland
13 plant in the study area.

1 **Table 12-9-64. Summary of Impacts on Grassland Plants under Alternative 9**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Carquinez goldenbush modeled habitat	1,346	4			Habitat loss from tidal habitat restoration
Grassland	78,047	2,706			Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, floodplain restoration, and construction of conservation hatcheries facilities
Covered Species					
Carquinez goldenbush			10	1	Occurrence affected by tidal restoration
Noncovered Species					
Big tarplant			5	0	None
Round-leaved filaree			2	0	None
Pappose tarplant			7	0	None
Parry's rough tarplant			5	1	Periodic inundation of one occurrence as a result of Yolo Bypass operations
Small-flowered morning-glory			0	0	None
Diamond-petaled poppy			1	0	None
Stinkbells			1	0	None
Fragrant fritillary			4	0	None
Gairdner's yampah			0	0	None
Streamside daisy ^a			1	0	None
Caper-fruited tropidocarpum			8	0	None

^a This species actually occurs in upland woodland, a habitat that has not been mapped or quantified in the BDCP.

2

3 **Impact BIO-171: Effects on Habitat and Populations of Grassland Plant Species**

4 Alternative 9 could have adverse effects on modeled habitat for Carquinez goldenbush. It could also
5 affect one occurrence of Carquinez goldenbush and one occurrence of Parry's rough tarplant.
6 Although Alternative 9 would have no expected effects on known occurrences of the other special-
7 status plant species that occur in grasslands, the loss of 3,389 acres of grassland would have the
8 potential to adversely affected undocumented populations of special-status grassland species.

1 The individual effects of each relevant conservation measure are addressed below. A summary
2 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
3 conservation measure discussions.

- 4 • *CM1 Water Facilities and Operation*: No modeled habitat for Carquinez goldenbush and no
5 known occurrences of the 12 special-status grassland plants are within the proposed footprint
6 for the Alternative 9 water conveyance facilities. About 427 acres of grassland habitat would be
7 affected by construction of the water conveyance facilities. However, this grassland habitat
8 consists of small patches of herbaceous ruderal vegetation along levees that do not provide
9 habitat for special-status grassland species. Therefore, under Alternative 9, construction and
10 operation of the water conveyance facilities would not affect the 12 special-status grassland
11 plants.
- 12 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries
13 enhancements would remove 627 acres of grassland habitat. Yolo Bypass operations would
14 result in more frequent and longer inundation of 1,597 acres of grasslands in the Yolo Causeway
15 (CZ 2) that include habitat for one occurrence of Parry's rough tarplant. Parry's rough tarplant is
16 a summer-blooming plant that occurs in areas subject to occasional inundation during the wet
17 season, such as swales and seasonal wetlands. Increasing the frequency or duration of
18 inundation may decrease the distribution in some areas by making some conditions too wet but
19 would also expand the distribution into areas that may currently be too dry. Overall, changing
20 the frequency and duration of inundation in the area of this occurrence should not result in a
21 substantial change in the range of numbers of Parry's rough tarplant. Construction and
22 operation of the Yolo Bypass fisheries enhancements would not affect modeled habitat for
23 Carquinez goldenbush or known occurrences of other special-status grassland plants.
- 24 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to preserve 8,000
25 acres of grassland habitat, some of which may contain modeled habitat for Carquinez
26 goldenbush. Protection of grassland habitat may also protect undiscovered occurrences of
27 special-status plant species.
- 28 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently
29 remove 1,122 acres of grassland habitat. Four acres of modeled habitat for Carquinez
30 goldenbush along the eastern side of Suisun Marsh could be lost as a result of habitat
31 conversion, including part of one known occurrence. Tidal restoration would not affect
32 other known occurrences of special-status grassland plants.
- 33 • *CM5 Seasonally Inundated Floodplain Restoration*: Construction of new floodplain levees would
34 result in the loss of 85 acres of grassland habitat, and periodic inundation of the floodplain
35 would affect 513 acres of grassland habitat. However, no modeled habitat for Carquinez
36 goldenbush or known occurrences of special-status grassland plants are present within areas
37 proposed for floodplain restoration, and the affected grassland habitat consists of herbaceous
38 ruderal vegetation that does not support special-status grassland plants. Therefore, floodplain
39 restoration and construction of new floodplain levees would have no impacts on covered and
40 noncovered grassland plants.
- 41 • *CM6 Channel Margin Enhancement*: No known occurrences of special-status grassland plants are
42 present within areas proposed for channel margin habitat enhancement. Areas mapped as
43 grassland along levees that would be affected by channel margin habitat enhancement are small
44 patches of ruderal vegetation along levees that do not provide habitat for special-status
45 grassland species and are not modeled habitat for Carquinez goldenbush. Therefore, channel

1 margin habitat enhancement would have no impacts on covered and noncovered grassland
2 plants.

- 3 • *CM7 Riparian Natural Community Restoration*: No modeled habitat for Carquinez goldenbush or
4 known occurrences of special-status grassland plants are present within areas proposed for
5 riparian habitat enhancement. About 401 acres of grassland habitat would be converted to
6 riparian habitat. The affected grassland habitat consists of herbaceous ruderal vegetation that
7 does not support special-status grassland plants. Therefore, riparian habitat enhancement
8 would have no impacts on covered and noncovered grassland plants.
- 9 • *CM8 Grassland Natural Community Restoration*: Grassland restoration would restore 2,000 acres
10 of grassland habitat. Restoration activities would take place in non-grasslands (ruderal habitat,
11 cultivated land) or degraded grasslands. These areas do not currently provide habitat for
12 special-status grassland plants. Therefore, grassland community restoration would have no
13 impacts on covered and noncovered grassland plants.
- 14 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: Vernal pool complex includes
15 vernal pools as well as the surrounding grassland matrix. Because the habitat to be restored
16 would consist of areas of former vernal pool complex that have been leveled for cultivation,
17 special-status grassland plants would not be present. Therefore, vernal pool complex
18 restoration would not affect special-status grassland plants.
- 19 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
20 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid grassland
21 habitat and would have no impacts on covered and noncovered grassland plants.
- 22 • *CM18 Conservation Hatcheries*: Construction of the conservation hatcheries would remove 35
23 acres of grassland habitat. The removed habitat would consist of ruderal herbaceous vegetation
24 that would not be likely to provide habitat for special-status grassland plants. Therefore,
25 construction of the conservation hatcheries would not be expected to affect special-status
26 grassland plants.
- 27 • *Avoidance and Minimization Measures*: Effects on Carquinez goldenbush potentially resulting
28 from implementation of CM4 and potential effects on undiscovered populations of special-status
29 grassland plants would be avoided or minimized through *AMM11 Covered Plant Species*, *AMM2*
30 *Construction Best Management Practices and Monitoring*, and *AMM37 Recreation*. Under AMM11,
31 surveys for covered plant species would be performed during the planning phase of projects,
32 and any impacts on populations of covered species would be avoided through project design or
33 subsequently minimized through AMM2. AMM37 requires that new recreation trails avoid
34 populations of Carquinez goldenbush.

35 The primary effect of Alternative 9 on special-status grassland plants is the loss of potential (i.e.,
36 modeled) habitat for Carquinez goldenbush, including part of one known occurrence. Adverse
37 effects on the occurrence will be minimized through AMM11. Protecting three unprotected
38 occurrences of Carquinez goldenbush (Objective CGB1.1, associated with CM3) and maintaining and
39 enhancing occupied Carquinez goldenbush (Objective CGB1.2, associated with CM11) would
40 compensate for any residual effects. One occurrence of Parry's rough tarplant would be affected by
41 CM2, but the effect is not expected to be adverse. No known occurrences of the other special-status
42 grassland plants would be affected.

1 Alternative 9 would have a potential beneficial effect on special-status grassland plants by
2 protecting 8,000 acres of grassland habitat. To ensure that this habitat preservation would
3 specifically benefit Carquinez goldenbush, the plan proposes to protect three Carquinez goldenbush
4 occurrences in CZs 1 and 11 that are currently not protected and to maintain and enhance occupied
5 Carquinez goldenbush habitat. The preservation of modeled or potential habitat, together with
6 avoidance and minimization of impacts on species occurrences, would reduce any effects Alternative
7 9 on covered grassland plants to a level that is no longer adverse.

8 **NEPA Effects:** The loss of modeled and occupied habitat for Carquinez goldenbush would be offset
9 through CM3, CM8, and CM11. Therefore, implementation of Alternative 9 would result in no
10 adverse effects on special-status grassland plants.

11 **CEQA Conclusion:** Because adverse effects on special-status grassland plant species would be
12 avoided or compensated for, Alternative 9 would not result in substantially reducing the numbers or
13 restricting the range of one covered or 11 noncovered special-status grassland plants, and this
14 impact would be less than significant. No mitigation is required.

15 **Valley/Foothill Riparian Plants**

16 Two covered plants and two noncovered special-status plants occur in valley/foothill riparian
17 habitat in the study area (Tables 12-2, 12-3, summarized in Table 12-9-65). The valley/foothill
18 riparian habitat model for Delta button-celery and slough thistle was mapped as all of the study area
19 along the flood plain of the San Joaquin River between the levees from the Mossdale Bridge to
20 Vernalis. Whether or not this modeled habitat is actually occupied by Delta button-celery and slough
21 thistle is unknown; all known occurrences of these species within the area of modeled habitat are
22 believed to be extirpated.

23 Full implementation of Alternative 9 would include the following conservation actions over the term
24 of the BDCP to benefit covered valley/foothill riparian plants (BDCP Chapter 3 Section 3.3, *Biological*
25 *Goals and Objectives*).

- 26 • Protect and enhance two occurrences of delta button celery. If occurrences are not found in the
27 Plan Area, establish self-sustaining occurrences of delta button celery for a total of two
28 occurrences within the restored floodplain habitat on the mainstem of the San Joaquin River in
29 Conservation Zone 7 between Mossdale and Vernalis. (Objective DBC1.1, associated with CM3
30 and CM11)
- 31 • Protect and enhance two occurrences of slough thistle. If occurrences are not found in the Plan
32 Area, establish self-sustaining occurrences of slough thistle for a total of two occurrences within
33 the 10,000 acres of restored floodplain on the mainstem of the San Joaquin River in
34 Conservation Zone 7 between Mossdale and Vernalis (Objective ST1.1: associated with CM3 and
35 CM11).

36 Of 17,966 acres of valley/foothill riparian habitat in the study area, Alternative 9 would adversely
37 affect 1,116 acres, including 15 acres that are modeled habitat for Delta button-celery and 11 acres
38 that are modeled habitat for slough thistle. Table 12-9-65 summarizes the acreage of modeled
39 habitat for Delta button-celery and slough thistle and the number of occurrences of each special-
40 status grassland plant in the study area.

1 **Table 12-9-65. Summary of Impacts on Valley/Foothill Riparian Plants under Alternative 9**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Delta button celery modeled habitat	3,361 ^a	15			Habitat loss from floodplain restoration
Slough thistle modeled habitat	1,834	11			Habitat loss from floodplain restoration
Valley/foothill riparian habitat	17,966	1,116			Habitat loss from construction of water conveyance facilities, tidal restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Covered Species					
Delta button celery			1 ^b	1	Occurrence potentially affected by floodplain restoration
Slough thistle			2	2	Occurrences potentially affected by floodplain restoration
Noncovered Species					
Northern California black walnut			1	0	None
Wright's trichocoronis			1	0	None
^a A portion of this acreage consists of alkali seasonal wetland					
^b A second occurrence is in alkali seasonal wetland					

2

3 **Impact BIO-172: Effects on Habitat and Populations of Valley/Foothill Riparian Plants**

4 No extant occurrences of Delta button-celery, slough thistle, Northern California black walnut, or
 5 Wright's trichocoronis are present in the study area. Therefore, no impacts on special-status
 6 valley/foothill riparian plants are expected. Modeled habitat for Delta button-celery and slough
 7 thistle, which may support undocumented occurrences of these species, would be affected by
 8 restoration of seasonally inundated floodplain.

9 The individual effects of each relevant conservation measure are addressed below. A summary
 10 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
 11 conservation measure discussions.

- 12 • *CM1 Water Facilities and Operation*: Construction of the water conveyance facilities would
 13 remove 310 acres of valley-foothill riparian habitat under Alternative 9. However, no modeled
 14 habitat and no known occurrences of the four special-status valley/foothill riparian plants are
 15 within the proposed footprint for the Alternative 9 water conveyance facilities. Therefore, under
 16 Alternative 9, construction and operation of the water conveyance facilities would not affect
 17 covered or noncovered special-status valley/foothill riparian plants.

- 1 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction and operation of the Yolo Bypass fisheries
2 enhancements would adversely affect 176 acres of valley/foothill riparian habitat. However, no
3 modeled habitat and no known occurrences of the four special-status valley/foothill riparian
4 plants are within the hypothetical footprint for construction or operation of the Yolo Bypass
5 fisheries enhancements. Therefore, construction and operation of the Yolo Bypass fisheries
6 enhancements would not affect the covered or noncovered valley/foothill riparian plants.
- 7 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes to protect 552 acres
8 of existing valley/foothill riparian forest in CZ 7. This action would have no substantial effects on
9 special-status valley/foothill plants because no extant occurrences of special-status
10 valley/foothill plants are present in the study area.
- 11 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would inundate 552 acres
12 of valley/foothill riparian habitat. However, no modeled habitat and no known occurrences of
13 the four special-status valley/foothill riparian plants are within the hypothetical footprint for
14 tidal restoration. Therefore, tidal restoration would not affect the covered or noncovered
15 valley/foothill riparian plants.
- 16 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
17 would remove about 78 acres of valley/foothill riparian habitat, including 15 acres of modeled
18 habitat for Delta button-celery along the San Joaquin River in CZ 7. In addition, floodplain
19 restoration would result in more frequent and longer inundation of 18 acres of modeled habitat
20 for Delta button-celery in this area. The area affected contains one historic occurrence of Delta
21 button celery. This occurrence is considered to be extirpated, because all habitat for Delta
22 button-celery at his location has been converted to agriculture (California Department of Fish
23 and Wildlife 2013). Therefore, Alternative 9 would not have an adverse effect on Delta button
24 celery in CZ 7.

25 The BDCP proposes to benefit Delta button-celery at this location by restoring 5,000 acres of
26 valley/foothill riparian habitat and re-introducing two occurrences of Delta button-celery.
27 Although Delta button celery occurs in riparian habitat, it is not associated with woodland or
28 scrub habitats; rather, it occurs in alkali seasonal wetlands in floodplains, which may or may not
29 also contain adjacent woody riparian habitat. Restoring habitat for Delta button-celery may not
30 be compatible with restoring woody riparian habitat. In addition, establishing new populations
31 of Delta button-celery is an untried, unproven procedure and may not be feasible. Therefore, any
32 beneficial effects on Delta button-celery would be speculative.

33 Floodplain restoration levee construction would remove 11 acres of modeled habitat for slough
34 thistle and would result in more frequent and longer inundation of 6 acres of modeled habitat
35 for slough thistle along the San Joaquin River in CZ 7. However, the BDCP would allow up to 50
36 acres of modeled habitat to be converted to riparian habitat. Whether the affected modeled
37 habitat is actually occupied by slough thistle is not known; however, of two historic occurrences
38 of slough thistle present in the study area, only one is considered to be extirpated (California
39 Department of Fish and Wildlife 2013). The BDCP would protect and enhance two occurrences
40 of slough thistle. If occurrences are not found in the study area, then two, self-sustaining
41 occurrences of slough thistle would be established using locally-sourced genetic material for a
42 total of two occurrences within the restored floodplain habitat on the main stem of the San
43 Joaquin River in CZ 7 between Mossdale and Vernalis. Establishing new populations of slough
44 thistle is an untried, unproven procedure and may not be feasible. Therefore, any beneficial
45 effects on slough thistle would be speculative.

1 One historic occurrence of Wright's trichocoronis in the study area near Lathrop (CZ 7) could
2 also be affected by floodplain restoration. The occurrence is presumed to be extant because the
3 presence or absence of suitable habitat has not been verified by field surveys (California
4 Department of Fish and Wildlife 2013). However, the species has not been observed at this
5 location for nearly a century, and habitat for Wright's trichocoronis, which would have been
6 similar to that for Delta button celery and slough thistle, no longer appears to be present in
7 aerial photographs of the area. Therefore, Alternative 9 would not be expected to have an
8 adverse effect on Wright's trichocoronis.

- 9 • *CM6 Channel Margin Habitat Enhancement*: No modeled habitat or occurrences of special-status
10 valley/foothill riparian plants are present within areas proposed for channel margin habitat
11 enhancement. Therefore, channel margin habitat enhancement would have no impacts on
12 covered and noncovered valley/foothill riparian plants.
- 13 • *CM7 Riparian Natural Community Restoration*: No extant occurrences of special-status
14 valley/foothill riparian plants are present within areas proposed for riparian habitat
15 restoration. Therefore, riparian habitat restoration would have no impacts on covered and
16 noncovered valley/foothill riparian plants.
- 17 • *CM8 Grassland Natural Community Restoration*: No occurrences of special-status valley/foothill
18 riparian plants are present within areas proposed for grassland communities restoration.
19 Therefore, grassland communities restoration would have no impacts on covered and
20 noncovered valley/foothill riparian plants.
- 21 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No occurrences of special-
22 status valley/foothill riparian plants are present within areas proposed for vernal pool and
23 alkali seasonal wetland complex restoration. Therefore, vernal pool complex restoration would
24 have no impacts on covered and noncovered valley/foothill riparian plants.
- 25 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
26 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid
27 valley/foothill riparian habitat and would have no impacts on covered and noncovered
28 valley/foothill riparian plants.
- 29 • *Avoidance and Minimization Measures*: Effects on Delta button-celery and slough thistle
30 potentially resulting from implementation of CM5 would be avoided or minimized though
31 *AMM11 Covered Plant Species* and *AMM2 Construction Best Management Practices and*
32 *Monitoring*. Under AMM11, surveys for covered plant species would be performed during the
33 planning phase of projects, and any impacts on populations of covered species would be avoided
34 through project design or subsequently minimized though AMM2.

35 Because no extant occurrences of special-status valley/foothill riparian plants are known to occur in
36 the study area, Alternative 9 is not expected to adversely affect any special-status valley/foothill
37 riparian plants. Modeled habitat for both Delta button-celery and slough thistle would be affected.
38 Under AMM11, surveys for covered plants would be performed during the planning phase for
39 floodplain restoration. If Delta button-celery or slough thistle were found to be present in the
40 floodplain restoration area, then the project would be designed to avoid impacts on the populations.
41 Therefore, Alternative 9 would not have an adverse effect on these species.

42 The BDCP proposes to benefit Delta button-celery and slough thistle by restoring 5,000 acres of
43 valley/foothill riparian habitat and re-introducing two occurrences of both species. Establishing

1 new populations of Delta-button-celery or slough thistle would be a beneficial effect. However,
2 establishing new populations is an untried, unproven procedure and may not be feasible.

3 **NEPA Effects:** Implementation of the BDCP under Alternative 9 would not have an adverse effect on
4 special-status valley/foothill riparian plant species.

5 **CEQA Conclusion:** Alternative 9 would not result in a reduction in the range and numbers of covered
6 and noncovered valley/foothill riparian plants. This impact would be less than significant. No
7 mitigation is required.

8 **Tidal Wetland Plants**

9 Seven covered plants and one noncovered special-status plant occur in tidal wetlands in the study
10 area (Tables 12-2, 12-3, summarized in Table 12-9-66). Five tidal wetland habitat models were
11 developed for the seven covered plant species occurring in tidal wetland habitat.

12 Modeled habitat for Mason's lilaepsis and Delta mudwort was mapped as areas within 10 feet (3
13 meters) on either side of the landward boundary of tidal perennial aquatic land cover type, which
14 was obtained from the BDCP GIS vegetation data layer.

15 The side-flowering skullcap model mapped the distribution of suitable habitat in the study area
16 according to the species' habitat association with woody riparian habitat. The model selected Delta
17 riparian vegetation types providing the habitat characteristics that side-flowering skullcap seems to
18 require, namely, woody substrate in freshwater tidal areas. The model included vegetation subunits
19 of the BDCP Valley Riparian natural community characterized by California dogwood, white alder,
20 and arroyo willow.

21 The modeled habitat for soft bird's-beak consisted of pickleweed- and saltgrass-dominated
22 vegetation units located west of the Antioch Bridge. Modeled habitat for these two plant species was
23 mapped as areas within 10 feet (3 meters) on either side of the landward boundary of tidal
24 perennial aquatic land cover types. The model used all Tidal Brackish Emergent Wetland polygons
25 that were limited by specific vegetation units that are known to be closely associated with soft
26 bird's-beak habitat.

27 Habitat for Delta tule pea and Suisun Marsh aster was modeled separately based on the salinity of
28 the water. For the tidal freshwater emergent wetland BDCP land cover type, modeled habitat was
29 mapped as the area within 10 feet (3 meters) of the landward side of the landward boundary,
30 exclusively where this land cover type is adjacent to grassland, vernal pool complex, valley/foothill
31 riparian, or cultivated land habitat cover types. For brackish water areas in and near Suisun Marsh,
32 the model used all tidal brackish emergent wetland polygons within an elevation range of 7 to 10
33 feet (2 to 3 meters) to capture elevations 1 foot (30 centimeters) below intertidal to 2 feet (60
34 centimeters) above intertidal.

35 The modeled habitat for Suisun thistle in and near Suisun Marsh consists of all tidal brackish
36 emergent wetland polygons with the appropriate vegetation. This included vegetation units
37 dominated by saltscale, saltgrass, pickleweed, and broad-leaved peppergrass.

38 Full implementation of Alternative 9 would include the following conservation actions over the term
39 of the BDCP to benefit covered tidal wetland plants (BDCP Chapter 3, Section 3.3, *Biological Goals*
40 *and Objectives*).

- 1 • No net loss of Mason’s lilaepsis and delta mudwort occurrences within restoration sites, or
2 within the area of affected tidal range of restoration projects (Objective DMW/ML1.1, associated
3 with CM4 and CM11).
- 4 • No net loss of Delta tule pea and Suisun Marsh aster occurrences within restoration sites
5 (Objective DTP/SMA1.1, associated with CM4 and CM11).
- 6 • Restore tidal inundation to wetlands in the Hill Slough Ecological Reserve and to the ponded
7 area at Rush Ranch (Objective SBB/SuT1.1, associated with CM4).
- 8 • Complete seed banking of all existing Suisun Marsh populations and the representative genetic
9 diversity using accepted seed banking protocols (Objective SBB/SuT1.2, associated with CM11).
- 10 • Establish a cultivated population of Suisun thistle from wild seed using accepted seed collection
11 protocols (Objective SBB/SuT1.3, associated with CM11).
- 12 • Establish two occurrences of Suisun thistle in Conservation Zone 11 (Objective SBB/SuT1.4,
13 associated with CM11).

14 Of 17,357 acres of tidal wetlands in the study area, Alternative 9 would affect 193 acres, including
15 areas that are modeled habitat for Mason’s lilaepsis, Delta mudwort, side-flowering skullcap, Delta
16 tule pea, Suisun Marsh aster, soft bird’s-beak, and Suisun thistle. Known occurrences of all of these
17 species would be affected. In addition, three occurrences of Bolander’s water-hemlock, a noncovered
18 special-status plant, could be affected by tidal habitat restoration. Table 12-9-66 summarizes the
19 acreage of modeled habitat for covered tidal wetland species and the number of occurrences of each
20 special-status tidal wetland plants in the study area.

21 **Table 12-9-66. Summary of Impacts on Tidal Wetland Plants under Alternative 9**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Delta mudwort/ Mason’s lilaepsis modeled habitat	6,081	163			Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Side-flowering skullcap modeled habitat	2,497	173			Habitat loss from construction of water conveyance facilities, conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Soft bird’s-beak modeled habitat	1,228	73			Habitat loss from tidal habitat restoration
Delta tule pea/ Suisun Marsh aster modeled habitat	5,853	26			Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Suisun thistle modeled habitat	1,281	73			Habitat loss from tidal habitat restoration

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Tidal brackish emergent wetland	8,501	0			None
Tidal freshwater emergent wetland	8,856	193			Habitat loss from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Covered Species					
Delta mudwort			58	10	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Delta tule pea			106	30	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Mason's lilaepsis			181	27	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Side-flowering skullcap			12	1	Occurrences affected by construction of water conveyance facilities
Soft bird's-beak			13	7	Occurrences affected by tidal habitat restoration
Suisun Marsh aster			164	27	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration
Suisun thistle			4	0	None
Noncovered Species					
Bolander's water hemlock			8	3	Occurrences affected by construction of water conveyance facilities and tidal habitat restoration

1

2 **Impact BIO-173: Effects on Habitat and Populations of Tidal Wetland Plants**

3 Alternative 9 would have adverse effects on tidal marsh special-status plants through
4 implementation of CM1, CM2, CM4, and CM5. No adverse effects are expected from implementation
5 of CM3, CM6, CM7, CM8, and CM9.

6 The individual effects of each relevant conservation measure are addressed below. A summary
7 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
8 conservation measure discussions.

- 9 • *CM1 Water Facilities and Operation:* Construction of the Alternative 9 water conveyance facilities
10 would remove 163 acres of modeled habitat for delta mudwort and Mason's lilaepsis, 173 acres
11 of modeled habitat for side-flowering skullcap, and 26 acres of modeled habitat for Delta tule

1 pea and Suisun Marsh aster. The extent to which modeled habitat is actually occupied by these
2 species is not known; however, 12 occurrences of Mason's lilaepsis, eight occurrences of Delta
3 mudwort, one occurrence of Suisun Marsh aster, two occurrences of side-flowering skullcap,
4 and one occurrence of Bolander's water-hemlock in the study area could be affected by
5 construction impacts. No known occurrences of soft bird's-beak or Suisun thistle would be
6 affected by construction of the water conveyance facilities.

- 7 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries
8 enhancements would remove 5 acres of modeled habitat for Mason's lilaepsis and delta
9 mudwort. The extent to which modeled habitat is actually occupied by these species is not
10 known; however, no known occurrences in the study area would be affected. Yolo Bypass
11 operations would result in more frequent and longer inundation of 8 acres of modeled habitat
12 Delta tule peas and Suisun Marsh aster. Two occurrences of Suisun Marsh aster would be
13 affected by Yolo Bypass operations. Habitat for these species is normally periodically inundated
14 or saturated; therefore, a small increase in the frequency and duration of periodic inundation of
15 the habitat would not be expected to have a substantial effect.
- 16 • *CM3 Natural Communities Protection and Restoration*: The BDCP proposes restoring or creating
17 20 linear miles of transitional tidal areas within other natural communities that would be
18 created or restored, including 6,000 acres of tidal brackish emergent wetland and 24,000 acres
19 of tidal freshwater emergent wetland. In addition, the habitat and ecosystem functions of these
20 areas would be maintained and enhanced. The BDCP does not specifically propose to protect
21 any occurrences of tidal wetland plants nor does it propose active restoration of affected habitat
22 or occurrences. Instead, the BDCP assumes that the 20 linear miles of restored transitional tidal
23 areas will be passively colonized by the covered tidal wetland plants.
- 24 • *CM4 Tidal Natural Communities Restoration*: Tidal habitat restoration would permanently
25 remove 6 acres of modeled habitat for Mason's lilaepsis and Delta mudwort. Habitat loss would
26 occur through conversion of the species habitat (at and immediately above the tidal zone in
27 marshes and along rivers and streams) to inundated tidal habitat. The extent to which modeled
28 habitat is actually occupied by the species is not known; however, 14 of 176 known occurrences
29 of Mason's lilaepsis and three of 57 known occurrences of delta mudwort in the study area
30 could be affected by tidal habitat restoration.

31 Tidal habitat restoration would remove 4 acres of modeled habitat for side-flowering skullcap.
32 Whether the affected modeled habitat is actually occupied by side-flowering skullcap is not
33 known; however, none of the 12 known occurrences in the study area would be affected.

34 Tidal habitat restoration would remove 2 acres of modeled habitat for Delta tule pea and Suisun
35 Marsh aster. However, the BDCP would allow up to 50 acres of modeled habitat to be removed.
36 Habitat loss would result from conversion of the species habitat (at and immediately above the
37 tidal zone in marshes and along rivers and streams) to inundated tidal habitat. The extent to
38 which modeled habitat is actually occupied by the species is not known; however, 26 of 112
39 known occurrences of Delta tule pea and 24 of 145 occurrences of Suisun Marsh aster in the
40 study area would be affected.

41 Tidal habitat restoration could affect 73 acres of modeled habitat for soft bird's-beak and Suisun
42 thistle, including 1.3 acres of critical habitat. The extent to which modeled habitat is actually
43 occupied by the species is not known; however, seven of 12 known occurrences of soft bird's-
44 beak in the study area could be affected. None of the four known occurrences of Suisun thistle in
45 the study area would be affected.

1 Tidal habitat restoration could affect three of eight known occurrences of Bolander's water-
2 hemlock, a noncovered special-status species in the study area. Because Bolander's water-
3 hemlock occurs in tidal marsh, it may benefit from tidal marsh restoration. However, site
4 preparation, earthwork, and other site activities could adversely affect Bolander's water-
5 hemlock through direct habitat removal.

- 6 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
7 would remove 3 acres of modeled habitat for Mason's lilaeopsis and delta mudwort and 2 acres
8 of modeled habitat for side-flowering skullcap. No known occurrences of these species in the
9 study area would be affected by floodplain restoration.

10 Floodplain restoration would result in more frequent and longer inundation of 2 acres of
11 modeled habitat for Mason's lilaeopsis and delta mudwort, 18 acres of modeled habitat for side-
12 flowering skullcap, and 1 acre of modeled habitat for Delta tule peas and Suisun Marsh aster. No
13 known occurrences of these species in the study area would be affected by periodic inundation
14 of restored floodplain habitat. Habitat for these species is normally periodically inundated or
15 saturated; therefore, a small increase in the frequency and duration of periodic inundation of the
16 habitat would not be expected to have a substantial effect.

- 17 • *CM6 Channel Margin Enhancement*: Effects of channel margin enhancement were not analyzed
18 separately from the effects of tidal habitat restoration. Channel margin enhancement would
19 have adverse effects on tidal wetland plants through direct removal and habitat modification.
20 However, it would have beneficial effects on these species by improving the habitat functions for
21 these species as a result of riprap removal and creation of floodplain benches. Side-flowering
22 skullcap would benefit from installation of large woody material, which it appears to colonize.

- 23 • *CM7 Riparian Natural Community Restoration*: Riparian habitat restoration is not expected to
24 adversely affect special-status tidal wetland plants. Preparatory work that involves habitat
25 disturbance would occur during implementation of CM4 and CM5. Riparian plantings carried out
26 for CM7 would be placed in floodplain areas, not in tidal wetlands.

- 27 • *CM8 Grassland Natural Community Restoration*: No tidal wetlands or occurrences of special-
28 status tidal wetland plants are present within areas proposed for grassland communities
29 restoration. Therefore, grassland communities restoration would have no impacts on covered
30 and noncovered tidal wetland plants.

- 31 • *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No tidal wetlands or
32 occurrences of special-status tidal wetland plants are present within areas proposed for vernal
33 pool complex restoration. Therefore, vernal pool complex restoration would have no impacts on
34 covered and noncovered tidal wetland plants.

- 35 • *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
36 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid tidal wetland
37 habitat and would have no impacts on covered and noncovered tidal wetland plants.

- 38 • *Avoidance and Minimization Measures*: Effects on covered tidal wetland plants potentially
39 resulting from implementation of CM1, CM2, CM4, and CM5 would be avoided or minimized
40 though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*
41 *Monitoring*, *AMM12 Vernal Pool Crustaceans*, *AMM30 Transmission Line Design and Alignment*
42 *Guidelines*, and *AMM37 Recreation*. Under AMM11, surveys for covered plant species would be
43 performed during the planning phase of projects, and any impacts on populations of covered
44 species would be avoided through project design or subsequently minimized through AMM2. In

1 addition, AMM11 contains specific guidance to avoid adverse modification of any of the primary
2 constituent elements for Suisun thistle or soft bird's-beak critical habitat. AMM30, which
3 specifies that the alignment of proposed transmission lines will be designed to avoid sensitive
4 terrestrial and aquatic habitats when siting poles and towers, to the maximum extent feasible,
5 would avoid some impacts on Mason's lilaepsis. AMM37 requires that new recreation trails
6 avoid populations of covered tidal wetland plants.

7 In summary, the GIS analysis indicates that Alternative 9 would result in the loss of modeled habitat
8 for all of the covered species and result in adverse effects on known occurrences of most of the
9 special-status plants occurring in tidal wetlands. However, the BDCP predicts that habitat
10 restoration activities would greatly expand the amount of habitat available to each of these species,
11 offsetting any potential loss of habitat or occurrences resulting from covered activities.

12 Delta mudwort could lose 163 acres of modeled habitat (2.7%), including all or part of ten
13 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
14 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
15 colonization by Delta mudwort, which could offset this habitat loss. Channel margin enhancement
16 (CM6) and riparian natural community restoration (CM7) will also consider the potential for
17 creating habitat for Delta mudwort; creation of suitable habitat under these measures could also
18 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP
19 predicts that natural expansion of populations into the restored habitat would take place and result
20 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation
21 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that
22 no net loss of occurrences has been achieved (Monitoring Action CM11–CM21, associated with
23 CM11).

24 Mason's lilaepsis could lose 163 acres of modeled habitat (2.7%), including all or part of 27
25 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
26 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
27 colonization by Mason's lilaepsis, which could offset this habitat loss. Channel margin enhancement
28 (CM6) and riparian natural community restoration (CM7) will also consider the potential for
29 creating habitat for Mason's lilaepsis; creation of suitable habitat under these measures could also
30 help offset this habitat loss. Although active restoration of this species is not proposed, the BDCP
31 predicts that natural expansion of populations into the restored habitat would take place and result
32 in no net loss of occurrences (Objective DMW/ML1.1, associated with CM11). Post-implementation
33 monitoring of affected occurrences and occurrences in reserve lands would be done to confirm that
34 no net loss of occurrences has been achieved (Monitoring Action CM11–CM21, associated with
35 CM11).

36 Delta tule pea could lose 26 acre of modeled habitat (0.4%), including all or part of 30 occurrences.
37 The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives
38 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by
39 Delta tule pea, which could offset this habitat loss. Channel margin enhancement (CM6) and riparian
40 natural community restoration (CM7) will also consider the potential for creating habitat for Delta
41 tule pea; creation of suitable habitat under these measures could also help offset this habitat loss.
42 Although active restoration of this species is not proposed, the BDCP predicts that natural expansion
43 of populations into the restored habitat would take place and result in no net loss of occurrences
44 (Objective DTP/SMA1.1, associated with CM11). Post-implementation monitoring of affected

1 occurrences and occurrences in reserve lands would be done to confirm that no net loss of
2 occurrences has been achieved (Monitoring Action CM11–CM22, associated with CM11).

3 Suisun Marsh aster could lose 26 acre of modeled habitat (0.4%), including all or part of 27
4 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
5 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
6 colonization by Suisun Marsh aster, which could offset this habitat loss. Channel margin
7 enhancement (CM6) and riparian natural community restoration (CM7) will also consider the
8 potential for creating habitat for Suisun marsh aster; creation of suitable habitat under these
9 measures could also help offset this habitat loss. Although active restoration of this species is not
10 proposed, the BDCP predicts that natural expansion of populations into the restored habitat would
11 occur and result in no net loss of occurrences (Objective DTP/SMA1.1, associated with CM11). Post-
12 implementation monitoring of affected occurrences and occurrences in reserve lands would be done
13 to confirm that no net loss of occurrences has been achieved (Monitoring Action CM11–CM22,
14 associated with CM11).

15 All four of these species (Delta mudwort, Mason’s lilaopsis, Delta tule pea, and Suisun Marsh aster)
16 are widespread in the study area with many occurrences. Habitat modification and loss are the
17 primary stressors that are responsible for their decline and that currently limit their distribution
18 and abundance. Therefore, restoring large areas of habitat and improving habitat functions for these
19 species would provide a reasonable expectation that the distribution and abundance of these
20 species would also improve. Because a relatively small amount of modeled habitat would be
21 adversely affected (less than 1% of the total), it is likely that the initial adverse effects of covered
22 activities on these species would be offset and that the overall effect of Alternative 9 on these
23 species would not be adverse.

24 Side-flowering skullcap could lose 173 acres of modeled habitat (7%), including all or part of one
25 occurrence. Under AMM11, this occurrence would be surveyed for, and because this is a tidal
26 freshwater wetland species, avoidance of the habitat during project construction would be highly
27 likely. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives
28 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by
29 side-flowering skullcap, which could offset this habitat loss. Channel margin enhancement (CM6)
30 and riparian natural community restoration (CM7) will also consider the potential for creating
31 habitat for side-flowering skullcap; creation of suitable habitat under these measures could also help
32 offset this habitat loss. No active restoration of this species is proposed, and no post-implementation
33 monitoring of affected occurrences and occurrences in reserve lands would be done. Because
34 impacts on occurrences of side-flowering skullcap would be avoided, and because loss of modeled
35 habitat for the species would be offset through restoration, the overall effect of Alternative on this
36 species would not be adverse.

37 Soft bird’s-beak could lose 73 acres of modeled habitat (6%), including all or part of seven
38 occurrences. The BDCP predicts that tidal habitat restoration activities proposed under CM4
39 (Objectives TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for
40 colonization by soft bird’s-beak, which could offset this habitat loss. Tidal restoration in the Hill
41 Slough Ecological Reserve would be done to increase potential habitat there for soft bird’s-beak
42 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and
43 manage livestock in tidal marsh habitat under CM11 could enhance habitat for soft bird’s-beak.
44 Although no active restoration of this species is proposed, post-implementation monitoring of soft
45 bird’s-beak occurrences in proximity to tidal restoration sites would be done to confirm that

1 occurrences are stable or increasing (Monitoring Action CM11–CM22, associated with CM11). Soft
2 bird’s-beak has a restricted distribution in the study area with highly localized occurrences, and
3 habitat modification is the primary factor responsible for the species’ decline and limiting the
4 species’ distribution and abundance. Improving habitat functions for this species would provide a
5 reasonable expectation that the distribution and abundance of soft bird’s-beak would also improve.
6 Although a substantial amount of modeled habitat could be affected, the primary habitat for soft
7 bird’s-beak is high tidal brackish marsh, and the affected habitat is low tidal brackish marsh.
8 Therefore, it is likely that the overall effect of Alternative 9 on this species would not be adverse.

9 Suisun thistle could lose 73 acres of modeled habitat (6%), although no occurrences would be
10 affected. The BDCP predicts that tidal habitat restoration activities proposed under CM4 (Objectives
11 TBEWNC1.1 and TFEWNC1.1) would increase the extent of habitat available for colonization by
12 Suisun thistle, which could offset this habitat loss. Tidal restoration in the Hill Slough Ecological
13 Reserve and at Rush Ranch would be done to increase potential habitat there for Suisun thistle
14 (Objective SBB/SuT1.1, associated with CM4). In addition, activities to control invasive plants and
15 manage livestock in tidal marsh habitat under CM11 could enhance habitat for Suisun thistle. In
16 addition, two new occurrences of Suisun thistle would be established in CZ 11 (Objective
17 SBB/SuT1.4, associated with CM11). Post-implementation monitoring of Suisun thistle occurrences
18 in proximity to tidal restoration sites would be done to confirm that occurrences are stable or
19 increasing (Monitoring Action CM11–CM22, associated with CM11). Habitat restoration,
20 enhancement of habitat functions, and establishment of new occurrences would offset any potential
21 loss of modeled habitat for Suisun Marsh thistle.

22 Three occurrences of Bolander’s water-hemlock could be affected. Although the extent of potential
23 habitat affected was not determined, it would be comparable to that for Delta tule pea and Suisun
24 Marsh aster (5 acres). Tidal habitat restoration activities proposed under CM4 (Objectives
25 TBEWNC1.1 and TFEWNC1.1) could increase the extent of habitat available for colonization by
26 Bolander’s water-hemlock, which could offset this habitat loss. Because only a few scattered
27 occurrences of Bolander’s water-hemlock are present in the study area, there is no reasonable
28 expectation that habitat restoration without active species-specific restoration activities would
29 result in the establishment of new occurrences to offset the losses. Also, because Bolander’s water-
30 hemlock is a noncovered species, the species protections and occurrence monitoring afforded to
31 covered species under the BDCP would not apply to this species. Therefore, the effects of Alternative
32 9 on Bolander’s water hemlock could be adverse.

33 **NEPA Effects:** The loss of modeled and occupied habitat for special-status tidal wetland plants
34 would be offset through tidal habitat restoration (CM4). Therefore, implementation of Alternative 9
35 would result in no adverse effects on seven of eight special-status grassland plants in the study area.
36 Alternative 9 would result in a reduction in the range and numbers of Bolander’s water-hemlock,
37 which would be an adverse effect. Adverse effects on Bolander’s water-hemlock could be avoided or
38 offset through implementation of Mitigation Measure BIO-170.

39 **CEQA Conclusion:** Because loss of occurrences and modeled habitat for covered tidal habitat plant
40 species would be offset through habitat restoration, impacts on covered tidal wetland plants as a
41 result of implementing Under Alternative 9 would not be significant. However, the loss of Bolander’s
42 water-hemlock populations in CZ 11 would result in a reduction in the range and numbers of this
43 species and would be a significant impact. Implementation of Mitigation Measure BIO-170 would
44 reduce this impact to a less-than-significant level.

1 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**
2 **Special-Status Plant Species**

3 DWR will evaluate all projects for their impacts on special-status plants, avoid or minimize
4 impacts on species that occur on project sites, and compensate for impacts on species. All
5 impacts on diamond-petaled California poppy and caper-fruited tropidocarpum shall be
6 avoided. Impacts on other special-status plant species shall be avoided to the extent feasible,
7 and any unavoidable impacts shall be compensated for.

- 8 ● DWR shall conduct surveys for the special-status plant species within and adjacent to all
9 project sites. Special-status plant surveys required for project-specific permit compliance
10 will be conducted during the planning phase to allow design of the individual restoration
11 projects to avoid adverse modification of habitat for specified covered plants if feasible. The
12 purpose of these surveys will be to verify that the locations of special-status plants
13 identified in previous record searches or surveys are extant, identify any new special-status
14 plant occurrences, and cover any portions of the project area not previously surveyed. The
15 extent of mitigation of direct loss of or indirect effects on special-status plants will be based
16 on these survey results.
- 17 ● All surveys shall be conducted by qualified biologists using the using *Guidelines for*
18 *Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate*
19 *Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating*
20 *Impacts to Special Status Native Plant Populations and Natural Communities* (California
21 Department of Fish and Game 2009) during the season that special-status plant species
22 would be evident and identifiable, i.e., during their blooming season. Locations of special-
23 status plants in proposed construction areas will be recorded using a GPS unit and flagged.
- 24 ● The construction monitoring plan for the protection of covered fish, wildlife, and plant
25 species, prepared by DWR before implementing an approved project, will provide for
26 construction activity monitoring in areas identified during the planning stages and
27 species/habitat surveys as having noncovered special-status plant species.
- 28 ● Where surveys determine that a special-status plant species is present in or adjacent to a
29 project site, direct and indirect impacts of the project on the species shall be avoided if
30 feasible through the establishment of 250-foot activity exclusion zones surrounding the
31 periphery of occurrences, within which no ground-disturbing activities shall take place,
32 including construction of new facilities, construction staging, or other temporary work
33 areas. Activity exclusion zones for special-status plant species shall be established according
34 to a 250-foot buffer surrounding the periphery of each plant species occurrence, the
35 boundaries of which shall be clearly marked with standard orange plastic construction
36 exclusion fencing or its equivalent. The establishment of activity exclusion zones shall not be
37 required if no construction-related disturbances will occur within 250 feet of the occurrence
38 periphery. The size of activity exclusion zones may be reduced through consultation with a
39 qualified biologist and with concurrence from USFWS or CDFW based on project site-
40 specific conditions.
- 41 ● Where avoidance of impacts on a special-status plant species is infeasible, DWR will
42 compensate for loss of individuals or occupied habitat of a special-status plant species
43 through the acquisition, protection, and subsequent management in perpetuity of other
44 existing occurrences at a 2:1 ratio (preservation: impact). DWR will provide detailed
45 information to USFWS and CDFW on the location of the preserved occurrences, quality of

1 the preserved habitat, feasibility of protecting and managing the areas in-perpetuity,
2 responsible parties, and other pertinent information. If suitable occurrences of a special-
3 status plant species are not available for preservation, then the project shall be redesigned
4 to remove features that would result in impacts on that species.

5 **Inland Dune Plants**

6 **Impact BIO-174: Effects on Habitat and Populations of Inland Dune Plants**

7 Alternative 9 would have no adverse effects on inland dune plants (Table 12-9-67). No construction
8 activities or habitat restoration would take place where the species occur. No specific actions to
9 benefit inland dune species are proposed.

10 **Table 12-9-67. Summary of Impacts on Inland Dune Plants under Alternative 9**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Modeled Habitat					
Inland Dunes	19	0			None
Noncovered Species					
Hoover's cryptantha			1	0	None
Antioch Dunes buckwheat			1	0	None
Mt. Diablo buckwheat			1	0	None
Contra Costa wallflower			3	0	None
Antioch Dunes evening- primrose			9	0	None

11
12 **NEPA Effects:** Implementation of the BDCP under Alternative 9 would not affect special-status
13 inland dune plant species.

14 **CEQA Conclusion:** Implementation of Alternative 9 would have no impacts on inland dune species.
15 No mitigation is required.

16 **Nontidal Wetland Plants**

17 No covered plant species occur in nontidal wetlands in the study area; however, six noncovered
18 special-status plant species occur in nontidal wetlands in the study area. Table 12-9-68 summarizes
19 the acreage of nontidal wetland habitat in the study area and the number of occurrences of each
20 special-status nontidal wetland plant in the study area.

1 **Table 12-9-68. Summary of Impacts on Nontidal Wetland Plants under Alternative 9**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Nontidal freshwater aquatic	5,567	269			Loss of habitat from construction of Yolo Bypass fisheries enhancements, tidal habitat restoration, and floodplain restoration
Nontidal freshwater perennial emergent wetland	1,509	151			Loss of habitat from construction of water conveyance facilities, tidal habitat restoration, Yolo Bypass fisheries enhancements, and floodplain restoration
Noncovered Species					
Watershield			3	0	None
Bristly sedge			18	1	Loss of habitat from construction of water conveyance facilities
Woolly rose- mallow ^a			121	14	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration
Eel-grass pondweed			1	1	Loss of habitat from construction of water conveyance facilities
Sanford's arrowhead			23	2	Loss of habitat from construction of water conveyance facilities, tidal habitat restoration
Marsh skullcap ^a			5	1	Loss of habitat from construction of water conveyance facilities

^a Also occurs in valley/foothill riparian habitat.

2

3 **Impact BIO-175: Effects on Habitat and Populations of Nontidal Wetland Plants**

4 Under Alternative 9, known occurrences eel-grass pondweed, bristly sedge, woolly rose-mallow,
5 Sanford's arrowhead, and marsh skullcap would be within the proposed footprint for the water
6 conveyance facilities or within the hypothetical footprint for restoration activities and would be
7 adversely affected. Alternative 9 would have no adverse effects on watershield.

8 The individual effects of each relevant conservation measure are addressed below. A summary
9 statement of the combined impacts and NEPA and CEQA conclusions follows the individual
10 conservation measure discussions.

- 11 • *CM1 Water Facilities and Operation*: Under Alternative 9, the primary effect on noncovered
12 plants would be the loss of occupied habitat as a result of in-stream island dredging and
13 construction of operable barriers. One occurrence of bristly sedge in CZ 5 would be adversely
14 affected by construction of a temporary access road. One occurrence of Sanford's arrowhead in
15 CZ 5 would be adversely affected by installation of an operable barrier and associated
16 transmission lines. Thirteen occurrences of woolly rose-mallow would be affected by channel
17 dredging, construction of operable barriers, and other construction activities: five in CZ 6, one in

- 1 CZ 5, one in CZ 4, and six in CZ 8. One occurrence of eel-grass pondweed at the Webb Tract and
2 one occurrence of marsh skullcap on the Middle River are present within areas in CZ 6 that
3 would be affected by construction of water conveyance facilities. The locations of these two
4 occurrences are not known with certainty (i.e., nonspecific occurrences), so the likelihood or
5 extent of the impact cannot be determined.
- 6 ● *CM2 Yolo Bypass Fisheries Enhancement*: No known occurrences of special-status nontidal
7 wetland plants are present in the hypothetical footprint for construction or operation of the
8 Yolo Bypass fisheries enhancements. Therefore, construction and operation of the Yolo Bypass
9 Fisheries enhancements would not affect special-status nontidal marsh plants.
 - 10 ● *CM3 Natural Communities Protection and Restoration*: No specific natural communities
11 protection is proposed for nontidal wetlands under the BDCP. Therefore, no occurrences of
12 special-status nontidal plants are proposed for protection.
 - 13 ● *CM4 Tidal Natural Communities Restoration*: One known occurrence of Sanford's arrowhead is
14 present within areas that could be affected by tidal habitat restoration in CZ 2. One known
15 occurrence of woolly rose-mallow is present within areas that could be affected by tidal habitat
16 restoration in CZ 7. No other known occurrences of special-status nontidal wetland plants are
17 present within areas proposed for tidal habitat restoration. Therefore, tidal habitat restoration
18 could have adverse effects on three special-status nontidal wetland plants.
 - 19 ● *CM5 Seasonally Inundated Floodplain Restoration*: No known occurrences of special-status
20 nontidal wetland plants are present within areas proposed for floodplain restoration.
 - 21 ● *CM6 Channel Margin Enhancement*: No known occurrences of special-status nontidal wetland
22 plants are present within areas proposed for channel margin habitat enhancement. Therefore,
23 channel margin habitat enhancement would have no impacts on special-status nontidal wetland
24 plants.
 - 25 ● *CM7 Riparian Natural Community Restoration*: No known occurrences of special-status nontidal
26 wetland plants are present within areas proposed for riparian habitat restoration. Therefore,
27 riparian habitat restoration would have no impacts on special-status nontidal wetland plants.
 - 28 ● *CM8 Grassland Natural Community Restoration*: No known occurrences of special-status nontidal
29 wetland plants are present within areas proposed for grassland communities restoration.
30 Therefore, grassland communities restoration would have no impacts on special-status nontidal
31 wetland plants.
 - 32 ● *CM9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No known occurrences of
33 special-status nontidal wetland plants are present within areas proposed for vernal pool
34 complex restoration. Therefore, vernal pool complex restoration would have no impacts on
35 special-status nontidal wetland plants.
 - 36 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration would take place through
37 conversion of cultivated lands. Therefore, nontidal marsh restoration would avoid existing
38 nontidal marsh and would have no adverse effects on special-status nontidal wetland plants.
39 The BDCP may benefit nontidal wetland species by creating 400 acres of nontidal freshwater
40 marsh, including components of nontidal perennial aquatic and nontidal freshwater perennial
41 emergent wetland communities, and by maintaining and enhancing the habitat functions of
42 protected and created nontidal wetland habitats for covered and other native species. However,
43 no specific actions to benefit noncovered species are proposed.

1 Under Alternative 9, 1,500 acres of nontidal marsh would be restored (Objective NFEW/NPANC1.1,
2 addressed under CM10). However, these wetlands would be restored primarily as habitat for giant
3 garter snake. These habitat restoration activities would be unlikely to expand the amount of habitat
4 available to bristly sedge, woolly rose-mallow, eel-grass pondweed, marsh skullcap, and Sanford's
5 arrowhead, potential loss of habitat or occurrences resulting from covered activities would not be
6 compensated for. Moreover, because special-status nontidal wetland plant species are not covered
7 under the BDCP, the species protections afforded to covered species under the AMMs do not apply
8 to these species, and the effects of Alternative 9 on these species would be adverse.

9 **NEPA Effects:** Implementation of the BDCP under Alternative 9 could result in a reduction in the
10 range and numbers of bristly sedge, woolly rose-mallow, eel-grass pondweed, marsh skullcap, and
11 Sanford's arrowhead, five noncovered nontidal wetland species, which would be an adverse effect.
12 Adverse effects on these species could be avoided or offset through implementation of Mitigation
13 Measure BIO-170.

14 **CEQA Conclusion:** Under Alternative 9, construction of the water conveyance facilities and tidal
15 habitat restoration would result in a reduction in the range and numbers of bristly sedge, woolly
16 rose-mallow, eel-grass pondweed, marsh skullcap, and Sanford's arrowhead. These impacts would
17 be significant. Implementation of Mitigation Measure BIO-170, *Avoid, Minimize, or Compensate for*
18 *Impacts on Noncovered Special-Status Plant Species*, would reduce these impacts to a less-than-
19 significant level.

20 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered**
21 **Special-Status Plant Species**

22 Please see Mitigation Measure BIO-170 under Impact BIO-173.

23 **General Terrestrial Biology Effects**

24 **Wetlands and Other Waters of the United States**

25 Alternative 9 actions would both permanently and temporarily remove or convert wetlands and
26 open water that are regulated by USACE under Section 404 of the CWA. The Section 404 regulations
27 and relevant information regarding mitigation of impacts on wetlands and waters of the United
28 States are described in Section 12.2.1.1. The following two impacts address the project-level effects
29 of CM1 on these potential wetlands and waters, and the programmatic-level effects of other relevant
30 conservation actions (CM2–CM10). CM11–CM21 would not directly result in loss or conversion of
31 wetlands or other waters of the United States. The methods used to conduct these analyses are
32 described in Section 12.3.2.4, *Methods Used to Assess Wetlands and Other Waters of the United States*.
33 The waters of the United States data used for this analysis is based on a verified wetland delineation
34 from USACE that was completed in early 2015. These waters of the United States were mapped at
35 finer scale than that which was done for the natural community mapping for the BDCP; therefore,
36 the acreages of these two datasets differ. The waters of the United States mapping identified
37 numerous agricultural ditches and seasonal wetlands occurring within and associated with
38 cultivated lands, which explains the majority of the difference.

39 **Impact BIO-176: Effects of Constructing Water Conveyance Facilities (CM1) on Wetlands and**
40 **Other Waters of the United States**

1 Alternative 9 proposes the construction, maintenance, and operation of water conveyance facilities
 2 within, or requiring the unavoidable fill of, waters of the United States. The estimated fill of
 3 jurisdictional waters associated with this alternative is described in Table 12-9-69. Based on the
 4 methodology used to conduct this analysis, these effects would occur at channel dredging sites, canal
 5 construction sites, operable barrier construction sites and channel widening sites throughout the
 6 study area, and at multiple temporary work areas associated with the construction activity. The
 7 permanent and temporary wetland effects would occur primarily in open tidally-influenced
 8 channels of the central and south Delta, including Middle River, Victoria Canal and Old River from
 9 channel dredging and canal construction. Construction of various operable barriers in major rivers,
 10 canals and sloughs throughout the central and south Delta would also contribute to the large
 11 acreage affected by water conveyance construction. Most of the construction and dredging activities
 12 would not permanently remove the waterways, but would permanently modify the channel bottoms
 13 and eliminate any associated aquatic vegetation. An additional effect on waters of the United States
 14 is the dredging of 517 acres of tidal flow in Middle River and Victoria and North Canals.

15 **Table 12-9-69. Estimated Fill of Waters of the United States Associated with the Construction of Water**
 16 **Conveyance Facilities under Alternative 9 (acres)**

Wetland/Water Type	Permanent Impact	Temporary Impacts Treated as Permanent ^a	Temporary Impact ^b	Total Impact
Agricultural Ditch	36.4	8.0	1.0	45.3
Alkaline Wetland	0	0	0	0
Clifton Court Forebay	13.2	0	0	13.2
Conveyance Channel	0.4	0	0	0.4
Depression	4.9	0.1	0	4.9
Emergent Wetland	54.1	9.0	165.0	64.0
Forest	23.5	14.0	60.0	38.0
Lake	0	0	0	0
Scrub-Shrub	5.2	4.0	42.0	9.0
Seasonal Wetland	91.6	28.6		120.2
Tidal Channel	687.0	24.0	401.0	712.0
Vernal Pool	0	0	0	0
Total	916	88	669	1,674

^a Temporary impacts treated as permanent are temporary impacts expected to last over one year. These impact sites will eventually be restored to pre-project conditions; however, due to the duration of effect, compensatory mitigation will be included for these areas.

^b Temporary impacts are due to dredging Delta channels.

17

18 The majority of the impacts on wetlands and waters of U.S. are on tidal channels, emergent
 19 wetlands, and on wetlands and waters found within cultivated lands (agricultural ditches and
 20 seasonal wetlands). These impacts mostly result from dredging work, spoils areas, and canal
 21 construction. The impacted seasonal wetlands mapped within the Conveyance Planning Area, as
 22 described in Section 12.3.2.4, *Methods Used to Assess Wetlands and Other Waters of the United States*,
 23 all occur in the central Delta within plowed agricultural fields.

1 Unavoidable impacts on waters of the United States would be offset such that the loss of acreage and
 2 functions due to construction activities are fully compensated. Wetland functions are defined as a
 3 process or series of processes that take place within a wetland. These include the storage of water,
 4 transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have
 5 value for the wetland itself, for surrounding ecosystems, and for people. Functions can be grouped
 6 broadly as habitat, hydrologic/hydraulic, or water quality. Not all wetlands perform all functions nor
 7 do they perform all functions equally well. The location and size of a wetland may determine what
 8 functions it will perform. For example, the geographic location may determine its habitat functions,
 9 and the location of a wetland within a watershed may determine its hydrologic/hydraulic or water-
 10 quality functions. Many factors determine how well a wetland will perform these functions: climatic
 11 conditions, quantity and quality of water entering the wetland, and disturbances or alteration within
 12 the wetland or the surrounding ecosystem. Wetland disturbances may be the result of natural
 13 conditions, such as an extended drought, or human activities, such as land clearing, dredging, or the
 14 introduction of nonnative species. Wetlands are among the most productive habitats in the world,
 15 providing food, water, and shelter for fish, shellfish, birds, and mammals, and serving as a breeding
 16 ground and nursery for numerous species. Many endangered plant and animal species are
 17 dependent on wetland habitats for their survival. Hydrologic and hydraulic functions are those
 18 related to the quantity of water that enters, is stored in, or leaves a wetland. These functions include
 19 such factors as the reduction of flow velocity, the role of wetlands as ground-water recharge or
 20 discharge areas, and the influence of wetlands on atmospheric processes. Water-quality functions
 21 include the trapping of sediment, pollution control, and the biochemical processes that take place as
 22 water enters, is stored in, or leaves a wetland.

23 The functions of the waters of the United States that would be temporarily or permanently
 24 impacted by this alternative vary greatly depending primarily on existing land uses and historical
 25 levels of disturbance. Generally, agricultural ditches and conveyance channels, which are regularly
 26 maintained and often devoid of vegetation, support only minimal hydraulic function (water
 27 conveyance), with virtually no water quality or habitat function. With respect to Clifton Court
 28 Forebay, the facility is regularly maintained, but supports some hydrologic, hydraulic, and water
 29 quality functions (e.g., reduction of velocity, groundwater recharge, and trapping of sediment). Tidal
 30 channels affected by this alternative support functions in all three categories, but the level at which
 31 these functions perform vary depending on setting, size, and level of disturbance. The alkaline
 32 wetlands and vernal pools exist in non-native grasslands and have been subjected to some
 33 disturbance due to past land uses. Although these features likely support habitat, water quality, and
 34 hydrologic/hydraulic functions, the capacity of these features to perform such functions vary
 35 depending on the overall ecological setting and level of disturbance. Functions associated with
 36 emergent wetland, forest, and scrub-shrub, depend primarily on the location of these habitat types.
 37 Where they exist as in-stream (in-channel islands) or as the thick band of habitat adjacent to a
 38 waterway, these features are expected to function at a high level. However, where these habitats
 39 exist as thin bands, or where they are situated in agricultural fields, their habitat functions will be
 40 considerably lower. All of the wetlands classified as seasonal wetlands occur in agricultural fields. As
 41 such, their habitat functions have been greatly compromised, but they retain some water quality and
 42 hydrologic/hydraulic function. Like seasonal wetlands, most depressions occur within agricultural
 43 areas; however the depressions may support wetland vegetation at their edges. The areas mapped
 44 as lake are the dredged borrow ponds created during the construction of Interstate 5. Although
 45 relatively small, each lake is likely performing functions from all three categories.

1 A functional assessment of wetlands proposed for fill will be conducted during the development of
2 the Conceptual Mitigation Plan as part of the CWA permitting process. The results of this assessment
3 will be compared with the expected functions at the proposed mitigation site(s) such that it can be
4 confirmed that the compensatory mitigation will in fact accomplish full functional replacement of
5 impacted wetlands. All impacted wetlands would be replaced with fully functional compensatory
6 wetland habitat demonstrating high levels of habitat, water quality, and hydrologic/hydraulic
7 function. Because many impacted wetlands are significantly less than high function, the
8 compensatory mitigation would result in a net increase in wetland function.

9 Alternative 9 was designed to avoid waters of the United States to the maximum extent practicable.
10 Each of the conveyance components has been located in upland areas where it was feasible to do so.
11 Once construction begins, specific measures will be implemented, as described in the AMMs set out
12 in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to further avoid and minimize effects
13 on waters of the United States as well as on special-status species. The AMMs would be implemented
14 at all phases of a project, from siting through design, construction, and on to operations and
15 maintenance. The AMMs that pertain specifically to waters of the U.S. are *AMM1 Worker Awareness*
16 *Training, AMM2 Construction Best Management Practices and Monitoring, AMM3 Stormwater*
17 *Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention,*
18 *Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations*
19 *Plan, AMM10 Restoration of Temporarily Affected Natural Communities, AMM12 Vernal Pool*
20 *Crustaceans, AMM30 Transmission Line Design and Alignment Guidelines, AMM34 Construction Site*
21 *Security, and AMM36 Notification of Activities in Waterways.*

22 The implementation of measures to avoid and minimize impacts on habitat for aquatic species and
23 species which utilize aquatic habitats, such as California tiger salamander, giant garter snake,
24 California red legged frog, western pond turtle, riparian woodrat, and riparian brush rabbit, will also
25 result in further avoidance and minimization of effects to waters of the United States.

26 Aside from wetland habitats that would be created as a result of implementing CM4–CM10, some of
27 which could serve the dual purpose of offsetting effects to species and mitigating impacts on waters
28 of the United States, more specific mitigation is required to ensure that there is no net loss of
29 wetland functions and values as a result of implementing Alternative 9 pursuant to USACE's and
30 EPA's Mitigation Rule (see Section 12.2.1.1). Mitigation Measure BIO-176, *Compensatory Mitigation*
31 *for Fill of Waters of the United States*, would be available to address adverse impacts on waters of the
32 United States.

33 **NEPA Effects:** The permanent and temporary loss of these jurisdictional wetlands and waters as a
34 result of constructing Alternative 9 water conveyance facilities would be a substantial effect if not
35 compensated by wetland protection and/or restoration. This loss would represent a removal of
36 federally protected wetlands as defined by Section 404 of the CWA. A. Project proponents would
37 implement AMM1–AMM7, AMM10, AMM12, AMM30, AMM34, and AMM36, which would avoid and
38 minimize fill of wetlands and waters and any indirect effects to wetlands and waters. However,
39 specific mitigation would be required to ensure that Alternative 9 does not result in a loss of
40 functions and values of waters of the United States and thus that the affect is not adverse. Mitigation
41 Measure BIO-176, *Compensatory Mitigation for Fill of Waters of the United States*, would be available
42 to reduce these effects such that they are not adverse.

43 **CEQA Conclusion:** The permanent and temporary loss of these jurisdictional wetlands and waters of
44 the United States as a result of constructing Alternative 9 water conveyance facilities would be a

1 significant impact. Specific mitigation would be required to ensure that Alternative 9 does not result
2 in a loss of functions and values of waters of the United States. Mitigation Measure BIO-176,
3 *Compensatory Mitigation for Fill of Waters of the United States*, would be available to reduce the
4 impact to a less-than-significant level. Additionally, Alternative 9 does propose to restore up to
5 76,721 acres of wetland natural communities under the Plan, which would include 65,000 acres of
6 tidal marsh restoration (CM4), 10,000 acres of seasonally inundated floodplain restoration (CM5),
7 21 acres of vernal pool/alkali seasonal wetlands (CM9; 67 acres of vernal pool complex and 72 acres
8 of alkali seasonal wetland complex assuming a wetland density of 15%), and 1,700 acres of nontidal
9 marsh restoration (CM10). In addition, Alternative 9 would restore 5,000 acres of riparian habitat
10 (CM7), some portion of which may also qualify as forested or scrub-shrub wetland. In addition, 20
11 miles of levees will have channel margin enhancement conducted on them (CM6), which would
12 include improving channel geometry and restoring riparian, marsh, and mudflat habitats on the
13 water side of levees. Impacts on wetlands from CM1 construction would occur in the first 10 years
14 after BDCP approval. Approximately 20,065 acres of this wetland restoration would occur during
15 this time period.

16 The success in implementing these conservation measures would be assured through effectiveness
17 monitoring, which includes success criteria, and adaptive management as outlined in the *Adaptive*
18 *Management and Monitoring* sections of the BDCP for tidal marsh restoration (BDCP Chapter 3,
19 Section 3.4.4.4), seasonal floodplain restoration (BDCP Section 3.4.5.4), channel margin
20 enhancement (BDCP Section 3.4.6.4), valley/foothill riparian restoration (BDCP Section 3.4.7.4),
21 vernal pool and alkali seasonal wetland complex restoration (BDCP Section 3.4.9.4), and nontidal
22 marsh restoration (BDCP Section 3.4.10.3). All restored areas will be secured in fee-title or through
23 conservation easements.

24 Alternative 9 would also result in the protection and management of the following natural
25 communities that contain wetlands: 750 acres of valley/foothill riparian, 600 acres of vernal pool
26 complex, 150 acres of alkali seasonal wetland complex, 8,100 acres of managed wetlands, and 50
27 acres of nontidal marsh. In addition, 8,000 acres of grasslands and 51,625 acres of cultivated lands
28 will be protected and managed, which would likely include areas of seasonal wetlands, ponds, and
29 agricultural ditches.

30 Project proponents under Alternative 9 would also implement AMM1–AMM7, AMM10, AMM12,
31 AMM30, AMM34, and AMM36, which would avoid and minimize fill of waters of the United States
32 and any indirect effects on wetlands and waters. As stated above, specific mitigation would be
33 required to ensure that Alternative 9 does not result in a loss of functions and values of waters of the
34 United States. Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters of the United*
35 *States*, would be available to reduce the impact to a less-than-significant level.

36 **Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United** 37 **States**

38 All mitigation proposed as compensatory mitigation would be subject to specific success criteria,
39 success monitoring, long-term preservation, and long-term maintenance and monitoring
40 pursuant to the requirements of the Mitigation Rule. All compensatory mitigation shall fully
41 replace lost function through the mechanisms discussed below which will result in restoration
42 and/or creation of habitat with at least as much function and value as those of the impacted
43 habitat. In some cases, the mitigation habitat will afford significantly higher function and value
44 than that of impacted habitat.

1 Compensation ratios are driven by type, condition, and location of replacement habitat as
2 compared to type, condition and location of impacted habitat. Compensatory mitigation usually
3 includes restoration, creation, or rehabilitation of aquatic habitat. The USACE does not typically
4 accept preservation as the only form of mitigation; use of preservation as mitigation typically
5 requires a very high ratio of replacement to impact. It is anticipated that ratios will be a
6 minimum of 1:1, depending on the factors listed above.

7 Compensatory mitigation will consist of restoration, creation, and/or rehabilitation of aquatic
8 habitat. Typically, impacted habitat will be replaced in-kind, although impacts on some habitat
9 types such as agricultural ditches, conveyance channels, and Clifton Court Forebay, will be
10 mitigated out-of-kind with higher functioning habitat types such as riparian wetland, marsh,
11 and/or seasonal wetland. Compensatory mitigation shall be accomplished by one, or a
12 combination of the following methods:

- 13 • Purchase credits for restored/created/rehabilitated habitat at an approved wetland
14 mitigation bank;
- 15 • On-site (adjacent to the project footprint) restoration or rehabilitation of wetlands
16 converted to uplands due to past land use activities (such as agriculture) or functionally
17 degraded by such activities;
- 18 • On-site (adjacent to the project footprint) creation of aquatic habitat;
- 19 • Off-site (within the Delta) restoration or rehabilitation of wetlands converted to uplands
20 due to past land use activities (such as agriculture) or functionally degraded by such
21 activities;
- 22 • Off-site (within the Delta) creation of aquatic habitat; and/or
- 23 • Payment into the Corps' Fee-in-Lieu program.

24 *Purchase of Credits or Payment into Fee-in-Lieu Program*

25 It is envisioned that purchase of bank credits and/or payment into a fee-in-lieu program will be
26 utilized for habitat types that would be difficult to restore or create within the Delta. Examples
27 are vernal pool habitat, which requires an intact hardpan or other impervious layer and very
28 specific soil types, and alkali seasonal wetland, which requires a specific set of chemical soil
29 parameters. It is anticipated that only a small amount of compensatory mitigation will fall into
30 these categories.

31 *On-Site Restoration, Rehabilitation and/or Creation*

32 Much of the Delta consists of degraded or converted habitat that is more or less functioning as
33 upland. Opportunities will be sought where on-site restoration, rehabilitation, and/or creation
34 could occur immediately adjacent to the project footprint. It is anticipated that some of the
35 compensatory mitigation will fall into this category.

36 *Off-Site Restoration, Rehabilitation and/or Creation*

37 There exists, within the immediate vicinity of the project area, Delta land which has been subject
38 to agricultural practices or other land uses which have degraded or even converted wetlands
39 that existed historically. Sites within the Delta will be evaluated for their restoration,

1 rehabilitation, and/or creation potential. It is anticipated that most of the compensatory
2 mitigation will fall into this category.

3 Compensatory mitigation will result in no net loss of acreage of waters of the United States and
4 will accomplish full functional replacement of impacted wetlands. All impacted wetlands will be
5 replaced with fully functioning wetland habitat demonstrating high levels of habitat, water
6 quality, and hydrologic/hydraulic function. Since many impacted wetlands are likely to function
7 at significantly less than high levels, the compensatory mitigation will result in a significant net
8 increase in wetland function.

9 **Impact BIO-177: Effects of Implementing Other Conservation Measures (CM2–CM10) on**
10 **Wetlands and Other Waters of the United States**

11 The habitat protection and restoration activities associated with Alternative 9's other conservation
12 measures (CM2–CM10) would alter the acreages and functions and values of wetlands and Waters of
13 the United States in the study area during the course of BDCP conservation action implementation.
14 Because these conservation measures have not been defined to the level of site-specific footprints, it
15 is not possible to delineate and quantify these effects in detail. Several of the conservation measures
16 (CM2, CM4, and CM5) have been described with theoretical footprints for purposes of the effects
17 analysis contained in BDCP Chapter 5, *Effects Analysis*.

18 Because the wetland delineation was only conducted within the Conveyance Planning Area and not
19 the remainder of the Plan Area, the effects on potential wetlands and waters of the United States
20 from CM2–CM10 were analyzed by looking at effects on wetland natural communities mapped
21 within the theoretical footprints for CM2, CM4, and CM5 by assuming that 100% of the
22 predominantly wetland natural communities listed in Appendix 12E, *Detailed Accounting of Direct*
23 *Effects of Alternatives on Natural Communities*, and that 10% of all of the non-wetland natural
24 communities listed in that table would qualify as wetlands or other waters of the United States
25 under the CWA. Based on this approach approximately 19,850 acres of potentially jurisdictional
26 wetlands and waters could be affected by CM2–CM10. The majority of these impacts are attributable
27 to the conversion of 13,746 acres of managed wetland to tidal marsh under CM4, which would likely
28 result in an improvement of wetland function in the Plan Area.

29 **NEPA Effects:** The conversion of existing wetland natural communities to other types of wetland
30 natural communities through implementation of CM2–CM10 for Alternative 9 would be
31 approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open
32 water through implementation of CM4. Although the increase in wetland acreage and wetland
33 functions from these restoration actions could in part offset the effects on waters of the United
34 States in these areas, implementation of Mitigation Measure BIO-176, *Compensatory Mitigation for*
35 *Fill of Waters of the United States*, would be required to ensure that these effects are not adverse.

36 **CEQA Conclusion:** The conversion of existing wetland natural communities to other types of
37 wetland natural communities through implementation of CM2–CM10 for Alternative 9 would be
38 approximately 19,850 acres. Most of these wetlands would be converted to tidal wetlands and open
39 water through implementation of CM4. In total, up to 76,721 acres of wetland natural communities
40 would be restored under Alternative 9. Although the increase in wetland acreage and wetland
41 functions from these restoration could in part offset the effects on waters of the United States
42 occurring in these areas, implementation of Mitigation Measure BIO-176, *Compensatory Mitigation*
43 *for Fill of Waters of the United States*, would be required to ensure that the impacts are reduced to a
44 less-than-significant level.

1 Shorebirds and Waterfowl

2 Managed wetlands, tidal natural communities, and cultivated lands (including grain and hay crops,
 3 pasture, field crops, rice, and idle lands) provide freshwater nesting, feeding, and resting habitat for
 4 a large number of Pacific flyway waterfowl and shorebirds. The primary effects of concern for
 5 shorebirds and waterfowl are related to the conversion of managed wetland and cultivated lands to
 6 tidal marsh associated with habitat restoration. Ducks Unlimited (2013) conducted an analysis to
 7 determine the effects of BDCP conservation measures on waterfowl, as well as to determine whether
 8 BDCP actions would impede attainment of the goals established by the Central Valley Joint Venture
 9 (CVJV) Implementation Plan for the Delta, Yolo, and Suisun Marsh drainage basins. The CVJV efforts
 10 are guided by its 2006 Implementation Plan, which is founded on the principles of strategic habitat
 11 conservation (Central Valley Joint Venture 2006). Those principles emphasize the establishment of
 12 population abundance objectives and the use of species-habitat models to link population objectives
 13 to habitat needs. The CVJV has used species-habitat models to translate bird abundance objectives
 14 into habitat objectives, while explicitly identifying the biological assumptions that underpin these
 15 models and the data used to populate them. As a result, the CVJV's biological planning provides a
 16 framework for evaluating the effects of the BDCP on waterfowl.

17 The Ducks Unlimited waterfowl analysis focused primarily on dabbling ducks. Less than 5% of all
 18 geese in the Central Valley occur in the Yolo, Delta, and Suisun Marsh drainage basins. Moreover,
 19 geese in the Central Valley rely mostly on agricultural habitats to meet their food energy needs. The
 20 BDCP's effect on agricultural habitats is limited to the Delta Basin where about 2500 acres of corn
 21 now available to geese would be converted to other habitats (Ducks Unlimited 2013: Table 5). Food
 22 supplies for geese would still be well in excess of demand even with the loss of these agricultural
 23 habitats (Central Valley Joint Venture 2006, Ducks Unlimited 2013). The duck population objectives
 24 used in the analysis were taken directly from the CVJV Plan. Dabbling duck species make up 92% of
 25 this objective, while diving duck species make up the remaining 8%. Thus, the results were mostly
 26 driven by dabbling duck needs and largely interpreted in the context of dabbling duck foraging
 27 ecology. The 55,000 acres of Tidal Natural Communities Restoration (CM4) would be expected to
 28 benefit diving ducks by providing deep water foraging habitat. Refer to the Ducks Unlimited Report
 29 (Ducks Unlimited 2013) for details of the analysis and methods with respect to the TRUMET model
 30 used to quantify effects on food biomass and food quality.

31 An analysis was conducted to determine the effects of the BDCP covered activities on wintering and
 32 breeding shorebird habitat (ICF International 2013). This analysis evaluated the relative increase
 33 and decrease in natural communities known to provide important foraging, roosting, and breeding
 34 habitat. Similar to the waterfowl analysis, the results were broken up into the three Central Valley
 35 Joint Venture Basins that overlap with the BDCP study area: Yolo, Delta, and Suisun. Natural
 36 community losses and gains were then translated into species-specific outcomes, comparing the
 37 relative habitat value of each BDCP natural community for each Central Valley shorebird species
 38 (Table 1, ICF International 2013). The shorebird species ranking system displayed in Table 1 (ICF
 39 International 2013) was modified from a table in Stralberg et. al (2011). The table was created using
 40 survey data and experts' species-specific habitat rankings. The survey data included fall, winter, and
 41 spring density data. This resulted in an overall, cross-season representation of habitat requirements.

1 **Impact BIO-178: Loss or Conversion of Habitat for Waterfowl and Shorebirds as a Result of**
2 **Water Conveyance Facilities Construction**

3 Development of the water conveyance facilities (CM1) would result in the permanent removal of
4 approximately 3 acres of managed wetland, 6 acres of tidal wetlands, 13 acres of nontidal wetlands,
5 and 2,541 acres of suitable cultivated lands (including grain and hay crops, pasture, field crops, rice,
6 and idle lands). In addition, 83 acres of managed wetland, 6 acres of tidal wetlands, 10 acres of
7 nontidal wetlands, and 899 acres of cultivated lands would be temporarily impacted.

8 These losses of habitat would occur within the first 10 years of Alternative 9 implementation in the
9 Delta Basin. The BDCP has committed to the near-term protection of 15,400 acres of non-rice
10 cultivated lands, 200 acres of rice, and 700 acres of rice or “rice equivalent” natural communities
11 including nontidal wetlands in the near-term. In addition, 4,100 acres of managed wetlands would
12 be created, protected, and enhanced, 8850 acres of freshwater tidal wetlands would be restored, and
13 2,000 acres of tidal brackish emergent wetland would be restored (Table 3-4, Chapter 3, *Description*
14 *of Alternatives*).

15 Construction activities could have an adverse effect on nesting shorebirds or waterfowl if they were
16 present in or adjacent to work areas and could result in destruction of nests or disturbance of
17 nesting and foraging behaviors. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
18 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on
19 nesting birds.

20 **NEPA Effects:** Habitat loss from construction of the Alternative 9 water conveyance facilities would
21 not result in an adverse effect on shorebirds and waterfowl because of the acres of natural
22 communities and cultivated lands that would be restored and protected in the near-term timeframe.
23 If waterfowl were present in or adjacent to work areas, construction activities could result in
24 destruction of nests or disturbance of nesting and foraging behaviors, which would be an adverse
25 affect on nesting shorebirds and waterfowl. Mitigation Measure BIO-75, *Conduct Preconstruction*
26 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse
27 effects on nesting birds.

28 **CEQA Conclusion:** Habitat loss from construction of the Alternative 9 water conveyance facilities
29 would have a less-than-significant impact on shorebirds and waterfowl because of the acres of
30 natural communities and cultivated lands that would be restored and protected in the near-term
31 timeframe. If waterfowl were present in or adjacent to work areas, construction activities could
32 result in destruction of nests or disturbance of nesting and foraging behaviors, which would be a
33 significant impact. Implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
34 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this impact on nesting birds to a
35 less-than-significant level.

36 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
37 **Disturbance of Nesting Birds**

38 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-179: Loss or Conversion of Habitat for Wintering Waterfowl as a Result of**
2 **Implementation of Conservation Components**

3 **Suisun Marsh:** Managed seasonal wetlands in Suisun Marsh would be reduced by an estimated
4 8,818 acres as a result of Alternative 9 implementation. This would represent a 25% decrease in
5 managed seasonal wetlands compared with long-term conditions without Alternative 9 (Ducks
6 Unlimited 2013, Table 5). There is considerable uncertainty about the biomass and nutritional
7 quality of waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult
8 to identify the amount of mitigation needed. To address this uncertainty, three levels of food
9 biomass and three levels of nutritional quality were modeled for these existing habitats (Ducks
10 Unlimited 2013, Table 7). Three mitigation scenarios based on these energetic assumptions of
11 biomass and food quality were then run to determine a minimum acreage of managed seasonal
12 wetlands to be protected and enhanced to compensate for the loss of productivity resulting from
13 habitat conversion to tidal wetlands.

- 14 • Scenario 1) Assume that existing managed seasonal wetlands provide low food biomass and low
15 food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh produce
16 50% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and these seeds
17 have 60% of the metabolizable energy of seeds produced outside of Suisun Marsh. Given the
18 assumption that managed seasonal wetlands in Suisun could be enhanced to provide high food
19 biomass and high food quality (equal to wetlands in the Central Valley), 5,000 acres of managed
20 wetlands protected and managed for high biomass and high food quality would mitigate the
21 conversion of 8,857 acres of managed seasonal wetland to tidal marsh.
- 22 • Scenario 2) Assume that the managed seasonal wetlands lost provide medium food biomass and
23 medium food quality. Under this assumption, the managed seasonal wetlands in Suisun Marsh
24 produce 75% of the seed biomass of seasonal wetlands elsewhere in the Central Valley, and
25 these seeds have 80% of the metabolizable energy of seeds produced outside of Suisun Marsh.
26 Given the assumption that managed seasonal wetlands in Suisun Marsh could be enhanced to
27 provide high food biomass and high food quality (equal to wetlands in the Central Valley),
28 13,300 acres of managed wetlands protected and managed for high biomass and high food
29 quality would mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal
30 marsh.
- 31 • Scenario 3) Assume that existing managed seasonal wetlands provide low food biomass and low
32 food quality. Given the assumption that managed seasonal wetlands in Suisun Marsh could only
33 be enhanced to provide medium food biomass and medium food quality (produce 75% of the
34 seed biomass of seasonal wetlands elsewhere in the Central Valley, with these seeds having 80%
35 of the metabolizable energy of seeds produced outside of Suisun Marsh), 8,800 acres of
36 managed wetlands protected and managed for medium biomass and medium food quality would
37 mitigate the conversion of 8,857 acres of managed seasonal wetland to tidal marsh.

38 The BDCP has committed to protecting and enhancing a minimum of 5,000 acres of managed
39 seasonal wetlands in Suisun Marsh to compensate for the loss of productivity from habitat
40 conversion to tidal marsh. This minimum commitment of 5,000 acres would mitigate the reduced
41 productivity resulting from conversion of managed seasonal wetlands under the assumptions that
42 1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-
43 quality food to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce
44 high biomass and high food quality. However, the food biomass and productivity in Suisun Marsh
45 would need to be quantified in order to determine if the 5,000 acres was sufficient to avoid an

1 adverse effect on wintering waterfowl in the Suisun Marsh, or if additional mitigation would be
2 needed. Mitigation Measure BIO-179a, *Conduct Food Studies and Monitoring for Wintering Waterfowl*
3 *in Suisun Marsh*, would be available to address this adverse effect.

4 **Yolo and Delta Basins:** The replacement of 1,400 acres of managed seasonal wetland with 19,000
5 acres of palustrine tidal wetlands in the Delta watershed, and the replacement of 600 acres of
6 managed seasonal wetlands with 2,000 acres of palustrine tidal wetlands in the Yolo watershed
7 would not be expected to have an adverse effect on food productivity, under the assumption that
8 these wetlands would provide adequate food sources. However, a monitoring component and a food
9 study in these tidal habitats would be necessary in order to demonstrate that there would be a less
10 than significant loss of food value in these habitats for wintering waterfowl. If it is determined from
11 monitoring that there in fact would be a significant loss in food productivity resulting from habitat
12 conversion to tidal wetlands, the protection and enhancement of managed wetlands in these
13 watersheds would require mitigation for the change in food biomass and quality. Mitigation
14 Measure *BIO-179b, Conduct Food Studies and Monitoring to Demonstrate Food Quality of Palustrine*
15 *Tidal Wetlands in the Yolo and Delta Basins*, would be available to address this uncertainty.

16 **NEPA Effects:** There is considerable uncertainty about the biomass and nutritional quality of
17 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify
18 the level of effect that Alternative 9 habitat loss or conversion would have. The BDCP has committed
19 to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in Suisun
20 Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal marsh. Of
21 this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl. This
22 minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced
23 productivity from conversion of managed seasonal wetlands under the assumptions that 1) existing
24 managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-quality food
25 to wintering waterfowl and 2) protected seasonal wetlands can be managed to produce high
26 biomass and high-quality food. However, the food biomass and productivity in Suisun Marsh would
27 need to be quantified to determine if the 5,000 acres would be sufficient for Alternative 9 to avoid an
28 adverse effect on wintering waterfowl in the Suisun Marsh. Mitigation Measure BIO-179a, *Conduct*
29 *Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would be available to address
30 this adverse effect.

31 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal
32 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands
33 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter
34 food productivity for wintering waterfowl. However, the conclusion that these new wetlands would
35 provide adequate food sources is entirely dependent on assumptions about food production in
36 palustrine tidal habitats. Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring to*
37 *Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would be
38 available to address this uncertainty and avoid an adverse effect on wintering waterfowl.

39 **CEQA Conclusion:** There is considerable uncertainty about the biomass and nutritional quality of
40 waterfowl foods produced in Suisun Marsh's managed wetlands, which makes it difficult to identify
41 the level of impact that Alternative 9 habitat loss or conversion would have. The BDCP has
42 committed to protecting and enhancing a minimum of 6,600 acres of managed seasonal wetlands in
43 Suisun Marsh to compensate for the loss of productivity resulting from habitat conversion to tidal
44 marsh. Of this 6,600 acres, at least 5,000 acres would be managed to benefit wintering waterfowl.
45 This minimum commitment of 5,000 acres for wintering waterfowl would mitigate the reduced

1 productivity resulting from conversion of managed seasonal wetlands under the assumptions that
2 1) existing managed seasonal wetlands on average in Suisun Marsh provide low biomass and low-
3 quality food for wintering waterfowl and 2) protected seasonal wetlands can be managed to
4 produce high biomass and high-quality food. However, the food biomass and productivity in Suisun
5 Marsh would need to be quantified to determine if the 5,000 acres would be sufficient for
6 Alternative 9 to avoid having a significant impact on wintering waterfowl in the Suisun Marsh, or if
7 additional mitigation would be needed. Implementation of Mitigation Measure BIO-179a, *Conduct*
8 *Food Studies and Monitoring for Wintering Waterfowl in Suisun Marsh*, would address this potential
9 significant impact.

10 The replacement of 1,400 acres of managed seasonal wetlands with 19,000 acres of palustrine tidal
11 wetlands in the Delta watershed, and the replacement of 600 acres of managed seasonal wetlands
12 with 2,000 acres of palustrine tidal wetlands in the Yolo watershed would not be expected to alter
13 food productivity. However, the conclusion that these tidal wetlands would provide adequate food
14 sources for wintering waterfowl is entirely dependent on assumptions about food production in
15 palustrine tidal habitats. Studies of food biomass and food quality in palustrine tidal habitats are
16 needed to confirm that no mitigation for wintering waterfowl would be required in the Yolo and
17 Delta Basins. Implementation of Mitigation Measure BIO-179b, *Conduct Food Studies and Monitoring*
18 *to Demonstrate Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins*, would address
19 this uncertainty and would reduce this impact on wintering waterfowl to a less-than-significant
20 level.

21 **Mitigation Measure BIO-179a: Conduct Food Studies and Monitoring for Wintering**
22 **Waterfowl in Suisun Marsh**

23 Poorly managed wetlands (considered low biomass and food quality) will be identified and
24 managed by BDCP proponents to improve food quality and biomass. Studies will be required to
25 quantify 1) food production of existing managed wetlands in Suisun Marsh and 2) energetic
26 productivity of brackish and tidal marsh habitats. Protected wetlands will be monitored to
27 measure changes in the energetic productivity of these sites. Based on the food studies and
28 monitoring results, BDCP proponents will determine if the minimum commitment of 5,000 acres
29 is sufficient to meet the goal of 1:1 compensation for loss of wintering waterfowl habitat with
30 the protection and management of managed wetlands in perpetuity. If monitoring demonstrates
31 that additional acreage is needed to meet this goal, additional acreage of protection or creation
32 of managed wetlands and management will be required.

33 **Mitigation Measure BIO-179b: Conduct Food Studies and Monitoring to Demonstrate**
34 **Food Quality of Palustrine Tidal Wetlands in the Yolo and Delta Basins**

35 In order to address the uncertainty of the impact of loss of managed wetlands in the Yolo and
36 Delta Basins on wintering waterfowl, BDCP proponents will conduct food studies and
37 monitoring to demonstrate the food quality of palustrine tidal habitats in these basins. If studies
38 show that the assumption of no effect was inaccurate, and the food quality goal of 1:1
39 compensation for wintering waterfowl food value is not met, additional acreage of protection or
40 creation of managed wetland and management will be required.

1 **Impact BIO-180: Loss or Conversion of Habitat for Breeding Waterfowl from Implementation**
2 **of Conservation Components**

3 Alternative 9 would reduce managed wetlands in the Yolo and Delta basins by 437 acres and 1,155
4 acres respectively. Under the assumption that 15% of these wetlands are managed as semi-
5 permanent wetlands, Alternative 9 would reduce semipermanent wetlands in the Yolo and Delta
6 drainage basins by 77 acres and 203 acres, respectively. While a reduction in these semipermanent
7 habitats would represent a habitat loss for breeding waterfowl, with the restoration of 24,000 acres
8 of palustrine tidal wetlands (Table 3-4, Chapter 3, *Description of Alternatives*) in the Yolo and Delta
9 basins there would be a less than adverse effect on breeding waterfowl. These palustrine habitats
10 would presumably contain water during the breeding period (i.e., March through July), and would
11 be expected to compensate for the loss of 280 acres of managed semi-permanent wetlands in the
12 Yolo and Delta watersheds attributed to the BDCP.

13 **Suisun Marsh:** Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640
14 acres from the conversion of managed seasonal and semi-permanent wetlands to tidal habitats.
15 Some of the remaining seasonal wetlands could be managed as semi-permanent wetlands to offset
16 the loss of breeding habitat, but this could further reduce food supplies available to wintering
17 waterfowl under the assumption that semi-permanent wetlands provide few food resources
18 compared to seasonally managed habitats (Central Valley Joint Venture 2006).

19 The BDCP includes a commitment to protect and enhance 1,600 acres of permanently flooded
20 managed wetlands in Suisun Marsh to provide habitat for breeding waterfowl. In addition, 5,000
21 acres of semipermanent wetlands that would be protected and enhanced for wintering and
22 migratory waterfowl (Table 3-4, Chapter 3; BDCP Chapter 3, *Conservation Strategy*, Objective
23 MWNC1.1.).

24 Food studies and monitoring would be necessary to determine how increases in tidal marsh and
25 salinity levels would affect the overall reproductive capacity of the marsh. These studies would be
26 needed in order to quantify impacts on breeding waterfowl in Suisun Marsh and to determine not
27 only the number of acres that would compensate for loss of breeding habitat at a ratio of 1:1 for
28 habitat value, but how those acres should be managed. Mitigation Measure BIO-180, *Conduct Food*
29 *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address the
30 uncertainty of this effect.

31 In addition to providing semipermanent wetlands to breeding waterfowl, the Suisun Marsh contains
32 several key upland areas that have significant nesting value. The largest block of upland habitat in
33 the region is the core area on the Grizzly Island Wildlife Area. This area does not overlap with the
34 hypothetical footprint for *CM4 Tidal Natural Communities Restoration*. However, this core area
35 includes over 2,000 acres of upland grasslands that have some of the highest duck nesting densities
36 in California (Central Valley Joint Venture 2006). A few small wetland areas are scattered within this
37 core grassland mosaic that provide necessary freshwater brooding habitat. If restoration footprints
38 were changed during the implementation process of BDCP to overlap with this area, the effects on
39 breeding waterfowl would likely be greatly increased.

40 **NEPA Effects:** Alternative 9 would reduce managed wetlands in the Yolo and Delta basins by 437
41 acres and 1,155 acres, respectively. Under the assumption that 15% of these wetlands are managed
42 as semi-permanent wetlands, Alternative 9 would reduce semi-permanent wetlands in the Yolo and
43 Delta drainage basins by 77 acres and 203 acres, respectively. The reduction in these semi-
44 permanent habitats would represent a habitat loss for breeding waterfowl. However, with the

1 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 9
 2 would not have an adverse effect on breeding waterfowl. These palustrine habitats would
 3 presumably contain water during the breeding period (March through July), and would be expected
 4 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta
 5 watersheds attributed to Alternative 9 implementation. Total managed wetlands in Suisun Marsh
 6 would decline from 41,012 acres to 30,640 acres with the conversion of managed seasonal and
 7 semi-permanent wetlands to tidal habitats. Some of the remaining seasonal wetlands could be
 8 managed as semi-permanent wetlands to offset the loss of breeding habitat, but such management
 9 could further reduce food supplies available to wintering waterfowl under the assumption that
 10 semi-permanent wetlands provide few food resources compared with seasonally managed habitats.
 11 The protection and enhancement of 1,600 acres of permanently flooded managed wetlands would
 12 provide habitat for breeding waterfowl. However, food studies and monitoring would be necessary
 13 to determine how increases in tidal marsh and salinity levels would affect the overall reproductive
 14 capacity of the marsh. Therefore, the loss of breeding waterfowl habitat resulting from
 15 implementation of Alternative 9 could have an adverse effect. Mitigation Measure BIO-180, *Conduct*
 16 *Food and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would be available to address
 17 the uncertainty of model assumptions and the potential adverse effect of habitat conversion on
 18 breeding waterfowl in Suisun Marsh.

19 **CEQA Conclusion:** Alternative 9 would reduce managed wetlands in the Yolo and Delta basins by
 20 437 acres and 1,155 acres, respectively. Under the assumption that 15% of these wetlands are
 21 managed as semi-permanent wetlands, Alternative 9 would reduce semi-permanent wetlands in the
 22 Yolo and Delta drainage basins by 77 acres and 203, acres respectively. The reduction in these semi-
 23 permanent habitats would represent a habitat loss for breeding waterfowl. However, with the
 24 restoration of 24,000 acres of palustrine tidal wetlands in the Yolo and Delta basins, Alternative 9
 25 would have a less-than-significant impact on breeding waterfowl. These palustrine habitats would
 26 presumably contain water during the breeding period (March through July), and would be expected
 27 to compensate for the loss of 280 acres of managed semi-permanent wetlands in the Yolo and Delta
 28 watersheds attributed to Alternative 9.

29 Total managed wetlands in Suisun Marsh would decline from 41,012 acres to 30,640 acres with the
 30 conversion of managed seasonal and semi-permanent wetlands to tidal habitats. Some of the
 31 remaining seasonal wetlands could be managed as semi-permanent wetlands to offset the loss of
 32 breeding habitat, but this management could further reduce food supplies available to wintering
 33 waterfowl under the assumption that semi-permanent wetlands provide few food resources
 34 compared with seasonally managed habitats. The protection and enhancement of 1,600 acres of
 35 permanently flooded managed wetlands would provide habitat for breeding waterfowl. However,
 36 food studies and monitoring would be necessary to determine how increases in tidal marsh and
 37 salinity levels would affect the overall reproductive capacity of the marsh. Therefore, the loss or
 38 conversion of habitat from implementation of Alternative 9 could have a significant impact on
 39 breeding waterfowl in Suisun Marsh. Implementation of Mitigation Measure BIO-180, *Conduct Food*
 40 *and Monitoring Studies of Breeding Waterfowl in Suisun Marsh*, would address the uncertainty of
 41 model assumptions and reduce the impact to a less-than-significant level.

42 **Mitigation Measure BIO-180: Conduct Food and Monitoring Studies of Breeding**
 43 **Waterfowl in Suisun Marsh**

44 To address the uncertainty of the impact of loss of managed wetlands in Suisun Marsh on
 45 breeding waterfowl, BDCP proponents will conduct food studies and monitoring to determine

1 how increases in tidal marsh and salinity levels will affect the overall reproductive capacity of
2 the marsh.

3 The required studies will examine how increases in tidal marsh and salinity levels will affect the
4 overall reproductive capacity of the Marsh. Reproductive studies will address but will not be
5 limited to the following questions:

- 6 • How does the distribution of breeding waterfowl in Suisun Marsh differ in tidal versus
7 managed habitats and across salinity gradients?
- 8 • How does waterfowl nest success and nest density vary with respect to tidal versus
9 managed habitats and across salinity gradients?
- 10 • What are the patterns of habitat selection and movements by waterfowl broods in relation
11 to tidal vs. managed habitats, and are there impacts on duckling survival?
- 12 • What is the current relationship between waterfowl reproductive success and interactions
13 with alternate prey and predators, and how is tidal restoration likely to alter these
14 relationships?

15 **Impact BIO-181: Loss or Conversion of Habitat for Shorebirds from Implementation of** 16 **Conservation Components**

17 Shorebird use of the study area varies by species and fluctuates both geographically and by habitat
18 type throughout the year. Shallow flooded agricultural fields and wetlands support large numbers of
19 wintering and migrating shorebirds (Shuford et al. 1998), particularly least and western sandpipers,
20 dunlin, greater yellowlegs and long-billed dowitcher. Rice lands of the Sacramento Valley provide
21 important breeding habitat for shorebirds such as American avocet and black-necked stilt (Shuford
22 et al. 2004) and have been designated as a Western Hemisphere Shorebird Reserve Network Site of
23 International Importance (Hickey et al. 2003). Managed wetlands provide suitable foraging and
24 roosting habitat for shorebirds; black-necked stilts, avocets, and yellowlegs use this habitat type
25 almost exclusively. Water depth in all of these habitat types is an important habitat variable as the
26 majority of shorebird species require water depths of approximately 10–20cm for foraging (Isola et
27 al. 2000, Hickey et al. 2003).

28 ***Managed Wetlands***

29 **Yolo Basin:** Primarily as a result of *CM4 Tidal Natural Communities Restoration* within the Yolo
30 Basin, 1,185 acres of managed wetland habitat would be permanently converted; 1,066 acres of
31 which are protected. In addition, 42 acres of managed wetland habitat would be temporarily lost by
32 construction-related activities associated with tidal restoration (CM4) and Fisheries Enhancement
33 activities (CM2) (Table 2, ICF International 2013). Increased inundation frequency, depth and
34 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could
35 periodically affect managed wetlands ranging from an estimated 643 acres during a notch flow of
36 1,000 cfs to an estimated 2,055 acres during a notch flow of 4,000 cfs Table 5.4-2, in BDCP Chapter
37 5, *Effects Analysis*) in the Yolo Basin.

38 **Delta Basin:** Within the Delta Basin, 90 acres of managed wetland habitat would be permanently
39 converted, as a result of tidal restoration (CM4). Thirteen of the 90 acres are protected (Table 3, ICF
40 International 2013). Periodic flooding would not affect this natural community type in Delta Basin.

1 **Suisun Basin:** Within the Suisun Basin, 11,532 acres of managed wetland habitat would be
2 permanently converted as a result of tidal restoration (CM4); 10,354 of which are protected. (Table
3 4, ICF International 2013). Periodic flooding would not affect this natural community type in Suisun
4 Basin.

5 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
6 managed wetland habitat suitability (Table 1, ICF International 2013): black-necked stilt
7 (*Himantopus mexicanus*), greater yellowlegs (*Tringa melanoleuca*), and long-billed dowitcher
8 (*Limnodromus scolopaceus*). Dunlin (*Calidris alpina*), least sandpiper (*Calidris minutilla*),
9 semipalmated plover (*Charadrius semipalmatus*), and western sandpiper (*Calidris mauri*), had a
10 rank 2 for managed wetland habitat suitability. Black-bellied plover (*Pluvialis squatarola*) and
11 whimbrel (*Numenius phaeopus*) both had rank 3 for managed wetland habitat suitability.

12 Managed wetlands would decrease in overall extent by 20% (Table 5, ICF International 2013). Most
13 of this loss would occur in Suisun with some additional acreage loss in the Yolo Basin. The loss of
14 managed wetland habitat for covered species and waterfowl would be compensated for with 8,200
15 acres remaining managed wetland protection in Suisun Marsh. Of these 8,200 acres, the 5,000 acres
16 of seasonal wetland protected, enhanced, and managed to provide overwintering waterfowl foraging
17 habitat would be the habitat type most likely to benefit overwintering shorebirds. However, the
18 1,600 acres of semi-permanent and permanent managed wetlands for breeding waterfowl and 1,500
19 acres of managed wetlands for salt marsh harvest mouse would also be expected to have some
20 benefit to wintering and breeding shorebirds.

21 **Cultivated Lands**

22 **Yolo Basin:** Primarily as a result of tidal restoration (CM4) and Fisheries Enhancement activities
23 (CM2) within the Yolo Basin, 8,309 acres of cultivated lands would be permanently converted; 1,272
24 acres of which are protected. Also within the Yolo Basin, increased inundation frequency, depth and
25 duration associated with the ongoing operation of a modified Fremont Weir (CM2) could affect an
26 estimated 3,219 acres of cultivated lands during a notch flow of 1,000 cfs to an estimated 5,512
27 acres during a notch flow of 6,000 cfs (Table 5.4-2, in BDCP Chapter 5, *Effects Analysis*)

28 **Delta Basin:** Within the Delta Basin, as a result of tidal restoration (CM4) and floodplain restoration
29 (CM5), 25,633 acres of cultivated lands would be permanently converted. There would also be an
30 additional 112 acres lost temporarily due to CM5 activities. Of the total permanently converted
31 lands, 3,925 acres are protected (Table 3, ICF International 2013). Seasonal flooding (CM5) on the
32 restored floodplain would periodically affect 738 acres of cultivated lands in Delta.

33 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
34 cultivated lands habitat suitability (Table 1, ICF International 2013): killdeer (*Charadrius*
35 *vociferous*), long-billed curlew, and whimbrel within pasture habitat. Long-billed dowitcher and
36 killdeer both had a rank 2 for idle crop habitat suitability and black-bellied plover was ranked 2 for
37 pasture habitat. Red-necked phalarope (*Phalaropus lobatus*) and Wilson's phalarope (*Phalaropus*
38 *tricolor*) were both ranked 2 for grain and hay crops. Long-billed dowitcher, dunlin, least sandpiper,
39 and long-billed curlew were all ranked 3 for rice habitat suitability and killdeer was ranked 3 for
40 field crop habitat suitability.

41 Cultivated land loss would occur in all three basins, but the majority of acreage loss would occur in
42 the Delta basin. Pasture crop types would decrease in overall extent by 15% over baseline (Table 5,
43 ICF International 2013), but would increase in protection by 135%. More than half of all cultivated

1 lands within the 48,000-acre BDCP cultivated lands reserve would be in pasture production
2 (primarily alfalfa) and enhanced and managed to benefit Swainson's hawk. Idle crop types are not
3 identified as a specific conservation target in the BDCP, are expected to occur within the reserve and
4 are recognized in the BDCP as having "moderate" foraging habitat value for Swainson's hawk, white-
5 tailed kite, and greater sandhill crane.

6 Grain and hay crop would be expected to decrease by 13% (Table 5, ICF International 2013) while
7 protection, enhancement and management would be expected to increase by 28% (Table 6, ICF
8 International 2013). These crop types would be managed for a tricolored blackbirds, Swainson's
9 hawk, white-tailed kite, greater sandhill crane, and burrowing owls.

10 Rice would decrease in overall extent by 2% (Table 5, ICF International 2013) but increase in total
11 protection by 57%. Rice lands would be protected, enhanced, and managed for the benefit for giant
12 garter snake.

13 **Tidal Wetlands**

14 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)
15 within the Yolo Basin, 194 acres of tidal wetland habitat would be permanently converted; 180 acres
16 of which are protected. In addition, 12 acres of tidal wetland habitat would be temporarily lost by
17 construction-related activities associated with Fisheries Enhancement activities (CM2) (Table 2, ICF
18 International 2013). Periodic flooding in Yolo Bypass would affect 3,957 acres of tidal wetlands in
19 Yolo Basin.

20 **Delta Basin:** Within the Delta Basin, 54 acres of tidal wetlands would be permanently converted as
21 a result of tidal restoration (CM4) (Table 3, ICF International 2013). Of the total permanently
22 converted lands, 26 acres are protected. Periodic flooding in Yolo Bypass would affect 26 acres of
23 tidal wetlands in Delta Basin.

24 **Suisun Basin:** Within the Suisun Basin, 219 acres of tidal wetland habitat would be permanently
25 converted as a result of tidal restoration (CM4); 215 of which are protected. (Table 4, ICF
26 International 2013). Periodic flooding would not affect this natural community type in Suisun Basin.

27 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
28 tidal mudflat habitat suitability (Table 6, ICF International 2013): black-bellied plover, dunlin, least
29 sandpiper, marbled godwit (*Limosa fedoa*), semipalmated plover, short-billed dowitcher
30 (*Limnodromus griseus*), western sandpiper, and willet (*Tringa semipalmata*). Long-billed curlew
31 (*Numenius americanus*) and whimbrel both had a rank 2 for tidal mudflat habitat suitability.
32 American avocet (*Recurvirostra americana*) was ranked 3 for tidal mudflat habitat suitability. For
33 tidal brackish emergent wetland/tidal freshwater emergent wetland, willet was ranked 2 and long-
34 billed curlew and whimbrel were both ranked 3 for habitat suitability.

35 Tidal mudflat habitat would be estimated to increase in extent by 1,780 acres. This extremely large
36 increase in tidal mudflat habitat would occur almost exclusively in Suisun Marsh as the result of
37 tidal restoration and the conversion of existing mid- and high-marsh types to low marsh and tidal
38 mudflats in response to sea level rise. BDCP Appendix 3.B, *BDCP Tidal Habitat Evolution Assessment*,
39 details the methods and assumptions modeled to come about this result. Tidal mudflat habitats
40 would be expected to require management, however, sediment augmentation has been discussed as
41 an experimental method that could be employed in places like Suisun to combat the loss of intertidal
42 marshes in the face of sea level rise and reduced sediment supplies.

1 Tidal emergent wetland habitat would increase in extent by 152% (Table 5, ICF International 2013).
2 Of the 30,000 acres of emergent wetland restoration, 6,000 acres would be in the Suisun Basin and
3 the rest would be distributed between the Yolo and Delta Basins. Enhancement and management on
4 these lands would be likely to be focused on nonnative, invasive species management. Any
5 additional actions in Suisun would be focused on salt marsh harvest mouse, Suisun shrew, California
6 clapper rail, black rail, Suisun thistle, and soft bird's-beak. In freshwater marshes, enhancement and
7 management would be likely to focus on black rail, western pond turtle, and, in some cases, giant
8 garter snake.

9 ***Nontidal Wetlands***

10 **Yolo Basin:** As a result of tidal restoration (CM4) and Fisheries Enhancement activities (CM2)
11 within the Yolo Basin, 313 acres of nontidal wetland habitat would be permanently converted; 119
12 acres of which are protected. In addition, 11 acres of nontidal wetland habitat would be temporarily
13 lost by construction-related activities associated with Fisheries Enhancement activities (CM2)
14 (Table 2, ICF International 2013). Periodic flooding in Yolo Bypass associated with ongoing Fremont
15 Weir operation (CM2) would affect 305 acres of nontidal wetlands in Yolo Basin, specifically
16 nontidal perennial aquatic habitat.

17 **Delta Basin:** Within the Delta Basin, 99 acres of nontidal wetlands would be permanently converted
18 as a result of tidal restoration (CM4) and floodplain restoration (CM5) (Table 3, ICF International
19 2013). There would also be 8 acres of nontidal perennial aquatic habitat temporarily lost from CM5
20 activities. Of the total permanently converted lands, 29 acres are protected. Periodic flooding from
21 CM5 would affect 4 acres of nontidal perennial aquatic habitat in Delta Basin.

22 **Suisun Basin:** Within the Suisun Basin, 1 acre of nontidal wetland habitat, specifically vernal pool
23 complex, would be permanently converted as a result of tidal restoration (CM4); and is not
24 protected. (Table 4, ICF International 2013). Periodic flooding would not affect this natural
25 community type in Suisun Basin.

26 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
27 nontidal wetland habitat suitability (Table 6, ICF International 2013): red-necked phalarope and
28 Wilson's phalarope for nontidal freshwater perennial emergent wetland and American avocet for
29 alkali seasonal wetland complex. Greater yellowlegs had a rank 2 for vernal pool complex habitat
30 suitability. Red-necked phalarope and western sandpiper were both ranked 3 for alkali seasonal
31 wetland habitat suitability and greater yellowlegs was ranked 3 for nontidal freshwater perennial
32 emergent wetland habitat suitability.

33 Nontidal freshwater emergent wetland would increase in extent by 88% as a result of BDCP
34 implementation (Table 5, ICF International 2013). These lands would be managed to benefit giant
35 garter snake and located within the Delta Basin (likely in the vicinity of White Slough) and the Yolo
36 Basin (in the Cache Slough area).

37 Impacts on wetted acres of vernal pool complex and alkali seasonal wetland complex would be
38 avoided and thus loss of this community is not expected. However, up to 10 acres of wetted acre loss
39 could be permitted under the Plan. Protection of vernal pool complex natural community would
40 increase by 13% and by 6% for alkali seasonal wetlands (Table 6, ICF International 2013).
41 Protection of these two community types would enhance and manage habitat for vernal pool
42 crustaceans and alkali-related plant species.

1 The protection and restoration of natural communities would also include management and
2 enhancement actions under *CM11 Natural Communities Enhancement and Management*. The
3 following management activities to benefit shorebirds would be considered for implementation
4 under CM11 in areas where they would not conflict with covered species management.

5 ● Managed Wetlands

- 6 ○ Managed wetlands can be potentially manipulated to provide the optimum water depths for
7 foraging shorebirds and islands for nesting (Hickey et al. 2003).
- 8 ○ During fall and spring, stagger the timing and location of draining and flooding to optimize
9 the extent of shallow-water habitat; varying depths within the wetland unit helps to create
10 temporal variation in foraging opportunities. During warm, dry springs when wetland units
11 dry quickly, wetland units can be re-supplied with water to extend habitat availability for
12 shorebirds.
- 13 ○ Provide open, shallow water habitat adjacent to minimally vegetated, shallowly sloped
14 edges for nesting shorebirds between April and July.
- 15 ○ Provide islands with little to no vegetation to increase the likelihood of shorebird roosting
16 and nesting.
- 17 ○ Create low slopes on islands and levees; gradual angles (10–12:1) are better than steep
18 angles.
- 19 ○ Limit levee maintenance during the nesting season (April through July). However, mowing
20 the center of levees is fine.
- 21 ○ Potentially add material to levees or to islands to encourage nesting for some species.

22 ● Cultivated Lands

- 23 ○ Maintaining a mosaic of dry and flooded crop types, and varying water depths will promote
24 a diverse community of waterbirds, including shorebirds, during fall migration and winter
25 (Shuford et al. 2013).
- 26 ○ To provide wintering habitat for multiple waterbird guilds, including shorebirds, use a
27 combination of flooding practices that include one-time water application and maintenance
28 flooding while also providing unflooded habitat (Strum et al. *in review*).
- 29 ○ The post-harvest flooding of winter wheat and potato fields in early fall (July–September)
30 can provide substantial benefits to shorebirds at a time of very limited shallow-water
31 habitat on the landscape (Shuford et al. 2013).
- 32 ○ Stagger the drawdown of flooded rice and other winter-flooded agricultural fields to
33 prolong the availability of flooded habitat (Iglecia et al. 2012). Be aware of soil type because
34 this practice may not be as effective on soils that drain quickly.
- 35 ○ Remove as much stubble as possible in rice and other agricultural fields after harvest to
36 increase the potential shorebird habitat on intentionally flooded or unflooded fields that
37 may passively gather rain water (Iglecia et al. 2012).
- 38 ○ Shallowly flood available agricultural fields during July, August, and September to provide
39 early fall migration habitat for shorebirds. Fields should be free of vegetation prior to
40 flooding, have minimal micro-topography (e.g., no large clods), and should remain flooded

- 1 for up to three week periods (after three weeks, vegetation encroachment reduces habitat
2 value for shorebirds) (ICF International 2013).
- 3 ○ Manage levee habitats to have minimal vegetation but do not spray herbicide directly or
4 drive on levees during the nesting season (April–July, Iglecia et al. 2012).
 - 5 ○ Maintain a minimum top-width of 30 inches for levees, based on increased avocet use of
6 wider levees (Iglecia et al. 2012).
 - 7 ○ When possible, flood fields with nesting habitat (modified levees and islands) in late April to
8 provide nesting habitat for American avocets (Iglecia et al. 2012).
 - 9 ○ Finer grained substrate (clods smaller than a fist) in rice and other agricultural fields may be
10 more appealing for nesting shorebirds (Iglecia et al. 2012).
 - 11 ○ Maintain gently sloping levees and island sides (10–12:1; Iglecia et al. 2012).
 - 12 ○ Islands should be disked along with the rest of the field after harvest to help inhibit
13 vegetation growth (Iglecia et al. 2012).

14 **NEPA Effects:** Alternative 9 implementation would result in the conversion of managed wetland and
15 cultivated lands to tidal natural communities, including tidal mudflat. The result would be
16 substantial loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs,
17 and long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least
18 sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and
19 willet. While substantial losses of cultivated lands would be incurred, protection, enhancement, and
20 management of the remaining acres would likely have substantial benefits for select species of
21 wintering and breeding shorebirds. This is because impacts on crop types would be distributed
22 across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,
23 and rice types. While the protection, enhancement, and management of these crop types are being
24 driven by covered species, these management actions would also benefit shorebirds. The protection,
25 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation
26 for the loss of substantial acreage, would have some incremental benefits for shorebirds, but would
27 be unlikely to compensate for the overall loss. However, with the protection and restoration of acres
28 in the Delta and Yolo watersheds, in addition to the implementation of the management actions
29 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would not
30 be expected to result in an adverse effect on shorebird populations in the study area.

31 **CEQA Conclusion:** Alternative 9 implementation would result in the conversion of managed wetland
32 and cultivated lands to tidal natural communities, including tidal mudflat. The result would be
33 significant loss of the primary habitat of black-necked stilt, American avocet, greater yellowlegs, and
34 long-billed dowitcher and a gain in the primary habitat of black-bellied plover, dunlin, least
35 sandpiper, marbled godwit, semipalmated plover, short-billed dowitcher, western sandpiper, and
36 willet. While significant losses of cultivated lands would be incurred, protection, enhancement, and
37 management of the remaining acres would likely have substantial benefits for select species of
38 wintering and breeding shorebirds. This is because impacts on crop types would be distributed
39 across all crop types, while protection would focus primarily on pasture lands, grain and hay, corn,
40 and rice types. While the protection, enhancement, and management of these types are being driven
41 by covered species, these management actions would also benefit shorebirds. The protection,
42 enhancement, and management of remaining managed wetlands in Suisun Marsh, in compensation
43 for substantial acreage loss, would have some incremental benefits for shorebirds, but would be
44 unlikely to compensate for the overall loss. However, with the protection and restoration of acres in

1 the Delta and Yolo watersheds, in addition to the implementation of the management actions
2 outlined in *CM11 Natural Communities Enhancement and Management*, habitat conversion would be
3 expected to have a less-than-significant impact on shorebird populations in the study area.

4 **Impact BIO-182: Effects on Shorebirds and Waterfowl Associated with Electrical** 5 **Transmission Facilities**

6 New transmission lines installed in the study area would increase the risk for bird-power line
7 strikes, which could result in injury or mortality of shorebirds and waterfowl. The existing network
8 of power lines in the study currently poses a risk for shorebirds and waterfowl in the Delta. New
9 transmission lines would increase this risk and have an adverse effect on shorebird and waterfowl
10 species in the absence of other conservation actions. However, transmission lines constructed under
11 Alternative 9 would be temporary and would be removed after the completion of CM1 construction
12 activities (within the first 10 years of Plan implementation). In addition, implementation of *AMM20*
13 *Greater Sandhill Crane* would reduce potential effects through the installation of flight diverters on
14 new transmission lines, and selected existing transmission lines in the study area.

15 **NEPA Effects:** New transmission lines would increase the risk for shorebird and waterfowl power
16 line strikes. With the implementation of *AMM20 Greater Sandhill Crane*, the potential effect of the
17 construction of new transmission lines on shorebird and waterfowl would not be adverse.

18 **CEQA Conclusion:** New transmission lines would increase the risk for shorebird and waterfowl
19 power line strikes. The implementation of *AMM20 Greater Sandhill Crane* would reduce the potential
20 impact of the construction of new transmission lines on shorebirds and waterfowl to a less-than-
21 significant level.

22 **Impact BIO-183: Indirect Effects of Plan Implementation on Shorebirds and Waterfowl**

23 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
24 with construction-related activities could result in temporary disturbances that affect shorebird and
25 waterfowl use of modeled habitat. Indirect effects associated with construction include noise, dust,
26 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
27 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
28 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
29 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
30 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use
31 of mechanical equipment during water conveyance construction could cause the accidental release
32 of petroleum or other contaminants that could affect shorebirds and waterfowl or their prey in the
33 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
34 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge
35 of sediment or excessive dust adjacent to shorebirds and waterfowl in the study area could also have
36 a negative effect on these species. AMM1–AMM7 would ensure that measures were in place to
37 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to
38 work areas.

39 **Methylmercury Exposure:** Covered activities have the potential to exacerbate bioaccumulation of
40 mercury in avian species, including shorebird and waterfowl species. Marsh (tidal and nontidal) and
41 floodplain restoration have the potential to increase exposure to methylmercury. Mercury is
42 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
43 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).

1 Thus, BDCP restoration activities that create newly inundated areas could increase bioavailability of
2 mercury (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration). Species sensitivity
3 to methylmercury differs widely and there is a large amount of uncertainty with respect to species-
4 specific effects. Increased methylmercury associated with natural community and floodplain
5 restoration could indirectly affect shorebirds and waterfowl, via uptake in lower trophic levels (as
6 described in BDCP Appendix 5.D, *Contaminants*).

7 In addition, the potential mobilization or creation of methylmercury within the Plan Area varies
8 with site-specific conditions and would need to be assessed at the project level. *CM12 Methylmercury*
9 *Management* includes provisions for project-specific Mercury Management Plans. Site-specific
10 restoration plans that address the creation and mobilization of mercury, as well as monitoring and
11 adaptive management as described in CM12 would be available to address the uncertainty of
12 methylmercury levels in restored tidal marsh and potential impacts on shorebirds and waterfowl.

13 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
14 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
15 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
16 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
17 2009). The effect of selenium toxicity differs widely between species and also between age and sex
18 classes within a species. In addition, the effect of selenium on a species can be confounded by
19 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
20 2009).

21 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
22 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
23 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
24 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
25 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
26 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
27 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
28 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
29 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
30 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
31 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
32 levels of selenium have a higher risk of selenium toxicity.

33 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
34 of selenium in soils (Ohlendorf and Heinz 2009) and covered activities have the potential to
35 exacerbate bioaccumulation of selenium in avian species, including shorebird and waterfowl
36 species. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
37 selenium, and therefore increase avian exposure from ingestion of prey items with elevated
38 selenium levels. Thus, BDCP restoration activities that create newly inundated areas could increase
39 bioavailability of selenium (see BDCP Chapter 3, *Conservation Strategy*, for details of restoration).
40 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was
41 determined that, relative to Existing Conditions and the No Action Alternative, CM1 would not result
42 in substantial, long-term increases in selenium concentrations in water in the Delta under any
43 alternative. However, it is difficult to determine whether the effects of potential increases in
44 selenium bioavailability associated with restoration-related conservation measures (CM4–CM5)
45 would lead to adverse effects on shorebirds and waterfowl species.

1 Because of the uncertainty that exists at this programmatic level of review, there could be a
 2 substantial effect on shorebirds and waterfowl from increases in selenium associated with
 3 restoration activities. This effect would be addressed through the implementation of *AMM27*
 4 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 5 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
 6 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
 7 selenium management to reduce selenium concentrations and/or bioaccumulation would be
 8 evaluated separately for each restoration effort as part of design and implementation. This
 9 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
 10 design schedule.

11 **NEPA Effects:** Noise and visual disturbances from the construction of Alternative 9 water
 12 conveyance facilities could reduce shorebird and waterfowl use of modeled habitat adjacent to work
 13 areas. Moreover, operation and maintenance of the water conveyance facilities, including the
 14 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could
 15 affect shorebird and waterfowl use of the surrounding habitat. AMM1–AMM7 would minimize these
 16 effects, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
 17 *Disturbance of Nesting Birds*, would be available to address adverse effects on nesting individuals.
 18 Tidal habitat restoration could result in increased exposure of shorebirds and waterfowl to
 19 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
 20 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
 21 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the
 22 indirect effects associated with noise and visual disturbances, and increased exposure to selenium
 23 from Alternative 9 implementation would not have an adverse effect on shorebirds and waterfowl.
 24 Tidal habitat restoration is unlikely to have an adverse effect on shorebirds and waterfowl through
 25 increased exposure to methylmercury, as these species currently nest and forage in tidal marshes
 26 with elevated methylmercury levels. However, it is unknown what concentrations of methylmercury
 27 are harmful to species of waterfowl and shorebirds, and the potential for increased exposure would
 28 vary substantially within the study area. Site-specific restoration plans in addition to monitoring and
 29 adaptive management, described in *CM12 Methylmercury Management*, would address the
 30 uncertainty of methylmercury levels in restored tidal marsh. Once site-specific sampling and other
 31 information is developed, the site-specific planning phase of marsh restoration would be the
 32 appropriate place to assess the potential risk of shorebird and waterfowl exposure to
 33 methylmercury.

34 **CEQA Conclusion:** Noise, potential hazardous spills, and increased dust and sedimentation as a
 35 result of Alternative 9 water conveyance facilities construction and operation and maintenance
 36 would have a significant impact on shorebirds and waterfowl. AMM1–AMM7 would minimize these
 37 impacts, and implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
 38 *Surveys and Avoid Disturbance of Nesting Birds*, would reduce the impacts to a less-than-significant
 39 level. Tidal habitat restoration is unlikely to have a significant impact on shorebirds and waterfowl
 40 species through increased exposure to methylmercury, as these species currently nest and forage in
 41 tidal marshes with elevated methylmercury levels. However, it is unknown what concentrations of
 42 methylmercury are harmful to species of waterfowl and shorebirds. Site-specific restoration plans
 43 that address the creation and mobilization of mercury, as well as the monitoring and adaptive
 44 management described in *CM12*, would be the appropriate place to assess the potential risk of
 45 shorebird and waterfowl exposure to methylmercury in the study area. Tidal habitat restoration
 46 could result in increased exposure of shorebirds and waterfowl to selenium. This effect would be

1 addressed through the implementation of *AMM27 Selenium Management*, which would provide
2 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
3 selenium and its bioavailability in tidal habitats. Therefore, the indirect effects of Alternative 9
4 implementation would have a less-than-significant impact on shorebirds and waterfowl.

5 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
6 **Disturbance of Nesting Birds**

7 See Mitigation Measure BIO-75 under Impact BIO-75.

8 **Common Wildlife and Plants**

9 Common wildlife and plants are widespread, often abundant, species that are not covered under
10 laws or regulations that address conservation or protection of individual species. Examples of
11 common wildlife and plants occurring in the study area are provided within the discussion for each
12 natural community type in Section 12.1.2.2, *Special-Status and Other Natural Communities*. Impacts
13 on common wildlife and plants would occur through the same mechanisms discussed for natural
14 communities and special-status wildlife and plants for each alternative.

15 **Impact BIO-184: Effects on Habitat and Populations of Common Wildlife and Plants**

16 Effects on habitat of common wildlife and plants, including habitat removal and conversion, are
17 discussed in the analysis of Alternative 9 effects on natural communities. In general, effects on
18 habitat of common wildlife and plants would not be adverse. Through the course of implementing
19 the Plan over a 50-year time period, several natural communities and land cover types would be
20 reduced in size, primarily from restoration of other natural communities. Grassland, managed
21 wetland and cultivated lands would be reduced in acreage, so the common species that occupy these
22 habitats would be affected. However, the losses in acreage and value of these habitats would be
23 offset by protection, restoration, enhancement and management actions contained in the BDCP,
24 including *CM3 Natural Communities Protection and Restoration*, *CM4 Tidal Natural Communities*
25 *Restoration*, *CM5 Seasonally Inundated Floodplain Restoration*, *CM6 Channel Margin Enhancement*,
26 *CM7 Riparian Natural Community Restoration*, *CM8 Grassland Natural Community Restoration*, *CM9*
27 *Vernal Pool and Alkali Seasonal Wetland Complex Restoration*, *CM10 Nontidal Marsh Restoration*, and
28 *CM11 Natural Communities Enhancement and Management*. In addition, the AMMs contained in
29 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, would be in place to reduce or eliminate
30 the potential to adversely affect both special-status and common wildlife and plants.

31 Direct effects on common wildlife and plants from constructing water conveyance facilities and
32 implementing Alternative 9 conservation measures would include construction or inundation-
33 related disturbances that result in injury or mortality of wildlife or plants and the immediate
34 displacement of wildlife. Indirect effects include project-related disturbances to nearby wildlife and
35 plants during construction (e.g., disruption of breeding and foraging behaviors from noise and
36 human activity, habitat degradation from fugitive dust and runoff) and effects occurring later in time
37 (e.g., collisions of birds with transmission lines, habitat fragmentation, vegetation management).
38 Indirect effects could result both from construction and from operations and maintenance (e.g.,
39 ground disturbances could result in the spread and establishment of invasive plants).

40 **NEPA Effects:** The direct and indirect effects associated with implementing the conservation
41 measures of Alternative 9 would not be adverse because the conservation measures and AMMs also
42 expand and protect natural communities, avoid or minimize effects on special-status species,

1 prevent the introduction and spread of invasive species, and enhance natural communities. These
2 actions would result in avoiding and minimizing effects on common wildlife and plants as well.

3 **CEQA Conclusion:** Construction and operation of the water conveyance facilities and habitat
4 restoration activities would have impacts on common wildlife and plants in the study area through
5 habitat loss and through direct or indirect loss or injury of individuals. The loss of habitat would not
6 be substantial, because habitat restoration would increase the amount and extent of habitat
7 available for use by most common wildlife and plant species. Conservation measures to avoid or
8 minimize effects on special-status species, to prevent the introduction and spread of invasive
9 species, and to enhance natural communities also would result in avoiding and minimizing effects on
10 common wildlife and plants. Consequently, implementation of the BDCP is not expected to cause any
11 populations of common wildlife or plants to drop below self-sustaining levels, and this impact would
12 be less than significant. No mitigation would be required.

13 **Wildlife Corridors**

14 ECAs are lands likely to be important to wildlife movement between large, mostly natural areas at
15 the state wide level. The ECAs form a functional network of wildlands that are considered important
16 to the continued support of California's diverse natural communities. Four general areas were
17 identified within the Plan Area that contain ECAs (Figure 12-2). The BDCP also identified important
18 landscape linkages in the Plan Area to guide reserve design, which can also be seen on Figure 12-2.

19 **Impact BIO-185: Effect of BDCP Conservation Measures on Wildlife Corridors**

20 Alternative 9 would have conveyance facility construction occurring within the Mandeville Island-
21 Staten Island ECA. The conveyance facility construction would also occur along two linkages
22 identified in the BDCP, the *Middle River* linkage (#6 in Figure 12-2) and the *White Slough to Stone*
23 *Lakes* linkage (#11 in Figure 12-2).

24 The construction of an operable barrier and associated transmission lines would occur on the
25 northwestern tip of Mandeville Island. These facilities would not create a substantial barrier to
26 wildlife movement within and outside of this ECA. The construction of transmission lines may result
27 in localized impacts on sandhill cranes and other avian species during periods of low visibility, but
28 these transmission lines are relatively short and would not substantially affect flight patterns.

29 The Alternative 9 dredge spoils areas and an operable barrier identified along Middle River (linkage
30 #6) would greatly conflict with the BDCP's plan for riparian conservation and establishing riparian
31 connectivity along this stretch of Middle River. The dredge disposal areas could make a substantial
32 section of Middle River unsuitable for BDCP riparian conservation actions.

33 The construction of a transmission line across BDCP the *White Slough to Stone Lakes* linkage would
34 not substantially conflict with the BDCP's plans for giant garter snake conservation along this
35 corridor.

36 Restoration activities would be implemented in the ECAs within Yolo Bypass (*CM2 Yolo Bypass*
37 *Fisheries Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural*
38 *Communities Restoration*). These activities would generally improve the movement of wildlife within
39 and outside of the study area. In addition, the preservation of restored lands (CM3) and the
40 enhancement and management of these areas (CM11) would improve and maintain wildlife
41 corridors within the study area.

1 **NEPA Effects:** Alternative 9 would conflict with the BDCP's planned riparian conservation along
2 Middle River; however, compared to No Action this alternative would not result in adverse effects
3 on wildlife corridors.

4 **CEQA Conclusion:**

5 The construction of an operable barrier and associated transmission lines would occur on the
6 northwestern tip of Mandeville Island. These facilities would not create a substantial barrier to
7 wildlife movement within and outside of the Mandeville Island-Staten Island ECA. The construction of
8 transmission lines may result in localized impacts on sandhill cranes and other avian species during
9 periods of low visibility, but these transmission lines are relatively short and would not
10 substantially affect flight patterns.

11 The Alternative 9 dredge spoils areas and an operable barrier identified along Middle River (linkage
12 #6) would greatly conflict with the BDCP's plan for riparian conservation and establishing riparian
13 connectivity along this stretch of Middle River. The dredge disposal areas could make a substantial
14 section of Middle River unsuitable for BDCP riparian conservation actions.

15 The construction of a transmission line across BDCP the *White Slough to Stone Lakes* linkage would
16 not substantially conflict with the BDCP's plans for giant garter snake conservation along this
17 corridor.

18 Restoration activities would be implemented in the ECAs within Yolo Bypass (*CM2 Yolo Bypass*
19 *Fisheries Enhancement*) and within the Grizzly Island-Lake Marie ECA (*CM4 Tidal Natural*
20 *Communities Restoration*). These activities would generally improve the movement of wildlife within
21 and outside of the study area. In addition, the preservation of restored lands (CM3) and the
22 enhancement and management of these areas (CM11) would improve and maintain wildlife
23 corridors within the study area.

24 Alternative 9 would conflict with the BDCP's planned riparian conservation along Middle River;
25 however, under the Existing Conditions, this alternative would overall result in less-than-significant
26 impacts on wildlife corridors.

27 **Invasive Plant Species**

28 The invasive plant species that primarily affect each natural community in the study area, which
29 include water hyacinth, perennial pepperweed, giant reed, and Brazilian waterweed, are discussed
30 in Section 12.1.4. Invasive species compete with native species for resources and can alter natural
31 communities by altering fire regimes, hydrology (e.g., sedimentation and erosion), light availability,
32 nutrient cycling, and soil chemistry but also have the potential to harm human health and the
33 economy by adversely affecting natural ecosystems, water delivery, flood protection systems,
34 recreation, agricultural lands, and developed areas (Randall and Hoshovsky 2000). The construction
35 and restoration activities covered under the BDCP could result in the introduction or spread of
36 invasive plant species by creating temporary ground disturbance that provides opportunities for
37 colonization by invasive plants in the study area.

38 The primary mechanisms for the introduction of invasive plants as the result of implementation of
39 Alternative 9 are listed here.

- 40
- Grading, excavation, grubbing, and placement of fill material.
 - Breaching, modification, or removal of existing levees and construction of new levees.
- 41

- 1 • Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,
 - 2 electric transmission and gas lines, irrigation infrastructure).
 - 3 • Maintenance of infrastructure.
 - 4 • Removal of existing vegetation and planting/seeding of vegetation.
 - 5 • Maintaining vegetation and vegetation structure (e.g., grazing, mowing, burning, trimming).
 - 6 • Dredging waterways.
- 7 Clearing operations and the movement of vehicles, equipment, and construction materials in the
- 8 study area would facilitate the introduction and spread of invasive plants by bringing in or moving
- 9 seeds and other propagules. These effects would result from four activities.
- 10 • Spreading chipped vegetative material from clearing operations over topsoil after earthwork
 - 11 operations are complete.
 - 12 • Importing, distributing, storing, or disposing of fill, reusable tunnel material, borrow, spoil, or
 - 13 dredge material.
 - 14 • Traffic from construction vehicles (e.g., water and cement trucks) and personal vehicles of
 - 15 construction staff.
 - 16 • Transport of construction materials and equipment within the study area and to/from the study
 - 17 area.

18 Table 12-9-70 lists the acreages of temporary disturbance in each natural community in the study

19 area that would result from implementation of Alternative 9 of the BDCP.

20 **Table 12-9-70. Summary of Temporary Disturbance in Natural Communities under Alternative 9**

Natural Community	Temporary Impacts (acres)
Tidal perennial aquatic	360
Tidal brackish emergent wetland	0
Tidal freshwater emergent wetland	123
Valley foothill riparian	367
Grassland	590
Inland dune scrub	0
Alkali seasonal wetland complex	0
Vernal pool complex	0
Other natural seasonal wetland	0
Nontidal freshwater perennial emergent wetland	25
Nontidal perennial aquatic	27
Managed wetlands	65
Agricultural lands	1,959
Total	3,516

21

1 **Impact BIO-186: Adverse Effects on Natural Communities Resulting from the Introduction**
2 **and Spread of Invasive Plant Species**

3 Under Alternative 9, the BDCP would have adverse effects on natural communities from the
4 introduction and spread of invasive plant species through implementation of CM1–CM10 and
5 AMM6. No adverse effects are expected from implementation of CM11–CM21.

- 6 • *CM1 Water Facilities and Operation*: Construction of the Alternative 9 water conveyance facilities
7 would result in the temporary disturbance of 3,507 acres that would provide opportunities for
8 colonization by invasive plant species.
- 9 • *CM2 Yolo Bypass Fisheries Enhancement*: Construction of the Yolo Bypass fisheries
10 enhancements would result in the temporary disturbance of 758 acres that would provide
11 opportunities for colonization by invasive plant species. Vegetation maintenance activities for
12 the Fremont Weir and Yolo Bypass improvements may include the removal of giant reed;
13 however, the clearing of linear areas to facilitate water flow may also result increased
14 opportunities for invasion. Sediment removal, transportation, and application as a source
15 material for restoration or levee projects as part of Fremont Weir and Yolo Bypass maintenance
16 activities could also result in the spread of invasives if the sediment contains viable invasive
17 plant propagules.
- 18 • *CM3 Natural Communities Protection and Restoration*: The restoration activities in the natural
19 communities located in the eleven CZs would result in the temporary disturbance of restoration
20 areas that would provide opportunities for colonization by invasive plant species.
- 21 • *CM4 Tidal Natural Communities Restoration*: The activities associated with the restoration of
22 tidal perennial aquatic, tidal mudflat, tidal freshwater emergent wetland, and tidal brackish
23 emergent wetland in ROAs would result in the temporary disturbance of tidal areas that would
24 provide opportunities for colonization by invasive plant species. These adverse effects would be
25 reduced by designing restoration projects to minimize the establishment of nonnative
26 submerged aquatic vegetation, and early restoration projects would be monitored to assess the
27 response of nonnative species to restoration designs and local environmental conditions. If
28 indicated by monitoring results, the BDCP Implementation Office would implement invasive
29 plant control measures in restored natural communities to help ensure the establishment of
30 native marsh plain plant species. Additionally, the BDCP Implementation Office would actively
31 remove submerged and floating aquatic vegetation in subtidal portions of tidal natural
32 community restoration sites.
- 33 • *CM5 Seasonally Inundated Floodplain Restoration*: Floodplain restoration levee construction
34 would result in the temporary disturbance of 1,285 acres along channels in the north, east, and
35 south Delta (San Joaquin, Old, and Middle Rivers) that would provide opportunities for
36 colonization by invasive plant species.
- 37 • *CM6 Channel Margin Enhancement*: The temporary effects of channel margin enhancement were
38 not estimated because specific locations for this activity and their areal extent have not been
39 developed. Channel margin enhancement (Sacramento River between Freeport and Walnut
40 Grove, San Joaquin River between Vernalis and Mossdale, Steamboat and Sutter Sloughs, and
41 salmonid migration channels in the interior Delta) would result in the temporary disturbance of
42 channel areas that would provide opportunities for colonization by invasive plant species.

- 1 ● *CM7 Riparian Natural Community Restoration*: The restoration of valley/foothill riparian habitat
2 would result in the temporary disturbance of riparian areas that would provide opportunities
3 for colonization by invasive plant species.
- 4 ● *CM8 Grassland Natural Community Restoration*: The restoration of grassland habitat in CZs 1, 8
5 and/or 11 would result in the temporary disturbance of degraded grassland or cultivated land
6 that would provide opportunities for colonization by invasive plant species.
- 7 ● *CM9 Vernal Pool and Alkali Season Wetland Complex Restoration*: The restoration of vernal pool
8 and alkali seasonal wetland complexes in CZs 1, 8, or 11 would result in the temporary
9 disturbance of grassland areas that would provide opportunities for colonization by invasive
10 plant species.
- 11 ● *CM10 Nontidal Marsh Restoration*: Nontidal marsh restoration, which would take place through
12 conversion of agricultural lands in CZs 2 and 4, would result in the temporary disturbance of
13 fallow agricultural areas that would provide opportunities for colonization by invasive plant
14 species. These adverse effects would be reduced by monitoring the development of marsh
15 vegetation to determine if nonnative vegetation needs to be controlled to facilitate the
16 establishment of native marsh vegetation or if restoration success could be improved with
17 supplemental plantings of native species. If indicated by monitoring, nonnative vegetation
18 control measures and supplemental plantings would be implemented.
- 19 ● *Avoidance and Minimization Measures: AMM6 Disposal and Reuse of Spoils* would have adverse
20 effects if spoils, RTM, dredged material, or chipped vegetative materials containing viable
21 invasive plant propagules are used as topsoil in uninfested areas.

22 The adverse effects that would result from the introduction and spread of invasive plants through
23 colonization of temporarily disturbed areas would be minimized by implementation of CM11, AMM4
24 AMM10 and AMM11.

25 *CM11 Natural Communities Enhancement and Management* would reduce these adverse effects by
26 implementing invasive plant control within the BDCP reserve system to reduce competition on
27 native species, thereby improving conditions for covered species, ecosystem function, and native
28 biodiversity. The invasive plant control efforts would target new infestations that are relatively easy
29 to control or the most ecologically damaging nonnative plants for which effective suppression
30 techniques are available. In aquatic and emergent wetland communities, Brazilian waterweed,
31 perennial pepperweed, barbgrass, and rabbitsfoot grass would be controlled (and tidal mudflats
32 would be maintained). In riparian areas, invasive plant control would focus on reducing or
33 eliminating species such as Himalayan blackberry, giant reed, and perennial pepperweed. In
34 grassland areas, techniques such as grazing and prescribed burning may be used to decrease the
35 cover of invasive plant species.

36 Implementation of AMM4, AMM10, and AMM11 would also reduce the adverse effects that could
37 result from construction activities. The AMMs provide methods to minimize ground disturbance,
38 guidance for developing restoration and monitoring plans for temporary construction effects, and
39 measures to minimize the introduction and spread of invasive plants. AMM4 would include the
40 preparation and implementation of an erosion and sediment control plan that would control erosion
41 and sedimentation and restore soils and vegetation in affected areas. The restoration and
42 monitoring plans for implementation of AMM10 would involve methods for stockpiling, storing, and
43 restoring topsoil, revegetating disturbed areas, monitoring and maintenance schedules, adaptive
44 management strategies, reporting requirements, and success criteria. AMM10 would also include

1 planting native species appropriate for the natural community being restored, with the exception of
2 some borrow sites in cultivated lands that would be restored as grasslands.

3 AMM11 specifies that the BDCP Implementation Office would retain a qualified botanist or weed
4 scientist prior to clearing operations to determine if affected areas contain invasive plants. If areas
5 to be cleared do contain invasive plants, then chipped vegetation material from those areas would
6 not be used for erosion control but would be disposed of to minimize the spread of invasive plant
7 propagules (e.g., burning, composting). During construction of the water conveyance facilities and
8 construction activities associated with the other conservation measures, construction vehicles and
9 construction machinery would be cleaned prior to entering construction sites that are in or adjacent
10 natural communities other than cultivated lands and prior to entering any BDCP restoration sites or
11 conservation lands other than cultivated lands. Vehicles working in or travelling off paved roads
12 through areas with infestations of invasive plant species would be cleaned before travelling to other
13 parts of the study area. Cleaning stations would be established at the perimeter of BDCP covered
14 activities along construction routes as well as at the entrance to reserve system lands. Biological
15 monitoring would include locating and mapping locations of invasive plant species within the
16 construction areas during the construction phase and the restoration phase. Infestations of invasive
17 plant species would be targeted for control or eradication as part of the restoration and revegetation
18 of temporarily disturbed construction areas.

19 **NEPA Effects:** The implementation of AMM4, AMM10, AMM11, and CM11 would reduce the
20 potential for the introduction and spread of invasive plants and avoid or minimize the potential
21 effects on natural communities and special-status species; therefore, these effects would not be
22 adverse.

23 **CEQA Conclusion:** Under Alternative 9, impacts on natural communities from the introduction or
24 spread of invasive plants as a result of implementing the BDCP would not result in the long-term
25 degradation of a sensitive natural community due to substantial alteration of site conditions and
26 would, therefore, be less than significant. No mitigation would be required.

27 **Compatibility with Plans and Policies**

28 **Impact BIO-187: Compatibility of the Proposed Water Conveyance Facilities and Other** 29 **Conservation Measures with Federal, State, or Local Laws, Plans, Policies, or Executive Orders** 30 **Addressing Terrestrial Biological Resources in the Study Area**

31 Constructing the water conveyance facilities (CM1) and implementing CM2–CM21 for Alternative 9
32 have the potential for being incompatible with plans and policies related to managing and protecting
33 terrestrial biological resources of the study area. A number of laws, plans, policies, programs, and
34 executive orders that are relevant to actions in the study area provide guidance for terrestrial
35 biological resource issues as overviewed in Section 12.2, *Regulatory Setting*. This overview of plan
36 and policy compatibility evaluates whether Alternative 9 would be compatible or incompatible with
37 such enactments, rather than whether impacts would be adverse or not adverse, or significant or
38 less than significant. If the incompatibility relates to an applicable plan, policy, or executive order
39 adopted to avoid or mitigate terrestrial biological resource effects, then an incompatibility might be
40 indicative of a related significant or adverse effect under CEQA and NEPA, respectively. Such
41 physical effects of Alternative 9 on terrestrial biological resources are addressed in the impacts on
42 natural communities and species. The following is a summary of compatibility evaluations related to

1 terrestrial biological resources for laws, plans, policies, and executive orders relevant to the BDCP.

2 Federal and State Legislation

- 3 • The federal *Clean Water Act*, *Endangered Species Act*, *Fish and Wildlife Coordination Act*,
4 *Migratory Bird Treaty Act*, *Rivers and Harbors Act* and *Marine Mammal Protection Act* all contain
5 legal guidance that either directly or indirectly promotes or stipulates the protection and
6 conservation of terrestrial biological resources in the process of undertaking activities that
7 involve federal decision making. The biological goals and objectives contained in the BDCP that
8 provide the major guidance for implementing the various conservation elements of Alternative
9 9 are all designed to promote the long-term viability of the natural communities, special-status
10 species, and common species that inhabit the study area. While some of the conservation
11 measures of the alternative involve permanent and temporary loss of natural communities and
12 associated habitats during facilities construction and expansion of certain natural communities,
13 the long-term guidance in the Plan would provide for the long-term viability and expansion of
14 the habitats and special-status species populations in the study area. Alternative 9 conservation
15 actions would be compatible with the policies and directives for terrestrial biological resources
16 contained in these federal laws.
- 17 • The *California Endangered Species Act*, *California Native Plant Protection Act*, *Porter-Cologne*
18 *Water Quality Control Act*, and *Natural Communities Conservation Planning Act* are state laws
19 that have relevance to the management and protection of terrestrial biological resources in the
20 study area. Each of these laws promotes consideration of wildlife and native vegetation either
21 through comprehensive planning or through regulation of activities that may have an adverse
22 effect on the terrestrial and aquatic natural resources of the state. The BDCP, which is the basis
23 for Alternative 9, contains biological goals and objectives that have been developed to promote
24 the species protection and natural resource conservation that are directed by these state laws.
25 Alternative 9 conservation actions would be compatible with the policies and directives
26 contained in these laws.
- 27 • The *Johnston-Baker-Andal-Boatwright Delta Protection Act of 1992 (Delta Protection Act)* and the
28 *Sacramento-San Joaquin Delta Reform Act*, which updated the Delta Protection Act, promote the
29 maintenance and protection of natural resources and the protection of agricultural land uses in
30 the Delta's primary zone through the goals and policies contained in the 2009 updated Land Use
31 and Resources Management Plan (LURMP). While nothing in the LURMP is binding on state
32 agencies that are BDCP proponents, the LURMP does promote restoration and enhancement of
33 habitats for the terrestrial and aquatic species of the Delta on public land. The BDCP biological
34 goals and objectives would be compatible with these LURMP goals (Delta Protection
35 Commission 2010).
- 36 • The *Suisun Marsh Preservation Act* of 1974 was designed to protect the Suisun Marsh for long-
37 term use as wildlife habitat, with a goal of preserving and enhancing the quality and diversity of
38 the Marsh's aquatic and wildlife habitats. The BDCP and its plans for protection and restoration
39 of tidal marsh habitats in Suisun Marsh would be compatible with the intent of the Suisun Marsh
40 Preservation Act.

41 **Plans, Programs, and Policies**

- 42 • *The Delta Plan*, which was developed by the Delta Stewardship Council in compliance with the
43 2009 Sacramento-San Joaquin Delta Reform Act, is mandated to achieve two co-equal goals:
44 provide for a more reliable water supply for California and protect, restore, and enhance the

Delta ecosystem. The co-equal goals are to be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place. The BDCP is intended to become a component of the Delta Plan. The Delta Stewardship Council would determine whether the BDCP is compatible with the goals and objectives of the Delta Plan prior to its incorporation into the Plan. The compatibility of the BDCP with the Delta Plan is considered in detail in Section 13.2.2.2 of Chapter 13, *Land Use*.

- *California Wetlands Conservation Policy*, which was adopted by Executive Order in 1993, promotes a long-term gain in the quantity, quality and permanence of wetlands acreages and values in California. Alternative 9 conservation measures that provide for a significant expansion of wetland acreage and quality in the Delta and Suisun Marsh are compatible with the intent of the California Wetlands Conservation Policy.
- *The North American Waterfowl Management Plan (NAWMP)* and *Central Valley Joint Venture (CVJV)* strive to maintain and expand wetlands and uplands for waterfowl and shorebirds in the major basins of California's Central Valley. The NAWMP is a management plan jointly approved by the United States and Canada in 1986. It contains general guidance from the principal wildlife management agencies of the two countries for sustaining abundant waterfowl populations by conserving landscapes through self-directed partnerships (joint ventures) that are guided by sound science. The CVJV is the joint venture established for overseeing NAWMP implementation in the Central Valley. The CVJV is made up of 21 conservation organizations, state and federal government agencies, and one corporation that have formed a partnership to improve the habitat conditions for breeding and nonbreeding waterfowl, breeding and nonbreeding shorebirds, waterbirds, and riparian-dependent songbirds in the Central Valley. The CVJV's 2006 Implementation Plan (Central Valley Joint Venture 2006) establishes conservation objectives and priorities for these bird groups within the basins of the Central Valley. The BDCP Plan Area includes all or portions of three Implementation Plan basins—the Delta, Yolo and Suisun basins. The 2006 Implementation Plan contains basin-specific objectives for wetland restoration, protection of existing wetland habitats, wetland enhancement, adequate power and water supplies for wetland management, agricultural land enhancement, farmland easements that maintain waterfowl food resources on agricultural land, and farmland easements that buffer existing wetlands from urban and residential growth.

Implementation of the Alternative 9 conservation measures would result in significant reductions in cultivated land and managed wetland acreage in the Delta, Yolo and Suisun basins; however, significant increases in tidal and nontidal wetlands in these basins would be another result. Because of the large conversion of managed wetland in the Suisun basin, the BDCP has included a large managed wetland conservation and enhancement goal for this area. For the Suisun basin conversions to be compatible with the 2006 Implementation Plan goals, this EIR/EIS has added mitigation that would require food production studies and adaptive management to ensure that the Suisun basin would continue to provide the waterfowl and shorebird habitat envisioned in the Implementation Plan.

- *Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan*, *Cosumnes River Preserve Management Plan*, *Brannan Island and Franks Tract State Recreation Areas General Plan*, *Yolo Bypass Wildlife Area Land Management Plan*, *Grizzly Island Wildlife Area Management Plan*, and the *Lower Sherman Island Wildlife Area Land Management Plan* are primarily designed to preserve and enhance the natural resource and recreation qualities of these areas. Implementing Alternative 9, especially construction of CM1 and CM2 facilities, and land modification associated with CM4 restoration activities, could create temporary disruptions to

1 the terrestrial biological resource management activities in these management areas. The
2 ultimate goals of aquatic and terrestrial habitat enhancement and restoration contained in the
3 BDCP would be compatible with the long-term management goals of these areas. Proposed
4 restoration areas in the Yolo Bypass, on Sherman Island, and in Suisun Marsh would be designed
5 to be compatible with and to complement the current management direction for these areas and
6 would be required to adapt restoration proposals to meet current policy established for
7 managing these areas.

- 8 • *Suisun Marsh Preservation Agreement* and *Suisun Marsh Plan* are the most recent efforts by the
9 state and federal agencies responsible for Suisun Marsh (the Marsh) to maintain its long-term
10 viability as managed wetlands and wildlife habitat, consistent with the Suisun Marsh
11 Preservation Act. The SMPA was signed in 1987 and modified in 2005 by DWR, CDFW,
12 Reclamation and the Suisun Resource Conservation District to establish the mitigation approach
13 in the Marsh for effects of operating the SWP and CVP. The primary concerns were the effects of
14 CVP and SWP Delta diversions on salinity in the Marsh. The SMPA focused on ways to ensure
15 adequate water quality and quantity for the managed wetlands and wildlife habitats in the
16 Marsh to assure equal waterfowl values in the Marsh. The Suisun Marsh Plan, for which a Final
17 EIS/EIR was released in 2010 by these agencies, provides for restoration of tidal marsh habitat
18 and enhancement of managed wetland in the Marsh, maintenance of waterfowl hunting and
19 recreational opportunities in the Marsh, maintenance and improvement of the Marsh levee
20 system, and protection and enhancement of water quality for beneficial uses of the Marsh. An
21 integral component of the Suisun Marsh Plan is balancing continued managed wetland
22 operation with new tidal wetland restoration to provide improved and greater habitat for fish
23 and wildlife species. The Suisun Marsh Plan is a programmatic, long-term plan and does not
24 include specific projects, project proponents, or funding mechanisms. However, the Suisun
25 Marsh Plan relies on tidal restoration to allow for managed wetland operations to continue. The
26 BDCP would provide a funding mechanism and increased management potential relative to
27 existing and restored habitats, assisting the Suisun Marsh Plan in meeting its broader ecological
28 goals, consistent with long-term operation of the SWP and CVP water conveyance facilities. The
29 conservation actions contained in the BDCP, which are designed to ensure the long-term
30 protection and recovery of special-status fish and wildlife species dependent on the Marsh,
31 would be compatible with the water quality and habitat restoration goals of the SMPA and
32 Suisun Marsh Plan.
- 33 • *California Aquatic Invasive Species Management Plan* does not address terrestrial invasive
34 species. Implementation of the Plan's long-term control and management objectives affect
35 terrestrial species that utilize study area aquatic habitats. These effects are positive in that Plan
36 objectives are to control and remove invasive aquatic species that are detrimental to native
37 aquatic and terrestrial species. Implementation of BDCP's conservation actions would be
38 undertaken with the goal of avoiding any further spread of aquatic invasive species. Alternative
39 9 would, therefore, be compatible with the objectives of the California Aquatic Invasive Species
40 Management Plan.
- 41 • *Habitat Conservation Plans* and *Natural Community Conservation Plans* are the subject of a
42 detailed analysis at the end of this chapter. The analysis considers the compatibility of the BDCP
43 with all HCPs and NCCPs that share planning area with the BDCP Plan Area.

1 **Executive Orders**

- 2 • *Executive Order 11990: Protection of Wetlands* requires all federal agencies to consider wetland
3 protection in their policies and actions. The BDCP proposes to protect, enhance and expand the
4 wetlands of the Plan Area, and, therefore, would be compatible with Executive Order 11990.
- 5 • *Executive Order 13112: Invasive Species* directs federal agencies to prevent and control the
6 introduction and spread of invasive species in a cost-effective and environmentally sound
7 manner. Alternative 9 construction and restoration actions have the potential to both introduce
8 and spread invasive species in the study area. Implementation of mitigation measures described
9 in this chapter would be capable of making Alternative 9 implementation compatible with
10 Executive Order 13112.
- 11 • *Executive Order 113443: Facilitation of Hunting Heritage and Wildlife Conservation* directs
12 federal agencies whose activities affect public land management, outdoor recreation, and
13 wildlife management to facilitate the expansion and enhancement of hunting opportunities, and
14 the management of game species and their habitat. Alternative 9 conservation measures that
15 involve conversion of cultivated land and managed wetland to tidal and nontidal wetlands and
16 other natural communities would conflict with the hunting expansion and enhancement aspects
17 of this executive order. Refer to Chapter 15, *Recreation*, for a detailed analysis of the effects of
18 alternatives on hunting opportunities. The habitat protection and expansion conservation
19 measures of Alternative 9 would be compatible with the executive order's goal of facilitating the
20 management of habitats for some game species.

21 **CEQA Conclusion:** The potential plan and policy incompatibilities of implementing Alternative 9
22 identified in the analysis above indicate the potential for a physical consequence to the environment.
23 The primary physical consequence of concern is the conversion of large acreages of cultivated land
24 and managed wetland to natural wetland and riparian habitat in the Plan Area. The physical effects
25 are discussed in the Shorebirds and Waterfowl analysis above and no additional CEQA conclusion is
26 required related to the compatibility of the alternative with relevant plans and polices. The reader is
27 referred to Section 13.2.3 of Chapter 13, *Land Use*, for a further discussion of the responsibilities of
28 state and federal agencies to comply with local regulations and the relationship between plan and
29 policy consistency and physical consequences to the environment.

12.3.4 Effects and Mitigation Approaches—Alternatives 4A, 2D, and 5A

12.3.4.1 No Action Alternative Early Long-Term

Effects of the No Action Alternative (ELT) as considered for the purposes of Alternative 4A, 2D, and 5A would be similar to the effects described for the No Action Alternative (LLT), except that the shorter timeframe would reduce the effects of many projects and programs listed in Table 12-7 in Section 12.3.3.1. The reduced timeframe would also lessen the potential effects of sea level rise and would reduce, but not eliminate, the risks to biological resources from flood- or seismic-related failure of Delta levees.

Implementation of the ongoing habitat expansion projects is likely to show significant progress in the ELT time period as efforts are made to counteract the terrestrial habitat losses associated with land conversion (primarily agricultural) and urban and infrastructure development in a timely fashion. These habitat expansions would be expected to counteract any transportation- or water-related infrastructure development or urban development in the study area because of the tight controls on these developments in the Delta. Management of the state and federal wildlife areas and the private wetlands would continue to emphasize a balance of protection for sensitive plant and wildlife species and the need for recreation opportunities and long-term agricultural viability. The number of habitat enhancement projects and the acreage of natural habitats restored and protected would likely be lower than what would be expected over a 50-year timeframe. Ongoing water management activities under the No Action Alternative (ELT) would not be likely to substantially modify the natural communities of the study area during the ELT time period. Most water management strategies being developed by state and federal water management agencies are designed to improve the conditions for special-status fish, wildlife, and plants in the study area.

The potential for adverse effects on biological resources from gradual sea level rise and from levee system failures due to major flooding episodes or seismic activity would be significantly reduced under No Action Alternative (ELT), compared with the 50-year timeframe under No Action Alternative (LLT). The extent of marsh habitat conversion would be lessened on the periphery of Suisun Marsh and the Yolo Basin, and along the Delta waterways, with a lower rise in sea level. The risk of habitat destruction from levee failure and subsequent flooding of riparian and cropland areas on Delta islands due to major flood events or seismic shaking would be reduced in the ELT. However, over the long-term, the risk would remain that major areas of cropland and adjacent natural habitats could be lost due to the poor condition of many Delta levees.

NEPA Effects: Even though the No Action Alternative (ELT) time period is significantly reduced from the No Action Alternative (LLT) time period, the overall direction of existing and ongoing programs and policies that influence land conversion and land management in the study area would continue to be toward maintaining the mix of agricultural, recreational, water management, and wildlife uses in the Delta, Yolo Bypass, and Suisun Marsh. Some actions under the No Action Alternative (ELT) will expand natural and manmade terrestrial and wetland habitats that will either benefit or have no effect on the special-status and common plants and wildlife in the study area. These activities may also result in impacts on some species but the overall benefit of these activities would not be adverse for many species by the ELT time period (see Table ES-8 in the *Executive Summary*). The potential will remain, however, for long-term trends in levee deterioration, global climate change,

1 and seismic activity that could damage levees and result in significant changes in natural
2 communities and cultivated lands.

3 **CEQA Conclusion:** Under the No Action Alternative (ELT) existing plans, programs and policies
4 would affect terrestrial biological resources in the study area in a mostly positive way. Risks
5 associated with natural processes that could damage or destroy Delta levees that protect both
6 natural habitats and agricultural lands will continue, only over a shorter time period than under the
7 No Action Alternative (LLT). The risks include flood-related levee deterioration, potential for
8 seismically induced levee collapse, and, to a lesser extent, sea level rise associated with climate
9 change. These risks, even over the shorter time period, if unchecked, could result in a net reduction
10 in sensitive natural communities and special-status species. Many plans and programs call for
11 expanded development and management of wetland and riparian habitats and increased
12 management of cultivated lands for joint benefit to the farmer and wildlife. The implementation of
13 these plans and programs would also likely impact some terrestrial biological resources, although
14 on balance these impacts would be offset by habitat improvements and would result in less-than-
15 significant impacts under CEQA by the ELT time period (see Table ES-8 in the *Executive Summary*).
16 For some species, especially those that occur in the study area at higher elevations, there may be no
17 impact from these plans and programs.

12.3.4.2 Alternative 4A—Dual Conveyance with Modified Pipeline/Tunnel and Intakes 2, 3, and 5 (9,000 cfs; Operational Scenario H)

Natural Communities

Tidal Perennial Aquatic

Construction, operation, maintenance, and management associated with the implementation of Alternative 4A would have no long-term adverse effects on the habitats associated with the tidal perennial aquatic natural community. Initial development and construction of water conveyance facilities would result in both permanent and temporary removal or modification of this community (see Table 12-4A-1). A small amount of this community could also be lost to channel margin habitat enhancement (Environmental Commitment 6).

Table 12-4A-1. Changes in Tidal Perennial Aquatic Natural Community Associated with Alternative 4A (acres)

Project Component	Permanent	Temporary
Water Conveyance Facilities	280	2,019 ^b
Environmental Commitment 4 ^a	0	0
Environmental Commitment 7 ^a	0	0
Environmental Commitment 10 ^a	0	0
TOTAL IMPACTS	280	2,019

^a See discussion below for a description of applicable Environmental Commitments.
^b The large acreage of tidal perennial aquatic habitat affected by Alternative 4A is related primarily to dredging of Clifton Court Forebay; the habitat would not be permanently removed, it would be expanded.

Impact BIO-1: Changes in Tidal Perennial Aquatic Natural Community as a Result of Implementing Alternative 4A

Construction and land grading activities that would accompany the implementation of water conveyance facilities for Alternative 4A would permanently affect an estimated 280 acres and temporarily remove 2,019 acres of tidal perennial aquatic natural community in the study area. The large temporary loss of this natural community would be primarily related to dredging of Clifton Court Forebay (1,931 acres). These modifications represent less than 3% of the 86,263 acres of the community that is mapped in the study area. The permanent and temporary effects would occur during the construction period for Alternative 4A as water conveyance facilities are developed. An undetermined amount of this natural community could also be affected by channel margin habitat enhancement along the major Delta waterways. The 450-acre expansion of Clifton Court Forebay during the water conveyance facility construction would offset the permanent losses.

The effects of water conveyance facilities and Environmental Commitment 6 are addressed below. A summary statement of impacts and NEPA and CEQA conclusions follows the individual environmental commitment discussion.

- 1 • *Water Facilities and Operation:* Construction of the Alternative 4A water conveyance facilities
2 would permanently remove 280 acres and temporarily disturb 2,019 acres of tidal perennial
3 aquatic community. Most of the permanent loss would occur where new facilities are
4 constructed at Clifton Court Forebay and where Intakes 2, 3, and 5 encroach on the Sacramento
5 River's east bank between Clarksburg and Courtland (see the Terrestrial Biology Mapbook for a
6 detailed view of proposed facilities overlain on natural community mapping). The footings and
7 the screens at the intake sites would be placed into the river margin and would displace
8 moderately deep to shallow, flowing open water with a mud substrate and very little aquatic
9 vegetation. Permanent losses would also occur where new control structures would be built into
10 the California Aqueduct and the Delta Mendota Canal adjacent to Clifton Court Forebay, where
11 Clifton Court Forebay levees are modified.
- 12 • The temporary effects on tidal perennial aquatic habitats would occur at numerous locations,
13 with the largest effect occurring at Clifton Court Forebay, where the entire forebay would be
14 dredged to provide additional storage capacity. Other temporary effects would occur in the
15 Sacramento River at Intakes 2, 3, and 5, and at temporary barge unloading facilities established
16 at four locations along the tunnel route. The barge unloading construction would temporarily
17 affect Snodgrass Slough just south of Hood, Potato Slough at the south end of Boldin Island,
18 Venice Reach of the San Joaquin River at the south end of Venice Island, Connection Slough at
19 the north end of Bacon Island, and Old River just south of its junction with North Victoria Canal.
20 In addition, temporary transmission lines have been identified as resulting in temporary
21 impacts; however, these areas will likely ultimately be avoided by spanning these areas of open
22 water. The details of these locations can be seen in the Terrestrial Biology Mapbook. These
23 losses would take place during the 14-year construction time period.
- 24 • *Environmental Commitment 6 Channel Margin Enhancement:* Channel margin habitat
25 enhancement could result in filling of small amounts of tidal perennial aquatic habitat along 4.6
26 miles of river and sloughs. The extent of this loss cannot be quantified at this time, but the
27 majority of the enhancement activity would be implemented on tidal perennial aquatic habitat
28 margins, including levees and channel banks. The improvements could be implemented on
29 sections of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter
30 Sloughs.

31 The following paragraphs summarize the effects discussed above and describe other project actions
32 that offset or avoid these effects. NEPA and CEQA impact conclusions are also included.

33 During the first 14 years of Alternative 4A implementation, the project would affect the tidal
34 perennial aquatic community through water conveyance facilities construction losses (280 acres
35 permanent and 2,019 acres temporary). These losses would occur primarily at Clifton Court Forebay
36 due to dredging, and along the Sacramento River at intake sites.

37 **NEPA Conclusion:** The construction losses of this special-status natural community would represent
38 an adverse effect if they were not offset by avoidance and minimization measures and restoration
39 actions associated with Alternative 4A environmental commitments. Loss of tidal perennial aquatic
40 natural community would be considered both a loss in acreage of a sensitive natural community and
41 a loss of waters of the United States as defined by Section 404 of the CWA. The largest loss would
42 occur at Clifton Court Forebay, and would be temporary. This tidal perennial habitat is of relatively
43 low value to special-status terrestrial species in the study area. The permanent expansion of the
44 Clifton Court Forebay aquatic habitat (approximately 450 acres) during the first 14 years of
45 Alternative 4A implementation would offset the permanent loss; the restoration of Clifton Court

1 Forebay aquatic habitat following construction-related dredging would offset the temporary project
2 effects. These actions would avoid any adverse effect. Typical project-level mitigation ratios (1:1 for
3 restoration) would indicate 2,299 acres of restoration would be needed to offset (i.e., mitigate) the
4 2,299 acres of effect (the total permanent and temporary effects listed in Table 12-4A-1) associated
5 with water conveyance facilities construction; however, as noted above, 1,931 acres of the
6 temporary impacts are associated with the dredging within the existing Clifton Court Forebay. The
7 forebay is an enclosed system that would prevent suspended sediments from spreading outside of
8 the area of disturbance, and the forebay would essentially revert back to pre-project conditions once
9 dredging is complete.

10 The alternative also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
11 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
12 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
13 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
14 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
15 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.
16 Therefore, changes in tidal perennial aquatic natural community as a result of implementing
17 Alternative 4A would not be adverse.

18 **CEQA Conclusion:** Alternative 4A would result in the loss, conversion, and temporary disturbance of
19 approximately 2,299 acres of tidal perennial aquatic natural community due to construction of the
20 water conveyance facilities. The construction losses would occur primarily at Clifton Court Forebay,
21 along the Sacramento River at intake sites, and along various Delta waterways at barge offloading
22 sites. The losses, conversions, and disturbance would be spread across the 14-year water
23 conveyance facilities construction period. These effects would be offset by planned restoration and
24 expansion of Clifton Court Forebay (a combined acreage of approximately 2,595) following project-
25 related dredging scheduled for the first 14 years of Alternative 4A implementation. AMM1, AMM2,
26 AMM6, AMM7, and AMM10 would also be implemented to minimize impacts. Because of these
27 offsetting restoration activities and AMMs, there would be no permanent loss of this sensitive
28 natural community and impacts would be less than significant. Typical project-level mitigation
29 ratios (1:1 for restoration) would indicate that 2,299 acres of restoration would be needed to offset
30 (i.e., mitigate) the 2,299 acres of loss, conversion, and disturbance. Impacts associated with changes
31 in tidal perennial aquatic natural community as a result of implementing Alternative 4A would be
32 less than significant. No mitigation is required.

33 **Impact BIO-2: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal** 34 **Perennial Aquatic Natural Community**

35 Alternative 4A would not result in periodic effects on the tidal perennial aquatic natural community
36 type.

37 **NEPA Effects:** No effect.

38 **CEQA Conclusion:** No impact.

39 **Impact BIO-3: Modification of Tidal Perennial Aquatic Natural Community from Ongoing** 40 **Operation, Maintenance and Management Activities**

41 Once the physical facilities associated with Alternative 4A are constructed and the stream flow
42 regime associated with changed water management is in effect, there would be new ongoing and

1 periodic actions associated with operation, maintenance and management of the water conveyance
 2 facilities and conservation lands that could affect tidal perennial aquatic natural community in the
 3 study area. The ongoing actions include diverting Sacramento River flows in the north Delta, and
 4 reduced diversion from south Delta channels. These actions are associated with water conveyance
 5 facilities. The periodic actions would involve access road and conveyance facility repair, vegetation
 6 management at the various water conveyance facilities, levee repair and replacement of levee
 7 armoring, channel dredging, and habitat enhancement in accordance with project mitigation
 8 requirements. The potential effects of these actions are described below.

- 9 • *Modified river flows upstream of and within the study area and reduced diversions from south*
 10 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
 11 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta
 12 channels (associated with Operational Scenario H) would not result in the permanent reduction
 13 in acreage of a sensitive natural community in the study area. Flow levels in the upstream rivers
 14 would not change such that the acreage of tidal perennial aquatic community would be reduced
 15 on a permanent basis. Some increases and some decreases would be expected to occur during
 16 some seasons and in some water-year types, but there would be no permanent loss. Similarly,
 17 increased diversions of Sacramento River flows in the north Delta would not result in a
 18 permanent reduction in tidal perennial aquatic community downstream of these diversions.
 19 Tidal influence on water levels in the Sacramento River and Delta waterways would continue to
 20 be dominant. Reduced diversions from the south Delta channels would not create a reduction in
 21 this natural community.

22 The periodic changes in flows in the Sacramento River, Feather River, and American River
 23 associated with Alternative 4A operations would affect salinity, water temperature, dissolved
 24 oxygen levels, turbidity, contaminant levels, and dilution capacity in these rivers and Delta
 25 waterways. These changes are discussed in detail in Chapter 8, *Water Quality*. Potentially
 26 substantial increases in electrical conductivity (salinity) are predicted for the Delta and Suisun
 27 Marsh as a result of increased export of Sacramento River water. These salinity changes are not
 28 expected to result in a permanent reduction in the acreage or value of tidal perennial aquatic
 29 natural community for terrestrial species in the study area.

- 30 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
 31 conveyance facilities and levees associated with Alternative 4A actions have the potential to
 32 require removal of adjacent vegetation and could entail earth and rock work in tidal perennial
 33 aquatic habitats. This activity could lead to increased soil erosion, turbidity and runoff entering
 34 tidal perennial aquatic habitats. These activities would be subject to normal erosion, turbidity
 35 and runoff control management practices, including those developed as part of *AMM2*
 36 *Construction Best Management Practices and Monitoring* and *AMM4 Erosion and Sediment*
 37 *Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic habitats would
 38 require use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed
 39 surfaces. Proper implementation of these measures would avoid permanent adverse effects on
 40 this community.
- 41 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
 42 treatment, would be a periodic activity associated with the long-term maintenance of water
 43 conveyance facilities and conservation sites. Use of herbicides to control nuisance vegetation
 44 could pose a long-term hazard to tidal perennial aquatic natural community at or adjacent to
 45 treated areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled
 46 runoff of contaminated stormwater onto the natural community, or direct discharge of

1 herbicides to tidal perennial aquatic areas being treated for invasive species removal.
2 Environmental commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan*
3 have been made part of the project to reduce hazards to humans and the environment from use
4 of various chemicals during maintenance activities, including the use of herbicides. These
5 commitments, including the commitment to prepare and implement spill prevention,
6 containment, and countermeasure plans and stormwater pollution prevention plans, are
7 described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*. Best management
8 practices, including control of drift and runoff from treated areas, and use of herbicides
9 approved for use in aquatic environments would also reduce the risk of affecting natural
10 communities adjacent to water conveyance features and levees associated with conservation
11 activities.

- 12 ● *Channel dredging*. Long-term operation of the Alternative 4A intakes on the Sacramento River
13 and at Clifton Court Forebay would include periodic dredging of sediments that might
14 accumulate in front of intake screens. The dredging would occur in tidal perennial aquatic
15 natural community and would result in short-term increases in turbidity and disturbance of the
16 substrate. These conditions would not eliminate the community, but would diminish its value
17 for special-status and common species that rely on it for movement corridor or foraging area.
18 The individual species effects are discussed in the *Wildlife Species* section.
- 19 ● *Habitat enhancement*. Alternative 4A includes a long-term management element for the natural
20 communities within the study area (Environmental Commitment 11). For tidal perennial aquatic
21 natural community, a management plan would be prepared that specifies actions to improve the
22 value of the habitats for species. Actions would include control of invasive nonnative plant and
23 animal species, restrictions on vector control and application of herbicides, and maintenance of
24 infrastructure that would allow for movement through the community. The enhancement efforts
25 would improve the long-term value of this community for both special-status and common
26 species.

27 The various operations and maintenance activities described above could alter acreage of tidal
28 perennial aquatic natural community in the study area through changes in flow patterns and
29 changes in water quality. Activities could also introduce sediment and herbicides that would reduce
30 the value of this community to common and sensitive plant and wildlife species. Other periodic
31 activities associated with the alternative, including management, protection and enhancement
32 actions associated with *Environmental Commitment 3 Natural Communities Protection and*
33 *Restoration* and *Environmental Commitment 11 Natural Communities Enhancement and Management*,
34 would be undertaken to enhance the value of the community. While some of these activities could
35 result in small reductions in acreage, these reductions would be greatly offset by restoration
36 activities planned as part of *Environmental Commitment 4 Tidal Natural Communities Restoration*,
37 and the restoration and expansion of this community at Clifton Court Forebay. The management
38 actions associated with levee repair, periodic dredging and control of invasive plant species would
39 also result in a long-term benefit to the species associated with tidal perennial aquatic habitats by
40 improving water movement.

41 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net
42 permanent reduction in this sensitive natural community within the study area. Therefore, there
43 would be no adverse effect on the tidal perennial aquatic natural community.

44 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4A would
45 have the potential to create minor losses in total acreage of tidal perennial aquatic natural

1 community in the study area, and could create temporary increases in turbidity and sedimentation.
2 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
3 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize
4 these impacts, and other operations and maintenance activities, including management, protection
5 and enhancement actions associated with *Environmental Commitment 3 Natural Communities*
6 *Protection and Restoration* and *Environmental Commitment 11 Natural Communities Enhancement*
7 *and Management*, would create positive effects, including improved water movement in these
8 habitats. Long-term restoration activities associated with *Environmental Commitment 4 Tidal*
9 *Natural Communities Restoration* and enlargement of Clifton Court Forebay would greatly expand
10 this natural community in the study area. Ongoing operation, maintenance and management
11 activities would not result in a net permanent reduction in the acreage or value of this sensitive
12 natural community within the study area. Therefore, there would be a less-than-significant impact
13 on the tidal perennial aquatic natural community.

14 **Tidal Brackish Emergent Wetland**

15 Construction associated with Alternative 4A water conveyance facilities and the alternative's
16 Environmental Commitments would not affect the tidal brackish emergent wetland natural
17 community. Operation, maintenance, and management activities associated with the alternative
18 could result in minor changes in total acreage of tidal brackish emergent wetland natural
19 community in the study area, and could create temporary increases in turbidity and sedimentation.

20 As explained below, with the restoration and enhancement of tidal marsh as part of Alternative 4A,
21 in addition to implementation of AMMs, impacts on this natural community would not be adverse
22 for NEPA purposes and would be less than significant for CEQA purposes.

23 **Impact BIO-4: Changes in Tidal Brackish Emergent Wetland Natural Community as a Result of** 24 **Implementing Alternative 4A**

25 No tidal brackish emergent wetland would be lost or converted under Alternative 4A.

26 *NEPA Effects:* No effect.

27 *CEQA Conclusion:* No impact.

28 **Impact BIO-5: Modification of Tidal Brackish Emergent Wetland Natural Community from** 29 **Ongoing Operation, Maintenance and Management Activities**

30 Once the physical facilities associated with water conveyance facilities and Environmental
31 Commitment 4 of Alternative 4A are constructed and the water management practices associated
32 with changed reservoir operations, diversions from the north Delta, and marsh restoration are in
33 effect, there would be new ongoing and periodic actions that could affect tidal brackish emergent
34 wetland natural community in the study area. The ongoing actions include water releases and
35 diversions, access road and levee repair, and replacement of levee armoring, and habitat
36 enhancement in accordance with natural community management plans. The potential effects of
37 these actions are described below.

- 38 • *Modified river flows upstream of and within the study area and reduced diversions from south*
39 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
40 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta
41 channels (associated with Operational Scenario H) would not result in the permanent reduction

1 in acreage of tidal brackish emergent wetland natural community in the study area. Flow levels
 2 in the upstream rivers would not directly affect this natural community because it does not exist
 3 upstream of the Delta. Increased diversions of Sacramento River flows in the north Delta would
 4 not result in a permanent reduction in tidal brackish emergent wetland downstream of these
 5 diversions. Salinity levels in Suisun Marsh would be similar or less relative to the No Action
 6 Alternative (ELT). There would be no increase in the long-term average electrical conductivity
 7 at modeled Suisun Marsh locations, and for some locations long-term average electrical
 8 conductivity would decrease (see Chapter 8, *Water Quality*); therefore, there would not be a
 9 change the acreage of brackish marsh. This natural community persists in an environment that
 10 experiences natural fluctuations in salinity due to tidal ebb and flow. Reduced diversions from
 11 the south Delta channels would not create a reduction in this natural community.

12 • The increased diversion of Sacramento River flows in the north Delta would result in reductions
 13 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The
 14 reduction is estimated to be approximately 9% of the river's current sediment load for
 15 Alternative 4A, which would have a north Delta diversion capacity of 9,000 cfs under
 16 Operational Scenario H (see Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3, *Summary of*
 17 *Changes to Sediment Supply in the Plan Area Due to BDCP Shift in Export Location and Volume*, in
 18 the BDCP for a detailed analysis of this issue). This would contribute to a decline in sediment
 19 reaching the Delta and Suisun Marsh that has been occurring over the past 50-plus years due to
 20 a gradual depletion of sediment from the upstream rivers. The depletion has been caused by a
 21 variety of factors, including depletion of hydraulic mining sediment in upstream areas, armoring
 22 of river channels and a cutoff of sediment due to dam construction on the Sacramento River and
 23 its major tributaries (Wright and Schoellhamer 2004; Barnard et al. 2013).

24 • Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on
 25 tidal marsh, including tidal brackish emergent wetland. Sediment trapped by the marsh
 26 vegetation allows the emergent plants to maintain an appropriate water depth as water levels
 27 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The project
 28 proponents have incorporated an environmental commitment (see Appendix 3B, Section
 29 3B.2.18, *Disposal and Reuse of Spoil, Reusable Tunnel Material and Dredged Material*) into the
 30 project that would lessen this potential effect. The Sacramento River water diverted at north
 31 Delta intakes would pass through sedimentation basins before being discharged to water
 32 conveyance structures. The commitment states that sediment collected in these basins would be
 33 periodically removed and reused, to the greatest extent feasible, in the study area for a number
 34 of purposes, including marsh restoration, levee maintenance, subsidence reversal, flood
 35 response, and borrow area fill. The portion of the sediment re-introduced to the Delta and
 36 estuary for marsh restoration would remain available for marsh accretion. With this
 37 commitment to reuse in the study area, the removal of sediment at the north Delta intakes
 38 would not result in a net reduction in the acreage and value of this special-status marsh
 39 community. The effect would not be adverse (NEPA) and would be less than significant (CEQA).

40 • *Access road and levee repair.* Periodic repair of access roads and levees associated with
 41 Alternative 4A actions have the potential to require removal of adjacent vegetation and could
 42 entail earth and rock work in tidal brackish emergent wetland habitats. This activity could lead
 43 to increased soil erosion, turbidity and runoff entering these habitats. The activities would be
 44 subject to normal erosion, turbidity and runoff control management practices, including those
 45 developed as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4*
 46 *Erosion and Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within

1 aquatic habitats would require use of sediment and turbidity barriers, soil stabilization and
2 revegetation of disturbed surfaces. Proper implementation of these measures would avoid
3 permanent adverse effects on this community.

- 4 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
5 treatment (Environmental Commitment 11), would be a periodic activity associated with the
6 long-term maintenance of restoration sites. Use of herbicides to control nuisance vegetation
7 could pose a long-term hazard to tidal brackish emergent wetland natural community at or
8 adjacent to treated areas. The hazard could be created by uncontrolled drift of herbicides,
9 uncontrolled runoff of contaminated stormwater onto the natural community, or direct
10 discharge of herbicides to wetland areas being treated for invasive species removal.
11 Environmental commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan*
12 have been made part of Alternative 4A to reduce hazards to humans and the environment from
13 use of various chemicals during maintenance activities, including the use of herbicides. These
14 commitments, including the commitment to prepare and implement spill prevention,
15 containment, and countermeasure plans and stormwater pollution prevention plans, are
16 described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*. Best management
17 practices, including control of drift and runoff from treated areas, and use of herbicides
18 approved for use in aquatic environments would also reduce the risk of affecting natural
19 communities adjacent to levees associated with tidal wetland restoration activities.
- 20 • *Habitat enhancement.* Alternative 4A includes a long-term management element for the natural
21 communities within the study area (Environmental Commitment 11). For tidal brackish
22 emergent wetland natural community, a management plan would be prepared that specifies
23 actions to improve the value of the habitats for special-status species. Actions would include
24 control of invasive nonnative plant and animal species, fire management, restrictions on vector
25 control and application of herbicides, and maintenance of infrastructure that would allow for
26 movement through the community. The enhancement efforts would improve the long-term
27 value of this community for both special-status and common species.

28 The various operations and maintenance activities described above could alter acreage and value of
29 tidal brackish emergent wetland natural community in the study area through water operations,
30 levee and road maintenance, and vegetation management in or adjacent to this community.
31 Activities could also introduce sediment and herbicides that would reduce the value of this
32 community to common and sensitive plant and wildlife species. Other periodic activities associated
33 with the alternative, including management, protection and enhancement actions associated with
34 *Environmental Commitment 3 Natural Communities Protection and Restoration* and *Environmental*
35 *Commitment 11 Natural Communities Enhancement and Management*, would be undertaken to
36 enhance the value of the community. While some of these activities could result in small changes in
37 acreage, these changes would be greatly offset by restoration activities planned as part of
38 *Environmental Commitment 4 Tidal Natural Communities Restoration*. The management actions
39 associated with levee repair and control of invasive plant species would also result in a long-term
40 benefit to the species associated with tidal brackish emergent wetland habitats by improving water
41 movement.

42 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
43 Alternative 4A would not result in a net permanent reduction in the tidal brackish emergent wetland
44 natural community within the study area. There would be no adverse effect on the tidal brackish
45 emergent wetland natural community.

1 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4A would
 2 have the potential to create minor changes in total acreage of tidal brackish emergent wetland
 3 natural community in the study area, and could create temporary increases in turbidity and
 4 sedimentation. The activities could also introduce herbicides periodically to control nonnative,
 5 invasive plants. Implementation of environmental commitments and AMM2, AMM4, and AMM5
 6 would minimize these impacts, and other operations and maintenance activities, including
 7 management, protection and enhancement actions associated with *Environmental Commitment 3*
 8 *Natural Communities Protection and Restoration* and *Environmental Commitment 11 Natural*
 9 *Communities Enhancement and Management*, would create positive effects, including improved
 10 water movement in these habitats. Restoration activities associated with *Environmental*
 11 *Commitment 4 Tidal Natural Communities Restoration* would expand this natural community in the
 12 study area. Ongoing operation, maintenance and management activities would not result in a net
 13 permanent reduction in this sensitive natural community within the study area. Therefore, there
 14 would be a less-than-significant impact.

15 **Tidal Freshwater Emergent Wetland**

16 Construction, operation, maintenance and management associated with the Environmental
 17 Commitments of Alternative 4A would have no long-term adverse effects on the habitats associated
 18 with the tidal freshwater emergent wetland natural community. Initial development and
 19 construction of water conveyance facilities would result in both permanent and temporary removal
 20 of small acreages of this community (see Table 12-4A-2). Small areas of this community could also
 21 be lost to the development of channel margin habitat associated with Environmental Commitment 6.

22 As explained below, with the restoration and enhancement of tidal habitat, in addition to
 23 implementation of AMMs, impacts on this natural community would not be adverse for NEPA
 24 purposes and would be less than significant for CEQA purposes.

25 **Table 12-4A-2. Changes in Tidal Freshwater Emergent Wetland Natural Community Associated**
 26 **with Alternative 4A (acres)^a**

Project Component	Permanent	Temporary
Water Conveyance Facilities	1	10
Environmental Commitment 4 ^a	0	0
Environmental Commitment 7 ^a	0	0
Environmental Commitment 10 ^a	0	0
TOTAL IMPACTS	1	10

^a See discussion below for a description of applicable Environmental Commitments.

27

28 **Impact BIO-6: Changes in Tidal Freshwater Emergent Wetland Natural Community as a Result**
 29 **of Implementing Alternative 4A**

30 Construction and land grading activities that would accompany the implementation of water
 31 conveyance facilities for Alternative 4A would permanently eliminate an estimated 1 acre and
 32 temporarily remove 10 acres of tidal freshwater emergent wetland natural community in the study
 33 area. These modifications represent less than 1% of the 8,856 acres of the community that is
 34 mapped in the study area. The majority of the permanent and temporary losses would happen
 35 during the first 14 years of Alternative 4A implementation, as water conveyance facilities are

1 constructed. Smaller areas of this natural community could be affected by levee breaching, grading,
2 and contouring associated with Environmental Commitment 4 and Environmental Commitment 6
3 restoration activities. Natural communities restoration would add at least 295 acres of tidal wetland
4 during the course of project restoration activities, which would expand the area of that habitat and
5 offset the losses.

6 The individual effects of water conveyance facilities, Environmental Commitment 4, and
7 Environmental Commitment 6 are addressed below. A summary statement of the impacts and NEPA
8 and CEQA conclusions follows the Environmental Commitment discussion.

- 9 • *Water Facilities and Operation:* Construction of the Alternative 4A water conveyance facilities
10 would permanently remove 1 acre and temporarily remove 10 acres of tidal freshwater
11 emergent wetland community. Most of the loss would occur along rivers and canals in the
12 central Delta from barge unloading facility construction (Old River on the east side of Victoria
13 Island and Connection Slough at the north end of Bacon Island), and from transmission line
14 construction (San Joaquin River and Potato Slough at the south and north ends of Venice Island,
15 Connection Slough at the north end of Bacon Island, and Railroad Slough at the north end of
16 Woodward Island; see Terrestrial Biology Mapbook). These losses would take place during the
17 water conveyance facilities construction period.
- 18 • There is the potential for increased nitrogen deposition associated with construction vehicles
19 during the construction phase of water conveyance facilities. Appendix 5.J, Attachment 5J.A,
20 *Construction-Related Nitrogen Deposition on BDCP Natural Communities*, of the BDCP addresses
21 this issue in detail. It has been concluded that this potential deposition would pose a low risk of
22 changing tidal freshwater emergent wetland natural community because the construction would
23 occur primarily downwind of the natural community and the construction would contribute a
24 negligible amount of nitrogen to regional projected emissions. No adverse effect is expected.
- 25 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* The restoration activities
26 associated with Environmental Commitment 4 would result in other effects that could alter the
27 habitat value of tidal freshwater emergent wetland. Disturbances associated with levee
28 breaching and grading or contouring would increase opportunities for the introduction or
29 spread of invasive species. Implementation of Environmental Commitment 11 would limit this
30 risk through invasive species control and wetland management and enhancement activities to
31 support native species. Flooding of dry areas for tidal marsh creation could also increase the
32 bioavailability of methylmercury, especially in the Cache Slough and Cosumnes/Mokelumne
33 ROAs. Site-specific conditions would dictate the significance of this hazard to marsh vegetation
34 and associated wildlife. A detailed review of the methylmercury issues associated with
35 implementation of Alternative 4A is contained in Appendix 11F, *Substantive BDCP Revisions*.
36 Site-specific restoration plans that address the creation and mobilization of mercury, and
37 monitoring and adaptive management as described in *Environmental Commitment 12*
38 *Methylmercury Management*, would be available to address the uncertainty of methylmercury
39 levels in restored tidal marsh. Water temperature fluctuations in newly created marsh is also an
40 issue of concern that is difficult to quantify at the current stage of restoration design. None of
41 these effects is expected to limit the extent or value of tidal freshwater emergent wetland in the
42 study area.
- 43 • *Environmental Commitment 6 Channel Margin Enhancement:* Channel margin habitat
44 enhancement could result in filling of small amounts of tidal freshwater emergent wetland
45 habitat along 4.6 miles of river and sloughs. The extent of this loss cannot be quantified at this

1 time, but the majority of the enhancement activity would occur on narrow strips of habitat,
2 including levees and channel banks. The improvements could occur within the study area on
3 sections of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter
4 Sloughs.

5 The following paragraphs summarize the combined effects discussed above and describe other
6 Alternative 4A environmental commitments that offset or avoid these effects. NEPA and CEQA
7 impact conclusions are also included.

8 During the construction phase of Alternative 4A, the project would affect the tidal freshwater
9 emergent wetland natural community through water conveyance facilities construction losses (1
10 acre permanent and 10 acres temporary). These losses would occur in the central Delta from
11 construction of barge unloading facilities and transmission lines on the fringes of Venice, Bacon and
12 Woodward Islands, and in various locations within the Yolo Bypass and the tidal restoration ROAs.
13 An undetermined acreage would also be affected through channel margin habitat creation
14 (Environmental Commitment 6) along the major Delta waterways.

15 The construction losses of this special-status natural community would represent an adverse effect
16 if they were not offset by avoidance and minimization measures and restoration actions associated
17 with Alternative 4A Environmental Commitments. Loss of tidal freshwater emergent wetland
18 natural community would be considered both a loss in acreage of a sensitive natural community and
19 a loss of wetland as defined by Section 404 of the CWA. However, the creation of 295 acres of tidal
20 wetland as part of Environmental Commitment 4 during the construction phase of Alternative 4A
21 would more than offset this loss, avoiding any adverse effect. Typical project-level mitigation ratios
22 (1:1 for restoration) would indicate that 11 acres of restoration would be needed to offset (i.e.,
23 mitigate) the 11 acres of loss (the total permanent and temporary effects listed in Table 12-4A-2).

24 Alternative 4A also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
25 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
26 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
27 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas.
28 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in
29 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

30 **NEPA Effects:** The creation of 295 acres of tidal wetland as part of Environmental Commitment 4
31 during the construction phase of Alternative 4A would more than offset the construction and
32 restoration effects of implementing water conveyance facilities and Environmental Commitment 6,
33 avoiding any adverse effect. Because of the 295 acres of tidal wetland restoration that would occur
34 as part of Alternative 4A, the project would not result in a net long-term reduction in the acreage of
35 a sensitive natural community; the effect would not be adverse.

36 **CEQA Conclusion:** Alternative 4A would result in the loss of approximately 11 acres of tidal
37 freshwater emergent wetland natural community (permanent and temporary) due to construction
38 of the water conveyance facilities. The construction losses would occur in primarily in the central
39 Delta on the fringes of Venice, Bacon and Victoria Islands, and in the Yolo Bypass and various tidal
40 restoration ROAs. An unknown amount of tidal freshwater emergent wetland could also be lost to
41 channel margin habitat creation (Environmental Commitment 6). The losses would be spread across
42 the Alternative 4A construction timeframe and would be offset by planned restoration of 295 acres
43 of tidal wetland scheduled for the first 14 years of Alternative 4A implementation (Environmental
44 Commitment 4). AMM1, AMM2, AMM6, AMM7, and AMM10 would also be implemented to minimize

1 impacts. Because of these offsetting restoration activities and AMMs, impacts would be less than
2 significant. Typical project-level mitigation ratios (1:1 for restoration) would indicate that 11 acres
3 of restoration would be needed to offset (i.e., mitigate) the 11 acres of loss. The restoration would be
4 initiated at the beginning of Alternative 4A implementation to minimize any time lag in the
5 availability of this habitat to special-status species, and would result in a net gain in acreage of this
6 sensitive natural community. The impact would be less than significant. No mitigation is required.

7 **Impact BIO-7: Increased Frequency, Magnitude and Duration of Periodic Inundation of Tidal**
8 **Freshwater Emergent Wetland Natural Community**

9 Alternative 4A would not result in periodic effects on the tidal freshwater emergent wetland natural
10 community type.

11 **NEPA Effects:** No effect.

12 **CEQA Conclusion:** No impact.

13 **Impact BIO-8: Modification of Tidal Freshwater Emergent Wetland Natural Community from**
14 **Ongoing Operation, Maintenance and Management Activities**

15 Once the physical facilities associated with Alternative 4A are constructed and the stream flow
16 regime associated with changed water management is in effect, there would be new ongoing and
17 periodic actions associated with operation, maintenance and management of the Alternative 4A
18 facilities and conservation lands that could affect tidal freshwater emergent wetland natural
19 community in the study area. The ongoing actions would include modified operation of upstream
20 reservoirs, the diversion of Sacramento River flows in the north Delta, and reduced diversions from
21 south Delta channels. These actions are associated with water conveyance facilities. The periodic
22 actions would involve access road and conveyance facility repair, vegetation management at the
23 various water conveyance facilities and habitat restoration sites (Environmental Commitment 11),
24 levee repair and replacement of levee armoring, channel dredging, and habitat enhancement in
25 accordance with natural community management plans. The potential effects of these actions are
26 described below.

- 27 • *Modified river flows upstream of and within the study area and reduced diversions from south*
28 *Delta channels.* Reduced diversions from the south Delta channels would not create a reduction
29 in tidal freshwater emergent wetland in the study area. However, the periodic changes in flows
30 in the Sacramento River, Feather River, and American River associated with modified reservoir
31 operations, and the increased diversion of Sacramento River flows at north Delta intakes
32 associated with Alternative 4A (Operational Scenario H) would affect salinity, water
33 temperature, dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in
34 these rivers and Delta waterways. These changes are discussed in detail in Chapter 8, *Water*
35 *Quality*. Potentially substantial increases in electrical conductivity (salinity) are predicted for the
36 west Delta and Suisun Marsh as a result of these changed water operations. These salinity
37 changes may alter the plant composition of tidal freshwater emergent wetland along the lower
38 Sacramento and San Joaquin Rivers and west Delta islands. The severity and extent of these
39 salinity changes would be complicated by anticipated sea level rise and the effects of
40 downstream tidal restoration over the life of the project. There is the potential that some tidal
41 freshwater marsh may become brackish. These potential changes are not expected to result in a
42 significant reduction in the acreage and value of tidal freshwater emergent wetland natural
43 community in the study area.

- 1 ● The increased diversion of Sacramento River flows in the north Delta would result in reductions
2 in sediment load (annual mass) flowing into the central and west Delta, and Suisun Marsh. The
3 reduction is estimated to be approximately 9% of the river's current sediment load for
4 Alternative 4A, which would have a north Delta diversion capacity of 9,000 cfs under
5 Operational Scenario H (see Appendix 5.C, Attachment 5C.D, Section 5C.D.3.3, *Summary of*
6 *Changes to Sediment Supply in the Plan Area Due to BDCP Shift in Export Location and Volume*, in
7 the BDCP for a detailed analysis of this issue). This would contribute to a decline in sediment
8 reaching the Delta and Suisun Marsh that has been occurring over the past 50-plus years due to
9 a gradual depletion of sediment from the upstream rivers. The depletion has been caused by a
10 variety of factors, including depletion of hydraulic mining sediment in upstream areas, armoring
11 of river channels and a cutoff of sediment due to dam construction on the Sacramento River and
12 its major tributaries (Wright and Schoellhamer 2004; Barnard et al. 2013).
- 13 ● Reduced sediment load flowing into the Delta and Suisun Marsh could have an adverse effect on
14 tidal marsh, including tidal freshwater emergent wetland. Sediment trapped by the marsh
15 vegetation allows the emergent plants to maintain an appropriate water depth as water levels
16 gradually rise from the effects of global warming (see Chapter 29, *Climate Change*). The project
17 proponents have incorporated an environmental commitment (see Appendix 3B, Section
18 3B.2.18, *Disposal and Reuse of Spoil, Reusable Tunnel Material and Dredged Material*) into the
19 project that would lessen this potential effect. The Sacramento River water diverted at north
20 Delta intakes would pass through sedimentation basins before being discharged to water
21 conveyance structures. The commitment states that sediment collected in these basins would be
22 periodically removed and reused, to the greatest extent feasible, in the study area for a number
23 of purposes, including marsh restoration, levee maintenance, subsidence reversal, flood
24 response, and borrow area fill. The portion of the sediment re-introduced to the Delta and
25 estuary for marsh restoration would remain available for marsh accretion. With this
26 commitment to reuse in the study area, the removal of sediment at the north Delta intakes
27 would not result in a net reduction in the acreage and value of this special-status marsh
28 community. The effect would not be adverse (NEPA) and would be less than significant (CEQA).
- 29 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
30 conveyance facilities and levees associated with Alternative 4A actions have the potential to
31 require removal of adjacent vegetation and could entail earth and rock work in or adjacent to
32 tidal freshwater emergent wetland habitats. This activity could lead to increased soil erosion,
33 turbidity and runoff entering tidal aquatic habitats. These activities would be subject to normal
34 erosion, turbidity and runoff control management practices, including those developed as part
35 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
36 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within emergent
37 wetland habitats would require use of sediment and turbidity barriers, soil stabilization and
38 revegetation of disturbed surfaces. Proper implementation of these measures would avoid
39 permanent adverse effects on this community.
- 40 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical
41 treatment, would be a periodic activity associated with the long-term maintenance of water
42 conveyance facilities and restoration sites (Environmental Commitment 11). Use of herbicides
43 to control nuisance vegetation could pose a long-term hazard to tidal freshwater emergent
44 wetland natural community at or adjacent to treated areas. The hazard could be created by
45 uncontrolled drift of herbicides, uncontrolled runoff of contaminated stormwater onto the
46 natural community, or direct discharge of herbicides to tidal aquatic areas being treated for

1 invasive species removal. Environmental commitments and *AMM5 Spill Prevention, Containment,*
2 *and Countermeasure Plan* have been made part of the project to reduce hazards to humans and
3 the environment from use of various chemicals during maintenance activities, including the use
4 of herbicides. These commitments, including the commitment to prepare and implement spill
5 prevention, containment, and countermeasure plans and stormwater pollution prevention
6 plans, are described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*. Best
7 management practices, including control of drift and runoff from treated areas, and use of
8 herbicides approved for use in aquatic environments would also reduce the risk of affecting
9 natural communities adjacent to water conveyance features and levees associated with
10 restoration activities.

- 11 ● *Channel dredging.* Long-term operation of the Alternative 4A intakes on the Sacramento River
12 would include periodic dredging of sediments that might accumulate in front of intake screens.
13 The dredging would occur in waterways adjacent to tidal freshwater emergent wetlands and
14 would result in short-term increases in turbidity and disturbance of the substrate. These
15 conditions would not eliminate the community, but would diminish its value for special-status
16 and common species that rely on it for cover or foraging area. The individual species effects are
17 discussed in the *Wildlife Species* section.
- 18 ● *Habitat enhancement.* The project includes a long-term management element for the natural
19 communities within the study area (Environmental Commitment 11). For tidal freshwater
20 emergent wetland community, a management plan would be prepared that specifies actions to
21 improve the value of the habitats for special-status species. Actions would include control of
22 invasive nonnative plant and animal species, fire management, restrictions on vector control
23 and application of herbicides, and maintenance of infrastructure that would allow for movement
24 through the community. The enhancement efforts would improve the long-term value of this
25 community for both special-status and common species.

26 The various operations and maintenance activities described above could alter acreage of tidal
27 freshwater emergent wetland natural community in the study area through changes in flow patterns
28 and resultant changes in water quality. Activities could also introduce sediment and herbicides that
29 would reduce the value of this community to common and sensitive plant and wildlife species. Other
30 periodic activities associated with Alternative 4A, including management, protection and
31 enhancement actions associated with *Environmental Commitment 3 Natural Communities Protection*
32 *and Restoration* and *Environmental Commitment 11 Natural Communities Enhancement and*
33 *Management*, would be undertaken to enhance the value of the community. While some of these
34 activities could result in small changes in acreage, these changes would be offset by restoration
35 activities planned as part of *Environmental Commitment 4 Tidal Natural Communities Restoration*.
36 The management actions associated with levee repair, periodic dredging and control of invasive
37 plant species would also result in a long-term benefit to the species associated with tidal freshwater
38 emergent wetland habitats by improving water movement.

39 **NEPA Effects:** Ongoing operation, maintenance, and management activities would not result in a net
40 permanent reduction in the tidal freshwater emergent wetland natural community within the study
41 area. Therefore, there would be no adverse effect on this natural community.

42 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4A,
43 including changed water operations in the upstream reservoirs, would have the potential to create
44 minor changes in total acreage of tidal freshwater emergent wetland natural community in the study
45 area, and could create temporary increases in turbidity and sedimentation. The activities could also

1 introduce herbicides periodically to control nonnative, invasive plants. Implementation of
2 environmental commitments and AMM2, AMM4, and AMM5 would minimize these impacts, and
3 other operations and maintenance activities, including management, protection and enhancement
4 actions associated with *Environmental Commitment 3 Natural Communities Protection and*
5 *Restoration* and *Environmental Commitment 11 Natural Communities Enhancement and Management*,
6 would create positive effects, including improved water movement in these habitats. Restoration
7 activities associated with *Environmental Commitment 4 Tidal Natural Communities Restoration*
8 would expand this natural community in the study area. Ongoing operation, maintenance and
9 management activities would not result in a net permanent reduction in this sensitive natural
10 community within the study area. Therefore, there would be a less-than-significant impact on the
11 tidal freshwater emergent wetland natural community.

12 **Valley/Foothill Riparian**

13 Construction, operation, maintenance and management associated with Alternative 4A would have
14 no long-term adverse effects on the habitats associated with the valley/foothill riparian natural
15 community. Initial development and construction of water conveyance facilities, Environmental
16 Commitment 4, and Environmental Commitment 6 would result in both permanent and temporary
17 removal of this community (see Table 12-4A-3). Implementation of Alternative 4A would also
18 include the following Environmental Commitments and Resource Restoration and Performance
19 Principles over the term of the project to benefit the valley/foothill riparian natural community.

- 20 ● Restore or create up to 251 acres of valley/foothill riparian natural community (Environmental
21 Commitment 7).
- 22 ● Protect up to 103 acres of existing valley/foothill riparian natural community (Environmental
23 Commitment 3).
- 24 ● Restore, maintain, and enhance riparian areas to provide a mix of early-, mid- and late-
25 successional habitat types with a well-developed understory of dense shrubs (Resource
26 Restoration and Performance Principle VFR1).
- 27 ● Maintain a single contiguous patch of mature riparian forest in either CZ4 or CZ7 (Resource
28 Restoration and Performance Principle VFR2).
- 29 ● The mature riparian forest intermixed with a portion of the early- to mid-successional riparian
30 vegetation will be a minimum patch size of 50 acres and minimum width of 330 feet where
31 practicable (Resource Restoration and Performance Principle VFR3).

32 As explained below, with the restoration and enhancement of these amounts of habitat, in addition
33 to implementation of AMMs, impacts on this natural community would not be adverse for NEPA
34 purposes and would be less than significant for CEQA purposes.

1 **Table 12-4A-3. Changes in Valley/Foothill Riparian Natural Community Associated with Alternative**
2 **4A (acres)^a**

Project Component	Permanent	Temporary
Water Conveyance Facilities	37	24
Environmental Commitment 4 ^a	11	0
Environmental Commitment 6	UNK	UNK
Environmental Commitment 7 ^a	0	0
Environmental Commitment 10 ^a	0	0
TOTAL IMPACTS	48	24

^a See discussion below for a description of applicable Environmental Commitments.

UNK = Unknown quantity but impact possible

3

4 **Impact BIO-9: Changes in Valley/Foothill Riparian Natural Community as a Result of**
5 **Implementing Alternative 4A**

6 Construction, land grading and habitat restoration activities that would accompany the
7 implementation of water conveyance facilities and Environmental Commitment 4, would
8 permanently eliminate an estimated 48 acres and temporarily remove 24 acres of valley/foothill
9 riparian natural community in the study area. Also, a relatively small but unknown amount of
10 habitat could be affected by *Environmental Commitment 6 Channel Margin Enhancement*. These
11 modifications represent approximately 0.5% of the 17,966 acres of the community that is mapped in
12 the study area. The majority of the permanent and temporary losses would happen during the
13 construction of Alternative 4A and as habitat restoration is initiated. Valley/foothill riparian
14 protection (103 acres) and restoration (251 acres) would be initiated during the same period, which
15 would offset the losses.

16 The individual effects of each relevant Environmental Commitment are addressed below. A
17 summary statement of the combined impacts and NEPA and CEQA conclusions follows the
18 individual activity discussions.

- 19 • *Water Facilities and Operation:* Construction of the Alternative 4A water conveyance facilities
20 would permanently remove 37 acres and temporarily remove 24 acres of valley/foothill
21 riparian natural community. The permanent losses would occur where Intakes 2, 3, and 5
22 encroach on the Sacramento River’s east bank between Freeport and Courtland. The riparian
23 areas here are very small patches, some dominated by valley oak and others by nonnative trees
24 (acacia) and scrub vegetation (see Terrestrial Biology Mapbook). Cottonwood, willow and mixed
25 brambles would be permanently lost at manmade ponds located north and south of Twin Cities
26 Road just west of Interstate 5, as these sites would be used to deposit reusable tunnel material.
27 Some cottonwood and valley oak riparian would be lost due to construction of a permanent
28 access road from the new forebay west to an RTM disposal area. Blackberry brambles would
29 also be lost to deposit of reusable tunnel material at the east end of Bouldin Island. Smaller areas
30 dominated by blackberry would be eliminated at the forebay site adjacent to Clifton Court
31 Forebay and patches of willow and blackberry would be lost along the transmission line
32 corridors where they cross waterways in the central and south Delta. Permanent losses would
33 occur along Lambert Road where temporary transmission lines would be installed. Temporary
34 losses would also occur adjacent to temporary intake work areas. The riparian habitat in these
35 areas is also composed of very small patches or stringers bordering waterways, which are

1 composed of valley oak, cottonwood, willow and scrub vegetation. These losses would take
2 place during the Alternative 4A construction period.

- 3 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* Environmental
4 Commitment 4 would permanently inundate or remove an estimated 11 acres of valley/foothill
5 riparian community. The losses would occur in one or more of the ROAs established for tidal
6 restoration (see Figure 12-1). No losses would occur in the Suisun Marsh ROA. These ROAs
7 support a mix of riparian vegetation types, including valley oak stands, extensive willow and
8 cottonwood stringers along waterways, and areas of scrub vegetation dominated by blackberry.
9 These areas are considered of low to moderate habitat value (see BDCP Chapter 5, Section
10 5.4.5.1.1, *Permanent Loss and Fragmentation*). The actual loss of riparian habitat to marsh
11 restoration would be expected to be smaller than predicted. As marsh restoration projects were
12 identified and planned, sites could be selected that avoid riparian areas as much as possible.
- 13 • *Environmental Commitment 6 Channel Margin Enhancement:* Channel margin habitat
14 enhancement could result in removal of small amounts of valley/foothill riparian habitat along
15 4.6 miles of river and sloughs. The extent of this loss cannot be quantified at this time, but the
16 majority of the enhancement activity would occur along waterway margins where riparian
17 habitat stringers exist, including levees and channel banks. The improvements would occur
18 within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers, and
19 along Steamboat and Sutter Sloughs.
- 20 • *Environmental Commitment 7 Riparian Natural Community Restoration:* The valley/foothill
21 riparian natural community would be restored primarily in association with the tidal
22 (Environmental Commitment 4) and channel margin (Environmental Commitment 6)
23 enhancements. A total of 251 acres of this community would be restored and 103 acres would
24 be protected during the construction period (14 years) of the project. A variety of successional
25 stages would be sought to benefit the variety of sensitive plant and animal species that rely on
26 this natural community in the study area.

27 The following paragraphs summarize the combined effects discussed above and describe other
28 Alternative 4A environmental commitments and AMMs that offset or avoid these effects. NEPA and
29 CEQA impact conclusions are also included.

30 Alternative 4A would affect the valley/foothill riparian natural community through water
31 conveyance facilities construction losses (37 acres permanent and 24 acres temporary) and the
32 Environmental Commitment 4 restoration actions (11 acres permanent). The water conveyance
33 facilities losses would occur along the eastern bank of the Sacramento River at intake sites; along
34 transmission lines in the central and south Delta and along Lambert Road; and at RTM storage sites
35 near Twin Cities Road, Clifton Court Forebay, and on Bouldin Island. The 11 acres of Environmental
36 Commitment 4 losses would occur in one or more of the ROAs mapped in Figure 12-1.

37 The construction losses of this special-status natural community would represent an adverse effect
38 if they were not offset by avoidance and minimization measures and protection/restoration actions
39 associated with Alternative 4A environmental commitments described in Appendix 3B,
40 *Environmental Commitments, AMMs, and CMs*. Loss of valley/foothill riparian natural community
41 would be considered a loss in acreage of a sensitive natural community, and could be considered a
42 loss of wetlands as defined in Section 404 of the CWA. As indicated above, most of the losses would
43 be in small patches or narrow strips along waterways, with limited structural complexity. However,
44 the restoration of up to 251 acres and protection (including significant enhancement) of 103 acres

1 of valley/foothill riparian natural community as part of Environmental Commitment 7 and
2 Environmental Commitment 3 during the Alternative 4A construction period would minimize this
3 loss, avoiding any adverse effect. The restoration areas would be large areas providing connectivity
4 with existing riparian habitats and would include a variety of trees and shrubs to produce structural
5 complexity. Typical project-level mitigation ratios (1:1 for restoration and 1:1 for protection) would
6 indicate that 72 acres of protection and 72 acres of restoration would be needed to offset (i.e.,
7 mitigate) the 72 acres of loss (the combination of permanent and temporary losses listed in Table
8 12-4A-3). The combination of the two approaches (protection and restoration) are designed to
9 avoid a temporal lag in the value of riparian habitat available to sensitive species.

10 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
11 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM10*
12 *Restoration of Temporarily Affected Natural Communities*, and *AMM18 Swainson's Hawk*. All of these
13 AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
14 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
15 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

16 Implementation of Alternative 4A would result in the loss of approximately 0.5% of valley/foothill
17 riparian natural community in the study area. These losses (48 acres of permanent and 24 acres of
18 temporary) would be largely associated with construction of the water conveyance facilities and
19 inundation during tidal marsh restoration (Environmental Commitment 4). Inundation losses would
20 occur through the course of the project's tidal marsh restoration program at various tidal
21 restoration sites throughout the study area. By the end of the project's construction period, a total of
22 251 acres of this natural community would be restored and 103 acres would be protected
23 (Environmental Commitment 7 and Environmental Commitment 3, respectively), primarily in CZ 4
24 and CZ 7 in the Cosumnes/Mokelumne and South Delta ROAs (see Figure 12-1).

25 **NEPA Effects:** The restoration of up to 251 acres and protection (including significant enhancement)
26 of 103 acres of valley/foothill riparian natural community as part of Environmental Commitment 7
27 and Environmental Commitment 3 together with Resource restoration and performance principles
28 VFR1-VFR3 during the construction period for Alternative 4A would minimize the loss of this
29 community, avoiding any adverse effect. Because of the project's commitment to restoration of up to
30 251 acres and protection of up to 103 acres of valley/foothill riparian natural community during the
31 course of the project, Alternative 4A would not result in a net long-term reduction in the acreage of a
32 sensitive natural community; the effect would not be adverse.

33 **CEQA Conclusion:** Alternative 4A would result in the loss of approximately 72 acres of
34 valley/foothill riparian natural community due to construction of the water conveyance facilities
35 and inundation during tidal marsh restoration (Environmental Commitment 4). The construction
36 losses would occur primarily along the Sacramento River at intake sites; along transmission
37 corridors in the central and south Delta and along Lambert Road; and at reusable tunnel material
38 storage sites on Bouldin Island, Clifton Court Forebay and near Twin Cities Road, while inundation
39 losses would occur at various tidal restoration sites throughout the study area. The construction
40 losses would be spread across the 14-year construction time frame of the project. These losses
41 would be minimized by planned restoration of up to 251 acres (Environmental Commitment 7) and
42 protection (including significant enhancement) of 103 acres (Environmental Commitment 3) of
43 valley/foothill riparian natural community scheduled for the construction period of Alternative 4A,
44 which would be guided by Resource Restoration and Performance Principles VFR1-VFR3. AMM1,
45 AMM2, AMM6, AMM7, AMM10, and AMM18 would also be implemented to minimize impacts.

1 Because of these restoration and protection activities and AMMs, impacts would be less than
2 significant. Typical project-level mitigation ratios (1:1 for protection and 1:1 for restoration) would
3 indicate that 72 acres of protection and 72 acres of restoration would be needed to offset (i.e.,
4 mitigate) the 72 acres of loss. The combination of the two approaches (protection and restoration) is
5 designed to avoid a temporal lag in the value of riparian habitat available to sensitive species. The
6 restoration would be initiated at the beginning of Alternative 4A implementation to minimize any
7 time lag in the availability of this habitat to special-status species, and would result in a net gain in
8 acreage of this sensitive natural community. Therefore, the impact would be less than significant.

9 **Impact BIO-10: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
10 **Valley/Foothill Riparian Natural Community**

11 Alternative 4A would not result in periodic effects on the valley/foothill riparian natural community
12 type.

13 *NEPA Effects:* No effect.

14 *CEQA Conclusion:* No impact.

15 **Impact BIO-11: Modification of Valley/Foothill Riparian Natural Community from Ongoing**
16 **Operation, Maintenance and Management Activities**

17 Once the physical facilities associated with Alternative 4A are constructed and the stream flow
18 regime associated with changed water management is in effect, there would be new ongoing and
19 periodic actions associated with operation, maintenance and management of the Alternative 4A
20 facilities and conservation lands that could affect valley/foothill riparian natural community in the
21 study area. The ongoing actions include modified operation of upstream reservoirs, the diversion of
22 Sacramento River flows in the north Delta, and reduced diversions from south Delta channels. These
23 actions are associated with water conveyance facilities and Environmental Commitment 11. The
24 periodic actions would involve access road and conveyance facility repair, vegetation management
25 at the various water conveyance facilities and habitat restoration sites (Environmental Commitment
26 11), levee repair and replacement of levee armoring, channel dredging, and habitat enhancement in
27 accordance with natural community management plans. The potential effects of these actions are
28 described below.

- 29
- 30 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
31 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect
32 valley/foothill riparian natural community. The anticipated water levels over time with
33 Alternative 4A, as compared to no action, would be slightly lower in the October to May
34 timeframe. The small changes in frequency of higher water levels in these lakes would not
35 substantially reduce the small patches of riparian vegetation that occupy the upper fringes of
36 the reservoir pools. Changes in releases that would influence downstream river flows are
discussed below.
 - 37 • *Modified river flows upstream of and within the study area and reduced diversions from south*
38 *Delta channels.* Changes in releases from reservoirs upstream of the study area and their
39 resultant changes in flows in the Sacramento, American and Feather Rivers (associated with
40 Operational Scenario H) would not be expected to result in the permanent reduction in acreage
41 of valley/foothill riparian natural community along these waterways. There is no evidence that
42 flow levels in the upstream rivers would change such that the acreage of this community would

1 be reduced on a permanent basis. Riparian habitats along the rivers of the Sacramento Valley
 2 have historically been exposed to significant variations in river stage. Based on modeling
 3 conducted for Alternative 4A (see Appendix 11C, *CALSIM II Model Results Utilized in the Fish*
 4 *Analysis*), flow levels in these upstream rivers could be reduced by as much as 33% (Feather
 5 River at confluence with Sacramento River) in the July to November time frame when compared
 6 to No Action, while flow levels in the February to May time frame could increase as much as
 7 31% (Feather River at confluence with Sacramento River) with implementation of Alternative
 8 4A. Similarly, increased diversions of Sacramento River flows in the north Delta would not be
 9 expected to result in a permanent reduction in valley/foothill riparian community downstream
 10 of these diversions, even though river flows are modeled to be reduced by 4–32% compared
 11 with No Action, depending on month and water-year type (see Appendix 11C, Section 11C.11,
 12 *Alternative 4A*). Reduced diversions from the south Delta channels would not create a reduction
 13 in this natural community.

- 14 ● The periodic changes in flows in the Sacramento River, Feather River, and American River
 15 associated with modified reservoir operations, and the increased diversion of Sacramento River
 16 flows at north Delta intakes associated with Alternative 4A would affect salinity, water
 17 temperature, dissolved oxygen levels, turbidity, contaminant levels and dilution capacity in
 18 these rivers and Delta waterways. These changes are discussed in detail in Chapter 8, *Water*
 19 *Quality*. Potentially substantial increases in electrical conductivity (salinity) are predicted for the
 20 west Delta and Suisun Marsh as a result of these changed water operations. These salinity
 21 changes may alter the plant composition of riparian habitats along the lower Sacramento and
 22 San Joaquin Rivers and west Delta islands. The severity and extent of these salinity changes
 23 would be complicated by anticipated sea level rise and the effects of downstream tidal
 24 restoration over the life of the project. There is the potential that some valley/foothill riparian
 25 natural community may be degraded immediately adjacent to river channels. The riparian
 26 communities in the west Delta are dominated by willows, cottonwood and mixed brambles.
 27 These potential changes are not expected to result in a significant reduction in the acreage and
 28 value of valley/foothill riparian natural community in the study area.
- 29 ● *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
 30 conveyance facilities and levees associated with Alternative 4A actions have the potential to
 31 require removal of adjacent vegetation and could entail earth and rock work in valley/foothill
 32 riparian habitats. This activity could lead to increased soil erosion, turbidity and runoff entering
 33 these habitats. These activities would be subject to normal erosion, turbidity and runoff control
 34 management practices, including those developed as part of *AMM2 Construction Best*
 35 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
 36 vegetation removal or earthwork adjacent to or within riparian habitats would require use of
 37 sediment barriers, soil stabilization and revegetation of disturbed surfaces (*AMM10 Restoration*
 38 *of Temporarily Affected Natural Communities*). Proper implementation of these measures would
 39 avoid permanent adverse effects on this community.
- 40 ● *Vegetation management.* Vegetation management, in the form of physical removal and chemical
 41 treatment, would be a periodic activity associated with the long-term maintenance of water
 42 conveyance facilities and restoration sites (*Environmental Commitment 11 Natural Communities*
 43 *Enhancement and Management*). Use of herbicides to control nuisance vegetation could pose a
 44 long-term hazard to valley/foothill riparian natural community at or adjacent to treated areas.
 45 The hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of
 46 contaminated stormwater onto the natural community, or direct discharge of herbicides to

1 riparian areas being treated for invasive species removal. Environmental commitments and
2 *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been made part of the
3 project to reduce hazards to humans and the environment from use of various chemicals during
4 maintenance activities, including the use of herbicides. These commitments, including the
5 commitment to prepare and implement spill prevention, containment, and countermeasure
6 plans and stormwater pollution prevention plans, are described in Appendix 3B, *Environmental*
7 *Commitments, AMMs, and CMs*. Best management practices, including control of drift and runoff
8 from treated areas, and use of herbicides approved for use in terrestrial environments would
9 also reduce the risk of affecting natural communities adjacent to water conveyance features and
10 levees associated with restoration activities.

- 11 ● *Channel dredging*. Operation of the Alternative 4A intakes on the Sacramento River would
12 include periodic dredging of sediments that might accumulate in front of intake screens. The
13 dredging could occur adjacent to valley/foothill riparian natural community. This activity should
14 not adversely affect riparian plants as long as dredging equipment is kept out of riparian areas
15 and dredge spoil is disposed of outside of riparian corridors.
- 16 ● *Habitat enhancement*. The project includes a long-term management element for the natural
17 communities within the study area (Environmental Commitment 11). For the valley/foothill
18 riparian natural community, a management plan would be prepared that specifies actions to
19 improve the value of the habitats for species. Actions would include control of invasive
20 nonnative plant and animal species, fire management, restrictions on vector control and
21 application of herbicides, and maintenance of infrastructure that would allow for movement
22 through the community. The enhancement efforts would improve the long-term value of this
23 community for both special-status and common species.

24 The various operations and maintenance activities described above could alter acreage of
25 valley/foothill riparian natural community in the study area through changes in flow patterns and
26 resultant changes in water quality. Activities could also introduce sediment and herbicides that
27 would reduce the value of this community to common and sensitive plant and wildlife species. Other
28 periodic activities associated with the project, including management, protection and enhancement
29 actions associated with *Environmental Commitment 3 Natural Communities Protection and*
30 *Restoration* and *Environmental Commitment 11 Natural Communities Enhancement and Management*,
31 would be undertaken to enhance the value of the community. While some of these activities could
32 result in small changes in acreage, these changes would be greatly offset by restoration and
33 protection activities planned as part of *Environmental Commitment 7 Riparian Natural Community*
34 *Restoration* and *Environmental Commitment 3 Natural Communities Protection and Restoration*, or
35 minimized by implementation of AMM2, AMM4, AMM5, AMM10, and AMM18. The management
36 actions associated with levee repair, periodic dredging and control of invasive plant species would
37 also result in a long-term benefit to the species associated with riparian habitats by improving water
38 movement in adjacent waterways and by eliminating competitive, invasive species of plants.

39 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
40 implementation of Alternative 4A would not result in a net permanent reduction in the
41 valley/foothill riparian natural community within the study area. Therefore, there would be no
42 adverse effect on this natural community.

43 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4A would
44 have the potential to create minor changes in total acreage of valley/foothill riparian natural
45 community in the study area, and could create temporary increases in turbidity and sedimentation.

1 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
 2 Implementation of environmental commitments and AMM2, AMM4, AMM5, AMM10, and AMM18
 3 would minimize these impacts, and other operations and maintenance activities, including
 4 management, protection and enhancement actions associated with *Environmental Commitment 3*
 5 *Natural Communities Protection and Restoration* and *Environmental Commitment 11 Natural*
 6 *Communities Enhancement and Management*, would create positive effects, including reduced
 7 competition from invasive, nonnative plants in these habitats. Restoration and protection activities
 8 associated with *Environmental Commitment 7 Riparian Natural Community Restoration* and
 9 *Environmental Commitment 3 Natural Communities Protection and Restoration* would expand this
 10 natural community in the study area. Ongoing operation, maintenance and management activities
 11 would not result in a net permanent reduction in this sensitive natural community within the study
 12 area. Therefore, there would be a less-than-significant impact on the valley/foothill riparian natural
 13 community.

14 **Nontidal Perennial Aquatic**

15 Construction, operation, maintenance and management and Environmental Commitment 4
 16 associated with Alternative 4A would have no long-term adverse effects on the habitats associated
 17 with the nontidal perennial aquatic natural community. Initial development and construction of
 18 water conveyance facilities would result in both permanent and temporary removal of this
 19 community (see Table 12-4A-4). Tidal restoration (Environmental Commitment 4) and channel
 20 margin habitat enhancement (Environmental Commitment 6) could also remove small areas of this
 21 natural community.

22 As explained below, with the restoration and enhancement of nontidal wetland habitat, in addition
 23 to implementation of AMMs, impacts on this natural community would not be adverse for NEPA
 24 purposes and would be less than significant for CEQA purposes.

25 **Table 12-4A-4. Changes in Nontidal Perennial Aquatic Natural Community Associated with**
 26 **Alternative 4A (acres)**

Project Component	Permanent	Temporary
Water Conveyance Facilities	58	6
Environmental Commitment 4 ^a	2	0
Environmental Commitment 7 ^a	0	0
Environmental Commitment 10 ^a	0	0
TOTAL IMPACTS	60	6

^a See discussion below for a description of applicable Environmental Commitments.

27

28 **Impact BIO-12: Changes in Nontidal Perennial Aquatic Natural Community as a Result of**
 29 **Implementing Alternative 4A**

30 Construction and land grading activities that would accompany the implementation of water
 31 conveyance facilities and tidal restoration (Environmental Commitment 4) would permanently
 32 eliminate an estimated 60 acres and temporarily remove 6 acres of nontidal perennial aquatic
 33 natural community in the study area. These modifications represent approximately 1.2% of the
 34 5,567 acres of the community that is mapped in the study area. Natural communities restoration
 35 would add 832 acres (Environmental Commitment 10) and protect up to 119 acres (Environmental

1 Commitment 3) of nontidal marsh during the same period which would expand the area of that
2 habitat and offset the losses. The nontidal marsh restoration would include a mosaic of nontidal
3 perennial aquatic and nontidal freshwater perennial emergent wetland natural communities. The
4 nontidal marsh would be restored in the vicinity of giant garter snake subpopulations identified in
5 the recovery plan for this species (U.S. Fish and Wildlife Service 1998).

6 The individual effects of each relevant Environmental Commitment are addressed below. A
7 summary statement of the combined impacts and NEPA and CEQA conclusions follows the
8 individual activity discussions.

- 9 • *Water Facilities and Operation*: Construction of the Alternative 4A water conveyance facilities
10 would permanently remove 58 acres and temporarily remove 6 acres of nontidal perennial
11 aquatic community. Most of the permanent loss would occur at the linear manmade ponds
12 located north and south of Twin Cities Road just west of I-5 and an RTM storage site on Bouldin
13 Island (see Terrestrial Biology Mapbook). Most of the temporary loss would occur where
14 transmission line construction would cross Mandeville Island. These wetlands are linear ponds
15 or small, isolated areas surrounded by agricultural land. These losses would take place during
16 the Alternative 4A construction period.
- 17 • *Environmental Commitment 4 Tidal Natural Communities Restoration*: Environmental
18 Commitment 4 would convert an estimated 2 acres of nontidal perennial aquatic habitat. The
19 losses would occur in one or more of the ROAs established for tidal restoration (see Figure 12-
20 1).
- 21 • *Environmental Commitment 6 Channel Margin Enhancement*: Channel margin habitat
22 enhancement could result in filling of small amounts of nontidal perennial aquatic habitat along
23 4.6 miles of river and sloughs. The extent of this loss cannot be quantified at this time, but the
24 majority of the enhancement activity would occur on the edges of tidal perennial aquatic habitat,
25 including levees and channel banks. Nontidal marsh adjacent to these tidal areas could be
26 affected. The improvements would be undertaken within the study area on sections of the
27 Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 28 • *Environmental Commitment 10 Nontidal Marsh Restoration*: Environmental Commitment 10
29 would entail restoration of up to 832 acres of nontidal marsh in CZs 2, 4, and/or 5. The
30 restoration would create a mosaic of nontidal perennial aquatic and nontidal freshwater
31 perennial emergent natural communities. This marsh restoration would occur in 25-acre or
32 larger patches in or near giant garter snake occupied habitat and would be accompanied by
33 adjacent grassland restoration or protection.

34 The following paragraphs summarize the combined effects discussed above and describe other
35 Alternative 4A environmental commitments and AMMs that offset or avoid these effects. NEPA and
36 CEQA impact conclusions are also included.

37 During the Alternative 4A construction period, activities would affect the nontidal perennial aquatic
38 community through water conveyance facilities construction and tidal restoration (60 acres
39 permanent and 6 acres temporary). Additional small losses could also occur during this time frame
40 as channel margin habitat enhancement is implemented.

41 The construction losses of this special-status natural community would represent an adverse effect
42 if they were not offset by avoidance and minimization measures and restoration actions associated
43 with Alternative 4A. Loss of nontidal perennial aquatic natural community would be considered

1 both a loss in acreage of a sensitive natural community and a loss of waters of the United States as
2 defined by Section 404 of the CWA. However, creating 832 acres of nontidal marsh as part of
3 Environmental Commitment 10 during the Alternative 4A construction period would offset this loss,
4 avoiding any adverse effect. Typical project-level mitigation ratios (1:1 for restoration and 1:1 for
5 protection) would indicate 66 acres of restoration and 66 acres of protection would be needed to
6 offset (i.e., mitigate) the 66 acres of loss. The project also includes protection of up to 119 acres of
7 nontidal marsh habitat (Environmental Commitment 3). The protection acreage exceeds the typical
8 1:1 protection requirement and fully compensates for the construction losses.

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
10 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
11 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
12 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
13 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
14 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

15 Implementation of Alternative 4A would result in relatively minor (1.2%) losses of nontidal
16 perennial aquatic community in the study area. These losses (60 acres of permanent and 6 acres of
17 temporary loss) would be largely associated with construction of the water conveyance facilities. By
18 the end of project construction, a total of 832 acres of nontidal marsh would be restored. The
19 restoration would potentially occur over a wide region of the study area, including within the
20 Cosumnes/Mokelumne, Yolo Bypass, South Delta and East Delta ROAs (see Figure 12-1).

21 **NEPA Effects:** During the Alternative 4A construction period, creating 832 acres of nontidal marsh
22 as part of Environmental Commitment 10 would offset the construction-related losses of 66 acres of
23 nontidal perennial aquatic natural community. The effect would not be adverse.

24 **CEQA Conclusion:** Alternative 4A would result in the loss of approximately 66 acres of nontidal
25 perennial aquatic natural community due to construction of the water conveyance facilities and tidal
26 restoration. The construction losses would occur primarily at reusable tunnel material storage sites
27 near Twin Cities Road and on Bouldin Island, and along the transmission corridor where it crosses
28 Mandeville Island. In addition, an estimated 2 acres would be lost due to tidal natural communities
29 restoration in one or more of the ROAs (see Figure 12-1). The losses would be spread across the
30 Alternative 4A construction period (14 years). These losses would be offset by planned restoration
31 of up to 832 acres and protection of up to 119 acres of nontidal marsh during the same time period
32 (Environmental Commitment 10 and Environmental Commitment 3). Also, AMM1, AMM2, AMM6,
33 AMM7, and AMM10 would be implemented to minimize impacts. Because of these offsetting
34 restoration activities and AMMs, impacts would be less than significant. Typical project-level
35 mitigation ratios (1:1 for restoration and 1:1 for protection) would indicate that 66 acres of
36 restoration and 66 acres of protection would be needed to offset (i.e., mitigate) the 66 acres of loss.
37 The project includes tidal marsh restoration (832 acres) and protection (119 acres) which is well in
38 excess of the typical 1:1 restoration and protection acreages, and therefore compensates for all
39 project-related losses. The restoration would be initiated at the beginning of Alternative 4A
40 implementation to minimize any time lag in the availability of this habitat to special-status species,
41 and would result in a net gain in acreage of this sensitive natural community. Therefore, the impact
42 would be less than significant. No mitigation is required.

1 **Impact BIO-13: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
2 **Nontidal Perennial Aquatic Natural Community**

3 Alternative 4A would not result in periodic effects on the nontidal perennial aquatic natural
4 community type.

5 **NEPA Effects:** No effect.

6 **CEQA Conclusion:** No impact.

7 **Impact BIO-14: Modification of Nontidal Perennial Aquatic Natural Community from Ongoing**
8 **Operation, Maintenance and Management Activities**

9 Once the physical facilities associated with Alternative 4A are constructed and the stream flow
10 regime associated with changed water management is in effect, there would be new ongoing and
11 periodic actions associated with operation, maintenance and management of the Alternative 4A
12 facilities and conservation lands that could affect nontidal perennial aquatic natural community in
13 the study area. The ongoing actions include modified operation of upstream reservoirs, the
14 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
15 channels. These actions would be associated with water conveyance facilities. The periodic actions
16 would involve access road and conveyance facility repair, vegetation management at the various
17 water conveyance facilities and habitat restoration sites (Environmental Commitment 11), levee
18 repair and replacement of levee armoring, channel dredging, and habitat enhancement in
19 accordance with natural community management plans. The potential effects of these actions are
20 described below.

- 21 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
22 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would affect
23 nontidal perennial aquatic natural community, in the form of the reservoir pools. The
24 Alternative 4A operations scheme would alter the surface elevations of these reservoir pools as
25 described in Chapter 6, *Surface Water*. These fluctuations would occur within historic ranges
26 and would not adversely affect the natural community. Changes in releases that would influence
27 downstream river flows are discussed below.
- 28 • *Modified river flows upstream of and within the study area and reduced diversions from south*
29 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
30 diversion of Sacramento River flows in the north Delta, and reduced diversion from south Delta
31 channels (associated with Operational Scenario H) would not result in the permanent reduction
32 in acreage of the nontidal perennial aquatic natural community in the study area. Flow levels in
33 the upstream rivers would not change such that the acreage of nontidal perennial aquatic
34 community would be reduced on a permanent basis. Some minor increases and some decreases
35 would be expected to occur along the major rivers during some seasons and in some water-year
36 types, but there would be no permanent loss. Similarly, increased diversions of Sacramento
37 River flows in the north Delta would not result in a permanent reduction in nontidal perennial
38 aquatic community downstream of these diversions. Nontidal wetlands below the diversions are
39 not directly connected to the rivers, as this reach of the river is tidally influenced. Reduced
40 diversions from south Delta channels would not create a reduction in this natural community.
- 41 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
42 conveyance facilities and levees associated with the Alternative 4A actions have the potential to
43 require removal of adjacent vegetation and could entail earth and rock work in nontidal

1 perennial aquatic habitats. This activity could lead to increased soil erosion, turbidity and runoff
2 entering nontidal perennial aquatic habitats. These activities would be subject to normal
3 erosion, turbidity and runoff control management practices, including those developed as part
4 of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4 Erosion and*
5 *Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within aquatic
6 habitats would require use of sediment and turbidity barriers, soil stabilization and revegetation
7 of disturbed surfaces. Proper implementation of these measures would avoid permanent
8 adverse effects on this community.

- 9 • *Vegetation management*. Vegetation management, in the form of physical removal and chemical
10 treatment, would be a periodic activity associated with the long-term maintenance of water
11 conveyance facilities and restoration sites (*Environmental Commitment 11 Natural Communities*
12 *Enhancement and Management*). Vegetation management is also the principal activity associated
13 with *Environmental Commitment 13 Invasive Aquatic Vegetation Control*. Use of herbicides to
14 control nuisance vegetation could pose a long-term hazard to nontidal perennial aquatic natural
15 community at or adjacent to treated areas. The hazard could be created by uncontrolled drift of
16 herbicides, uncontrolled runoff of contaminated stormwater onto the natural community, or
17 direct discharge of herbicides to nontidal perennial aquatic areas being treated for invasive
18 species removal. Environmental commitments and *AMM5 Spill Prevention, Containment, and*
19 *Countermeasure Plan* have been made part of the project to reduce hazards to humans and the
20 environment from use of various chemicals during maintenance activities, including the use of
21 herbicides. These commitments, including the commitment to prepare and implement spill
22 prevention, containment, and countermeasure plans and stormwater pollution prevention
23 plans, are described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*. Best
24 management practices, including control of drift and runoff from treated areas, and use of
25 herbicides approved for use in aquatic environments would also reduce the risk of affecting
26 natural communities adjacent to water conveyance features and levees associated with
27 restoration activities.
- 28 • *Habitat enhancement*. The project includes a long-term management element for the natural
29 communities within the study area (*Environmental Commitment 11*). For nontidal perennial
30 aquatic natural community, a management plan would be prepared that specifies actions to
31 improve the value of the habitats for species. Actions would include control of invasive
32 nonnative plant and animal species, fire management, restrictions on vector control and
33 application of herbicides, and maintenance of infrastructure that would allow for movement
34 through the community. The enhancement efforts would improve the long-term value of this
35 community for both special-status and common species.

36 The various operations and maintenance activities described above could alter acreage of nontidal
37 perennial aquatic natural community in the study area through changes in flow patterns and
38 changes in periodic inundation of this community. Activities could also introduce sediment and
39 herbicides that would reduce the value of this community to common and sensitive plant and
40 wildlife species. Other periodic activities associated with the project, including management,
41 protection and enhancement actions associated with *Environmental Commitment 3 Natural*
42 *Communities Protection and Restoration* and *Environmental Commitment 11 Natural Communities*
43 *Enhancement and Management*, would be undertaken to enhance the value of the community. While
44 some of these activities could result in small changes in acreage, these changes would be offset by
45 restoration activities planned as part of *Environmental Commitment 10 Nontidal Marsh Restoration*
46 and protection actions associated with *Environmental Commitment 3 Natural Communities*

1 *Protection and Restoration.* The management actions associated with levee repair and control of
2 invasive plant species would also result in a long-term benefit to the species associated with
3 nontidal perennial aquatic habitats by improving water movement.

4 **NEPA Effects:** Ongoing operation, maintenance and management activities would not result in a net
5 permanent reduction in the nontidal perennial aquatic natural community within the study area.
6 Therefore, there would be no adverse effect on this natural community.

7 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4A would
8 have the potential to create minor changes in total acreage of nontidal perennial aquatic natural
9 community in the study area, and could create temporary increases in turbidity and sedimentation.
10 The activities could also introduce herbicides periodically to control nonnative, invasive plants.
11 Implementation of environmental commitments and AMM2, AMM4, and AMM5 would minimize
12 these impacts, and other operations and maintenance activities, including management, protection
13 and enhancement actions associated with *Environmental Commitment 3 Natural Communities*
14 *Protection and Restoration* and *Environmental Commitment 11 Natural Communities Enhancement*
15 *and Management*, would create positive effects, including improved water movement in these
16 habitats. Long-term restoration activities associated with *Environmental Commitment 10 Nontidal*
17 *Marsh Restoration* and protection actions associated with *Environmental Commitment 3 Natural*
18 *Communities Protection and Restoration* would expand this natural community in the study area.
19 Ongoing operation, maintenance and management activities would not result in a net permanent
20 reduction in this sensitive natural community within the study area. Therefore, there would be a
21 less-than-significant impact on the nontidal perennial aquatic natural community.

22 **Nontidal Freshwater Perennial Emergent Wetland**

23 Construction, operation, maintenance and management associated with Alternative 4A would have
24 no long-term adverse effects on the habitats associated with the nontidal freshwater perennial
25 emergent wetland natural community. Initial development and construction of water conveyance
26 facilities would result in both permanent and temporary removal of this community (see Table 12-
27 4A-5). Small losses of this community could also occur with tidal restoration (Environmental
28 Commitment 4) and planned channel margin enhancement activities (Environmental Commitment
29 6).

30 As explained below, with the restoration and enhancement of nontidal marsh habitat, in addition to
31 implementation of AMMs, impacts on this natural community would not be adverse for NEPA
32 purposes and would be less than significant for CEQA purposes.

33 **Table 12-4A-5. Changes in Nontidal Freshwater Perennial Emergent Wetland Natural Community**
34 **Associated with Alternative 4A (acres)**

Project Component	Permanent	Temporary
Water Conveyance Facilities	2	4
Environmental Commitment 4 ^a	1	0
Environmental Commitment 7 ^a	0	0
Environmental Commitment 10 ^a	0	0
TOTAL IMPACTS	3	4

^a See discussion below for a description of applicable Environmental Commitments.

35

1 **Impact BIO-15: Changes in Nontidal Freshwater Perennial Emergent Wetland Natural**
2 **Community as a Result of Implementing Alternative 4A**

3 Construction and land grading activities that would accompany the implementation of water
4 conveyance facilities and tidal restoration would permanently eliminate an estimated 3 acres and
5 temporarily remove 4 acres of nontidal freshwater perennial emergent wetland natural community
6 in the study area. These modifications represent approximately 0.5% of the 1,509 acres of the
7 community that is mapped in the study area. Nontidal marsh restoration (Environmental
8 Commitment 10) would add 832 acres of nontidal marsh and natural communities protection
9 (Environmental Commitment 3) would protect up to 119 acres of nontidal marsh. These actions
10 would be taken over the course of Alternative 4A marsh restoration activities, which would expand
11 the area of that habitat and offset the losses. The nontidal marsh restoration would include a mosaic
12 of nontidal perennial aquatic and nontidal freshwater perennial emergent wetland natural
13 communities. The nontidal marsh protection would be designed to support tricolored blackbird and
14 western pond turtle populations in the study area. The restoration would occur in blocks that are
15 contiguous with or near giant garter snake subpopulations identified in the recovery plan for this
16 species (U.S. Fish and Wildlife Service 1998), and in areas suitable for greater sandhill crane
17 permanent roosting and foraging.

18 The individual effects of each relevant Environmental Commitment are addressed below. A
19 summary statement of the combined impacts and NEPA and CEQA conclusions follows the
20 individual activity discussions.

- 21 • *Water Facilities and Operation:* Construction of the Alternative 4A water conveyance facilities
22 would permanently remove 2 acres and temporarily remove 4 acres of tidal freshwater
23 perennial emergent wetland community. The permanent losses would occur at the Clifton Court
24 Forebay construction site and the RTM site on Bouldin Island (see Terrestrial Biology Mapbook).
25 The temporary loss would occur in a temporary work area and where temporary powerlines
26 would be constructed across Mandeville Island. These wetlands are extremely small and remote
27 water bodies, surrounded by agricultural operations. These losses would take place during the
28 project's construction period.
- 29 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* Environmental
30 Commitment 4 would permanently inundate or remove an estimated 1 acre of tidal freshwater
31 perennial emergent wetland. The losses would occur in one or more of the ROAs established for
32 tidal restoration (see Figure 12-1).
- 33 • *Environmental Commitment 6 Channel Margin Enhancement:* Channel margin habitat
34 enhancement could result in filling of small amounts of nontidal freshwater perennial emergent
35 wetland habitat along 4.6 miles of river and sloughs. The extent of this loss cannot be quantified
36 at this time, but the majority of the enhancement activity would occur on the edges of tidal
37 perennial aquatic habitat, including levees and channel banks. Nontidal marsh adjacent to these
38 tidal areas could be affected. The improvements would occur within the study area on sections
39 of the Sacramento, San Joaquin and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.
- 40 • *Environmental Commitment 10 Nontidal Marsh Restoration:* Environmental Commitment 10
41 would entail restoration of up to 832 acres of nontidal marsh in CZs 2, 4, and/or 5. The
42 restoration would create a mosaic of nontidal perennial aquatic and nontidal freshwater
43 perennial emergent natural communities. Some of this marsh restoration would occur in 25-

1 acre or larger patches in or near giant garter snake occupied habitat and would be accompanied
2 by adjacent grassland restoration or protection.

3 The following paragraphs summarize the combined effects discussed above and describe other
4 Alternative 4A environmental commitments and AMMs that offset or avoid these effects. NEPA and
5 CEQA impact conclusions are also included.

6 During the project's construction time frame, Alternative 4A would affect the nontidal freshwater
7 perennial emergent wetland community through water conveyance facilities construction and tidal
8 restoration (Environmental Commitment 6) (3 acres permanent and 4 acres temporary). Small
9 additional losses could result where channel margin habitat enhancement occurs along major Delta
10 waterways (Environmental Commitment 6).

11 The construction losses of this special-status natural community would represent an adverse effect
12 if they were not offset by avoidance and minimization measures and restoration actions associated
13 with the project. Loss of nontidal freshwater perennial emergent wetland natural community would
14 be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
15 defined by Section 404 of the CWA. However, the combination of creating 832 acres and protecting
16 119 acres of nontidal perennial marsh as part of Environmental Commitment 3 and Environmental
17 Commitment 10 during the construction of Alternative 4A would offset this loss, avoiding any
18 adverse effect. Typical project-level mitigation ratios (1:1 for restoration and 1:1 for protection)
19 would indicate 7 acres of restoration and 7 acres of protection would be needed to offset (i.e.,
20 mitigate) the 7 acres of loss. The project includes well in excess of the typical 1:1 restoration and
21 protection acreages for this natural community.

22 The project also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
23 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
24 *Barge Operations Plan* and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
25 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas and
26 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
27 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

28 Implementation of Alternative 4A would result in small (0.5%) losses of nontidal freshwater
29 perennial emergent wetland community in the study area. These losses (3 acres of permanent and 4
30 acres of temporary loss) would be associated with construction of the water conveyance facilities.
31 By the end of water conveyance facilities construction, a total of 832 acres of nontidal marsh would
32 be restored and 119 acres would be protected. The restoration would occur near giant garter snake
33 occupied habitat and greater sandhill crane roosting and foraging areas in the eastern Delta.
34 Approximately half of the 119 acres of protection would occur in CZ 1, 2, 8, or 11 to provide nesting
35 habitat for tri-colored blackbird (see Figure 12-1).

36 **NEPA Effects:** The combination of creating 832 acres and protecting 119 acres of nontidal perennial
37 marsh as part of Environmental Commitment 3 and Environmental Commitment 10 would offset the
38 losses associated with construction of water conveyance facilities and tidal restoration, avoiding any
39 adverse effect. With 832 acres of nontidal marsh restoration and 119 acres of protection, Alternative
40 4A would not result in a net long-term reduction in the acreage of a sensitive natural community;
41 the effect would not be adverse.

1 **CEQA Conclusion:** Alternative 4A would result in the loss of approximately 7 acres of nontidal
2 freshwater perennial emergent wetland natural community due to construction of the water
3 conveyance facilities and tidal restoration. The construction losses would occur near Clifton Court
4 Forebay and along transmission line construction areas on Mandeville Island, and tidal restoration
5 would occur in one or more of the ROAs established for tidal restoration (see Figure 12-1). The
6 losses would occur during the project construction timeframe. These losses would be offset by
7 planned restoration of up to 832 acres and protection of up to 119 acres of nontidal marsh
8 (Environmental Commitment 10 and Environmental Commitment 3). AMM1, AMM2, AMM6, AMM7,
9 and AMM10 would also be implemented to minimize impacts. Typical project-level mitigation ratios
10 (1:1 for restoration and 1:1 for protection) would indicate that 7 acres of restoration and 7 acres of
11 protection would be needed to offset (i.e., mitigate) the 7 acres of loss. The project includes well in
12 excess of the typical 1:1 restoration and protection acreages and therefore compensates for the
13 construction-related losses. The restoration and protection would be initiated at the beginning of
14 Alternative 4A implementation to minimize any time lag in the availability of this habitat to special-
15 status species, and would result in a net gain in acreage of this sensitive natural community. Because
16 of these offsetting restoration and protection activities and AMMs, impacts would be less than
17 significant.

18 **Impact BIO-16: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
19 **Nontidal Freshwater Perennial Emergent Wetland Natural Community**

20 Alternative 4A would not result in periodic effects on the nontidal freshwater perennial emergent
21 wetland natural community type.

22 **NEPA Effects:** No effect.

23 **CEQA Conclusion:** No impact.

24 **Impact BIO-17: Modification of Nontidal Freshwater Perennial Emergent Wetland Natural**
25 **Community from Ongoing Operation, Maintenance and Management Activities**

26 Once the physical facilities associated with Alternative 4A are constructed and the stream flow
27 regime associated with changed water management is in effect, there would be new ongoing and
28 periodic actions associated with operation, maintenance and management of the Alternative 4A
29 facilities and conservation lands that could affect nontidal freshwater perennial emergent wetland
30 natural community in the study area. The ongoing actions include modified operation of upstream
31 reservoirs, the diversion of Sacramento River flows in the north Delta, and reduced diversions from
32 south Delta channels. These actions are associated with water conveyance facilities. The periodic
33 actions would involve access road and conveyance facility repair, vegetation management at the
34 various water conveyance facilities and habitat restoration sites (Environmental Commitment 11),
35 levee repair and replacement of levee armoring, channel dredging, and habitat enhancement in
36 accordance with natural community management plans. The potential effects of these actions are
37 described below.

- 38 • *Modified releases and water levels in upstream reservoirs.* Modified releases and water levels at
39 Shasta Lake, Lake Oroville, Whiskeytown Lake, Lewiston Lake, and Folsom Lake would not affect
40 the nontidal freshwater perennial emergent wetland natural community. These reservoirs do
41 not support significant stands of freshwater emergent wetlands. Changes in releases that would
42 influence downstream river flows are discussed below.

- 1 • *Modified river flows upstream of and within the study area and reduced diversions from south*
2 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
3 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
4 channels (associated with Operational Scenario H) would not result in the permanent reduction
5 in acreage of the nontidal freshwater perennial emergent wetland natural community in the
6 study area. The majority of this wetland type exists outside of the levees of the larger rivers and
7 would not be affected by flow changes in river or Delta channels. Similarly, increased diversions
8 of Sacramento River flows in the north Delta would not result in a permanent reduction in
9 nontidal freshwater perennial emergent wetland community downstream of these diversions.
10 Nontidal wetlands below the diversions are not directly connected to the rivers, as this reach of
11 the river is tidally influenced. Reduced diversions from south Delta channels would not create a
12 reduction in this natural community.
- 13 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
14 conveyance facilities and levees associated with the project's actions have the potential to
15 require removal of adjacent vegetation and could entail earth and rock work in nontidal
16 freshwater perennial emergent wetland habitats. This activity could lead to increased soil
17 erosion, turbidity and runoff entering nontidal freshwater perennial habitats. These activities
18 would be subject to normal erosion, turbidity and runoff control management practices,
19 including those developed as part of *AMM2 Construction Best Management Practices and*
20 *Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or earthwork
21 adjacent to or within aquatic habitats would require use of sediment and turbidity barriers, soil
22 stabilization and revegetation of disturbed surfaces. Proper implementation of these measures
23 would avoid permanent adverse effects on this community.
- 24 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
25 treatment, would be a periodic activity associated with the long-term maintenance of water
26 conveyance facilities and restoration sites (*Environmental Commitment 11 Natural Communities*
27 *Enhancement and Management*). Use of herbicides to control nuisance vegetation could pose a
28 long-term hazard to nontidal freshwater perennial emergent wetland natural community at or
29 adjacent to treated areas. The hazard could be created by uncontrolled drift of herbicides,
30 uncontrolled runoff of contaminated stormwater onto the natural community, or direct
31 discharge of herbicides to nontidal perennial wetland areas being treated for invasive species
32 removal. Environmental commitments and *AMM5 Spill Prevention, Containment, and*
33 *Countermeasure Plan* have been made part of Alternative 4A to reduce hazards to humans and
34 the environment from use of various chemicals during maintenance activities, including the use
35 of herbicides. These commitments, including the commitment to prepare and implement spill
36 prevention, containment, and countermeasure plans and stormwater pollution prevention
37 plans, are described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*. Best
38 management practices, including control of drift and runoff from treated areas, and use of
39 herbicides approved for use in aquatic environments would also reduce the risk of affecting
40 natural communities adjacent to water conveyance features and levees associated with
41 restoration activities.
- 42 • *Habitat enhancement.* The project includes a long-term management element for the natural
43 communities within the study area (*Environmental Commitment 11*). For nontidal freshwater
44 perennial emergent wetland natural community, a management plan would be prepared that
45 specifies actions to improve the value of the habitats for species. Actions would include control
46 of invasive nonnative plant and animal species, fire management, restrictions on vector control

1 and application of herbicides, and maintenance of infrastructure that would allow for movement
2 through the community. The enhancement efforts would improve the long-term value of this
3 community for both special-status and common species.

4 The various operations and maintenance activities described above could alter acreage of nontidal
5 freshwater perennial emergent wetland natural community in the study area through changes in
6 flow patterns and facilities maintenance activities. Activities could also introduce sediment and
7 herbicides that would reduce the value of this community to common and sensitive plant and
8 wildlife species. Other periodic activities associated with the project, including management,
9 protection and enhancement actions associated with *Environmental Commitment 3 Natural*
10 *Communities Protection and Restoration* and *Environmental Commitment 11 Natural Communities*
11 *Enhancement and Management*, would be undertaken to enhance the value of the community. While
12 some of these activities could result in small changes in acreage, these changes would be greatly
13 offset by restoration activities planned as part of *Environmental Commitment 10 Nontidal Marsh*
14 *Restoration* and protection actions associated with *Environmental Commitment 3 Natural*
15 *Communities Protection and Restoration*. The management actions associated with levee repair and
16 control of invasive plant species would also result in a long-term benefit to the species associated
17 with nontidal freshwater perennial emergent wetland habitats by improving water movement.

18 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
19 Alternative 4A would not result in a net permanent reduction in the nontidal freshwater perennial
20 emergent wetland natural community within the study area. Therefore, there would be no adverse
21 effect on this natural community.

22 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4A would
23 have the potential to create minor changes in total acreage of nontidal freshwater perennial
24 emergent wetland natural community in the study area, and could create temporary increases in
25 turbidity and sedimentation. The activities could also introduce herbicides periodically to control
26 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4, and
27 AMM5 would minimize these impacts, and other operations and maintenance activities, including
28 management, protection and enhancement actions associated with *Environmental Commitment 3*
29 *Natural Communities Protection and Restoration* and *Environmental Commitment 11 Natural*
30 *Communities Enhancement and Management*, would create positive effects, including improved
31 water movement in and adjacent to these habitats. Long-term restoration activities associated with
32 *Environmental Commitment 10 Nontidal Marsh Restoration* and protection actions associated with
33 *Environmental Commitment 3 Natural Communities Protection and Restoration* would expand this
34 natural community in the study area. Ongoing operation, maintenance and management activities
35 would not result in a net permanent reduction in this sensitive natural community within the study
36 area. Therefore, there would be a less-than-significant impact on the nontidal freshwater perennial
37 emergent wetland natural community.

38 **Alkali Seasonal Wetland Complex**

39 Construction, operation, maintenance and management associated with Alternative 4A would have
40 no long-term adverse effects on the habitats associated with the alkali seasonal wetland complex
41 natural community. Initial development and construction of water conveyance facilities would
42 result in a small permanent removal of this community (see Table 12-4A-6). Also, tidal restoration
43 (Environmental Commitment 4) would remove a small estimated amount of alkali seasonal wetland
44 complex. Implementation of Alternative 4A would also include the following Resource Restoration

1 and Performance Principles over the term of the project to benefit the alkali seasonal wetland
2 natural community.

- 3 • Restore vernal pool and alkali seasonal wetland complex to achieve no net loss of wetted
4 acreage (Resource Restoration and Performance Principle VP/AW2).
- 5 • Increase the size and connectivity of protected vernal pool and alkali seasonal wetland complex
6 in the greater Byron Hill area (Resource Restoration and Performance Principle VP/AW3).
- 7 • Provide appropriate seasonal flooding characteristics for supporting and sustaining vernal pool
8 and alkali seasonal wetland complex species (Resource Restoration and Performance Principle
9 VP/AW4).

10 As explained below, with the protection, restoration, and enhancement of the amounts of habitat
11 proposed for Alternative 4A, in addition to implementation of AMMs, impacts on this natural
12 community would not be adverse for NEPA purposes and would be less than significant for CEQA
13 purposes.

14 **Table 12-4A-6. Changes in Alkali Seasonal Wetland Complex Natural Community Associated with**
15 **Alternative 4A (acres)**

Project Component	Permanent	Temporary
Water Conveyance Facilities	1	0
Environmental Commitment 4 ^a	1	0
Environmental Commitment 7 ^a	0	0
Environmental Commitment 10 ^a	0	0
TOTAL IMPACTS	2	0

^a See discussion below for a description of applicable Environmental Commitments.

16
17 **Impact BIO-18: Changes in Alkali Seasonal Wetland Complex Natural Community as a Result**
18 **of Implementing Alternative 4A**

19 Construction and land grading activities that would accompany the implementation of water
20 conveyance facilities under Alternative 4A would permanently eliminate an estimated 1 acre of
21 alkali seasonal wetland complex natural community in the study area, a portion of which includes
22 iodine bush scrub, a sensitive plant community. In addition, an estimated 1 acre of alkali seasonal
23 wetland would be impacted through grading and/or inundation from tidal restoration activities.
24 There would be no temporary impacts to alkali seasonal wetlands. These modifications represent
25 approximately 0.05% of the 3,723 acres of the community that is mapped in the study area. The
26 combined vernal pool/alkali seasonal wetland complex protection (188 acres) and restoration (48
27 acres) would be initiated during project construction; these actions would offset the losses.

28 The effects associated with construction of water conveyance facilities are addressed below. A
29 summary statement of the impacts and NEPA and CEQA conclusions follows the individual
30 Environmental Commitment discussion.

- 31 • *Water Facilities and Operation:* Construction of the Alternative 4A transmission lines
32 immediately west of Clifton Court Forebay would permanently affect 1 acre of alkali seasonal
33 wetland complex natural community (see the Terrestrial Biology Mapbook). The alkali seasonal
34 wetland complex at this location is scattered and significantly degraded by past agricultural and

1 water development-related activities. It is surrounded by or adjacent to vernal pool complex
2 natural community.

3 The construction activity associated with water conveyance facilities also has the potential to
4 lead to increased nitrogen deposition in alkali seasonal wetland habitats in the vicinity of Clifton
5 Court Forebay. A significant number of cars, trucks, and land grading equipment involved in
6 construction would emit small amounts of atmospheric nitrogen from fuel combustion; this
7 material could be deposited in sensitive alkali seasonal wetland areas that are located west of
8 the major construction areas at Clifton Court Forebay. Nitrogen deposition can pose a risk of
9 adding a fertilizer to nitrogen-limited soils and their associated plants. Nonnative invasive
10 species can be encouraged by the added nitrogen available. Appendix 5.J, Attachment 5J.A,
11 *Construction-Related Nitrogen Deposition on BDCP Natural Communities*, in the BDCP addresses
12 this issue in detail. It has been concluded that this potential deposition would pose a low risk of
13 changing the alkali seasonal wetland complex in the construction area because the construction
14 would occur primarily downwind of the natural community and the construction would
15 contribute a negligible amount of nitrogen to regional projected emissions. No adverse effect is
16 expected.

- 17 ● *Environmental Commitment 3 Natural Communities Protection and Restoration:* Environmental
18 Commitment 3 proposes to protect up to 188 acres of vernal pool/alkali seasonal wetland
19 complex in the study area. The protection would occur in areas containing a mosaic of grassland
20 and vernal pool complex in unfragmented natural landscapes supporting a diversity of native
21 plant and wildlife species. These areas would be both protected and enhanced to increase the
22 cover of alkali seasonal wetland plants relative to nonnative species.
- 23 ● *Environmental Commitment 4 Tidal Natural Communities Restoration:* Environmental
24 Commitment 4 would permanently inundate or remove an estimated 1 acre of alkali seasonal
25 wetland complex. The losses would occur in one or more of the ROAs established for tidal
26 restoration (see Figure 12-1).
- 27 ● *Environmental Commitment 9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration:*
28 Environmental Commitment 9 includes both vernal pool complex and alkali seasonal wetland
29 complex restoration goals. The intent of the Environmental Commitment is to match the acreage
30 of restoration with the actual acreage lost to other project measures (primarily water
31 conveyance facilities). The current estimate for vernal pool/alkali seasonal wetland complex
32 restoration is 48 acres. The goal is for no net loss of this natural community, consistent with the
33 project's Resource Restoration and Performance Principles.

34 The following paragraphs summarize the combined effects discussed above and describe other
35 project environmental commitments and AMMs that offset or avoid these effects. NEPA and CEQA
36 impact conclusions are also included.

37 During project construction, Alternative 4A would affect the alkali seasonal wetland complex natural
38 community through water conveyance facilities construction and tidal restoration (Environmental
39 Commitment 4) (2 acres permanent).

40 The construction losses of this special-status natural community would represent an adverse effect
41 if they were not offset by avoidance and minimization measures and restoration actions associated
42 with the project's Environmental Commitments. Loss of alkali seasonal wetland complex natural
43 community would be considered both a loss in acreage of a sensitive natural community and a loss
44 of wetland as defined by Section 404 of the CWA. However, the protection of up to 188 acres of

1 combined vernal pool/alkali seasonal wetland complex as part of Environmental Commitment 3, the
2 restoration of up to 48 acres of these communities as part of Environmental Commitment 9, and the
3 implementation of *AMM30 Transmission Line Design and Alignment Guidelines* would offset this loss,
4 avoiding any adverse effect. AMM30 would require that transmission line construction avoid any
5 losses of alkali seasonal wetland complex natural community to the maximum extent feasible (see
6 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, for a full description of AMM30).
7 Because it is not possible to create iodine bush scrub, mitigation for impacts on this plant
8 community must be through avoidance and/or protection of compensating mitigation areas.
9 Protection of iodine bush scrub within the grassland/vernal pool complex/alkali seasonal wetland
10 habitats adjacent to Clifton Court Forebay provides the only opportunity in the Plan Area to protect
11 this habitat. Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration) would
12 indicate 4 acres of protection and 2 acres of restoration would be needed to offset (i.e., mitigate) the
13 2 acres of loss.

14 The project also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
15 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, *AMM7*
16 *Barge Operations Plan*, and *AMM10 Restoration of Temporarily Affected Natural Communities*. All of
17 these AMMs include elements that avoid or minimize the risk of affecting habitats at work areas.
18 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in
19 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

20 Implementation of Alternative 4A would result in very minor (0.05%) losses of alkali seasonal
21 wetland natural community in the study area. These losses (2 acres) would be associated with
22 construction of the project's water conveyance facility and tidal restoration.

23 **NEPA Effects:** During the 14-year construction period for Alternative 4A, 188 acres of vernal
24 pool/alkali seasonal wetland complex would be protected as part of Environmental Commitment 3
25 and 48 acres of these communities would be restored as part of Environmental Commitment 9,
26 which would be guided by Resource Restoration and Performance Principles VP/AW2-VP/AW4.
27 These Environmental Commitments would offset the loss of this community associated with water
28 conveyance facilities and tidal restoration, avoiding any adverse effect. The protection and
29 restoration would occur primarily in the Clifton Court Forebay area. Therefore, Alternative 4A
30 would not have an adverse effect on the alkali seasonal wetland complex natural community.

31 **CEQA Conclusion:** Alternative 4A would result in the permanent loss of approximately 2 acres of
32 alkali seasonal wetland complex natural community due to water conveyance facility construction
33 and tidal restoration. The construction losses would occur primarily in the area adjacent to Clifton
34 Court Forebay. The losses would occur during project construction. Tidal restoration losses would
35 occur in one or more of the ROAs established for tidal restoration (see Figure 12-1).

36 The construction losses of this special-status natural community would represent a significant
37 impact if they were not offset by avoidance and minimization measures and other actions associated
38 with the project's environmental commitments. Loss of alkali seasonal wetland complex natural
39 community would be considered both a loss in acreage of a sensitive natural community and a loss
40 of wetland as defined by Section 404 of the CWA. However, the protection of up to 188 acres of
41 combined vernal pool/alkali seasonal wetland complex as part of Environmental Commitment 3, the
42 restoration of up to 48 acres of these communities as part of Environmental Commitment 9,
43 Resource Restoration and Performance Principles VP/AW2-VP/AW4, and the implementation of
44 *AMM30 Transmission Line Design and Alignment Guidelines* during construction of Alternative 4A

1 would offset this loss, avoiding any significant impact. Typical project-level mitigation ratios (2:1 for
2 protection and 1:1 for restoration) would indicate 4 acres of protection and 2 acres or restoration
3 would be needed to offset (i.e., mitigate) the 2 acres of loss. AMM1, AMM2, AMM3, AMM4, and
4 AMM10 would also be implemented to minimize impacts. Because of the offsetting protection and
5 restoration activities and AMMs, impacts would be less than significant.

6 **Impact BIO-19: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
7 **Alkali Seasonal Wetland Natural Community**

8 Alternative 4A would not result in periodic effects on the alkali seasonal wetland natural community
9 type.

10 **NEPA Effects:** No effect.

11 **CEQA Conclusion:** No impact.

12 **Impact BIO-20: Modification of Alkali Seasonal Wetland Complex Natural Community from**
13 **Ongoing Operation, Maintenance and Management Activities**

14 Once the physical facilities associated with Alternative 4A were constructed and the stream flow
15 regime associated with changed water management was in effect, there would be new ongoing and
16 periodic actions associated with operation, maintenance and management of the Alternative 4A
17 facilities and conservation lands that could affect alkali seasonal wetland complex natural
18 community in the study area. The ongoing actions include modified operation of upstream
19 reservoirs, the diversion of Sacramento River flows in the north Delta, and reduced diversions from
20 south Delta channels. These actions are associated with water conveyance facilities and
21 Environmental Commitment 11. The periodic actions would involve access road and conveyance
22 facility repair, vegetation management at the various water conveyance facilities and habitat
23 restoration sites (Environmental Commitment 11), levee repair and replacement of levee armoring,
24 channel dredging, and habitat enhancement in accordance with natural community management
25 plans. The potential effects of these actions are described below.

- 26
- 27 • *Modified river flows upstream of and within the study area and reduced diversions from south*
28 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
29 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
30 channels (associated with Operational Scenario H) would not affect alkali seasonal wetland
31 natural community. This natural community does not exist within or adjacent to the active
32 Sacramento River system channels and Delta waterways that would be affected by modified
33 flow levels.
 - 34 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
35 conveyance facilities and levees associated with Alternative 4A actions have the potential to
36 require removal of adjacent vegetation and could entail earth and rock work in or adjacent to
37 alkali seasonal wetland complex habitats. This activity could lead to increased soil erosion and
38 runoff entering these habitats. These activities would be subject to normal erosion and runoff
39 control management practices, including those developed as part of *AMM2 Construction Best*
40 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
41 vegetation removal or earthwork adjacent to or within alkali seasonal wetland complex habitats
would require use of sediment barriers, soil stabilization and revegetation of disturbed surfaces

1 as required by *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper
2 implementation of these measures would avoid permanent adverse effects on this community.

- 3 • *Vegetation management*. Vegetation management, in the form of physical removal and chemical
4 treatment, would be a periodic activity associated with the long-term maintenance of water
5 conveyance facilities and restoration sites (*Environmental Commitment 11 Natural Communities*
6 *Enhancement and Management*). Use of herbicides to control nuisance vegetation could pose a
7 long-term hazard to alkali seasonal wetland complex natural community at or adjacent to
8 treated areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled
9 runoff of contaminated stormwater onto the natural community, or direct discharge of
10 herbicides to alkali seasonal wetland complex areas being treated for invasive species removal.
11 Environmental commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan*
12 have been made part of the project to reduce hazards to humans and the environment from use
13 of various chemicals during maintenance activities, including the use of herbicides. These
14 commitments, including the commitment to prepare and implement spill prevention,
15 containment, and countermeasure plans and stormwater pollution prevention plans, are
16 described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*. Best management
17 practices, including control of drift and runoff from treated areas, and use of herbicides
18 approved for use in terrestrial environments would also reduce the risk of affecting natural
19 communities adjacent to water conveyance features and levees associated with restoration
20 activities.
- 21 • *Habitat enhancement*. Alternative 4A includes a long-term management element for the natural
22 communities within the study area (*Environmental Commitment 11*). For the alkali seasonal
23 wetland complex natural community, a management plan would be prepared that specifies
24 actions to improve the value of the habitats for species. Actions would include control of
25 invasive nonnative plant and animal species, fire management, restrictions on vector control
26 and application of herbicides, and maintenance of infrastructure that would allow for movement
27 through the community. The enhancement efforts would improve the long-term value of this
28 community for both special-status and common species.

29 The various operations and maintenance activities described above could alter acreage of alkali
30 seasonal wetland complex natural community in the study area. Activities could introduce sediment
31 and herbicides that would reduce the value of this community to common and sensitive plant and
32 wildlife species. Other periodic activities associated with the project, including management,
33 protection and enhancement actions associated with *Environmental Commitment 3 Natural*
34 *Communities Protection and Restoration* and *Environmental Commitment 11 Natural Communities*
35 *Enhancement and Management*, would be undertaken to enhance the value of the community. While
36 some of these activities could result in small changes in acreage, these changes would be offset by
37 protection and restoration activities planned as part of *Environmental Commitment 3 Natural*
38 *Communities Protection and Restoration* and *Environmental Commitment 9 Vernal Pool and Alkali*
39 *Seasonal Wetland Complex Restoration*, or minimized by implementation of AMM2, AMM4, AMM5,
40 and AMM10. The management actions associated with control of invasive plant species would also
41 result in a long-term benefit to the species associated with alkali seasonal wetland complex habitats
42 by eliminating competitive, invasive species of plants.

43 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
44 Alternative 4A would not result in a net permanent reduction in this natural community within the

1 study area. Therefore, there would be no adverse effect on the alkali seasonal wetland complex
2 natural community.

3 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4A would
4 have the potential to create minor changes in total acreage of alkali seasonal wetland complex
5 natural community in the study area, and could create temporary increases sedimentation. The
6 activities could also introduce herbicides periodically to control nonnative, invasive plants.
7 Implementation of environmental commitments and AMM2, AMM4, AMM5, and AMM10 would
8 minimize these impacts, and other operations and maintenance activities, including management,
9 protection and enhancement actions associated with *Environmental Commitment 3 Natural*
10 *Communities Protection and Restoration* and *Environmental Commitment 11 Natural Communities*
11 *Enhancement and Management*, would create positive effects, including reduced competition from
12 invasive, nonnative plants in these habitats. Long-term restoration activities associated with
13 *Environmental Commitment 9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and
14 protection actions associated with *Environmental Commitment 3 Natural Communities Protection*
15 *and Restoration* would ensure that the acreage of this natural community would not decrease in the
16 study area. Ongoing operation, maintenance and management activities would not result in a net
17 permanent reduction in this natural community within the study area. Therefore, there would be a
18 less-than-significant impact on the alkali seasonal wetland complex natural community.

19 **Vernal Pool Complex**

20 Construction, operation, maintenance and management associated with the Environmental
21 Commitments of Alternative 4A would have no long-term adverse effects on the habitats associated
22 with the vernal pool complex natural community. Initial development and construction of water
23 conveyance facilities would result in permanent removal of 19 acres of this community and tidal
24 restoration would result in the conversion of an estimated 25 acres of vernal pool complex (see
25 Table 12-4A-7). Implementation of Alternative 4A would also include the following Resource
26 Restoration and Performance Principles over the term of the project to benefit the vernal pool
27 complex natural community.

- 28 ● Protect existing vernal pool complex in the greater Byron Hills area primarily in core vernal pool
29 recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of California and*
30 *Southern Oregon* (U.S. Fish and Wildlife Service 2005) (Resource Restoration and Performance
31 Principle VP/AW1).
- 32 ● Restore vernal pool and alkali seasonal wetland complex to achieve no net loss of wetted
33 acreage (Resource Restoration and Performance Principle VP/AW2).
- 34 ● Increase the size and connectivity of protected vernal pool and alkali seasonal wetland complex
35 in the greater Byron Hill area (Resource Restoration and Performance Principle VP/AW3).
- 36 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining vernal pool
37 and alkali seasonal wetland complex species (Resource Restoration and Performance Principle
38 VP/AW4).

39 As explained below, with the protection, restoration and enhancement of the amounts of habitat
40 proposed for Alternative 4A, in addition to implementation of AMMs, impacts on this natural
41 community would not be adverse for NEPA purposes and would be less than significant for CEQA
42 purposes.

1 **Table 12-4A-7. Changes in Vernal Pool Complex Natural Community Associated with Alternative**
2 **4A (acres)**

Project Component	Permanent	Temporary
Water Conveyance Facilities	19	3
Environmental Commitment 4 ^a	25	0
Environmental Commitment 7 ^a	0	0
Environmental Commitment 10 ^a	0	0
TOTAL IMPACTS	44	3

^a See discussion below for a description of applicable Environmental Commitments.

3

4 **Impact BIO-21: Changes in Vernal Pool Complex Natural Community as a Result of**
5 **Implementing Alternative 4A**

6 Construction and land grading activities that would accompany the implementation of water
7 conveyance facilities and tidal restoration would permanently eliminate an estimated 44 acres and
8 temporarily remove 3 acres of vernal pool complex natural community in the study area. These
9 acreages are based on the proposed location of the water conveyance facilities construction
10 footprint and the estimated effects from tidal restoration (Environmental Commitment 4). The loss
11 of this combined 47 acres would represent approximately 0.4% of the 12,133 acres of the
12 community that is mapped in the study area. Vernal pool/alkali seasonal wetland complex
13 protection (188 acres) and restoration (48 acres) would be initiated during the Alternative 4A
14 construction period to counteract the loss of habitat. Because of the high sensitivity of this natural
15 community and its shrinking presence in the study area, avoidance and minimization measures have
16 been built into the project to eliminate the majority of this potential loss.

17 The individual effects of water conveyance facilities are addressed below. A summary statement of
18 the impacts and NEPA and CEQA conclusions follows the individual activity discussions.

- 19 ● *Water Facilities and Operation:* Construction of the Alternative 4A water conveyance facilities
20 would directly affect 22 acres of vernal pool complex natural community, including 19 acres
21 permanently affected and 3 acres temporarily affected. A portion of this habitat adjacent to
22 Clifton Court Forebay includes iodine bush scrub, a sensitive plant community. The permanent
23 loss would occur along the southern edge of Clifton Court Forebay, where the forebay would be
24 expanded to provide greater storage capacity and from the construction of permanent
25 transmission lines. The temporary losses would occur in a temporary work area immediately
26 adjacent to Clifton Court Forebay (see Figure 12-1 and the Terrestrial Biology Mapbook).
- 27 ● Because of the close proximity of construction activity to adjacent vernal pool complex near
28 Clifton Court Forebay, there is also the potential for indirect loss or damage to vernal pools from
29 changes in pool hydrology or deposition of construction-related sediment. These potential
30 indirect effects are discussed in detail in the vernal pool crustaceans impact analysis in the
31 *Wildlife Species* section.
- 32 ● The construction activity associated with water conveyance facilities also has the potential to
33 lead to increased nitrogen deposition in vernal pool complex habitats in the vicinity of Clifton
34 Court Forebay and Stone Lakes NWR. A significant number of cars, trucks, and land grading
35 equipment involved in construction would emit small amounts of atmospheric nitrogen from
36 fuel combustion; this material could be deposited in sensitive vernal pool areas that are located

1 west of the major construction areas at Clifton Court Forebay and east of the construction areas
2 adjacent to Stone Lakes NWR. Nitrogen deposition can pose a risk of adding a fertilizer to
3 nitrogen-limited soils and their associated plants. Nonnative invasive species can be encouraged
4 by the added nitrogen available. Appendix 5.J, Attachment 5J.A, *Construction-Related Nitrogen*
5 *Deposition on BDCP Natural Communities*, of the BDCP addresses this issue in detail. It has been
6 concluded that this potential deposition would pose a low risk of changing the vernal pool
7 complex in the construction areas because the construction would contribute a negligible
8 amount of nitrogen to regional projected emissions. Also, the construction at Clifton Court
9 Forebay would occur primarily downwind of the natural community. At Stone Lakes NWR,
10 USFWS refuge management undertakes active invasive species control, including use of grazing.
11 No adverse effect is expected.

- 12 ● *Environmental Commitment 3 Natural Communities Protection and Restoration*: Environmental
13 Commitment 3 proposes to protect up to 188 acres of vernal pool complex/alkali seasonal
14 wetland complex, primarily in the Clifton Court Forebay area. The protection would occur in
15 areas containing a mosaic of grassland and vernal pool complex in unfragmented natural
16 landscapes supporting a diversity of native plant and wildlife species. These areas would be
17 both protected and enhanced to increase the cover of vernal pool complex plants relative to
18 nonnative species.
- 19 ● *Environmental Commitment 4 Tidal Natural Communities Restoration*: Environmental
20 Commitment 4 would permanently inundate or remove an estimated 25 acres of vernal pool
21 complex. The losses would occur in one or more of the ROAs established for tidal restoration
22 (see Figure 12-1).
- 23 ● *Environmental Commitment 9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*:
24 Environmental Commitment 9 includes both vernal pool complex and alkali seasonal wetland
25 complex restoration goals. The current estimate for vernal pool/alkali seasonal wetland
26 complex restoration is 48 acres. This restoration Environmental Commitment includes a “no net
27 loss” policy normally applied to this natural community.

28 The following paragraphs summarize the combined effects discussed above and describe other
29 project environmental commitments and AMMs that offset or avoid these effects. NEPA and CEQA
30 impact conclusions are also included.

31 During the project construction period (14 years), Alternative 4A could directly affect 47 acres of
32 vernal pool complex natural community through construction-related losses in habitat from water
33 conveyance facilities and tidal restoration.

34 The construction loss of this special-status natural community would represent an adverse effect if
35 it were not offset by avoidance and minimization measures and restoration actions associated with
36 the project’s Environmental Commitments. Loss of vernal pool complex natural community would
37 be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
38 defined by Section 404 of the CWA. The protection of up to 188 acres of vernal pool/alkali seasonal
39 wetland complex as part of Environmental Commitment 3 and the restoration of up to 48 acres of
40 these communities (including a commitment to have restoration keep pace with losses) as part of
41 Environmental Commitment 9 during construction of Alternative 4A facilities would offset this loss.
42 The project focuses this protection in the core vernal pool areas identified in the USFWS vernal pool
43 recovery plan (U.S. Fish and Wildlife Service 2005). The core areas exist in CZ 1, CZ 8, and CZ 11 (see
44 Figure 12-1). Typical project-level mitigation ratios (2:1 for protection and 1:1 for restoration)

1 would indicate 94 acres of protection and 47 acres of restoration would be needed to offset (i.e.,
2 mitigate) the 47 acres of loss. In addition, because it is not possible to create iodine bush scrub,
3 mitigation for impacts on this plant community must be through avoidance and/or protection of
4 compensating mitigation areas. Protection of iodine bush scrub within the grassland/vernal pool
5 complex/alkali seasonal wetland habitats adjacent to Clifton Court Forebay provides the only
6 opportunity in the Plan Area to protect this habitat.

7 To further avoid adverse effect, the project includes commitments to implement *AMM1 Worker*
8 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*
9 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM10 Restoration*
10 *of Temporarily Affected Natural Communities*, *AMM12 Vernal Pool Crustaceans*, and *AMM30*
11 *Transmission Line Design and Alignment Guidelines*. All of these AMMs include elements that avoid or
12 minimize the risk of affecting habitats at work areas. BDCP Appendix 3.C describes the AMMs, which
13 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
14 *AMMs, and CMs*, of the Final EIR/EIS. With these AMMs in place, Alternative 4A would not adversely
15 affect vernal pool complex natural community.

16 **NEPA Effects:** The Environmental Commitments associated with Alternative 4A include protection
17 of up to 188 acres (Environmental Commitment 3) and restoration of an estimated 48 acres
18 (Environmental Commitment 9) of vernal pool/alkali seasonal wetland complex, which would be
19 guided by Resource Restoration and Performance Principles VP/AW1-VP/AW4. The project focuses
20 the protection in the core vernal pool areas identified in the USFWS vernal pool recovery plan (U.S.
21 Fish and Wildlife Service 2005). A core area exists in CZ 1 (see Figure 12-1). With these
22 Environmental Commitments and AMMs in effect through the entire project period, Alternative 4A
23 would not have an adverse effect on the vernal pool complex natural community.

24 **CEQA Conclusion:** During the 14-year construction period, Alternative 4A could result in the direct
25 loss of approximately 47 acres of vernal pool complex natural community due to construction of the
26 water conveyance facility and tidal restoration.

27 The construction-related loss of this special-status natural community would represent a significant
28 impact if it were not offset by avoidance and minimization measures and other actions associated
29 with Alternative 4A Environmental Commitments. Loss of vernal pool complex natural community
30 would be considered both a loss in acreage of a sensitive natural community and a loss of wetland as
31 defined by Section 404 of the CWA. The protection of up to 188 acres of vernal pool/alkali seasonal
32 wetland complex as part of Environmental Commitment 3 and the restoration of an estimated 48
33 acres of this community (including a commitment to have restoration keep pace with losses) as part
34 of Environmental Commitment 9 during the construction of Alternative 4A facilities would offset
35 this loss, Resource Restoration and Performance Principles VP/AW1-VP/AW4. Typical project-level
36 mitigation ratios (2:1 for protection and 1:1 for restoration) would indicate 94 acres of protection
37 and 47 acres of restoration would be needed to offset (i.e., mitigate) the 47 acres of loss. Alternative
38 4A also includes AMM1, AMM2, AMM3, AMM4, AMM10, AMM12, and AMM30 to minimize impacts.
39 Because of the offsetting protection and restoration activities and implementation of AMMs, impacts
40 would be less than significant.

41 **Impact BIO-22: Increased Frequency, Magnitude and Duration of Periodic Inundation of** 42 **Vernal Pool Complex Natural Community**

43 Alternative 4A would not result in periodic effects on the vernal pool complex natural community
44 type.

1 **NEPA Effects:** No effect.

2 **CEQA Conclusion:** No impact.

3 **Impact BIO-23: Modification of Vernal Pool Complex Natural Community from Ongoing**
4 **Operation, Maintenance and Management Activities**

5 Once the physical facilities associated with Alternative 4A are constructed and the stream flow
6 regime associated with changed water management is in effect, there would be new ongoing and
7 periodic actions associated with operation, maintenance and management of the project facilities
8 and conservation lands that could affect vernal pool complex natural community in the study area.
9 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento
10 River flows in the north Delta, and reduced diversions from south Delta channels. These actions are
11 associated with water conveyance facilities and Environmental Commitment 11. The periodic
12 actions would involve access road and conveyance facility repair, vegetation management at the
13 various water conveyance facilities and habitat restoration sites (Environmental Commitment 11),
14 levee repair and replacement of levee armoring, channel dredging, and habitat enhancement in
15 accordance with natural community management plans. The potential effects of these actions are
16 described below.

- 17 • *Modified river flows upstream of and within the study area and reduced diversions from south*
18 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
19 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
20 channels (associated with Operational Scenario H) would not affect vernal pool complex natural
21 community. This natural community does not exist within or adjacent to the major Sacramento
22 River system and Delta waterways.
- 23 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
24 conveyance facilities and levees associated with the Alternative 4A actions have the potential to
25 require removal of adjacent vegetation and could entail earth and rock work adjacent to vernal
26 pool complex habitats. This activity could lead to increased soil erosion and runoff entering
27 these habitats. These activities would be subject to normal erosion and runoff control
28 management practices, including those developed as part of *AMM2 Construction Best*
29 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any
30 vegetation removal or earthwork adjacent to vernal pool complex habitats would require use of
31 sediment barriers, soil stabilization and revegetation of disturbed surfaces as part of *AMM10*
32 *Restoration of Temporarily Affected Natural Communities*. Proper implementation of these
33 measures would avoid permanent adverse effects on this community.
- 34 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
35 treatment, would be a periodic activity associated with the long-term maintenance of water
36 conveyance facilities and restoration sites (*Environmental Commitment 11 Natural Communities*
37 *Enhancement and Management*). Use of herbicides to control nuisance vegetation could pose a
38 long-term hazard to vernal pool complex natural community at or adjacent to treated areas. The
39 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
40 stormwater onto the natural community, or direct discharge of herbicides to vernal pool
41 complex areas being treated for invasive species removal. Environmental commitments and
42 *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been made part of the
43 project to reduce hazards to humans and the environment from use of various chemicals during
44 maintenance activities, including the use of herbicides. These commitments, including the

1 commitment to prepare and implement spill prevention, containment, and countermeasure
2 plans and stormwater pollution prevention plans, are described in Appendix 3B, *Environmental*
3 *Commitments, AMMs, and CMs*. Best management practices, including control of drift and runoff
4 from treated areas, and use of herbicides approved for use in terrestrial or aquatic
5 environments would also reduce the risk of affecting natural communities adjacent to water
6 conveyance features and levees associated with restoration activities.

- 7 • *Habitat enhancement*. The project includes a long-term management element for the natural
8 communities within the study area (Environmental Commitment 11). For the vernal pool
9 complex natural community, a management plan would be prepared that specifies actions to
10 improve the value of the habitats for species. Actions would include control of invasive
11 nonnative plant and animal species, fire management, restrictions on vector control and
12 application of herbicides, and maintenance of infrastructure that would allow for movement
13 through the community. The enhancement efforts would improve the long-term value of this
14 community for both special-status and common species.

15 The various operations and maintenance activities described above could alter acreage of vernal
16 pool complex natural community in the study area. Activities could introduce sediment and
17 herbicides that would reduce the value of this community to common and sensitive plant and
18 wildlife species. Other periodic activities associated with the project, including management,
19 protection and enhancement actions associated with *Environmental Commitment 3 Natural*
20 *Communities Protection and Restoration* and *Environmental Commitment 11 Natural Communities*
21 *Enhancement and Management*, would be undertaken to enhance the value of the community. While
22 some of these activities could result in small changes in acreage, these changes would be greatly
23 offset by restoration activities planned as part of *Environmental Commitment 9 Vernal Pool and*
24 *Alkali Seasonal Wetland Complex Restoration*, or minimized by implementation of AMM2, AMM4,
25 AMM5, AMM10, AMM12, and AMM30. The management actions associated with control of invasive
26 plant species would also result in a long-term benefit to the species associated with vernal pool
27 complex habitats by eliminating competitive, invasive species of plants.

28 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
29 Alternative 4A would not result in a net permanent reduction in the vernal pool complex natural
30 community within the study area. Therefore, there would be no adverse effect on this natural
31 community.

32 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4A would
33 have the potential to create minor changes in total acreage of vernal pool complex natural
34 community in the study area. The activities could also introduce herbicides periodically to control
35 nonnative, invasive plants. Implementation of environmental commitments and AMM2, AMM4,
36 AMM5, AMM10, AMM12, and AMM30 would minimize these impacts, and other operations and
37 maintenance activities, including management, protection and enhancement actions associated with
38 *Environmental Commitment 3 Natural Communities Protection and Restoration* and *Environmental*
39 *Commitment 11 Natural Communities Enhancement and Management*, would create positive effects,
40 including reduced competition from invasive, nonnative plants in these habitats. Long-term
41 restoration activities associated with *Environmental Commitment 9 Vernal Pool and Alkali Seasonal*
42 *Wetland Complex Restoration* and protection actions associated with *Environmental Commitment 3*
43 *Natural Communities Protection and Restoration* would ensure that the acreage of this natural
44 community would not decrease in the study area. Ongoing operation, maintenance and management
45 activities would not result in a net permanent reduction in this natural community within the study

1 area. Therefore, there would be a less-than-significant impact on the vernal pool complex natural
2 community.

3 **Managed Wetland**

4 The construction of water conveyance facilities for Alternative 4A would reduce the acreage of
5 managed wetland currently found in the study area. Initial development and construction of water
6 conveyance facilities would result in both permanent and temporary removal of this community
7 (see Table 12-4A-8). Also, tidal restoration (Environmental Commitment 4) would result in the
8 removal or conversion of managed wetland (see Table 12-4A-8).

9 Creation of similar habitat values by restoring nontidal marsh as part of Environmental
10 Commitment 10 would offset the losses of managed wetland. The net effect would be a decrease in
11 the amount of managed wetland, but an increase in similar habitat value for special-status and
12 common species as cultivated land is converted to nontidal marsh. Impacts on this natural
13 community would not be adverse for NEPA purposes and would be less than significant for CEQA
14 purposes. Refer to Impacts BIO-178 through BIO-183 in the *Shorebirds and Waterfowl* discussion for
15 further consideration of the effects of removing managed wetland natural community.

16 **Table 12-4A-8. Changes in Managed Wetland Associated with Alternative 4A (acres)**

Project Component	Permanent	Temporary
Water Conveyance Facilities	16	25
Environmental Commitment 4 ^a	20	0
Environmental Commitment 7 ^a	0	0
Environmental Commitment 10 ^a	0	0
TOTAL IMPACTS	36	25

^a See discussion below for a description of applicable Environmental Commitments.

17

18 **Impact BIO-24: Changes in Managed Wetland Natural Community as a Result of Implementing**
19 **Alternative 4A**

20 Construction and land grading activities that would accompany the implementation of water
21 conveyance facilities and tidal restoration (Environmental Commitment 4) would permanently
22 eliminate an estimated 36 acres and temporarily affect 25 acres of managed wetland in the study
23 area. These modifications represent approximately 0.09% of the 70,798 acres of managed wetland
24 that is mapped in the study area. This loss would occur over the course of Alternative 4A
25 construction (14 year period). Alternative 4A does not include protection or restoration actions
26 directed specifically at managed wetland, but protection and restoration of nontidal wetland (119
27 acres and 832 acres, respectively) would replace the habitat values lost for special-status wildlife
28 and plant species.

29 The individual effects of the relevant Environmental Commitment are addressed below. A summary
30 statement of the combined impacts and NEPA and CEQA conclusions follows the individual activity
31 discussions.

- 32 • *Water Facilities and Operation:* Construction of the Alternative 4A water conveyance facilities
33 would permanently remove 16 acres and temporarily remove 25 acres of managed wetland
34 community. The permanent losses would occur near the northeast corner of Clifton Court

1 Forebay for the construction of a permanent shaft location, a permanent transmission line west
2 of Clifton Court Forebay, and a permanent access road on Bouldin Island. Temporary impacts
3 would occur in association with temporary work areas on Mandeville Island, a concrete batch
4 plant on Bouldin Island, and a tunnel muck conveyor facility near Clifton Court Forebay (see the
5 Terrestrial Biology Mapbook). Smaller losses would occur from construction of the temporary
6 transmission lines that parallel the tunnel alignment northwest of the intermediate forebay and
7 across the length of Mandeville Island.

- 8 • *Environmental Commitment 4 Tidal Natural Communities Restoration*: Environmental
9 Commitment 4 would permanently inundate or remove an estimated 20 acres of managed
10 wetlands. The losses would occur in one or more of the ROAs established for tidal restoration
11 (see Figure 12-1).
- 12 • *Environmental Commitment 6 Channel Margin Enhancement*: Channel margin habitat
13 enhancement could result in filling of small amounts of managed wetland habitat along 4.6 miles
14 of river and sloughs. The extent of this loss cannot be quantified at this time, but the majority of
15 the enhancement activity would occur on the edges of tidal perennial aquatic habitat, including
16 levees and channel banks. Managed wetland adjacent to these tidal areas could be affected. The
17 improvements would occur within the study area on sections of the Sacramento, San Joaquin
18 and Mokelumne Rivers, and along Steamboat and Sutter Sloughs.

19 The following paragraphs summarize the combined effects discussed above and describe other
20 project environmental commitments and AMMs that offset or avoid these effects. NEPA and CEQA
21 impact conclusions are also included.

22 During construction of the water conveyance facility and implementation of tidal restoration,
23 Alternative 4A would permanently remove 36 acres and temporarily remove 25 acres of managed
24 wetland.

25 The construction loss of this special-status natural community would represent an adverse effect if
26 it were not offset by the Environmental Commitments described in Chapter 3, Section 3.5.18.2,
27 *Environmental Commitments*. Loss of managed wetland natural community would be considered
28 both a loss in acreage of a sensitive natural community and potentially a loss of wetland as defined
29 by Section 404 of the CWA. Many managed wetland areas are interspersed with small natural
30 wetlands that would be regulated under Section 404. The restoration of up to 832 acres of nontidal
31 wetland (Environmental Commitment 10) and protection and enhancement of 119 acres
32 (Environmental Commitment 3) of nontidal wetland during the Alternative 4A construction period
33 would offset the loss of the habitat values associated with managed wetland associated with water
34 conveyance facilities managed wetland loss. Typical project-level mitigation ratios (1:1 for
35 protection) would indicate 61 acres of protection would be needed to offset the 61 acres of loss
36 associated with water conveyance facilities. The protection and restoration of nontidal marsh
37 associated with Alternative 4A would fully compensate for the loss in habitat value associated with
38 the managed wetland loss.

39 The project also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*
42 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting
43 habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and

1 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
2 EIR/EIS.

3 In spite of the managed wetland protection, restoration and avoidance measures contained in
4 Alternative 4A, there would be a net reduction in the acreage of this special-status natural
5 community. This would be an adverse effect when judged by the significance criteria used for
6 analysis of terrestrial biological resources (see Section 12.3.1.2, *Significance Criteria for Terrestrial*
7 *Biological Resources*). However, the creation of nontidal marsh habitats (832 acres) that support
8 similar ecological functions would offset this adverse effect. Also, there are other Environmental
9 Commitments contained in the project (Environmental Commitment 3 and Environmental
10 Commitment 11) that would improve management and enhance existing habitat values, further
11 offsetting the effects of managed wetland loss on special-status terrestrial species and on common
12 species that rely on this natural community for some life phase. As a result, there would be no
13 adverse effect.

14 **NEPA Effects:** Alternative 4A would result in a loss of 61 acres of managed wetland within the study
15 area; however, it would also protect and enhance up to 119 acres and restore up to 832 acres of
16 habitat (nontidal wetland) with similar wildlife values. Therefore, there would be no adverse effect
17 on managed wetland natural community.

18 **CEQA Conclusion:** During the project's construction time frame (14 years), Alternative 4A would
19 permanently remove 36 acres and temporarily remove 25 acres of managed wetland through
20 construction-related losses in habitat from water conveyance facilities activities and tidal
21 restoration.

22 The construction loss of this special-status natural community would represent a significant impact
23 if it were not offset by other the Environmental Commitments described in Chapter 3, Section
24 3.5.18.2. Loss of managed wetland natural community would be considered both a loss in acreage of
25 a sensitive natural community and potentially a loss of wetland as defined by Section 404 of the
26 CWA. The restoration of up to 832 acres and protection and enhancement of 119 acres of nontidal
27 marsh as part of Environmental Commitment 3 and Environmental Commitment 10 during
28 construction of Alternative 4A would fully offset the losses in habitat value associated with water
29 conveyance facilities. Typical project-level mitigation ratios (1:1 for protection) would indicate 61
30 acres of protection would be needed to offset the 61 acres of loss associated with water conveyance
31 facilities. The combined protection and restoration proposed for nontidal marsh would offset the
32 loss of wildlife habitat value. This acreage would significantly exceed the number of acres of
33 managed wetland lost.

34 The project also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
35 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
36 *Plan*, *AMM4 Erosion and Sediment Control Plan*, and *AMM10 Restoration of Temporarily Affected*
37 *Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of affecting
38 habitats at work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and
39 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
40 EIR/EIS.

41 In spite of the nontidal marsh protection and restoration contained in Alternative 4A, there would
42 be a net reduction in the acreage of managed wetland special-status natural community. This would
43 be a significant impact when judged by the significance criteria listed in Section 12.3.1.2, *Significance*
44 *Criteria for Terrestrial Biological Resources*. However, there are other Environmental Commitments

1 contained in the project (Environmental Commitment 3, Environmental Commitment 10 and
2 Environmental Commitment 11) that would improve management and enhance existing habitat
3 values and expand habitat with similar values, further offsetting the impacts of managed wetland
4 loss on special-status terrestrial species and on common species that rely on this natural community
5 for some life phase. As a result, there would be a less-than-significant impact.

6 **Impact BIO-25: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
7 **Managed Wetland Natural Community**

8 Alternative 4A would not result in periodic effects on the managed wetland natural community type.

9 *NEPA Effects:* No effect.

10 *CEQA Conclusion:* No impact.

11 **Impact BIO-26: Modification of Managed Wetland Natural Community from Ongoing**
12 **Operation, Maintenance and Management Activities**

13 Once the physical facilities associated with Alternative 4A are constructed and the stream flow
14 regime associated with changed water management is in effect, there would be new ongoing and
15 periodic actions associated with operation, maintenance and management of the project facilities
16 and conservation lands that could affect managed wetland natural community in the study area. The
17 ongoing actions include changes in operation of upstream reservoirs, the diversion of Sacramento
18 River flows in the north Delta, and reduced diversions from south Delta channels. These actions are
19 associated with water conveyance facilities and Environmental Commitment 11. The periodic
20 actions would involve access road and conveyance facility repair, vegetation management at the
21 various water conveyance facilities and habitat restoration sites (Environmental Commitment 11),
22 levee repair and replacement of levee armoring, channel dredging, and habitat enhancement in
23 accordance with natural community management plans. The potential effects of these actions are
24 described below.

- 25 • *Modified river flows upstream of and within the study area and reduced diversions from south*
26 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
27 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
28 channels (associated with Operational Scenario H) would not result in the reduction in acreage
29 of the managed wetland natural community in the study area. Flow levels in the upstream rivers
30 would not change to the degree that water levels in adjacent managed wetlands would be
31 altered. Similarly, increased diversions of Sacramento River flows in the north Delta would not
32 result in a permanent reduction in the managed wetland community downstream of these
33 diversions. The majority of the managed wetlands below the diversions is not directly connected
34 to the rivers. Reduced diversions from the south Delta channels would not create a reduction in
35 this natural community.
- 36 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
37 conveyance facilities and levees associated with Alternative 4A actions have the potential to
38 require removal of adjacent vegetation and could entail earth and rock work in managed
39 wetland habitats. This activity could lead to increased soil erosion, turbidity and runoff entering
40 managed wetlands. These activities would be subject to normal erosion, turbidity and runoff
41 control management practices, including those developed as part of *AMM2 Construction Best*
42 *Management Practices and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any

1 vegetation removal or earthwork adjacent to or within managed wetland habitats would require
2 use of sediment and turbidity barriers, soil stabilization and revegetation of disturbed surfaces.
3 Proper implementation of these measures would avoid permanent adverse effects on this
4 community.

- 5 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
6 treatment, would be a periodic activity associated with the long-term maintenance of water
7 conveyance facilities and restoration sites (*Environmental Commitment 11 Natural Communities*
8 *Enhancement and Management*). Use of herbicides to control nuisance vegetation could pose a
9 long-term hazard to managed wetland natural community at or adjacent to treated areas. The
10 hazard could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
11 stormwater onto the community, or direct discharge of herbicides to managed wetland areas
12 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
13 *Prevention, Containment, and Countermeasure Plan* have been made part of the project to reduce
14 hazards to humans and the environment from use of various chemicals during maintenance
15 activities, including the use of herbicides. These commitments, including the commitment to
16 prepare and implement spill prevention, containment, and countermeasure plans and
17 stormwater pollution prevention plans, are described in Appendix 3B, *Environmental*
18 *Commitments, AMMs, and CMs*. Best management practices, including control of drift and runoff
19 from treated areas, and use of herbicides approved for use in aquatic and terrestrial
20 environments would also reduce the risk of affecting natural communities adjacent to water
21 conveyance features and levees associated with restoration activities.
- 22 • *Habitat enhancement.* The project includes a long-term management element for the natural
23 communities within the study area (*Environmental Commitment 11*). For the managed wetland
24 natural community, a management plan would be prepared that specifies actions to improve the
25 value of the habitats for species. Actions would include control of invasive nonnative plant and
26 animal species, fire management, restrictions on vector control and application of herbicides,
27 and maintenance of infrastructure that would allow for movement through the community. The
28 enhancement efforts would improve the long-term value of this community for both special-
29 status and common species.

30 The various operations and maintenance activities described above could alter acreage of managed
31 wetland natural community in the study area through facilities maintenance and vegetation
32 management. Activities could also introduce sediment and herbicides that would reduce the value of
33 this community to common and sensitive plant and wildlife species. Other periodic activities
34 associated with the project, including management, protection and enhancement actions associated
35 with *Environmental Commitment 3 Natural Communities Protection and Restoration* and
36 *Environmental Commitment 11 Natural Communities Enhancement and Management*, would be
37 undertaken to enhance the value of the community. While some of these activities could result in
38 small changes in acreage, these changes would be offset by restoration activities planned as part of
39 *Environmental Commitment 10 Nontidal Marsh Restoration* and protection and restoration actions
40 associated with *Environmental Commitment 3 Natural Communities Protection and Restoration*. The
41 management actions associated with levee repair and control of invasive plant species would also
42 result in a long-term benefit to the species associated with managed wetland habitats by improving
43 water movement.

44 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
45 Alternative 4A would not result in a net permanent reduction in acreage of managed wetland

1 natural community within the study area. Therefore, there would be no adverse effect on this
2 natural community.

3 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4A would
4 have the potential to create minor changes in total acreage of managed wetland natural community
5 in the study area, and could create temporary increases in turbidity and sedimentation. The
6 activities could also introduce herbicides periodically to control nonnative, invasive plants. Hunting
7 could intermittently reduce the availability of this community to special-status and common wildlife
8 species. Implementation of environmental commitments and AMM2, AMM4, and AMM5 would
9 minimize these impacts, and other operations and maintenance activities, including management,
10 protection and enhancement actions associated with *Environmental Commitment 3 Natural*
11 *Communities Protection and Restoration* and *Environmental Commitment 11 Natural Communities*
12 *Enhancement and Management*, would create positive effects, including improved water movement
13 in and adjacent to these habitats. Long-term restoration activities associated with *Environmental*
14 *Commitment 10 Nontidal Marsh Restoration* and protection and restoration actions associated with
15 *Environmental Commitment 3 Natural Communities Protection and Restoration* would greatly expand
16 the ecological functions of this natural community in the study area. Ongoing operation,
17 maintenance and management activities would not result in a net permanent reduction in this
18 sensitive natural community within the study area. Therefore, there would be a less-than-significant
19 impact on the managed wetland natural community.

20 **Other Natural Seasonal Wetland**

21 The other natural seasonal wetlands natural community encompasses all the remaining natural (not
22 managed) seasonal wetland communities other than vernal pools and alkali seasonal wetlands.
23 These areas mapped by CDFW (Hickson and Keeler-Wolf 2007) and ICF biologists (the western area
24 of additional analysis; see Figure 12-1) consist of seasonally ponded, flooded, or saturated soils
25 dominated by grasses, sedges, or rushes. The largest segments of this community in the study area
26 are located along the Cosumnes River northeast of Thornton, and in the western extension of the
27 study area northwest of Rio Vista. Most of the smaller mapped areas are located in the Suisun Marsh
28 ROA on the western edge of the Montezuma Hills and in the interior of the Potrero Hills. There are
29 also other natural seasonal wetlands mapped along Old River and Middle River in CZ 7. The only
30 project conservation activity that would potentially affect this natural community is the channel
31 margin enhancement measure (Environmental Commitment 6) (see Table 12-4A-9).

32 **Table 12-4A-9. Changes in Other Natural Seasonal Wetland Associated with Alternative 4A (acres)**

Project Component	Permanent	Temporary
Water Conveyance Facilities	0	0
Environmental Commitment 4 ^a	0	0
Environmental Commitment 7 ^a	UNK	UNK
Environmental Commitment 10 ^a	0	0
TOTAL IMPACTS	0	0

UNK = unknown

^a See discussion below for a description of applicable Environmental Commitments.

33

1 **Impact BIO-27: Modification of Other Natural Seasonal Wetland Natural Community as a**
2 **Result of Implementing Alternative 4A**

3 Because specific locations for implementing Alternative 4A's *Environmental Commitment 6 Channel*
4 *Margin Enhancement* have not been identified, it is not known whether the creation of channel
5 margin habitats along study area streams would remove other natural seasonal wetland community
6 habitats. Several small patches of other natural seasonal wetland natural community are mapped
7 along study area waterways. Because the areas of this community are small, and because their
8 habitat values are also provided by other seasonal wetlands in the study area, the small potential
9 that other natural seasonal wetland would be removed by channel margin enhancement is not
10 expected to create an adverse effect on the special-status species that use this habitat.

11 **NEPA Effects:** Alternative 4A Environmental Commitments would not adversely affect other natural
12 seasonal wetland natural community because of the small potential for this community to be
13 displaced.

14 **CEQA Conclusion:** This community would not be significantly impacted because of the small
15 potential for channel margin enhancement to displace other natural seasonal wetland acreage.
16 There would be no substantial impact on the community. The impact would be less than significant.

17 **Impact BIO-28: Modification of Other Natural Seasonal Wetland Natural Community from**
18 **Ongoing Operation, Maintenance and Management Activities**

19 Once the physical facilities associated with Alternative 4A are constructed and the stream flow
20 regime associated with changed water management is in effect, there would be new ongoing and
21 periodic actions associated with operation, maintenance and management of the project facilities
22 and conservation lands that could affect other natural seasonal wetland natural community in the
23 study area. The ongoing actions include modified operation of upstream reservoirs, the diversion of
24 Sacramento River flows in the north Delta, and reduced diversions from south Delta channels. These
25 actions are associated with water conveyance facilities. The periodic actions would involve access
26 road and conveyance facility repair, vegetation management at the various water conveyance
27 facilities and habitat restoration sites (Environmental Commitment 11), levee repair and
28 replacement of levee armoring, channel dredging, and habitat enhancement in accordance with
29 natural community management plans. The potential effects of these actions are described below.

- 30 • *Modified river flows upstream of and within the study area and reduced diversions from south*
31 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
32 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
33 channels (associated with Operational Scenario H) would not affect other natural seasonal
34 wetland natural community. The small areas mapped in the study area are not in or adjacent to
35 streams that would experience changes in water levels as a result of these operations.
- 36 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
37 conveyance facilities and levees associated with the project actions have the potential to require
38 removal of adjacent vegetation and could entail earth and rock work in other natural seasonal
39 wetland habitats. This activity could lead to increased soil erosion and runoff entering these
40 habitats. These activities would be subject to normal erosion and runoff control management
41 practices, including those developed as part of *AMM2 Construction Best Management Practices*
42 *and Monitoring* and *AMM4 Erosion and Sediment Control Plan*. Any vegetation removal or
43 earthwork adjacent to or within other natural seasonal wetland habitats would require use of

1 sediment barriers, soil stabilization and revegetation of disturbed surfaces as required by
2 *AMM10 Restoration of Temporarily Affected Natural Communities*. Proper implementation of
3 these measures would avoid permanent adverse effects on this community.

- 4 ● *Vegetation management*. Vegetation management, in the form of physical removal and chemical
5 treatment, would be a periodic activity associated with the long-term maintenance of water
6 conveyance facilities and restoration sites (*Environmental Commitment 11 Natural Communities*
7 *Enhancement and Management*). Use of herbicides to control nuisance vegetation could pose a
8 long-term hazard to the other natural seasonal wetland natural community at or adjacent to
9 treated areas. The hazard could be created by uncontrolled drift of herbicides, uncontrolled
10 runoff of contaminated stormwater onto the natural community, or direct discharge of
11 herbicides to wetland areas being treated for invasive species removal. Environmental
12 commitments and *AMM5 Spill Prevention, Containment, and Countermeasure Plan* have been
13 made part of the project to reduce hazards to humans and the environment from use of various
14 chemicals during maintenance activities, including the use of herbicides. These commitments,
15 including the commitment to prepare and implement spill prevention, containment, and
16 countermeasure plans and stormwater pollution prevention plans, are described in Appendix
17 3B, *Environmental Commitments, AMMs, and CMs*. Best management practices, including control
18 of drift and runoff from treated areas, and use of herbicides approved for use in terrestrial or
19 aquatic environments would also reduce the risk of affecting natural communities adjacent to
20 water conveyance features and levees associated with restoration activities.
- 21 ● *Habitat enhancement*. The project includes a long-term management element for the natural
22 communities within the study area (*Environmental Commitment 11*). For the other natural
23 seasonal wetland natural community, a management plan would be prepared that specifies
24 actions to improve the value of the habitats for species. Actions would include control of
25 invasive nonnative plant and animal species, fire management, restrictions on vector control
26 and application of herbicides, and maintenance of infrastructure that would allow for movement
27 through the community. The enhancement efforts would improve the long-term value of this
28 community for both special-status and common species.

29 The various operations and maintenance activities described above could alter acreage of other
30 natural seasonal wetland natural community in the study area. Activities could introduce sediment
31 and herbicides that would reduce the value of this community to common and sensitive plant and
32 wildlife species. Other periodic activities associated with the project, including management,
33 protection and enhancement actions associated with *Environmental Commitment 3 Natural*
34 *Communities Protection and Restoration* and *Environmental Commitment 11 Natural Communities*
35 *Enhancement and Management*, would be undertaken to enhance the value of the community. While
36 some of these activities could result in small changes in acreage, these changes would be minor
37 when compared to the restoration activities planned as part of *Environmental Commitment 9 Vernal*
38 *Pool and Alkali Seasonal Wetland Complex Restoration*, or minimized by implementation of AMM2,
39 AMM4, AMM5, and AMM10. The vernal pool/alkali seasonal wetland complex Environmental
40 Commitment (*Environmental Commitment 9*) includes restoration of up to 48 acres of seasonal
41 wetlands with similar ecological values as the other natural seasonal wetland community. The
42 management actions associated with control of invasive plant species would also result in a long-
43 term benefit to the species associated with other natural seasonal wetland habitats by eliminating
44 competitive, invasive species of plants.

1 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
2 Alternative 4A would not result in a net permanent reduction in this natural community within the
3 study area. Therefore, there would be no adverse effect on the other natural seasonal wetland
4 natural community.

5 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4A would
6 have the potential to create minor changes in total acreage of other natural seasonal wetland natural
7 community in the study area, and could create temporary increases in sedimentation. The activities
8 could also introduce herbicides periodically to control nonnative, invasive plants. Implementation of
9 environmental commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts,
10 and other operations and maintenance activities, including management, protection and
11 enhancement actions associated with *Environmental Commitment 3 Natural Communities Protection*
12 *and Restoration* and *Environmental Commitment 11 Natural Communities Enhancement and*
13 *Management*, would create positive effects, including reduced competition from invasive, nonnative
14 plants in these habitats. Long-term restoration activities associated with *Environmental Commitment*
15 *9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration* and protection actions associated
16 with *Environmental Commitment 3 Natural Communities Protection and Restoration* would ensure
17 that the ecological values provided by this small natural community would not decrease in the study
18 area. Ongoing operation, maintenance and management activities would not result in a net
19 permanent reduction in this natural community within the study area. Therefore, there would be a
20 less-than-significant impact on the other natural seasonal wetland natural community.

21 **Grassland**

22 Construction, operation, maintenance and management associated with Alternative 4A would have
23 no long-term adverse effects on the habitats associated with the grassland natural community.
24 Initial development and construction of water conveyance facilities, tidal restoration
25 (Environmental Commitment 4), and riparian restoration (Environmental Commitment 7) would
26 result in both permanent and temporary removal of this community (see Table 12-4A-10).
27 Implementation of Alternative 4A would also include the following Resource Restoration and
28 Performance Principles over the term of the project to benefit the grassland natural community.

- 29 ● Restore grasslands to connect fragmented patches of protected grassland and to provide upland
30 habitat (Resource Restoration and Performance Principle G1).
- 31 ● Restore and sustain a mosaic of grassland vegetation alliances, reflecting localized water
32 availability, soil chemistry, soil texture, topography, and disturbance regimes, with
33 consideration of historical sites (Resource Restoration and Performance Principle G3).
- 34 ● Increase the extent, distribution, and density of native perennial grasses intermingled with
35 other native species, including annual grasses, geophytes, and other forbs (Resource Restoration
36 and Performance Principle G4).
- 37 ● Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and
38 duration and suitable composition of vegetative cover to support breeding for amphibian and
39 aquatic reptile species (Resource Restoration and Performance Principle G7).
- 40 ● Protect grassland on the landward side of levees adjacent to restored floodplain to provide flood
41 refugia and foraging habitat for riparian brush rabbit (Resource Restoration and Performance
42 Principle G8).

- 1 • Create or protect high-value upland giant garter snake habitat adjacent to the nontidal perennial
2 aquatic habitat being restored and created (Resource Restoration and Performance Principle
3 G9).
- 4 • Protect up to 647 acres of grassland in the Byron Hills area where practicable and/or in other
5 appropriate locations (Resource Restoration and Performance Principle G10).

6 As explained below, with the protection, restoration and enhancement of the amounts of habitat
7 included in the project, in addition to implementation of AMMs, impacts on this natural community
8 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

9 **Table 12-4A-10. Changes in Grassland Natural Community Associated with Alternative 4A (acres)**

Project Component	Permanent	Temporary
Water Conveyance Facilities	467	158
Environmental Commitment 4 ^a	40	0
Environmental Commitment 7 ^a	1	0
Environmental Commitment 10 ^a	0	0
Environmental Commitment 11 ^a	20	0
TOTAL IMPACTS	528	158

^a See discussion below for a description of applicable Environmental Commitments.

10

11 **Impact BIO-29: Changes in Grassland Natural Community as a Result of Implementing**
12 **Alternative 4A**

13 Construction and land grading activities that would accompany the implementation of water
14 conveyance facilities, tidal restoration (Environmental Commitment 4), and riparian restoration
15 (Environmental Commitment 7) would permanently eliminate an estimated 528 acres and
16 temporarily remove 158 acres of grassland natural community in the study area. These
17 modifications represent approximately 0.9% of the 78,047 acres of the community that is mapped in
18 the study area.

19 The individual effects of each relevant Environmental Commitment are addressed below. A
20 summary statement of the combined impacts and NEPA and CEQA conclusions follows the
21 individual activity discussions.

- 22 • *Water Facilities and Operation:* Construction of the Alternative 4A water conveyance facilities
23 would permanently remove 467 acres and temporarily remove 158 acres of grassland natural
24 community. The permanent losses would occur where Intakes 2, 3, and 5 encroach on the
25 Sacramento River’s east bank between Clarksburg and Courtland;; a reusable tunnel material
26 storage site on Bouldin Island; at a permanent pipeline shaft access road on the east side of
27 Bacon Island; and at various permanent facility sites around Clifton Court Forebay, including a
28 reusable tunnel material storage site, new canal connections from Clifton Court Forebay to the
29 two aqueducts, and in the forebay expansion area on the south side of the existing forebay. Most
30 of the permanent losses would be of ruderal and herbaceous grassland areas that exist in very
31 narrow bands adjacent to waterways, levees and roads (see the Terrestrial Biology Mapbook).
32 Some of the grassland lost at the sites of new canals south of Clifton Court Forebay is composed
33 of larger stands of ruderal and herbaceous vegetation and California annual grassland. A portion
34 of the grassland habitat adjacent to Clifton Court Forebay includes iodine bush scrub, a sensitive

1 plant community. The temporary losses would be associated with construction of the temporary
2 access roads along the Sacramento River; temporary transmission lines; at work areas and
3 barge offloading facility construction sites at the south end of Bouldin Island, at the north end of
4 Bacon Island, and the south end of Venice Island and at the northwest corner of Victoria Island;
5 at temporary access road sites on the northern and southern ends of Bacon Island and the
6 northwest corner of Victoria Island; at temporary work areas on Mandeville and Bacon Islands;
7 at the operable barrier construction site at the head of Old River, and various locations around
8 Clifton Court Forebay. These losses would take place during the Alternative 4A construction
9 period.

- 10 • The construction activity associated with water conveyance facilities also has the potential to
11 lead to increased nitrogen deposition in grassland habitats in the vicinity of Clifton Court
12 Forebay. A significant number of cars, trucks, and land grading equipment involved in
13 construction in and around the forebay would emit small amounts of atmospheric nitrogen from
14 fuel combustion; this material could be deposited in sensitive grassland areas that are located
15 west of the major construction areas at Clifton Court Forebay. Nitrogen deposition can pose a
16 risk of adding a fertilizer to nitrogen-limited soils and their associated plants. Nonnative
17 invasive species can be encouraged by the added nitrogen available. Appendix 5.J, Attachment
18 5J.A, *Construction-Related Nitrogen Deposition on BDCP Natural Communities*, of the BDCP
19 addresses this issue in detail. It has been concluded that this potential deposition would pose a
20 low risk of changing the grassland in and adjacent to the construction areas because the
21 construction would contribute a negligible amount of nitrogen to regional projected emissions
22 and the existing grassland is dominated by nonnative invasive species of plants. Also, the
23 construction at Clifton Court Forebay would occur primarily downwind of the natural
24 community. No adverse effect is expected.
- 25 • *Environmental Commitment 3 Natural Community Protection and Restoration*: Approximately
26 1,060 acres of grassland natural community would be protected to restore and enhance aquatic
27 and upland habitat for a number of amphibian, reptile and mammal special-status species.
- 28 • *Environmental Commitment 4 Tidal Natural Communities Restoration*: Environmental
29 Commitment 4 would permanently inundate or remove an estimated 40 acres of grassland. The
30 losses would occur in one or more of the ROAs established for tidal restoration (see Figure 12-
31 1).
- 32 • *Environmental Commitment 6 Channel Margin Enhancement*: Channel margin habitat
33 enhancement could result in removal of small amounts of grassland natural community along
34 4.6 miles of river and sloughs. The extent of this loss cannot be quantified at this time, but the
35 majority of the enhancement activity would occur along waterway margins where grassland
36 habitat stringers exist, including along levees and channel banks. The improvements would
37 occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers,
38 and along Steamboat and Sutter Sloughs.
- 39 • *Environmental Commitment 7 Riparian Natural Community Restoration*: Environmental
40 Commitment 7 would permanently remove an estimated 1 acre of grassland.
- 41 • *Environmental Commitment 8 Grassland Natural Community Restoration*: Up to 1,070 acres of
42 grassland natural community would be restored primarily on the fringes of the Delta, where
43 upland areas merge with Delta wetland and agricultural lands. Restoration would focus on CZ 1,
44 CZ 8, and CZ 11, as proposed by the BDCP.

- 1 • *Environmental Commitment 11 Natural Communities Enhancement and Management*: Natural
2 communities enhancement and management would include a wide range of activities designed
3 to improve habitat conditions in restored and protected lands associated with the project. This
4 measure also promotes sound use of pesticides, vector control activities, invasive species
5 control and fire management in preserve areas.

6 The following paragraphs summarize the combined effects discussed above and describe other
7 project Environmental Commitments and AMMs that offset or avoid these effects. NEPA and CEQA
8 impact conclusions are also included.

9 During the project's construction timeframe, Alternative 4A would affect the grassland natural
10 community through water conveyance facilities construction, tidal restoration (Environmental
11 Commitment 4), and riparian restoration (Environmental Commitment 7) (528 acres permanent
12 and 158 acres temporary).

13 The construction losses of this natural community would not represent an adverse effect based on
14 the significance criteria used for this section because grassland is not considered a special-status or
15 sensitive natural community. Most Central Valley grasslands are dominated by nonnative annual
16 grasses and herbs. However, the importance of grassland as a habitat that supports life stages of
17 numerous special-status plants and wildlife is well documented (see Chapter 3, *Conservation*
18 *Strategy*, of the BDCP). The significance of losses in grassland habitat is, therefore, discussed in more
19 detail in species analyses in the *Wildlife Species* section. In addition, the loss of iodine bush scrub
20 located in grassland adjacent to Clifton Court Forebay would be an adverse effect. The combination
21 of restoring 1,070 acres grassland (Environmental Commitment 8), protecting and enhancing 1,060
22 acres (Environmental Commitment 3) of grassland natural community during the construction
23 phase of the project (14 years), and the commitment to restore temporarily affected grassland (158
24 acres) to its pre-project condition within one year of completing construction as required by *AMM10*
25 *Restoration of Temporarily Affected Natural Communities*, would offset this construction loss,
26 avoiding any loss in the value of this habitat for special-status species. The protected and restored
27 habitat would be managed and enhanced to benefit special-status and common wildlife species
28 (Environmental Commitment 3 and Environmental Commitment 11). Typical project-level
29 mitigation ratios (2:1 for protection) would indicate that 1,372 acres of protection would be needed
30 to offset (i.e., mitigate) the 686 acres of combined permanent and temporary loss. In addition,
31 because it is not possible to create iodine bush scrub, mitigation for impacts on this plant
32 community must be through avoidance and/or protection of compensating mitigation areas.
33 Protection of iodine bush scrub within the grassland/vernal pool complex/alkali seasonal wetland
34 habitats adjacent to Clifton Court Forebay provides the only opportunity in the Plan Area to protect
35 this habitat. The combination of protection, along with the enhancement and management
36 associated with Environmental Commitment 3 and Environmental Commitment 11 contained in the
37 project, is designed to avoid a temporal lag in the value of grassland habitat available to sensitive
38 species.

39 The project also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, and
41 *AMM7 Barge Operations Plan*. All of these AMMs include elements that avoid or minimize the risk of
42 affecting habitats at work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which
43 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
44 *AMMs, and CMs*, of the Final EIR/EIS.

1 **NEPA Effects:** By the end of the project's construction time frame, a total of 1,060 acres of grassland
2 would be protected (Environmental Commitment 3) and 1,070 acres of grassland would be restored
3 (Environmental Commitment 8), which would be guided by Resource Restoration and Performance
4 Principles G1, G3, G4, and G7-G10. The protection would occur primarily in the west Delta and
5 Clifton Court Forebay areas. Temporarily affected grassland would also be restored following
6 construction activity as described in AMM10. There would be a permanent and temporary loss of
7 686 acres of grassland in the study area. However, the combination of restoration, protection and
8 enhancement of grassland associated with Alternative 4A would replace the habitat lost and
9 improve the habitat value of this community in the study area; there would not be an adverse effect
10 on the grassland natural community.

11 **CEQA Conclusion:** Alternative 4A would result in the permanent and temporary loss of
12 approximately 686 acres of grassland natural community due to construction of the water
13 conveyance facilities.

14 The construction losses of this natural community would not represent a significant impact based
15 on the significance criteria used for this section because grassland is not considered a special-status
16 or sensitive natural community. Nonetheless, these losses would be offset by planned restoration of
17 158 acres of temporarily affected grassland, the restoration of up to 1,070 acres of grassland, and
18 protection of up to 1,060 acres of grassland natural community scheduled for the 14-year
19 construction period of Alternative 4A, which would be guided by Resource Restoration and
20 Performance Principles G1, G3, G4, and G7-G10. Also, AMM1, AMM2, AMM6, and AMM7 would be
21 implemented to minimize impacts. Because of these offsetting restoration and protection activities
22 and AMMs, impacts would be less than significant. Typical project-level mitigation ratios (2:1 for
23 protection) would indicate that 1,372 acres of protection would be needed to offset (i.e., mitigate)
24 the 686 acres of loss. The combined protection (1,060 acres) and restoration (1,070 acres) of 2,130
25 acres of grassland would more than offset the losses from the project. The combination of two
26 approaches (protection and restoration) contained in the project Environmental Commitments and
27 avoidance and minimization measures is designed to avoid a temporal lag in the value of grassland
28 habitat available to special-status species. The protection and restoration would be initiated at the
29 beginning of Alternative 4A implementation to minimize any time lag in the availability of this
30 habitat to special-status species. Therefore, there would be a less-than-significant impact on the
31 grassland natural community.

32 **Impact BIO-30: Increased Frequency, Magnitude and Duration of Periodic Inundation of**
33 **Grassland Natural Community**

34 Alternative 4A would not result in periodic effects on grassland natural community type.

35 **NEPA Effects:** No effect.

36 **CEQA Conclusion:** No impact.

37 **Impact BIO-31: Modification of Grassland Natural Community from Ongoing Operation,**
38 **Maintenance and Management Activities**

39 Once the physical facilities associated with Alternative 4A are constructed and the stream flow
40 regime associated with changed water management is in effect, there would be new ongoing and
41 periodic actions associated with operation, maintenance and management of the Alternative 4A
42 facilities and conservation lands that could affect grassland natural community in the study area.

1 The ongoing actions include modified operation of upstream reservoirs, the diversion of Sacramento
2 River flows in the north Delta, and reduced diversions from south Delta channels. These actions are
3 associated with water conveyance facilities. The periodic actions would involve access road and
4 conveyance facility repair, vegetation management at the various water conveyance facilities and
5 habitat restoration sites (Environmental Commitment 11), levee repair and replacement of levee
6 armoring, channel dredging, and habitat enhancement in accordance with natural community
7 management plans. The potential effects of these actions are described below.

- 8 • *Modified river flows upstream of and within the study area and reduced diversions from south*
9 *Delta channels.* Changes in releases from reservoirs upstream of the study area, increased
10 diversion of Sacramento River flows in the north Delta, and reduced diversions from south Delta
11 channels (associated with Operational Scenario H) would not result in the permanent reduction
12 in acreage of grassland natural community in the study area. Flow levels in the upstream rivers
13 would not change such that the acreage of this community would be reduced on a permanent
14 basis. The grassland along rivers upstream of planned north Delta diversions is primarily
15 ruderal vegetation on levee banks and is dependent on winter and spring rains for germination
16 and growth rather than on river levels. Similarly, increased diversions of Sacramento River
17 flows in the north Delta would not result in a permanent reduction in grassland natural
18 community downstream of these diversions. The reductions in flows below the intakes would
19 occur primarily in the wet months when the existing nonnative annual grasslands along river
20 levees are dormant, and like upstream grassland, this community is dependent on winter and
21 spring rains for germination and growth in the winter and spring months, not on river stage.
22 Anticipated small changes in river salinity in the west Delta and Suisun Marsh would not create
23 a substantial change in grassland acreage in these areas. Reduced diversions from south Delta
24 channels would not create a reduction in this natural community.
- 25 • *Access road, water conveyance facility and levee repair.* Periodic repair of access roads, water
26 conveyance facilities and levees associated with project actions have the potential to require
27 removal of adjacent vegetation and could entail earth and rock work in grassland habitats. This
28 activity could lead to increased soil erosion and runoff entering these habitats. These activities
29 would be subject to normal erosion and runoff control management practices, including those
30 developed as part of *AMM2 Construction Best Management Practices and Monitoring* and *AMM4*
31 *Erosion and Sediment Control Plan*. Any vegetation removal or earthwork adjacent to or within
32 grassland habitats would require use of sediment barriers, soil stabilization and revegetation of
33 disturbed surfaces (*AMM10 Restoration of Temporarily Affected Natural Communities*). Proper
34 implementation of these measures would avoid permanent adverse effects on this community.
- 35 • *Vegetation management.* Vegetation management, in the form of physical removal and chemical
36 treatment, would be a periodic activity associated with the long-term maintenance of water
37 conveyance facilities and restoration sites (*Environmental Commitment 11 Natural Community*
38 *Enhancement and Management*). Use of herbicides to control nuisance vegetation could pose a
39 long-term hazard to grassland natural community at or adjacent to treated areas. The hazard
40 could be created by uncontrolled drift of herbicides, uncontrolled runoff of contaminated
41 stormwater onto the natural community, or direct discharge of herbicides to grassland areas
42 being treated for invasive species removal. Environmental commitments and *AMM5 Spill*
43 *Prevention, Containment, and Countermeasure Plan* have been made part of Alternative 4A to
44 reduce hazards to humans and the environment from use of various chemicals during
45 maintenance activities, including the use of herbicides. These commitments, including the
46 commitment to prepare and implement spill prevention, containment, and countermeasure

1 plans and stormwater pollution prevention plans, are described in Appendix 3B, *Environmental*
2 *Commitments, AMMs, and CMs*. Best management practices, including control of drift and runoff
3 from treated areas, and use of herbicides approved for use in terrestrial environments would
4 also reduce the risk of affecting natural communities adjacent to water conveyance features and
5 levees associated with restoration activities.

- 6 • *Channel dredging*. Long-term operation of the Alternative 4A intakes on the Sacramento River
7 would include periodic dredging of sediments that might accumulate in front of intake screens.
8 The dredging could occur adjacent to grassland natural community. This activity should not
9 permanently reduce the acreage of grassland natural community because it is periodic in
10 nature; the grassland in the vicinity of the proposed intakes is ruderal grasses and herbs with
11 low habitat value.
- 12 • *Habitat enhancement*. Alternative 4A includes a long-term management element for the natural
13 communities within the study area (Environmental Commitment 11). For the grassland natural
14 community, a management plan would be prepared that specifies actions to improve the value
15 of the habitats for species. Actions would include control of invasive nonnative plant and animal
16 species, fire management, restrictions on vector control and application of herbicides, and
17 maintenance of infrastructure that would allow for movement through the community. The
18 enhancement efforts would improve the long-term value of this community for both special-
19 status and common species.

20 The various operations and maintenance activities described above could alter acreage of grassland
21 natural community in the study area through changes in flow patterns and changes in periodic
22 inundation of this community. Activities could also introduce sediment and herbicides that would
23 reduce the value of this community to common and sensitive plant and wildlife species. Other
24 periodic activities associated with the Plan, including management, protection and enhancement
25 actions associated with *Environmental Commitment 3 Natural Communities Protection and*
26 *Restoration* and *Environmental Commitment 11 Natural Communities Enhancement and Management*,
27 would be undertaken to enhance the value of the community. While some of these activities could
28 result in small changes in acreage, these changes would be offset by protection and enhancement
29 activities planned as part of *Environmental Commitment 3 Natural Communities Protection and*
30 *Restoration*, or minimized by implementation of AMM2, AMM4, AMM5, and AMM10. The
31 management actions associated with levee repair, periodic dredging and control of invasive plant
32 species would also result in a long-term benefit to the species associated with grassland habitats by
33 improving water movement in adjacent waterways and by eliminating competitive, invasive species
34 of plants.

35 **NEPA Effects:** Ongoing operation, maintenance and management activities associated with
36 Alternative 4A would not result in a net permanent reduction in grassland natural community
37 within the study area. Therefore, there would be no adverse effect on this natural community.

38 **CEQA Conclusion:** The operation and maintenance activities associated with Alternative 4A would
39 have the potential to create minor changes in total acreage of grassland natural community in the
40 study area, and could create temporary increases sedimentation. The activities could also introduce
41 herbicides periodically to control nonnative, invasive plants. Implementation of environmental
42 commitments and AMM2, AMM4, AMM5, and AMM10 would minimize these impacts, and other
43 operations and maintenance activities, including management, protection and enhancement actions
44 associated with *Environmental Commitment 3 Natural Communities Protection and Restoration* and
45 *Environmental Commitment 11 Natural Communities Enhancement and Management*, would create

1 positive effects, including reduced competition from invasive, nonnative plants in these habitats.
2 Protection and enhancement actions associated with *Environmental Commitment 3 Natural*
3 *Communities Protection and Restoration* would increase the value of this natural community in the
4 study area. Ongoing operation, maintenance and management activities would not result in a net
5 permanent reduction in this natural community within the study area. Therefore, there would be a
6 less-than-significant impact on the grassland natural community.

7 **Inland Dune Scrub**

8 The inland dune scrub natural community is composed of vegetated, stabilized sand dunes
9 associated with river and estuarine systems. In the study area, the inland dune scrub community
10 consists of remnants of low-lying ancient stabilized dunes related to the Antioch Dunes formation
11 located near the town of Antioch (CZ 10; see Figure 12-1). While inland dune scrub is within the
12 study area, none of the Alternative 4A actions is expected to affect this community.

13 **Cultivated Lands**

14 Cultivated lands is the major land cover type in the study area (487,106 acres, see Table 12-1 in
15 Section 12.1.2, *Land Cover Types*). The Delta, the Yolo Bypass and the Cache Slough drainage are
16 dominated by various types of agricultural activities, with crop production the dominant element
17 (see Figure 12-1). Major crops and cover types in agricultural production include grain and hay
18 crops (wheat, oats and barley), field crops (corn, beans and safflower), truck crops (tomatoes,
19 asparagus and melons), pasture (alfalfa, native and nonnative pasture), rice, orchards, and
20 vineyards. Tables 12-2 and 12-3 in Section 12.1.3, *Special-Status Species*, list special-status wildlife
21 species supported by cultivated lands.

22 The effects of Alternative 4A on cultivated lands are discussed from various perspectives in this
23 document. Chapter 14, *Agricultural Resources*, includes a detailed analysis of cropland conversion as
24 it relates to agricultural productivity. Many of the discussions of individual terrestrial plant and
25 wildlife species in this section also focus on the relevance of cultivated land loss. Because cultivated
26 lands is not a natural community and because the effects of its loss are captured in the individual
27 species analyses, there is no separate analysis of this land cover type presented here. For Alternative
28 4A, the total loss (permanent and temporary) is estimated to be 7,043 acres. The majority of the
29 permanent loss would be associated with tidal marsh restoration (Environmental Commitment 4;
30 192 acres), riparian natural community restoration (Environmental Commitment 7; 250 acres),
31 grassland restoration (Environmental Commitment 8; 1,070 acres), nontidal marsh restoration
32 (Environmental Commitment 10; 832 acres), and construction of the modified tunnel and associated
33 water conveyance facilities (permanent removal of 3,544 acres and temporary removal 1,155 acres
34 of cultivated lands). Of the 7,043 acres, 6,844 would be made up of croplands and the other 199
35 acres would be non-cropland agricultural areas.

36 **Developed Lands**

37 Additional lands in the study area that were not designated with a natural community type have
38 been characterized as developed lands (90,660 acres). Developed lands include lands with
39 residential, industrial, and urban land uses, as well as landscaped areas, riprap, road surfaces and
40 other transportation facilities (see Figure 12-1 and the Terrestrial Biology Mapbook). Developed
41 lands support some common plant and wildlife species, whose abundance and species richness vary
42 with the intensity of development. One special-status species, the giant garter snake, is closely

1 associated with a small element of developed lands; specifically, embankments and levees near
2 water that are covered with riprap provide giant garter snake habitat.

3 As with cultivated lands, no effort has been made to analyze the effects of Alternative 4A activities
4 on this land cover type because it is not a natural community. The effects of its conversion are
5 discussed in Chapter 13, *Land Use*. Where the loss of developed lands may affect individual special-
6 status species or common species, the impact analysis is contained in that species discussion.

7 **Wildlife Species**

8 **Vernal Pool Crustaceans**

9 This section describes the effects of Alternative 4A, including water conveyance facilities
10 construction and implementation of the Environmental Commitments, on vernal pool crustaceans
11 (California linderiella, Conservancy fairy shrimp, longhorn fairy shrimp, midvalley fairy shrimp,
12 vernal pool fairy shrimp, and vernal pool tadpole shrimp). The habitat model used to assess effects
13 for the vernal pool crustaceans consists of: vernal pool complex, which consists of vernal pools and
14 uplands that display characteristic vernal pool and swale visual signatures that have not been
15 significantly affected by agricultural or development practices; alkali seasonal wetlands in CZ 8; and
16 degraded vernal pool complex, which consists of low-value ephemeral habitat ranging from areas
17 with vernal pool and swale visual signatures that display clear evidence of significant disturbance
18 due to plowing, disking, or leveling to areas with clearly artificial basins such as shallow agricultural
19 ditches, depressions in fallow fields, and areas of compacted soils in pastures. For the purpose of the
20 effects analysis, vernal pool complex is categorized as high-value for vernal pool crustaceans and
21 degraded vernal pool complex is categorized as low-value for these species. Alkali seasonal wetlands
22 in CZ 8 were included in the model as high-value habitat for vernal pool crustaceans. Also included
23 as low-value habitat for vernal pool crustaceans are areas along the eastern boundary of CZ 11 that
24 are mapped as vernal pool complex because they flood seasonally and support typical vernal pool
25 plants, but which do not include topographic depressions that are characteristic of vernal pool
26 crustacean habitat.

27 Alternative 4A would result in permanent losses (see Table 12-4A-11) and indirect conversions of
28 vernal pool crustacean modeled habitat. Alternative 4A would also include the following
29 Environmental Commitments and associated Resource Restoration and Performance Principles to
30 benefit vernal pool crustaceans.

- 31 ● Restore vernal pool complex and alkali seasonal wetland suitable for vernal pool crustaceans to
32 achieve no net loss of wetted acreage (Environmental Commitment 9, Resource Restoration and
33 Performance Principle VP/AW2).
- 34 ● Increase size and connectivity of protected vernal pool complexes and alkali seasonal wetlands
35 in the greater Byron Hill area (Resource Restoration and Performance Principle VP/AW3).
- 36 ● Protect up to 188 acres of existing vernal pool/alkali seasonal wetland complex (Environmental
37 Commitment 3) in the greater Byron Hills area, primarily in core vernal pool recovery areas
38 identified in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (U.S.
39 Fish and Wildlife Service 2005) (Resource Restoration and Performance Principle VP/AW1).
- 40 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining vernal pool
41 and alkali seasonal wetland complex species (Resource Restoration and Performance Principle
42 VP/AW4).

1 As explained below, with the restoration and protection of these amounts of habitat, in addition to
 2 implementation of AMMs, impacts on vernal pool crustaceans would not be adverse for NEPA
 3 purposes and would be less than significant for CEQA purposes.

4 **Table 12-4A-11. Changes in Vernal Pool Crustacean Modeled Habitat Associated with Alternative**
 5 **4A (acres)^a**

Project Component	Habitat Type	Permanent	Temporary	Indirect
Water Conveyance Facilities	High-value	13	1	42
	Low-value	7	2	0
Total Impacts Water Conveyance Facilities		20	3	42
Environmental Commitments 4, 6-7, 9-11 ^a	High-value	17	0	3
	Low-value	8	0	1
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		25	0	4
TOTAL IMPACTS		45	3	46

^a See discussion below for a description of applicable Environmental Commitments.

6

7 **Impact BIO-32: Loss or Conversion of Habitat for and Direct Mortality of Vernal Pool**
 8 **Crustaceans**

9 Alternative 4A would result in the direct permanent and temporary loss combined of 48 acres of
 10 modeled vernal pool crustacean habitat from conveyance facilities construction and tidal
 11 restoration. In addition, water conveyance facilities construction and tidal restoration that causes
 12 hydrologic changes could result in the indirect conversion of an additional 45 acres of high-value
 13 and 1 acre of low-value vernal pool crustacean habitat. Construction of the water conveyance
 14 facilities and tidal restoration projects may result in the modification of hardpan and changes to the
 15 perched water table, which could lead to alterations in the rate, extent, and duration of inundation of
 16 nearby vernal pool crustacean habitat. USFWS typically considers construction within 250 feet of
 17 vernal pool crustacean habitat to constitute a possible conversion of crustacean habitat unless more
 18 detailed information is provided to further refine the limits of any such effects. For the purposes of
 19 this analysis, the 250-foot buffer was applied to the water conveyance facilities work areas where
 20 surface and subsurface disturbance activities would take place. Habitat enhancement and
 21 management activities (Environmental Commitment 11), which include disturbance or removal of
 22 nonnative vegetation, could result in local adverse habitat effects.

23 Alternative 4A would also result in impacts on critical habitat for vernal pool fairy shrimp (185
 24 acres). These impacts would be from water conveyance facilities construction west of Clifton Court
 25 Forebay. Of the 185 acres of vernal pool fairy shrimp critical habitat, only 5 acres consist of modeled
 26 habitat for vernal pool crustaceans, with the remainder consisting of cultivated lands.

27 As specified in *AMM12 Vernal Pool Crustaceans* and *Environmental Commitment 9 Vernal Pool and*
 28 *Alkali Seasonal Wetland Complex Restoration*, restoration projects are designed such that no more
 29 than a total of 10 wetted acres of vernal pool crustacean habitat are permanently lost. AMM12
 30 would also ensure that no more than 20 wetted acres of vernal pool crustacean habitat are indirectly
 31 affected by alterations to hydrology resulting from adjacent habitat restoration activities, in
 32 particular tidal restoration. *AMM30 Transmission Line Design and Alignment Guidelines* would ensure
 33 that transmission lines avoid removal of wetted acres of vernal pools and alkali seasonal wetlands

1 wetted acres of aquatic habitats to the maximum extent feasible. The term wetted acres refers to an
2 area that would be defined by the three parameter wetland delineation method used by the U.S.
3 Army Corps of Engineers to determine the limits of a wetland, which involve an evaluation of
4 wetland soil, vegetation, and hydrology characteristics. This acreage differs from vernal pool
5 complex acreages in that a vernal pool complex is composed of individual wetlands (vernal pools)
6 and those upland areas that are in between and surrounding them, which provide the supporting
7 hydrology (surface runoff and groundwater input), organic and nutrient inputs, and refuge for the
8 terrestrial phase of some vernal pool species.

9 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the
10 individual activity discussions.

- 11 • *Water Facilities and Operation:* Construction of Alternative 4A conveyance facilities would result
12 in the permanent and temporary combined loss of approximately 23 acres of vernal pool
13 crustacean habitat, composed of 14 acres of high-value and 9 acres of low-value habitat (Table
14 12-4A-11). The construction of the conveyance facilities would result in the permanent loss of
15 habitat associated with a vernal pool fairy shrimp CNDDDB occurrence as a result of the
16 expansion of Clifton Court Forebay. In addition, conveyance facility construction could result in
17 the indirect conversion of 42 acres of high-value vernal pool crustacean habitat in the vicinity of
18 Clifton Court Forebay. The indirect effects would result from the construction of permanent
19 transmission lines, from the storage of RTM, and permanent access roads. There are records of
20 vernal pool fairy shrimp and midvalley fairy shrimp in the vicinity of these areas (California
21 Department of Fish and Game 2013). Alternative 4A would also result in the permanent loss of
22 185 acres of critical habitat for vernal pool fairy shrimp. The permanent impacts on critical
23 habitat are associated with the RTM disposal areas and an associated access road west of Clifton
24 Court Forebay (177 acres), a new transmission line (5 acres), and upgrades to a permanent
25 access road just south of this area (3 acres). However, as discussed above, only 5 acres of this
26 critical habitat consists of modeled habitat for vernal pool crustaceans and the remaining critical
27 habitat consist of cultivated lands that are not suitable for the species. *AMM30 Transmission Line
28 Design and Alignment Guidelines* would ensure that transmission lines are designed to avoid
29 removal of aquatic habitats to the maximum extent feasible.
- 30 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal natural communities
31 restoration would result in the conversion of an estimated 25 acres of modeled vernal pool
32 crustacean habitat (17 acres high value and 8 acres low value habitat). Tidal restoration would
33 also result in the indirect conversion of an estimated 4 acres of modeled vernal pool crustacean
34 habitat. The effects would take place in one or more of the ROAs established for tidal restoration
35 (see Figure 12-1).
- 36 • *Environmental Commitment 11 Natural Communities Enhancement and Management:* The
37 project's restoration/creation of vernal pools to achieve no net loss and the protection of up to
38 188 acres of vernal pool/alkali seasonal wetland complex would benefit vernal pool
39 crustaceans. A variety of habitat management actions included in Environmental Commitment
40 11 that are designed to enhance wildlife values in protected habitats may result in localized
41 ground disturbances that could temporarily affect vernal pool crustacean habitat. Ground-
42 disturbing activities, such as removal of nonnative vegetation and road and other infrastructure
43 maintenance, are expected to have minor effects on vernal pool crustacean habitat and are
44 expected to result in overall improvements to and maintenance of vernal pool crustacean
45 habitat values. These effects cannot be quantified, but are expected to be minimal and would be
46 avoided and minimized by the AMMs listed below.

1 The proposed conservation efforts have been evaluated to determine whether they would provide
 2 sufficient habitat protection and restoration in an appropriate timeframe to ensure that the effects
 3 of construction would not be adverse under NEPA and would be less than significant under CEQA.
 4 Table 12-4A-11 lists the impacts on modeled vernal pool crustacean habitat that is based on the
 5 natural community mapping done within the study area. Table 12-4A-12 was prepared to further
 6 analyze the project's effects on vernal pool crustaceans using wetted acres of habitat in order to
 7 compare the effects of this alternative with the effect limits established in *AMM12 Vernal Pool*
 8 *Crustaceans*, which are measured in wetted acres of habitat. Wetted acres were estimated by using
 9 the BDCP's assumption that restored vernal pool complexes would have a 15% density of vernal
 10 pools (i.e., of 100 acres of vernal pool complex 15 acres would constitute vernal pools and the
 11 remaining 85 acres supporting uplands). Based on an informal evaluation of aerial photographs of
 12 the project area it is likely that the actual densities within the project area are approximately 10%,
 13 but the 15% density value was chosen as a conservative estimate for determining effects.

14 **Table 12-4A-12. Estimated Effects on Wetted Vernal Pool Crustacean Habitat under Alternative 4A**
 15 **(acres)**

	Direct Loss	Indirect Conversion
AMM 12 Impact Limit	10	20
Water Conveyance Facilities ^a	3.45	6.30
Environmental Commitments 4, 6-7, 9-11	3.75	0.60
Total	7.2	6.9

^a These acreages were generated by assuming that the modeled habitat identified in Table 12-4A-11 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.

16
 17 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by
 18 Alternative 4A would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion
 19 impacts are mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would
 20 indicate that 7.2 wetted acres of vernal pool crustacean habitat (or 48 acres of vernal pool/alkali
 21 seasonal wetland complex) should be restored and 28.2 wetted acres (or 188 acres of vernal
 22 pool/alkali seasonal wetland complex) protected to mitigate Alternative 4A's direct and indirect
 23 effects on vernal pool crustacean habitat. With the implementation of AMM30, the effects on aquatic
 24 habitat would be avoided to the maximum extent feasible during the designing of the transmission
 25 line west of Clifton Court Forebay.

26 Project proponents would commit to protecting up to 188 acres of vernal pool/alkali seasonal
 27 wetland complex by protecting at least 2 wetted acres of vernal pools for each wetted acre directly
 28 or indirectly affected. Alternative 4A has also committed to restoring/creating vernal pools and
 29 alkali seasonal wetlands such that there is no net loss of vernal pool acreage. The final amount of
 30 restoration would be determined during implementation based on the following criteria.

- 31 • If restoration is completed (i.e., restored natural community meets all success criteria) prior to
 32 impacts, then 1.0 wetted acre of vernal pools and/or alkali seasonal wetlands suitable for the
 33 species would be restored for each wetted acre directly affected (1:1 ratio).
- 34 • If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
 35 but restored habitat has not met all success criteria, prior to impacts occurring), then 1.5 wetted

1 acres of vernal pools and/or alkali seasonal wetlands suitable for the species would be restored
2 for each wetted acre directly affected (1.5:1 ratio).

3 The protection and restoration efforts would include the following the Resource Restoration and
4 Performance Principles.

- 5 ● Protect existing vernal pool complex in the greater Byron Hills area primarily in core vernal pool
6 recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of California and*
7 *Southern Oregon* (U.S. Fish and Wildlife Service 2005) (Resource Restoration and Performance
8 Principle VP/AW1).
- 9 ● Increase size and connectivity of protected vernal pool complexes and alkali seasonal wetlands
10 in the greater Byron Hill area (Resource Restoration and Performance Principle VP/AW2).
- 11 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining vernal pool
12 and alkali seasonal wetland complex species.

13 Alternative 4A also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
14 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
15 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
16 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM10 Restoration of Temporarily Affected*
17 *Natural Communities, AMM12 Vernal Pool Crustaceans, and AMM30 Transmission Line Design and*
18 *Alignment Guidelines*. All of these AMMs include elements that avoid or minimize the risk of affecting
19 habitats and species adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have
20 since been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs,*
21 *and CMs*, of the Final EIR/EIS.

22 **NEPA Effects:** The loss of vernal pool crustacean habitat under Alternative 4A would not be adverse
23 under NEPA because project proponents have committed to avoiding and minimizing effects and to
24 restoring and protecting an acreage that meets the typical mitigation ratios described above. This
25 habitat protection, restoration, management and enhancement would be guided by Resource
26 Restoration and Performance Principles VP/AW1-VP/AW4, and by AMM1–AMM6, AMM10, AMM12,
27 and AMM30, which would be in place throughout the period of construction and operations.
28 Considering these commitments, losses and conversion of vernal pool crustacean habitat under
29 Alternative 4A would not be an adverse effect.

30 **CEQA Conclusion:** Alternative 4A would have significant impact on vernal pool crustacean habitat as
31 a result of habitat modification of a special-status species and potential for direct mortality in the
32 absence of the protection and restoration of habitat. However, the project proponents have
33 committed to habitat protection, restoration, management and enhancement associated with
34 Environmental Commitment 3, Environmental Commitment 9, and Environmental Commitment 11.
35 These conservation activities would be guided by Resource Restoration and Performance Principles
36 VP/AW1-VP/AW4 and effects would be avoided and minimized by AMM1–AMM6, AMM10, AMM12,
37 and AMM30, which would be in place throughout the period of construction and operations.
38 Considering these commitments, Alternative 4A would not result in a substantial adverse effect
39 through habitat modifications and would not substantially reduce the number or restrict the range
40 of vernal pool crustaceans. Therefore, Alternative 4A would have a less-than-significant impact on
41 vernal pool crustaceans under CEQA.

1 **Impact BIO-33: Indirect Effects of Alternative 4A on Vernal Pool Crustaceans**

2 Construction and maintenance activities associated with water conveyance facilities, and restoration
3 actions could indirectly affect vernal pool crustaceans and their habitat in the vicinity of
4 construction and restoration areas, and maintenance activities. Ground-disturbing activities,
5 stockpiling of soils, and maintenance and refueling of heavy equipment could result in the
6 inadvertent release of sediment and hazardous substances into this habitat. Vernal pool crustaceans
7 and their habitat could be periodically indirectly affected by maintenance activities at water
8 conveyance facilities. Embankment maintenance activities around Clifton Court Forebay could result
9 in the inadvertent discharge of sediments and hazardous materials into vernal pool crustacean
10 habitat that occurs along the southern and western boundaries of the forebays.

11 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly
12 affect vernal pool crustaceans and their habitat in the vicinity of construction areas. These potential
13 effects would be avoided and minimized through AMM1–AMM6, AMM10, and AMM12, which would
14 be in effect throughout the period of construction and operations. The indirect effects of Alternative
15 4A on vernal pool crustaceans and their habitat would not be adverse under NEPA.

16 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance
17 facilities, and restoration actions could indirectly impact vernal pool crustaceans and their habitat in
18 the vicinity of these work areas. These potential impacts would be minimized or avoided through
19 AMM1–AMM6, AMM10, and AMM12, which would be in effect throughout the period of construction
20 and operations. The indirect impacts of Alternative 4A on vernal pool crustaceans would be less
21 than significant under CEQA.

22 **Impact BIO-34: Periodic Effects of Inundation of Vernal Pool Crustacean Habitat as a Result of**
23 **Implementation of Alternative 4A**

24 No Alternative 4A components would result in periodic effects on vernal pool crustacean habitat.

25 **NEPA Effects:** No effect.

26 **CEQA Conclusion:** No impact.

27 **Valley Elderberry Longhorn Beetle**

28 The habitat model used to assess the effects for valley elderberry longhorn beetle is based on
29 riparian habitat and nonriparian habitat (vernal pool complexes and grasslands within 200 feet of
30 channels). Alternative 4A would result in both temporary and permanent losses of valley elderberry
31 longhorn beetle modeled habitat as indicated in Table 12-4A-13. The majority of the losses would
32 take place over an extended period of time as the restoration Environmental Commitments are
33 being implemented. In addition, an estimated 14 elderberry shrubs that were previously mapped by
34 DWR in the DHCCP Conveyance Planning Area could be impacted by the Alternative 4A water
35 conveyance alignment. Full implementation of Alternative 4A would also include the following
36 Environmental Commitments and associated Resource Restoration and Performance Principles to
37 benefit valley elderberry longhorn beetle.

- 38 • Mitigate impacts on elderberry shrubs consistent with USFWS conservation guidelines (U.S. Fish
39 and Wildlife Service 1999a) for the species and planting shrubs in high-density cluster
40 (Resource Restoration and Performance Principle VELB1).

- 1 • Site elderberry longhorn beetle habitat restoration with drainage immediately adjacent to or in
- 2 the vicinity of occupied habitat (Resource Restoration and Performance Principle VELB2).
- 3 • Restore up to 251 acres of valley/foothill riparian (Environmental Commitment 7).
- 4 • Protect up to 103 acres of valley/foothill riparian (Environmental Commitment 3).

5 As explained below, with the restoration and protection of these amounts of habitat, impacts on
6 valley elderberry longhorn beetle would not be adverse for NEPA purposes and would be less than
7 significant for CEQA purposes.

8 **Table 12-4A-13. Changes in Valley Elderberry Longhorn Beetle Modeled Habitat Associated with**
9 **Alternative 4A (acres)^a**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Riparian	37	24
	Nonriparian	201	87
Total Impacts Water Conveyance Facilities		238	111
Environmental Commitments 4, 6-7, 9-11 ^a	Riparian	11	0
	Nonriparian	12	0
Total Impacts Environmental Commitments 4, 6-7, 9-11a		23	0
TOTAL IMPACTS		261	111

^a See discussion below for a description of applicable Environmental Commitments.

10

11 **Impact BIO-35: Loss of Valley Elderberry Longhorn Beetle Habitat**

12 Alternative 4A would result in the permanent and temporary loss combined of up to 372 acres of
13 modeled valley elderberry longhorn beetle habitat (72 acres of riparian habitat and 300 acres of
14 nonriparian habitat), and an estimated 14 elderberry shrubs from water conveyance facilities, which
15 represent potential habitat for the species (Table 12-4A-13). Due to the limitation of the habitat
16 suitability model, the effects on modeled habitat are assumed to be a large overestimate of the true
17 effect on potential valley elderberry longhorn beetle habitat. These losses would be a result of water
18 conveyance facilities and transmission line construction, and establishment and use of RTM areas,
19 and tidal habitat restoration (Environmental Commitment 4). Habitat enhancement and
20 management activities (Environmental Commitment 11), which include ground disturbance or
21 removal of nonnative vegetation, could result in local adverse habitat effects. In addition,
22 maintenance activities associated with the long-term operation of the water conveyance facilities
23 and other project physical facilities could degrade or eliminate valley elderberry longhorn beetle
24 habitat. Implementation of the habitat protection and restoration contained in Alternative 4A and
25 implementation of AMMs committed to would result in no adverse effects under NEPA and less-
26 than-significant impacts under CEQA. Each of these activities is described below.

- 27 • *Water Facilities and Operation:* Construction of Alternative 4A conveyance facilities would result
- 28 in the permanent and temporary combined loss of approximately 349 acres of modeled valley
- 29 elderberry longhorn beetle habitat, composed of 61 acres of riparian habitat and 288 acres of
- 30 nonriparian habitat (Table 12-4A-13). In addition, an estimated 14 shrubs could be removed as
- 31 a result of conveyance facilities construction. As noted in Section 12.3.2.3, *Methods Used to Assess*
- 32 *Species Effects*, elderberry shrubs were mapped in the DHCCP Conveyance Planning Area where
- 33 accessible and thus the entire footprint of water conveyance facilities was not surveyed. In many

1 cases, the data collected did not always specify the number of shrubs observed but rather the
2 size class and a range of stem numbers. The exact number of shrubs to be impacted would be
3 determined during pre-construction surveys of the footprints of the conveyance facility and
4 associated work areas as part of the implementation of *AMM15 Valley Elderberry Longhorn*
5 *Beetle*. Most of these impacts are associated with the intake and forebay construction in the
6 north delta. There are no records of valley elderberry longhorn beetle within these impact areas.
7 The portion of the above impacts that result from temporary habitat loss includes 111 acres of
8 modeled valley elderberry longhorn beetle habitat (24 acres riparian and 87 acres nonriparian
9 habitat). Elderberry shrubs could be affected from ground-disturbing activities associated with
10 conveyance construction footprints, reusable tunnel material storage areas, geotechnical boring
11 areas, temporary access roads, and staging areas.

- 12 ● *Environmental Commitment 4 Tidal Natural Communities Restoration*: Tidal natural communities
13 restoration would result in the permanent loss of approximately 23 acres of modeled habitat
14 (11 acres of riparian and 12 acres of nonriparian habitat). Elderberry shrubs could be affected
15 from ground-disturbing activities associated with the re-contouring of surface topography,
16 excavation or modification of channels, type conversion from riparian and grasslands to tidal
17 habitat, levee removal and modification, and removal of riprap and other protections from
18 channel banks.
- 19 ● *Environmental Commitment 11 Natural Communities Enhancement and Management*: Activities
20 associated with natural communities enhancement and management, such as grazing practices
21 and ground disturbance or herbicide use in the control of nonnative vegetation, intended to
22 maintain and improve habitat functions of protected habitats for species could result in loss of
23 elderberry shrubs and the potential for injury or mortality to beetles. These effects cannot be
24 quantified, but are expected to be minimal and would be avoided and minimized by the AMMs
25 listed below.
- 26 ● *Operations and maintenance*: Post-construction operation and maintenance of the above-
27 ground water conveyance facilities and restoration infrastructure could result in ongoing but
28 periodic disturbances that could affect valley elderberry beetle. Maintenance activities would
29 include vegetation management, levee and structure repair, and re-grading of roads and
30 permanent work areas could affect elderberry shrubs occupied by the species. These effects,
31 however, would be reduced by AMMs listed below.

32 The following paragraphs summarize the combined effects discussed above and describe the
33 environmental commitments and AMMs that offset or avoid these effects. NEPA and CEQA impact
34 conclusions are also included.

35 The study area supports approximately 34,456 acres of modeled habitat (17,786 acres of riparian
36 and 16,670 acres of nonriparian) for valley elderberry longhorn beetle. Alternative 4A as a whole
37 would result in the permanent loss of and temporary effects on 372 acres of modeled valley
38 elderberry longhorn beetle habitat (72 acres of riparian habitat and 300 acres of nonriparian
39 habitat) (1% of the modeled habitat in the study area). These losses would not fragment any known
40 populations of valley elderberry longhorn beetle.

41 Typical NEPA and CEQA project-level mitigation ratios for riparian habitat affected by the project
42 would be 1:1 for restoration and 1:1 for protection of riparian habitat. Using these typical ratios
43 would indicate that 72 acres of the riparian habitat should be restored/created and 72 acres of

1 existing riparian should be protected to mitigate project losses of valley elderberry longhorn beetle
2 habitat.

3 Alternative 4A includes a commitment to restore/create up to 251 acres of riparian habitat and
4 protect up to 103 acres of riparian habitat and in the project area. The Resource Restoration and
5 Performance Principles identified under Alternative 4A for valley elderberry longhorn beetle
6 conservation include implementing the USFWS conservation guidelines for the species
7 (transplanting elderberry shrubs and planting elderberry seedlings and associated natives)
8 (Resource Restoration and Performance Principle VELB1) and siting elderberry restoration within
9 drainages immediately adjacent to or in the vicinity of sites confirmed to be occupied by valley
10 elderberry longhorn beetle (Resource Restoration and Performance Principle VELB2). These
11 Resource Restoration and Performance Principles would be met through the implementation of
12 *Environmental Commitment 7 Riparian Natural Community Restoration*. *Environmental Commitment*
13 *7 Riparian Natural Community Restoration* specifically calls for the planting of elderberry shrubs in
14 large, contiguous clusters with a mosaic of associated natives as part of riparian restoration
15 consistent with USFWS conservation guidelines (U.S. Fish and Wildlife Service 1999a). The acres of
16 riparian protection and restoration proposed would satisfy the typical mitigation requirements
17 described in the previous paragraph. Though there are no restoration and preservation goals for the
18 nonriparian habitat affected, the commitment to transplant shrubs and plant additional elderberry
19 seedlings and associated natives would, together with the proposed restoration and protection of
20 riparian (a higher quality habitat), would be more than adequate to compensate for the projects
21 effects on the nonriparian habitat component of the modeled habitat for the species.

22 The project also includes commitments to implement AMM1 *Worker Awareness Training*, AMM2
23 *Construction Best Management Practices and Monitoring*, AMM3 *Stormwater Pollution Prevention*
24 *Plan*, AMM4 *Erosion and Sediment Control Plan*, AMM5 *Spill Prevention, Containment, and*
25 *Countermeasure Plan*, AMM6 *Disposal and Reuse of Spoils*, and AMM15 *Valley Elderberry Longhorn*
26 *Beetle*. AMM15 requires surveys for elderberry shrubs within 100 feet of any ground disturbing
27 activities, the implementation of avoidance and minimize measures for any shrubs that are
28 identified within this 100-foot buffer, and transplanting shrubs that can't be avoided. All of these
29 AMMs include elements that avoid or minimize the risk of affecting habitats and species adjacent to
30 work areas and RTM storage sites.

31 Other factors relevant to effects on valley elderberry longhorn beetle include:

- 32 ● Habitat loss is widely dispersed throughout the study area and would not be concentrated in
33 any one location.
- 34 ● There would be a temporal loss of riparian habitat, which is expected to result in a minimal
35 effect on valley elderberry longhorn beetle because much of the riparian habitat in the project
36 area is not known to be currently occupied by the species, because all elderberry shrubs that are
37 suitable for transplantation would be moved to conservation areas in the project area, and
38 because most of the affected community is composed of small patches of riparian scrub and
39 herbaceous vegetation that are fragmented and distributed across the agricultural landscape of
40 the project area and thus are likely to provide no or low-value habitat for the beetle.
- 41 ● Temporarily disturbed areas would be restored within 1 year following completion of
42 construction and management activities. Under AMM10, a restoration and monitoring plan
43 would be developed prior to initiating any construction-related activities associated with the

1 Environmental Commitments or other project activities that would result in temporary effects
2 on natural communities.

3 **NEPA Effects:** In the absence of actions to compensate and avoid and minimize effects, the losses of
4 valley elderberry longhorn beetle habitat and potential for direct mortality of a special-status
5 species associated with Alternative 4A would represent an adverse effect. However, with habitat
6 protection and restoration associated with Environmental Commitment 7, Resource Restoration and
7 Performance Principles VELB1 and VELB2, and by AMM1–AMM6, AMM10, and AMM15, the effects
8 of Alternative 4A as a whole on valley elderberry longhorn beetle would not be adverse under NEPA.

9 **CEQA Conclusion:** Considering the protection and restoration provisions, which would provide
10 acreages of new or enhanced habitat in amounts greater than necessary to compensate for habitats
11 lost to construction and restoration activities, together with Resource Restoration and Performance
12 Principles VELB1 and VELB2, implementation of Alternative 4A as a whole would not result in a
13 substantial adverse effect through habitat modifications and would not substantially reduce the
14 number or restrict the range of the species. Therefore, the alternative would have a less-than-
15 significant impact on valley elderberry longhorn beetle under CEQA.

16 **Impact BIO-36: Indirect Effects on Valley Elderberry Longhorn Beetle and its Habitat**

17 Construction activities associated with water conveyance facilities, habitat restoration, and habitat
18 enhancement, as well as operation and maintenance of above-ground water conveyance facilities,
19 including the transmission facilities, could result in ongoing periodic post-construction disturbances
20 with localized impacts on valley elderberry longhorn beetle. Construction related effects could
21 result from ground-disturbing activities, stockpiling of soils, and maintenance and refueling of heavy
22 equipment could result in dust and the inadvertent release of hazardous substances in areas where
23 elderberry shrubs occur. A GIS analysis estimates that approximately 37 shrubs could be indirectly
24 affected by conveyance facilities construction (see Section 12.3.2.3, *Methods Used to Assess Species*
25 *Effects*, for a discussion of the methods used to make this estimate). Restoration activities could
26 result in excavation or modification of channels, and type conversion from riparian and grasslands
27 to other habitats, that occur within 100 feet of an elderberry shrubs. These potential effects would
28 be minimized or avoided through AMM1–AMM6, AMM10, and AMM15.

29 **NEPA Effects:** With the implementation of AMM1–AMM6, AMM10, and AMM15 as part of Alternative
30 4A construction, operations, and maintenance, substantial adverse indirect effects on valley
31 elderberry longhorn beetle would be avoided and minimized. The indirect effects on valley
32 elderberry longhorn beetle as a result of implementing Alternative 4A environmental commitments
33 would not have an adverse effect on valley elderberry longhorn beetle under NEPA.

34 **CEQA Conclusion:** With the implementation of AMM1–AMM6, AMM10, and AMM15 as part of
35 Alternative 4A construction, operation, and maintenance, substantial adverse indirect effects on
36 valley elderberry longhorn beetle would be avoided and minimized. Furthermore, the impacts from
37 project would not result in a substantial reduction in numbers or a restriction in the range of valley
38 elderberry longhorn beetle. Therefore, the indirect effects under this alternative would have a less-
39 than-significant impact on valley elderberry longhorn beetle under CEQA.

40 **Impact BIO-37: Periodic Effects of Inundation of Valley Elderberry Longhorn Beetle Habitat** 41 **as a Result of Implementation of Alternative 4A**

42 Alternative 4A would not result in periodic effects on valley elderberry longhorn beetle.

1 **NEPA Effects:** No effect.

2 **CEQA Conclusion:** No impact.

3 **Nonlisted Vernal Pool Invertebrates**

4 This section describes the effects of Alternative 4A, including water conveyance facilities
5 construction and implementation of the environmental commitments, on nonlisted vernal pool
6 invertebrates (Blennosperma vernal pool andrenid bee, hairy water flea, Ricksecker's water
7 scavenger beetle, curved-foot hygrotus beetle, molestan blister beetle). Little is known about the
8 range of these species so it is assumed that they have potential to occur in the same areas described
9 by the vernal pool crustacean modeled habitat. That habitat model consists of: vernal pool complex,
10 which consists of vernal pools and uplands that display characteristic vernal pool and swale visual
11 signatures that have not been significantly affected by agricultural or development practices; alkali
12 seasonal wetlands in CZ 8; and degraded vernal pool complex, which consists of low-value
13 ephemeral habitat ranging from areas with vernal pool and swale visual signatures that display
14 clear evidence of significant disturbance due to plowing, disking, or leveling to areas with clearly
15 artificial basins such as shallow agricultural ditches, depressions in fallow fields, and areas of
16 compacted soils in pastures. For the purpose of the effects analysis, vernal pool complex is
17 categorized as high-value and degraded vernal pool complex is categorized as low-value for these
18 species. Alkali seasonal wetlands in CZ 8 were also included as high-value habitat for vernal pool
19 crustaceans in the model. Also included as low-value for vernal pool habitat are areas along the
20 eastern boundary of CZ 11 that are mapped as vernal pool complex because they flood seasonally
21 and support typical vernal pool plants, but do not include topographic depressions that are
22 characteristic of vernal pools.

23 Alternative 4A would result in permanent losses of habitat for nonlisted vernal pool invertebrates as
24 indicated in Table 12-4A-14 and indirect conversions of vernal pool habitat. Alternative 4A would
25 also include the following environmental commitments and associated Resource Restoration and
26 Performance Principles that would benefit nonlisted vernal pool invertebrates.

- 27 • Protect up to 188 acres of existing vernal pool/alkali seasonal wetland complex (Environmental
28 Commitment 3) in the greater Byron Hills area primarily in core vernal pool recovery areas
29 identified in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (U.S.
30 Fish and Wildlife Service 2005) (Resource Restoration and Performance Principles VP/AW1)
- 31 • Restore vernal pool complex and alkali seasonal wetland suitable for vernal pool invertebrates
32 to achieve no net loss of wetted acreage (Environmental Commitment 9, Resource Restoration
33 and Performance Principles VP/AW2).
- 34 • Increase size and connectivity of protected vernal pool complexes and alkali seasonal wetlands
35 in the greater Byron Hill area (Resource Restoration and Performance Principles VP/AW3).
- 36 • Provide appropriate seasonal flooding characteristics for supporting and sustaining vernal pool
37 and alkali seasonal wetland complex species (Resource Restoration and Performance Principles
38 VP/AW4).

39 As explained below, with the restoration and protection of these amounts of habitat, impacts on
40 nonlisted vernal pool invertebrates would not be adverse for NEPA purposes and would be less-than
41 significant for CEQA purposes.

1 **Table 12-4A-14. Changes in Nonlisted Vernal Pool Invertebrate Habitat Associated with**
2 **Alternative 4A (acres)^a**

Project Component	Habitat Type	Permanent	Temporary	Indirect
Water Conveyance Facilities	High-value (vernal pool complex and alkali seasonal wetland complex)	13	1	42
	Low-value (degraded vernal pool complex)	7	2	0
Total Impacts Water Conveyance Facilities		20	3	41
Environmental Commitments 4, 6-7, 9-11 ^a	High-value (vernal pool complex and alkali seasonal wetland complex)	17	0	3
	Low-value (degraded vernal pool complex)	8	0	1
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		25	0	4
TOTAL IMPACTS		45	3	46

^a See discussion below for a description of applicable environmental commitments.

3
4 **Impact BIO-38: Loss or Conversion of Habitat for and Direct Mortality of Nonlisted Vernal**
5 **Pool Invertebrates**

6 Alternative 4A would result in the direct, permanent and temporary loss combined of 48 acres of
7 vernal pool habitat from conveyance facilities construction and tidal restoration. In addition,
8 conveyance construction and tidal restoration could result in the indirect conversion due to
9 hydrologic alteration of an additional 46 acres of vernal pool complex. Construction of the water
10 conveyance facilities may result in the modification of hardpan and changes to the perched water
11 table, which could lead to alterations in the rate, extent, and duration of inundation of nearby vernal
12 pool habitat. USFWS typically considers construction within 250 feet of vernal pools to constitute an
13 indirect effect unless more detailed information is provided to further refine the limits of any such
14 effects. For the purposes of this analysis, the 250-foot buffer was applied to the water conveyance
15 facilities work areas where surface and subsurface disturbance activities would take place. Habitat
16 enhancement and management activities (Environmental Commitment 11), which include
17 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.

18 As specified in *AMM12 Vernal Pool Crustaceans* and *Environmental Commitment 9 Vernal Pool and*
19 *Alkali Seasonal Wetland Complex Restoration*, restoration projects would be designed such that no
20 more than a total of 10 wetted acres of vernal pool crustacean habitat are permanently lost. AMM12
21 would also ensure that no more than 20 wetted acres of vernal pool crustacean habitat are indirectly
22 affected by alterations to hydrology resulting from adjacent habitat restoration activities, in
23 particular tidal restoration. *AMM30 Transmission Line Design and Alignment Guidelines* would ensure
24 that transmission lines avoid removal of wetted acres of vernal pools and alkali seasonal wetlands
25 wetted acres of aquatic habitats to the maximum extent feasible. The term wetted acres refers to an
26 area that would be defined by the three parameter wetland delineation method used by the U.S.
27 Army Corps of Engineers to determine the limits of a wetland, which involve an evaluation of
28 wetland soil, vegetation, and hydrology characteristics. This acreage differs from vernal pool
29 complex acreages in that a vernal pool complex is composed of individual wetlands (vernal pools)
30 and those upland areas that are in between and surrounding them, which provide the supporting
31 hydrology (surface runoff and groundwater input), organic and nutrient inputs, and refuge for the
32 terrestrial phase of some vernal pool species.

1 A summary statement of the combined impacts and NEPA and CEQA conclusions follows the
2 individual activity discussions.

- 3 • *Water Facilities and Operation*: Construction of Alternative 4A conveyance facilities would result
4 in the permanent and temporary combined loss of approximately 23 acres of vernal pool
5 habitat, composed of 14 acres of high-value and 9 acres of low-value habitat (Table 12-4A-14).
6 In addition, the conveyance facilities could result in the indirect conversion of 42 acres of vernal
7 pool habitat in the vicinity of Clifton Court Forebay. The indirect effects would result from the
8 construction of permanent transmission lines, from the storage of reusable tunnel material, and
9 permanent access roads. *AMM30 Transmission Line Design and Alignment Guidelines* would
10 ensure that temporary transmission lines are designed to avoid removal wetted acres of aquatic
11 habitats to the maximum extent practicable. There are no records of these nonlisted vernal pool
12 invertebrates at this location (California Department of Fish and Game 2013).
- 13 • *Environmental Commitment 4 Tidal Natural Communities Restoration*: Implementation would
14 result in the conversion of an estimated 25 acres of modeled vernal pool habitat (17 acres of
15 high-value and 8 acres low-value habitat). Tidal restoration would also result in the indirect
16 conversion of an estimated 4 acres of modeled vernal pool habitat. The effects would take place
17 in one or more of the ROAs established for tidal restoration (see Figure 12-1).
- 18 • *Environmental Commitment 11 Natural Communities Enhancement and Management*: Alternative
19 4A's restoration/creation of vernal pools to achieve no net loss and the protection of up to 188
20 acres of vernal pool/alkali seasonal wetland complex would benefit vernal pool invertebrates. A
21 variety of habitat management actions included in Environmental Commitment 11 that are
22 designed to enhance wildlife values in protected habitats may result in localized ground
23 disturbances that could temporarily affect vernal pool invertebrate habitat. Ground-disturbing
24 activities, such as removal of nonnative vegetation and road and other infrastructure
25 maintenance, are expected to have minor effects on vernal pool invertebrate habitat and are
26 expected to result in overall improvements to and maintenance of vernal pool habitat values.
27 These effects cannot be quantified, but are expected to be minimal and would be avoided and
28 minimized by the AMMs listed below.

29 The following paragraphs summarize the combined effects discussed above and describe other
30 environmental commitments and AMMs that offset or avoid these effects. NEPA and CEQA impact
31 conclusions are also included.

32 The proposed conservation efforts have been evaluated to determine whether they would provide
33 sufficient habitat protection and restoration in an appropriate timeframe to ensure that the effects
34 of construction would not be adverse under NEPA and would be less than significant under CEQA.
35 Table 12-4A-14 above lists the impacts on nonlisted vernal pool invertebrate habitat that are based
36 on the natural community mapping done within the study area. Table 12-4A-15 was prepared to
37 further analyze the project's effects on vernal pool invertebrates using wetted acres of habitat in
38 order to compare the effects of this alternative with the effect limits established in *AMM12 Vernal
39 Pool Crustaceans*, which are measured in wetted acres of habitat. Wetted acres were estimated by
40 using the BDCP's assumption that restored vernal pool complexes would have a 15% density of
41 vernal pools (i.e., of 100 acres of vernal pool complex 15 acres would constitute vernal pools and the
42 remaining 85 acres supporting uplands). Based on an informal evaluation of aerial photographs of
43 the project area, it is likely that the actual densities within the project area are approximately 10%,
44 but the 15% density value was chosen as a conservative estimate for determining effects.

1 **Table 12-4A-15. Estimated Effects on Wetted Vernal Pool Crustacean Habitat under Alternative 4A**
2 **(acres)**

	Direct Loss	Indirect Conversion
AMM 12 Impact Limit	10	20
Water Conveyance Facilities ^a	3.45	6.30
Environmental Commitments 4, 6-7, 9-11	3.75	0.60
Total	7.2	6.9

^a These acreages were generated by assuming that the modeled habitat identified in Table 12-4A-14 has densities of wetted habitat at 15%. The direct effects numbers include permanent and temporary impacts.

3
4 Typical NEPA and CEQA project-level mitigation ratios for loss of vernal pools affected by
5 Alternative 4A would be 1:1 for restoration and 2:1 for protection. Typically, indirect conversion
6 impacts are mitigated by protecting vernal pools at a 2:1 ratio. Using these typical ratios would
7 indicate that 7.2 wetted acres of vernal pool habitat (48 acres of vernal pool/alkali seasonal wetland
8 complex) should be restored and 28.2 wetted acres of vernal pool habitat (188 acres of vernal
9 pool/alkali seasonal wetland complex) protected to mitigate Alternative 4A's direct and indirect
10 effects on nonlisted vernal pool species habitat. With the implementation of AMM30, the effects on
11 aquatic habitat would be avoided to the maximum extent feasible during the designing of the
12 transmission line west of Clifton Court Forebay.

13 Project proponents would commit to protecting 188 acres of vernal pool/alkali seasonal wetland
14 complex by protecting at least 2 wetted acres of vernal pools protected for each wetted acre directly
15 or indirectly affected. Alternative 4A also includes a commitment to restore or create vernal pools
16 such that the project would result in no net loss of vernal pool acreage. The amount of restoration
17 would be determined during implementation based on the following criteria, which would satisfy
18 Resource Restoration and Performance Principle VP/AW2.

- 19 ● If restoration is completed (i.e., restored natural community meets all success criteria) prior to
20 impacts, then 1.0 wetted acre of vernal pools would be restored for each wetted acre directly
21 affected (1:1 ratio).
- 22 ● If restoration takes place concurrent with impacts (i.e., restoration construction is completed,
23 but restored habitat has not met all success criteria prior to impacts occurring), then 1.5 wetted
24 acres of vernal pools would be restored for each wetted acre directly affected (1.5:1 ratio).

25 The protection and restoration would be achieved by implementation of the following the Resource
26 Restoration and Performance Principles.

- 27 ● Protect existing vernal pool complex in the greater Byron Hills area primarily in core vernal pool
28 recovery areas identified in the *Recovery Plan for Vernal Pool Ecosystems of California and*
29 *Southern Oregon* (U.S. Fish and Wildlife Service 2005) (Resource Restoration and Performance
30 Principles VP/AW1).
- 31 ● Increase size and connectivity of protected vernal pool complexes and alkali seasonal wetlands
32 in the greater Byron Hill area (Resource Restoration and Performance Principles VP/AW3).
- 33 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining vernal pool
34 and alkali seasonal wetland complex species (Resource Restoration and Performance Principles
35 VP/AW4).

1 Alternative 4A also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM10 Restoration of Temporarily Affected*
5 *Natural Communities, and AMM30 Transmission Line Design and Alignment Guidelines. AMM12 Vernal*
6 *Pool Crustaceans*, though developed for vernal pool crustaceans, includes measures to avoid and
7 minimize direct and indirect effects on vernal pools and would thus be applicable to nonlisted
8 vernal pool invertebrates as well. All of these AMMs include elements that avoid or minimize the
9 risk of affecting habitats and species adjacent to work areas. BDCP Appendix 3.C describes the
10 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
11 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

12 **NEPA Effects:** The loss of vernal pool habitat under Alternative 4A would not be adverse under
13 NEPA because project proponents would commit to avoiding and minimizing effects from and to
14 restoring and protecting an acreage that meets the typical mitigation ratios described above. This
15 habitat protection, restoration, management, and enhancement would be guided by Resource
16 Restoration and Performance Principles VP/AW1-VP/AW4, and by AMM1-AMM6, AMM10, AMM12,
17 and AMM30, which would be in place throughout the time period of construction and operations.
18 Considering these commitments, losses and conversions of nonlisted vernal pool invertebrates
19 habitat under Alternative 4A would not be adverse.

20 **CEQA Conclusion:** The effects on nonlisted vernal pool invertebrate habitat from Alternative 4A
21 would represent an adverse effect as a result of habitat modification of a special-status species and
22 potential for direct mortality in the absence of actions to compensate, avoid, and minimize impacts.
23 However, project proponents have committed to habitat protection, restoration, management, and
24 enhancement associated with Environmental Commitment 3, Environmental Commitment 9, and
25 Environmental Commitment 11. These conservation activities would be guided by Resource
26 Restoration and Performance Principles VP/AW1-VP/AW4, and by AMM1-AMM6, AMM10, AMM12,
27 and AMM30, which would be in place throughout the period of construction and operations.
28 Considering these commitments, Alternative 4A would not result in a substantial adverse effect
29 through habitat modifications and would not substantially reduce the number or restrict the range
30 of nonlisted vernal pool invertebrates. Therefore, Alternative 4A would have a less-than-significant
31 impact on nonlisted vernal pool invertebrates under CEQA.

32 **Impact BIO-39: Indirect Effects of Alternative 4A on Nonlisted Vernal Pool Invertebrates**

33 Construction and maintenance activities associated with water conveyance facilities, and restoration
34 actions could indirectly affect nonlisted vernal pool invertebrates and their habitat in the vicinity of
35 construction and restoration areas, and maintenance activities. Ground-disturbing activities,
36 stockpiling of soils, and maintenance and refueling of heavy equipment could result in the
37 inadvertent release of sediment and hazardous substances into this habitat. Vernal pools could be
38 periodically indirectly affected by maintenance activities at water conveyance facilities.
39 Embankment maintenance activities around Clifton Court Forebay could result in the inadvertent
40 discharge of sediments and hazardous materials into nonlisted vernal pool invertebrate habitat that
41 occurs along the southern and western boundaries of the forebays.

42 **NEPA Effects:** Water conveyance facilities construction and restoration activities could indirectly
43 affect nonlisted vernal pool invertebrates and their habitat in the vicinity of construction areas.
44 These potential effects would be avoided and minimized through AMM1-AMM6, and AMM10 which

1 would be in effect throughout the period of construction and operations. The indirect effects of
2 Alternative 4A on nonlisted vernal pool invertebrates would not be adverse under NEPA.

3 **CEQA Conclusion:** Construction and maintenance activities associated with water conveyance
4 facilities, and restoration actions could indirectly impact nonlisted vernal pool invertebrates and
5 their habitat in the vicinity of construction and restoration areas, and maintenance activities. These
6 potential impacts would be minimized or avoided through AMM1–AMM6, and AMM10, which would
7 be in effect throughout period of construction and operations. The indirect impacts of Alternative 4A
8 on nonlisted vernal pool invertebrates would be less than significant under CEQA.

9 **Impact BIO-40: Periodic Effects of Inundation of Nonlisted Vernal Pool Invertebrates' Habitat**
10 **as a Result of Implementation of Alternative 4A**

11 No Alternative 4A components would result in periodic effects on nonlisted vernal pool
12 invertebrates.

13 **NEPA Effects:** No effect.

14 **CEQA Conclusion:** No impact.

15 **Sacramento and Antioch Dunes Anthicid Beetles**

16 This section describes the effects of Alternative 4A, including water conveyance facilities
17 construction and implementation of the Environmental Commitments, on Sacramento and Antioch
18 Dunes anthicid beetles. Potential habitat in the study area includes the inland dune scrub at Antioch
19 Dunes NWR, sand bars along the Sacramento and San Joaquin Rivers, and sandy dredge spoil piles
20 (California Department of Fish and Game 2006c and 2006d).

21 The construction, and operations and maintenance of the water conveyance facilities under
22 Alternative 4A would not likely affect Sacramento and Antioch Dunes anthicid beetles. The
23 construction of the water conveyance structure and associated infrastructure would generally avoid
24 affects to channel margins where sand bars are likely to form. Conveyance construction would not
25 affect inland dune scrub habitat at Antioch Dunes NWR. No dredge spoil areas that could be
26 occupied by Sacramento anthicid beetle were identified within conveyance facilities footprints
27 during a review of Google Earth imagery. Also, a review of the locations of the Alternative 4A water
28 intake facilities on aerial imagery did not reveal any sandbars along the channel margins. These
29 portions of the Sacramento River have steep, riprap lined channel banks that are likely not
30 conducive to the formation of sandbars.

31 Implementation of Alternative 4A restoration measures could affect habitat for Sacramento and
32 Antioch Dunes anthicid beetles. Both species are known to utilize interior sand dunes and sandbar
33 habitat. The only interior sand dune habitat within the project area is at Antioch Dunes, which
34 would not be impacted by the Alternative 4A Environmental Commitments. Both species are known
35 to occur along the Sacramento River and San Joaquin Rivers. The implementation of Alternative 4A
36 restoration actions could affect habitat for Sacramento and Antioch Dunes anthicid beetles along
37 channels throughout the project area; however the extent of these habitats in the project area is
38 unknown because these areas were not identified at the scale of mapping done within the study
39 area. Because of current and historic channel modifications (channel straightening and dredging)
40 and levee construction throughout the Delta, sandbar habitat is likely very limited and restricted to
41 channel margins. The implementation of *Environmental Commitment 4 Tidal Natural Communities*

1 *Restoration and Environmental Commitment 6 Channel Margin Enhancement* could impact sandbar
2 habitat along the river channels and possibly sandy, dredge piles on Delta islands.

3 Alternative 4A would likely result in beneficial effects on Sacramento and Antioch Dunes anthicid
4 beetles. The following Alternative 4A Environmental Commitments would generally increase
5 opportunities for the formation of sandbars in the project area.

- 6 • As stated in Environmental Commitment 6, 4.6 miles of channel margin habitat would be
7 enhanced.
- 8 • Restore up to 251 acres of riparian habitat (Environmental Commitment 7).
- 9 • Protect up to 103 acres of riparian habitat (Environmental Commitment 3).

10 These measures would improve shoreline conditions by creating benches along levees, shallow
11 habitat along margins, and increasing shoreline vegetation, all of which would likely contribute to
12 the formation of sandbars along Delta river channels where these measures would be implemented.
13 Increasing the structural diversity of Delta river channel margins would create opportunities for
14 sand to be deposited and for sandbars to subsequently form. As explained below, potential impacts
15 on Sacramento and Antioch Dunes anthicid beetle would not be adverse for NEPA purposes and
16 would be less than significant for CEQA purposes.

17 **Table 12-4A-16. Changes in Sacramento and Antioch Dunes Anthicid Beetles' Habitat Associated**
18 **with Alternative 4A (acres)^a**

Project Component	Permanent	Temporary
Total Impacts Water Conveyance Facilities	0	0
Total Impacts Environmental Commitments 4, 6-7, 9-11 ^a	Unknown	Unknown
TOTAL IMPACTS	Unknown	Unknown

^a See discussion below for a description of applicable Environmental Commitments.

19
20 **Impact BIO-41: Loss or Conversion of Habitat for and Direct Mortality of Sacramento and**
21 **Antioch Dunes Anthicid Beetles**

22 Implementation of Alternative 4A Environmental Commitments could affect Sacramento and
23 Antioch Dunes anthicid beetles and their habitat. As mentioned above, the full extent of this habitat
24 in the study area is unknown but it is assumed that sand bars likely occur to some degree along the
25 Sacramento and San Joaquin Rivers and that some islands in the Delta may contain sandy dredge
26 spoil piles. A review of Google Earth imagery in the north Delta did identify three general areas that
27 appear to have accumulations of sandy soils (with some vegetation), possibly from dredge disposal,
28 are Decker Island, the western portion of Bradford Island, and the southwestern tip of Grand Island.
29 A review of Google Earth imagery in the south Delta did identify sandbar habitat along the San
30 Joaquin River from the southern end of the project area downstream to an area just west of Lathrop.
31 An additional area along Paradise Cut was identified just north of I-5. Environmental Commitments
32 that could result in impacts on Sacramento and Antioch Dunes anthicid beetles are tidal habitat
33 restoration (Environmental Commitment 4) and channel margin enhancement (Environmental
34 Commitment 6). In addition, maintenance activities associated with the long-term operation of the
35 water conveyance facilities could degrade or eliminate habitat for Sacramento and Antioch Dunes
36 anthicid beetles. Each of these individual activities is described below. A summary statement of the
37 combined impacts and NEPA and CEQA conclusions follows the individual activity discussions.

- 1 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal natural communities
2 restoration could impact the areas of sandy soils identified from aerial photographs on Decker
3 Island, the western portion of Bradford Island, and on the southwestern tip of Grand Island
4 because these areas fall within the West Delta Restoration Opportunity Area (ROA). The
5 methods and techniques for tidal restoration may include the recontouring of lands so that
6 elevations are suitable for the establishment of marsh plains and the eventual breaching of
7 levees. There are three CNDDDB records of Sacramento anthicid beetle (just north of Rio Vista,
8 one just south of Rio Vista along the west shore of the Sacramento River, and one on Grand
9 Island) and one CNDDDB record of Antioch Dunes anthicid beetle (just north of Rio Vista) that fall
10 within the West Delta ROA (California Department of Fish and Wildlife 2013). Tidal restoration
11 actions in the West Delta ROA may eliminate potential habitat and impact occupied habitat of
12 both Sacramento and Antioch Dunes anthicid beetles.
- 13 • *Environmental Commitment 6 Channel Margin Enhancement:* Channel margin enhancement
14 could result in impacts on 4.6 miles of channel margin that could contain sandbars.

15 The following paragraphs summarize the combined effects discussed above and describe other
16 Environmental Commitments and AMMs that offset or avoid these effects. NEPA and CEQA impact
17 conclusions are also included.

18 Alternative 4A could result in substantial effects on Sacramento and Antioch Dunes anthicid beetles
19 because all of the habitat identifiable from aerial photo review falls within either the West Delta
20 ROA, which may be considered for tidal restoration (Environmental Commitment 4). Furthermore,
21 three of the records for Sacramento anthicid beetle within the study area fall within areas being
22 considered for tidal restoration (Environmental Commitment 4), which represents approximately
23 one quarter of the extant records for this species range wide (3 of 13). The only extant record for
24 Antioch Dunes anthicid beetle, which represents one of five extant records range wide, falls within
25 the West Delta ROA that is just north of Rio Vista. These occurrences could be affected if tidal
26 restoration occurs in these areas. However, considering all of the Environmental Commitments
27 under Alternative 4A, Sacramento and Antioch Dunes anthicid beetles would likely benefit from the
28 project. Under Alternative 4A, Environmental Commitment 6, and Environmental Commitment 7,
29 would generally contribute to the formation of sandbar habitat in the project area. These measures
30 would improve shoreline conditions by creating benches along levees (Environmental Commitment
31 6) and increasing shoreline vegetation (Environmental Commitment 7), all of which would likely
32 contribute to the formation of sandbars along Delta river channels where these measures would be
33 implemented. Increasing the structural diversity of Delta river channel margins would create areas
34 of slow water that would allow for sand to be deposited and for sandbars to subsequently form.

35 **NEPA Effects:** The potential impacts on Sacramento and Antioch Dunes anthicid beetles associated
36 with Alternative 4A as a whole would represent an adverse effect as a result of habitat modification
37 of a special-status species and potential for direct mortality in the absence of other means to
38 compensate for, avoid, and/or minimize impacts. However, considering the implementation of
39 restoration associated with Environmental Commitment 6 and Environmental Commitment 7 the
40 effects of Alternative 4A as a whole on Sacramento and Antioch Dunes anthicid beetles would not be
41 adverse under NEPA.

42 **CEQA Conclusion:** Alternative 4A would potentially impact Sacramento and Antioch Dunes anthicid
43 beetles' habitat and could impact three occurrences of Sacramento anthicid beetle and one
44 occurrence of Antioch Dunes anthicid beetle. However, the implementation of the Environmental
45 Commitments would likely benefit Sacramento and Antioch Dunes anthicid beetles. Environmental

1 Commitment 6 and Environmental Commitment 7 would generally contribute to the formation of
2 sandbar habitat in the project area. Alternative 4A as a whole would not result in a substantial
3 adverse effect though habitat modification and would not substantially reduce the number or
4 restrict the range of these species. Therefore, the alternative would have a less-than-significant
5 impact on Sacramento and Antioch Dunes anthicid beetles under CEQA.

6 **Delta Green Ground Beetle**

7 Suitable habitat in the study area would be vernal pool complexes and annual grasslands in the
8 general Jepson Prairie area. The construction, and operations and maintenance of the water
9 conveyance facilities under Alternative 4A would not affect delta green ground beetle because the
10 facilities and construction area are outside the known range of the species. Implementation of
11 Alternative 4A could affect delta green ground beetle through the potential protection of grasslands
12 (Environmental Commitment 3) in the vicinity of Jepson Prairie and the subsequent implementation
13 of habitat enhancement and management actions (Environmental Commitment 11) in these areas.
14 In addition, tidal natural communities restoration (Environmental Commitment 4) and vernal pool
15 and alkali seasonal wetland complex restoration (Environmental Commitment 9) could result in
16 potential impacts on delta green ground beetle and its habitat. Alternative 4A could result in
17 beneficial effects on delta green ground beetle through the protection of grasslands it occurs in CZ 1.

18 These areas could contain currently occupied habitat for delta green ground beetle and/or create
19 conditions suitable for eventual range expansion. As explained below, potential impacts on delta
20 green ground beetle would be adverse for NEPA purposes and would be significant for CEQA
21 purposes. Mitigation Measure BIO-42 would reduce the effects under NEPA and reduce the impacts
22 to a less-than-significant level under CEQA.

23 **Table 12-4A-17. Changes in Delta Green Ground Beetle Habitat Associated with Alternative 4A**
24 **(acres)^a**

Project Component	Permanent	Temporary
Total Impacts Water Conveyance Facilities	0	0
Total Impacts Environmental Commitments 4, 6-7, 9-11 ^a	Unknown	Unknown
TOTAL IMPACTS	Unknown	Unknown

^a See discussion below for a description of applicable Environmental Commitments.

25
26 **Impact BIO-42: Loss or Conversion of Habitat for and Direct Mortality of Delta Green Ground**
27 **Beetle**

28 Alternative 4A Environmental Commitments could result in the conversion of habitat and/or direct
29 mortality to delta green ground beetle. Environmental Commitments that could affect delta green
30 ground beetle include tidal natural communities habitat restoration (Environmental Commitment
31 4), vernal pool and alkali seasonal wetland complex restoration (Environmental Commitment 9), and
32 habitat enhancement and management activities (Environmental Commitment 11) in CZ 1. CZ 1 is
33 the only portion of the project area that contains occupied and potential habitat for delta green
34 ground beetle. The range of the delta green ground beetle is currently believed to be generally
35 bound by Travis Air Force Base to the west, Highway 113 to the east, Hay Road to the north, and
36 Creed Road to the south (Arnold and Kavanaugh 2007; U.S. Fish and Wildlife Service 2009a). Further
37 discussion of this potential effect is provided below, and NEPA and CEQA conclusions follow.

- 1 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal restoration in the
2 Cache Slough ROA could result in the loss of delta green ground beetle habitat if restoration is
3 planned in areas known to be or potentially occupied by the species. The tidal restoration
4 methods and techniques identified in Environmental Commitment 4 include excavating
5 channels; modifying ditches, cuts, and levees to encourage tidal circulation; and scalping higher
6 elevation areas to create marsh plains. These disturbances could affect delta green ground
7 beetle through habitat modification, either directly or indirectly through hydrologic
8 modifications, and/or result in direct mortality to the species.
- 9 • *Environmental Commitment 9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration:*
10 Vernal pool restoration may occur in CZ 1 and could result in disturbance to delta green ground
11 beetle habitat if restoration is implemented in areas known to be or potentially occupied by the
12 species. These restoration activities would most likely take place in areas that were historically
13 vernal pool complexes that have since been highly degraded, but which are suitable for vernal
14 pool restoration. These areas would not likely provide habitat for delta green ground beetle.
15 However, if these activities take place in areas more suitable, then disturbances could result in
16 direct mortality of the species. Nevertheless, restoration ultimately would expand habitat
17 available to the species.
- 18 • *Environmental Commitment 11 Natural Communities Enhancement and Management:* Grasslands
19 would potentially be protected in CZ 1. Potential effects from Environmental Commitment 11
20 could include direct mortality to larvae and adults from the implementation of grassland
21 management techniques, which may include livestock grazing, prescribed burning, and mowing.
22 In addition to these grassland management actions, Environmental Commitment 11 also
23 includes guidelines and techniques for invasive plant control, which may include manual control
24 (hand-pulling and digging), mechanical control (large equipment), and chemical control, though
25 some of these methods would be restricted in areas where rare plants occur or in critical habitat
26 for vernal pool species.

27 **NEPA Effects:** The potential protection of grassland in CZ 1 (Environmental Commitment 3) could
28 benefit delta green ground beetle if these areas occur within the range of the species. Tidal natural
29 communities restoration (Environmental Commitment 4), and vernal pool and alkali seasonal
30 wetland complex restoration (Environmental Commitment 9) could impact delta green ground
31 beetle. The management of these grasslands according to *Environmental Commitment 11 Natural*
32 *Communities Enhancement and Management* has a potential to affect this species. Direct mortality
33 and the affects on delta green ground beetle habitat would be an adverse effect under NEPA.
34 Implementation of mitigation measure BIO-42, *Avoid Impacts on Delta Green Ground Beetle and its*
35 *Habitat*, would reduce this effect.

36 **CEQA Conclusion:** The implementation of grassland protection (Environmental Commitment 3),
37 tidal natural communities restoration (Environmental Commitment 4), and vernal pool and alkali
38 seasonal wetland complex restoration (Environmental Commitment 9) could impact delta green
39 ground beetle. Tidal restoration projects around Calhoun Cut and possible Lindsey Slough could
40 affect habitat and result in direct mortality to the species from excavating channels; modifying
41 ditches, cuts, and levees to encourage tidal circulation; and scalping higher elevation areas to create
42 marsh plains. Potential impacts from Environmental Commitment 11 could include direct mortality
43 to larvae and adults resulting from grassland management techniques, which may include livestock
44 grazing, prescribed burning, and mowing. Environmental Commitment 11 also includes guidelines
45 and techniques for invasive plant control, which may include manual control (hand-pulling and

1 digging), mechanical control (large equipment), and chemical control, though some of these
2 methods would be restricted in areas where rare plants occur and in critical habitat for vernal pool
3 species. These actions could result in adverse effects through habitat modification and a possible
4 reduction in the number of the species or restrict its range, and therefore result in significant
5 impacts on delta green ground beetle. Implementation of Mitigation Measure BIO-42, *Avoid Impacts*
6 *on Delta Green Ground Beetle and its Habitat*, would reduce these potential impacts to a less-than-
7 significant level.

8 **Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat**

9 As part of the design and development of management plans for conservation areas in the area
10 of Jepson Prairie, the project proponents will implement the following measures to avoid effects
11 on delta green ground beetle.

- 12 • If habitat restoration or protection is planned for the lands adjacent to Calhoun Cut and
13 noncultivated lands on the western side of Lindsey Slough, these area will be evaluated by a
14 USFWS approved biologist for potential delta green ground beetle habitat (large playa pools,
15 or other similar aquatic features, with low growing vegetation or bare soils around the
16 perimeter). The biologist will have previous experience with identifying suitable habitat
17 requirements for delta green ground beetle.
- 18 • Any suitable habitat identified by the biologist (with previous experience with delta green
19 ground beetle) within the species current range will be considered potentially occupied and
20 all ground disturbing activities in these areas will be avoided, which for the project area is
21 generally the area west of State Route 113.
- 22 • Any other areas identified as suitable habitat outside of the current range of the species will
23 be surveyed by a biologist with previous experience in surveying for and identifying delta
24 green ground beetle. No ground disturbing activities will be implemented in areas identified
25 as occupied by delta green ground beetle.
- 26 • Based on the results of the habitat evaluations and surveys and site-specific restoration and
27 management plans will be developed so that they don't conflict with the recovery goals for
28 delta green ground beetle in the USFWS's 2005 *Recovery Plan for Vernal Pool Ecosystems of*
29 *California and Southern Oregon* (U.S. Fish and Wildlife Service 2005). Plans will include
30 measures to protect and manage for delta green ground beetle so that they continue to
31 support existing populations or allow for future colonization.

32 **Callippe Silverspot Butterfly**

33 This section describes the effects of Alternative 4A on callippe silverspot butterfly. Suitable habitats
34 are typically in areas influenced by coastal fog with hilltops that support the specie's host-plant,
35 Johnny jump-ups. Preferred nectar flowers used by adults include thistles, blessed milk thistle, and
36 coyote wild mint. Other native nectar sources include hairy false goldenaster, coast buckwheat,
37 mourning bride, and California buckeye. Suitable habitat in the study area is located in CZ 11 in the
38 Cordelia Hills west of I-680 and in the Potrero Hills on the northern edge of Suisun Marsh. The
39 construction, and operations and maintenance of the water conveyance facilities under Alternative
40 4A would not result in impacts on callippe silverspot butterfly or its habitat. If Cordelia Hills and
41 Potrero Hills are identified for grassland protection opportunities as part of *Environmental*
42 *Commitment 3 Natural Communities Protection and Restoration* and the subsequent implementation
43 of *Environmental Commitment 11 Natural Communities Enhancement and Management*, could affect

1 callippe silverspot butterfly. Callippe silverspot butterfly has been documented in the western most
 2 portion of the project area (CZ 11) in the Cordelia Hills (Solano County Water Agency 2009).
 3 Potential habitat for the species (grassy hills with *Viola pedunculata*) is present in the Potrero Hills,
 4 but it has not been observed there (EDAW 2005, California Department of Fish and Wildlife 2013).
 5 Alternative 4A would protect up to 1,060 acres of grassland, some of which may occur in areas in CZ
 6 11 that contain habitat for callippe silverspot butterfly. As explained below, potential impacts on
 7 callippe silverspot would be adverse for NEPA purposes and would be significant for CEQA
 8 purposes. Mitigation Measure BIO-43 would reduce the effects under NEPA and reduce the impacts
 9 to a less-than-significant level under CEQA.

10 **Table 12-4A-18. Changes in Callippe Silverspot Butterfly Habitat Associated with Alternative 4A**
 11 **(acres)^a**

Project Component	Permanent	Temporary
Total Impacts Water Conveyance Facilities	0	0
Total Impacts Environmental Commitments 4, 6-7, 9-11 ^a	Unknown	Unknown
TOTAL IMPACTS	Unknown	Unknown

^a See discussion below for a description of applicable Environmental Commitments.

12
 13 **Impact BIO-43: Loss or Conversion of Habitat for and Direct Mortality of Callippe Silverspot**
 14 **Butterfly**

15 Alternative 4A Environmental Commitments could result in the conversion of habitat and/or direct
 16 mortality to callippe silverspot butterfly. Only one Environmental Commitment was identified as
 17 potentially affecting Callippe silverspot butterfly, *Environmental Commitment 11 Natural*
 18 *Communities Enhancement and Management*, which could result in the disturbance of callippe
 19 silverspot butterfly habitat if such areas are acquired as part of grassland protection under
 20 *Environmental Commitment 3 Natural Communities Protection and Restoration*. Further discussion of
 21 this potential effect is provided below and NEPA and CEQA conclusions follow.

22 Up to 1,060 acres of grasslands would be protected in the project area, some of which may occur in
 23 CZ 11. If areas chosen for protection include Cordelia Hills or Potrero Hills, where there is known
 24 and potential habitat, respectively, then grassland enhancement and management actions could
 25 affect the callippe silverspot butterfly. Potential effects from Environmental Commitment 11 could
 26 include the loss of larval host and nectar sources and direct mortality to larvae and adults from the
 27 installation of artificial nesting burrows and structures and the implementation of grassland
 28 management techniques, which may include livestock grazing, prescribed burning, and mowing. In
 29 addition to these grassland management actions, Environmental Commitment 11 also includes
 30 guidelines and techniques for invasive plant control, which may include manual control (hand-
 31 pulling and digging), mechanical control (large equipment), and chemical control. Several of the
 32 preferred nectar sources are thistles, some of which have been identified by the California Invasive
 33 Plant Council as having limited to moderate ecological impacts (California Invasive Plant Council
 34 2006).

35 **NEPA Effects:** The protection of up to 1,060 acres of grassland some of which may occur within CZ
 36 11 could benefit callippe silverspot butterfly if these protected areas include occupied and potential
 37 habitat on the hill tops in Cordelia Hills and Potrero Hills. However, the management of these
 38 grasslands according to *Environmental Commitment 11 Natural Communities Enhancement and*

1 *Management* also has a potential to adversely affect this species. Direct mortality and/or the
2 removal of larval host plants and nectar sources for adults would be an adverse effect under NEPA.
3 Implementation of Mitigation Measure BIO-43, *Avoid and Minimize Loss of Callippe Silverspot*
4 *Butterfly Habitat*, would ensure the effect is not adverse under NEPA.

5 **CEQA Conclusion:** If grasslands within the Cordelia Hills and Potrero Hills are protected as part of
6 *Environmental Commitment 3 Natural Communities Protection and Restoration* then the subsequent
7 management of these grasslands according to *Environmental Commitment 11 Natural Communities*
8 *Enhancement and Management* has a potential to affect this species. These actions could result in
9 adverse effects through habitat modification and a possible reduction in the number of the species
10 or restrict its range and would therefore result in significant impact on the species under CEQA.
11 However, callippe silverspot butterfly could benefit from the protection of occupied and potential
12 habitat for the species with the implementation of Mitigation Measure BIO-43, which would avoid
13 and minimize effects from management actions and thus reduce the potential impact to a less-than-
14 significant level under CEQA.

15 **Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly** 16 **Habitat**

17 As part of the development of site-specific management plans on protected grasslands in the
18 Cordelia Hills and/or Potrero Hills, project proponents will implement the following measures
19 to avoid and minimize the loss of callippe silverspot habitat.

- 20 • Hilltops in Cordelia Hills and Potrero Hills will be surveyed for callippe silverspot larval host
21 plants (Johnny jump-ups) by a biologist familiar with identifying this plant species. These
22 surveys should occur during the plant's blooming period (typically early January through
23 April)
- 24 • If larval host plants are present, then presence/absence surveys for callippe silverspot
25 butterfly larvae will be conducted according to the most recent USFWS approved survey
26 methods by a biologist with previous experience in surveying for and identifying callippe
27 larvae and/or signs of larval presence. These surveys should be conducted prior to the adult
28 flight season, which usually starts in mid-May.
- 29 • If larvae are detected then no further surveys are necessary. If larvae are not detected then
30 surveys for adults will be conducted by a biologist familiar with surveying for and
31 identifying callippe silverspot. Surveys typically start in mid-May and continue weekly for 8
32 to 10 weeks.
- 33 • If callippe silverspot butterflies are detected, then the site-specific management plans will
34 be written to include measures to protect and manage for larval host plants and nectar
35 sources so that they continue to support existing populations and/or allow for future
36 colonization. Mapping of both larval host plants and nectar sources will be incorporated into
37 the management plans.

38 **California Red-Legged Frog**

39 Modeled California red-legged frog habitat in the study area is restricted to freshwater aquatic and
40 grassland habitat, and immediately adjacent cultivated lands along the study area's southwestern
41 edge in CZ 7, CZ 8, CZ 9, and CZ 11. Pools in perennial and seasonal streams and stock ponds provide

1 potential aquatic habitat for this species. While stock ponds are underrepresented as a modeled
2 habitat, none is expected to be affected by project actions.

3 Alternative 4A would result in both temporary and permanent losses of California red-legged frog
4 modeled habitat as indicated in Table 12-4A-19. Factors considered in assessing the value of
5 affected habitat for the California red-legged frog, to the extent that information is available, are
6 presence of limiting habitat (aquatic breeding habitat), known occurrences and clusters of
7 occurrences, proximity of the affected habitat to existing protected lands, and the overall degraded
8 or fragmented nature of the habitat. The study area represents the extreme eastern edge of the
9 species' coastal range, and species' occurrences are reported only from CZ 8 and CZ 11.

10 Alternative 4A would include the following Environmental Commitments and associated Resource
11 Restoration and Performance Principles to benefit the California red-legged frog.

- 12 ● Protect and improve habitat linkages that allow terrestrial species to move between protected
13 habitats within and adjacent to the project area (Resource Restoration and Performance
14 Principle L2).
- 15 ● Protect up to 647 acres of grassland in the Byron Hills area where practicable and/or in other
16 appropriate locations (Environmental Commitment 3, Resource Restoration and Performance
17 Principle G10).
- 18 ● Protect up to 188 acres and restore up to 48 acres of existing vernal pool/alkali seasonal
19 wetlands complexes in the greater Byron Hills including associated grasslands (Environmental
20 Commitment 3, Environmental Commitment 9, and Resource Restoration and Performance
21 Principle VP/AW1) with the grassland portions expected to benefit California red-legged frog.
- 22 ● Increase burrow availability for burrow-dependent species in grasslands surrounding all
23 suitable aquatic habitat including stock ponds and vernal pool/alkali seasonal wetland
24 complexes (Resource Restoration and Performance Principles G5, VP/AW6).
- 25 ● Increase native species diversity and relative cover of native plant species, and reduce the
26 introduction and proliferation of nonnative species (Resource Restoration and Performance
27 Principle L3).
- 28 ● Protect up to 6 acres of stock ponds and other aquatic features within protected grasslands to
29 provide aquatic breeding habitat for native amphibians and aquatic reptiles (Resource
30 Restoration and Performance Principle G2).
- 31 ● Maintain and enhance aquatic features in protected grasslands to provide suitable inundation
32 depth and duration and suitable composition of vegetative cover to support breeding for
33 amphibian and aquatic reptile species (Resource Restoration and Performance Principle G7).

34 As explained below, with the restoration and protection of these amounts of habitat, in addition to
35 implementation of AMMs to reduce potential effects, impacts on California red-legged frog would
36 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4A-19. Changes in California Red-Legged Frog Modeled Habitat Associated with**
2 **Alternative 4A (acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Aquatic	1	0
	Upland	21	32
Total Impacts Water Conveyance Facilities		22	32
Environmental Commitments 4, 6-7, 9-11 ^a	Aquatic	0	0
	Upland	11	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		11	0
TOTAL IMPACTS		33	32

^a See discussion below for a description of applicable Environmental Commitments.

3

4 **Impact BIO-44: Loss or Conversion of Habitat for and Direct Mortality of California Red-**
5 **Legged Frog**

6 Alternative 4A water conveyance facilities construction and Environmental Commitments would
7 result in the permanent and temporary loss combined of up to 1 acre of modeled aquatic habitat and
8 64 acres of modeled upland habitat for California red-legged frog (Table 12-4A-19). Construction
9 activities associated with the water conveyance facilities, including operation of construction
10 equipment, could result in permanent and temporary effects on, as well as injury and mortality of,
11 California red-legged frogs. In addition, natural enhancement and management activities
12 (Environmental Commitment 11), which include ground disturbance or removal of nonnative
13 vegetation, could result in local adverse habitat effects. Maintenance activities associated with the
14 long-term operation of the water conveyance facilities and other project facilities could degrade or
15 eliminate California red-legged frog habitat including injury and mortality of California red-legged
16 frogs. Each of these individual activities is described below. A summary statement of the combined
17 impacts and NEPA effects and a CEQA conclusion follow the individual activity discussions.

- 18 ● *Water Facilities and Operation:* Construction of Alternative 4A would result in the permanent
19 loss of up to 1 acre of aquatic habitat and 21 acres of upland habitat for California red-legged
20 frog in CZ 8 (Table 12-4A-19). Permanent effects would be associated with RTM, grading,
21 paving, excavating, extension and installation of cross culverts, installation of structural
22 hardscape, and installation and relocation of utilities. Construction-related effects would
23 temporarily disturb 32 acres of upland habitat for the California red-legged frog (Table 12-4A-
24 19). Although there are no California red-legged frog occurrences that overlap with the water
25 conveyance facilities construction footprint there are a number of occurrences approximately
26 0.5 mile to the west of Clifton Court Forebay.
- 27 ● *Environmental Commitment 11 Natural Communities Enhancement and Management* Protection
28 of up to 647 acres of grassland, protection of up to 188 acres and restoration of up to 48 acres of
29 existing vernal pool/alkali seasonal wetlands complexes in the greater Byron Hills including
30 associated grasslands, and protection and restoration of up to 6 acres of aquatic habitat would
31 benefit California red-legged frog. Activities associated with natural communities enhancement
32 and management in protected California red-legged frog habitat, such as ground disturbance or
33 herbicide use to control nonnative vegetation, could result in local adverse habitat effects on,
34 and injury or mortality of, California red-legged frogs. These effects would be avoided and
35 minimized with implementation of the AMMs discussed below. Herbicides would only be used in

1 California red-legged frog habitat in accordance with the written recommendation of a licensed,
2 registered pest control advisor and in conformance with label precautions and federal, state,
3 and local regulations in a manner that avoids or minimizes harm to the California red-legged
4 frog. *AMM14 California Red-Legged Frog* would be implemented to ensure that California red-
5 legged frog upland and aquatic habitats are avoided, as described in Appendix 3B,
6 *Environmental Commitments, AMMs, and CMs*.

- 7 ● Critical habitat: Several Environmental Commitments would be implemented in California red-
8 legged frog habitat and designated critical habitat in CZ 8 and CZ 11. Approximately 2,460 acres
9 of designated critical habitat for the California red-legged frog overlaps with the study area
10 along the western edge of CZ 11 in critical habitat unit SOL-1. An additional 862 acres of
11 designated critical habitat is also present along the western edge of CZ 8 in critical habitat unit
12 ALA-2. Environmental Commitments to protect and enhance grassland habitat for wildlife
13 species, including California red-legged frog in CZ 8 could include acquisition and enhancement
14 of designated critical habitat for the California red-legged frog and California tiger salamander.
15 Any habitat enhancement actions for these species in designated critical habitat are expected to
16 enhance the value of any affected designated critical habitat for conservation of California red-
17 legged frog. These actions would result in an overall benefit to California red-legged frog within
18 the study area through protection and management of grasslands with associated intermittent
19 stream habitat and through restoration of vernal pool complex habitat and its associated
20 grassland habitat.
- 21 ● Operations and maintenance: Ongoing water conveyance facilities operation and maintenance is
22 expected to have little if any adverse effect on the California red-legged frog. Postconstruction
23 operation and maintenance of the above-ground water conveyance facilities could result in
24 ongoing but periodic postconstruction disturbances that could affect California red-legged frog
25 use of the surrounding habitat. Operation of maintenance equipment, including vehicle use
26 along transmission corridors in CZ 8, could also result in injury or mortality of California red-
27 legged frogs if present in work sites. Implementation environmental commitments and AMM1-
28 AMM6, AMM10, and AMM14 would reduce these effects.
- 29 ● Injury and direct mortality: Construction activities associated with the water conveyance
30 facilities, stock pond and vernal pool complex restoration, and habitat and management
31 enhancement-related activities, including operation of construction equipment, could result in
32 injury or mortality of California red-legged frogs. Breeding, foraging, dispersal, and
33 overwintering behavior may be altered during construction activities, resulting in injury or
34 mortality of California red-legged frog. Frogs occupying burrows could be trapped and crushed
35 during ground-disturbing activities. Degradation and loss of estivation habitat is also anticipated
36 to result from the removal of vegetative cover and collapsing of burrows. Injury or mortality
37 would be avoided and minimized through implementation of seasonal constraints and
38 preconstruction surveys in suitable habitat, collapsing unoccupied burrows, and relocating frogs
39 outside of the construction area as described in AMM1-AMM6, AMM10, and AMM14.

40 The following paragraphs summarize the combined effects discussed above and describe other
41 Environmental Commitments and associated Resource Restoration and Performance Principles that
42 offset or avoid these effects. NEPA effects and a CEQA conclusion are also included.

43 There are approximately 159 acres of modeled aquatic habitat and 7,766 acres of modeled upland
44 habitat for California red-legged frog in the study area. Alternative 4A as a whole would result in the
45 permanent loss of and temporary effects on 1 acre of aquatic habitat and 64 acres of upland habitat

1 for California red-legged frog (less than 1% of the total aquatic habitat and total upland habitat in
2 the study area).

3 These effects would result from construction of the water conveyance (54 acres) and other facilities
4 (11 acres). The 1 acre of aquatic habitat that would be permanently lost is not known to be used for
5 breeding. Most of the California red-legged frog upland habitat that would be removed consists of
6 naturalized grassland or cultivated land in a highly disturbed or modified setting on lands
7 immediately adjacent to Clifton Court Forebay. The removed upland cover and dispersal habitat is
8 within 0.5 mile of a cluster of known California red-legged frog occurrences to the west. However,
9 this habitat consists mostly of cultivated lands and small patches of grasslands, and past and current
10 surveys in this area have not found any evidence that this habitat is being used (see Appendix 12C,
11 *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*).

12 With full implementation of Alternative 4A up to 647 acres of grassland would be protected, 188
13 acres of vernal pool/alkali seasonal wetland complexes with associated grasslands would be
14 protected and 48 acres would be restored, and up to 6 acres of aquatic habitat would be protected
15 and restored in the greater Byron Hills in CZ 8. Protection of grassland in CZ 8 west of Byron
16 Highway would benefit the California red-legged frog by providing habitat in the portion of the
17 study area with the highest long-term conservation value for the species based on known species
18 occurrences and large, contiguous habitat areas. Six acres of ponds in the grasslands would also be
19 protected to provide aquatic habitat for this species, and the surrounding grassland would provide
20 dispersal and aestivation habitat. Aquatic features in the protected grasslands in CZ 8 would be
21 maintained and enhanced to provide suitable inundation depth and duration and suitable
22 composition of vegetative cover to support breeding California red-legged frogs. Additionally,
23 livestock exclusion from streams and ponds and other measures would be implemented as
24 described in Environmental Commitment 11 to promote growth of aquatic vegetation with
25 appropriate cover characteristics favorable to California red-legged frogs. Lands protected in CZ 8
26 would connect with lands protected under the *East Contra Costa County HCP/NCCP* and the
27 extensive Los Vaqueros Watershed lands, including grassland areas supporting this species. This
28 would ensure that California red-legged frog upland and associated aquatic habitats would be
29 protected and enhanced in the largest possible patch sizes adjacent to occupied habitat within and
30 adjacent to the study area.

31 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
32 affected would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and 2:1 for
33 protection of grassland habitats. Using these ratios would indicate that 1 acre of aquatic habitat
34 should be restored, 1 acre of aquatic habitat should be protected, and 128 acres of grassland should
35 be protected for California red-legged frog.

36 Alternative 4A also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
37 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
38 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
39 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
40 *Natural Communities*, and *AMM14 California Red-Legged Frog*. These AMMs include elements that
41 avoid or minimize the risk of affecting individuals and species habitats adjacent to work areas and
42 storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
43 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 **NEPA Effects:** In the absence of actions to restore and protect habitat, the effects on California red-
2 legged frog habitat from Alternative 4A would represent an adverse effect as a result of habitat
3 modification and potential direct mortality of special-status species. However, with habitat
4 protection, restoration, management, and enhancement guided by Resource Restoration and
5 Performance Principles L2, L3, VP/AW1, VP/AW6, G2, G7, and G10, and guided by AMM1–AMM6,
6 AMM10, and AMM14, which would be in place throughout the construction period, the effects of
7 Alternative 4A as a whole on California red-legged frog would not be an adverse effect.

8 **CEQA Conclusion:** In the absence of actions to restore and protect habitat, the effects on California
9 red-legged frog habitat from Alternative 4A would represent a significant impact as a result of
10 habitat modification and potential direct mortality of a special-status species. However, with habitat
11 protection, restoration, management, and enhancement guided by Resource Restoration and
12 Performance Principles L2, L3, VP/AW1, VP/AW6, G2, G7, and G10, and guided by AMM1–AMM6,
13 AMM10, and AMM14, which would be in place throughout the construction period and operations,
14 the impact of Alternative 4A as a whole on California red-legged frog would be less than significant.

15 **Impact BIO-45: Indirect Effects of Alternative 4A on California Red-Legged Frog**

16 Noise and visual disturbance including artificial nighttime lighting outside the project footprint but
17 within 500 feet of construction activities are indirect effects that could temporarily affect the use of
18 California red-legged frog habitat, all of which is upland cover and dispersal habitat. The areas to be
19 affected are near Clifton Court Forebay, and no California red-legged frogs were detected during
20 recent surveys conducted by DWR in this area (see Appendix 12C, 2009 to 2011 Bay Delta
21 Conservation Plan EIR/EIS Environmental Data Report).

22 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment
23 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability
24 of California red-legged frog habitat downstream of the construction area by filling in pools and
25 smothering eggs. Accidental spills of toxic fluids also could result in the subsequent loss of California
26 red-legged frog if these materials enter the aquatic system. Hydrocarbon and heavy metal pollutants
27 associated with roadside runoff also have the potential to enter the aquatic system, affecting water
28 quality and California red-legged frog.

29 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, and AMM14 as part of implementing
30 Alternative 4A would avoid the potential for adverse effects on California red-legged frogs, either
31 indirectly or through habitat modifications. These AMMs would also avoid and minimize effects that
32 could substantially reduce the number of California red-legged frogs, or restrict the species' range.
33 Therefore, the indirect effects of Alternative 4A would not have an adverse effect on California red-
34 legged frog.

35 **CEQA Conclusion:** Indirect effects from Environmental Commitment operations and maintenance, as
36 well as construction-related noise and visual disturbances including artificial nighttime lighting,
37 could impact California red-legged frog in aquatic and upland habitats. The use of mechanical
38 equipment during construction could cause the accidental release of petroleum or other
39 contaminants that could impact California red-legged frog or its prey. The inadvertent discharge of
40 sediment or excessive dust adjacent to California red-legged frog habitat could also have a negative
41 impact on the species or its prey. With implementation of AMM1–AMM6, AMM10, and AMM14,
42 Alternative 4A construction, operation, and maintenance would avoid the potential for substantial
43 adverse effects on California red-legged frog, either indirectly or through habitat modifications, and
44 would not result in a substantial reduction in numbers or a restriction in the range of California red-

1 legged frogs. The indirect effects of Alternative 4A would have a less-than-significant impact on
2 California red-legged frogs.

3 **California Tiger Salamander**

4 Modeled California tiger salamander habitat in the study area contains two habitat types: terrestrial
5 cover and aestivation habitat, and aquatic breeding habitat and is restricted to CZ 1, CZ 2, CZ 4, CZ 5,
6 CZ 7, CZ 8, and CZ 11 (Figure 12-14). Modeled terrestrial cover and aestivation habitat contains all
7 grassland types and alkali seasonal wetland with a minimum patch size of 100 acres and within a
8 geographic area defined by species records and areas most likely to support the species. Patches of
9 grassland that were below the 100-acre minimum patch size but were contiguous with grasslands
10 outside of the study area boundary were included. Modeled aquatic breeding habitat for the
11 California tiger salamander includes vernal pools and seasonal and perennial ponds.

12 California tiger salamander occurs within the study area in CZ 8 west of Clifton Court Forebay and in
13 CZ 11 in the Potrero Hills (Figure 12-14). Potential habitat exists in vernal pool habitats in Yolo and
14 Solano Counties (CZs 1, 2, and 3) west of Liberty Island and in the vicinity of Stone Lakes and the
15 Cosumnes River Preserve in Sacramento County (CZ 4). DWR found California tiger salamander west
16 of Clifton Court Forebay in the same vicinity as several of the CNNDB (California Department of Fish
17 and Wildlife 2013) records (see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*
18 *Environmental Data Report*). There is also a small, isolated population near Manteca, south of
19 Highway 120 in CZ 7.

20 Construction and restoration associated with Alternative 4A would result in temporary and
21 permanent losses of upland habitat that California tiger salamander uses for cover and dispersal
22 (Table 12-4A-20). Potential aquatic habitat for this species would not be affected. Factors
23 considered in assessing the value of affected habitat for California tiger salamander, to the extent
24 that information is available, include presence of limiting habitat (aquatic breeding habitat), known
25 occurrences and clusters of occurrences, proximity of the affected habitat to existing protected
26 lands, and the overall degraded or fragmented nature of the habitat. While Environmental
27 Commitments implemented in other CZs could have potential effects on California tiger salamander,
28 those activities in CZ 8 and CZ 11 are considered to have a proportionately larger effect due to their
29 closer proximity to known occurrences of the species.

30 Alternative 4A would include the following Environmental Commitments and associated Resource
31 Restoration and Performance Principles to benefit the California tiger salamander (see Chapter 3,
32 *Conservation Strategy*, of the BDCP).

- 33 ● Protect and improve habitat linkages that allow terrestrial species to move between protected
34 habitats within and adjacent to the project area (Resource Restoration and Performance
35 Principle L2).
- 36 ● Protect up to 647 acres of grassland in the Byron Hills area where practicable and/or in other
37 appropriate locations (Environmental Commitment 3, Resource Restoration and Performance
38 Principle G10).
- 39 ● Protect up to 188 acres and restore up to 48 acres of existing vernal pool/alkali seasonal
40 wetlands complexes in the greater Byron Hills including associated grasslands (Environmental
41 Commitment 3, Environmental Commitment 9, and Resource Restoration and Performance
42 Principle VP/AW1).

- 1 • Increase burrow availability for burrow-dependent species in grasslands surrounding all
2 suitable aquatic habitat including stock ponds and vernal pool/alkali seasonal wetland
3 complexes (Resource Restoration and Performance Principles G5, VP/AW6).
- 4 • Increase native species diversity and relative cover of native plant species, and reduce the
5 introduction and proliferation of nonnative species (Resource Restoration and Performance
6 Principle L3).
- 7 • Protect up to 6 acres of stock ponds and other aquatic features within protected grasslands to
8 provide aquatic breeding habitat for native amphibians and aquatic reptiles (Resource
9 Restoration and Performance Principle G2).
- 10 • Maintain and enhance aquatic features in protected grasslands to provide suitable inundation
11 depth and duration and suitable composition of vegetative cover to support breeding for
12 amphibian and aquatic reptile species (Resource Restoration and Performance Principle G7).
- 13 • Increase the size and connectivity of protected vernal pool complex within the project area and
14 increase connectivity with protected vernal pool complex adjacent to the project area (Resource
15 Restoration and Performance Principle VP/AW3).

16 As explained below, with the restoration or protection of these amounts of habitat, in addition to the
17 implementation of AMMs, impacts on California tiger salamander would not be adverse for NEPA
18 purposes and would be less than significant for CEQA purposes.

19 **Table 12-4A-20. Changes in California Tiger Salamander Modeled Habitat Associated with**
20 **Alternative 4A (acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Aquatic	0	0
	Upland	19	32
Total Impacts Water Conveyance Facilities		19	32
Environmental Commitments 4, 6-7, 9-11 ^a	Aquatic	17	0
	Upland	41	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		58	0
TOTAL IMPACTS		77	32

^a See discussion below for a description of applicable Environmental Commitments.

21

22 **Impact BIO-46: Loss or Conversion of Habitat for and Direct Mortality of California Tiger**
23 **Salamander**

24 Alternative 4A would result in the permanent and temporary loss combined of up to 17 acres of
25 aquatic habitat and 92 acres of modeled upland habitat for California tiger salamander (Table 12-
26 4A-20). Project measures that would result in these losses are water conveyance facilities and
27 transmission line construction, and establishment and use of RTM and tidal restoration. In addition,
28 natural enhancement and management activities (Environmental Commitment 11), which include
29 ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects.
30 Maintenance activities associated with the long-term operation of the water conveyance facilities
31 and other project facilities could degrade or eliminate California tiger salamander habitat including
32 injury and mortality of California tiger salamanders. Each of these individual activities is described

1 below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion
2 follow the individual activity discussions.

- 3 • *Water Facilities and Operation*: Construction of Alternative 4A conveyance facilities, including
4 transmission lines, would result in the permanent loss of 19 acres of upland habitat for
5 California tiger salamander habitat, primarily in CZ 8 (Table 12-4A-20). No aquatic habitat
6 would be affected. Permanent effects would be associated with RTM, grading, paving,
7 excavating, extension and installation of cross culverts, installation of structural hardscape, and
8 installation and relocation of utilities. Construction-related effects would temporarily disturb 32
9 acres of upland habitat for the California tiger salamander (Table 12-4A-20). There is one
10 California tiger salamander occurrence just south of the City of Byron that overlaps with the
11 area of temporary effects. The area that would be affected by conveyance facilities construction
12 is south of Clifton Court Forebay, where modeled California tiger salamander habitat is of
13 relatively low value in that it consists of fragmented patches of primarily terrestrial habitat
14 surrounded by actively cultivated lands. The highest concentration of California tiger
15 salamander occurrences are in CZ 8 and west of the conveyance facilities alignment, while lands
16 to the east consist primarily of actively cultivated lands that are not suitable for the species.
17 Habitat loss in this area is not expected to contribute to habitat fragmentation or impede
18 important California tiger salamander dispersal.
- 19 • *Environmental Commitment 4 Tidal Natural Communities Restoration*: This activity would result
20 in the permanent removal of an estimated 17 acres of aquatic and 24 acres of upland habitat for
21 California tiger salamander. The effects would take place in one or more of the ROAs established
22 for tidal restoration (see Figure 12-1).
- 23 • *Environmental Commitment 11 Natural Communities Enhancement and Management*: Protection
24 of up to 647 acres of grassland, protection of up to 188 acres and restoration of up to 48 acres of
25 existing vernal pool/alkali seasonal wetlands complexes in the greater Byron Hills including
26 associated grasslands, and protection and restoration of up to 6 acres of aquatic habitat would
27 benefit California tiger salamander. Habitat enhancement- and management-related activities in
28 protected California tiger salamander habitats would result in overall improvements to and
29 maintenance of California tiger salamander habitat values. Activities associated with natural
30 communities enhancement and management in protected California tiger salamander habitat,
31 such as ground disturbance or herbicide use to control nonnative vegetation, could result in
32 local adverse habitat effects and injury or mortality of California tiger salamander and
33 disturbance effects if individuals are present in work sites. Implementation of AMM1-AMM6,
34 AMM10, and AMM13 would reduce these effects. Herbicides would only be used in California
35 tiger salamander habitat in accordance with the written recommendation of a licensed,
36 registered Pest Control Advisor and in conformance with label precautions and federal, state,
37 and local regulations in a manner that avoids or minimizes harm to the California tiger
38 salamander.
- 39 • *Critical habitat*: Approximately 1,781 acres of designated Critical Habitat Unit 2, Jepson Prairie
40 Unit, for California tiger salamander overlap the study area in CZ 1. While this area is located
41 within the Cache Slough Complex, it is not expected to be affected by project restoration actions.
- 42 • *Operations and maintenance*: Ongoing facilities operation and maintenance is expected to have
43 little if any adverse effect on the California tiger salamander. Postconstruction operation and
44 maintenance of the above-ground water conveyance facilities could result in ongoing but
45 periodic disturbances that could affect California tiger salamander use of the surrounding

1 habitat. Operation of maintenance equipment, including vehicle use along transmission
2 corridors in CZ 8, could also result in injury or mortality of California tiger salamanders if
3 present in work sites. These effects, however, would be minimized with implementation of the
4 California tiger salamander measures described in AMM1–AMM6, AMM10, and AMM13.

- 5 • Injury and direct mortality: Construction activities associated with the water conveyance
6 facilities, stock pond and vernal pool complex restoration, and habitat and management
7 enhancement-related activities, including operation of construction equipment, could result in
8 injury or mortality of California tiger salamanders. Foraging, dispersal, and overwintering
9 behavior may be altered during construction activities, resulting in injury or mortality of
10 California tiger salamander if the species is present. Salamanders occupying burrows could be
11 trapped and crushed during ground-disturbing activities. Degradation and loss of estivation
12 habitat is also anticipated to result from the removal of vegetative cover and collapsing of
13 burrows. Injury or mortality would be avoided and minimized through implementation of
14 seasonal constraints and preconstruction surveys in suitable habitat, collapsing unoccupied
15 burrows, and relocating salamanders outside of the construction area as described in AMM1–
16 AMM6, AMM10, and AMM13.

17 The following paragraphs summarize the combined effects discussed above and describe other
18 Environmental Commitments and associated Resource Restoration and Performance Principles that
19 offset or avoid these effects. NEPA effects and CEQA conclusions are also included.

20 There are approximately 8,273 acres of aquatic and 29,459 acres of upland modeled habitat for
21 California tiger salamander in the study area. Alternative 4A as a whole would result in the
22 permanent loss of, and temporary effects combined on 17 acres of aquatic and 92 acres of upland
23 habitat for California tiger salamander for the term of the plan (less than 1% of the total upland
24 habitat in the study area). These effects would result from construction of the water conveyance
25 facilities and tidal restoration.

26 With full implementation of Alternative 4A up to 647 acres of grassland would be protected, 188
27 acres of vernal pool/alkali seasonal wetland complexes with associated grasslands would be
28 protected and 48 acres would be restored, and up to 6 acres of aquatic habitat would be protected
29 and restored in the greater Byron Hills in CZ 8. Protection of grassland in CZ 8 west of Byron
30 Highway would benefit the California tiger salamander by providing habitat in the portion of the
31 study area with the highest long-term conservation value for the species based on known species
32 occurrences and large, contiguous habitat areas. Six acres of ponds in the grasslands would also be
33 protected or restored to provide aquatic habitat for this species, and the surrounding grassland
34 would provide dispersal and aestivation habitat. Aquatic features in the protected grasslands in CZ 8
35 would be maintained and enhanced to provide suitable inundation depth and duration and suitable
36 composition of vegetative cover to support breeding California tiger salamanders. Additionally,
37 livestock exclusion from streams and ponds and other measures would be implemented as
38 described in Environmental Commitment 11 to promote growth of aquatic vegetation with
39 appropriate cover characteristics favorable to California tiger salamanders. Lands protected in CZ 8
40 would connect with lands protected under the *East Contra Costa County HCP/NCCP* and the
41 extensive Los Vaqueros Watershed lands, including grassland areas supporting this species. This
42 would ensure that California tiger salamander upland and associated aquatic habitats would be
43 protected and enhanced in the largest possible patch sizes adjacent to occupied habitat within and
44 adjacent to the study area.

1 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
2 affected would be 1:1 for restoration and 1:1 for protection of nontidal wetlands and 2:1 for
3 protection of grassland habitats. Using these ratios would indicate that 17 acres of aquatic habitat
4 should be restored, 17 acres of aquatic habitat should be protected, and 184 acres of grassland
5 should be protected for California tiger salamander.

6 Alternative 4A also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
7 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
8 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
9 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM10 Restoration of Temporarily Affected*
10 *Natural Communities*, and *AMM13 California Tiger Salamander*. These AMMs include elements that
11 avoid or minimize the risk of affecting habitats and species adjacent to work areas and storage sites.
12 BDCP Appendix 3.C describes the AMMs, which have since been updated and which are provided in
13 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

14 **NEPA Effects:** In the absence of actions to restore and protect habitat, the effects on California tiger
15 salamander habitat from Alternative 4A would represent an adverse effect as a result of habitat
16 modification and potential direct mortality of special-status species. However, with habitat
17 protection, restoration, management, and enhancement guided by Resource Restoration and
18 Performance Principles L2, L3, VP/AW1, VP/AW3, VP/AW6, G2, G7, and G10, and guided by AMM1–
19 AMM6, AMM10, and AMM13, which would be in place throughout the construction period and
20 operations, the effects of Alternative 4A as a whole on California tiger salamander would not be an
21 adverse effect.

22 **CEQA Conclusion:** In the absence of actions to restore and protect habitat, the effects on California
23 tiger salamander habitat from Alternative 4A would represent a significant impact as a result of
24 habitat modification and potential direct mortality of a special-status species. However, with habitat
25 protection, restoration, management, and enhancement guided by Resource Restoration and
26 Performance Principles L2, L3, VP/AW1, VP/AW3, VP/AW6, G2, G7, and G10, and by AMM1–AMM6,
27 AMM10, and AMM13, which would be in place throughout the construction period and operations,
28 the impact of Alternative 4A as a whole on California tiger salamander would be less than
29 significant.

30 **Impact BIO-47: Indirect Effects of Alternative 4A on California Tiger Salamander**

31 Indirect effects could occur outside of the construction footprint but within 500 feet of California
32 tiger salamander habitat. Activities associated with conveyance construction, restoration, and
33 ongoing habitat enhancement, as well as operation and maintenance of above-ground water
34 conveyance facilities, including the transmission facilities, could result in ongoing but periodic
35 postconstruction disturbances with localized effects on California tiger salamander and its habitat,
36 and temporary noise and visual disturbances, including artificial night lighting at a worksite. Most of
37 the areas indirectly affected are associated with the construction of Byron Forebay in CZ 8.

38 Maintenance and refueling of heavy equipment could result in the inadvertent release of sediment
39 and hazardous substances into species habitat. Increased sedimentation could reduce the suitability
40 of California tiger salamander habitat downstream of the construction area by filling in pools and
41 smothering eggs. Accidental spills of toxic fluids into the aquatic system could result in the
42 subsequent loss of California tiger salamander habitat. Hydrocarbon and heavy metal pollutants
43 associated with roadside runoff also have the potential to enter the aquatic system, affecting water
44 quality and California tiger salamander.

1 **NEPA Effects:** Implementation of AMM1–AMM6, AMM10, and AMM13 under Alternative 4A would
2 avoid or minimize the potential for adverse effects on California tiger salamanders, either indirectly
3 or through habitat modifications. These AMMs would also avoid and minimize effects that could
4 substantially reduce the number of California tiger salamanders or restrict the species’ range.
5 Therefore, the indirect effects of Alternative 4A would not have an adverse effect on California tiger
6 salamander.

7 **CEQA Conclusion:** Indirect effects resulting from project operations and maintenance as well as
8 construction-related noise and visual disturbances including artificial night lighting could impact
9 California tiger salamander in aquatic and upland habitats. The use of mechanical equipment during
10 construction could cause the accidental release of petroleum or other contaminants that could
11 impact California tiger salamander or its prey. The inadvertent discharge of sediment or excessive
12 dust adjacent to California tiger salamander habitat could also have a negative impact on the species
13 or its prey. With implementation of AMM1–AMM6, AMM10, and AMM13 as part of Alternative 4A,
14 the project would avoid the potential for substantial adverse effects on California tiger salamander,
15 either indirectly or through habitat modifications, and would not result in a substantial reduction in
16 numbers or a restriction in the range of California tiger salamanders. The indirect effects of
17 Alternative 4A would have a less-than-significant impact on California tiger salamander.

18 **Impact BIO-48: Periodic Effects of Inundation of California Tiger Salamander Habitat as a**
19 **Result of Implementation of Alternative 4A**

20 There would be no periodic effects on California tiger salamander.

21 **NEPA Effects:** No effect.

22 **CEQA Conclusion:** No impact.

23 **Giant Garter Snake**

24 The habitat model used to assess effects for the giant garter snake is based on aquatic habitat and
25 upland habitat. Modeled aquatic habitat is composed of tidal perennial aquatic, tidal freshwater
26 perennial emergent wetland, nontidal freshwater emergent wetland, and nontidal perennial aquatic
27 natural communities; rice fields; and artificial canals and ditches. Modeled upland habitat is
28 composed of all nonwetland and nonaquatic natural communities (primarily grassland and
29 cropland) within 200 feet of modeled aquatic habitat features. The modeled upland habitat is ranked
30 as high-, moderate-, or low-value based on giant garter snake associations between vegetation and
31 cover types (U.S. Fish and Wildlife Service 2012) and historical and recent occurrence records (see
32 Appendix 12C, 2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report), and
33 presence of features necessary to fulfill the species’ life cycle requirements. Modeled habitat is
34 expressed in acres for aquatic and upland habitats, and in miles for linear movement corridors in
35 aquatic habitat. Other factors considered in assessing the value of affected habitat for the giant
36 garter snake, to the extent that information is available, are proximity to conserved lands and
37 recorded occurrences of the species, proximity to giant garter snake subpopulations (Yolo
38 Basin/Willow Slough and Coldani Marsh/White Slough) in the study area that are identified in the
39 draft recovery plan for this species (U.S. Fish and Wildlife Service 1999b), and contribution to
40 connectivity between giant garter snake subpopulations.

1 Construction and restoration associated with Alternative 4A would result in both temporary and
2 permanent losses of giant garter snake modeled habitat as indicated in Table 12-4A-21. Alternative
3 4A would include the following Environmental Commitments and associated Resource Restoration
4 and Performance Principles to benefit the giant garter snake.

- 5 • Increase native species diversity and relative cover of native plant species, and reduce the
6 introduction and proliferation of nonnative species (Resource Restoration and Performance
7 Principle L3).
- 8 • Protect up to 1,060 acres and restore up to 1,070 acres of grassland (Environmental
9 Commitment 3 and Environmental Commitment 8).
- 10 • Protect up to 843 acres of high-value upland giant garter snake habitat adjacent to suitable
11 aquatic habitat (Environmental Commitment 3, Resource Restoration and Performance
12 Principle GGS4).
- 13 • Restore up to 255 acres of nontidal marsh consisting of a mosaic of nontidal perennial aquatic
14 and nontidal freshwater emergent wetland natural communities, with suitable habitat
15 characteristics for giant garter snake and western pond turtle in CZ 4 and CZ 5 (Environmental
16 Commitment 10).
- 17 • Protect up to 11,870 acres of cultivated lands that provide suitable habitat for native wildlife
18 species, of which 255 acres of rice land or equivalent-value habitat would be protected for giant
19 garter snake and connected to the restored 255 acres of aquatic habitat in nontidal marsh for
20 giant garter snake in CZ 4 or CZ 5 (Environmental Commitment 3, Resource Restoration and
21 Performance Principles GGS1 and GGS3).
- 22 • Protect and improve habitat linkages that allow terrestrial species to move between protected
23 habitats within and adjacent to the project area (Resource Restoration and Performance
24 Principle L2)
- 25 • Target cultivated land conservation to provide connectivity between other conservation lands
26 (Resource Restoration and Performance Principle CL2).
- 27 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
28 lands that occur in cultivated lands within the conservation area, including isolated valley oak
29 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
30 water conveyance channels, grasslands, ponds, and wetlands (Resource Restoration and
31 Performance Principle CL1).
- 32 • Protect giant garter snakes on restored and protected nontidal marsh and adjacent uplands
33 from incidental injury or mortality by establishing 200-foot buffers between protected giant
34 garter snake habitat and roads (other than those roads primarily used to support adjacent
35 cultivated lands and levees). Establish giant garter snake conservation area at least 2,500 feet
36 from urban areas or areas zoned for urban development (Resource Restoration and
37 Performance Principle GGS2).
- 38 • Create connections from the Coldani Marsh/White Slough subpopulation to other areas in the
39 giant garter snake's historical range in the Stone Lakes vicinity by protecting 255 acres of rice
40 land or equivalent-value habitat (e.g., perennial wetland) for the giant garter snake in CZ 4
41 and/or CZ 5. Any portion of the 255 acres may consist of muted tidal freshwater emergent
42 wetland and may overlap with the 160 acres of tidally restored freshwater emergent wetland if

1 it meets specific giant garter snake habitat criteria (Resource Restoration and Performance
2 Principle GGS5).

3 As explained below, with the restoration or protection of these amounts of habitat, in addition to the
4 implementation of AMMs, impacts on giant garter snake would not be adverse for NEPA purposes
5 and would be less than significant for CEQA purposes.

6 **Table 12-4A-21. Changes in Giant Garter Snake Modeled Habitat Associated with Alternative 4A**

Project Component	Habitat Type ^b	Permanent	Temporary
Water Conveyance Facilities	Aquatic (acres)	210	110
	Upland (acres)	408	206
	Aquatic (miles) ³	11	6
Total Impacts Water Conveyance Facilities (acres)		618	316
Environmental Commitments 4, 6-7, 9-11 ^a	Aquatic (acres)	3	0
	Upland (acres)	46	0
	Aquatic (miles)	2	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a (acres)		49	0
TOTAL IMPACTS (acres)		667	316

^a See discussion below for a description of applicable Environmental Commitments.

^b Aquatic acres represent tidal and nontidal habitat combined, and upland acres represent low-, moderate-, and high-value acreages combined.

7

8 **Impact BIO-49: Loss or Conversion of Habitat for and Direct Mortality of Giant Garter Snake**

9 Alternative 4A would result in the permanent and temporary loss combined of up to 323 acres of
10 modeled aquatic habitat (tidal and nontidal combined), up to 660 acres of modeled upland habitat,
11 and up to 19 miles of channels providing aquatic movement habitat for the giant garter snake (Table
12 12-4A-21). Project measures that would result in these losses are water conveyance facilities and
13 transmission line construction, geotechnical investigation, and establishment and use of RTM and
14 tidal restoration. Habitat enhancement and management activities (Environmental Commitment
15 11), which include ground disturbance or removal of nonnative vegetation. Ground-disturbing
16 activities, such as removal of nonnative vegetation and road and other infrastructure maintenance,
17 are expected to have minor effects on available giant garter snake habitat and are expected to result
18 in overall improvements to and maintenance of giant garter snake habitat values. In addition,
19 maintenance activities associated with the long-term operation of the water conveyance facilities
20 and other physical facilities would degrade or eliminate giant garter snake habitat. Each of these
21 individual activities is described below. A summary statement of the combined impacts and NEPA
22 effects and a CEQA conclusion follow the individual activity discussions.

- 23 • *Water Facilities and Operation:* Construction of Alternative 4A conveyance facilities would result
24 in the permanent loss of approximately 618 acres of modeled giant garter snake habitat,
25 composed of 210 acres of aquatic habitat and 408 acres of upland habitat (Table 12-4A-21). The
26 408 acres of upland habitat that would be removed for the construction of the conveyance
27 facilities consists of 116 acres of high-, 262 acres of moderate-, and 30 acres of low-value
28 habitat. In addition, approximately 11 miles of channels providing giant garter snake movement
29 habitat would be removed as a result of conveyance facilities construction. Development of the

1 water conveyance facilities would also result in the temporary removal of up to 110 acres of
2 giant garter snake aquatic habitat and up to 206 acres of adjacent upland habitat in areas near
3 construction and geotechnical investigation in CZ 5 and CZ 6 (see Table 12-4A-21 and
4 Terrestrial Biology Mapbook). In addition, approximately 6 miles of channels providing giant
5 garter snake movement habitat would be temporarily removed as a result of conveyance
6 facilities construction. There are three giant garter snake occurrences in the vicinity of the water
7 conveyance facilities construction footprint in Snodgrass Slough and Middle River.

- 8 ● *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal natural communities
9 restoration would result in an estimated permanent loss of approximately 3 acres of aquatic
10 habitat and 46 acres of upland habitat for the giant garter snake to tidal marsh. This estimate
11 includes 15 acres of high-value, 27 acres of moderate-value, and 4 acres of low-value habitat. In
12 addition, an estimated 2 miles of channels providing giant garter snake movement habitat would
13 be removed as a result of tidal natural communities restoration. The effects would take place in
14 one or more of the ROAs established for tidal restoration (see Figure 12-1).
- 15 ● *Environmental Commitment 11 Natural Communities Enhancement and Management:* A variety of
16 habitat management actions included in Environmental Commitment 11 that are designed to
17 enhance wildlife values in protected habitats may result in localized ground disturbances that
18 could temporarily remove small amounts of giant garter snake habitat. Ground-disturbing
19 activities, such as removal of nonnative vegetation and road and other infrastructure
20 maintenance, are expected to have minor effects on available giant garter snake habitat and are
21 expected to result in overall improvements to and maintenance of giant garter snake habitat
22 values. These effects cannot be quantified, but are expected to be minimal because vegetation
23 removal would occur around existing infrastructure and roads where giant garter snake are not
24 as likely to be present. Any of these minor impacts would be avoided and minimized by the
25 AMMs listed below.
- 26 ● *Operations and maintenance:* Postconstruction operation and maintenance of the above-ground
27 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
28 disturbances that could affect giant garter snake use of the surrounding habitat in the Cache
29 Slough area, and the north and south Delta (CZ 1, CZ 2, CZ 3, CZ 4, CZ 5, CZ 6, CZ 7, and CZ 8).
30 Maintenance activities would include vegetation management, levee and structure repair, and
31 regrading of roads and permanent work areas. These effects, however, would be reduced by
32 AMMs and environmental commitments as described below.
- 33 ● *Injury and direct mortality:* Construction vehicle activity may cause injury or mortality of the
34 giant garter snake. If snakes reside where activities take place (most likely in the vicinity of the
35 Coldani Marsh/White Slough subpopulation [CZ 4]), the operation of equipment for land
36 clearing, construction, conveyance facilities operation and maintenance, and habitat restoration,
37 enhancement, and management could result in injury or mortality of giant garter snakes. This
38 risk is highest from late fall through early spring, when the snakes are dormant. Increased
39 vehicular traffic associated construction and restoration could contribute to a higher incidence
40 of road kill. However, preconstruction surveys would be implemented after the project planning
41 phase and prior to any ground-disturbing activity. Any disturbance to suitable aquatic and
42 upland sites in or near the project footprint would be avoided to the extent feasible, and the loss
43 of aquatic habitat and grassland vegetation would be minimized through adjustments to project
44 design, as practicable. Construction monitoring and other measures would be implemented to
45 avoid and minimize injury or mortality of this species during construction as described in
46 *AMM16 Giant Garter Snake.*

1 The following paragraphs summarize the combined effects discussed above and describe other
2 Alternative 4A Environmental Commitments that offset or avoid these effects. NEPA effects and a
3 CEQA conclusion are also included.

4 There are approximately 31,281 acres of aquatic and 53,285 acres of upland modeled habitat for
5 giant garter snake in the study area. Alternative 4A as a whole would result in the permanent loss of
6 and temporary effects on 323 acres of aquatic habitat and 660 acres of upland habitat for giant
7 garter snake during the term of the plan (1% of the total aquatic and upland modeled habitat in the
8 study area).

9 With full implementation of Alternative 4A there would be protection of up to 1,060 acres and
10 restoration of up to 1,070 acres of grassland, protection of up to 11,870 acres of cultivated lands,
11 119 acres of nontidal wetlands, and restoration of up to 832 acres of nontidal wetlands in the study
12 area. Lands to be protected and restored specifically for the giant garter snake total 1,353 acres (255
13 acres nontidal marsh, 843 acres of grassland, 255 acres of cultivated lands (rice or habitat of
14 equivalent value in CZ 4, and CZ 5). In addition to the 1,353 acres of high-value habitat targeted
15 specifically for giant garter snake, the protection and restoration of other natural communities is
16 expected to provide additional restoration and protection of garter snake habitat. An unknown
17 number of irrigation and drainage ditches located in cultivated lands and suitable for giant garter
18 snake movement would be maintained and protected within the conservation area, which would
19 include isolated valley oak trees, trees and shrubs along field borders and roadsides, remnant
20 groves, riparian corridors, water conveyance channels, grasslands, ponds, and wetlands.

21 Protection and management of cultivated lands (Environmental Commitment 11) would also benefit
22 the giant garter snake by providing connectivity and maintaining irrigation and drainage channels
23 that provide aquatic habitat for the snake. Giant garter snake habitat would be restored and
24 protected specifically to conserve and expand the Coldani Marsh/White Slough subpopulation of the
25 giant garter snake. Protecting and expanding existing giant garter snake subpopulations, and
26 providing connectivity between protected areas, is considered the most effective approach to giant
27 garter snake conservation in the study area. The Coldani Marsh/White Slough and Yolo
28 Basin/Willow Slough subpopulations are the only known subpopulations of giant garter snakes in
29 the study area and are identified as important for the recovery of the species in the draft recovery
30 plan for the species (U.S. Fish and Wildlife Service 1999b). Implementation actions that target giant
31 garter snake habitat would focus on these two important subpopulations.

32 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
33 affected would be 1:1 for restoration and 1:1 for protection of aquatic habitats and 2:1 for
34 protection of upland habitats. Using these ratios would indicate that 323 acres of aquatic habitat
35 should be restored, 323 acres of aquatic habitat should be protected, and 1,320 acres of upland
36 habitat should be protected for giant garter snake.

37 Alternative 4A also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
38 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
39 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
40 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
41 *Restoration of Temporarily Affected Natural Communities*, and *AMM16 Giant Garter Snake*. All of
42 these AMMs include elements that avoid or minimize the risk of activities affecting habitats and
43 species adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs, which

1 have since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
2 *AMMs*, and *CMs*, of the Final EIR/EIS.

3 **NEPA Effects:** In the absence of actions to restore and protect habitat, the effects on giant garter
4 snake habitat from Alternative 4A would represent an adverse effect as a result of habitat
5 modification and potential direct mortality of special-status species. However, with habitat
6 protection, restoration, management, and enhancement guided by Resource Restoration and
7 Performance Principles GGS1-GGS5, L2, L3, CL1, and CL2, and guided by AMM1–AMM7, AMM10, and
8 AMM16, which would be in place throughout the construction period and operations, the effects of
9 Alternative 4A as a whole on giant garter snake would not be an adverse effect.

10 **CEQA Conclusion:** In the absence of actions to restore and protect habitat, the effects on giant garter
11 snake habitat from Alternative 4A would represent a significant impact as a result of habitat
12 modification and potential direct mortality of a special-status species. However, with habitat
13 protection, restoration, management, and enhancement guided by Resource Restoration and
14 Performance Principles GGS1-GGS5, L2, L3, CL1, and CL2, and guided by AMM1–AMM7, AMM10, and
15 AMM16, which would be in place throughout the construction period and operations, the impact of
16 Alternative 4A as a whole on giant garter snake would not result in a substantial reduction in
17 numbers or a restriction in the range of giant garter snakes. Therefore, the effects of Alternative 4A
18 would have a less-than-significant impact on giant garter snakes.

19 **Impact BIO-50: Indirect Effects of Alternative 4A on Giant Garter Snake**

20 Construction activities outside the project footprint but within 200 feet of construction associated
21 with water conveyance facilities, habitat restoration, and ongoing habitat enhancement, as well as
22 operation and maintenance of above-ground water conveyance facilities, including the transmission
23 facilities, could result in ongoing periodic postconstruction disturbances with localized effects on
24 giant garter snake habitat, and temporary noise and visual disturbances. These potential effects
25 would be minimized or avoided through AMM1–AMM7, AMM10, and AMM16, which would be in
26 effect during all project activities.

27 The use of mechanical equipment during water conveyance facilities construction could cause the
28 accidental release of petroleum or other contaminants that could affect giant garter snake or its
29 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to giant garter snake
30 habitat could also have a negative effect on the species or its prey. AMM1–AMM6 would minimize
31 the likelihood of such spills and would ensure measures are in place to prevent runoff from the
32 construction area and potential effects of sediment or dust on giant garter snake or its prey.

33 Project activities have the potential to exacerbate bioaccumulation of mercury in species that feed
34 on aquatic species, including giant garter snake. The operational impacts of new flows under water
35 conveyance facilities were analyzed to assess potential effects on mercury concentration and
36 bioavailability. Results indicated that changes in total mercury levels in water and fish tissues due to
37 future operational conditions were insignificant (see BDCP Appendix 5.D, *Contaminants*).

38 Marsh (tidal and nontidal) restoration also has the potential to increase exposure to methylmercury.
39 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
40 especially areas subjected to regular wetting and drying such as tidal marshes. Thus, restoration
41 activities that create newly inundated areas could increase bioavailability of mercury. Increased
42 methylmercury associated with natural community restoration may indirectly affect giant garter
43 snake, which feeds on small fishes, tadpoles, and small frogs, especially introduced species, such as

1 small bullfrogs (*Rana catesbeiana*) and their larvae, carp (*Cyprinus carpio*), and mosquitofish
2 (*Gambusia affinis*). In general, the highest methylation rates are associated with high tidal marshes
3 that experience intermittent wetting and drying and associated anoxic conditions (Alpers et al.
4 2008). Along with minimization and mitigation measures and adaptive management and
5 monitoring, *Environmental Commitment 12 Methylmercury Management* is expected to reduce the
6 amount of methylmercury resulting from the restoration of natural communities.

7 Extant populations of giant garter snake within the study area are known only from the upper Yolo
8 Basin and at the Coldani Marsh/White Slough area. Davis et al. (2007) found mercury
9 concentrations in fish at White Slough (and the central Delta in general) to be relatively low
10 compared to other areas of the Delta. No restoration activities involving flooding (and subsequent
11 methylation of mercury) are planned within the known range of the Coldani Marsh/White Slough
12 giant garter snake population. Yolo Basin is where some of the highest concentrations of mercury
13 and methylmercury have been documented (Foe et al. 2008); however, there would be no
14 construction or restoration in this area. Effects from exposure to methylmercury may include
15 decreased predator avoidance, reduced success in prey capture, difficulty in shedding, and reduced
16 ability to move between shelter and foraging or thermoregulation areas (Wylie et al. 2009). The
17 potential mobilization or creation of methylmercury within the study area varies with site-specific
18 conditions and would need to be assessed at the project level. Measures described in *Environmental*
19 *Commitment 12 Methylmercury Management* include provisions for project-specific Mercury
20 Management Plans. Along with avoidance and minimization measures and adaptive management
21 and monitoring, Environmental Commitment 12 is expected to reduce the effects of methylmercury
22 resulting from natural communities and floodplain restoration on giant garter snake.

23 **NEPA Effects:** Implementation of the AMMs listed above and *Environmental Commitment 12*
24 *Methylmercury Management* as part of implementing Alternative 4A would avoid the potential for
25 substantial adverse effects on giant garter snakes, either indirectly or through habitat modifications.
26 These AMMs and Environmental Commitment would also avoid and minimize effects that could
27 substantially reduce the number of giant garter snakes or restrict the species' range. Therefore, the
28 indirect effects of Alternative 4A would not have an adverse effect on giant garter snake.

29 **CEQA Conclusion:** Indirect effects from project operations and maintenance as well as construction-
30 related noise and visual disturbances could impact giant garter snake in aquatic and upland habitats.
31 The use of mechanical equipment during construction could cause the accidental release of
32 petroleum or other contaminants that could impact giant garter snake or its prey. The inadvertent
33 discharge of sediment or excessive dust adjacent to giant garter snake habitat could also have a
34 negative impact on the species or its prey. With implementation of AMM1-AMM7, AMM10, and
35 AMM16 and *Environmental Commitment 12 Methylmercury Management* as part of Alternative 4A
36 construction, operation and maintenance, the project would avoid or minimize the potential for
37 substantial adverse effects on giant garter snakes, either indirectly or through habitat modifications.
38 Therefore, the indirect effects of Alternative 4A would have a less-than-significant impact on giant
39 garter snakes.

40 **Impact BIO-50a: Loss of Connectivity among Giant Garter Snakes in the Coldani Marsh/White** 41 **Slough Subpopulation, Stone Lakes National Wildlife Refuge, and the Delta**

42 Implementation of Alternative 4A would not introduce a substantial barrier to the movement among
43 giant garter snakes in the Coldani Marsh/White Slough subpopulation, Stone Lakes NWR, and the
44 Delta in the study area.

1 **NEPA Effects:** Alternative 4A would not adversely affect connectivity among giant garter snakes in
2 the Coldani Marsh/White Slough subpopulation, Stone Lakes NWR, and the Delta in the study area.

3 **CEQA Conclusion:** Alternative 4A would have a less-than-significant impact on connectivity among
4 giant garter snakes in the study area and therefore no mitigation is required.

5 **Impact BIO-51: Periodic Effects of Inundation of Giant Garter Snake Habitat as a Result of**
6 **Implementation of Alternative 4A**

7 There would be no periodic effects on giant garter snake.

8 **NEPA Effects:** No effect.

9 **CEQA Conclusion:** No impact.

10 **Western Pond Turtle**

11 The habitat model used to assess effects on the western pond turtle is based on aquatic and upland
12 nesting and overwintering habitat. Further details regarding the habitat model, including
13 assumptions on which the model is based, are provided in BDCP Appendix 2.A, *Species Accounts*,
14 Section 2A.29, *Western Pond Turtle*. The model quantified two types of upland nesting and
15 overwintering habitat, including upland habitat in natural communities as well as upland in
16 agricultural areas adjacent to aquatic habitats. Both of these upland habitat types are combined for
17 this analysis. Factors considered in assessing the value of affected aquatic habitat are natural
18 community type and availability of adjacent nesting and overwintering habitat. The highest value
19 aquatic habitat types in the study area consist of nontidal freshwater perennial emergent wetlands
20 and ponds adjacent to suitable nesting and overwintering habitat (Patterson pers. comm.). Less
21 detail is provided on effects on dispersal habitat because, although dispersal habitat is important for
22 maintaining and increasing distribution and genetic diversity, turtles have been known to travel
23 over many different land cover types; therefore, this habitat type is not considered limiting. The
24 value of dispersal habitat depends less on the habitat type itself than on the proximity of that habitat
25 type to high-value aquatic and nesting and overwintering habitat.

26 Alternative 4A would result in both temporary and permanent losses of western pond turtle
27 modeled habitat, as indicated in Table 12-4A-22. The majority of these losses would take place over
28 an extended period of time as tidal marsh is restored in the study area.

29 Alternative 4A would include the following Environmental Commitments and Resource Restoration
30 and Performance Principles to benefit the western pond turtle.

- 31 ● Protect up to 103 acres and restore up to 251 acres of valley/foothill riparian habitat
32 (Environmental Commitments 3 and 7).
- 33 ● Protect up to 119 acres and restore up to 832 acres of nontidal marsh consisting of a mosaic of
34 nontidal perennial aquatic and nontidal freshwater emergent wetland natural communities,
35 which will include suitable habitat characteristics for western pond turtle (Environmental
36 Commitments 3 and 10, Resource Restoration and Performance Principle WPT1).
- 37 ● Protect up to 1,060 acres and restore up to 1,070 acres of grassland (Environmental
38 Commitments 3 and 8).

- Protect up to 6 acres of stock ponds and other aquatic features within protected grasslands to provide aquatic breeding habitat for native amphibians and aquatic reptiles (Resource Restoration and Performance Principle G2).
- Maintain and protect the small patches of important wildlife habitats associated with cultivated lands that occur in cultivated lands within the conservation area, including isolated valley oak trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water conveyance channels, grasslands, ponds, and wetlands (Resource Restoration and Performance Principle CL1).

As explained below, with the restoration and protection of these amounts of habitat, in addition to implementation of AMMs, impacts on western pond turtle would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-4A-22. Changes in Western Pond Turtle Modeled Habitat Associated with Alternative 4A

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Aquatic (acres)	335	2,005
	Upland (acres)	261	84
	Aquatic (miles)	7	4
Total Impacts Water Conveyance Facilities (acres)		596	2,089
Environmental Commitments 4, 6-7, 9-11 ^a	Aquatic (acres)	231	0
	Upland (acres)	38	0
	Aquatic (miles)	2	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a (acres)		269	
TOTAL IMPACTS (acres)		865	2,089

^a See discussion below for a description of applicable Environmental Commitments.

^b Upland acres represent upland nesting and overwintering habitat acreages combined for both natural communities and agricultural lands adjacent to aquatic habitats.

Impact BIO-52: Loss or Conversion of Habitat for and Direct Mortality of Western Pond Turtle

Alternative 4A would result in the permanent and temporary loss of up to 2,363 acres of aquatic habitat and 383 acres of upland nesting and overwintering habitat (Table 12-4A-22). Activities that would result in the temporary and permanent loss of western pond turtle modeled habitat are conveyance facilities and transmission line construction, geotechnical investigations, and establishment and use of RTM, and tidal habitat restoration (Environmental Commitment 4). Habitat enhancement and management activities (Environmental Commitment 11), such as ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other physical facilities could degrade or eliminate western pond turtle habitat. Each of these individual activities is described below. A summary statement of the combined impacts and NEPA effects and a CEQA conclusion follow the individual activity discussions.

- Water Facilities and Operation: Construction of Alternative 4A conveyance facilities would result in the permanent loss of approximately 335 acres of aquatic habitat and 261 acres of upland nesting and overwintering habitat for the western pond turtle in the study area (Table 12-4A-22). Development of the water conveyance facilities would also result in the temporary

1 removal of up to 2,005 acres of aquatic habitat and 84 acres of upland nesting and
2 overwintering habitat for the western pond turtle in the study area (see Table 12-4A-22).
3 Approximately 7 miles of channels providing western pond turtle movement habitat would be
4 removed and 4 miles would be temporarily disturbed. There are four western pond turtle
5 occurrences that overlap with the water conveyance facilities footprint in CZ 2, one occurrence
6 that overlaps with an RTM area on the southern tip of Bouldin Island in CZ 5, and one
7 occurrence that overlaps with an RTM area along Twin Cities Road in CZ 4.

8 Permanent effects on an estimated 162 of the total 596 aquatic and upland acres combined and
9 4 of the 7 miles would be lost as storage areas for RTM, which would likely be moved to other
10 sites for use in levee build-up and restoration. The affected area would likely be restored.
11 Although this effect is categorized as permanent because there is no assurance that the material
12 would eventually be moved, the effect would likely be temporary. Furthermore, the amount of
13 storage area needed for RTM is flexible and the footprint used in the effects analysis is based on
14 a worst case scenario. The actual area to be affected by RTM storage would likely be less than
15 the estimated acreage.

16 The majority of the permanent loss of aquatic habitat and upland nesting and overwintering
17 habitat would be near Clifton Court Forebay in CZ 8. Refer to the Terrestrial Biology Mapbook
18 for a detailed view of Alternative 4A construction locations. The aquatic habitat in the Clifton
19 Court Forebay area is considered to be of reasonably high-value because it consists of
20 agricultural ditches in or near known species occurrences. The nesting and overwintering
21 habitat that would be lost consists primarily of cultivated lands with some small portion of
22 ruderal grassland habitat. Except for remnant, uncultivated patches, the cultivated lands are not
23 suitable for nesting and overwintering unless left fallow. Construction of the water conveyance
24 facilities would also affect dispersal habitat, which is primarily cultivated lands. Although there
25 are western pond turtle occurrences scattered throughout CZ 3, CZ 4, CZ 5, and CZ 6, this effect
26 would be widely dispersed because of the long, linear nature of the pipeline footprint.

- 27 ● *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal natural communities
28 restoration would result in the conversion of an estimated 23 acres of aquatic habitat and 38
29 acres of upland nesting and overwintering habitat for western pond turtle to tidal marsh. Tidal
30 habitat restoration is expected to change existing salinity and flow conditions rather than lead to
31 complete loss of aquatic habitat. Restoration of tidal flow where habitat consists of the calm
32 waters of managed freshwater ponds and wetlands could have an adverse effect on the western
33 pond turtle. Tidal restoration is likely to create suitable, slow-moving freshwater slough and
34 marsh habitat suitable for western pond turtle. The effects would take place in one or more of
35 the ROAs established for tidal restoration (see Figure 12-1). Actual effects are expected to be
36 lower because sites would be selected to minimize effects on western pond turtle habitat (see
37 AMM17 in Appendix 3B, *Environmental Commitments, AMMs, and CMs*).
- 38 ● *Environmental Commitment 11 Natural Communities Enhancement and Management:* A variety of
39 habitat management actions included in Environmental Commitment 11 that are designed to
40 enhance wildlife values in protected habitats may result in localized ground disturbances that
41 could temporarily remove small amounts of western pond turtle habitat. Ground-disturbing
42 activities, such as removal of nonnative vegetation and road and other infrastructure
43 maintenance, are expected to have minor adverse effects on available western pond turtle
44 habitat and are expected to result in overall improvements to and maintenance of western pond
45 turtle habitat values. In addition, effects would be avoided and minimized by the AMMs listed
46 below.

- 1 • Operations and maintenance: Ongoing maintenance of facilities is expected to have little if any
2 adverse effect on the western pond turtle. Postconstruction operation and maintenance of the
3 above-ground water conveyance facilities and restoration infrastructure could result in ongoing
4 but periodic disturbances that could affect western pond turtle use where there is suitable
5 habitat in the study area. Maintenance activities would include vegetation management, levee
6 and structure repair, and regrading of roads and permanent work areas. These effects, however,
7 would be minimized by AMMs and environmental commitments described below.
- 8 • Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
9 western pond turtles. If turtles reside where Environmental Commitments are implemented
10 (most likely in the vicinity of aquatic habitats in the study area), the operation of equipment for
11 land clearing, construction, conveyance facilities operation and maintenance, and habitat
12 restoration, enhancement, and management could result in injury or mortality of western pond
13 turtles. However, to avoid injury or mortality, preconstruction surveys would be conducted in
14 suitable aquatic or upland habitat for the western pond turtle, and turtles found would be
15 relocated outside the construction areas, as required by the AMMs listed below.

16 The following paragraphs summarize the combined effects discussed above and describe other
17 Environmental Commitments and Resource Restoration and Performance Principles that offset or
18 avoid these effects. NEPA effects and a CEQA conclusion are also included.

19 Based on the habitat model, the study area supports approximately 81,666 acres of aquatic and
20 28,864 acres of upland habitat for western pond turtle. Alternative 4A as a whole would remove
21 2,363 acres of aquatic habitat and 383 acres of upland nesting and overwintering habitat for
22 western pond turtle (3% of the total aquatic habitat and 1% of the total upland habitat in the study
23 area).

24 These effects would result from water conveyance facilities construction (2,340 acres of aquatic and
25 345 acres of upland habitats), tidal habitat restoration (Environmental Commitment 4, 23 acres of
26 aquatic and 38 acres of upland habitat). Most of the impacts (2,005 acres) from water conveyance
27 facilities would be temporary in the vicinity of Clifton Court Forebay and are expected to return to
28 suitable aquatic habitat once construction is completed. Therefore the following analysis addresses
29 the permanent loss of 358 acres of aquatic habitat.

30 Implementation of Alternative 4A as a whole would increase the extent and distribution of high-
31 value aquatic and upland nesting and overwintering habitat for western pond turtle in the study
32 area. The conservation strategy for western pond turtle involves restoration and protection of
33 aquatic and adjacent upland habitat, and establishment of an interconnected conservation area that
34 provides for western pond turtle dispersal. The project proponents have committed to protection
35 and restoration of up to 957 acres of aquatic habitat including 951 acres of nontidal wetland and up
36 to 6 acres of stock ponds. In addition, there would be 354 acres of valley/foothill riparian habitat
37 and 2,130 acres of grasslands habitat. The most beneficial restoration would occur in the 832 acres
38 of freshwater emergent wetland consisting of slow-moving slough and marsh adjacent to protected,
39 undisturbed grassland of which 77 acres would be protected and 77 acres restored with suitable
40 habitat characteristics for western pond turtle. Aquatic features (e.g., ditches and ponds) and
41 adjacent uplands that are preserved and managed as part of the 11,870 acres of protected cultivated
42 lands described above for giant garter snake are also expected to benefit the species and to help
43 offset the loss of aquatic habitat. Additionally, basking platforms would be installed as needed in
44 restored freshwater marsh to benefit the western pond turtle.

1 Riparian restoration would potentially increase the quantity and value of aquatic and nesting and
2 overwintering habitat. Where riparian vegetation is restored adjacent to slower-moving channels,
3 sloughs, and ponds, downed trees can provide important basking habitat and cover habitat for
4 turtles. Riparian restoration in those more interior portions of Old and Middle Rivers that would be
5 managed for riparian brush rabbit habitat have potential to benefit resident western pond turtles as
6 riparian-adjacent grassland is an important habitat characteristic for the rabbit.

7 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
8 affected for western pond would be 1:1 for restoration and 1:1 for protection of aquatic habitats and
9 2:1 for protection of upland habitats. Using these ratios would indicate that 358 acres of aquatic
10 habitat should be restored, 358 acres of aquatic habitat should be protected, and 766 acres of
11 upland habitat should be protected for western pond turtle. Alternative 4A also contains
12 commitments to implement *AMM1 Worker Awareness Training, AMM2 Construction Best*
13 *Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion*
14 *and Sediment Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6*
15 *Disposal and Reuse of Spoils, AMM10 Restoration of Temporarily Affected Natural Communities, and*
16 *AMM17 Western Pond Turtle*. These AMMs include elements that would avoid or minimize the risk of
17 affecting habitats and species adjacent to work areas and storage sites. BDCP Appendix 3.C describes
18 the AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
19 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

20 **NEPA Effects:** In the absence of actions to restore and protect habitat, the effects on western pond
21 turtle would represent an adverse effect as a result of habitat modification and potential direct
22 mortality of a special-status species. However, with habitat protection, restoration, management,
23 and enhancement guided by Resource Restoration and Performance Principles WPT1, G2, and CL1,
24 and guided by AMM1–AMM6, AMM10, AMM17, and AMM 37, the effects of Alternative 4A as a whole
25 on western pond turtle would not be an adverse effect.

26 **CEQA Conclusion:** In the absence of actions to restore and protect habitat, the effects on western
27 pond turtle habitat from Alternative 4A would represent a significant impact as a result of habitat
28 modification and potential direct mortality of a special-status species. However, with habitat
29 protection, restoration, management, and enhancement guided by Resource Restoration and
30 Performance Principles WPT1, G2, and CL1, and guided by AMM1–AMM6, AMM10, and AMM17,
31 which would be in place throughout the construction period and operations, the impact of
32 Alternative 4A as a whole on western pond turtle would be less than significant.

33 **Impact BIO-53: Indirect Effects of Alternative 4A on Western Pond Turtle**

34 Indirect effects on western pond turtle within 200 feet of construction activities could temporarily
35 affect the use of aquatic habitat and upland nesting and overwintering habitat for the western pond
36 turtle. Construction activities outside the construction footprint but within 200 feet of water
37 conveyance facilities, habitat restoration, and ongoing habitat enhancement, as well as operation
38 and maintenance of above-ground water conveyance facilities, including the transmission facilities,
39 could result in ongoing periodic postconstruction disturbances with localized impacts on western
40 pond turtle habitat, and temporary noise and visual disturbances.

41 The use of mechanical equipment during water conveyance facilities construction could cause the
42 accidental release of petroleum or other contaminants that could affect western pond turtle or its
43 aquatic prey. The inadvertent discharge of sediment or excessive dust adjacent to western pond
44 turtle aquatic habitat could also have a negative effect on the species or its prey. AMM1–AMM6, and

1 AMM10 would minimize the likelihood of such spills and would ensure measures are in place to
2 prevent runoff from the construction area and potential effects of sediment or dust on western pond
3 turtle or its prey.

4 **NEPA Effects:** With implementation of AMM1–AMM6, AMM10, and AMM17 as part of Alternative
5 4A, the project would avoid the potential for substantial adverse effects on western pond turtles,
6 either directly or through habitat modifications. These AMMs would also avoid and minimize effects
7 that could substantially reduce the number of western pond turtles or restrict the species range.
8 Therefore, the indirect effects of Alternative 4A would not have an adverse effect on western pond
9 turtle.

10 **CEQA Conclusion:** Indirect effects resulting from project operations and maintenance as well as
11 construction-related noise and visual disturbances could impact western pond turtle in aquatic and
12 upland habitats. The use of mechanical equipment during construction could cause the accidental
13 release of petroleum or other contaminants that could affect western pond turtle or its prey. The
14 inadvertent discharge of sediment or excessive dust adjacent to western pond turtle habitat could
15 also have a negative effect on the species or its prey. With implementation of AMM1–AMM6,
16 AMM10, and AMM17 as part of Alternative 4A construction, operation, and maintenance, Alternative
17 4A would avoid the potential for substantial adverse effects on western pond turtles, either
18 indirectly or through habitat modifications, and would not result in a substantial reduction in
19 numbers or a restriction in the range of western pond turtles. The indirect effects of Alternative 4A
20 would have a less-than-significant impact on western pond turtles.

21 **Impact BIO-54: Periodic Effects of Inundation of Western Pond Turtle Habitat as a Result of** 22 **Implementation of Alternative 4A**

23 There would be no periodic effects on western pond turtle.

24 **NEPA Effects:** No effect.

25 **CEQA Conclusion:** No impact.

26 **Silvery Legless Lizard, San Joaquin Coachwhip, and Blainville’s Horned Lizard**

27 This section describes the effects of Alternative 4A on the silvery legless lizard, San Joaquin
28 coachwhip and Blainville’s horned lizard (special-status reptiles). The habitat types used to assess
29 effects on silvery legless lizard are limited to inland sand dunes near Antioch (CZ 9 and CZ 10)
30 (Figure 12-17). There are isolated patches of sandy habitat in the vicinity of Oakley and along the
31 railroad in the East Bay Regional Park Legless Lizard Preserve that are not shown in Figure 12-17
32 because project mapping was not available at this level of detail. Furthermore, none of these areas
33 would be affected by construction or restoration activities and this species is not discussed any
34 further.

35 The habitat types used to assess effects on the San Joaquin coachwhip are alkali seasonal wetland
36 complex, grassland, and inland dune scrub west of Byron Highway (CZ 7) and west of Old River and
37 West Canal (CZ 8). The habitat types used to assess effects on the Blainville’s horned lizard are the
38 same as those for the whipsnake in CZ 7 and CZ 8. There is also potential habitat for the horned
39 lizard to occur in grassland habitat around Stone Lake (CZ 4). Although the expected range for San
40 Joaquin coachwhip and Blainville’s horned lizard extends into the study area, there are no records
41 for either of these species within the study area (California Department of Fish and Wildlife 2013).

1 In addition, historic museum records show that Blainville’s horned lizard occurrences could have been
2 extirpated within the study area (Jennings and Hayes 1994).

3 Construction associated with Alternative 4A Environmental Commitments would result in both
4 temporary and permanent removal of habitat that special-status reptiles use for cover and dispersal
5 (Table 12-4A-23).

6 Alternative 4A would also include the following Environmental Commitments and associated
7 Resource Restoration and Performance Principles to benefit special-status reptiles.

- 8 • Increase the size and connectivity of the conservation area by acquiring lands adjacent to and
9 between existing conservation lands (Resource Restoration and Performance Principle L1).
- 10 • Increase native species diversity and relative cover of native plant species, and reduce the
11 introduction and proliferation of nonnative species (Resource Restoration and Performance
12 Principle L3).
- 13 • Protect and improve habitat linkages that allow native terrestrial species to move between
14 protected habitats within and adjacent to the project area (Resource Restoration and
15 Performance Principle L2).
- 16 • Protect up to 188 acres and restore up to 48 acres of existing vernal pool/alkali seasonal
17 wetlands complexes in the greater Byron Hills including associated grasslands (Environmental
18 Commitments 3 and 9).
- 19 • Protect up to 1,060 acres and restore up to 1,070 acres of grassland (Environmental
20 Commitments 3 and 8).
- 21 • Increase the extent, distribution, and density of native perennial grasses intermingled with
22 other native species, including annual grasses, geophytes, and other forbs (G4).
- 23 • Increase burrow availability for burrow-dependent species (G5)
- 24 • Increase prey abundance and accessibility, especially of small mammals and insects, for
25 grassland-foraging species (G6)

26 As explained below, with the restoration or protection of these amounts of habitat, in addition to
27 implementation of AMMs, impacts on special-status reptiles would not be adverse for NEPA
28 purposes and would be less than significant for CEQA purposes.

29 **Table 12-4A-23. Changes in Special-Status Reptile Habitat Associated with Alternative 4A (acres)**

Project Component	Habitat Type ^b	Permanent	Temporary
Water Conveyance Facilities	Grassland	269	102
Total Impacts Water Conveyance Facilities		269	102
Environmental Commitments 4, 6-7, 9-11 ^a	Grassland	0	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		0	0
TOTAL IMPACTS		269	102

^a See discussion below for a description of applicable Environmental Commitments.

^b Grassland impacts include alkali seasonal wetland complex, grassland, and inland dune scrub natural communities.

30

1 **Impact BIO-55: Loss or Conversion of Habitat for and Direct Mortality of Special-Status**
2 **Reptiles**

3 Alternative 4A would result in the permanent and temporary loss of 371 acres of habitat for special-
4 status reptiles (Table 12-4A-23). Water conveyance facilities and transmission line construction,
5 including establishment and use of RTM and geotechnical investigations would cause the loss of
6 special-status reptile habitat. In addition, habitat enhancement and management activities
7 (Environmental Commitment 11), such as ground disturbance or removal of nonnative vegetation,
8 could result in local adverse habitat effects for special-status reptiles. For purposes of this analysis,
9 the acres of total effect are considered the same for both San Joaquin coachwhip and Blainville's
10 horned lizard, even though this assumption results in slightly more acres of permanent effect on the
11 San Joaquin coachwhip resulting from water conveyance facilities activities in CZ 4 where it does not
12 occur.

13 In addition to habitat loss and conversion, construction activities, such as grading, the movement of
14 construction vehicles or heavy equipment, and the installation of water conveyance facilities
15 components and new transmission lines, may result in the direct mortality, injury, or harassment of
16 special-status reptiles, including the potential crushing of individuals and disruption of essential
17 behaviors. Construction of access roads could fragment suitable habitat, impede upland movements
18 in some areas, and increase the risk of road mortality. Construction activities related to
19 Environmental Commitments could have similar effects. Each of these individual activities is
20 described below. A summary statement of the combined impacts and NEPA effects and a CEQA
21 conclusion follow the individual activity discussions.

- 22 • *Water Facilities and Operation:* Development of the conveyance facilities would result in the
23 permanent loss of approximately 269 acres of habitat for special-status reptiles in the vicinity of
24 Clifton Court Forebay. Construction-related effects would temporarily disturb 102 acres of
25 suitable habitat for special-status reptiles in the study area. There are no occurrences of either
26 species within the construction footprint for water conveyance facilities.
- 27 • *Environmental Commitment 11 Natural Communities Enhancement and Management:* A variety of
28 habitat management actions included in *Environmental Commitment 11* that are designed to
29 enhance wildlife values in protected habitats may result in localized ground disturbances that
30 could temporarily remove small amounts of special-status reptile habitat. Ground-disturbing
31 activities, such as removal of nonnative vegetation and road and other infrastructure
32 maintenance, are expected to have minor adverse effects on available special-status reptile
33 habitat and are expected to result in overall improvements to and maintenance of species
34 habitat values. These effects cannot be quantified, but are expected to be minimal and would be
35 reduced through implementation of Mitigation Measure BIO-55 *Conduct Preconstruction Surveys*
36 *for Noncovered Special-Status Reptiles and Implement Applicable AMMs.*
- 37 • *Operations and maintenance:* Ongoing facilities operation and maintenance is expected to have
38 little if any adverse effect on special-status reptiles. Postconstruction operation and
39 maintenance of the above-ground water conveyance facilities could result in ongoing but
40 periodic disturbances that could affect special-status reptiles' use of suitable habitat in the study
41 area. These effects, however, would be minimized with implementation of Mitigation Measure
42 BIO-55.
- 43 • *Injury and direct mortality:* Construction vehicles may cause injury to or mortality of special-
44 status reptiles. The operation of equipment for land clearing, construction, operation and

1 maintenance, and restoration, enhancement, and management activities could result in injury or
2 mortality. This risk is highest from late fall through early spring, when special-status reptiles are
3 not as active. However, the risk of crushing Blainville's horned lizard would not necessarily be
4 lower during the active season, because the species uses crypsis to hide from predators and
5 would be hard to spot from a moving vehicle. Seasonal risk reduction may be more appropriate
6 for the coachwhip, but there is still a risk of crushing the horned lizard during the active season.
7 In addition, both species would not be active under conditions of extreme temperatures and
8 could be taking cover in burrows or crevices or under structures such as rocks or logs (Morey
9 2000). They could also burrow beneath the soil and be crushed by vehicles. Increased vehicular
10 traffic associated with project actions could contribute to a higher incidence of road kill.
11 However, conducting construction during the late-spring through early fall periods when
12 feasible, and when temperatures are 67–100 degrees F, and implementation of Mitigation
13 Measure BIO-55 would avoid and minimize injury or mortality of special-status reptiles during
14 construction.

15 The following paragraphs summarize the combined effects discussed above and describe other
16 Environmental Commitments and associated Resource Restoration and Performance Principles that
17 offset or avoid these effects. NEPA effects and a CEQA conclusion are also included.

18 Alternative 4A would remove 371 acres of grassland habitat for special-status reptiles as a result of
19 water conveyance facilities.

20 Effects of water conveyance facilities construction on special-status reptiles would be offset through
21 the project's protection of up to 1,060 acres and restoration of up to 1,070 acres of grassland, and
22 grassland associated with protection and restoration of up to 198 acres of vernal pool/alkali
23 seasonal wetland complex. Grassland protection would focus in particular on acquiring the largest
24 remaining contiguous patches of unprotected grassland habitat, which are located south of SR 4 in
25 CZ 8. This area connects to more than 620 acres of existing habitat that is protected under the East
26 Contra Costa County HCP/NCCP. The projects commitment to protect the largest remaining
27 contiguous habitat patches (including grasslands and the grassland component of vernal pool/alkali
28 seasonal wetland complexes) in CZ 8 would sufficiently offset the adverse effects resulting from
29 water conveyance facilities construction.

30 The typical NEPA and CEQA project-level mitigation ratio (2:1 for protection) for this natural
31 community would indicate that 742 acres should be protected to offset water conveyance facilities
32 losses.

33 **NEPA Effects:** In the absence of actions to restore and protect habitat, the effects on special-status
34 reptile habitat from Alternative 4A would represent an adverse effect as a result of habitat
35 modification and potential direct mortality of special-status species. However, with habitat
36 protection, restoration, management, and enhancement guided by Resource Restoration and
37 Performance Principles L1-L3, and by Mitigation Measure BIO-55, which would be in place
38 throughout the construction period and operations, the effects of Alternative 4A as a whole on
39 special-status reptiles would not be an adverse effect.

40 **CEQA Conclusion:** In the absence of other actions to restore and protect habitat, the effects on
41 special-status reptile habitat from Alternative 4A would represent a significant impact as a result of
42 habitat modification and potential direct mortality of a special-status species. However, with habitat
43 protection, restoration, management, and enhancement guided by Resource Restoration and
44 Performance Principles L1-L3, and by Mitigation Measure BIO-55, which would be in place

1 throughout the construction period and operations, the impact of Alternative 4A as a whole on
2 special-status reptiles would be less than significant.

3 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**
4 **Status Reptiles and Implement Applicable AMMs**

5 DWR will retain a qualified biologist to conduct a habitat assessment in construction and
6 restoration areas that are relatively undisturbed or have a moderate to high potential to support
7 Blainville's horned lizard and San Joaquin coachwhip in CZ 4, CZ 7, and CZ 8. The qualified
8 biologist will survey for these reptiles in areas of suitable habitat concurrent with the
9 preconstruction surveys for other special-status species in CZ 4, CZ 7, and CZ 8. If special-status
10 reptiles are found in work areas, the biologist will first attempt to allow these species to move
11 out of the work area on their own but if conditions do not allow this, individuals will be captured
12 by the biologist and relocated to the nearest suitable habitat outside of the work area as
13 determined in consultation with CDFW. To the extent feasible, work in areas with suitable
14 habitat for Blainville's horned lizard and San Joaquin coachwhip should not be conducted
15 during periods of cold and hot temperatures (below 67 degrees F and above 100 degrees F),
16 because both species would be relatively inactive during these periods and could be taking
17 cover in loose soil, in burrows or crevices, or under structures such as rocks or logs (Morey
18 2000). This would reduce the impact of being crushed by vehicles and equipment.

19 In addition, *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management Practices*
20 *and Monitoring*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
21 *Affected Natural Communities*, will be implemented for all special-status reptiles adversely
22 affected by the project to avoid, minimize, or compensate for impacts.

23 **Impact BIO-56: Indirect Effects of Alternative 4A on Special-Status Reptile Species**

24 Construction activities associated with water conveyance facilities, Environmental Commitments,
25 and ongoing habitat enhancement, as well as operations and maintenance of above-ground water
26 conveyance facilities, including the transmission facilities, could result in ongoing periodic
27 postconstruction disturbances and noise with localized effects on special-status reptiles and their
28 habitat.

29 In addition, construction activities could indirectly affect special-status reptiles if construction
30 resulted in the introduction of invasive weeds that create vegetative cover that is too dense for the
31 species to navigate. Construction vehicles and equipment can transport in their tires and various
32 parts under the vehicles invasive weed seeds and vegetative parts from other regions to
33 construction sites, resulting in habitat degradation. These potential effects would be reduced
34 through implementation of AMM10. Water conveyance facilities operations and maintenance
35 activities would include vegetation and weed control, ground squirrel control, canal maintenance,
36 infrastructure and road maintenance, levee maintenance, and maintenance and upgrade of electrical
37 systems. While maintenance activities are not expected to remove special-status reptile habitat,
38 operation of equipment could disturb small areas of vegetation around maintained structures and
39 could result in injury or mortality of individual special-status reptiles, if present.

40 **NEPA Effects:** Implementation of the Mitigation Measure BIO-55, *Conduct Preconstruction Surveys*
41 *for Noncovered Special-Status Reptiles and Implement Applicable AMMs* would avoid the potential for
42 substantial adverse effects on these species, either indirectly or through habitat modifications. The
43 mitigation measure would also avoid and minimize effects that could substantially reduce the

1 number of special-status reptiles, or restrict either species' range. Therefore, with implementation
2 of Mitigation Measure BIO-55, the indirect effects of Alternative 4A on special-status reptiles would
3 not be adverse under NEPA.

4 **CEQA Conclusion:** Indirect effects from project operations and maintenance as well as construction-
5 related noise and visual disturbances could impact special-status reptiles. In addition, construction
6 activities could indirectly affect special-status reptiles if construction resulted in the introduction of
7 invasive weeds that create vegetative cover that is too dense for the species to navigate. Water
8 conveyance facilities operations and maintenance activities, such as vegetation and weed control,
9 and road maintenance, are not expected to remove special-status reptile habitat, but operation of
10 equipment could disturb small areas of vegetation around maintained structures and could result in
11 injury or mortality of individual special-status reptiles, if present. These activities could result in a
12 significant impact.

13 With implementation of Mitigation Measure BIO-55, *Conduct Preconstruction Surveys for Noncovered*
14 *Special-Status Reptiles and Implement Applicable AMMs* as part of Alternative 4A construction,
15 operation, and maintenance, the project would avoid the potential for significant effects on special-
16 status reptile species, either indirectly or through habitat modifications, and would not result in a
17 substantial reduction in numbers or a restriction in the range of either species. With implementation
18 of Mitigation Measure BIO-55, the indirect effects of Alternative 4A would have a less-than-
19 significant impact on special-status reptiles.

20 **Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-**
21 **Status Reptiles and Implement Applicable AMMs**

22 See description of Mitigation Measure BIO-55 under Impact BIO-55.

23 **California Black Rail**

24 This section describes the effects of Alternative 4A, including water conveyance facilities
25 construction and implementation of Environmental Commitments, on California black rail. The
26 habitat model used to assess effects for the California black rail is based on primary breeding habitat
27 and secondary habitat. Primary (breeding) habitat for this species within the Delta includes all
28 *Schoenoplectus* and *Typha*-dominated tidal and nontidal freshwater emergent wetland in patches
29 greater than 0.55 acre (essentially instream islands of the San Joaquin River and its tributaries and
30 White Slough Wildlife Area). In Suisun Marsh, primary habitat includes all *Schoenoplectus* and
31 *Typha*-dominated, and *Salicornia*-dominated patches greater than 0.55 acre, with the exception that
32 all low marsh habitats dominated by *Schoenoplectus acutus* and *S. californicus* and all managed
33 wetlands, in general, are considered secondary habitat with lesser ecological value. Upland
34 transitional zones that provide refugia during high tides within 150 feet of the tidal wetland edge
35 were also included as secondary habitat. Secondary habitats generally provide only a few ecological
36 functions such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland
37 transition zones), while primary habitats provide multiple functions, including breeding, effective
38 predator cover, and valuable foraging opportunities.

39 Alternative 4A would result in both temporary and permanent losses of California black rail
40 modeled habitat as indicated in Table 12-4A-24. Full implementation of Alternative 4A would also
41 include the following Resource Restoration and Performance Principles that would benefit the
42 California black rail.

- 1 • At the ecotone that would be created between restored tidal wetlands and transitional uplands
2 (Environmental Commitment 4), provide for at least 13.5 acres of California black rail habitat
3 (*Schoenoplectus* and *Typha*-dominated tidal and nontidal freshwater emergent wetland in
4 patches greater than 0.55 acres at a location subject to CDFW approval) consisting of shallowly
5 inundated emergent vegetation at the upper edge of the marsh (within 50 meters of upland
6 refugia habitat) with adjacent riparian or other shrubs that will provide upland refugia, and
7 other moist soil perennial vegetation. If feasible, create the 13.5 acres of tidal habitat in a single
8 patch in a location that is contiguous with occupied California black rail habitat (Resource
9 Restoration and Performance Principle CBR1).
- 10 • Create topographic heterogeneity in restored tidal wetlands (Environmental Commitment 4,
11 Resource Restoration and Performance Principle CBR2).

12 California black rail is a fully protected species and take of California black rail individuals is
13 prohibited under Fish and Game Code Section 3511. With the implementation of *AMM38 California*
14 *Black Rail*, construction activities would not result in take and effects on the species would be
15 avoided. As explained below, with the restoration and protection of tidal wetland habitat, in addition
16 to natural community enhancement and management commitments (including *Environmental*
17 *Commitment 12 Methylmercury Management*) and implementation of AMM1–AMM7, *AMM38*
18 *California Black Rail*, and *AMM27 Selenium Management*, impacts on the California black rail would
19 not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

20 **Table 12-4A-24. Changes in California Black Rail Modeled Habitat Associated with Alternative 4A**
21 **(acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Primary	0.5	11
	Secondary	0	0
Total Impacts Water Conveyance Facilities		0.5	11
Environmental Commitments 4, 6–7, 9–11 ^a	Primary	1	0
	Secondary	1	0
Total Impacts Environmental Commitments 4, 6–7, 9–11^a		0	0
TOTAL IMPACTS		2.5	11

^a See discussion below for a description of applicable Environmental Commitments.

22

23 **Impact BIO-57: Loss or Conversion of Habitat for and Direct Mortality of California Black Rail**

24 Alternative 4A would result in the combined permanent and temporary loss of 13.5 acres of
25 modeled primary habitat for California black rail (Table 12-4A-24). Project measures that would
26 result in these losses are water conveyance facilities and transmission line construction, and
27 establishment and use of RTM areas. Habitat enhancement and management activities
28 (Environmental Commitment 11) which include ground disturbance or removal of nonnative
29 vegetation could result in local adverse habitat effects. In addition, maintenance activities associated
30 with the long-term operation of the water conveyance facilities and other Alternative 4A physical
31 facilities could degrade or eliminate California black rail habitat. Each of these individual activities is
32 described below.

1 • *Water Facilities Construction:* Construction of Alternative 4A conveyance facilities would result
2 in the permanent loss of up to 0.5 acres and the temporary loss of up to 11 acres of modeled
3 primary California black rail habitat (Table 12-4A-24). The construction of a temporary
4 transmission line in the central Delta that extends from Bouldin Island to Victoria Island would
5 impact modeled habitat on Mandeville Island, the north end of Bacon Island, and on in-channel
6 islands along the transmission line alignment. Other temporary impacts on modeled habitat
7 would result from a temporary barge unloading facility and a temporary access road along the
8 north end of Bacon Island, and from a temporary work area on Mandeville Island. Geotechnical
9 exploration could also impact black rail habitat on an in-channel island east of Bacon Island.
10 Less than 0.5 acres of habitat would be permanently lost from the construction of a permanent
11 transmission line at the northeast corner of Clifton Court Forebay in CZ 8. The water conveyance
12 facilities footprint intersects with one California black rail occurrence on Mandeville Island,
13 from the footprint of the temporary transmission line.

14 Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4A construction
15 locations. Impacts from water conveyance facilities would occur within the first 10–14 years of
16 Alternative 4A implementation.

17 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* Up to 2 acres of California
18 black rail modeled habitat (1 acre of primary habitat and 1 acre of secondary habitat) would be
19 affected by tidal marsh restoration. The restoration of up to 13.5 acres of tidal wetlands would
20 benefit California black rail. The primary habitat for the species in the Delta consists of in-
21 channel islands, which are in areas that are most vulnerable to the effects of sea level rise in the
22 study area. Tidal restoration under Environmental Commitment 4 would ensure that land is
23 protected adjacent to current habitat in the delta with the consideration of sea level rise. Tidal
24 restoration for the California black rail would include an ecotone between wetlands and
25 transitional uplands which would provide upland refugia for the species.

26 • *Environmental Commitment 11 Natural Communities Enhancement and Management:* A variety of
27 habitat management actions associated with natural communities enhancement, that are
28 designed to enhance wildlife values in restored tidal wetland habitats may result in localized
29 ground disturbances that could temporarily remove small amounts of California black rail
30 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and
31 other infrastructure maintenance activities are expected to have minor adverse effects on
32 available California black rail habitat and are expected to result in overall improvements and
33 maintenance of California black rail habitat values. Noise and visual disturbances during
34 implementation of habitat management actions could also result in temporary disturbances that
35 affect California black rail use of the surrounding habitat. These effects cannot be quantified, but
36 would be avoided and minimized by the AMMs listed below (AMMs are described in detail in
37 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). The implementation of *AMM38*
38 *California Black Rail* would avoid disturbance and take by requiring restrictions on construction
39 activities during the breeding season and establishing nodisturbance buffers around California
40 black rail territories. In addition, construction would be avoided altogether if breeding
41 territories cannot be accurately delimited. Environmental Commitment 11 would also include
42 the control of nonnative predators through habitat manipulation techniques or trapping to
43 reduce nest predation on California black rail if needed.

44 *Water Facility Operations and Maintenance:* Post construction operation and maintenance of the
45 above-ground water conveyance facilities and restoration infrastructure could result in ongoing
46 but periodic disturbances that could affect California black rail use of the central Delta.

1 Maintenance activities would include vegetation management, levee and structure repair, and
2 re-grading of roads and permanent work areas. These effects, however, would be reduced by the
3 AMMs listed below. BDCP Appendix 3.C describes the AMMs, which have since been updated and
4 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
5 EIR/EIS.

6 Injury and Direct Mortality: California black rail is a fully protected species and take is
7 prohibited under Section 3511 of the Fish and Game Code. If rails are present adjacent to project
8 activities, the operation of equipment for land clearing, construction, conveyance facilities
9 operation and maintenance, and habitat restoration, enhancement, and management could
10 result in injury or take of California black rail. Increased vehicular traffic associated with
11 construction and maintenance of water conveyance facilities could also contribute to a higher
12 potential for take. The implementation of *AMM38 California Black Rail* would avoid disturbance
13 and take of California black rail individuals by restricting construction activities during the
14 breeding season and establishing 500-foot no-disturbance buffers around identified territorial
15 calling centers. If the 500-foot buffer does not provide complete avoidance of take, a CDFW-
16 approved biologist would monitor construction activities to ensure that black rail individuals
17 are not harmed. If breeding territories cannot be accurately delimited construction would not
18 occur in order to avoid impacts (*AMM38 California Black Rail* is described in Appendix 3B,
19 *Environmental Commitments, AMMs, and CMs*).

20 The following paragraphs summarize the combined effects discussed above and describe
21 Environmental Commitments that offset or avoid these effects. NEPA and CEQA conclusions are
22 provided at the end of the section.

23 The study area supports approximately 7,467 acres of primary and 17,915 acres of secondary
24 habitat for California black rail. Alternative 4A would result in the permanent loss of 2.5 acre and
25 temporary effects on up to 11 acres of primary California black rail habitat (much less than 1% of
26 the total primary habitat in the study area) as a result of water conveyance facilities construction.
27 The typical NEPA and CEQA project-level mitigation ratio for the tidal wetlands that would be
28 affected by the project would be 1:1 for restoration/creation of tidal wetlands. Using this ratio
29 would indicate that 13.5 acres of tidal freshwater emergent wetland should be restored/created to
30 mitigate the losses of California black rail habitat.

31 The project includes measures to improve habitat for California black rail to offset the habitat that is
32 permanently and temporarily lost. Conservation commitments under Alternative 4A through
33 *Environmental Commitment 4 Tidal Natural Communities Restoration* would restore or create up to
34 13.5 acres of tidal wetlands at a location subject to CDFW approval.

35 Upland refugia for California black rail would be created between the restored tidal wetlands and
36 transitional uplands to provide cover from predators (*Environmental Commitment 4 Tidal Natural
37 Communities Restoration/Resource Restoration and Performance Principle CBR1*). In addition,
38 nonnative predators would be controlled to reduce nest predation if necessary through
39 *Environmental Commitment 11 Natural Communities Enhancement and Management*. These wetlands
40 would consist of *Schoenoplectus* and *Typha*-dominated tidal and nontidal freshwater emergent
41 wetland in patches greater than 0.55 acre, which would provide primary habitat for the black rail. If
42 feasible, the 13.5 acres of tidal restoration would occur in a single patch at a location adjacent to
43 occupied California black rail habitat. Upland refugia for California black rail would be created
44 between the restored tidal freshwater emergent wetlands and transitional uplands to provide cover
45 from predators (*Environmental Commitment 4/Resource Restoration and Performance Principle*

1 CBR1). In addition, nonnative predators would be controlled to reduce nest predation if necessary
2 through *Environmental Commitment 11 Natural Communities Enhancement and Management*.

3 The project also includes commitments to implement the following avoidance and minimization
4 measures that will help to avoid and minimize adverse effects on California black rail: *AMM1 Worker*
5 *Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*
6 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*
7 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge*
8 *Operations Plan*, and *AMM38 California Black Rail*. *AMM38 California Black Rail* requires surveys for
9 California black rail and the implementation of avoidance and minimization measures including the
10 establishment of a 500 foot no disturbance buffer around any identified calling stations. All of these
11 AMMs include elements that avoid or minimize the risk of affecting habitat and avoid the risk of take
12 of California black rail in or adjacent to work areas and RTM storage sites.

13 **NEPA Effects:** In the absence of Environmental Commitments and AMMs, the losses of California
14 black rail habitat and potential for take of a special-status species associated with Alternative 4A
15 would represent an adverse effect. However, with habitat protection and restoration associated with
16 Environmental Commitment 4, guided by Resource Restoration and Performance Principles CBR1
17 and CBR2, and AMM1–AMM7 and *AMM38 California Black Rail*, the effects of Alternative 4A as a
18 whole on California black rail would not be adverse under NEPA.

19 **CEQA Conclusion:** In the absence of Environmental Commitments and AMMs, the losses of California
20 black rail habitat and potential for take of a special-status species associated with Alternative 4A
21 would represent a significant impact. Considering the restoration provisions, which would provide
22 acreages of new tidal marsh habitat in amounts necessary to compensate for habitats lost to
23 construction and restoration activities guided by Resource Restoration and Performance Principles
24 CBR1 and CBR2, and the implementation of AMM1–AMM7 and *AMM38 California Black Rail*,
25 implementation of Alternative 4A as a whole would not result in a substantial adverse effect through
26 habitat modifications and would avoid take of California black rail individuals. Therefore, the
27 alternative would have a less-than-significant impact on California black rail under CEQA.

28 **Impact BIO-58: Effects on California Black Rail Associated with Electrical Transmission** 29 **Facilities**

30 A variety of rail species are known to suffer take from transmission line collision, likely associated
31 with migration and flights between foraging areas (Eddleman et al.1994). Due to their wing shape
32 and body size, rails have low to moderate flight maneuverability (Bevanger 1998), increasing
33 susceptibility to collision mortality. However, there are relatively few records of California black rail
34 collisions with overhead wires.

35 California black rails exhibit daytime site fidelity and a lack of long-distance night migration, two
36 factors which are associated with low collision risk in avian species (Eddleman et al. 1994).
37 California black rail movements in the study area are likely short, seasonal, and at low altitudes,
38 typically less than 16 feet (5 meters) (Eddleman et al, 1994). There are numerous occurrences
39 within 1 mile of the proposed temporary transmission line which extends north-south between
40 Bouldin Island and Clifton Court Forebay. However, although the species may have low to moderate
41 flight maneuverability, the bird's behavior (e.g., sedentary, nonmigratory, ground-nesting and
42 foraging, solitary, no flocking, secretive) reduces potential exposure to overheard wires and
43 vulnerability to collision mortality (see BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential*
44 *Bird Collisions at Proposed BDCP Powerlines*). Marking transmission lines with flight diverters that

1 make the lines more visible to birds has been shown to reduce the incidence of bird mortality
2 (Brown and Drewien 1995). For example, Yee (2008) estimated that marking devices in the Central
3 Valley could reduce avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new
4 project transmission lines would be fitted with flight diverters, which would greatly reduce the risk
5 of California black rails colliding with project powerlines. There would be no take of California black
6 rail from the project as defined under Section 86 of the California Fish and Game Code.

7 Transmission line poles and towers also provide perching substrate for raptors, which are predators
8 on California black rail. Although there is potential for temporary transmission lines to increase
9 perching opportunities for raptors and result in increased predation pressure on local black rails,
10 little is currently known about the seasonal movements of black rails or the potential for increased
11 predation on rails near power poles. Therefore, because of the limited area over which poles would
12 be installed relative to the amount of California black rail habitat in the Delta, it is assumed that the
13 increased risk of predation on California black rail from an increase in raptor perching opportunities
14 would be negligible.

15 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
16 adverse effect because the risk of bird strike is considered to be minimal based on the species' flight
17 behaviors. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike
18 diverters on all new powerlines, which would further reduce the risk of bird strike for California
19 black rails from the project. The increased risk of predation on California black rail from an increase
20 in raptor perching opportunities would be negligible because of the limited area over which poles
21 would be installed relative to the amount of California black rail habitat in the Delta. Therefore, the
22 construction and operation of new transmission lines would not result in an adverse effect on
23 California black rail.

24 **CEQA Conclusion:** The construction and presence of new transmission lines would not result in
25 "take" of California black rail pursuant to California Fish and Game Code Section 86 because the risk
26 of bird strike is considered to be minimal based on the species' flight behaviors. In addition, *AMM20*
27 *Greater Sandhill Crane* contains the commitment to place bird strike diverters on all new powerlines,
28 which would further reduce the risk of bird strike for California black rails from the project. The
29 increased risk of predation on California black rail from an increase in raptor perching opportunities
30 would be negligible when considering the limited area over which poles would be installed relative
31 to the amount of California black rail habitat in the Delta. Therefore, the construction and operation
32 of new transmission lines under Alternative 4A would result in a less-than-significant impact on
33 California black rail.

34 **Impact BIO-59: Indirect Effects of Alternative 4A on California Black Rail**

35 **Indirect Construction-Related Effects:** Both primary and secondary habitat for California black
36 rail within the vicinity of proposed construction areas could be indirectly affected by construction
37 activities. Indirect effects associated with construction include noise, dust, and visual disturbance
38 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
39 footprint but within 500 feet from the construction edge. Construction noise above background
40 noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction
41 activities (see BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
42 *Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP Revisions*).
43 However, there is no available data to determine the extent to which these noise levels could affect
44 California black rail. The use of mechanical equipment during water conveyance facilities

1 construction could cause the accidental release of petroleum or other contaminants that could affect
2 California black rail in the surrounding habitat. The inadvertent discharge of sediment or excessive
3 dust adjacent to California black rail habitat could also affect the species.

4 If construction occurs during the nesting season, these indirect effects could result in the loss or
5 abandonment of nests, and take of any eggs and/or nestlings. The implementation of *AMM38*
6 *California Black Rail* would avoid disturbance and take of individuals by requiring preconstruction
7 surveys of potential breeding habitat, establishment of a 500-foot no-disturbance buffer, and the
8 presence of an onsite monitor during the breeding season (see Appendix 3B, *Environmental*
9 *Commitments, AMMs, and CMs*). In addition, construction would be avoided altogether if breeding
10 territories cannot be accurately delimited.

11 **Salinity:** Water operations ranging between Operational Scenarios H3 and H4 would have an effect
12 on salinity gradients in Suisun Marsh. It is expected that the salinity of water in Suisun Marsh would
13 generally increase as a result of water operations and operations of salinity-control gates to mimic a
14 more natural water flow. This would likely encourage the establishment of tidal wetland plant
15 communities tolerant of more brackish environments, which should be beneficial to California black
16 rail because its historical natural Suisun Marsh habitat was brackish tidal marsh.

17 **Methylmercury Exposure:** The modeled primary habitat for California black rail includes tidal
18 brackish emergent wetland and tidal freshwater emergent wetland in Suisun Marsh and the Delta
19 west of Sherman Island, and instream islands and White Slough Wildlife Area in the central Delta.
20 Black rails typically occur in the high marsh zone near the upper limit of tidal flooding in salt and
21 brackish habitats. Low marsh, managed wetlands, and the upland fringe are considered secondary
22 habitat. California black rails are a top predator in the benthic food chain; they nest and forage in
23 dense vegetation and prey on isopods, insects and arthropods from the surface of mud and
24 vegetation. They also consume insects and seeds from bulrushes (*Schoenoplectus* spp.) and cattails
25 (*Typha* spp.) (Eddleman et al. 1994).

26 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
27 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
28 species would overestimate the effects on black rail. Organisms feeding within pelagic-based (algal)
29 foodwebs have been found to have higher concentrations of methylmercury than those in benthic or
30 epibenthic foodwebs; this has been attributed to food chain length and dietary segregation
31 (Grimaldo et al. 2009). Modeled effects of mercury concentrations from changes in operations of
32 water conveyance facilities on largemouth bass did not differ substantially from existing conditions;
33 therefore, results also indicate that black rail mercury tissue concentrations would not measurably
34 increase as a result of water conveyance facilities implementation.

35 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
36 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
37 Thus, Alternative 4A restoration activities that create newly inundated areas could increase
38 bioavailability of mercury. In general, the highest methylation rates are associated with high tidal
39 marshes (primary black rail habitat) that experience intermittent wetting and drying and associated
40 anoxic conditions (Alpers et al. 2008). Mercury is generally elevated throughout the Delta, and
41 restoration of the lower potential areas in total may result in generalized, very low level increases of
42 mercury. Given that some species have existing elevated mercury tissue levels, these low level
43 increases could result in some level of effects. Environmental Commitment 12 would be

1 implemented to address this risk of low level increases in methylmercury which could add to the
2 current elevated tissue concentrations.

3 Due to the complex and very site-specific factors that would determine if mercury becomes
4 mobilized into the foodweb, *Environmental Commitment 12 Methylmercury Management*, is included
5 to provide for site-specific evaluation for each restoration project. If a project is identified where
6 there is a high potential for methylmercury production that could not be fully addressed through
7 restoration design and adaptive management, alternate restoration areas would be considered.
8 Environmental Commitment 12 would be implemented in coordination with other similar efforts to
9 address mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis
10 Section. This Environmental Commitment would include the following actions.

- 11 • Assess pre-restoration conditions to determine the risk that the project could result in increased
12 mercury methylation and bioavailability.
- 13 • Define design elements that minimize conditions conducive to generation of methylmercury in
14 restored areas.
- 15 • Define adaptive management strategies that can be implemented to monitor and minimize
16 actual postrestoration creation and mobilization of methylmercury.

17 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
18 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
19 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
20 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
21 2009). The effect of selenium toxicity differs widely between species and also between age and sex
22 classes within a species. In addition, the effect of selenium on a species can be confounded by
23 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
24 2009).

25 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
26 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
27 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
28 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
29 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
30 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
31 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
32 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
33 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
34 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
35 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
36 levels of selenium have a higher risk of selenium toxicity.

37 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
38 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
39 exacerbate bioaccumulation of selenium in avian species, including California black rail. Tidal and
40 nontidal marsh restoration has the potential to mobilize selenium, and therefore increase avian
41 exposure from ingestion of prey items with elevated selenium levels. Thus, tidal marsh restoration
42 activities that create newly inundated areas could increase bioavailability of selenium. Changes in
43 selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that,
44 relative to Existing Conditions and the No Action Alternative, water conveyance facilities would not

1 result in substantial, long-term increases in selenium concentrations in water in the Delta under any
2 alternative.

3 There could be an effect on California black rail from increases in selenium associated with tidal
4 restoration activities (Environmental Commitment 4); however, effects on the California black rail
5 population would be expected to be minimal as the amount of tidal restoration would total up to 22
6 acres. Any effects would be addressed through the implementation of *AMM27 Selenium*
7 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
8 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
9 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS). Furthermore, the effectiveness
10 of selenium management to reduce selenium concentrations and/or bioaccumulation would be
11 evaluated separately for each restoration effort as part of project design and implementation. This
12 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
13 design.

14 **NEPA Effects:** Noise and visual disturbances related to construction-related activities from
15 Environmental Commitments could reduce California black rail use of modeled habitat adjacent to
16 work sites. Moreover, operation and maintenance of the water conveyance facilities, including the
17 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could
18 affect use of the surrounding habitat by California black rail. Potential effects of noise and visual
19 disturbances on California black rail individuals would be avoided with *AMM38 California Black Rail*.
20 *AMM1–AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*, would
21 minimize the likelihood of spills from occurring and ensure that measures were in place to prevent
22 runoff from the construction area and to avoid negative effects of dust on habitat for the species.

23 Implementation of operations ranging between Operational Scenarios H3 and H4, including
24 operation of salinity-control gates are expected to increase water salinity in Suisun Marsh because
25 they will create conditions more similar to historic conditions.

26 Tidal habitat restoration could result in increased exposure of California black rail to selenium;
27 however, the amount of tidal restoration would total up to 22 acres, and potential exposure to
28 selenium resulting from these acres of restoration would not be expected to adversely affect the
29 California black rail population. Any effects would be addressed through the implementation of
30 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
31 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
32 habitats.

33 Changes in water operations would not be expected to result in increased mercury bioavailability to
34 California black rail. Restoration actions that would create high and low tidal marsh, which is
35 California black rail habitat, could provide biogeochemical conditions for methylation of mercury in
36 the newly inundated soils. There is potential for increased exposure of the foodwebs to
37 methylmercury in these areas, with the level of exposure dependent on the amounts of mercury
38 available in the soils and the biogeochemical conditions. However, the amount of tidal restoration
39 would total up to 22 acres, and potential exposure to methylmercury resulting from these acres of
40 restoration would not be expected to adversely affect the California black rail population.
41 Implementation of Environmental Commitment 12 which contains measures to assess the amount
42 of mercury before project development, followed by appropriate design and adaptation
43 management, would minimize the potential for any effects of increased methylmercury exposure.

1 With the above measures in place, the indirect effects of Alternative 4A implementation would not
2 result in take of California black rail individuals, nor would it result in a substantial adverse effect on
3 the species through habitat modification. Therefore, the indirect effects of Alternative 4A
4 implementation would not have adverse effect on California black rail.

5 **CEQA Conclusion:** Noise and visual disturbances related to construction-related activities and
6 Environmental Commitments could reduce California black rail use of modeled habitat adjacent to
7 work sites. Moreover, operation and maintenance of the water conveyance facilities, including the
8 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could
9 affect use of the surrounding habitat by California black rail. Potential effects of noise and visual
10 disturbance on California black rail individuals would be avoided with *AMM38 California Black Rail*.
11 *AMM1–AMM7*, including *AMM2 Construction Best Management Practices and Monitoring*, would
12 minimize the likelihood of spills from occurring and ensure that measures were in place to prevent
13 runoff from the construction area and to avoid negative effects on dust on habitat for the species.

14 Implementation of Operational Scenarios H3 and H4, including operation of salinity-control gates,
15 are expected to increase water salinity in Suisun Marsh. These salinity gradient changes should have
16 a beneficial impact on California black rail because they will create conditions more similar to
17 historic conditions.

18 Tidal habitat restoration could result in increased exposure of California black rail to selenium;
19 however, the amount of tidal restoration would total up to 22 acres, and potential exposure to
20 selenium resulting from these acres of restoration would not be expected to adversely affect the
21 California black rail population. Any effects would be addressed through the implementation of
22 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
23 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
24 habitats. With implementation of *AMM27*, potential for increased selenium exposure would result in
25 no adverse effect on the species.

26 Changes in water operations would not be expected to result in increased mercury bioavailability to
27 California black rail. Restoration actions that would create high and low tidal marsh, which is
28 California black rail habitat, could provide biogeochemical conditions for methylation of mercury in
29 the newly inundated soils. There is potential for increased exposure of the foodwebs to
30 methylmercury in these areas, with the level of exposure dependent on the amounts of mercury
31 available in the soils and the biogeochemical conditions. However, the amount of tidal restoration
32 would total up to 22 acres, and potential exposure to methylmercury resulting from these acres of
33 restoration would not be expected to adversely affect the California black rail population.
34 Implementation of Environmental Commitment 12 which contains measures to assess the amount
35 of mercury before project development, followed by appropriate design and adaptation
36 management, would minimize the potential for any effects of increased methylmercury exposure.

37 With these measures in place, indirect effects of Alternative 4A implementation would not result in
38 take of California black rail individuals, nor would it result in a substantial adverse effect on the
39 species through habitat modification. Therefore, the indirect effects of Alternative 4A
40 implementation would have a less-than-significant impact on California black rail.

1 **Impact BIO-60: Fragmentation of California Black Rail Habitat as a Result of Project**
2 **Implementation**

3 Restoration activities may temporarily fragment existing wetlands and could create temporary
4 barriers to California black rail movements. Grading, filling, contouring and other initial ground-
5 disturbing activities could remove habitat along movement corridors used by individuals and
6 potentially temporarily reduce access to adjacent habitat areas. The temporary adverse effects of
7 fragmentation of tidal freshwater emergent wetland habitat for California black rail or restoration
8 activities resulting in barriers to movement would be minimized through sequencing of
9 *Environmental Commitment 4 Tidal Natural Community Restoration* activities to allow for recovery of
10 some areas before restoration actions are initiated in other areas. In addition, *AMM38 California*
11 *Black Rail* would avoid and minimize effects on California black rail.

12 **NEPA Effects:** The fragmentation of existing wetlands and creation of temporary barriers to
13 movement would not represent an adverse effect on California black rail as a result of habitat
14 modification of a special-status species because *Environmental Commitment 4 Tidal Natural*
15 *Communities Restoration* would be phased to allow for the recovery of some areas before restoration
16 actions are initiated in other areas. In addition, *AMM38 California Black Rail* would avoid and
17 minimize effects on California black rail.

18 **CEQA Conclusion:** The fragmentation of existing wetlands and creation of temporary barriers to
19 movement would represent a less-than-significant impact on California black rail as a result of
20 habitat modification of a special-status species because *Environmental Commitment 4 Tidal Natural*
21 *Communities Restoration* would be phased to allow for the recovery of some areas before restoration
22 actions are initiated in other areas. In addition, *AMM38 California Black Rail* would avoid and
23 minimize impacts on California black rail.

24 **Impact BIO-61: Periodic Effects of Inundation of California Black Rail Habitat as a Result of**
25 **Implementation of Alternative 4A**

26 No Alternative 4A components would result in periodic effects of inundation on California black rail.

27 **NEPA Effects:** There would be no periodic effects of inundation on California black rail.

28 **CEQA Conclusion:** There would be no periodic impacts of inundation on California black rail.

29 **California Clapper Rail**¹

30 This section describes the effects of Alternative 4A, including water conveyance facilities
31 construction and implementation of Environmental Commitments, on California clapper rail.
32 California clapper rail modeled habitat includes primarily middle marsh habitat with select
33 emergent wetland plant alliances. High marsh is also used if it is of high value, and low marsh
34 provides foraging habitat for the species. California clapper rail secondary habitats generally
35 provide only a few ecological functions such as foraging (low marsh) or high-tide refuge (upland

¹ Based on recent genetic studies by Maley and Brumfield (2013) and Chesser et al. (2014), the “California” (*Rallus longirostris obsoletus*), “Yuma” (*R. l. yumanensis*), and “light-footed” (*R. l. levipes*) subspecies of clapper rail are now recognized by the American Ornithologists’ Union (AOU) as a separate species: Ridgway’s rail (*Rallus obsoletus*). Consequently, the taxon formerly known as California clapper rail (*R. l. obsoletus*) is now California Ridgway’s rail (*R. o. obsoletus*). For the purposes of this document, the “California clapper rail” common name has been retained due to its use in previous BDCP documents.

1 transition zones), while primary habitats provide multiple functions including breeding, effective
2 predator cover, and foraging opportunities.

3 Alternative 4A would occur outside of the current range of the species and would not result in
4 effects on modeled California clapper rail habitat as indicated in Table 12-4A-25. There is no
5 modeled habitat for the species in the water conveyance facilities footprint and tidal restoration
6 under Alternative 4A would not take place in Suisun Marsh.

7 **Table 12-4A-25. Changes in California Clapper Rail Modeled Habitat Associated with Alternative**
8 **4A (acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Primary	0	0
	Secondary	0	0
Total Impacts Water Conveyance Facilities		0	0
Environmental Commitments 4, 6-7, 9-11 ^a	Primary	0	0
	Secondary	0	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		0	0
TOTAL IMPACTS		0	0

^a See discussion below for a description of applicable Environmental Commitments.

9

10 **Impact BIO-62: Loss or Conversion of Habitat for and Direct Mortality of California Clapper**
11 **Rail**

12 No habitat would be lost or converted and there would be no direct take of California clapper rail
13 under Alternative 4A. As noted above, water conveyance facilities and Environmental Commitment
14 4 activities would not be implemented within or adjacent to Suisun Marsh, which is the only portion
15 of the study area where the species is known to occur.

16 **NEPA Effects:** There would be no effects on California clapper rail habitat.

17 **CEQA Conclusion:** There would be no impacts on California clapper rail habitat.

18 **Impact BIO-63: Indirect Effects of the Project on California Clapper Rail**

19 No indirect effects on California clapper rail were identified under Alternative 4A. As noted above,
20 water conveyance facilities and Environmental Commitment 4 activities would not be implemented
21 within or adjacent to Suisun Marsh, which is the only portion of the study area where the species is
22 known to occur.

23 **NEPA Effects:** There would be no indirect effects on California clapper rail.

24 **CEQA Conclusion:** There would be no indirect impacts on California clapper rail.

25 **Impact BIO-64: Effects on California Clapper Rail Associated with Electrical Transmission**
26 **Facilities**

27 Isolated patches of suitable California clapper rail habitat may occur in the study area as far east as
28 (but not including) Sherman Island. Home range and territory of the California clapper rail is not
29 known, but in locations outside of California, clapper rail territory ranges 0.3 acre to 8 acres (0.1 to

1 3.2 hectares) (Rush et al. 2012), indicating that known occurrences are not likely to intersect with
2 the proposed lines (BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at*
3 *Proposed BDCP Transmission Lines*). The location of the current population and suitable habitat for
4 the species make collision with the proposed transmission lines highly unlikely.

5 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse
6 effect on California clapper rail because the location of the current population and suitable habitat
7 for the species would make collision with the proposed transmission lines highly unlikely.

8 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
9 significant impact on California clapper rail because the location of the current population and
10 suitable habitat for the species would make collision with the proposed transmission lines highly
11 unlikely.

12 **Impact BIO-65: Fragmentation of California Clapper Rail Habitat as a Result of Project** 13 **Implementation**

14 No effects of fragmentation of California clapper rail were identified under Alternative 4A. As noted
15 above, water conveyance facilities and Environmental Commitment 4 activities would not be
16 implemented within or adjacent to Suisun Marsh, which is the only portion of the study area where
17 the species is known to occur.

18 **NEPA Effects:** There would be no effects of fragmentation on California clapper rail habitat.

19 **CEQA Conclusion:** There would be no impacts of fragmentation on California clapper rail habitat.

20 **California Least Tern**

21 This section describes the effects of Alternative 4A, including water conveyance facilities
22 construction and implementation of Environmental Commitments, on California least tern.
23 California least tern modeled habitat identifies foraging habitat as all tidal perennial aquatic natural
24 community in the study area. Breeding habitat is not included in the model because most of the
25 natural shoreline in the study area that historically provided nesting sites has been modified or
26 removed. Least terns currently nest on artificial fill adjacent to tidal perennial aquatic habitat in the
27 vicinity of Suisun Marsh and west Delta, and additional nesting could occur at the edge of tidal
28 perennial waters whenever disturbed or artificial sites mimic habitat conditions sought for nesting
29 (i.e., sandy or gravelly substrates with sparse vegetation). The study area is outside of the primary
30 range of California least tern, although there are two CNDDDB occurrences, one in Suisun Marsh (CZ
31 11), and one in Pittsburg (CZ 10).

32 Alternative 4A would result in both temporary and permanent losses of California least tern
33 modeled foraging habitat as indicated in Table 12-4A-26.

34 California least tern is a fully protected species and “take” of individuals, pursuant to California Fish
35 and Game Code Section 86, is prohibited. With the implementation of *AMM20 Greater Sandhill Crane*
36 and Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect*
37 *Effects on Colonies will be Minimized*, construction activities would not result in take of the species,

1 which would avoid take under Section 86 of the California Fish and Game Code². As explained below,
2 with the expansion of aquatic foraging habitat in Clifton Court Forebay, in addition to natural
3 community enhancement and management commitments (including *Environmental Commitment 12*
4 *Methylmercury Management*) and implementation of AMM1–AMM7, *AMM27 Selenium Management*,
5 and mitigation to avoid impacts on terns should they nest in the study area, impacts on the
6 California least tern would not be adverse for NEPA purposes and would be less than significant for
7 CEQA purposes.

8 **Table 12-4A-26. Changes in California Least Tern Modeled Habitat Associated with Alternative 4A**
9 **(acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Foraging	281	2,019
Total Impacts Water Conveyance Facilities		281	2,019
Environmental Commitments 4, 6–7, 9–11 ^a	Foraging	0	0
Total Impacts Environmental Commitments 4, 6–7, 9–11^a		0	0
TOTAL IMPACTS		281	2,019

^a See discussion below for a description of applicable Environmental Commitments.

10

11 **Impact BIO-66: Loss or Conversion of Habitat for and Direct Mortality of California Least Tern**

12 Alternative 4A would result in the combined permanent and temporary loss of up to 2,300 acres of
13 modeled foraging habitat for California least tern (Table 12-4A-26). The project components that
14 would result in these losses are construction of water conveyance facilities and operation. Habitat
15 enhancement and management activities (Environmental Commitment 11), which include ground
16 disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. In
17 addition, maintenance activities associated with the long-term operation of the water conveyance
18 facilities could degrade or eliminate California least tern foraging habitat. Each of these individual
19 activities is described below.

- 20 • *Water Facilities Construction:* Construction of Alternative 4A conveyance facilities would result
21 in the combined permanent and temporary loss of up to 2,300 acres of modeled California least
22 tern aquatic foraging habitat (Table 12-4A-26). Of these acres, 281 acres would be a permanent
23 loss the majority of which would occur where new facilities are constructed at Clifton Court
24 Forebay. A smaller portion of the permanent loss would occur where Intakes 2, 3, and 5
25 encroach on the Sacramento River’s east bank between Clarksburg and Courtland. Permanent
26 losses would also occur where new control structures would be built into the California
27 Aqueduct and the Delta Mendota Canal adjacent to Clifton Court Forebay where Clifton Court
28 Forebay levees are modified. The temporary effects on tidal perennial aquatic habitats would
29 occur at numerous locations, with the largest affect occurring at Clifton Court Forebay, where
30 the entire forebay would be dredged to provide additional storage capacity. Other temporary
31 effects would occur in the Sacramento River at Intakes 2, 3, and 5, and at temporary barge
32 unloading facilities established at three locations along the tunnel route. The water conveyance
33 facilities footprint does not overlap with any California least tern occurrences. Refer to the

² Section 86 of the California Fish and Game Code defines take as “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.” The project proponents do not propose to hunt, pursue, catch, or capture California least tern. Killing would be avoided through AMM20.

1 Terrestrial Biology Mapbook for a detailed view of Alternative 4A construction locations.
2 Impacts from water conveyance facilities would occur within the first 10–14 years of Alternative
3 4A implementation.

- 4 • *Environmental Commitment 11 Natural Communities Enhancement and Management*: Noise and
5 visual disturbances during implementation of habitat management actions could result in
6 temporary disturbances that affect California least tern use of the surrounding habitat. These
7 effects cannot be quantified, but are expected to be minimal because few management activities
8 would be implemented in aquatic habitat and because terns are not expected to nest on
9 protected lands. Surveys would be conducted prior to ground disturbance in any areas that have
10 suitable nesting substrate for California least tern (flat, unvegetated areas near aquatic foraging
11 habitat) and effects on nesting terns would be avoided and minimized by the AMMs and
12 Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect
13 Effects on Colonies Will Be Minimized*, described below.
- 14 • *Water Facilities Operations and Maintenance*: Post construction operation and maintenance of
15 the above-ground water conveyance facilities and restoration infrastructure could result in
16 ongoing but periodic postconstruction disturbances, localized impacts on California least tern
17 foraging habitat, and temporary noise and disturbances over the term of the project.
18 Maintenance activities would include vegetation management, levee and structure repair, and
19 re-grading of roads and permanent work areas which could be adjacent to California least tern
20 foraging habitat. These effects, however, would be reduced by AMMs described below.
- 21 • *Injury and Direct Mortality*: California least terns currently nest in the vicinity of potential
22 restoration sites in the west Delta area (CZ 10). New nesting colonies could establish if suitable
23 nesting habitat is created during restoration activities (e.g., placement of unvegetated fill to raise
24 surface elevations prior to breaching levees during restoration efforts). If nesting occurs where
25 covered activities are undertaken, the operation of equipment for land clearing, construction,
26 conveyance facilities operation and maintenance, and habitat restoration, enhancement, and
27 management could result in injury or take of California least tern. Risk of injury or disturbance
28 would be greatest to eggs and nestlings susceptible to land-clearing activities, abandonment of
29 nests and nesting colonies, or increased exposure to the elements or to predators. Injury to
30 adults or fledged juveniles is less likely as these individuals would be expected to avoid contact
31 with construction equipment. However, injury or take would be avoided through planning and
32 preconstruction surveys to identify nesting colonies, the design of projects to avoid locations
33 with least tern colonies, and the provision for 500-foot buffers as required by Mitigation
34 Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect Effects on
35 Colonies Will Be Minimized*.

36 The following paragraph summarizes the combined effects discussed above and describes
37 Environmental Commitments and AMMs that offset or avoid these effects. NEPA and CEQA
38 conclusions are provided at the end of the section.

39 With Alternative 4A implementation, there would be a permanent loss of 281 acres of modeled
40 foraging habitat for California least tern in the study area. The permanent loss would occur
41 primarily from the expansion of the Clifton Court Forebay and, a lesser amount would be lost along
42 the Sacramento River. In addition, 2,019 acres would be temporarily unavailable from the dredging
43 of the Clifton Court Forebay. The temporary loss of habitat would not be expected to adversely affect
44 California least tern as the impact area is outside of their primary range.

1 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected by
2 water conveyance facilities would be 1:1 for restoration/creation of tidal perennial aquatic habitat.
3 Using this ratio would indicate that 281 acres of the tidal perennial aquatic natural community
4 should be restored/created to compensate for the permanent loss of potential California least tern
5 habitat from the construction of the water conveyance facilities. Part of the project includes the
6 permanent expansion of the Clifton Court Forebay, which would create approximately 450 acres of
7 aquatic habitat, which would be available for the California least tern if they were to forage in the
8 area. This habitat creation would occur within the same timeframe as the construction temporary
9 and permanent losses, thereby avoiding adverse effects on California least tern from loss of foraging
10 habitat. In addition, up to 295 acres of tidal natural communities would be restored in the Delta,
11 which would provide foraging opportunities for the species.

12 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
13 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
14 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
15 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
16 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
17 species habitats at or adjacent to work areas and storage sites. BDCP Appendix 3.C describes the
18 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
19 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

20 Although nesting by California least tern is not expected to occur, restoration sites could attract
21 individuals wherever disturbed or artificial sites mimic habitat conditions sought for nesting (i.e.,
22 sandy or gravelly substrates with sparse vegetation). If nesting were to occur, construction activities
23 could have an adverse effect on California least tern. Mitigation Measure BIO-66, *California Least*
24 *Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies Will be Minimized*, would be
25 available to address this adverse effect on nesting California least terns.

26 **NEPA Effects:** The potential for effects on California least tern associated with Alternative 4A would
27 represent an adverse effect in the absence of the mitigation measure and AMMs described below.
28 Although nesting by California least tern is not expected to occur in the study area, restoration sites
29 could attract individuals wherever disturbed or artificial sites mimic habitat conditions sought for
30 nesting (i.e., sandy or gravelly substrates with sparse vegetation). If nesting were to occur,
31 construction activities could have an adverse effect on California least tern. Mitigation Measure BIO-
32 66, *California Least Tern Nesting Colonies Shall be Avoided and Indirect Effects on Colonies will be*
33 *Minimized*, would be available to address this effect on nesting California least terns. Temporary
34 impacts on tidal perennial aquatic habitat in Clifton Court Forebay associated with dredging would
35 not be expected to impact California least tern, as this region of the study area is outside of their
36 primary range. The restoration of aquatic habitat associated with the expansion of the Clifton Court
37 Forebay (water conveyance facilities), and Environmental Commitment 4 (tidal restoration) would
38 be sufficient to compensate for permanent impacts on California least tern foraging habitat. With
39 these acres of restoration, in addition to the implementation of *AMM1 Worker Awareness Training*,
40 *AMM2 Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution*
41 *Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*, which
43 would be in place during all project activities, the effects of Alternative 4A as a whole on California
44 least tern would not be adverse.

1 **CEQA Conclusion:** The potential effects on California least tern associated with Alternative 4A would
2 represent an adverse effect in the absence of the Mitigation Measure and AMMs described below as
3 a result of potential for take of a special-status species. Although nesting by California least tern is
4 not expected to occur in the study area, restoration sites could attract individuals wherever
5 disturbed or artificial sites mimic habitat conditions sought for nesting (i.e., sandy or gravelly
6 substrates with sparse vegetation). Mitigation Measure BIO-66, *California Least Tern Nesting*
7 *Colonies Shall be Avoided and Indirect Effects on Colonies will be Minimized*, would avoid the potential
8 for take of California least tern individuals and reduce this effect to a less-than-significant impact.

9 Temporary impacts on tidal perennial aquatic habitat in Clifton Court Forebay associated with
10 dredging would not be expected to impact California least tern, as this region of the study area is
11 outside of their primary range. The restoration of aquatic habitat associated with the expansion of
12 the Clifton Court Forebay (water conveyance facilities), and *Environmental Commitment 4 Tidal*
13 *Natural Communities Restoration* would be sufficient to compensate for permanent impacts on
14 California least tern foraging habitat. With these acres of restoration, in addition to the
15 implementation of *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management*
16 *Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment*
17 *Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and*
18 *Reuse of Spoils*, and *AMM7 Barge Operations Plan*, which would be in place during all project
19 activities, the effects of Alternative 4A as a whole on California least tern would not result in a
20 substantial adverse effect through habitat modifications and would avoid take of individuals.
21 Therefore, the implementation of Alternative 4A would have a less-than-significant impact on
22 California least tern.

23 **Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and**
24 **Indirect Effects on Colonies Will Be Minimized**

25 If suitable nesting habitat for California least tern (flat unvegetated areas near aquatic foraging
26 habitat) is identified during planning level surveys, DWR will ensure that a qualified biologist
27 with experience observing the species and its nests conducts at least three preconstruction
28 surveys for this species during the nesting season. DWR will design projects to avoid the loss of
29 California least tern nesting colonies. No construction will take place within 500 feet California
30 least tern nests during the nesting season (April 15 to August 15 or as determined through
31 surveys). Only inspection, maintenance, research, or monitoring activities may be performed
32 during the least tern breeding season in areas within or adjacent to least tern breeding habitat
33 with USFWS and CDFW approval under the supervision of a qualified biologist.

34 **Impact BIO-67: Indirect Effects of the Project on California Least Tern**

35 **Indirect Construction- and Operation-Related Effects:** Indirect effects associated with
36 construction that could affect California least tern include noise, dust, and visual disturbance caused
37 by grading, filling, contouring, and other ground-disturbing operations outside the project footprint
38 but within 500 feet from the construction edge. Construction noise above background noise levels
39 (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (see
40 BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
41 *Facility on Sandhill Crane*, Table 5J.D-4, and Appendix 11F, *Substantive BDCP Revisions*). However,
42 there are no available data to determine the extent to which these noise levels could affect California
43 least tern. The use of mechanical equipment during water conveyance facilities construction could
44 cause the accidental release of petroleum or other contaminants that could affect California least

1 tern or their prey species in the surrounding habitat. The inadvertent discharge of sediment or
2 excessive dust adjacent to foraging habitat could also affect the species. Noise and visual disturbance
3 is not expected to have an adverse effect on California least tern foraging behavior. As described in
4 Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and Indirect*
5 *Effects on Colonies Will Be Minimized*, if least tern nests were found during planning or
6 preconstruction surveys, no construction would take place within 500 feet of active nests. In
7 addition, AMM1–AMM7, including construction best management practices, would minimize the
8 likelihood of spills or excessive dust being created during construction. Should a spill occur,
9 implementation of these AMMs would greatly reduce the likelihood of individuals being affected.

10 **Methylmercury Exposure:** Project activities have the potential to exacerbate the bioaccumulation
11 of mercury in the California least tern. The operational impacts of new flows with water conveyance
12 facilities were analyzed using a DSM-2 based model to assess potential effects on mercury
13 concentration and bioavailability. Largemouth bass were used as a surrogate species for this
14 analysis and results would be expected to be similar or lower for the California least tern. Results
15 indicated that changes in total mercury levels in water and largemouth bass tissues were
16 insignificant (see Appendix 11F, Section 11F.5.2, *Effects of Contaminants on Terrestrial Species*).

17 Marsh (tidal and nontidal) restoration also has the potential to increase exposure to methylmercury.
18 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
19 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
20 Thus, Alternative 4A restoration activities that create newly inundated areas could increase
21 bioavailability of mercury. Increased methylmercury associated with natural community restoration
22 may indirectly affect California least tern, via uptake through consumption of prey (as described in
23 BDCP Appendix 5.D, *Contaminants*).

24 Schwarzbach and Adelsbach (2003) investigated mercury exposure in 15 species of birds inhabiting
25 the Bay-Delta ecosystem. Among the species studied, the highest concentrations of mercury were
26 found in the eggs of piscivorous birds (terns and cormorants) that bioaccumulate mercury from
27 their fish prey. The very highest concentrations were found in Caspian and Forster's terns, especially
28 those inhabiting South San Francisco Bay. Based on three California least tern eggs collected from
29 Alameda Naval Air Station in the San Francisco Central Bay, concentrations in California least tern
30 eggs were a third (0.3 ppm) those of the eggs of the other two terns. Because of the small sample
31 size, there is a high degree of uncertainty regarding the levels of mercury that may be present in
32 California least tern eggs. If the mercury levels measured at Alameda Naval Air Station are
33 representative of the population in the San Francisco Bay, they would not be expected to result in
34 adverse effects on tern hatchlings. Hatching and fledging success were not reduced in common tern
35 eggs in Germany with mercury concentrations of 6.7 ppm (Hothem and Powell 2000).

36 Mercury is generally elevated throughout the Delta, and restoration of the lower potential areas in
37 total may result in generalized, very low level increases of mercury. Given that some species have
38 elevated mercury tissue levels pre-Alternative 4A, these low level increases could result in some
39 level of effects. Environmental Commitment 12, described below, would be implemented to address
40 this risk of low level increases in methylmercury which could add to the current elevated tissue
41 concentrations.

- 42 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
43 mercury methylation and bioavailability.

- 1 • Define design elements that minimize conditions conducive to generation of methylmercury in
2 restored areas.
- 3 • Define adaptive management strategies that can be implemented to monitor and minimize
4 actual postrestoration creation and mobilization of methylmercury.

5 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low
6 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf
7 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also
8 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The
9 effect of selenium toxicity differs widely between species and also between age and sex classes
10 within a species. In addition, the effect of selenium on a species can be confounded by interactions
11 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

12 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
13 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
14 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
15 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
16 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
17 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
18 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
19 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
20 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
21 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
22 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
23 levels of selenium have a higher risk of selenium toxicity.

24 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
25 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
26 exacerbate bioaccumulation of selenium in avian species, including California least tern. Marsh (tidal
27 and nontidal) restoration has the potential to mobilize selenium, and therefore increase avian
28 exposure from ingestion of prey items with elevated selenium levels. Thus, Alternative 4A
29 restoration activities that create newly inundated areas could increase bioavailability of selenium.
30 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was
31 determined that, relative to Existing Conditions and the No Action Alternative, water conveyance
32 facilities would not result in substantial, long-term increases in selenium concentrations in water in
33 the Delta under any alternative. However, it is difficult to determine whether the effects of potential
34 increases in selenium bioavailability associated with Environmental Commitment 4 would lead to
35 adverse effects on California least tern.

36 Because of the uncertainty that exists with respect to specific siting of tidal restoration areas, there
37 could be a substantial effect on California least tern from increases in selenium associated with
38 restoration activities. This effect would be addressed through the implementation of *AMM27*
39 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
40 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
41 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
42 selenium management to reduce selenium concentrations and/or bioaccumulation would be
43 evaluated separately for each restoration effort as part of design and implementation. This
44 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
45 design schedule.

1 **NEPA Effects:** Noise and visual disturbances within 500 feet of construction-related activities from
2 the Environmental Commitments could disturb California least tern foraging habitat adjacent to
3 work sites. Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be Avoided and*
4 *Indirect Effects on Colonies Will Be Minimized*, would avoid this potential adverse effect.

5 AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would
6 minimize the likelihood of spills from occurring and ensure that measures were in place to prevent
7 runoff from the construction area and to avoid negative effects of dust on the species.

8 Tidal habitat restoration could result in increased exposure of California least tern to selenium. This
9 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
10 would provide specific tidal habitat restoration design elements to reduce the potential for
11 bioaccumulation of selenium and its bioavailability in tidal habitats.

12 Changes in water operations under water conveyance facilities would not be expected to result in
13 increased mercury bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could
14 result in increased exposure of California least tern to methylmercury. There is potential for
15 increased exposure of the foodwebs to methylmercury in these areas, with the level of exposure
16 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
17 However, it is unknown what concentrations of methylmercury are harmful to the species, and the
18 potential for increased exposure varies substantially within the study area. Implementation of
19 Environmental Commitment 12 which contains measures to assess the amount of mercury before
20 project development, followed by appropriate design and adaptation management, would minimize
21 the potential for increased methylmercury exposure, and would result in no adverse effect on the
22 species.

23 With AMM1–7, AMM12, AMM27, and Environmental Commitment 12 in place, in addition to the
24 implementation of Mitigation Measure BIO-66, the indirect effects of Alternative 4A implementation
25 would not result in an adverse effect on California least tern.

26 **Mitigation Measure BIO-66, California Least Tern Nesting Colonies Shall Be Avoided and**
27 **Indirect Effects on Colonies Will Be Minimized**

28 See Mitigation Measure BIO-66 under Impact BIO-66.

29 **CEQA Conclusion:** Noise and visual disturbances within 500 feet of construction-related activities
30 from the Environmental Commitments would not be expected to disturb California least tern
31 foraging habitat adjacent to work sites. If terns were to nest in newly graded restoration sites during
32 construction activities, Mitigation Measure BIO-66, *California Least Tern Nesting Colonies Shall Be*
33 *Avoided and Indirect Effects on Colonies Will Be Minimized*, would avoid the potential for disturbance
34 and take of California least tern individuals.

35 AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would
36 minimize the likelihood of spills from occurring and ensure that measures were in place to prevent
37 runoff from the construction area and to avoid negative effects of dust on the species.

38 Tidal habitat restoration could result in increased exposure of California least tern to selenium. This
39 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
40 would provide specific tidal habitat restoration design elements to reduce the potential for
41 bioaccumulation of selenium and its bioavailability in tidal habitats.

1 Changes in water operations under water conveyance facilities would not be expected to result in
2 increased mercury bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could
3 result in increased exposure of California least tern to methylmercury. There is potential for
4 increased exposure of the foodwebs to methylmercury in these areas, with the level of exposure
5 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
6 However, it is unknown what concentrations of methylmercury are harmful to the species, and the
7 potential for increased exposure varies substantially within the study area. Implementation of
8 Environmental Commitment 12 which contains measures to assess the amount of mercury before
9 project development, followed by appropriate design and adaptation management, would minimize
10 the potential for increased methylmercury exposure, and would result in no adverse effect on the
11 species.

12 With AMM1-7, AMM12, AMM27, and Environmental Commitment 12 in place, in addition to the
13 implementation of Mitigation Measure BIO-66, the indirect effects of Alternative 4A implementation
14 would not result in take of California least tern individuals, nor would it result in a substantial
15 adverse effect on the species through habitat modification. Therefore, the indirect effects of
16 Alternative 4A implementation would have a less-than-significant impact on California least tern.

17 **Mitigation Measure BIO-66, California Least Tern Nesting Colonies Shall Be Avoided and**
18 **Indirect Effects on Colonies Will Be Minimized**

19 See Mitigation Measure BIO-66 under Impact BIO-66.

20 **Impact BIO-68: Effects on California Least Tern Associated with Electrical Transmission**
21 **Facilities**

22 The risk of take of California least tern from the construction of new transmission lines is considered
23 to be minimal based on tern flight behaviors and its unlikely use of habitats near the transmission
24 line corridors. Terns exhibit low wing loading and high aspect-ratio wings and as a result can
25 maneuver relatively quickly around an obstacle such as a transmission line. Their wing structure
26 and design allows for rapid flight and quick, evasive actions (see BDCP Appendix 5.J, Attachment
27 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). Marking transmission lines
28 with flight diverters that make the lines more visible to birds has been shown to reduce the
29 incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that marking devices
30 in the Central Valley could reduce avian mortality by 60%. All new project transmission lines would
31 be fitted with flight diverters. Bird flight diverters would make transmission lines highly visible to
32 California least terns and would further reduce the potential for powerline collisions. There would
33 be no take of California least tern from the project pursuant to California Fish and Game Code
34 Section 86.

35 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
36 adverse effect on California least tern because they are uncommon in the vicinity of proposed
37 transmission lines and because the probability of bird-powerline strikes is highly unlikely due to
38 tern flight behaviors. All new transmission lines constructed as a result of the project would be fitted
39 with bird diverters, which have been shown to reduce avian mortality by 60%. By implementing
40 *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines would not
41 result in an adverse effect on California least tern.

42 **CEQA Conclusion:** The construction and presence of new transmission lines would not result in take
43 of California least tern pursuant to California Fish and Game Section 86Code because they are

1 uncommon in the vicinity of proposed transmission lines and because the probability of bird-
2 powerline strikes is highly unlikely due to tern flight behaviors. *AMM20 Greater Sandhill Crane*
3 contains the commitment for all new transmission lines constructed as a result of the project to be
4 fitted with bird diverters, which have been shown to reduce avian mortality by 60%. By
5 implementing *AMM20 Greater Sandhill Crane*, there would be no take of California least tern from
6 the project under California Fish and Game Code Section 86, and the construction and operation of
7 transmission lines would result in a less-than-significant impact on California least tern.

8 **Greater Sandhill Crane**

9 This section describes the effects of Alternative 4A, including water conveyance facilities
10 construction and implementation of Environmental Commitments, on greater sandhill crane.
11 Greater sandhill cranes in the study area are almost entirely dependent on privately owned
12 agricultural lands for foraging. Long-term sustainability of the species is thus dependent on
13 providing a matrix of compatible crop types that afford suitable foraging habitat and maintaining
14 compatible agricultural practices, while sustaining and increasing the extent of other essential
15 habitat elements such as night roosting habitat. The habitat model for greater sandhill crane
16 includes permanent and temporary “roosting and foraging” and “foraging” habitat. These habitat
17 types include certain agricultural types, specific grassland types, irrigated pastures and hay crops,
18 managed seasonal wetland, and other natural seasonal wetland. Roosting and foraging habitat
19 includes known, traditional roost sites that also provide foraging habitat (see BDCP Appendix 2.A
20 *Covered Species Accounts*). Both temporary and permanent roost sites were identified for greater
21 Sandhill crane. Permanent roosting and foraging sites are those used regularly, year after year, while
22 temporary roosting and foraging sites are those only used in some years. Factors included in
23 assessing the loss of foraging habitat for the greater sandhill crane includes the relative habitat
24 value of specific crop or land cover types, and proximity to known roost sites. Foraging habitat for
25 greater sandhill crane included crop types and natural communities up to 4 miles from known roost
26 sites, within the boundary of the winter crane use area (see BDCP Appendix 2.A).

27 Alternative 4A would result in both temporary and permanent losses of foraging and roosting
28 habitat for greater sandhill crane as indicated in Table 12-4A-27. Full implementation of Alternative
29 4A would also include the following Resource Restoration and Performance Principles that would
30 benefit the greater sandhill crane.

- 31 ● Protect high- to very high-value habitat for greater sandhill crane, with at least 80% maintained
32 in very high-value types in any given year. This protected habitat will be within 2 miles of
33 known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and local seasonal
34 flood events, greater sandhill crane population levels, and the location of foraging habitat loss.
35 Patch size of protected cultivated lands will be at least 160 acres. [In order to offset the effects
36 on foraging habitat for both greater and lesser sandhill cranes, foraging habitat will be replaced
37 at a minimum of 1:1 based on the acreage of impact on either the greater or lesser sandhill crane
38 foraging habitat, whichever is greater.] (Resource Restoration and Performance Principle GSC1).
- 39 ● Create at least 320 acres of managed wetlands (part of the nontidal wetland restoration
40 acreage) in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area
41 in CZs 3, 4, 5, or 6, with consideration of sea level rise and local seasonal flood events. The
42 wetlands will be located within 2 miles of existing permanent roost sites and protected in
43 association with other protected natural community types (excluding nonhabitat cultivated
44 lands) at a ratio of 2:1 upland to wetland to provide buffers around the wetlands (Resource
45 Restoration and Performance Principle GSC2).

- 1 • Create at least two 90-acre wetland complexes within the Stone Lakes NWR project boundary.
2 The complexes will be no more than 2 miles apart and will help provide connectivity between
3 the Stone Lakes and Cosumnes River Preserve greater sandhill crane populations. Each complex
4 will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane roosting
5 habitat, and will be protected in association with other protected natural community types
6 (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e., two
7 sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be
8 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
9 support roosting cranes and provide highest-value foraging habitat, provided such substitution
10 is consistent with the long-term conservation goals of Stone Lakes NWR for greater sandhill
11 crane (Resource Restoration and Performance Principle GSC3).
- 12 • Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost
13 sites. The habitat will consist of active cornfields that are flooded following harvest to support
14 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least
15 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will
16 be sited with consideration of the location of roosting habitat loss and will be in place prior to
17 roosting habitat loss (Resource Restoration and Performance Principle GSC4).

18 Greater sandhill crane is a fully protected species and take of individuals, pursuant to Section 86 of
19 the California Fish and Game Code, is prohibited. With the implementation of *AMM20 Greater*
20 *Sandhill Crane*, construction activities would not result in take of the species and would avoid take
21 pursuant to Section 86 of the California Fish and Game Code. As explained below, with the
22 restoration and protection of these amounts of habitat, in addition to natural community
23 enhancement and management commitments (including *Environmental Commitment 12*
24 *Methylmercury Management*) and implementation of AMM1–AMM6, *AMM20 Greater Sandhill Crane*,
25 *AMM27 Selenium Management*, and *AMM30 Transmission Line Design and Alignment Guidelines*,
26 impacts on the greater sandhill crane would not be adverse for NEPA purposes and would be less
27 than significant for CEQA purposes.

28 **Table 12-4A-27. Changes in Greater Sandhill Crane Modeled Habitat Associated with Alternative 4A**
29 **(acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Roosting and Foraging–Permanent	0	4
	Roosting and Foraging–Temporary	16	71
	Foraging	1,695	772
Total Impacts Water Conveyance Facilities		1,711	847
Environmental Commitments 4, 6–7, 9–11 ^a	Roosting and Foraging–Permanent	0	0
	Roosting and Foraging–Temporary	1	0
	Foraging	2,017	0
Total Impacts Environmental Commitments 4, 6–9–11^a		2,018	0
Total Roosting/Foraging–Permanent		0	4
Total Roosting/Foraging–Temporary		17	71
Total Foraging		3,712	772
TOTAL IMPACTS		3,729	847

^a See discussion below for a description of applicable Environmental Commitments.

Impact BIO-69: Loss or Conversion of Habitat for and Direct Mortality of Greater Sandhill Crane

Alternative 4A would result in the combined permanent and temporary loss of up to 92 acres of modeled roosting and foraging habitat (17 acres of permanent loss, 75 acres of temporary loss) and 4,484 acres of foraging habitat for greater sandhill crane (3,712 of permanent loss, 772 acres of temporary loss; see Table 12-4A-27). Project measures that would result in these losses are water conveyance facilities and transmission line construction, establishment and use of reuseable tunnel material areas, *Environmental Commitment 4 Tidal Natural Communities Restoration*, *Environmental Commitment 8 Grassland Natural Communities Restoration*, *Environmental Commitment 10 Nontidal Marsh Natural Community Restoration*, and *Environmental Commitment 11 Natural Communities Enhancement and Management*. The majority of habitat loss would result from water conveyance facility construction and conversion of habitat to nontidal wetland through Environmental Commitment 10. Habitat enhancement and management activities through Environmental Commitment 11, which include ground disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other physical facilities could degrade or eliminate greater sandhill crane modeled habitat. Each of these individual activities is described below.

- *Water Facilities Construction*: Construction of Alternative 4A conveyance facilities as they are currently designed would result in the combined permanent loss of up to 1,711 acres of modeled greater sandhill crane habitat. This would consist of the permanent removal of 16 acres of temporary roosting and foraging habitat, and 1,695 acres of foraging habitat (Table 12-4A-27). Foraging habitat that would be permanently impacted by water conveyance construction would consist of 1,050 acres of very high-value, 29 acres of high-value, 199 acres of medium-value, and 492 acres of low-value foraging habitat (Table 12-4A-28). In addition, 4 acres of permanent roosting and foraging habitat, 71 acres of temporary roosting and foraging habitat, and 772 acres of foraging habitat would be temporarily removed (Table 12-4A-27, Table 12-4A-28). The temporarily removed habitat would consist primarily of cultivated lands and it would be restored within one year following construction; however, it would not necessarily be restored to its original topography and it could be restored as grasslands in the place of cultivated lands. Water conveyance facilities activities that would result in temporary impacts would include temporary access roads, reusable tunnel material sites, and work areas for construction.

The acres of roosting and foraging habitat that would be removed would occur from the construction of a temporary transmission line on Zacharias Island, Bouldin Island, and Venice Island and from the construction of a temporary concrete batch plant and a permanent access road on Bouldin Island; however, the implementation of *AMM20 Greater Sandhill Crane* would require that water conveyance facilities activities be designed to avoid direct loss of crane roost sites. This includes a provision that the final transmission line alignment would be designed to avoid crane roost sites. Avoidance of crane roost sites would be accomplished either by siting activities outside of identified roost sites or by relocating the roost site if it consisted of cultivated lands (roost sites consisting of wetlands would not be subject to re-location). Relocated roost sites would be established prior to construction activities affecting the original roost site, as described in *AMM20 Greater Sandhill Crane* (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Therefore there would be no loss of crane roosting and foraging habitat as a result of water conveyance facility construction once the facilities were fully

1 designed. The potential for greater sandhill crane bird strike on electrical transmission facilities
2 is addressed below under Impact BIO-70.

3 Activities that would impact modeled greater sandhill crane foraging habitat consist of
4 intermediate forebay and intake construction, construction and use of temporary access roads,
5 and construction of temporary transmission lines. Loss of foraging habitat would also result
6 from the construction of permanent and temporary access roads on Mandeville and Bacon
7 Islands, and from construction of vent shafts on Staten and Bacon Island. Temporary impacts on
8 foraging habitat would also result from geotechnical boring activities along the tunnel
9 alignment. Approximately 1,502 acres of the permanent loss of foraging habitat would be from
10 the storage of reusable tunnel material. This material would likely be moved to other sites for
11 use in levee build-up and restoration, and the affected area would likely eventually be restored.
12 This effect is categorized as permanent because there is no assurance that the material would
13 eventually be moved. The implementation of *AMM6 Disposal and Reuse of Spoils* would require
14 that the areas used for reusable tunnel material storage be minimized in crane foraging habitat
15 and completely avoid crane roost sites (see Appendix 3B, *Environmental Commitments, AMMs,*
16 *and CMs*).

17 Construction-related activities would not be expected to result in take of greater sandhill crane
18 if they were present in the study area, because cranes would be expected to avoid contact with
19 construction and other equipment. The potential for greater sandhill crane bird strike on
20 electrical transmission lines is discussed below under Impact BIO-70.

21 The effects of noise and visual disturbance from water conveyance facilities construction
22 activities are discussed under Impact BIO-71. Refer to the Terrestrial Biology Mapbook for a
23 detailed view of Alternative 4A construction locations. Impacts from water conveyance facilities
24 would occur within the first 10–14 years of Alternative 4A implementation.

1 **Table 12-4A-28. Value of Greater Sandhill Crane Foraging Habitat affected by Alternative 4A**

Foraging Habitat Value Class	Land Cover Type	Amount Affected by Water Conveyance Facilities permanent [temporary] (acres)	Amount Affected by Environmental Commitments (permanent acres)
Very high	Corn, rice	1,050 [216]	534
High	Wheat, managed wetlands,	0 [21]	226
Medium	Alfalfa and alfalfa mixtures, irrigated mixed pasture, irrigated native pasture, irrigated pasture, irrigated other pasture, grain and hay crops, miscellaneous grain and hay, mixed grain and hay, nonirrigated mixed grain and hay, other grain crops, sudan, miscellaneous grasses, grassland, alkali seasonal wetlands, vernal pool complex	180 [307]	648
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry), native vegetation	465 [229]	609
Total		1,695 [772]	2,017

2

- 3 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* This activity would result
4 in the permanent loss or conversion of approximately 1 acre of temporary roosting and foraging
5 habitat and 88 acres of greater sandhill crane foraging habitat in the north Delta. Loss of
6 foraging habitat from Environmental Commitment 4 would consist of 23 acres of very high-
7 value, 10 acres of high-value, 28 acres of medium-value, and 27 acres of low-value foraging
8 habitat.
- 9 • *Environmental Commitment 7 Riparian Natural Communities Restoration:* This activity would
10 result in the permanent loss of approximately 251 acres of greater sandhill crane foraging
11 habitat. Loss of foraging habitat from Environmental Commitment 4 would consist of 66 acres of
12 very high-value, 28 acres of high-value, 81 acres of medium-value, and 76 acres of low-value
13 foraging habitat.
- 14 • *Environmental Commitment 8 Grassland Natural Communities Restoration:* This activity would
15 result in the permanent loss or conversion of approximately 843 acres of cultivated lands that
16 comprise greater sandhill crane foraging habitat. Loss of foraging habitat from Environmental
17 Commitment 4 would consist of 222 acres of very high-value, 94 acres of high-value, 271 acres
18 of medium-value, and 255 acres of low-value foraging habitat.
- 19 • *Environmental Commitment 10 Nontidal Marsh Restoration:* Nontidal marsh restoration would
20 result in the permanent conversion of approximately 832 acres of modeled foraging habitat for
21 the greater sandhill crane. Impacts would consist of approximately 219 acres of very high-value,
22 93 acres of high-value, 268 acres of medium-value, and 252 acres of low-value foraging habitat
23 (Table 12-4A-28). A portion of the restored nontidal marsh would be expected to provide
24 roosting and foraging habitat value for the greater sandhill crane. However, some of this

1 restored marsh would be unsuitable as it would lack emergent vegetation and consist of open
2 water that would be too deep to provide suitable roosting or foraging habitat.

- 3 ● *Environmental Commitment 11 Natural Communities Enhancement and Management*: A variety of
4 habitat management actions included in Environmental Commitment 11 that are designed to
5 enhance wildlife values in restored or protected habitats could result in localized ground
6 disturbances that could permanently remove 3 acres of foraging habitat and temporarily
7 remove small amounts of modeled habitat. Ground-disturbing activities, such as removal of
8 nonnative vegetation and road and other infrastructure maintenance activities would be
9 expected to have minor adverse effects on available habitat and would be expected to result in
10 overall improvements to and maintenance of habitat values. The potential for these activities to
11 result in take of greater sandhill crane would be minimized with the implementation of *AMM20*
12 *Greater Sandhill Crane*.
- 13 ● *Water Facilities Operations and Maintenance*: Post construction operation and maintenance of
14 the above-ground water conveyance facilities could result in ongoing but periodic disturbances
15 that could affect greater sandhill crane use of the surrounding habitat. Maintenance activities
16 would include vegetation management, levee and structure repair, and re-grading of roads and
17 permanent work areas. These effects could be adverse as sandhill cranes are sensitive to
18 disturbance. However, potential impacts would be reduced by the AMMs listed below. BDCP
19 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
20 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

21 The following paragraphs summarize the combined effects discussed above and describe Alternative
22 4A Environmental Commitments that offset or avoid these effects. NEPA effects and CEQA
23 conclusions are provided at the end of the section.

24 Alternative 4A would remove 92 acres roosting and foraging habitat (17 acres of permanent loss, 75
25 acres of temporary loss) from the construction of the water conveyance facilities. In addition, 4,484
26 acres of foraging habitat would be removed or converted (Water Conveyance Facilities—2,467
27 acres; *Environmental Commitment 4 Tidal Natural Communities Restoration, Environmental*
28 *Commitment 7 Riparian Natural Communities Restoration, Environmental Commitment 8 Grassland*
29 *Natural Communities Restoration, and Environmental Commitment 10 Nontidal Marsh Restoration*—
30 2,017 acres). Of these acres of foraging habitat impact, 3,182 acres would be medium- to very high-
31 value habitat (Table 12-4A-28).

32 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
33 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection of high- to very high-
34 value foraging habitat for loss of foraging habitat. Using these ratios would indicate that 92 acres of
35 greater sandhill crane roosting habitat should be restored/created and 92 acres should be protected
36 to compensate for the losses of greater sandhill crane roosting and foraging habitat. In addition,
37 4,484 acres of high- to very high-value foraging habitat should be protected to mitigate the losses of
38 greater sandhill crane foraging habitat.

39 The implementation of *AMM20 Greater Sandhill Crane* would require no direct impact of greater
40 sandhill crane roost sites by project activities related to water conveyance facilities, including
41 transmission lines and their associated footprints (see Appendix 3B, *Environmental Commitments,*
42 *AMMs, and CMs*). Therefore, there would be no loss of crane roosting and foraging habitat as a result
43 of water conveyance facility construction once the facilities were fully designed, which would avoid

1 the water conveyance facilities impact on 91 acres of roosting and foraging habitat. Indirect effects
2 of construction-related noise and visual disturbance are discussed below under Impact BIO-71.

3 Under Alternative 4A, project proponents would commit to creating up to 95 acres of roosting
4 habitat within 2 miles of existing permanent roost sites Resource Restoration and Performance
5 Principle GSC4). These roosts would consist of active cornfields that are flooded following harvest to
6 support roosting cranes and also provide the highest-value foraging habitat for the species.
7 Individual fields would be at least 40 acres could shift locations throughout the Greater Sandhill
8 Crane Winter Use Area, and would be in place prior to roosting habitat loss. In addition, 320 acres of
9 roosting habitat would be created in minimum patch sizes of 40 acres within the Greater Sandhill
10 Crane Winter Use Area in CZs 3, 4, 5, or 6 (Resource Restoration and Performance Principle GSC2).
11 Restoration sites would be identified with consideration of sea level rise and local seasonal flood
12 events. These wetlands would be created within 2 miles of existing permanent roost sites and
13 protected in association with other protected natural community types at a ratio of 2:1 upland to
14 wetland habitat to provide buffers that will protect cranes from the types of disturbances that would
15 otherwise result from adjacent roads and developed areas (e.g., roads, noise, visual disturbance,
16 lighting). The creation of 180 acres of crane roosting habitat would be constructed within the Stone
17 Lakes NWR project boundary (see Figure 3.3-7 in the BDCP) and would be designed to provide
18 connectivity between the Stone Lakes and Cosumnes greater sandhill crane populations (Resource
19 Restoration and Performance Principle GSC3). The large patch sizes of these wetland complexes
20 would provide additional conservation to address the threats of vineyard conversion, urbanization
21 to the east, and sea level rise to the west of greater sandhill crane wintering habitat.

22 As directed by Resource Restoration and Protection Principle GSC1, at least 4,584 acres of cultivated
23 lands that provide high- to very high-value foraging habitat would be protected. This habitat would
24 occur within 2 miles of known roost sites and at least 80% would be maintained in very high-value
25 habitat types in any given year (see Table 12-4-28 for greater sandhill crane foraging habitat
26 values).

27 The project also includes commitments to implement the following avoidance and minimization
28 measures that will help to avoid and minimize adverse effects on greater sandhill crane: *AMM1*
29 *Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*
30 *Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill*
31 *Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM30*
32 *Transmission Line Design and Alignment Guidelines*. All of these AMMs include elements that would
33 avoid or minimize the risk of affecting greater sandhill crane habitats adjacent to work areas. BDCP
34 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
35 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

36 **NEPA Effects:** The loss of greater sandhill crane habitat under Alternative 4A would not be adverse
37 under NEPA because Alternative 4A has committed the project proponents to avoiding and
38 minimizing effects and to restoring and protecting acreages that are greater than the typical
39 mitigation ratios described above. This habitat protection, restoration, management, and
40 enhancement would be guided by Resource Restoration and Performance Principles GSC1-GSC4,
41 and by AMM1–AMM6, *AMM20 Greater Sandhill Crane*, and *AMM30 Transmission Line Design and*
42 *Alignment Guidelines*, which would be in place during all project activities. Construction activities
43 would not be expected to result in greater sandhill crane take because foraging and roosting
44 individuals would be expected to temporarily avoid the increased noise and activity associated with

1 construction areas. Considering these commitments, the implementation of Alternative 4A would
2 not result in an adverse effect on greater sandhill crane.

3 **CEQA Conclusion:** The effects on greater sandhill crane habitat under Alternative 4A would
4 represent an adverse effect as a result of habitat modification of a special-status species in the
5 absence of other Environmental Commitments, Resource Restoration and Performance Principles
6 GSC1-GSC4, and AMMs. However, the project proponents have committed to habitat protection,
7 restoration, management, and enhancement associated with Environmental Commitment 3 and
8 Environmental Commitment 10 that are greater than the mitigation ratios described above. These
9 conservation actions would be guided by AMM1-AMM6, *AMM20 Greater Sandhill Crane*, and *AMM30*
10 *Transmission Line Design and Alignment Guidelines*, which would be in place during all project
11 activities. Construction activities would not be expected to result in greater sandhill crane take
12 because foraging and roosting individuals would be expected to temporarily avoid the increased
13 noise and activity associated with construction areas. Considering these commitments, Alternative
14 4A would not result in a substantial adverse effect through habitat modifications. Therefore,
15 Alternative 4A would have a less-than-significant impact on greater sandhill cranes under CEQA.

16 **Impact BIO-70: Effects on Greater Sandhill Crane Associated with Electrical Transmission** 17 **Facilities**

18 Greater sandhill cranes are susceptible to collision with power lines and other structures during
19 periods of inclement weather and low visibility (Avian Power Line Interaction Committee 1994,
20 Brown and Drewien 1995, Manville 2005). There are extensive existing transmission and
21 distribution lines in the sandhill crane winter use area. These include a network of distribution lines
22 that are between 11- and 22-kV. In addition, there are two 115-kV lines that cross the study area,
23 one that overlaps with the sandhill crane winter use area between Antioch and I-5 east of Hood, and
24 one that crosses the northern tip of the sandhill crane winter use area north of Clarksburg. There are
25 69-kV lines within the study area that parallel Twin Cities Road, Herzog Road, Lambert Road, and
26 the Southern Pacific Dredge Cut in the vicinity of Stone Lakes NWR. At the south end of the winter
27 use area, there are three 230-kV transmission lines that follow I-5, and then cut southwest through
28 Holt, and two 500-kV lines cross the southwestern corner of the winter use area. This existing
29 network of power lines in the study currently poses a collision and electrocution risk for sandhill
30 cranes, because they cross over or surround sandhill crane roost sites in the study area.

31 Both permanent and temporary electrical transmission lines would be constructed to supply
32 construction and operational power to Alternative 4A facilities, as described below. The potential
33 for birdstrikes could be exacerbated by construction-related effects, especially in low-visibility
34 conditions. The potential take of greater sandhill crane in the area of the proposed transmission
35 lines was estimated for the BDCP using collision mortality rates developed by Brown and Drewien
36 (1995) and an estimate of potential crossings along the proposed lines (See BDCP Appendix 5.J,
37 Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). This analysis
38 concluded that risk of take could be substantially reduced by marking new transmission lines to
39 increase their visibility to sandhill cranes.

40 Alternative 4A would substantially reduce the length of permanent and temporary transmission
41 lines as compared with the BDCP, substantially reducing the likelihood of crane collisions. Under
42 Alternative 4A, no permanent transmission lines would be constructed within the sandhill crane
43 winter use area. In addition, no new transmission lines (permanent or temporary) would be
44 constructed in the vicinity of Staten Island which is one of the most important wintering sites for

1 greater sandhill cranes in the Delta. The Alternative 4A transmission line alignment within the
 2 sandhill crane winter use area would be limited to three segments of temporary transmission lines:
 3 a temporary 11-mile segment extending north and south between Intake 2 and the intermediate
 4 forebay, a temporary 9-mile segment extending east and west between the intermediate forebay
 5 and the SMUD/WAPA substation, and an 11-mile segment extending north and south between
 6 Bouldin Island and Victoria Island. These three temporary lines would be removed after
 7 construction of the water conveyance facilities, after 10–14 years. Limiting the proposed
 8 transmission line footprint to temporary lines and siting these lines away from the highest use areas
 9 by greater sandhill cranes, substantially reduces the potential for sandhill crane bird strike in
 10 Alternative 4A as compared to the BDCP.

11 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
 12 transmission line alignment, such as co-locating transmission lines when it would minimize effects
 13 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. In
 14 addition, after the Draft EIR/EIS was issued in December 2013, additional avoidance features were
 15 added to *AMM20 Greater Sandhill Crane*. *AMM20 Greater Sandhill Crane* requires that Alternative 4A
 16 meets the performance standard of no take of greater sandhill crane associated with the new
 17 facilities. This would be achieved by implementing one or any combination of the following: 1) siting
 18 new transmission lines in lower bird strike risk zones; 2) removing, relocating or undergrounding
 19 existing lines where feasible; 3) using natural gas generators in lieu of installing transmission lines
 20 in high-risk zones of the sandhill crane winter use area; 4) undergrounding new lines in high-risk
 21 zones of the sandhill crane winter use area; 5) permanently installing flight diverters on existing
 22 lines over lengths equal to or greater than the length of the new temporary transmission lines in the
 23 crane winter use area; 6) for areas outside of the Stone Lakes NWR project boundary, shifting
 24 locations of flooded areas that provide crane roosts to lower risk areas. These measures are
 25 described in detail in *AMM20 Greater Sandhill Crane* in Appendix 3B, *Environmental Commitments*,
 26 *AMMs, and CMs*.

27 The implementation of the measures described above under *AMM20 Greater Sandhill Crane*, in
 28 addition to the project design changes to avoid high crane use areas, would not result in take of
 29 greater sandhill crane pursuant to California Fish and Game Code Section 86. Potential measures
 30 include using natural gas generators in lieu of transmission lines or undergrounding new lines in
 31 high-risk zones in the sandhill crane winter use area. Marking transmission lines with flight
 32 diverters that make the lines more visible to birds has been shown to reduce the incidence of bird
 33 mortality, including for sandhill cranes (Brown and Drewien 1995). Yee (2008) estimated that
 34 marking devices in the Central Valley could reduce avian mortality by 60%. All new temporary
 35 transmission lines would be fitted with flight diverters. The installation of flight diverters on existing
 36 permanent lines would be prioritized in the highest risk zones for greater sandhill crane (as
 37 described in BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed*
 38 *BDCP Powerlines*) and diverters would be installed in a configuration that research indicates would
 39 reduce bird strike risk by at least 60%. The length of existing line to be fitted with bird strike
 40 diverters would be equal to the length of new transmission lines constructed for the project, in an
 41 area with the same or higher greater sandhill crane strike risk to provide a net benefit to the species.
 42 For optimum results, the recommended spacing distance for bird flight diverters is 15 to 16.5 feet
 43 (4.5 to 5 meters) (Avian Power Line Interaction Committee 1994). Placing diverters on existing lines
 44 would be expected to reduce existing take in the Plan Area and therefore result in a net benefit to
 45 the greater sandhill crane population because these flight diverters would be maintained in
 46 perpetuity. Considering that the temporary lines would be removed within the first 10–14 years of

1 Alternative 4A implementation, and with the implementation of one or a combination of the
2 measures described under *AMM20 Greater Sandhill Crane*, there would be no take of greater sandhill
3 crane from the project pursuant to California Fish and Game Code Section 86.

4 **NEPA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
5 existing network of power lines in the study area currently poses a risk for sandhill cranes. Under
6 Alternative 4A, proposed transmission lines have been designed to substantially reduce the
7 likelihood of a crane collision with transmission lines. New transmission lines constructed as part of
8 the project would be limited to temporary lines which would be removed within the first 10–14
9 years of Alternative 4A implementation. In addition, no new transmission lines would be sited in the
10 vicinity of Staten Island, which has the highest crane-use in the sandhill crane winter use area.
11 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
12 transmission line alignment, such as co-locating transmission lines when it would minimize effects
13 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. All new
14 transmission lines constructed as a result of the project would be fitted with bird diverters, which
15 have been shown to reduce avian mortality by 60%. By incorporating *AMM30 Transmission Line*
16 *Design and Alignment Guidelines* and one or a combination of the measures to greatly reduce the risk
17 of bird strike described in *AMM20 Greater Sandhill Crane*, the construction and operation of
18 transmission lines under Alternative 4A would not result in an adverse effect on greater sandhill
19 crane.

20 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
21 existing network of power lines in the study area currently poses a risk for sandhill cranes. Under
22 Alternative 4A, proposed transmission lines have been designed to substantially reduce the
23 likelihood of a crane collision with transmission lines. New transmission lines constructed as part of
24 the project would be limited to temporary lines which would be removed within the first 10–14
25 years of Alternative 4A implementation. In addition, no new transmission lines would be sited in the
26 vicinity of Staten Island, which has the highest crane-use in the sandhill crane winter use area.
27 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
28 transmission line alignment, such as co-locating transmission lines when it would minimize effects
29 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. All new
30 transmission lines constructed as a result of the project would be fitted with bird diverters, which
31 have been shown to reduce avian mortality by 60%. By incorporating *AMM30 Transmission Line*
32 *Design and Alignment Guidelines* and one or a combination of the measures to greatly reduce the risk
33 of bird strike described in *AMM20 Greater Sandhill Crane*, there would be no take of greater sandhill
34 crane from the project pursuant to California Fish and Game Code Section 86, and the construction
35 and operation of transmission lines under Alternative 4A would have a less-than-significant impact
36 on greater sandhill crane.

37 **Impact BIO-71: Indirect Effects of the Project on Greater Sandhill Crane**

38 **Indirect Construction- and Operation-Related Effects:** Sandhill cranes are sensitive to
39 disturbance. Noise and visual disturbances from the construction of water conveyance facilities and
40 Environmental Commitments could reduce greater sandhill crane use of modeled habitat adjacent to
41 work areas. Indirect effects associated with construction include noise, dust, and visual disturbance
42 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
43 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the
44 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise
45 and visual disturbances that could affect greater sandhill crane use of surrounding habitat. These

1 effects could result from periodic vehicle use along the conveyance corridor, inspection and
2 maintenance of aboveground facilities, and similar activities. These potential effects would be
3 minimized with implementation of *AMM20 Greater Sandhill Crane*, described in Appendix 3B,
4 *Environmental Commitments, AMMs, and CMs*.

5 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would
6 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill
7 crane (see BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
8 *Conveyance Facility on Sandhill Crane*, and EIR/EIS Appendix 11F, *Substantive BDCP Revisions*). The
9 analysis addressed the potential noise effects on cranes, and concluded that as much as 20,243 acres
10 of crane habitat could potentially be affected by general construction noise (including pile driving)
11 above baseline level (50–60 dBA; Table 12-4A-29). This would include 1,008 acres of permanent
12 crane roosting habitat, 1,909 acres of temporary crane roosting habitat, and 17,327 acres of crane
13 foraging habitat. The analysis was conducted based on the assumption that there would be direct
14 line-of-sight from sandhill crane habitat areas to the construction site, and, therefore, provides a
15 worst-case estimate of effects. In many areas the existing levees would partially or completely block
16 the line-of-sight and would function as effective noise barriers, substantially reducing noise
17 transmission. However, there is insufficient data to assess the effects that increased noise levels
18 would have on sandhill crane behavior.

19 **Table 12-4A-29. Greater Sandhill Crane Habitat Affected by General Construction and Pile Driving**
20 **Noise Under Alternative 4A (acres)**

Habitat Type	General Construction	
	Above 60 dBA	Above 50 dBA
Permanent Roosting	196	1,008
Temporary Roosting	810	1,909
Foraging	7,676	17,327
Total Habitat	8,681	20,243

21
22 Evening and nighttime construction activities would require the use of extremely bright lights.
23 Nighttime construction could also result in headlights flashing into roost sites when construction
24 vehicles are turning onto or off of construction access routes. Proposed surge towers would require
25 the use of safety lights that would alert low-flying aircraft to the presence of these structures
26 because of their height. Little data is available on the effects of impact of artificial lighting on
27 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes
28 to flush and it is thought that they may avoid roosting in areas where lighting is bright (see BDCP
29 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to
30 sleep-wake cycle shifts and reproductive cycle shifts. Potential risks of visual impacts from lighting
31 include a reduction in the cranes' quality of nocturnal rest, and effects on their sense of photo-period
32 which might cause them to shift their physiology towards earlier migration and breeding (see BDCP
33 Chapter 5). Effects such as these could prove detrimental to the cranes' overall fitness and
34 reproductive success (which could in turn have population-level impacts). A change in photo-period
35 interpretation could also cause cranes to fly out earlier from roost sites to forage and might increase
36 their risk of power line collisions if they were to leave roosts before dawn (see BDCP Chapter 5).

37 The effects of noise and visual disturbance on greater sandhill crane would be minimized through
38 the implementation of *AMM20 Greater Sandhill Crane* (see Appendix 3B, *Environmental*

1 *Commitments, AMMs, and CMs*). Activities within 0.75 mile of crane roosting habitat would reduce
2 construction noise during night time hours (from one hour before sunset to one hour after sunrise)
3 such that construction noise levels do not exceed 50 dBA L_{eq} (1 hour) at the nearest temporary or
4 permanent roosts during periods when the roost sites are available (flooded). In addition, the area
5 of crane foraging habitat that would be affected during the day (from one hour after sunrise to one
6 hour before sunset) by construction noise exceeding 50 dBA L_{eq} (1 hour) would also be minimized.
7 Unavoidable noise related effects would be compensated for by the enhancement of 0.1 acre of
8 foraging habitat for every acre indirectly affected within the 50 dBA L_{eq} (1 hour) construction noise
9 contour. With these measures in place, indirect effects of noise and visual disturbance from
10 construction activities are not expected to reduce the greater sandhill crane population in the study
11 area.

12 The use of mechanical equipment during water conveyance facilities construction could cause the
13 accidental release of petroleum or other contaminants that could affect greater sandhill crane in the
14 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to greater
15 sandhill crane habitat could also affect the species. The implementation of AMM1–AMM6 would
16 minimize the likelihood of such spills and ensure that measures were in place to prevent runoff from
17 the construction area and negative effects of dust on foraging habitat (see Appendix 3B,
18 *Environmental Commitments, AMMs, and CMs*).

19 **Methylmercury Exposure:** Changes in water operations from the construction of the water
20 conveyance facilities and the implementation of Environmental Commitment 10 (Nontidal Marsh
21 Restoration) have the potential to exacerbate bioaccumulation of mercury in greater sandhill crane.
22 Largemouth bass was used as a surrogate species for analysis of impacts from changes in operations
23 from the construction of the water conveyance facilities (see Appendix 11F, *Substantive BDCP*
24 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
25 species overestimate the effects on greater sandhill crane because of their position in the foodweb.
26 Organisms feeding within pelagic-based (algal) foodwebs have been found to have higher
27 concentrations of methylmercury than those in benthic or epibenthic foodwebs; this has been
28 attributed to food chain length and dietary segregation (Grimaldo et al. 2009). Potential indirect
29 effects of increased mercury exposure are likely low for greater sandhill crane because they
30 primarily forage on waste grains and, to a lesser extent, invertebrates associated with cultivated
31 crops. The modeled effects of mercury concentrations from changes in water operations with water
32 conveyance facilities on largemouth bass did not differ substantially from existing conditions;
33 therefore, results also indicate that greater sandhill crane tissue concentrations would not
34 measurably increase as a result of water conveyance facilities construction.

35 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
36 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
37 Thus, Alternative 4A restoration activities that create newly inundated areas could increase
38 bioavailability of mercury. Increased methylmercury associated with *Environmental Commitment 10*
39 *Nontidal Marsh Restoration* may indirectly affect greater sandhill crane via uptake in lower trophic
40 levels (see Appendix 11F, Section 11F.5.2, *Effects of Contaminants on Terrestrial Species*). Mercury is
41 generally elevated throughout the Delta, and restoration of the lower potential areas in total may
42 result in generalized, very low level increases of mercury.

43 Due to the complex and very site-specific factors that would determine if mercury becomes
44 mobilized into the foodweb, *Environmental Commitment 12 Methylmercury Management* is included
45 to provide for site-specific evaluation for each restoration project. If a project is identified where

1 there is a high potential for methylmercury production that could not be fully addressed through
2 restoration design and adaptive management, alternate restoration areas would be considered.
3 Environmental Commitment 12 would be implemented in coordination with other similar efforts to
4 address mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis
5 Section. This Environmental Commitment would include the following actions.

- 6 • Assess pre-restoration conditions to determine the risk that the project could result in increased
7 mercury methylation and bioavailability
- 8 • Define design elements that minimize conditions conducive to generation of methylmercury in
9 restored areas.
- 10 • Define adaptive management strategies that can be implemented to monitor and minimize
11 actual postrestoration creation and mobilization of methylmercury.

12 **Selenium:** Selenium is an essential nutrient for avian species and has a beneficial effect in low
13 doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009, Ohlendorf
14 and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults, and can also
15 result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz 2009). The
16 effect of selenium toxicity differs widely between species and also between age and sex classes
17 within a species. In addition, the effect of selenium on a species can be confounded by interactions
18 with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith 2009).

19 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
20 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
21 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
22 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
23 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
24 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
25 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
26 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
27 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
28 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
29 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
30 levels of selenium have a higher risk of selenium toxicity.

31 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
32 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
33 exacerbate bioaccumulation of selenium in avian species, including greater sandhill crane.
34 Environmental Commitment 10 (Nontidal Marsh Restoration) has the potential to mobilize
35 selenium, and therefore increase greater sandhill crane exposure from ingestion of prey items
36 (waste grain and associated invertebrates) with elevated selenium levels. Changes in selenium
37 concentrations were analyzed in Chapter 8, *Water Quality*, and it was determined that, relative to
38 Existing Conditions and the No Action Alternative, water conveyance facilities would not result in
39 substantial, long-term increases in selenium concentrations in water in the Delta under any
40 alternative. However, it is difficult to determine whether the effects of potential increases in
41 selenium bioavailability associated with restoration-related Environmental Commitments
42 (Environmental Commitment 10) would lead to adverse effects on greater sandhill crane.

43 Because of the uncertainty that exists with respect to the location of nontidal restoration activities,
44 there could be an effect on greater sandhill crane from increases in selenium associated with

1 restoration activities. This effect would be addressed through the implementation of *AMM27*
2 *Selenium Management*, which would provide specific habitat restoration design elements to reduce
3 the potential for bioaccumulation of selenium and its bioavailability in tidal and nontidal habitats
4 (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
5 selenium management to reduce selenium concentrations and/or bioaccumulation would be
6 evaluated separately for each restoration effort as part of design and implementation. This
7 avoidance and minimization measure would be implemented as part of the restoration design.

8 **NEPA Effects:** Crane habitat could potentially be affected by general construction noise above
9 baseline level (50–60 dBA). Construction in certain areas would take place 7 days a week and 24
10 hours a day and evening and nighttime construction activities would require the use of extremely
11 bright lights, which could adversely affect roosting cranes by impacting their sense of photo-period
12 and by exposing them to predators. Effects of noise and visual disturbance could substantially alter
13 the suitability of habitat for greater sandhill crane. *AMM20 Greater Sandhill Crane* would include
14 requirements (described above) to minimize the effects of noise and visual disturbance on greater
15 sandhill cranes and to compensate for affected habitat.

16 The implementation of *Environmental Commitment 10 Nontidal Marsh Restoration* could result in
17 increased exposure of greater sandhill crane to methylmercury and selenium. The potential indirect
18 effect of increased mercury exposure is likely low for greater sandhill crane because they primarily
19 forage on cultivated crops and associated invertebrates. Implementation of *Environmental*
20 *Commitment 12* which contains measures to assess the amount of mercury before project
21 development, followed by appropriate design and adaptation management, would minimize the
22 potential for increased methylmercury exposure. The potential effect of selenium exposure would
23 be addressed through the implementation of *AMM27 Selenium Management*, which would provide
24 specific restoration design elements to reduce the potential for bioaccumulation of selenium and its
25 bioavailability in restored habitats.

26 With *AMM1–AMM6*, *AMM20 Greater Sandhill Crane*, *AMM27 Selenium Management*, and
27 *Environmental Commitment 12* in place, the indirect effects of Alternative 4A implementation would
28 not substantially reduce the number or restrict the range of greater sandhill cranes. Therefore, the
29 indirect effects of Alternative 4A implementation on greater sandhill crane would not be adverse
30 under NEPA.

31 With *AMM1–AMM6*, *AMM20 Greater Sandhill Crane*, *AMM27 Selenium Management*, and
32 *Environmental Commitment 12* in place, the indirect effects of Alternative 4A implementation would
33 not substantially reduce the number or restrict the range of greater sandhill cranes. Therefore, the
34 indirect effects of Alternative 4A implementation would not result in an adverse effect on greater
35 sandhill crane under NEPA.

36 **CEQA Conclusion:** Crane habitat could potentially be affected by general construction noise above
37 baseline level (50–60 dBA). Construction in certain areas would take place 7 days a week and 24
38 hours a day and evening and nighttime construction activities would require the use of extremely
39 bright lights, which could adversely affect roosting cranes by impacting their sense of photo-period
40 and by exposing them to predators. Effects of noise and visual disturbance could substantially alter
41 the suitability of habitat for greater sandhill crane. This would be a significant impact. *AMM20*
42 *Greater Sandhill Crane* would include requirements (described above) to minimize the effects of
43 noise and visual disturbance on greater sandhill cranes and to mitigate impacts on affected habitat.

1 The implementation of *Environmental Commitment 10 Nontidal Marsh Restoration* could result in
2 increased exposure of greater sandhill crane to methylmercury and selenium. This would be a
3 significant impact. The potential indirect effect of increased mercury exposure is likely low for
4 greater sandhill crane because they primarily forage on cultivated crops and associated
5 invertebrates. Implementation of Environmental Commitment 12 which contains measures to
6 assess the amount of mercury before project development, followed by appropriate design and
7 adaptation management, would minimize the potential for increased methylmercury exposure. The
8 potential effect of selenium exposure would be addressed through the implementation of *AMM27*
9 *Selenium Management*, which would provide specific restoration design elements to reduce the
10 potential for bioaccumulation of selenium and its bioavailability in restored habitats.

11 With AMM1–AMM6, *AMM20 Greater Sandhill Crane*, *AMM27 Selenium Management*, and
12 Environmental Commitment 12 in place, the indirect effects of Alternative 4A implementation would
13 not substantially reduce the number or restrict the range of greater sandhill cranes. Therefore, the
14 indirect effects of Alternative 4A implementation would have a less-than-significant impact on
15 greater sandhill crane under CEQA.

16 **Lesser Sandhill Crane**

17 This section describes the effects of Alternative 4A, including water conveyance facilities
18 construction and implementation of Environmental Commitments, on lesser sandhill crane. Lesser
19 sandhill cranes in the study area are almost entirely dependent on privately owned agricultural
20 lands for foraging. Long-term sustainability of the lesser sandhill crane is thus dependent on
21 providing a matrix of compatible crop types that afford suitable foraging habitat and maintaining
22 compatible agricultural practices, while sustaining and increasing the extent of other essential
23 habitat elements such as night roosting habitat. The habitat model for lesser sandhill crane is limited
24 to the sandhill crane winter use area (Figure 12-22) and includes “roosting and foraging” (known
25 roost sites that also provide foraging habitat) and “foraging” habitat. Suitable roosting and foraging
26 habitat in the study area includes certain agricultural types, specific grassland types, irrigated
27 pastures and hay crops, managed seasonal wetland, and other natural seasonal wetland. Roosting
28 and foraging habitat includes traditional roost sites that are known to be used by sandhill cranes
29 (both greater and lesser) and that also provide foraging habitat. Detail regarding the roosting and
30 foraging modeled habitat for both subspecies of sandhill crane is included in the BDCP (see BDCP
31 Appendix 2.A, *Covered Species Accounts*). Both temporary and permanent roost sites were identified
32 for sandhill cranes. Permanent roosting and foraging sites are those used regularly, year after year,
33 while temporary roosting and foraging sites are those used in some years. Factors included in
34 assessing the loss of foraging habitat for the lesser sandhill crane considers the relative habitat value
35 of specific crop or land cover types. Although both the greater and the lesser sandhill crane use
36 similar crop or land cover types, these provide different values of foraging habitat for the two
37 subspecies based on proportional use of these habitats. Lesser sandhill cranes are less traditional
38 than greater sandhill cranes and are more likely to move between different roost site complexes and
39 different wintering regions (Ivey pers. comm.) The wintering range is ten times larger than the
40 greater sandhill crane and their average foraging flight radius from roost sites is twice that of
41 greater sandhill cranes. Because of this higher mobility, lesser sandhill cranes are more flexible in
42 their use of foraging areas than the greater sandhill crane. Therefore, within the sandhill crane
43 winter use area, there is more suitable foraging habitat modeled for lesser sandhill crane than for
44 greater sandhill crane.

1 Alternative 4A would result in both temporary and permanent losses of foraging and roosting
2 habitat for lesser sandhill crane as indicated in Table 12-4A-30. Full implementation of Alternative
3 4A would include the following Resource Restoration and Performance Principles for greater
4 sandhill crane that would similarly benefit the lesser sandhill crane.

- 5 • Protect high- to very high-value habitat for greater sandhill crane, with at least 80% maintained
6 in very high-value types in any given year. This protected habitat will be within 2 miles of
7 known roosting sites in CZs 3, 4, 5, and/or 6 and will consider sea level rise and local seasonal
8 flood events, greater sandhill crane population levels, and the location of foraging habitat loss.
9 Patch size of protected cultivated lands will be at least 160 acres [In order to offset the effects on
10 foraging habitat for both greater and lesser sandhill cranes, foraging habitat will be replaced at a
11 minimum of 1:1 based on the acreage of impact on either the greater or lesser sandhill crane
12 foraging habitat, whichever is greater.] (Resource Restoration and Performance Principles
13 GSC1).
- 14 • Create at least 320 acres of managed wetlands in minimum patch sizes of 40 acres within the
15 Greater Sandhill Crane Winter Use Area in CZs 3, 4, 5, or 6, with consideration of sea level rise
16 and local seasonal flood events. The wetlands will be located within 2 miles of existing
17 permanent roost sites and protected in association with other protected natural community
18 types (excluding nonhabitat cultivated lands) at a ratio of 2:1 upland to wetland to provide
19 buffers around the wetlands (Resource Restoration and Performance Principles GSC2).
- 20 • Create at least two 90-acre wetland complexes within the Stone Lakes NWR project boundary.
21 The complexes will be no more than 2 miles apart and will help provide connectivity between
22 the Stone Lakes and Cosumnes greater sandhill crane populations. Each complex will consist of
23 at least three wetlands totaling at least 90 acres of greater sandhill crane roosting habitat, and
24 will be protected in association with other protected natural community types (excluding
25 nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e., two sites with at
26 least 90 acres of wetlands each). One of the 90-acre wetland complexes may be replaced by 180
27 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to support roosting
28 cranes and provide highest-value foraging habitat, provided such substitution is consistent with
29 the long-term conservation goals of Stone Lakes NWR for greater sandhill crane (Resource
30 Restoration and Performance Principles GSC3).
- 31 • Create an additional 95 acres of roosting habitat within 2 miles of existing permanent roost
32 sites. The habitat will consist of active cornfields that are flooded following harvest to support
33 roosting cranes and that provide highest-value foraging habitat. Individual fields will be at least
34 40 acres and can shift locations throughout the Greater Sandhill Crane Winter Use Area, but will
35 be sited with consideration of the location of roosting habitat loss and will be in place prior to
36 roosting habitat loss (Resource Restoration and Performance Principles GSC4).

37 As explained below, with the restoration and protection of these amounts of habitat, in addition to
38 natural community enhancement and management commitments (including *Environmental*
39 *Commitment 12 Methylmercury Management*) and implementation of AMM1-AMM7, *AMM20 Greater*
40 *Sandhill Crane*, *AMM27 Selenium Management*, and *AMM30 Transmission Line Design and Alignment*
41 *Guidelines*, impacts on the lesser sandhill crane would be less than significant for CEQA purposes,
42 and would not be adverse for NEPA purposes.

1 **Table 12-4A-30. Changes in Lesser Sandhill Crane Modeled Habitat Associated with Alternative 4A**
2 **(acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Roosting and Foraging–Permanent	0	4
	Roosting and Foraging–Temporary	16	71
	Foraging	1,707	860
Total Impacts Water Conveyance Facilities		1,723	935
Environmental Commitments 4, 6--11 ^a	Roosting and Foraging–Permanent	0	0
	Roosting and Foraging–Temporary	1	0
	Foraging	2,017	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		2,018	0
Total Roosting/Foraging–Permanent		0	4
Total Roosting/Foraging–Temporary		17	71
Total Foraging		3,724	860
TOTAL IMPACTS		3,741	935

^a See discussion below for a description of applicable Environmental Commitments.

3

4 **Impact BIO-72: Loss or Conversion of Habitat for and Direct Mortality of Lesser Sandhill**
5 **Crane**

6 Alternative 4A would result in the combined permanent and temporary loss of up to 92 acres of
7 modeled roosting and foraging habitat (17 acres of permanent loss, 75 acres of temporary loss) and
8 4,584 acres of foraging habitat (3,724 acres of permanent loss, 860 acres of temporary loss, Table
9 12-4A-30). Project measures that would result in these losses are water conveyance facilities and
10 transmission line construction, establishment and use of reusable tunnel material areas,
11 *Environmental Commitment 4 Tidal Natural Communities Restoration, Environmental Commitment 7*
12 *Riparian Natural Communities Restoration, Environmental Commitment 8 Grassland Natural*
13 *Communities Restoration, Environmental Commitment 10 Nontidal Marsh Restoration, and*
14 *Environmental Commitment 11 Natural Communities Enhancement and Management.* The majority of
15 habitat loss would result from water conveyance facility construction and conversion of foraging
16 habitat to nontidal natural communities through Environmental Commitment 10. Habitat
17 enhancement and management activities through Environmental Commitment 11, which include
18 ground disturbance or removal of nonnative vegetation, could also result in local adverse habitat
19 effects. In addition, maintenance activities associated with the long-term operation of the water
20 conveyance facilities and other physical facilities could degrade or eliminate lesser sandhill crane
21 modeled habitat. Each of these individual activities is described below.

- 22 • *Water Facilities Construction:* Construction of Alternative 4A conveyance facilities would result
23 in the combined permanent loss of up to 1,723 acres of modeled lesser sandhill crane habitat.
24 This would consist of the permanent removal of 16 acres of temporary roosting and foraging
25 habitat, and 1,707 acres of foraging habitat. Foraging habitat that would be permanently
26 impacted by water conveyance construction would consist of 1,018 acres of very high-value, 135
27 acres of high-value, and 301 acres of medium-value foraging habitat (Table 12-4A-31). In
28 addition, 4 acres of permanent roosting and foraging habitat, 71 acres of temporary roosting
29 and foraging habitat, and 860 acres of foraging habitat would be temporarily removed (Table

1 12-4A-30). The temporarily removed habitat would consist primarily of cultivated lands and it
2 would be restored within 1 year following construction. However, it would not necessarily be
3 restored to its original topography and it could be restored as grasslands. Water conveyance
4 facilities activities that would result in temporary impacts would include temporary access
5 roads, reusable tunnel material sites, and work areas for construction.

- 6 • The acres of roosting and foraging habitat that would be permanently removed is located on
7 Bouldin Island, from the construction of a permanent access road. Temporary impacts on
8 roosting and foraging habitat would occur on Bouldin Island from the construction of a
9 temporary concrete batch plant and a fuel station. Temporary losses would also occur from the
10 construction of temporary transmission lines between the Lambert Road vent shaft and the
11 intermediate forebay, and on Venice Island. However, the implementation of *AMM20 Greater*
12 *Sandhill Crane* would require that water conveyance facilities activities be designed to avoid
13 direct loss of crane roost sites. This includes a provision that the final transmission line
14 alignment would be designed to avoid crane roost sites. Avoidance of crane roost sites would be
15 accomplished either by siting activities outside of identified roost sites or by relocating the roost
16 site if it consisted of cultivated lands (roost sites consisting of wetlands would not be subject to
17 re-location). Relocated roost sites would be established prior to construction activities affecting
18 the original roost site, as described in *AMM20 Greater Sandhill Crane* (see Appendix 3B,
19 *Environmental Commitments, AMMs, and CMs*). Therefore, there would be no loss of crane
20 roosting and foraging habitat as a result of water conveyance facility construction once the
21 facilities were fully designed.
- 22 • Activities that would impact modeled lesser sandhill crane foraging habitat consist of
23 intermediate forebay and intake construction, construction and use of temporary access roads,
24 and construction of temporary transmission lines. Loss of foraging habitat would also result
25 from the construction of permanent and temporary access roads on Mandeville and Bacon
26 Islands, and from construction of vent shafts on Staten and Bacon Islands. Temporary impacts
27 on foraging habitat would also result from geotechnical boring activities along the tunnel
28 alignment. Approximately 1,502 acres of the permanent loss of foraging habitat would be from
29 the storage of reusable tunnel material. This material would be stored on Bouldin Island,
30 Zacharias Island and parcels south of Lambert Road and north of the Cosumnes River. The
31 reusable tunnel material would likely be moved to other sites for use in levee build-up and
32 restoration, and the affected areas would likely eventually be restored. This effect is categorized
33 as permanent because there is no assurance that the material would eventually be moved. The
34 implementation of *AMM6 Disposal and Reuse of Spoils* would require that the areas used for
35 reusable tunnel material storage be minimized in crane foraging habitat and completely avoid
36 crane roost sites (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*).

37 Construction-related activities would not be expected to result in direct mortality of lesser
38 sandhill crane if they were present in the study area, because cranes would be expected to avoid
39 contact with construction and other equipment. The potential for lesser sandhill crane bird
40 strike on electrical transmission lines is discussed below under Impact BIO-73.

41 The effects of noise and visual disturbance from water conveyance facilities construction activities
42 are discussed under Impact BIO-74. Refer to the Terrestrial Biology Mapbook for a detailed view of
43 Alternative 4A construction locations. Impacts from water conveyance facilities would occur within
44 the first 10–14 years of Alternative 4A implementation.

1 **Table 12-4A-31. Value of Lesser Sandhill Crane Foraging Habitat Affected By Alternative 4A Water**
2 **Conveyance Facilities**

Foraging Habitat Value Class	Land Cover Type	Water Conveyance Facilities Permanent [Temporary] (acres)
Very high	Corn, alfalfa and alfalfa mixtures	1,018[319]
High	Mixed pasture, native pasture, other pasture, irrigated pasture, native vegetation, rice	135 [124]
Medium	Grain and hay crops, miscellaneous grain and hay, mixed grain and hay, unirrigated mixed grain and hay, other grain crops, miscellaneous grasses, grassland, wheat, other grain crops, managed wetlands	301 [201]
Low	Other irrigated crops, idle cropland, blueberries, asparagus, clover, cropped within the last 3 years, grain sorghum, green beans, miscellaneous truck, miscellaneous field, new lands being prepped for crop production, nonirrigated mixed pasture, nonirrigated native pasture, onions, garlic, peppers, potatoes, safflower, sudan, sugar beets, tomatoes (processing), melons squash and cucumbers all types, artichokes, beans (dry)	242 [205]
None	Vineyards, orchards	12 [10]

- 3
- 4 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* This activity would result
5 in the permanent loss or conversion of approximately 1 acre of temporary roosting and foraging
6 habitat and 88 acres of lesser sandhill crane foraging habitat in the north Delta.
- 7 • *Environmental Commitment 7 Riparian Natural Communities Restoration:* This activity would
8 result in the permanent loss or conversion of approximately 251 acres of lesser sandhill crane
9 foraging habitat in the north Delta.
- 10 • *Environmental Commitment 8 Grassland Natural Communities Restoration:* This activity would
11 result in the permanent loss or conversion of approximately 843 acres of lesser sandhill crane
12 foraging habitat in the north Delta.
- 13 • *Environmental Commitment 10 Nontidal Marsh Restoration:* Nontidal marsh restoration would
14 result in the permanent conversion of approximately 832 acres of modeled foraging habitat for
15 the lesser sandhill crane. A portion of the restored nontidal marsh would be restored to provide
16 roosting and foraging habitat value for sandhill cranes. However, some of this restored marsh
17 would be unsuitable as it would lack emergent vegetation and consist of open water that would
18 be too deep to provide suitable roosting or foraging habitat.
- 19 • *Environmental Commitment 11 Natural Communities Enhancement and Management:* A variety of
20 habitat management actions included in *Environmental Commitment 11* that are designed to
21 enhance wildlife values in restored or protected habitats could result in localized ground
22 disturbances that could permanently remove 3 acres of foraging habitat and temporarily
23 remove small amounts of modeled habitat. Ground-disturbing activities, such as removal of
24 nonnative vegetation and road and other infrastructure maintenance activities would be
25 expected to have minor adverse effects on available habitat and would be expected to result in
26 overall improvements to and maintenance of habitat values. The potential for these activities to

1 result in direct mortality of lesser sandhill crane would be minimized with the implementation
2 of *AMM20 Greater Sandhill Crane*.

- 3 • *Water Facilities Operations and Maintenance*: Post construction operation and maintenance of
4 the above-ground water conveyance facilities could result in ongoing but periodic disturbances
5 that could affect lesser sandhill crane use of the surrounding habitat. Maintenance activities
6 would include vegetation management, levee and structure repair, and re-grading of roads and
7 permanent work areas. These effects, could be adverse as sandhill cranes are sensitive to
8 disturbance. However, potential impacts would be reduced by the AMMs listed below. BDCP
9 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
10 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

11 The following paragraphs summarize the combined effects discussed above and describe Alternative
12 4A Environmental Commitments, Resource Restoration and Performance Principles, and AMMs that
13 offset or avoid these effects. NEPA effects and CEQA conclusions are provided at the end of the
14 section.

15 Alternative 4A would remove 92 acres roosting and foraging habitat (17 acres of permanent loss, 75
16 acres of temporary loss) from the construction of the water conveyance facilities. In addition, 4,584
17 acres of foraging habitat would be removed or converted (*Water Conveyance Facilities*—2,567
18 acres; *Environmental Commitment 4 Tidal Natural Communities Restoration*, *Environmental*
19 *Commitment 7 Riparian Natural Communities Restoration*, *Environmental Commitment 8 Grassland*
20 *Natural Communities Restoration* and *Environmental Commitment 10 Nontidal Marsh Restoration*—
21 2,017 acres).

22 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
23 be 1:1 protection and 1:1 restoration for loss of roost sites and 1:1 protection for loss of foraging
24 habitat. Using these ratios would indicate that 92 acres of sandhill crane roosting habitat should be
25 restored/created and 92 acres should be protected to compensate for the losses of lesser sandhill
26 crane roosting and foraging habitat. In addition, 4,584 acres of foraging habitat should be protected
27 to mitigate the losses of lesser sandhill crane foraging habitat.

28 The implementation of *AMM20 Greater Sandhill Crane* would require no direct impacts on sandhill
29 crane roost sites by project activities related to water conveyance facilities, including transmission
30 lines and their associated footprints (see Appendix 3B, *Environmental Commitments, AMMs, and*
31 *CMs*). Therefore there would be no loss of crane roosting and foraging habitat as a result of water
32 conveyance facility construction once the facilities were fully designed, which would avoid the water
33 conveyance facilities impact on 91 acres of roosting and foraging habitat once the project design is
34 final. Indirect effects of construction-related noise and visual disturbance are discussed below under
35 Impact BIO-74.

36 Alternative 4A also includes the following performance standards for the greater sandhill crane
37 which would also benefit the lesser sandhill crane, as they utilize similar habitats and face similar
38 threats within their winter use areas.

39 Project proponents would commit to creating up to 95 acres of roosting habitat within 2 miles of
40 existing permanent roost sites (Resource Restoration and Performance Principle GSC4). These
41 roosts would consist of active cornfields that are flooded following harvest to support roosting
42 cranes and also provide the highest-value foraging habitat for the species. Individual fields would be
43 at least 40 acres could shift locations throughout the Greater Sandhill Crane Winter Use Area, and

1 would be in place prior to roosting habitat loss. In addition, 320 acres of roosting habitat would be
 2 created in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area in
 3 CZs 3, 4, 5, or 6 (Resource Restoration and Performance Principle GSC2). Restoration sites would be
 4 identified with consideration of sea level rise and local seasonal flood events. These wetlands would
 5 be created within 2 miles of existing permanent roost sites and protected in association with other
 6 protected natural community types at a ratio of 2:1 upland to wetland habitat to provide buffers that
 7 would protect cranes from the types of disturbances that would otherwise result from adjacent
 8 roads and developed areas (e.g., roads, noise, visual disturbance, lighting). The creation of 180 acres
 9 of crane roosting habitat would be constructed within the Stone Lakes NWR project boundary (see
 10 Figure 3.3-7 in the BDCP) and would be designed to provide connectivity between the Stone Lakes
 11 and Cosumnes greater sandhill crane populations (Resource Restoration and Performance Principle
 12 GSC3). The large patch sizes of these wetland complexes would provide additional conservation to
 13 address the threats of vineyard conversion, urbanization to the east, and sea level rise to the west of
 14 sandhill crane wintering habitat.

15 As specified in GSC1, at least 4,584 acres of cultivated lands that provide high- to very high-
 16 valueforaging habitat for greater sandhill crane would be protected. This habitat would occur within
 17 2 miles of known roost sites and at least 80% would be maintained in very high-value habitat types
 18 for greater sandhill crane in any given year (which would be high- to very high-value crop types for
 19 the lesser sandhill crane; see Table 12-4A-28 and Table 12-4A-31 for sandhill crane foraging habitat
 20 values). The remaining habitat protected could range between medium to very-high value habitat
 21 for lesser sandhill crane. The proposed project would also include commitments to implement the
 22 following avoidance and minimization measures that will help to avoid and minimize adverse effects
 23 on lesser sandhill crane: *AMM1 Worker Awareness Training, AMM2 Construction Best Management*
 24 *Practices and Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment*
 25 *Control Plan, AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and*
 26 *Reuse of Spoils, and AMM30 Transmission Line Design and Alignment Guidelines. All of these AMMs*
 27 *include elements that would avoid or minimize the risk of affecting lesser sandhill crane habitats*
 28 *adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and*
 29 *which are provided in Appendix 3B, Environmental Commitments, AMMs, and CMs, of the Final*
 30 *EIR/EIS.*

31 **NEPA Effects:** The loss of lesser sandhill crane habitat under Alternative 4A would not be adverse
 32 under NEPA because Alternative 4A has committed the project proponents to avoiding and
 33 minimizing effects and to restoring and protecting acreages that meet the typical mitigation ratios
 34 described above. This habitat protection, restoration, management, and enhancement would be
 35 guided by Resource Restoration and Performance Principles GSC1-GSC4, and by AMM1-AMM6,
 36 *AMM20 Greater Sandhill Crane, and AMM30 Transmission Line Design and Alignment Guidelines,*
 37 *which would be in place during all project activities. Considering these commitments, the*
 38 *implementation of Alternative 4A would not result in an adverse effect on lesser sandhill crane.*

39 **CEQA Conclusion:** The effects on lesser sandhill crane habitat under Alternative 4A would represent
 40 an adverse effect as a result of habitat modification of a special-status species in the absence of
 41 Environmental Commitments, Resource Restoration and Performance Principles GSC1-GSC4 for
 42 greater sandhill crane (which would also benefit lesser sandhill crane), and AMMs. However, the
 43 project proponents have committed to habitat protection, restoration, management, and
 44 enhancement associated with Environmental Commitment 3 and Environmental Commitment 10
 45 that are greater than the mitigation ratios described above. These conservation actions would be
 46 guided by AMM1-AMM6, *AMM20 Greater Sandhill Crane, and AMM30 Transmission Line Design and*

1 *Alignment Guidelines*, which would be in place during all project activities. Considering these
2 commitments, Alternative 4A would not result in a substantial adverse effect through habitat
3 modifications and would not substantially reduce the number or restrict the range of lesser sandhill
4 cranes. Therefore, Alternative 4A would have a less-than-significant impact on lesser sandhill cranes
5 under CEQA.

6 **Impact BIO-73: Effects on Lesser Sandhill Crane Associated with Electrical Transmission**
7 **Facilities**

8 Sandhill cranes are susceptible to collision with power lines and other structures during periods of
9 inclement weather and low visibility (Avian Power Line Interaction Committee 1994, Brown and
10 Drewien 1995, Manville 2005). There are extensive existing transmission and distribution lines in
11 the sandhill crane winter use area. These include a network of distribution lines that are between
12 11- and 22-kV. In addition, there are two 115-kV lines that cross the study area, one that overlaps
13 with the sandhill crane winter use area between Antioch and I-5 east of Hood, and one that crosses
14 the northern tip of the sandhill crane winter use area north of Clarksburg. There are 69-kv lines
15 within the study area that parallel Twin Cities Road, Herzog Road, Lambert Road, and the Southern
16 Pacific Dredge Cut in the vicinity of Stone Lakes NWR. At the south end of the winter use area, there
17 are three 230-kV transmission lines that follow I-5, and then cut southwest through Holt, and two
18 500-kV lines cross the southwestern corner of the winter use area. This existing network of power
19 lines in the study currently poses a collision and electrocution risk for sandhill cranes, because they
20 cross over or surround sandhill crane roost sites in the study area.

21 Both permanent and temporary electrical transmission lines would be constructed to supply
22 construction and operational power to Alternative 4A facilities, as described below. The potential
23 for birdstrikes could be exacerbated by construction-related effects, especially in low-visibility
24 conditions. The potential mortality of greater sandhill crane in the area of the proposed
25 transmission lines was estimated for the BDCP using collision mortality rates developed by Brown
26 and Drewien (1995) and an estimate of potential crossings along the proposed lines (See BDCP
27 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*).
28 This analysis concluded that mortality risk could be substantially reduced by marking new
29 transmission lines to increase their visibility to sandhill cranes. Mortality risk would be similarly
30 reduced for lesser sandhill cranes by marking new transmission lines.

31 The transmission line footprint for Alternative 4A was changed substantially from the BDCP to
32 reduce potential risk of greater sandhill crane collisions. The following changes also reduce
33 potential risk of lesser sandhill crane collisions:

34 Alternative 4A would substantially reduced the length of permanent and temporary transmission
35 lines as compared with the BDCP, substantially reducing the likelihood of crane collisions. Under
36 Alternative 4A, no permanent transmission lines would be constructed within the sandhill crane
37 winter use area. In addition, no new transmission lines (permanent or temporary) would be
38 constructed in the vicinity of Staten Island which is one of the most important wintering sites for
39 greater sandhill cranes in the Delta. The Alternative 4A transmission line alignment within the
40 sandhill crane winter use area would be limited to three segments of temporary transmission lines:
41 a temporary 11-mile segment extending north and south between Intake 2 and the intermediate
42 forebay, a temporary 9-mile segment extending east and west between the intermediate forebay
43 and the SMUD/WAPA substation, and an 11-mile segment extending north and south between
44 Bouldin Island and Victoria Island. These three temporary lines would be removed after

1 construction of the water conveyance facilities, after 10–14 years. Limiting the proposed
 2 transmission line footprint to temporary lines and siting these lines away from the highest use areas
 3 by both greater and lesser sandhill cranes, substantially reduces the potential for sandhill crane bird
 4 strike in Alternative 4A as compared to the BDCP.

5 *AMM30 Transmission Line Design and Alignment Guidelines* would require design features for the
 6 transmission line alignment, such as co-locating transmission lines when it would minimize effects
 7 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. In
 8 addition, after the Draft EIR/EIS was issued in December 2013, additional avoidance features were
 9 added to *AMM20 Greater Sandhill Crane*. *AMM20 Greater Sandhill Crane* requires that Alternative 4A
 10 meet the performance standard of no mortality of greater sandhill crane associated with the new
 11 facilities. This would be achieved by implementing one or any combination of the following: 1) siting
 12 new transmission lines in lower bird strike risk zones; 2) removing, relocating or undergrounding
 13 existing lines where feasible; 3) using natural gas generators in lieu of installing transmission lines
 14 in high-risk zones of the sandhill crane winter use area; 4) undergrounding new lines in high-risk
 15 zones of the sandhill crane winter use area; 5) permanently installing flight diverters on existing
 16 lines over lengths equal to or greater than the length of the new temporary transmission lines in the
 17 sandhill crane winter use area; 6) for areas outside of the Stone Lakes NWR project boundary,
 18 shifting locations of flooded areas that provide crane roosts to lower risk areas. These measures are
 19 described in detail in *AMM20 Greater Sandhill Crane* (see Appendix 3B, *Environmental Commitments*,
 20 *AMMs, and CMs*).

21 The implementation of the measures described above under *AMM20 Greater Sandhill Crane*, in
 22 addition to the project design changes to avoid high crane use areas, would substantially reduce
 23 potential collisions of lesser sandhill cranes with transmission lines. Potential measures include
 24 using natural gas generators in lieu of transmission lines or undergrounding new lines in high-risk
 25 zones in the sandhill crane winter use area. Marking transmission lines with flight diverters that
 26 make the lines more visible to birds has been shown to reduce the incidence of bird mortality,
 27 including for sandhill cranes (Brown and Drewien 1995). Yee (2008) estimated that marking
 28 devices in the Central Valley could reduce avian mortality by 60%. All new temporary transmission
 29 lines would be fitted with flight diverters. The installation of flight diverters on existing permanent
 30 lines would be prioritized in the highest risk zones for greater sandhill crane (as described in BDCP
 31 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*) and
 32 diverters would be installed in a configuration that research indicates would reduce bird strike risk
 33 by at least 60% The length of existing line to be fitted with bird strike diverters would be equal to
 34 the length of new transmission lines constructed as a result of the project, in an area with the same
 35 or higher lesser sandhill crane strike risk to provide a net benefit to the species. For optimum
 36 results, the recommended spacing distance for bird flight diverters is 15 to 16.5 feet (4.5 to 5
 37 meters) (Avian Power Line Interaction Committee 1994). Placing diverters on existing lines would
 38 be expected to reduce existing lesser and greater sandhill crane mortality in the Plan Area and,
 39 therefore, would result in a net benefit to the lesser sandhill crane population because these flight
 40 diverters would be maintained in perpetuity.

41 **NEPA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
 42 existing network of power lines in the study area currently poses a risk for lesser sandhill cranes.
 43 Under Alternative 4A, proposed transmission lines have been designed to substantially reduce the
 44 likelihood of a crane collision with transmission lines. New transmission lines constructed as part of
 45 the project would be limited to temporary lines which would be removed within the first 10–14
 46 years of Alternative 4A implementation. In addition, no new transmission lines would be sited in the

1 vicinity of Staten Island, which has high use by wintering lesser sandhill cranes. *AMM30*
2 *Transmission Line Design and Alignment Guidelines* would require design features for the
3 transmission line alignment, such as co-locating transmission lines when it would minimize effects
4 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. All new
5 transmission lines constructed for the project would be fitted with bird diverters, which have been
6 shown to reduce avian mortality by 60%. By incorporating *AMM30 Transmission Line Design and*
7 *Alignment Guidelines* and one or a combination of the measures to greatly reduce the risk of bird
8 strike described in *AMM20 Greater Sandhill Crane*, the construction and operation of transmission
9 lines under Alternative 4A would not result in an adverse effect on lesser sandhill crane.

10 **CEQA Conclusion:** Sandhill cranes are known to be susceptible to collision with overhead wires. The
11 existing network of power lines in the study area currently poses a risk for lesser sandhill cranes.
12 Under Alternative 4A, proposed transmission lines have been designed to substantially reduce the
13 likelihood of a crane collision with transmission lines. New transmission lines constructed as part of
14 the project would be limited to temporary lines which would be removed within the first 10–14
15 years of Alternative 4A implementation. In addition, no new transmission lines would be sited in the
16 vicinity of Staten Island, which has high use by wintering lesser sandhill cranes. *AMM30*
17 *Transmission Line Design and Alignment Guidelines* would require design features for the
18 transmission line alignment, such as co-locating transmission lines when it would minimize effects
19 on sandhill cranes, to avoid impacts on sensitive habitats to the maximum extent feasible. All new
20 transmission lines constructed for the project would be fitted with bird diverters, which have been
21 shown to reduce avian mortality by 60%. By incorporating *AMM30 Transmission Line Design and*
22 *Alignment Guidelines* and one or a combination of the measures to greatly reduce the risk of bird
23 strike described in *AMM20 Greater Sandhill Crane*, the construction and operation of transmission
24 lines under Alternative 4A would have a less-than-significant impact on lesser sandhill crane.

25 **Impact BIO-74: Indirect Effects of the Project on Lesser Sandhill Crane**

26 **Indirect Construction- and Operation-Related Effects:** Sandhill cranes are sensitive to
27 disturbance. Noise and visual disturbances from the construction of water conveyance facilities and
28 Environmental Commitments could reduce lesser sandhill crane use of modeled habitat adjacent to
29 work areas. Indirect effects associated with construction include noise, dust, and visual disturbance
30 caused by grading, filling, contouring, and other ground-disturbing operations outside the project
31 footprint but within 1,300 feet of the construction edge. Furthermore, maintenance of the
32 aboveground water conveyance facilities could result in ongoing but periodic postconstruction noise
33 and visual disturbances that could affect lesser sandhill crane use of surrounding habitat. These
34 effects could result from periodic vehicle use along the conveyance corridor, inspection and
35 maintenance of aboveground facilities, and similar activities. These potential effects would be
36 minimized with implementation of *AMM20 Greater Sandhill Crane*, described in Appendix 3B,
37 *Environmental Commitments, AMMs, and CMs*.

38 The BDCP includes an analysis of the indirect effects of noise and visual disturbance that would
39 result from the construction of the Alternative 4 water conveyance facilities on greater sandhill
40 crane (see BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
41 *Conveyance Facility on Sandhill Crane*, and EIR/EIS Appendix 11F, *Substantive BDCP Revisions*). The
42 analysis addressed the potential noise effects on cranes, and concluded that as much as 20,243 acres
43 of crane habitat could potentially be affected by general construction noise (including pile driving)
44 above baseline level (50–60 dBA; Table 12-4A-29). This would include 1,008 acres of permanent
45 crane roosting habitat, 1,909 acres of temporary crane roosting habitat, and 17,327 acres of crane

1 foraging habitat. The analysis was conducted based on the assumption that there would be direct
2 line-of-sight from sandhill crane habitat areas to the construction site, and, therefore, provides a
3 worst-case estimate of effects. In many areas the existing levees would partially or completely block
4 the line-of-sight and would function as effective noise barriers, substantially reducing noise
5 transmission. However, there is insufficient data to assess the effects that increased noise levels
6 would have on sandhill crane behavior. Similar acreages of lesser sandhill crane habitat would be
7 expected to be indirectly affected. However, lesser sandhill cranes are less traditional in their winter
8 roost sites and may be more likely to travel away from disturbed areas to roost and forage in more
9 suitable habitat.

10 Evening and nighttime construction activities would require the use of extremely bright lights.
11 Nighttime construction could also result in headlights flashing into roost sites when construction
12 vehicles are turning onto or off of construction access routes. Proposed surge towers would require
13 the use of safety lights that would alert low-flying aircraft to the presence of these structures
14 because of their height. Little data is available on the effects of impact of artificial lighting on
15 roosting birds. Direct light from automobile headlights has been observed to cause roosting cranes
16 to flush and it is thought that they may avoid roosting in areas where lighting is bright (see BDCP
17 Chapter 5, *Effects Analysis*). If the birds were to roost in a brightly lit site, they may be vulnerable to
18 sleep-wake cycle shifts and reproductive cycle shifts, and be more vulnerable to predators. Potential
19 risks of visual impacts from lighting include a reduction in the cranes' quality of nocturnal rest, and
20 effects on their "sense of photo-period which might cause them to shift their physiology towards
21 earlier migration and breeding." (see BDCP Chapter 5). Effects such as these could prove detrimental
22 to the cranes' overall fitness and reproductive success (which could in turn have population-level
23 impacts). A change in photo-period interpretation could also cause cranes to fly out earlier from
24 roost sites to forage and might increase their risk of power line collisions if they were to leave roosts
25 before dawn (see BDCP Chapter 5).

26 The effects of noise and visual disturbance on lesser sandhill crane would be minimized through the
27 implementation of AMM20 (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*).
28 Activities within 0.75 mile of crane roosting habitat would reduce construction noise during night
29 time hours (from one hour before sunset to one hour after sunrise) such that construction noise
30 levels do not exceed 50 dBA L_{eq} (1 hour) at the nearest temporary or permanent roosts during
31 periods when the roost sites are available (flooded). In addition, the area of crane foraging habitat
32 that would be affected during the day (from one hour after sunrise to one hour before sunset) by
33 construction noise exceeding 50 dBA L_{eq} (1 hour) would also be minimized. Unavoidable noise
34 related effects would be compensated for by the enhancement of 0.1 acre of foraging habitat for
35 every acre indirectly affected within the 50 dBA L_{eq} (1 hour) construction noise contour. With these
36 measures in place, indirect effects of noise and visual disturbance from construction activities are
37 not expected to reduce the lesser sandhill crane population in the study area.

38 The use of mechanical equipment during water conveyance facilities construction could cause the
39 accidental release of petroleum or other contaminants that could affect lesser sandhill cranes in the
40 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to lesser
41 sandhill crane habitat could also affect the subspecies. The implementation of AMM1-AMM6 would
42 minimize the likelihood of such spills and ensure that measures were in place to prevent runoff from
43 the construction area and negative effects of dust on foraging habitat (see Appendix 3B,
44 *Environmental Commitments, AMMs, and CMs*).

1 **Methylmercury Exposure:** Changes in water operations from the construction of the water
2 conveyance facilities and the implementation of *Environmental Commitment 10 Nontidal Marsh*
3 *Restoration* have the potential to exacerbate bioaccumulation of mercury in lesser sandhill cranes.
4 Largemouth bass was used as a surrogate species for analysis of impacts from changes in operations
5 from the construction of the water conveyance facilities (see Appendix 11F, *Substantive BDCP*
6 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
7 species overestimate the effects on lesser sandhill crane because of their position in the foodweb.
8 Organisms feeding within pelagic-based (algal) foodwebs have been found to have higher
9 concentrations of methylmercury than those in benthic or epibenthic foodwebs; this has been
10 attributed to food chain length and dietary segregation (Grimaldo et al. 2009). Potential indirect
11 effects of increased mercury exposure are likely low for lesser sandhill cranes because they
12 primarily forage on waste grains, other cultivated crops, and associated invertebrates. The modeled
13 effects of mercury concentrations from changes in water conveyance facilities operations on
14 largemouth bass did not differ substantially from existing conditions; therefore, results also indicate
15 that lesser sandhill crane tissue concentrations would not measurably increase as a result of water
16 conveyance facilities construction.

17 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
18 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
19 Thus, Alternative 4A restoration activities that create newly inundated areas could increase
20 bioavailability of mercury. Increased methylmercury associated with *Environmental Commitment 10*
21 *Nontidal Marsh Restoration* may indirectly affect lesser sandhill crane via uptake in lower trophic
22 levels (see Appendix 11F, Section 11F.5.2, *Effects of Contaminants on Terrestrial Species*). Mercury is
23 generally elevated throughout the Delta, and restoration of the lower potential areas in total may
24 result in generalized, very low level increases of mercury.

25 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
26 the foodweb, *Environmental Commitment 12 Methylmercury Management* is included to provide for
27 site-specific evaluation for each restoration project. If a project is identified where there is a high
28 potential for methylmercury production that could not be fully addressed through restoration
29 design and adaptive management, alternate restoration areas would be considered. Environmental
30 Commitment 12 would be implemented in coordination with other similar efforts to address
31 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
32 Environmental Commitment would include the following actions.

- 33 • Assess pre-restoration conditions to determine the risk that the project could result in increased
34 mercury methylation and bioavailability
- 35 • Define design elements that minimize conditions conducive to generation of methylmercury in
36 restored areas.

37 Define adaptive management strategies that can be implemented to monitor and minimize actual
38 postrestoration creation and mobilization of methylmercury.

39 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
40 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
41 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
42 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
43 2009). The effect of selenium toxicity differs widely between species and also between age and sex
44 classes within a species. In addition, the effect of selenium on a species can be confounded by

1 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
2 2009).

3 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
4 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
5 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
6 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
7 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
8 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
9 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
10 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
11 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
12 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
13 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
14 levels of selenium have a higher risk of selenium toxicity.

15 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
16 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
17 exacerbate bioaccumulation of selenium in avian species, including the lesser sandhill crane.
18 *Environmental Commitment 10 Nontidal Marsh Restoration* has the potential to mobilize selenium,
19 and therefore increase lesser sandhill crane exposure from ingestion of prey items with elevated
20 selenium levels. Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and
21 it was determined that, relative to Existing Conditions and the No Action Alternative, water
22 conveyance facilities would not result in substantial, long-term increases in selenium concentrations
23 in water in the Delta under any alternative. However, it is difficult to determine whether the effects
24 of potential increases in selenium bioavailability associated with restoration-related Environmental
25 Commitments (Environmental Commitment 10) would lead to adverse effects on lesser sandhill
26 crane.

27 Because of the uncertainty that exists with respect to the location of nontidal restoration activities,
28 there could be an effect on lesser sandhill crane from increases in selenium associated with
29 restoration activities. This effect would be addressed through the implementation of *AMM27*
30 *Selenium Management*, which would provide specific habitat restoration design elements to reduce
31 the potential for bioaccumulation of selenium and its bioavailability in tidal and nontidal habitats
32 (see 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
33 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
34 separately for each restoration effort as part of design and implementation. This avoidance and
35 minimization measure would be implemented as part of the restoration design.

36 **NEPA Effects:** Crane habitat could potentially be affected by general construction noise above
37 baseline level (50–60 dBA). However, lesser sandhill cranes are less traditional in their winter roost
38 sites than greater sandhill cranes and may be more likely to travel away from disturbed areas to
39 roost in more suitable habitat. Construction in certain areas would take place 7 days a week and 24
40 hours a day and evening and nighttime construction activities would require the use of extremely
41 bright lights, which could adversely affect roosting cranes by impacting their sense of photo-period
42 and by exposing them to predators. Effects of noise and visual disturbance could substantially alter
43 the suitability of habitat for lesser sandhill crane. *AMM20 Greater Sandhill Crane* would include
44 requirements (described above) to minimize the effects of noise and visual disturbance on sandhill
45 cranes and to compensate for effects on habitat.

1 The implementation of *Environmental Commitment 10 Nontidal Marsh Restoration* could result in
2 increased exposure of lesser sandhill crane to selenium which could result in the mortality of a
3 special status species. This effect would be addressed through the implementation of *AMM27*
4 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
5 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

6 The implementation of tidal natural communities restoration could result in increased exposure of
7 lesser sandhill crane to methylmercury and selenium. methylmercury and selenium. The potential
8 indirect effect of increased mercury exposure is likely low for lesser sandhill crane because they
9 primarily forage on waste grains, other cultivated crops, and associated invertebrates.

10 Implementation of Environmental Commitment 12 which contains measures to assess the amount
11 of mercury before project development, followed by appropriate design and adaptation
12 management, would minimize the potential for increased methylmercury exposure. The potential
13 effect of selenium exposure would be addressed through the implementation of *AMM27 Selenium*
14 *Management*, which would provide specific restoration design elements to reduce the potential for
15 bioaccumulation of selenium and its bioavailability in restored habitats.

16 With AMM1–AMM6, *AMM20 Greater Sandhill Crane*, *AMM27 Selenium Management*, and
17 Environmental Commitment 12 in place, the indirect effects of Alternative 4A implementation would
18 not substantially reduce the number or restrict the range of lesser sandhill crane. Therefore, the
19 indirect effects of Alternative 4A implementation on lesser sandhill crane would not be adverse
20 under NEPA.

21 **CEQA Conclusion:** Crane habitat could potentially be affected by general construction noise above
22 baseline level (50–60 dBA). However, lesser sandhill cranes are less traditional in their winter roost
23 sites and may be more likely to travel away from disturbed areas to roost in more suitable habitat.
24 Construction in certain areas would take place 7 days a week and 24 hours a day and evening and
25 nighttime construction activities would require the use of extremely bright lights, which could
26 adversely affect roosting cranes by impacting their sense of photo-period and by exposing them to
27 predators. Effects of noise and visual disturbance could substantially alter the suitability of habitat
28 for lesser sandhill crane. This would be a significant impact. With *AMM20 Greater Sandhill Crane* in
29 place, which would include requirements (described above) to minimize the effects of noise and
30 visual disturbance on sandhill cranes and to mitigate for affected habitat, there would not be an
31 adverse effect on lesser sandhill crane.

32 The implementation of *Environmental Commitment 10 Nontidal Marsh Restoration* could result in
33 increased exposure of lesser sandhill crane to methylmercury and selenium. This would be a
34 significant impact. The potential indirect effect of increased mercury exposure is likely low for lesser
35 sandhill crane because they primarily forage on cultivated crops and associated invertebrates.
36 Implementation of Environmental Commitment 12 which contains measures to assess the amount
37 of mercury before project development, followed by appropriate design and adaptation
38 management, would minimize the potential for increased methylmercury exposure. The potential
39 effect of selenium exposure would be addressed through the implementation of *AMM27 Selenium*
40 *Management*, which would provide specific restoration design elements to reduce the potential for
41 bioaccumulation of selenium and its bioavailability in restored habitats.

42 With AMM1–AMM6, *AMM20 Greater Sandhill Crane*, *AMM27 Selenium Management*, and
43 Environmental Commitment 12 in place, the indirect effects of Alternative 4A implementation would
44 not substantially reduce the number or restrict the range of lesser sandhill cranes. Therefore, the

1 indirect effects of Alternative 4A implementation would have a less-than-significant impact on lesser
2 sandhill crane.

3 **Least Bell’s Vireo and Yellow Warbler**

4 This section describes the effects of Alternative 4A, including water conveyance facilities
5 construction and implementation of Environmental Commitments, on least Bell’s vireo and yellow
6 warbler. Least Bell’s vireo and yellow warbler modeled habitat identifies suitable nesting and
7 migratory habitat as those plant alliances from the valley/foothill riparian modeled habitat that
8 contain a dense shrub component, including all willow-dominated alliances.

9 Alternative 4A would result in both temporary and permanent losses of least Bell’s vireo and yellow
10 warbler modeled habitat as indicated in Table 12-4A-32. Full implementation of Alternative 4A
11 would also include the following Environmental Commitments and Resource Restoration and
12 Performance Principles that would benefit least Bell’s vireo and yellow warbler.

- 13 • Restore or create up to 251 acres of valley/foothill riparian natural community (Environmental
14 Commitment 7).
- 15 • Protect up to 103 acres of existing valley/foothill riparian natural community (Environmental
16 Commitment 3).
- 17 • Restore, maintain, and enhance riparian areas to provide a mix of early-, mid- and late-
18 successional habitat types with a well-developed understory of dense shrubs (Resource
19 Restoration and Performance Principle VFR1).
- 20 • Maintain a single contiguous patch of 100 acres of mature riparian forest in either CZ 4 or CZ 7
21 (Resource Restoration and Performance Principle VFR2).
- 22 • The mature riparian forest will be intermixed with a portion of the early- to mid-successional
23 riparian vegetation and will be a minimum width of 330 feet where practicable (Resource
24 Restoration and Performance Principle VFR3).

25 As explained below, with the restoration and protection of these amounts of habitat, in addition to
26 natural community enhancement and management commitments and implementation of AMM1-
27 AMM7, AMM10 *Restoration of Temporarily Affected Natural Communities*, and AMM22 *Suisun Song*
28 *Sparrow, Yellow-Breasted Chat, Least Bell’s Vireo, Western Yellow-Billed Cuckoo*, and Mitigation
29 Measure BIO-75, impacts on least Bell’s vireo and yellow warbler would not be adverse for NEPA
30 purposes and would be less than significant for CEQA purposes.

31 **Table 12-4A-32. Changes in Least Bell’s Vireo and Yellow Warbler Modeled Habitat Associated**
32 **with Alternative 4A (acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Migratory and breeding	30	20
Total Impacts Water Conveyance Facilities		30	20
Environmental Commitments 4, 6-7, 9-11 ^a	Migratory and breeding	10	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		10	0
TOTAL IMPACTS		40	20

^a See discussion below for a description of applicable Environmental Commitments.

33

1 **Impact BIO-75: Loss or Conversion of Habitat for and Direct Mortality of Least Bell's Vireo**
2 **and Yellow Warbler**

3 Alternative 4A would result in the combined permanent and temporary loss of 60 acres of modeled
4 habitat (40 acres of permanent loss and 20 acres of temporary loss) for least Bell's vireo and yellow
5 warbler (Table 12-4A-32). Project measures that would result in these losses are water conveyance
6 facilities and transmission line construction, and establishment and use of reusable tunnel material
7 areas and *Environmental Commitment 4 Tidal Natural Communities Restoration*. Habitat
8 enhancement and management activities (Environmental Commitment 11), which include ground
9 disturbance or removal of nonnative vegetation, could also result in local adverse habitat effects. In
10 addition, maintenance activities associated with the long-term operation of the water conveyance
11 facilities and other physical facilities could degrade or eliminate least Bell's vireo and yellow
12 warbler habitat. Each of these individual activities is described below.

- 13 • *Water Facilities Construction*: Construction of Alternative 4A conveyance facilities would result
14 in the combined permanent and temporary loss of up to 50 acres of modeled least Bell's vireo
15 and yellow warbler habitat (Table 12-4A-32). Of the 50 acres of modeled habitat that would be
16 removed for the construction of the conveyance facilities, 30 acres would be a permanent loss
17 and 20 acres would be a temporary loss of habitat. Activities that would impact modeled habitat
18 consist of the construction of tunnel, forebay, and intake construction, permanent and
19 temporary access roads, construction of transmission lines, and temporary barge unloading
20 facilities and work areas. Impacts from water conveyance facilities would occur in the central
21 Delta in CZs 3, 4, 5, 6, and 8. Permanent habitat loss would result from the construction of
22 Intakes 2, 3, and 5 on the east bank of the Sacramento River between Freeport and Courtland.
23 Some habitat would also be impacted by the construction of a permanent access road from the
24 new forebay west to an reusable tunnel material disposal area. Additional losses would also
25 occur along Lambert Road where permanent utility lines would be installed and from the
26 construction of an operable barrier at the confluence of Old River and the San Joaquin River.
27 Temporary losses of habitat would result from the construction of a barge unloading facility
28 west of the intermediate forebay in Snodgrass Slough and where temporary work areas
29 surround intake sites. Temporarily affected areas would be restored as riparian habitat within 1
30 year following completion of construction activities as described in *AMM10 Restoration of*
31 *Temporarily Affected Natural Communities*. Although the effects are considered temporary, the
32 restored riparian habitat would require at least four years for ecological succession to occur and
33 for restored riparian habitat to functionally replace habitat that has been affected. However,
34 restored riparian vegetation can have the habitat structure to support breeding vireos within 3
35 to 5 years, particularly if the restored vegetation is adjacent to established riparian areas (Kus
36 2002), and similar habitat would be suitable for yellow warbler. The majority of the riparian
37 vegetation to be temporarily removed is early- to mid-successional; therefore, the replaced
38 riparian vegetation would be expected to have structural components comparable to the
39 temporarily removed vegetation within the first 5 to 10 years after the initial restoration
40 activities are complete. There are no occurrences of least Bell's vireo or yellow warbler that
41 intersect with the water conveyance facilities footprint. Refer to the Terrestrial Biology
42 Mapbook for a detailed view of Alternative 4A construction locations. Impacts from water
43 conveyance facilities would occur within the first 10–14 years of Alternative 4A implementation.

- 44 • *Environmental Commitment 4 Tidal Natural Communities Restoration*: Tidal habitat restoration
45 site preparation and inundation would permanently remove approximately 10 acres of modeled
46 least Bell's vireo and yellow warbler habitat.

- 1 • *Environmental Commitment 6 Channel Margin Enhancement*: Channel margin habitat
2 enhancement could result in removal of small amounts of valley/foothill riparian habitat along
3 4.6 miles of river and sloughs. The extent of this loss cannot be quantified at this time, but the
4 majority of the enhancement activity would occur along waterway margins where riparian
5 habitat stringers exist, including levees and channel banks. The improvements would occur
6 within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers, and
7 along Steamboat and Sutter Sloughs.
- 8 • *Environmental Commitment 11 Natural Communities Enhancement and Management*: Habitat
9 protection and management activities that could be implemented in protected least Bell's vireo
10 and yellow warbler habitats are expected to maintain and improve the functions of the habitat.
11 Least Bell's vireo and yellow warbler would be expected to benefit from the increase in
12 protected habitat, which would maintain conditions favorable for future species establishment
13 in the study area. If least Bell's vireo and yellow warbler established breeding populations in
14 restored riparian habitats in the study area, occupied habitat would be monitored to determine
15 if there were a need to implement controls on brood parasites (brown-headed cowbird) or nest
16 predators. If implemented, these actions would be expected to benefit the least Bell's vireo and
17 yellow warbler by removing a potential stressor that could, if not addressed, adversely affect the
18 stability of newly established populations.
- 19 Habitat management- and enhancement-related activities could disturb least Bell's vireo and
20 yellow warbler nests. If either species were to nest in the vicinity of a worksite, equipment
21 operation could destroy nests, and noise and visual disturbances could lead to their
22 abandonment, resulting in mortality of eggs and nestlings. The potential for these activities to
23 result in direct mortality of least Bell's vireo or yellow warbler would be minimized with the
24 implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
25 *Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
26 *Surveys and Avoid Disturbance of Nesting Birds*.
- 27 • *Water Facilities Operations and Maintenance*: Postconstruction operation and maintenance of
28 the above-ground water conveyance facilities and restoration infrastructure could result in
29 ongoing but periodic disturbances that could affect least Bell's vireo and yellow warbler use of
30 the surrounding habitat. Maintenance activities would include vegetation management, levee
31 and structure repair, and re-grading of roads and permanent work areas. These effects,
32 however, would be reduced by AMMs described below.
- 33 • *Injury and Direct Mortality*: Nesting of least Bell's vireo and yellow warbler has not been
34 confirmed in the study area. Although there have been recent occurrences of least Bell's vireo in
35 the Yolo Bypass and of both least Bell's vireo and yellow warbler at the San Joaquin River
36 National Wildlife Refuge, the reestablishment of a breeding population of either species unlikely
37 over the term of the project (14 years). If present in the study area, construction-related
38 activities would not be expected to result in direct mortality of least Bell's vireo or yellow
39 warbler because adults and fledged young would be expected to avoid contact with construction
40 and other equipment. If either species were to nest in the construction area, equipment
41 operation, noise and visual disturbances could destroy nests or lead to their abandonment,
42 resulting in mortality of eggs and nestlings. These effects would be avoided and minimized with
43 the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo,*
44 *Western Yellow-Billed Cuckoo*. In addition, Mitigation Measure BIO-75, *Conduct Preconstruction*
45 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address
46 adverse effects on nesting yellow warblers.

1 The following paragraphs summarize the combined effects discussed above and describe
2 Environmental Commitments, Resource Restoration and Performance Principles, and AMMs that
3 offset or avoid these effects. NEPA and CEQA conclusions are provided at the end of the section.

4 The study area supports approximately 14,850 acres of modeled habitat for least Bell's vireo and
5 yellow warbler. Alternative 4A as a whole would result in the permanent loss of and temporary
6 effects on 60 acres of habitat for these species during the term of the Plan (<1% of the total habitat
7 in the study area). These losses would occur from the construction of the water conveyance facilities
8 and from *Environmental Commitment 4 Tidal Natural Communities Restoration*. The locations of
9 these losses would be in fragmented riparian habitat throughout the study area.

10 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
11 affected would be 1:1 for restoration/creation and 1:1 protection of dense shrubby successional
12 valley/foothill riparian habitat. Using these ratios would indicate that 60 acres of valley/foothill
13 riparian habitat should be restored/created and 60 acres should be protected to compensate for the
14 losses of least Bell's vireo and yellow warbler habitat.

15 Alternative 4A includes conservation commitments through *Environmental Commitment 7 Riparian*
16 *Natural Community Restoration* and *Environmental Commitment 3 Natural Communities Protection*
17 *and Restoration* to restore or create up to 251 acres and protect up to 103 acres of valley/foothill
18 riparian woodland. Riparian areas would be restored, maintained, and enhanced to provide a mix of
19 early-, mid- and late-successional habitat types with a well-developed understory of dense shrubs
20 (Resource Restoration and Performance Principle VFR1). A single, contiguous patch of 100 acres of
21 mature riparian forest would be maintained within either CZ 4 (in the vicinity of Cosumnes River
22 Preserve) or CZ 7 (in the vicinity of San Joaquin National Wildlife Refuge and Caswell State Memorial
23 Park) (Resource Restoration and Performance Principle VFR2). The mature riparian forest would be
24 intermixed with a portion of the early- to mid-successional riparian vegetation and would be a
25 minimum width of 330 feet where practicable (Resource Restoration and Performance Principle
26 VFR3).

27 The project also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22*
31 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of
32 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
33 species habitats adjacent to work areas and storage sites. BDCP Appendix 3.C describes the AMMs,
34 which have since been updated and which are provided in Appendix 3B, *Environmental*
35 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

36 **NEPA Effects:** The loss of least Bell's vireo and yellow warbler habitat from Alternative 4A would
37 not be adverse under NEPA because project proponents have committed to avoiding and minimizing
38 effects from and to restoring and protecting an acreage that meets the typical mitigation ratios
39 described above. This habitat protection, restoration, management, and enhancement would be
40 guided by Resource Restoration and Performance Principles VFR1-VFR3, and by AMM1-AMM7, and
41 AMM22. Mitigation Measure BIO-75 would be available to address potential adverse effects on
42 nesting yellow warblers. Environmental commitments and AMMs would be in place during all
43 project activities. However, neither species is an established breeder in the study area and impacts
44 would likely be limited to loss of migratory habitat. Considering these commitments, losses and

1 conversions of least Bell's vireo and yellow warbler habitat under Alternative 4A would not be
2 adverse.

3 **CEQA Conclusion:** The loss of least Bell's vireo and yellow warbler habitat from Alternative 4A
4 would represent an adverse effect in the absence of other conservation actions as a result of habitat
5 modification and potential for direct mortality of a special-status species. However, neither species
6 is an established breeder in the study area and impacts would likely be limited to loss of migratory
7 habitat. In addition, habitat protection and restoration associated with Environmental Commitment
8 3 and Environmental Commitment 7, guided by Resource Restoration and Performance Principles
9 VFR1-VFR3 and by *AMM1 Worker Awareness Training*, *AMM2 Construction Best Management*
10 *Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention Plan*, *AMM4 Erosion and Sediment*
11 *Control Plan*, *AMM5 Spill Prevention, Containment, and Countermeasure Plan*, *AMM6 Disposal and*
12 *Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted*
13 *Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, would be in place during all project activities.
14 Considering these commitments, in addition to Mitigation Measure BIO-75, Alternative 4A would not
15 result in a substantial adverse effect through habitat modifications and would not substantially
16 reduce the number or restrict the range of least Bell's vireo or yellow warbler. Therefore,
17 Alternative 4A would have a less-than-significant impact on least Bell's vireo and yellow warbler
18 under CEQA.

19 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
20 **Disturbance of Nesting Birds**

21 To reduce impacts on nesting birds, DWR will implement the measures listed below prior to
22 construction and operations and maintenance activities.

- 23 • To the maximum extent feasible, vegetation removal and trimming will be scheduled during
24 the nonbreeding season of birds (September 1–January 31). If vegetation removal cannot be
25 removed in accordance with this timeframe, preconstruction/preactivity surveys for nesting
26 birds and additional protective measures will be implemented as described below.
- 27 • A qualified wildlife biologist with knowledge of the relevant species will conduct nesting
28 surveys before the start of construction. A minimum of three separate surveys will be
29 conducted within 30 days prior to construction, with the last survey within 3 days prior to
30 construction. Surveys will include a search of all suitable nesting habitat in the construction
31 area. In addition, a 500-foot radius around the construction area, where accessible, will be
32 surveyed for nesting raptors and species of special concern (except the Modesto song
33 sparrow), and an area within 50 feet of construction will be surveyed for other non-special
34 status nesting birds or birds protected by the MBTA. If no active nests are detected during
35 these surveys, no additional measures are required.
- 36 • If active nests are found in the survey area, no-disturbance buffers will be established
37 around the nest sites to avoid disturbance or destruction of the nest site until the end of the
38 breeding season (approximately September 1) or until a qualified wildlife biologist
39 determines that the young have fledged and moved out of the project area (this date varies
40 by species). A qualified wildlife biologist will monitor construction activities in the vicinity
41 of the nests to ensure that construction activities do not affect nest success. The extent of the
42 buffers will be determined by DWR biologists in consultation with USFWS and CDFW and
43 will depend on the level of noise or construction disturbance, line-of-sight between the nest

1 and the disturbance, ambient levels of noise and other disturbances, and other
2 topographical or artificial barriers. Suitable buffer distances may vary between species.

3 **Impact BIO-76: Fragmentation of Least Bell's Vireo and Yellow Warbler Habitat**

4 Grading, filling, contouring, and other initial ground-disturbing operations may temporarily
5 fragment modeled least Bell's vireo and yellow warbler habitat. This could temporarily reduce the
6 affected habitat's extent and functions, including exposure to cowbird parasitism, a nest parasite of
7 both species. Preconstruction surveys under *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat,*
8 *Least Bell's Vireo, Western Yellow-Billed Cuckoo* and Mitigation Measure BIO-75, *Conduct*
9 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would identify any
10 nesting pairs and the potential for habitat fragmentation to affect either species. If a nesting pairs of
11 either species were detected where fragmentation has occurred, nests would be monitored for edge
12 effects or other effects caused by the disturbance. The habitat would be adaptively managed to avoid
13 or minimize impacts (e.g., cowbird control) under Environmental Commitment 11, which includes
14 the control of nonnative predators through habitat manipulation techniques or trapping to reduce
15 nest predation.

16 **NEPA Effects:** Because there are only two recent occurrences of least Bell's vireo within the study
17 area, and no occurrences of yellow warbler breeding in the study area, habitat fragmentation
18 resulting from ground-disturbing operations is not expected to affect either species. If nesting pairs
19 of either species were detected where fragmentation has occurred, nests would be monitored for
20 edge effects or other effects caused by the disturbance. The habitat would be adaptively managed to
21 avoid or minimize impacts (e.g., cowbird control) under Environmental Commitment 11. Therefore,
22 the effect of habitat fragmentation would not have an adverse effect on least Bell's vireo or yellow
23 warbler.

24 **CEQA Conclusion:** Because there are only two recent occurrences of least Bell's vireo within the
25 study area, and no occurrences of yellow warbler breeding in the study area, habitat fragmentation
26 resulting from ground-disturbing operations would not be expected to substantially modify habitat
27 or result in the direct mortality of special status species. If nesting pairs of either species were
28 detected where fragmentation has occurred, nests would be monitored for edge effects or other
29 effects caused by the disturbance. The habitat would be adaptively managed to avoid or minimize
30 impacts (e.g., cowbird control) under Environmental Commitment 11. Therefore, the effect of
31 habitat fragmentation, as a result of Alternative 4A would have a less-than-significant impact on
32 least Bell's vireo and yellow warbler.

33 **Impact BIO-77: Effects on Least Bell's Vireo and Yellow Warbler Associated with Electrical** 34 **Transmission Facilities**

35 Both least Bell's vireo and yellow warbler typically occur in early to mid-successional riparian
36 habitat, which is used to meet all of its life requisites. Least Bell's vireo are rarely observed in open
37 habitats away from riparian vegetation. Neither species form flocks and individuals generally
38 remain at or below the riparian canopy, below the height of proposed transmission lines (see BDCP
39 Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions at Proposed BDCP Powerlines*). The
40 behavior and habitat requirements of least Bell's vireo and yellow warbler make collision with the
41 proposed transmission lines unlikely. *AMM30 Transmission Line Design and Alignment Guidelines*
42 would ensure that the transmission lines are designed to avoid sensitive terrestrial habitats
43 (including riparian) when siting poles and towers to the maximum extent feasible, which would

1 minimize the potential for collision. Marking transmission lines with flight diverters that make the
2 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
3 Drewien 1995). For example, Yee (2008) estimated that marking devices in the Central Valley could
4 reduce avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new project
5 transmission lines would be fitted with flight diverters, which would substantially reduce any
6 potential for mortality of least Bell's vireo or yellow warbler individuals from powerline collisions.

7 **NEPA Effects:** Installation and presence of new transmission lines would not result in an adverse
8 effect on least Bell's vireo or yellow warbler because the probability of bird-powerline strikes is
9 unlikely due to the behavior and habitat requirements of these species. *AMM30 Transmission Line
10 Design and Alignment Guidelines* would avoid impacts on riparian habitat to the maximum extent
11 feasible, which will minimize the potential for collision. *AMM20 Greater Sandhill Crane* contains the
12 commitment to place bird strike diverters on all new powerlines, which would substantially reduce
13 the risk of mortality from bird strike for least Bell's vireo and yellow warbler from the project.
14 Therefore, the construction and operation of new transmission lines would not result in an adverse
15 effect on least Bell's vireo or yellow warbler.

16 **CEQA Conclusion:** Installation and presence of new transmission lines would result in less-than-
17 significant impact on least Bell's vireo or yellow warbler because the probability of bird-powerline
18 strikes is unlikely due to the lack of occurrences in the study area and the behavior and habitat
19 requirements of these species. *AMM30 Transmission Line Design and Alignment Guidelines* would
20 avoid impacts on riparian habitat to the maximum extent feasible, which will minimize the potential
21 for collision. *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters
22 on all new powerlines, which would substantially reduce the risk of mortality from bird strike for
23 least Bell's vireo and yellow warbler from the project. Therefore, the construction and operation of
24 new transmission lines would result in a less-than-significant impact on least Bell's vireo or yellow
25 warbler.

26 **Impact BIO-78: Indirect Effects of The Project on Least Bell's Vireo and Yellow Warbler**

27 **Indirect Construction- and Operation-Related Effects:** If least Bell's vireo or yellow warbler were
28 to nest in or adjacent to work areas, construction and subsequent maintenance-related noise and
29 visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the
30 functions of suitable nesting habitat for these species. Construction noise above background noise
31 levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities
32 (see BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance
33 Facility on Sandhill Crane*, Table 5J.D-4, and EIR/EIS Appendix 11F, *Substantive BDCP Revisions*).
34 However, there are no available data to determine the extent to which these noise levels could affect
35 least Bell's vireo or yellow warbler. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's
36 Vireo, Western Yellow-Billed Cuckoo* would reduce the potential for adverse effects of construction-
37 related activities on survival and productivity of nesting least Bell's vireo and a 500 foot no-
38 disturbance buffer would be established around the active nest. Mitigation Measure BIO-75, *Conduct
39 Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
40 reduce the potential for adverse effects of construction-related activities on nesting yellow warbler.
41 The use of mechanical equipment during water conveyance facilities construction could cause the
42 accidental release of petroleum or other contaminants that could affect least Bell's vireo and yellow
43 warbler in the surrounding habitat. The inadvertent discharge of sediment or excessive dust
44 adjacent to suitable habitat could also have an adverse effect on these species. *AMM2 Construction
45 Best Management Practices and Monitoring* would minimize the likelihood of such spills and ensure

1 that measures are in place to prevent runoff from the construction area and negative effects of dust
2 on active nests.

3 **Methylmercury Exposure:** Project activities have the potential to exacerbate bioaccumulation of
4 mercury in avian species, including the least Bell's vireo and yellow warbler. Marsh (tidal and
5 nontidal) restoration has the potential to increase exposure to methylmercury. Mercury is
6 transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas
7 subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008).
8 Thus, Alternative 4A restoration activities that create newly inundated areas could increase
9 bioavailability of mercury. Species sensitivity to methylmercury differs widely and there is a large
10 amount of uncertainty with respect to species-specific effects. Increased methylmercury associated
11 with natural community and floodplain restoration could indirectly affect least Bell's vireo and
12 yellow warbler, via uptake in lower trophic levels (as described in Appendix 11F, *Substantive BDCP*
13 *Revisions*).

14 The potential mobilization or creation of methylmercury within the study area varies with site-
15 specific conditions and would need to be assessed at the project level. Due to the complex and very
16 site-specific factors that would determine if mercury becomes mobilized into the foodweb,
17 *Environmental Commitment 12 Methylmercury Management* is included to provide for site-specific
18 evaluation for each restoration project. If a project is identified where there is a high potential for
19 methylmercury production that could not be fully addressed through restoration design and
20 adaptive management, alternate restoration areas would be considered. Environmental
21 Commitment 12 would be implemented in coordination with other similar efforts to address
22 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
23 Environmental Commitment would include the following actions.

- 24 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
25 mercury methylation and bioavailability
- 26 ● Define design elements that minimize conditions conducive to generation of methylmercury in
27 restored areas.

28 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
29 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
30 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
31 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
32 2009). The effect of selenium toxicity differs widely between species and also between age and sex
33 classes within a species. In addition, the effect of selenium on a species can be confounded by
34 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
35 2009).

36 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
37 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
38 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
39 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
40 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
41 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
42 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
43 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
44 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which

1 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
2 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
3 levels of selenium have a higher risk of selenium toxicity.

4 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
5 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
6 exacerbate bioaccumulation of selenium in avian species, including least Bell's vireo and yellow
7 warbler. Tidal and nontidal marsh restoration has the potential to mobilize selenium, and, therefore,
8 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus, tidal
9 marsh restoration activities that create newly inundated areas could increase bioavailability of
10 selenium. Changes in selenium concentrations are analyzed in Chapter 8, *Water Quality*, which
11 concludes that, relative to Existing Conditions and the No Action Alternative, water conveyance
12 facilities would not result in substantial, long-term increases in selenium concentrations in water in
13 the Delta under any alternative.

14 There could be an effect on least Bell's vireo and yellow warbler from increases in selenium
15 associated with tidal restoration activities (Environmental Commitment 4); however, effects on the
16 species populations would be expected to be minimal because the amount of tidal restoration would
17 total up to 22 acres. Any effects would be addressed through the implementation of *AMM27*
18 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
19 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
20 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
21 selenium management to reduce selenium concentrations and/or bioaccumulation would be
22 evaluated separately for each restoration effort as part of project design and implementation. This
23 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
24 design.

25 **NEPA Effects:** Impacts of noise, the potential for hazardous spills, increased dust and sedimentation,
26 and operations and maintenance of the water conveyance facilities on least Bell's vireo would not be
27 adverse with the implementation of *AMM1-AMM7*, and *AMM22 Suisun Song Sparrow, Yellow-*
28 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. Mitigation Measure *BIO-75, Conduct*
29 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to
30 address adverse effects on nesting yellow warblers.

31 Tidal habitat restoration could result in increased exposure of least Bell's vireo and yellow warbler
32 to selenium; however, the amount of tidal restoration would total up to 22 acres, and potential
33 exposure to selenium resulting from these acres of restoration would not be expected to adversely
34 affect the species populations. Any effects would be addressed through the implementation of
35 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
36 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
37 habitats.

38 The implementation of tidal natural communities restoration could result in increased exposure of
39 least Bell's vireo and yellow warbler to methylmercury. Implementation of Environmental
40 Commitment 12, which contains measures to assess the amount of mercury before project
41 development, followed by appropriate design and adaptation management, would minimize the
42 potential for increased methylmercury exposure, and would result in no adverse effect on the
43 species.

1 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
2 sedimentation, and operations and maintenance of the water conveyance facilities would have an
3 adverse effect on least Bell's vireo and yellow warbler in the absence of Environmental
4 Commitments and AMMs as a result of habitat modification and potential for direct mortality of
5 special-status species. With the implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted*
6 *Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, Mitigation Measure BIO-75, *Conduct*
7 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and *AMM2 Construction*
8 *Best Management Practices and Monitoring* in place, the effect would not be adverse.

9 Tidal habitat restoration could result in increased exposure of least Bell's vireo and yellow warbler
10 to selenium; however, the amount of tidal restoration would total up to 22 acres, and potential
11 exposure to selenium resulting from these acres of restoration would not be expected to adversely
12 affect the species populations. Any effects would be addressed through the implementation of
13 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
14 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
15 habitats.

16 The implementation of tidal natural communities restoration could result in increased exposure of
17 least Bell's vireo and yellow warbler to methylmercury. Implementation of Environmental
18 Commitment 12 which contains measures to assess the amount of mercury before project
19 development, followed by appropriate design and adaptation management, would minimize the
20 potential for increased methylmercury exposure, and would result in no adverse effect on the
21 species.

22 With AMM1–AMM7, AMM22, and Environmental Commitment 12 in place, the indirect effects of
23 Alternative 4A implementation would not substantially reduce the number or restrict the range of
24 least Bell's vireo or yellow warbler. Therefore, the indirect effects of Alternative 4A implementation
25 would have a less-than-significant impact on least Bell's vireo or yellow warbler.

26 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
27 **Disturbance of Nesting Birds**

28 See Mitigation Measure BIO-75 under Impact BIO-75.

29 **Impact BIO-79: Periodic Effects of Inundation of Least Bell's Vireo and Yellow Warbler**
30 **Habitat as a Result of Implementation of Alternative 4A**

31 No Alternative 4A components would result in periodic effects on least Bell's vireo or yellow
32 warbler.

33 **NEPA Effects:** No effect.

34 **CEQA Conclusion:** No impact.

35 **Suisun Song Sparrow and Saltmarsh Common Yellowthroat**

36 This section describes the effects of Alternative 4A, including water conveyance facilities
37 construction and implementation of Environmental Commitments, on Suisun song sparrow and
38 saltmarsh common yellowthroat. The habitat model used to assess effects on Suisun song sparrow
39 and saltmarsh common yellowthroat is based on primary breeding habitat and secondary habitat.
40 Suisun song sparrow and saltmarsh common yellowthroat primary habitat consists of all *Salicornia*-

1 dominated tidal brackish emergent wetland and all *Typha*-, *Scirpus*-, and *Juncus*-dominated tidal
 2 freshwater emergent wetland in the study area west of Sherman Island, with the exception that
 3 *Scirpus acutus* and *S. californicus* plant communities (low marsh) and all of the plant communities
 4 listed below that occur in managed wetlands were classified as secondary habitat. Upland
 5 transitional zones, providing refugia during high tides, within 150 feet of the wetland edge were also
 6 included as secondary habitat. Secondary habitats generally provide only a few ecological functions
 7 such as foraging (low marsh and managed wetlands) or extreme high tide refuge (upland transition
 8 zones), while primary habitats provide multiple functions, including breeding, effective predator
 9 cover, and high-value forage.

10 Alternative 4A would result in no effects on modeled Suisun song sparrow and saltmarsh common
 11 yellowthroat modeled habitat as indicated in Table 12-4A-33. There is no modeled habitat for
 12 Suisun song sparrow and saltmarsh common yellowthroat in the water conveyance facilities
 13 footprint and tidal restoration under Alternative 4A would not take place in Suisun Marsh.

14 **Table 12-4A-33. Changes in Suisun Song Sparrow Saltmarsh Common Yellowthroat Modeled**
 15 **Habitat Associated with Alternative 4A (acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Primary	0	0
	Secondary	0	0
Total Impacts Water Conveyance Facilities		0	0
Environmental Commitments 4, 6-7, 9-11 ^a	Primary	0	0
	Secondary	0	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		0	0
TOTAL IMPACTS		0	0

^a See discussion below for a description of applicable Environmental Commitments.

16
 17 **Impact BIO-80: Loss or Conversion of Habitat for and Direct Mortality of Suisun Song Sparrow**
 18 **and Saltmarsh Common Yellowthroat**

19 No habitat would be lost or converted and there would be no direct mortality of Suisun song
 20 sparrow or saltmarsh common yellowthroat under Alternative 4A. As noted above, water
 21 conveyance facilities and Environmental Commitment 4 activities would not be implemented within
 22 or adjacent to Suisun Marsh, which is the only portion of the study area where the species are
 23 known to occur.

24 **NEPA Effects:** No effect.

25 **CEQA Conclusion:** No impact.

26 **Impact BIO-81: Indirect Effects of Alternative 4A on Suisun Song Sparrow and Saltmarsh**
 27 **Common Yellowthroat**

28 No indirect effects on Suisun song sparrow and saltmarsh common yellowthroat were identified
 29 under Alternative 4A. As noted above, water conveyance facilities and Environmental Commitment
 30 4 activities would not be implemented within or adjacent to Suisun Marsh, which is the only portion
 31 of the study area where these species are known to occur.

1 **NEPA Effects:** No effect.

2 **CEQA Conclusion:** No Impact.

3 **Impact BIO-82: Effects on Suisun Song Sparrow and Saltmarsh Common Yellowthroat**
4 **Associated with Electrical Transmission Facilities**

5 The range of the Suisun song sparrow extends eastward into the study area to approximately
6 Kimball Island. There are several reported occurrences from Kimball Island, Browns Island, and in
7 the Suisun Marsh in the western portion of the study area. The easternmost range of the saltmarsh
8 common yellowthroat also ends in Suisun Marsh. These species ranges, along with areas of suitable
9 habitat, are far from the proposed transmission line routes (BDCP Attachment 5.J-2, *Memorandum:*
10 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Location of the current
11 populations, species ranges, and suitable habitat in the study area make collision with the proposed
12 transmission lines highly unlikely. Therefore the construction and presence of new transmission
13 lines would not have an adverse effect on Suisun song sparrow and saltmarsh common
14 yellowthroat.

15 **NEPA Effects:** The construction and presence of new transmission lines would not have an adverse
16 effect on Suisun song sparrow and saltmarsh common yellowthroat because the location of the
17 current populations, species ranges, and suitable habitat for the species make collision with the
18 proposed transmission lines highly unlikely.

19 **CEQA Conclusion:** The construction and presence of new transmission lines would not be expected
20 to have an adverse effect on Suisun song sparrow and saltmarsh common yellowthroat because the
21 location of the current populations, species ranges, and suitable habitat for the species make
22 collision with the proposed transmission lines highly unlikely. Therefore, the construction and
23 presence of new transmission lines under Alternative 4A would have a less-than-significant impact
24 on Suisun song sparrow and saltmarsh common yellowthroat.

25 **Swainson's Hawk**

26 This section describes the effects of Alternative 4A, including water conveyance facilities
27 construction and implementation of Environmental Commitments, on Swainson's hawk. The habitat
28 model used to assess impacts on Swainson's hawk includes plant alliances and land cover types
29 associated with Swainson's hawk nesting and foraging habitat. Alternative 4A would result in both
30 temporary and permanent losses of Swainson's hawk modeled habitat as indicated in Table 12-4A-
31 34. The majority of the losses would occur from the construction of the water conveyance facilities.
32 Although protection and restoration for the loss of nesting and foraging habitat would be initiated in
33 the same timeframe as the losses, it could take one or more decades (for nesting habitat) for
34 restored habitats to replace the functions of habitat lost. This time lag between impacts and
35 restoration of habitat function would be minimized through specific requirements of *AMM18*
36 *Swainson's Hawk*, including transplanting mature trees in the first 10 years. Full implementation of
37 Alternative 4A would also include the following Environmental Commitments and Resource
38 Restoration and Performance Principles which would benefit the Swainson's hawk.

- 39
- 40 • Restore or create up to 251 acres of valley/foothill riparian natural community (Environmental
Commitment 7).
 - 41 • Protect up to 103 acres of existing valley/foothill riparian natural community (Environmental
42 Commitment 3).

- 1 • Restore, maintain, and enhance riparian areas to provide a mix of early-, mid- and late-
2 successional habitat types with a well-developed understory of dense shrubs (Resource
3 Restoration and Performance Principles VFR1).
- 4 • Maintain a single contiguous patch of 100 acres of mature riparian forest in either CZ 4 or CZ7.
5 The mature riparian forest intermixed with a portion of the early- to mid-successional riparian
6 vegetation will be a minimum width of 330 feet where practicable (Resource Restoration and
7 Performance Principles VFR1 and VFR2).
- 8 • Conserve 1 acre of Swainson’s hawk foraging habitat for each acre of lost foraging habitat in
9 minimum patch sizes of 40 acres (Resource Restoration and Performance Principle SH1).
- 10 • Protect Swainson’s hawk foraging habitat above 1 foot above mean sea level with at least 50% in
11 very high-value habitat (see Table 12-4A-35 for a definition habitat value) production (Resource
12 Restoration and Performance Principle SH2).
- 13 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
14 lands within the conservation area, including isolated valley oak trees, trees and shrubs along
15 field borders and roadsides, remnant groves, riparian corridors, water conveyance channels,
16 grasslands, ponds, and wetlands (Resource Restoration and Performance Principle CL1).

17 As explained below, with the restoration or protection of these amounts of habitat, in addition to
18 management activities that would enhance habitat for the species and implementation of AMM1–
19 AMM7, AMM10 *Restoration of Temporarily Affected Natural Communities*, and AMM18 *Swainson’s*
20 *Hawk* to minimize potential effects, impacts on Swainson’s hawk would not be adverse for NEPA
21 purposes and would be less than significant for CEQA purposes.

22 **Table 12-4A-34. Changes in Swainson’s Hawk Modeled Habitat Associated with Alternative 4A**
23 **(acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Nesting	16	10
	Foraging	3,238	1,052
Total Impacts Water Conveyance Facilities		3,254	1,062
Environmental Commitments 4, 6–7, 9–11 ^a	Nesting	5	0
	Foraging	2,427	0
Total Impacts Environmental Commitments 4, 6–9–11^a		2,432	0
Total Nesting		21	10
Total Foraging		5,665	1,052
TOTAL IMPACTS		5,686	1,062

^a See discussion below for a description of applicable Environmental Commitments.

24

25 **Impact BIO-83: Loss or Conversion of Habitat for and Direct Mortality of Swainson’s Hawk**

26 Alternative 4A would result in the combined permanent and temporary loss of up to 6,748 acres of
27 modeled habitat (31 acres of nesting habitat and 6,717 acres of foraging habitat) for Swainson’s
28 hawk (Table 12-4A-34). Project measures that would result in these losses are water conveyance
29 facilities and transmission line construction, and establishment and use of reusable tunnel material
30 areas, tidal habitat restoration (Environmental Commitment 4), riparian restoration,

(Environmental Commitment 7), grassland restoration (Environmental Commitment 8), and nontidal marsh restoration (Environmental Commitment 10). Habitat enhancement and management activities (Environmental Commitment 11), which include ground disturbance or removal of nonnative vegetation, could also result in local habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other physical facilities could affect Swainson’s hawk modeled habitat. Each of these individual activities is described below.

- Water Facilities Construction:* Construction of Alternative 4A water conveyance facilities would result in the combined permanent and temporary loss of up to 26 acres of Swainson’s hawk nesting habitat (16 acres of permanent loss habitat and 10 acres of temporary loss). In addition, 4,290 acres of foraging habitat would be removed (3,238 acres of permanent loss, 1,052 acres of temporary loss; Table 12-4A-34). Activities that would impact modeled Swainson’s hawk habitat consist of tunnel, forebay, and intake construction, temporary access roads, and construction of transmission lines. Most of the permanent loss of nesting habitat would occur where Intakes 2, 3, and 5 impact the Sacramento River’s east bank between Freeport and Courtland. The riparian areas here are very small patches, some dominated by valley oak and others by nonnative trees. Some nesting habitat would be lost due to construction of a permanent access road from the new forebay west to an reusable tunnel material disposal area. Permanent losses would also occur along Lambert Road where permanent utility lines would be installed and from the construction of an operable barrier at the confluence of Old River and the San Joaquin River. Temporary losses of nesting habitat would result from the construction of a barge unloading facility west of the intermediate forebay in Snodgrass Slough and where temporary work areas surround intake sites. The riparian habitat in these areas is also composed of very small patches or stringers bordering waterways, which are composed of valley oak and scrub vegetation. There are at least 12 occurrences of nesting Swainson’s hawk that overlap with the construction footprint of water conveyance facilities, primarily from the construction of intakes 2, 3, and 5, and the construction footprint for the permanent and temporary transmission lines. The implementation of *AMM18 Swainson’s Hawk*, would minimize the effects of construction on nesting Swainson’s hawks if present in the area (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS). Impacts on foraging habitat would occur throughout the central Delta in CZs 3–6, and CZ 8. Permanent foraging habitat impacts would include 849 acres of very high-value habitat (Table 12-4A-35). Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4A construction locations. Impacts from water conveyance facilities would occur within the first 10–14 years of Alternative 4A implementation.

Table 12-4A-35. Acres of Impacted Foraging Habitat by Value Classes for Swainson’s Hawk

Foraging Habitat Value Class	Cultivated Land and Other Land Cover Types	Water Conveyance Facilities Permanent (temporary)	Environmental Commitments Permanent (temporary)
Very high	Alfalfa hay	849 (128)	681 (0)
Moderate	Irrigated pasture, other hay crops	745 (350)	752 (0)
Low	Other irrigated field and truck/berry crops	668 (234)	551 (0)
Very low	Safflower, sunflower, corn, grain sorghum	977 (340)	443 (0)

- 1 ● *Environmental Commitment 4 Tidal Natural Communities Restoration*: Tidal habitat restoration
2 site preparation and inundation would permanently remove an estimated 5 acres of Swainson’s
3 hawk nesting habitat and 254 acres of foraging habitat. Because the species is highly mobile and
4 wide-ranging, habitat fragmentation is not expected to reduce the use of remaining cultivated
5 lands or preclude access to surrounding lands. Trees would not be actively removed but tree
6 mortality would be expected over time as areas became tidally inundated.
- 7 ● *Environmental Commitment 7 Riparian Natural Community Restoration*: Riparian restoration
8 would permanently remove approximately 251 acres of Swainson’s hawk foraging habitat.
- 9 ● *Environmental Commitment 8 Grassland Natural Community Restoration*: Grassland restoration
10 would convert approximately 1,070 acres of cultivated lands that provide Swainson’s hawk
11 foraging habitat to grassland.
- 12 ● *Environmental Commitment 10 Nontidal Marsh Restoration*: Restoration and creation of nontidal
13 freshwater marsh would result in the permanent removal of 832 acres of Swainson’s hawk
14 foraging habitat.
- 15 ● *Environmental Commitment 11 Natural Communities Enhancement and Management*: Habitat
16 management- and enhancement-related activities could disturb Swainson’s hawk nests if they
17 were present near work sites. A variety of habitat management actions that are designed to
18 enhance wildlife values in Alternative 4A-protected habitats may result in localized ground
19 disturbances that could temporarily remove small amounts of Swainson’s hawk habitat and
20 reduce the functions of habitat until restoration is complete. Ground-disturbing activities, such
21 as removal of nonnative vegetation and road and other infrastructure maintenance, are
22 expected to have minor effects on available Swainson’s hawk habitat and are expected to result
23 in overall improvements to and maintenance of habitat values. These effects cannot be
24 quantified, but are expected to be minimal and would be avoided and minimized by the AMMs
25 listed below. BDCP Appendix 3.C describes the AMMs, which have since been updated and which
26 are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.
- 27 ● Permanent and temporary nesting habitat losses from the above Environmental Commitments
28 would primarily consist of small, fragmented riparian stands. Temporarily affected nesting
29 habitat would be restored as riparian habitat within 1 year following completion of construction
30 activities as described in *AMM10 Restoration of Temporarily Affected Natural Communities*. The
31 restored riparian habitat would require 1 to several decades to functionally replace habitat that
32 has been affected and for trees to attain sufficient size and structure suitable for nesting by
33 Swainson’s hawks. *AMM18 Swainson’s Hawk* contains actions described below to reduce the
34 effect of temporal loss of nesting habitat, including the transplanting of mature trees and
35 planting of trees near high-value foraging habitat. The functions of cultivated lands and
36 grassland communities that provide foraging habitat for Swainson’s hawk are expected to be
37 restored relatively quickly (within 10–14 years of Alternative 4A implementation).
- 38 ● *Water Facilities Operations and Maintenance*: Postconstruction operation and maintenance of
39 the above-ground water conveyance facilities and restoration infrastructure could result in
40 ongoing but periodic disturbances that could affect Swainson’s hawk use of the surrounding
41 habitat. Maintenance activities would include vegetation management, levee and structure
42 repair, and re-grading of roads and permanent work areas. These effects, however, would be
43 reduced by AMM1–AMM7 and *AMM18 Swainson’s Hawk* described below.

- 1 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
2 direct mortality of adult or fledged Swainson's hawk if they were present in the study area,
3 because they would be expected to avoid contact with construction and other equipment.
4 However, if Swainson's hawk were to nest in the construction area, construction-related
5 activities, including equipment operation, noise and visual disturbances could affect nests or
6 lead to their abandonment, potentially resulting in mortality of eggs and nestlings. These effects
7 would be avoided and minimized with the incorporation of *AMM18 Swainson's Hawk* into
8 Alternative 4A.

9 The following paragraphs summarize the combined effects discussed above and describe
10 Environmental Commitments and Resource Restoration and Performance Principles that offset or
11 avoid these effects. NEPA and CEQA conclusions are also provided at the end of the section.

12 The study area supports approximately 9,796 acres of modeled nesting habitat and 477,879 acres of
13 modeled foraging habitat for Swainson's hawk. Alternative 4A as a whole would result in the
14 permanent loss of and temporary effects on 31 acres of potential nesting habitat (<1% of the
15 potential nesting habitat in the study area) and 6,748 acres of foraging habitat (1% of the foraging
16 habitat in the study area).

17 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
18 be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for nesting
19 habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 31 acres of
20 nesting habitat should be restored/created and 31 acres should be protected to compensate for the
21 losses of Swainson's hawk nesting habitat. In addition, 6,748 acres of foraging habitat should be
22 protected to mitigate the losses of Swainson's hawk foraging habitat.

23 Project proponents would commit to conserving 1 acre of Swainson's hawk foraging habitat for
24 every acre of lost foraging habitat (Resource Restoration and Performance Principle SH1). These
25 acres of cultivated lands and grasslands would be located above 1 foot above sea level, and at least
26 50% would be in very high-value production (Resource Restoration and Performance Principle
27 SH2). These Resource Restoration and Performance Principles would be associated with
28 Environmental Commitment 3 and would occur in the same timeframe as the construction and early
29 restoration losses.

30 Alternative 4A includes conservation commitments through *Environmental Commitment 7 Riparian*
31 *Natural Community Restoration* and *Environmental Commitment 3 Natural Communities Protection*
32 *and Restoration* to restore or create up to 251 acres and protect up to 103 acres of valley/foothill
33 riparian woodland, which would provide nesting habitat for Swainson's hawk. Riparian areas would
34 be restored, maintained, and enhanced to provide a mix of early-, mid- and late-successional habitat
35 types with a well-developed understory of dense shrubs. A single, contiguous patch of 100 acres of
36 mature riparian forest would be maintained in either CZ 4 or CZ 7, ensuring that acres of restored
37 and protected habitat provide habitat for nesting raptors. In addition, small but essential nesting
38 habitat for Swainson's hawk associated with cultivated lands would also be maintained and
39 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
40 farmyards or at rural residences (Environmental Commitment 3).

41 The 251 acres of restored riparian habitat would be initiated in the first 10 years to offset the loss of
42 modeled nesting habitat, but would require one to several decades to functionally replace habitat
43 that has been affected and for trees to attain sufficient size and structure suitable for nesting by
44 Swainson's hawks. This time lag between the removal and restoration of nesting habitat could have

1 a substantial impact on Swainson's hawk in the first 10 years. Nesting habitat is limited throughout
2 much of the study area, consisting mainly of intermittent riparian, isolated trees, small groves, tree
3 rows along field borders, roadside trees, and ornamental trees near rural residences. The removal of
4 nest trees or nesting habitat would further reduce this limited resource and could reduce or restrict
5 the number of active Swainson's hawk nests within the study area until restored riparian habitat is
6 sufficiently developed.

7 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
8 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
9 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
10 within the 125-acre block are removed. These mature trees would be supplemented with additional
11 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
12 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
13 addition, at least 5 trees (5-gallon container size) would be planted for every tree removed by
14 construction that was suitable for nesting by Swainson's hawks (20 feet or taller). A variety of native
15 tree species would be planted to provide trees with differing growth rates, maturation, and life span.
16 Trees would be planted in areas that support high-value Swainson's hawk foraging habitat to
17 increase nest sites, or within riparian plantings as a component of riparian restoration
18 (Environmental Commitment 7) where they are in close proximity to suitable foraging habitat.
19 Replacement trees that were incorporated into the riparian restoration would not be clustered in a
20 single region of the study area, but would be distributed throughout the lands protected as foraging
21 habitat for Swainson's hawk. Swainson's hawk foraging habitat would be protected within 3 miles of
22 a known Swainson's hawk nest tree and within 50 miles of the project footprint on land not subject
23 to threat of seasonal flooding, construction disturbances, or other conditions that would reduce the
24 foraging value of the land. Further details of AMM18 are provided in Appendix 3B, *Environmental*
25 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

26 The project also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
27 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
28 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
29 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM10*
30 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that
31 would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
32 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
33 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

34 **NEPA Effects:** The loss of Swainson's hawk nesting and foraging habitat from Alternative 4A would
35 not be adverse under NEPA because project proponents have committed to avoiding and minimizing
36 effects from and to restoring and protecting an acreage that meets or exceeds the typical mitigation
37 ratios described above. This habitat protection, restoration, management, and enhancement would
38 be guided by Resource Restoration and Performance Principles VFR1, VFR2, SH1, SH2, and CL1, and
39 by AMM1-AMM7, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM18*
40 *Swainson's Hawk*, which would be in place during all project activities. Considering these
41 commitments, losses and conversions of Swainson's hawk habitat under Alternative 4A would not
42 be adverse.

43 **CEQA Conclusion:** The effects on Swainson's hawk habitat from Alternative 4A would represent an
44 adverse effect as a result of habitat modification of a special-status species and potential for direct
45 mortality in the absence of Environmental Commitments and AMMs. However, project proponents

1 have committed to habitat protection, restoration, management, and enhancement associated with
2 Environmental Commitment 3, Environmental Commitment 7, and Environmental Commitment 11
3 that meet or exceed the typical mitigation ratios described above. These conservation activities
4 would be guided by Resource Restoration and Performance Principles VFR1, VFR2, SH1, SH2, and
5 CL1s, and by AMM1–AMM6, *AMM10 Restoration of Temporarily Affected Natural Communities*, and
6 *AMM18 Swainson’s Hawk*, which would be in place during all project activities. Considering these
7 commitments, Alternative 4A would not result in a substantial adverse effect through habitat
8 modifications and would not substantially reduce the number or restrict the range of Swainson’s
9 hawk. Therefore, Alternative 4A would have a less-than-significant impact on Swainson’s hawk
10 under CEQA.

11 **Impact BIO-84: Effects on Swainson’s Hawk Associated with Electrical Transmission Facilities**

12 New transmission lines would increase the risk that Swainson’s hawks could be subject to power
13 line strikes, which could result in injury or mortality of Swainson’s hawks. However, this species
14 would be at low risk of bird strike mortality based on factors assessed in the bird strike vulnerability
15 analysis (BDCP Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed*
16 *BDCP Transmission Lines*). Factors analyzed include the height of the new transmission lines and the
17 flight behavior of the species. The existing network of transmission lines in the study area currently
18 poses the same small risk for Swainson’s hawk, and any incremental risk associated with the new
19 power line corridors would also be expected to be low. Marking transmission lines with flight
20 diverters that make the lines more visible to birds has been shown to reduce the incidence of bird
21 mortality (Brown and Drewien 1995). Yee (2008) estimated that marking devices in the Central
22 Valley could reduce avian mortality by 60%. All new project transmission lines would be fitted with
23 flight diverters. Bird flight diverters would make transmission lines highly visible to Swainson’s
24 hawks and would further reduce any potential for powerline collisions.

25 **NEPA Effects:** New transmission lines would minimally increase the risk for Swainson’s hawk power
26 line strikes. All new transmission lines constructed as a result of the project would be fitted with
27 bird diverters, which have been shown to reduce avian mortality by 60%. With implementation of
28 *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines would not
29 result in an adverse effect on Swainson’s hawk.

30 **CEQA Conclusion:** New transmission lines would minimally increase the risk for Swainson’s hawk
31 power line strikes. All new transmission lines constructed as a result of the project would be fitted
32 with bird diverters, which have been shown to reduce avian mortality by 60%. With implementation
33 of *AMM20 Greater Sandhill Crane*, the construction and operation of transmission lines would result
34 in a less-than-significant impact on Swainson’s hawk.

35 **Impact BIO-85: Indirect Effects of The Project on Swainson’s Hawk**

36 Noise and visual disturbances from the construction of water conveyance facilities and
37 Environmental Commitments could reduce Swainson’s hawk use of modeled habitat adjacent to
38 work areas. Construction noise above background noise levels (greater than 50 dBA) could extend
39 500 to 5,250 feet from the edge of construction activities (see BDCP Appendix 5.J, Attachment 5J.D,
40 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4).
41 However, there are no available data to determine the extent to which these noise levels could affect
42 Swainson’s hawk. Moreover, operation and maintenance of the water conveyance facilities,
43 including the transmission facilities, could result in ongoing but periodic postconstruction

1 disturbances that could affect Swainson's hawk use of the surrounding habitat. Swainson's hawks
2 are seasonally abundant across much of the study area wherever adequate nest trees occur within a
3 cultivated landscape that supports suitable foraging habitat. There would be a potential for noise
4 and visual disturbances associated with Alternative 4A actions to temporarily displace Swainson's
5 hawks and temporarily reduce the use of suitable habitat adjacent to construction areas. These
6 adverse effects would be minimized with the implementation of *AMM18 Swainson's Hawk*.

7 The use of mechanical equipment during water conveyance facilities construction could cause the
8 accidental release of petroleum or other contaminants that could affect Swainson's hawk foraging in
9 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
10 suitable habitat could also have an adverse effect on these species. *AMM2 Construction Best
11 Management Practices and Monitoring* would minimize the likelihood of such spills and ensure that
12 measures are in place to prevent runoff from the construction area and negative effects of dust on
13 habitat.

14 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
15 could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover, operation
16 and maintenance of the water conveyance facilities, including the transmission facilities, could result
17 in ongoing but periodic postconstruction disturbances that could affect Swainson's hawk use of the
18 surrounding habitat. Noise, the potential for hazardous spills, increased dust and sedimentation, and
19 operations and maintenance of the water conveyance facilities would not have an adverse effect on
20 Swainson's hawk with the implementation of AMM1-AMM7, and *AMM18 Swainson's Hawk*.

21 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
22 facilities could reduce Swainson's hawk use of modeled habitat adjacent to work areas. Moreover,
23 operation and maintenance of the water conveyance facilities, including the transmission facilities,
24 could result in ongoing but periodic postconstruction disturbances that could affect Swainson's
25 hawk use of the surrounding habitat. The effects of noise, the potential for hazardous spills,
26 increased dust and sedimentation, and operations and maintenance of the water conveyance
27 facilities would result in a less-than-significant impact on Swainson's hawk with the implementation
28 of AMM1-AMM7, and *AMM18 Swainson's Hawk*.

29 **Impact BIO-86: Periodic Effects of Inundation of Swainson's Hawk Nesting and Foraging** 30 **Habitat as a Result of Implementation of Alternative 4A**

31 No Alternative 4A components would result in periodic effects on Swainson's hawk.

32 **NEPA Effects:** No effect.

33 **CEQA Conclusion:** No impact.

34 **Tricolored Blackbird**

35 This section describes the effects of Alternative 4A, including water conveyance facilities
36 construction and implementation of Environmental Commitments, on tricolored blackbird. The
37 habitat model used to assess effects for tricolored blackbird is based on breeding habitat and
38 nonbreeding habitat. Although nesting colonies have been documented along the fringe of Suisun
39 Marsh, in the Yolo Bypass, along the southwestern perimeter of the study area, and in the southeast
40 corner of the study area near the San Joaquin River, breeding colonies are uncommon in the study
41 area. Modeled breeding habitat includes bulrush/cattail wetlands and shrub communities that may
42 provide suitable nesting substrate, and adjacent high-value foraging areas that occur within 5 miles

1 of nesting colonies documented in the study area. The nesting component consists of nontidal
2 freshwater perennial emergent marsh, and valley foothill riparian natural communities that occur
3 within 5 miles of breeding colonies documented between 1998 and 2012. The foraging component
4 includes cultivated lands and noncultivated land cover types known to support abundant insect
5 populations such as grasslands, pasturelands (including alfalfa), natural seasonal wetlands, and
6 sunflower croplands. The Delta is recognized as a major wintering area for tricolored blackbird
7 (Hamilton 2004, Beedy 2008). Modeled nonbreeding habitat includes emergent wetlands and shrub
8 stands that provide suitable roosting habitat, as well as cultivated lands and noncultivated lands that
9 provide foods sought by tricolored blackbirds during the winter. Outside of the breeding season,
10 tricolored blackbirds are primarily granivores that forage opportunistically across the study area in
11 grasslands, pasturelands, croplands, dairies, and livestock feed lots. Factors considered in assessing
12 the value of affected habitat for the tricolored blackbird, include patch size, suitability of vegetation,
13 and proximity to recorded occurrences.

14 Alternative 4A would result in both temporary and permanent losses of tricolored blackbird
15 modeled breeding and nonbreeding habitat as indicated in Table 12-4A-36. Full implementation of
16 Alternative 4A would also include the following Environmental Commitments and Resource
17 Restoration and Performance Principles to benefit the tricolored blackbird.

- 18 • Protect and manage occupied or recently occupied (within the last 15 years) tricolored
19 blackbird nesting habitat located within 3 miles of high-value foraging habitat in Conservation
20 Zones 1, 2, 8, or 11. Nesting habitat will be managed to provide young, lush stands of
21 bulrush/cattail emergent vegetation and prevent vegetation senescence, or other non-marsh
22 nesting habitat suitable for the species. If sufficient acres of protection are not available, create
23 suitable nesting habitat at a ratio of 1:1 (Resource Restoration and Performance Principle TB1).
- 24 • Protect high- to very high-value breeding-foraging habitat (as defined in Table 12-4A-37)
25 (within 5 miles of occupied or recently occupied) (within the last 15 years) tricolored blackbird
26 nesting habitat. At least 130 acres will be within 3 miles of the 38 acres of nontidal wetland
27 nesting habitat protected (Resource Restoration and Performance Principle TB2).
- 28 • Protect moderate-, high-, or very high-value cultivated lands (as defined in Table 12-4A-37) as
29 nonbreeding foraging habitat, at least 50% of which is of high- or very high-value (Resource
30 Restoration and Performance Principle TB3).
- 31 • Protect up to 119 acres and restore up to 832 acres of nontidal wetland (Environmental
32 Commitment 3 and Environmental Commitment 10).

33 As explained below, with the restoration or protection of these amounts of habitat, in addition to
34 management activities that would enhance these natural communities for the species and
35 implementation of AMM1–AMM7 and *AMM21 Tricolored Blackbird*, impacts on tricolored blackbird
36 would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4A-36. Changes to Tricolored Modeled Habitat Associated with Alternative 4A (acres)**

Project Component	Habitat Type	Permanent	Temporary	
Water Conveyance Facilities	Breeding	Nesting	15	4
		Foraging-cultivated	1,389	172
		Foraging-noncultivated	290	105
	Non-breeding	Roosting	9	21
		Foraging-cultivated	1,047	487
		Foraging-noncultivated	179	53
Total Impacts Water Conveyance Facilities		2,929	842	
Environmental Commitments 4, 6-7, 9-12, and 15-16 ^a	Breeding	Nesting	0	0
		Foraging-cultivated	806	0
		Foraging-noncultivated	58	0
	Non-breeding	Roosting	17	0
		Foraging-cultivated	1,502	0
		Foraging-noncultivated	23	0
Total Impacts Environmental Commitments 4, 6-7, 9-12, and 15-16^a		2,405	0	
Total Breeding		2,558		
Total Nonbreeding		2,777		
TOTAL IMPACTS		5,335	842	

^a See discussion below for a description of applicable Environmental Commitments.

2

3 **Impact BIO-87: Loss or Conversion of Habitat for and Direct Mortality of Tricolored Blackbird**

4 Alternative 4A would result in the combined permanent and temporary loss of up to 6,177 acres of
5 modeled habitat (2,839 acres of breeding habitat and up to 3,338 acres of nonbreeding habitat) for
6 tricolored blackbird (Table 12-4A-36). Project components that would result in these losses are
7 water conveyance facilities and transmission line construction, and establishment and use of
8 reusable tunnel material areas, tidal habitat restoration (Environmental Commitment 4), riparian
9 restoration (Environmental Commitment 7), grassland restoration (Environmental Commitment 8),
10 and nontidal marsh restoration (Environmental Commitment 10). Habitat enhancement and
11 management activities (Environmental Commitment 11), which include ground disturbance or
12 removal of nonnative vegetation, could result in local adverse habitat effects. In addition,
13 maintenance activities associated with the long-term operation of the water conveyance facilities
14 and other physical facilities could degrade or eliminate tricolored blackbird habitat. Each of these
15 individual activities is described below.

- 16 • *Water Facilities Construction:* Construction of Alternative 4A water conveyance facilities would
17 result in the permanent loss of 1,694 acres of tricolored blackbird breeding habitat (15 acres
18 nesting habitat, 1,389 acres of cultivated lands, and 290 acres of noncultivated lands suitable for
19 foraging) and 1,235 acres of nonbreeding habitat (9 acres roosting habitat, 1,047 acres of
20 cultivated lands, and 179 acres of noncultivated lands suitable for foraging, Table 12-4A-36).

1 Approximately 796 of the 1,757 acres permanently impacted would be lost as reusable tunnel
2 material storage areas, which would likely be moved to other sites for use in levee build-up and
3 restoration, and the affected area would likely be restored. This effect is categorized as
4 permanent because there is no assurance that the material would eventually be moved. In
5 addition, water conveyance facilities would result in the temporary removal of 281 acres of
6 breeding habitat (4 acres nesting habitat, 172 acres of cultivated lands, and 105 acres of
7 noncultivated lands suitable for foraging) and 561 acres of nonbreeding habitat (21 acres
8 roosting habitat, 487 acres of cultivated lands, and 53 acres of noncultivated lands suitable for
9 foraging, Table 12-4A-36). *AMM21 Tricolored Blackbird* would minimize the effects of
10 construction on nesting tricolored blackbirds if present in the area (see Appendix 3B,
11 *Environmental Commitments, AMMs, and CMs*). Refer to the Terrestrial Biology Mapbook for a
12 detailed view of Alternative 4A construction locations. Impacts from water conveyance facilities
13 would occur within 10–14 years.

- 14 ● *Environmental Commitment 4 Tidal Natural Communities Restoration*: Tidal natural communities
15 restoration would result in the inundation of approximately 116 acres of breeding habitat and
16 116 acres of nonbreeding habitat. No nesting habitat would be removed as a result of tidal
17 natural communities restoration.
- 18 ● *Environmental Commitment 7 Riparian Natural Communities Restoration*: Riparian natural
19 communities restoration could remove approximately 5 acres of breeding habitat and 246 acres
20 of nonbreeding habitat.
- 21 ● *Environmental Commitment 8 Grassland Natural Communities Restoration*: Grassland natural
22 communities restoration would convert approximately 407 acres of breeding foraging habitat
23 and 663 acres of nonbreeding foraging habitat consisting of cultivated lands and grasslands.
24 Grassland provides high-value foraging habitat for tricolored blackbird during the breeding
25 season. Therefore, while impacted habitat may be temporarily unavailable, restored grasslands
26 would be expected to provide foraging habitat for the species if in the vicinity of breeding
27 colonies.
- 28 ● *Environmental Commitment 10 Nontidal Marsh Restoration*: Marsh restoration activities would
29 result in the permanent removal or conversion of approximately 316 acres of breeding foraging
30 habitat and 516 acres of nonbreeding foraging habitat (all cultivated lands suitable for foraging).
31 Some portion of the restored nontidal marsh would be open water, and the remainder would
32 support emergent wetland vegetation that could provide roosting habitat for tricolored
33 blackbird depending on vegetation density and composition.
- 34 ● *Environmental Commitment 11 Natural Communities Enhancement and Management*: A variety of
35 habitat management actions that are designed to enhance wildlife values in protected habitats
36 could result in localized ground disturbances that could permanently remove 20 acres of
37 tricolored blackbird breeding habitat and temporarily remove small amounts of tricolored
38 blackbird habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
39 road and other infrastructure maintenance, would be expected to have minor effects on
40 available tricolored blackbird habitat and are expected to result in overall improvements to and
41 maintenance of tricolored blackbird habitat values. These effects cannot be quantified, but are
42 expected to be minimal and would be avoided and minimized by the AMMs listed below. BDCP
43 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
44 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

- 1 • *Water Facilities Operations and Maintenance*: Postconstruction operation and maintenance of
2 the above-ground water conveyance facilities and restoration infrastructure could result in
3 ongoing but periodic disturbances that could affect tricolored blackbird use of the surrounding
4 habitat in or adjacent to work areas. Maintenance activities would include vegetation
5 management, levee and structure repair, and re-grading of roads and permanent work areas.
6 These effects, however, would be reduced by AMMs described below.
- 7 • *Injury and Direct Mortality*: Operation of construction equipment may cause injury to or
8 mortality of tricolored blackbirds. Risk would be greatest to eggs and nestlings susceptible to
9 land clearing activities, nest abandonment, or increased exposure to the elements or to
10 predators. Injury to or mortality of adults and fledged juveniles would not be expected as
11 individuals would be expected to avoid contact with construction equipment. Construction
12 activities could temporarily fragment existing tricolored blackbird habitat during grading, filling,
13 contouring, and other initial ground-disturbing operations that could temporarily reduce the
14 extent and functions supported by the affected habitat. Construction activities would avoid
15 active tricolored blackbird nesting colonies and associated habitat during the breeding season
16 (generally March 15–July 31). Avoidance measures would include relocating project activities
17 away from the nesting colonies and associated habitat to the maximum extent practicable. To
18 the maximum extent practicable, construction activity will be avoided up to 1,300 feet, but not
19 less than a minimum of 250 feet, from an active tricolored blackbird nesting colony. If
20 monitoring determines an activity is adversely affecting a nesting colony, construction will be
21 modified, as practicable, by either delaying construction until the colony site is abandoned or
22 until the end of the breeding season, whichever occurs first, by temporarily relocating staging
23 areas, or temporarily rerouting access to the construction site. Construction and restoration
24 projects would also be designed, in consultation with CDFW, to avoid construction activity
25 within at least 300 feet from occupied active tricolored blackbird roosting habitat. These
26 measures to avoid injury or mortality of nesting and roosting tricolored blackbirds are
27 described in *AMM21 Tricolored Blackbird* (see Appendix 3B, *Environmental Commitments, AMMs,*
28 *and CMs*).

29 The following paragraphs summarize the combined effects discussed above and describe other
30 Environmental Commitments, Resource Restoration and Performance Principles, and AMMs that
31 offset or avoid these effects. NEPA and CEQA conclusions are provided at the end of the section.

1 **Table 12-4A-37. Tricolored Blackbird Foraging Habitat Value Classes**

Foraging Habitat Value Class	Agricultural Crop Type/Habitats	
	Breeding Season ^a Foraging Habitat	Nonbreeding Season Foraging Habitat
Very high	Native pasture, nonirrigated native pasture, annual grasslands, vernal pool grasslands, alkali grasslands, unsprayed alfalfa, unsprayed sunflower, unsprayed mixed alfalfa	Livestock feed lots
High	Sunflower, alfalfa and mixed alfalfa, mixed pasture, induced high water table native pasture, nonirrigated mixed pasture, dairies,	Corn, sunflower, alfalfa and mixed alfalfa, mixed pasture, native pasture, nonirrigated native pasture, rice, dairies, annual grasslands, vernal pool grasslands, alkali grasslands
Moderate	Miscellaneous grasses, fallow lands cropped within 3 years, new lands prepped for crop production, livestock feed lots, organic rice	Miscellaneous grass pasture, nonirrigated mixed pasture, fallow lands cropped within 3 years, new lands prepped for crop production
Low	Mixed grain and hay crops, farmsteads, non-irrigated mixed grain and hay, rice	Wheat, oats, mixed grain and hay, farmsteads, unirrigated mixed grain and hay, and non-irrigated misc. grain and hay

^a Generally March through August; occasional breeding in fall (September through November).

2
3 Based on the habitat model, the study area approximately 164,947 acres of breeding and 259,093
4 acres of nonbreeding habitat for tricolored blackbird. The Delta is an important wintering area for
5 the tricolored blackbird (Hamilton 2004, Beedy 2008). Although there is a large acreage of modeled
6 breeding habitat available, the study area does not currently support many nesting tricolored
7 blackbirds with the exception of a few occurrences on the fringes of the Suisun Marsh, in the Yolo
8 Bypass, and along the southwestern perimeter of the study area. Alternative 4A would result in the
9 combined permanent and temporary loss of up to 6,177 acres of modeled habitat (2,839 acres of
10 breeding habitat and up to 3,338 acres of nonbreeding habitat) for tricolored blackbird (2% of the
11 total breeding habitat in the study area and 1% of the total nonbreeding habitat in the study area).
12 These impacts would consist of 19 acres of nesting habitat, 47 acres of roosting habitat, 708 acres of
13 noncultivated foraging habitat, and 5,403 acres of cultivated lands suitable for foraging.

14 Typical NEPA and CEQA project-level mitigation ratios would be 2:1 for protection of nesting
15 habitat, 1:1 creation and 1:1 protection of roosting wetland habitat, 2:1 protection for loss of
16 noncultivated lands suitable for foraging (for the breeding and nonbreeding season), and 1:1
17 protection for the loss of cultivated lands.

18 Project proponents would commit to protecting and managing 38 acres of occupied or recently
19 occupied (within the last 15 years) tricolored blackbird nesting habitat located within 3 miles of
20 high-value foraging habitat in Conservation Zones 1, 2, 8, or 11. Nesting habitat would be managed
21 to provide young, lush stands of bulrush/cattail emergent vegetation and prevent vegetation
22 senescence, or other non-marsh nesting habitat suitable for the species (Resource Restoration and
23 Performance Principle TB1). These acres would compensate for impacts on 19 acres of tricolored
24 blackbird nesting habitat. An additional 47 acres of nontidal wetland would be protected and 47
25 acres would be restored which would provide sufficient compensation for impacts on 47 acres of
26 roosting habitat. Alternative 4A would also commit to protecting 1,416 acres of high- to very high-

1 value breeding-foraging habitat (as defined in Table 4A-38) within 5 miles of occupied or recently
2 occupied - within the last 15 years - tricolored blackbird nesting habitat. At least 130 acres would be
3 within 5 miles of the 38 acres of nontidal wetland nesting habitat protected (Resource Restoration
4 and Performance Principle TB2). In addition, 5,403 acres of moderate-, high-, or very high-value
5 cultivated lands (as defined in Table 4A-38) would be protected as nonbreeding foraging habitat, at
6 least 50% of which would be of high- or very high-value (Resource Restoration and Performance
7 Principle TB3). These acres would be sufficient to compensate for impacts on tricolored blackbird
8 foraging habitat.

9 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
10 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
11 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
12 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
13 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
14 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
15 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
16 of the Final EIR/EIS.

17 **NEPA Effects:** The loss of tricolored blackbird breeding and nonbreeding habitat from Alternative
18 4A would not be adverse under NEPA because project proponents have committed to avoiding and
19 minimizing effects and to restoring and protecting acreages that meets the typical mitigation ratios
20 described above. This habitat protection, restoration, management, and enhancement would be
21 guided by Resource Restoration and Performance Principles TB1-TB4, and by AMM1–AMM7, and
22 *AMM21 Tricolored Blackbird*, which would be in place during all project activities. Considering these
23 commitments, losses and conversions of tricolored blackbird habitat under Alternative 4A would
24 not be adverse.

25 **CEQA Conclusion:** The effects on tricolored blackbird habitat from Alternative 4A would represent
26 an adverse effect as a result of habitat modification of a special-status species and potential for
27 direct mortality in the absence of Environmental Commitments and AMMs. However, project
28 proponents have committed to habitat protection, restoration, management, and enhancement
29 associated with Environmental Commitment 3, Environmental Commitment 10, and Environmental
30 Commitment 11. These conservation activities would be guided by Resource Restoration and
31 Performance Principles TB1-TB4, and by AMM1–AMM6, and *AMM21 Tricolored Blackbird*, which
32 would be in place during all project activities. Considering these commitments, Alternative 4A would
33 not result in a substantial adverse effect through habitat modifications and would not substantially
34 reduce the number or restrict the range of tricolored blackbird. Therefore, Alternative 4A would
35 have a less-than-significant impact on tricolored blackbird under CEQA.

36 **Impact BIO-88: Effects on Tricolored Blackbird Associated with Electrical Transmission** 37 **Facilities**

38 New transmission lines would increase the risk that tricolored blackbirds could be subject to power
39 line strikes, which could result in injury or mortality of individuals. Tricolored blackbirds would
40 have the potential to intersect the proposed transmission lines largely due to winter movements
41 throughout the study area, when individuals are migrating in large flocks and dense fog is common
42 in the area. Although migratory movements and daily flights between roosting and foraging habitat
43 make tricolored blackbird vulnerable to collision with transmission lines, daily flights associated
44 with winter foraging likely occurs in smaller flocks at heights that are lower than the transmission

1 lines (BDCP Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP*
2 *Transmission Lines*). Marking transmission lines with flight diverters that make the lines more
3 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
4 1995). For example, Yee (2008) estimated that marking devices in the Central Valley could reduce
5 avian mortality by 60%. As described in *AMM20 Greater Sandhill Crane*, all new project transmission
6 lines would be fitted with flight diverters, which would further reduce any potential for tricolored
7 blackbird collision with transmission lines.

8 Transmission line poles and towers provide perching substrate for raptors, which are predators on
9 tricolored blackbird. Although there is potential for transmission lines to result in increased
10 perching opportunities for raptors and result in increased predation pressure on tricolored
11 blackbirds, the existing network of transmission lines in the study area currently poses these risks
12 and any incremental risk associated with the new power line corridors would not be expected to
13 affect the study area population. Therefore, it is assumed that the increased risk of predation on
14 tricolored blackbird from an increase in raptor perching opportunities would be minimal.

15 **NEPA Effects:** New transmission lines would increase the risk for tricolored blackbird powerline
16 strikes, primarily in winter during daily flights between roosting and foraging sites and during
17 migration movements. *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike
18 diverters on all new powerlines, which would reduce the potential impact of the construction of new
19 transmission lines on tricolored blackbird. The increased risk of predation on tricolored blackbird
20 from an increase in raptor perching opportunities would be minimal. Therefore, the construction
21 and operation of new transmission lines under Alternative 4A would not result in an adverse effect
22 on tricolored blackbird.

23 **CEQA Conclusion:** New transmission lines would increase the risk for tricolored blackbird
24 powerline strikes, primarily in winter during daily flights between roosting and foraging sites and
25 during migration movements. *AMM20 Greater Sandhill Crane* contains the commitment to place bird
26 strike diverters on all new powerlines, which would reduce the potential impact of the construction
27 of new transmission lines on tricolored blackbird. The increased risk of predation on tricolored
28 blackbird from an increase in raptor perching opportunities would be minimal. The construction
29 and operation of new transmission lines under Alternative 4A would not substantially reduce the
30 number or restrict the range of the species and would therefore result in a less-than-significant
31 impact on tricolored blackbird.

32 **Impact BIO-89: Indirect Effects of the Project on Tricolored Blackbird**

33 **Indirect Construction- and Operation-Related Effects:** Tricolored blackbird nesting habitat
34 within the vicinity of proposed construction areas that could be indirectly affected by construction
35 activities. Construction noise above background noise levels (greater than 50 dBA) could extend 500
36 to 5,250 feet from the edge of construction activities (see BDCP Appendix 5.J, Attachment 5J.D,
37 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4,
38 and EIR/EIS Appendix 11F, *Substantive BDCP Revisions*). However, there are no available data to
39 determine the extent to which these noise levels could affect tricolored blackbird. Indirect effects
40 associated with construction include noise, dust, and visual disturbance caused by grading, filling,
41 contouring, and other ground-disturbing operations outside the project footprint but within 1,300
42 feet from the construction edge. Construction and subsequent maintenance-related noise and visual
43 disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the functions of
44 suitable nesting habitat for these species. *AMM21 Tricolored Blackbird* would require

1 preconstruction surveys, and if detected, project activities would be avoided within a minimum 250
2 feet of an active nesting colony and up to 1,300 feet where practicable until breeding has ceased. In
3 addition, monitoring would be implemented to ensure that construction does not adversely affect
4 the nesting colony. If a colony appears to be affected, the activity would be modified, as practicable,
5 by either delaying construction until the colony abandons the site or until the end of the breeding
6 season, whichever occurs first, temporarily relocating staging areas, or temporarily rerouting access
7 to the construction site. Construction and restoration projects would also be designed, in
8 consultation with CDFW, to avoid construction activity within at least 300 feet from occupied active
9 tricolored blackbird roosting habitat. The use of mechanical equipment during water conveyance
10 facilities construction could cause the accidental release of petroleum or other contaminants that
11 could affect tricolored blackbird in the surrounding habitat. The inadvertent discharge of sediment
12 or excessive dust adjacent to tricolored blackbird habitat could also affect the species. AMM1–
13 AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would minimize
14 the likelihood of such spills and ensure that measures are in place to prevent runoff from the
15 construction area and negative effects of dust on active nests.

16 **Methylmercury Exposure:** Project activities have the potential to exacerbate bioaccumulation of
17 mercury in avian species, including tricolored blackbird. Tidal and nontidal marsh restoration also
18 have the potential to increase exposure to methylmercury. Mercury is transformed into the more
19 bioavailable form of methylmercury in aquatic systems, especially areas subjected to regular
20 wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, Alternative 4A
21 restoration activities that create newly inundated areas could increase bioavailability of mercury.

22 Breeding tricolored blackbirds are not thought to be highly susceptible to methylmercury exposure
23 because tidal wetlands are not expected to be a major foraging area for the species. However,
24 species sensitivity to methylmercury differs widely and there is a large amount of uncertainty with
25 respect to species-specific effects and increased methylmercury associated with natural community
26 restoration could indirectly affect tricolored blackbird, via uptake in lower trophic levels (as
27 described in BDCP Appendix 5.D, *Contaminants*). A detailed review of the methylmercury issues
28 associated with implementation of Alternative 4A is contained in Appendix 11F, *Substantive BDCP*
29 *Revisions*. The review includes an overview of the project-related mechanisms that could result in
30 increased mercury in the foodweb, and how exposure of individual species to mercury may occur
31 based on feeding habits and where species habitat overlaps with the areas where mercury
32 bioavailability could increase.

33 Due to the complex and very site-specific factors that would determine if mercury becomes
34 mobilized into the foodweb, *Environmental Commitment 12 Methylmercury Management* is included
35 to provide for site-specific evaluation for each restoration project. On a project-specific basis, where
36 high potential for methylmercury production is identified that restoration design and adaptive
37 management cannot fully address while also meeting restoration objectives, alternate restoration
38 areas would be considered. Environmental Commitment 12 would be implemented in coordination
39 with other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury
40 Monitoring and Analysis Section. This Environmental Commitment would include the following
41 actions.

- 42 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
43 mercury methylation and bioavailability
- 44 ● Define design elements that minimize conditions conducive to generation of methylmercury in
45 restored areas.

- 1 • Define adaptive management strategies that can be implemented to monitor and minimize
2 actual postrestoration creation and mobilization of methylmercury.

3 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
4 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
5 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
6 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
7 2009). The effect of selenium toxicity differs widely between species and also between age and sex
8 classes within a species. In addition, the effect of selenium on a species can be confounded by
9 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
10 2009).

11 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
12 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
13 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
14 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
15 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
16 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
17 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
18 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
19 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
20 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
21 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
22 levels of selenium have a higher risk of selenium toxicity.

23 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
24 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
25 exacerbate bioaccumulation of selenium in avian species, including tricolored blackbird. Tidal and
26 nontidal marsh restoration have the potential to mobilize selenium, and therefore increase avian
27 exposure from ingestion of prey items with elevated selenium levels. Thus, Alternative 4A
28 restoration activities that create newly inundated areas could increase bioavailability of selenium.
29 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was
30 determined that, relative to Existing Conditions and the No Action Alternative, water conveyance
31 facilities would not result in substantial, long-term increases in selenium concentrations in water in
32 the Delta under any alternative. However, it is difficult to determine whether the effects of potential
33 increases in selenium bioavailability associated with Environmental Commitment 4 would lead to
34 adverse effects on tricolored blackbird.

35 Because of the uncertainty that exists with respect to the location of tidal restoration activities, there
36 could be a substantial effect on tricolored blackbird from increases in selenium associated with
37 restoration activities. This effect would be addressed through the implementation of *AMM27*
38 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
39 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
40 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
41 selenium management to reduce selenium concentrations and/or bioaccumulation would be
42 evaluated separately for each restoration effort as part of design and implementation. This
43 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
44 design schedule.

1 **NEPA Effects:** The effects of noise, potential spills of hazardous material, increased dust and
2 sedimentation, and operations and maintenance of the water conveyance facilities would not be
3 adverse with the implementation of AMM1–AMM7 and *AMM21 Tricolored Blackbird*.

4 Tidal habitat restoration could result in increased exposure of tricolored blackbird to selenium. This
5 effect would be addressed through the implementation of *AMM27 Selenium Management*, which
6 would provide specific tidal habitat restoration design elements to reduce the potential for
7 bioaccumulation of selenium and its bioavailability in tidal habitats.

8 The implementation of tidal natural communities restoration could result in increased exposure of
9 tricolored blackbird to methylmercury. It is unlikely that breeding tricolored blackbird would be
10 highly susceptible to methylmercury exposure because tidal wetlands are not expected to be a major
11 foraging area for the species. However, it is unknown what concentrations of methylmercury are
12 harmful to this species and the potential for increased exposure varies substantially within the study
13 area. Implementation of Environmental Commitment 12, which contains measures to assess the
14 amount of mercury before project development, followed by appropriate design and adaptation
15 management, would minimize the potential for increased methylmercury exposure, and would
16 result in no adverse effect on tricolored blackbird.

17 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
18 sedimentation, and operations and maintenance of the water conveyance facilities would be less
19 than significant with the implementation of *AMM21 Tricolored Blackbird* and AMM1–AMM7.

20 Tidal habitat restoration could result in increased exposure of tricolored blackbird to selenium. This
21 impact would be addressed through the implementation of *AMM27 Selenium Management*, which
22 would provide specific tidal habitat restoration design elements to reduce the potential for
23 bioaccumulation of selenium and its bioavailability in tidal habitats.

24 The implementation of tidal natural communities restoration could result in increased exposure of
25 tricolored blackbird to methylmercury. It is unlikely that breeding tricolored blackbird would be
26 highly susceptible to methylmercury exposure because tidal wetlands are not expected to be a major
27 foraging area for the species. However, it is unknown what concentrations of methylmercury are
28 harmful to this species. Implementation of Environmental Commitment 12, which contains
29 measures to assess the amount of mercury before project development, followed by appropriate
30 design and adaptation management, would minimize the potential for increased methylmercury
31 exposure, and would result in no adverse effect on tricolored blackbird.

32 Therefore, with AMM1–AMM7, AMM21, AMM27, and Environmental Commitment 12 in place, the
33 indirect effects of Alternative 4A implementation would not result in a substantial adverse effect
34 through habitat modification or potential mortality. Therefore, the indirect effects of Alternative 4A
35 implementation would have a less-than-significant impact on tricolored blackbird.

36 **Impact BIO-90: Periodic Effects of Inundation of Tricolored Blackbird Habitat as a Result of**
37 **Implementation of Alternative 4A**

38 No Alternative 4A components would result in periodic effects on tricolored blackbird.

39 **NEPA Effects:** No effect.

40 **CEQA Conclusion:** No impact.

1 **Western Burrowing Owl**

2 This section describes the effects of Alternative 4A, including water conveyance facilities
3 construction and implementation of Environmental Commitments, on western burrowing owl.
4 Western burrowing owl modeled habitat consisted of high- and low-value habitat for nesting and
5 foraging. High-value habitat consists of plant alliances within the grassland and vernal pool natural
6 communities and pasture. Low-value habitat includes plant alliances and crop types from managed
7 wetland, alkali seasonal wetland, and cultivated lands. Value was determined through reported
8 species use patterns from the literature.

9 Alternative 4A would result in both temporary and permanent losses of western burrowing owl
10 modeled habitat as indicated in Table 12-4A-38. Full implementation of Alternative 4A would also
11 include the following Environmental Commitment and Resource Restoration and Performance
12 Principle that would benefit the western burrowing owl.

- 13 • Protect up to 1,060 acres of grassland and 11,870 acres of cultivated lands (Environmental
14 Commitment 3). The following Swainson’s hawk Resource Restoration and Performance
15 Principles would be implemented as part of these acres and would also benefit western
16 burrowing owl:
 - 17 ○ Conserve 1 acre of Swainson’s hawk foraging habitat for each acre of lost foraging habitat in
18 a minimum of 40-acre patches (Resource Restoration and Performance Principle SH1).

19 As explained below, with the restoration or protection of these amounts of habitat, in addition to
20 management activities that would enhance habitat for the species and implementation of AMM1–
21 AMM7, and AMM23 *Western Burrowing Owl*, impacts on western burrowing owl would not be
22 adverse for NEPA purposes and would be less than significant for CEQA purposes.

23 **Table 12-4A-38. Changes in Western Burrowing Owl Modeled Habitat Associated with Alternative**
24 **4A (acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	High-value	863	314
	Low-value	2,294	559
Total Impacts Water Conveyance Facilities		3,157	873
Environmental Commitments 4, 6–7, 9–11 ^a	High-value	521	0
	Low-value	1,902	0
Total Impacts Environmental Commitments 4, 6–7, 9–11^a		2,423	0
Total High-value		1,384	314
Total Low-value		4,196	559
TOTAL IMPACTS		5,580	873

^a See discussion below for a description of applicable Environmental Commitments.

25

26 **Impact BIO-91: Loss or Conversion of Habitat for and Direct Mortality of Western Burrowing**
27 **Owl**

28 Alternative 4A would result in the combined permanent and temporary loss of up to 6,453 acres of
29 modeled habitat for western burrowing owl (of which 1,698 acres is of high-value and 4,755 acres is
30 of low value, Table 12-4A-38). Project measures that would result in these losses are water

1 conveyance facilities and transmission line construction, and establishment and use of reusable
2 tunnel material areas, *Environmental Commitment 4 Tidal Natural Communities Restoration*,
3 *Environmental Commitment 7 Riparian Natural Community Restoration*, *Environmental Commitment*
4 *8 Grassland Restoration*, *Environmental Commitment 10 Nontidal Marsh Restoration*, and
5 *Environmental Commitment 11 Natural Communities Enhancement and Management*. Habitat
6 enhancement and management activities (Environmental Commitment 11), which include ground
7 disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In
8 addition, maintenance activities associated with the long-term operation of the water conveyance
9 facilities and other physical facilities could degrade or eliminate western burrowing owl habitat.
10 Each of these individual activities is described below.

- 11 • *Water Facilities Construction*: Construction of Alternative 4A water conveyance facilities would
12 result in the combined permanent and temporary loss of up to 1,177 acres of acres of modeled
13 high-value western burrowing owl habitat (863 acres of permanent loss, 314 acres of temporary
14 loss) from CZs 3–6 and CZ 8. In addition, 2,853 acres of low-value burrowing owl habitat would
15 be removed (2,294 acres of permanent loss, 559 acres of temporary loss). The majority of high-
16 value grassland habitat that would be removed would be in CZ 8, from the construction of the
17 new forebay in CZ 8. There is a high concentration of CNDDDB and DHCCP survey records for
18 western burrowing owls in CZ 8 to the west and the south of the Clifton Court Forebay. The loss
19 of high-value habitat from facility construction and the establishment of the forebay reusable
20 tunnel material storage area could remove occupied habitat, displace nesting and wintering
21 owls, and fragment occupied burrowing owl habitat.
- 22 • The reusable tunnel material storage area overlaps with six occurrences of western burrowing
23 owl and there are also several occurrences west of the new forebay control structure that could
24 be indirectly affected by construction activities. The amount of storage area needed for reusable
25 tunnel material is flexible (dependent on storage pile height and other factors) and the footprint
26 used in the effects analysis is based on a worst case scenario. However, the actual area to be
27 affected by reusable tunnel material storage would likely be less than the estimated acreage. The
28 implementation of *AMM6 Disposal and Reuse of Spoils* and *AMM23 Western Burrowing Owl* would
29 require that to the extent practicable, the reusable tunnel material storage area footprint
30 avoided locations where active burrows are present. The footprints of a permanent
31 transmission line and a permanent access road, both located west of the Clifton Court Forebay
32 overlap with an additional 8 occurrences of western burrowing owl. Preconstruction surveys
33 would be conducted prior to any construction activities under *AMM23 Western Burrowing Owl*
34 during the nonbreeding and the breeding season. If avoidance was not possible, passive
35 relocation would be considered in consultation with CDFW. If owls were to be excluded from
36 existing burrows, artificial burrows would be used if it were possible for them to be installed
37 within 100 meters from the existing burrows on protected lands. A substantial portion of the
38 high-value grassland protection and enhancement under *Environmental Commitment 8*
39 *Grassland Natural Community Restoration* would be expected to occur to the west and to the
40 south of these occurrences in CZ 8, which would provide high-value protected lands in close
41 proximity to the disturbed habitat.
- 42 • Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4A construction
43 locations. Impacts from water conveyance facilities would occur within the first 10–14 years of
44 Alternative 4A implementation.

- 1 ● *Environmental Commitment 4 Tidal Natural Communities Restoration*: Tidal habitat restoration
2 site preparation and inundation would permanently remove an estimated 153 acres of high-
3 value and 97 acres of low-value western burrowing owl habitat.
- 4 ● *Environmental Commitment 7 Riparian Natural Community Restoration*: Riparian restoration
5 would permanently remove approximately 1 acre of high-value and 250 acres of low-value
6 western burrowing owl habitat.
- 7 ● *Environmental Commitment 8 Grassland Natural Community Restoration*: Grassland restoration
8 would permanently remove approximately 235 acres of high-value and 835 acres of low-value
9 western burrowing owl habitat.
- 10 ● *Environmental Commitment 10 Nontidal Marsh Restoration*: Implementation would result in the
11 permanent removal of 112 acres of high-value and 720 acres of low-value western burrowing
12 owl habitat.
- 13 ● *Environmental Commitment 11 Natural Communities Enhancement and Management*: A variety of
14 habitat management actions that are designed to enhance wildlife values in restored or
15 protected habitats could result in localized ground disturbances that could permanently remove
16 20 acres of high-value western burrowing owl habitat and could temporarily remove small
17 amounts of western burrowing owl habitat. The burrowing owl's fossorial habits make the
18 species more sensitive to the effects of ground disturbance than other raptors. Ground-
19 disturbing activities, such as removal of nonnative vegetation and road and other infrastructure
20 maintenance activities, would be expected to have minor adverse effects on available western
21 burrowing owl habitat and would be expected to result in overall improvements to and
22 maintenance of habitat values.
- 23 ● Habitat management- and enhancement-related activities and equipment operation could
24 destroy nests burrows, and noise and visual disturbances could lead to their abandonment,
25 resulting in mortality of eggs and nestlings. The potential for these activities to result in nest
26 failure and mortality or other adverse effects on western burrowing owl would be avoided or
27 minimized with the incorporation of *AMM23 Western Burrowing Owl* which would require
28 surveys to determine presence or absence and the establishment of no-disturbance buffers
29 around active sites.
- 30 ● *Water Facilities Operations and Maintenance*: Postconstruction operation and maintenance of
31 the above-ground water conveyance facilities and restoration infrastructure could result in
32 ongoing but periodic disturbances that could affect western burrowing owl use of the
33 surrounding habitat. Maintenance activities would include vegetation management, levee and
34 structure repair, and re-grading of roads and permanent work areas. These effects, however,
35 would be reduced by AMMs described below.
- 36 ● *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
37 western burrowing owl. However, if nest burrows were occupied in the vicinity of construction
38 activities, equipment operation could destroy nests and noise and visual disturbances could lead
39 to abandonment. *AMM23 Western Burrowing Owl* would ensure that preconstruction surveys
40 detected any occupied burrows and no-disturbance buffers would be implemented.

41 The following paragraphs summarize the combined effects discussed above and describe other
42 Environmental Commitments, Resource Restoration and Performance Principles, and AMMs that
43 offset or avoid these effects. NEPA and CEQA conclusions are provided at the end of the section.

1 Based on the habitat model, the study area supports approximately 152,014 acres of high-value and
2 254,352 acres of low-value habitat for western burrowing owl. Alternative 4A as a whole would
3 result in the permanent loss of and temporary effects on 1,698 acres of high-value habitat (1% of the
4 habitat in the study area) and 4,755 acres of low-value western burrowing owl habitat (2% of the
5 habitat in the study area). These effects would result from the construction of the water conveyance
6 facilities and implementing *Environmental Commitment 4 Tidal Natural Communities Restoration*,
7 *Environmental Commitment 7 Riparian Natural Communities Restoration*, *Environmental*
8 *Commitment 8 Grassland Natural Communities Restoration*, and *Environmental Commitment 10*
9 *Nontidal Marsh Restoration*.

10 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
11 be 2:1 protection of high-value habitat, and 1:1 protection of low-value habitat. Using these typical
12 ratios would indicate that 3,396 acres should be protected to compensate for the loss of high-value
13 habitat and 4,715 acres should be protected to compensate for the loss of low-value habitat.

14 Project proponents would commit to protect up to 1,060 acres of grassland and 11,870 acres of
15 cultivated lands, which would be sufficient to compensate for impacts on western burrowing owl
16 habitat. As part of these acres of protection, Alternative 4A would conserve 1 acre of Swainson's
17 hawk foraging habitat for every acre of lost foraging habitat (which would also benefit western
18 burrowing owl), which would total 6,805 acres. These acres would be sufficient to compensate for
19 impacts on western burrowing owl habitat.

20 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
21 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
22 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
23 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
24 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
25 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
26 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
27 of the Final EIR/EIS.

28 **NEPA Effects:** The loss of western burrowing owl habitat from Alternative 4A would not be adverse
29 under NEPA because project proponents have committed to avoiding and minimizing effects from
30 and to restoring and protecting an acreage that exceeds the typical mitigation ratios described
31 above. This habitat protection, restoration, management, and enhancement would be guided by
32 Resource Restoration and Performance Principle SH1, and by AMM1-AMM7, and *AMM23 Western*
33 *Burrowing Owl*, which would be in place during all project activities. Considering these
34 commitments, losses and conversions of western burrowing owl habitat under Alternative 4A would
35 not be adverse.

36 **CEQA Conclusion:** The effects on western burrowing owl habitat from Alternative 4A would
37 represent an adverse effect as a result of habitat modification of a special-status species and
38 potential for direct mortality in the absence of Environmental Commitments and AMMs. However,
39 project proponents have committed to habitat protection, restoration, management, and
40 enhancement associated with Environmental Commitment 3 and Environmental Commitment 11.
41 These conservation activities would be guided by Resource Restoration and Performance Principle
42 SH1, and by AMM1-AMM6 and *AMM23 Western Burrowing Owl*, which would be in place during all
43 project activities. Considering these commitments, Alternative 4A would not result in a substantial
44 adverse effect through habitat modifications and would not substantially reduce the number or

1 restrict the range of western burrowing owl. Therefore, with the implementation of Mitigation
2 Measure BIO-75, Alternative 4A would have a less-than-significant impact on western burrowing
3 owl under CEQA.

4 **Impact BIO-92: Effects on Western Burrowing Owl Associated with Electrical Transmission** 5 **Facilities**

6 New transmission lines would increase the risk for bird-power line strikes and/or electrocution,
7 which could result in injury or mortality of western burrowing owl. The species is large-bodied but
8 with relatively long and rounded wings, making it moderately maneuverable. While burrowing owls
9 may nest in loose colonies, they do not flock or congregate in roosts or foraging groups. Collectively,
10 the species' keen eyesight and largely ground-based hunting behavior make it a relatively low-risk
11 species for powerline collision. While the species is not widespread in the study area, it may become
12 more widely distributed as grassland enhancement improves habitat for the species. Even so, the
13 risk of effects on the population are low, given its physical and behavioral characteristics (BDCP
14 Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission*
15 *Lines*) and new transmission lines would not be expected to have an adverse effect on the species.
16 Marking transmission lines with flight diverters that make the lines more visible to birds has been
17 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated
18 that marking devices in the Central Valley could reduce avian mortality by 60%. All new project
19 transmission lines would be fitted with flight diverters. Bird flight diverters would make
20 transmission lines highly visible to western burrowing owls and would further reduce any potential
21 for powerline collisions.

22 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
23 adverse effect on western burrowing owl because the risk of bird strike is considered to be minimal
24 based on the owl's physical and behavioral characteristics. All new transmission lines constructed as
25 a result of the project would be fitted with bird diverters (*AMM20 Greater Sandhill Crane*), which
26 have been shown to reduce avian mortality by 60% and which would further reduce any potential
27 for powerline collisions.

28 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
29 significant impact on western burrowing owl because the risk of bird strike is considered to be
30 minimal based on the owl's physical and behavioral characteristics. All new transmission lines
31 constructed as a result of the project would be fitted with bird diverters (*AMM20 Greater Sandhill*
32 *Crane*), which have been shown to reduce avian mortality by 60% and which would further reduce
33 any potential for powerline collisions.

34 **Impact BIO-93: Indirect Effects of the Project on Western Burrowing Owl**

35 Noise and visual disturbances associated with construction-related activities could result in
36 temporary disturbances that affect western burrowing owl use of up to 13,922 acres of modeled
37 burrowing owl habitat (6,113 acres of high-value habitat) within 500 feet of project activities will
38 temporarily be made less suitable as a result of construction noise and visual disturbances adjacent
39 to proposed construction areas. Indirect effects associated with construction include noise, dust, and
40 visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations.
41 Any disturbance within 250 feet of a burrow occupied by burrowing owl during the breeding season
42 (February 1–August 31) and within 160 feet during the nonbreeding season (September 1–January
43 31) could potential displace winter owls or cause abandonment of active nests. These potential

1 effects would be minimized with incorporation of *AMM23 Western Burrowing Owl* into Alternative
2 4A, which would require preconstruction surveys and establish no-disturbance buffers around
3 active burrows. Construction noise above background noise levels (greater than 50 dBA) could
4 extend 500 to 5,250 feet from the edge of construction activities (see BDCP Appendix 5.J,
5 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
6 *Crane*, Table 5J.D-4, and EIR/EIS Appendix 11F, *Substantive BDCP Revisions*). However, there are no
7 available data to determine the extent to which these noise levels could affect western burrowing
8 owl.

9 The use of mechanical equipment during water conveyance facilities construction could cause the
10 accidental release of petroleum or other contaminants that could affect western burrowing owl in
11 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
12 western burrowing owl habitat could also affect the species. *AMM1-AMM7* in addition to *AMM23*
13 *Western Burrowing Owl* would minimize the likelihood of such spills and ensure that measures were
14 in place to prevent runoff from the construction area and any adverse effects of dust on active nests.

15 **NEPA Effects:** Indirect effects on western burrowing owl as a result of Alternative 4A
16 implementation could have adverse effects on this species through the modification of habitat and
17 potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential to
18 disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton Court
19 Forebay and adjacent to work area. With the implementation of *AMM1-AMM7*, and *AMM23 Western*
20 *Burrowing Owl*, the indirect effects from Alternative 4A implementation would not be adverse under
21 NEPA.

22 **CEQA Conclusion:** Indirect effects on western burrowing owl as a result of Alternative 4A
23 implementation could have significant impacts on these species through the modification of habitat
24 and potential for direct mortality. Construction of the new forebay in CZ 8 would have the potential
25 to disrupt nesting owls or active burrows in the high-value grassland habitat surrounding Clifton
26 Court Forebay and adjacent to work areas. With the implementation of *AMM1-AMM7* and *AMM23*
27 *Western Burrowing Owl*, the indirect effects resulting from Alternative 4A implementation would
28 have a less-than-significant impact on western burrowing owl.

29 **Impact BIO-94: Periodic Effects of Inundation on Western Burrowing Owl Habitat as a Result** 30 **of Implementation of Alternative 4A**

31 No Alternative 4A components would result in periodic effects on western burrowing owl.

32 **NEPA Effects:** No effect.

33 **CEQA Conclusion:** No impact.

34 **Western Yellow-Billed Cuckoo**

35 This section describes the effects of Alternative 4A, including water conveyance facilities
36 construction and implementation of Environmental Commitments, on western yellow-billed cuckoo.
37 The habitat model for western yellow-billed cuckoo includes potential breeding habitat, which
38 includes plant alliances from the valley/foothill riparian modeled habitat that contain a dense forest
39 canopy for foraging with understory willow for nesting, and a minimum patch size of 50 acres, and
40 migratory habitat, which includes the same plant alliances as breeding habitat without the minimum
41 50 acres patch size requirement.

1 The western yellow-billed cuckoo is uncommon in the study area at present, and the likelihood that
 2 it would be found using the modeled habitat is low relative to more abundant riparian species.
 3 Nesting of the species in the study area has not been confirmed for approximately 100 years.
 4 Western yellow-billed cuckoo was detected in the study area during 2009 DHCCP surveys, but
 5 nesting was not confirmed and the bird is suspected to have been a migrant (see Appendix 12C,
 6 *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). Alternative 4A would
 7 result in both temporary and permanent losses of Western yellow-billed cuckoo modeled habitat as
 8 indicated in Table 12-4A-39. Full implementation Alternative 4A would also include the following
 9 environmental commitments and Resource Restoration and Performance Principles which would
 10 benefit the western yellow-billed cuckoo.

- 11 • Restore or create up to 251 acres of valley/foothill riparian natural community (Environmental
 12 Commitment 7).
- 13 • Protect up to 103 acres of existing valley/foothill riparian natural community (Environmental
 14 Commitment 3).
- 15 • Restore, maintain, and enhance riparian areas to provide a mix of early-, mid- and late-
 16 successional habitat types with a well-developed understory of dense shrubs (Resource
 17 Restoration and Performance Principle VFR1).
- 18 • Maintain a single contiguous patch of 100 acres of mature riparian forest in either CZ 4 or CZ 7.
 19 The mature riparian forest will be intermixed with a portion of the early- to mid-successional
 20 riparian vegetation and will be a minimum width of 330 feet where practicable (Resource
 21 Restoration and Performance Principles VFR2 and VFR3).

22 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 23 management activities that would enhance these natural communities for the species and
 24 implementation of AMM1–AMM7, *AMM10 Restoration of Temporarily Affected Natural Communities*,
 25 and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed*
 26 *Cuckoo*, impacts on Western yellow-billed cuckoo would not be adverse for NEPA purposes and
 27 would be less than significant for CEQA purposes.

28 **Table 12-4A-39. Changes in Western Yellow-Billed Cuckoo Modeled Habitat Associated with**
 29 **Alternative 4A (acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Breeding	6	2
	Migratory	15	15
Total Impacts Water Conveyance Facilities		21	17
Environmental Commitments 4, 6–7, 9–11 ^a	Breeding	2	0
	Migratory	7	0
Total Impacts Environmental Commitments 4, 6–7, 9–11^a		9	0
Total Breeding		8	2
Total Migratory		22	15
TOTAL IMPACTS		30	17

^a See discussion below for a description of applicable Environmental Commitments.

30

Impact BIO-95: Loss or Conversion of Habitat for and Direct Mortality of Western Yellow-Billed Cuckoo

Alternative 4A would result in the combined permanent and temporary loss of up to 47 acres of modeled habitat for western yellow-billed cuckoo (10 acres of breeding habitat, 37 acres of migratory habitat, Table 12-4A-39). Project components that would result in these losses are water conveyance facilities and transmission line construction, and establishment and use of reusable tunnel material areas, and tidal habitat restoration (Environmental Commitment 4). Habitat enhancement and management activities (Environmental Commitment 11) which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other physical facilities could degrade or eliminate western yellow-billed cuckoo modeled habitat. Each of these individual activities is described below.

- Water Facilities Construction:* Construction of Alternative 4A conveyance facilities would result in the combined permanent and temporary loss of up to 8 acres of breeding habitat (6 acres of permanent loss, 2 acres of temporary loss) for yellow-billed cuckoo. In addition, 30 acres of migratory habitat would be removed (15 acres of permanent loss, 15 acres of temporary loss, see Table 12-4A-39). Activities that would impact modeled habitat consist of tunnel, forebay, and intake construction, permanent and temporary access roads, construction of transmission lines, and temporary barge unloading facilities and work areas. Impacts from water conveyance facilities would occur in the central Delta in CZs 3–6, and 8. Permanent habitat loss would occur from the construction of Intakes 2, 3, and 5 on the east bank of the Sacramento River between Freeport and Courtland. Some habitat would also be impacted by the construction of a permanent access road from the new forebay west to an reusable tunnel material disposal area. Additional losses would also occur along Lambert Road where permanent utility lines would be installed and from the construction of an operable barrier at the confluence of Old River and the San Joaquin River. Temporary losses of habitat would result from the construction of a barge unloading facility west of the intermediate forebay in Snodgrass Slough and where temporary work areas surround intake sites. Permanent and temporary habitat losses from the Environmental Commitments would primarily consist of small, fragmented riparian stands in CZ 2–CZ 8 that do not provide high-value habitat for the species. Temporarily affected areas would be restored as riparian habitat within 1 year following completion of construction activities as described in *AMM10 Restoration of Temporarily Affected Natural Communities*. Although the effects are considered temporary, the restored riparian habitat would require 5 years to several decades, for ecological succession to occur and for restored riparian habitat to functionally replace habitat that has been affected. The majority of the riparian vegetation to be temporarily removed is early- to mid-successional; therefore, the replaced riparian vegetation would be expected to have structural components comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial restoration activities are complete.

There are no extant occurrences of yellow-billed cuckoo nests in the study area; however, habitat loss from the construction of water conveyance facilities would have the potential to displace individuals, if present, and remove the functions and value of modeled habitat for nesting, protection, or foraging. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, would minimize the effects of construction on nesting cuckoos if present in the area (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4A construction

1 locations. Impacts from water conveyance facilities would occur within the first 10–14 years of
2 Alternative 4A implementation.

- 3 ● *Environmental Commitment 4 Tidal Natural Communities Restoration*: Tidal habitat restoration
4 site preparation and inundation would permanently remove an estimated 2 acres of modeled
5 yellow-billed cuckoo breeding habitat and 7 acres of modeled migratory habitat. There are no
6 extant nesting records of yellow-billed cuckoo in the study area. However, a yellow-billed
7 cuckoo detection was recorded during DHCCP surveys in 2009 (see Appendix 12C, *2009 to 2011*
8 *Bay Delta Conservation Plan EIR/EIS Environmental Data Report*) in CZ 5 between Twin Cities
9 Road and Walnut Grove.
- 10 ● *Environmental Commitment 11 Natural Communities Enhancement and Management*: Habitat
11 protection and management activities that could be implemented in protected western yellow-
12 billed cuckoo habitats would maintain and improve the functions of the habitat. With conditions
13 favorable for its future establishment in the study area, western yellow-billed cuckoo would be
14 expected to benefit from the increase in protected habitat. However, habitat management- and
15 enhancement-related activities could disturb western yellow-billed cuckoo nests if they were
16 present near work sites. Environmental Commitment 11 actions designed to enhance wildlife
17 values in restored riparian habitats may result in localized ground disturbances that could
18 temporarily remove small amounts of western yellow-billed cuckoo habitat. Ground-disturbing
19 activities, such as removal of nonnative vegetation and road and other infrastructure
20 maintenance activities, would be expected to have minor adverse effects on available western
21 yellow-billed cuckoo habitat and would be expected to result in overall improvements and
22 maintenance of western yellow-billed cuckoo habitat values.
- 23 ● *Water Facilities Operations and Maintenance*: Postconstruction operation and maintenance of
24 the above-ground water conveyance facilities and restoration infrastructure could result in
25 ongoing but periodic disturbances that could affect western yellow-billed cuckoo use of the
26 surrounding habitat. Maintenance activities would include vegetation management, levee and
27 structure repair, and re-grading of roads and permanent work areas. These effects, however,
28 would be reduced by AMMs described below.
- 29 ● *Injury and Direct Mortality*: Western yellow-billed cuckoo nesting has not been confirmed in the
30 Delta for approximately 100 years. However, an unconfirmed breeding detection during 2009
31 DHCCP surveys (see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS*
32 *Environmental Data Report*) and the presence of suitable habitat indicate that the species is
33 potentially breeding in the study area, or may nest there in the future. Construction-related
34 activities would not be expected to result in direct mortality of adult or fledged western yellow-
35 billed cuckoo if they were present in the study area, because they would be expected to avoid
36 contact with construction and other equipment. Although there is minimal habitat in the Plan
37 Area that is of appropriate width, and suitable understory to support nesting cuckoos, if western
38 yellow-billed cuckoo were to nest in the construction area, construction-related activities,
39 including equipment operation, noise and visual disturbances could destroy nests or lead to
40 their abandonment, resulting in mortality of eggs and nestlings. as described in *AMM22 Suisun*
41 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*, to the
42 extent feasible, the contractor will employ best management practices to reduce construction
43 noise during daytime and evening hours (7:00 a.m. to 10:00 p.m.) such that construction noise
44 levels do not exceed 60 dBA (A-weighted decibel) Leq (1 hour) at the nearest western yellow-
45 billed cuckoo migratory habitat during migration periods. Limit construction during nighttime
46 hours (10:00 p.m. to 7:00 a.m.) such that construction noise levels do not exceed 50 dBA

1 Lmax[1] at the nearest residential land uses. Limit pile driving to daytime hours (7:00 a.m. to
2 7:00 p.m.). Locate, store, and maintain portable and stationary equipment as far as possible from
3 suitable western yellow-billed cuckoo habitat. Employ preventive maintenance including
4 practicable methods and devices to control, prevent, and minimize noise. Route truck traffic in
5 order to reduce construction noise impacts and traffic noise levels within 1,200 feet of suitable
6 western yellow-billed cuckoo migratory habitat during migration periods. Limit trucking
7 activities (e.g., deliveries, export of materials) to the hours of 7:00 a.m. to 10:00 p.m. Screen all
8 lights and direct them down toward work activities away from migratory habitat. A biological
9 construction monitor will ensure that lights are properly directed at all times. Operate portable
10 lights at the lowest allowable wattage and height, while in accordance with the National
11 Cooperative Highway Research Program's Report 498: Illumination Guidelines for Nighttime
12 Highway Work.

13 The following paragraphs summarize the combined effects discussed above and describe other
14 Environmental Commitments, Resource Restoration and Performance Principles, and AMMs that
15 offset or avoid these effects. NEPA and CEQA conclusions are provided at the end of the section.

16 The habitat model indicates that the study area supports approximately 12,395 acres of modeled
17 breeding and migratory habitat for yellow-billed cuckoo. Alternative 4A as a whole would result in
18 the permanent loss of and temporary effects on 47 acres of modeled habitat (<1% of the modeled
19 habitat in the study area). These losses would occur from the construction of the water conveyance
20 facilities and from *Environmental Commitment 4 Tidal Natural Communities Restoration*. The
21 locations of these losses would be in fragmented riparian habitat throughout the study area.

22 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
23 affected would be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat.
24 Using these ratios would indicate that 47 acres of valley/foothill riparian habitat should be
25 restored/created and 47 acres should be protected to compensate for the losses of western yellow-
26 billed cuckoo habitat.

27 Alternative 4A includes conservation commitments through *Environmental Commitment 7 Riparian*
28 *Natural Community Restoration* and *Environmental Commitment 3 Natural Communities Protection*
29 *and Restoration* to restore or create up to 251 acres and protect up to 103 acres of valley/foothill
30 riparian woodland. Riparian areas would be restored, maintained, and enhanced to provide a mix of
31 early-, mid- and late-successional habitat types with a well-developed understory of dense shrubs
32 (Resource Restoration and Performance Principle VFR1). A single, contiguous patch of 100 acres of
33 mature riparian forest would be maintained within either CZ 4 (in the vicinity of Cosumnes River
34 Preserve) or CZ 7 (in the vicinity of San Joaquin National Wildlife Refuge and Caswell State Memorial
35 Park) to ensure that restored and protected riparian would be of sufficient size to provide suitable
36 habitat for yellow-billed cuckoo (Resource Restoration and Performance Principle VFR2). The
37 mature riparian forest would be intermixed with a portion of the early- to mid-successional riparian
38 vegetation and would be a minimum width of 330 feet where practicable (Resource Restoration and
39 Performance Principle VFR3).

40 The project also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
41 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
42 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
43 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
44 *Restoration of Temporarily Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-*

1 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo.* All of these AMMs include elements
2 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
3 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
4 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
5 EIR/EIS.

6 **NEPA Effects:** The loss of western yellow-billed cuckoo habitat from Alternative 4A would not be
7 adverse under NEPA because project proponents have committed to avoiding and minimizing
8 effects from and to restoring and protecting an acreage that meets the typical mitigation ratios
9 described above. This habitat protection, restoration, management, and enhancement would be
10 guided by Resource Restoration and Performance Principles VFR1-VFR3, and by AMM1-AMM7,
11 AMM10, and AMM22. These environmental commitments and AMMs would be in place during all
12 project activities. Considering these commitments, losses and conversions of western yellow-billed
13 cuckoo habitat under Alternative 4A would not be adverse.

14 **CEQA Conclusion:** The loss of western yellow-billed cuckoo habitat from Alternative 4A would
15 represent an adverse effect in the absence of Environmental Commitments and AMMs as a result of
16 habitat modification and potential for direct mortality of a special-status species. However, habitat
17 protection and restoration associated with Environmental Commitment 3 and Environmental
18 Commitment 7, guided by Resource Restoration and Performance Principles VFR1-VFR3 and by
19 *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and Monitoring,*
20 *AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill*
21 *Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge*
22 *Operations Plan, AMM10 Restoration of Temporarily Affected Natural Communities, and AMM22*
23 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,* would
24 be in place during all project activities. Considering these commitments, Alternative 4A would not
25 result in a substantial adverse effect through habitat modifications and would not substantially
26 reduce the number or restrict the range of western yellow-billed cuckoo. Therefore, Alternative 4A
27 would have a less-than-significant impact on western yellow-billed cuckoo under CEQA.

28 **Impact BIO-96: Fragmentation of Western Yellow-Billed Cuckoo Habitat as a Result of** 29 **Constructing the Water Conveyance Facilities**

30 Grading, filling, contouring, and other initial ground-disturbing operations for water conveyance
31 facilities construction may temporarily fragment modeled western yellow-billed cuckoo habitat.
32 This could temporarily reduce the extent and functions supported by the affected habitat. Because
33 western yellow-billed cuckoo is not currently known to breed in the study area, and the protection
34 and restoration of riparian habitat will expand contiguous habitat block requirements, habitat
35 fragmentation would have a minimal effect on the species.

36 **NEPA Effects:** Because western yellow-billed cuckoo is not currently known to breed in the study
37 area and the protection and restoration of riparian habitat will expand contiguous habitat block
38 requirements, fragmentation of habitat would not have an adverse effect on western yellow-billed
39 cuckoo.

40 **CEQA Conclusion:** Because western yellow-billed cuckoo is not currently known to breed in the
41 study area and the protection and restoration of riparian habitat will expand contiguous habitat
42 block requirements, fragmentation of habitat would have a less-than-significant impact on western
43 yellow-billed cuckoo.

1 **Impact BIO-97: Effects on Western Yellow-Billed Cuckoo Associated with Electrical**
2 **Transmission Facilities**

3 New transmission lines would increase the risk for bird-power line strikes, which could result in
4 injury or mortality of western yellow-billed cuckoo. Because the western yellow-billed cuckoo uses
5 riparian forests to meet all of its breeding and wintering life requisites, the species remains
6 primarily within the canopy of riparian forests and rarely ventures into open spaces except during
7 migration, limiting its opportunity to encounter the proposed transmission lines. As a summer
8 resident, if the species were to occur in the study area it would be during periods of relatively high
9 visibility and clear weather conditions, thus further reducing collision risk from daily use patterns
10 or seasonal migration flights. Finally, western yellow-billed cuckoo wing shape is characterized by
11 low wing loading and a moderate aspect ratio, making the species moderately maneuverable and
12 presumably able to avoid collisions, especially during high-visibility conditions (BDCP Attachment
13 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*).

14 Transmission line poles and towers also provide perching substrate for raptors, which are predators
15 on western yellow-billed cuckoo. Although there is potential for transmission lines to result in
16 increased perching opportunities for raptors, the existing network of transmission lines in the study
17 area currently poses these risks and any incremental risk associated with the new power line
18 corridors would not be expected to affect the population. In addition, the transmission lines that
19 would be constructed in the vicinity of modeled western yellow-billed cuckoo habitat would be
20 temporary and would be removed within 10–14 years of Alternative 4A implementation. Because
21 there is low probability for the species to occur in the study area, and because the transmission lines
22 that would be constructed near modeled habitat would be temporary, any increased risk of
23 predation on western yellow-billed cuckoo from an increase in raptor perching opportunities would
24 be minimal.

25 **NEPA Effects:** The risk of bird-strike is considered to be minimal based on the species' rarity in the
26 study area, its proclivity to remain in the riparian canopy, its presence in the study area during
27 periods of relative high visibility, and its overall ability to successfully negotiate around overhead
28 wires that it may encounter. Transmission line poles and towers also provide perching substrate for
29 raptors, which could result in increased predation pressure on western yellow-billed cuckoo.
30 However, because there is a low probability for the species to occur in the study area, and because
31 the transmission lines that would be constructed near modeled habitat would be temporary, any
32 increased risk of predation on western yellow-billed cuckoo from an increase in raptor perching
33 opportunities would be minimal. Therefore, the construction and operation of new transmission
34 lines under Alternative 4A would not result in an adverse effect on western yellow-billed cuckoo.

35 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
36 significant impact on western yellow-billed cuckoo because the risk of bird-strike is considered to
37 be minimal based on the species' rarity in the study area, its proclivity to remain in the riparian
38 canopy, its presence during periods of relative high visibility, and its overall ability to successfully
39 negotiate around overhead wires that it may encounter. Transmission line poles and towers also
40 provide perching substrate for raptors, which could result in increased predation pressure on
41 western yellow-billed cuckoo. However, because there is a low probability for the species to occur in
42 the study area, and because the transmission lines that would be constructed near modeled habitat
43 would be temporary, any increased risk of predation on western yellow-billed cuckoo from an
44 increase in raptor perching opportunities would be minimal. Therefore, the construction and

1 operation of new transmission lines under Alternative 4A would result in a less-than-significant
 2 impact on western yellow-billed cuckoo.

3 **Impact BIO-98: Indirect Effects of the Project on Western Yellow-Billed Cuckoo**

4 **Construction- and operation-related effects:** Noise and visual disturbances associated with
 5 construction-related activities could result in temporary disturbances that affect western yellow-
 6 billed cuckoo use of modeled habitat adjacent to proposed construction areas. Construction noise
 7 above background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge
 8 of construction activities (see BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*
 9 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and EIR/EIS Appendix
 10 11F, *Substantive BDCP Revisions*). However, there are no available data to determine the extent to
 11 which these noise levels could affect western yellow-billed cuckoo. Indirect effects associated with
 12 construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and
 13 other ground-disturbing operations outside the project footprint but within 1,300 feet from the
 14 construction edge. If western yellow-billed cuckoo were to nest in or adjacent to work areas,
 15 construction and subsequent maintenance-related noise and visual disturbances could mask calls,
 16 disrupt foraging and nesting behaviors, and reduce the functions of suitable nesting habitat for these
 17 species. These potential effects would be minimized with incorporation of *AMM22 Suisun Song*
 18 *Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* into Alternative 4A
 19 which would require a no disturbance buffer around nest sites during the breeding season in
 20 addition to monitoring and noise reducing measures. To the extent feasible, the contractor will
 21 employ best practices to reduce construction noise during daytime and evening hours (7:00 a.m. to
 22 10:00 p.m.) such that construction noise levels do not exceed 60 dBA (A-weighted decibel) Leq (1
 23 hour) at the nearest western yellow-billed cuckoo migratory habitat during migration periods. Limit
 24 construction during nighttime hours (10:00 p.m. to 7:00 a.m.) such that construction noise levels do
 25 not exceed 50 dBA Lmax[1] at the nearest residential land uses. Limit pile driving to daytime hours
 26 (7:00 a.m. to 7:00 p.m.). Locate, store, and maintain portable and stationary equipment as far as
 27 possible from suitable western yellow-billed cuckoo habitat. Employ preventive maintenance
 28 including practicable methods and devices to control, prevent, and minimize noise. Route truck
 29 traffic in order to reduce construction noise impacts and traffic noise levels within 1,200 feet of
 30 suitable western yellow-billed cuckoo migratory habitat during migration periods. Limit trucking
 31 activities (e.g., deliveries, export of materials) to the hours of 7:00 a.m. to 10:00 p.m. Screen all lights
 32 and direct them down toward work activities away from migratory habitat. A biological construction
 33 monitor will ensure that lights are properly directed at all times. Operate portable lights at the
 34 lowest allowable wattage and height, while in accordance with the National Cooperative Highway
 35 Research Program's Report 498: *Illumination Guidelines for Nighttime Highway Work*. The use of
 36 mechanical equipment during water conveyance facilities construction could cause the accidental
 37 release of petroleum or other contaminants that could affect western yellow-billed cuckoo in the
 38 surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to western
 39 yellow-billed cuckoo habitat could also affect the species. AMM1-AMM7, including *AMM2*
 40 *Construction Best Management Practices and Monitoring*, in addition to *AMM22 Suisun Song Sparrow*,
 41 *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* would minimize the likelihood
 42 of such spills from occurring and ensure that measures were in place to prevent runoff from the
 43 construction area and any adverse effects of dust on active nests.

44 **Methylmercury Exposure:** The modeled primary habitat for western yellow-billed cuckoo includes
 45 tidal brackish emergent wetland and tidal freshwater emergent wetland in Suisun Marsh and the

1 Delta west of Sherman Island, and instream islands and White Slough Wildlife Area in the central
2 Delta. Cuckoos typically occur in the high marsh zone near the upper limit of tidal flooding in salt
3 and brackish habitats. Low marsh, managed wetlands, and the upland fringe are considered
4 secondary habitat. Cuckoos are a top predator in the benthic food chain; they nest and forage in
5 dense vegetation and prey on isopods, insects and arthropods from the surface of mud and
6 vegetation. They also consume insects and seeds from bulrushes (*Schoenoplectus* spp.) and cattails
7 (*Typha* spp.) (Eddleman et al. 1994).

8 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
9 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
10 species would overestimate the effects on yellow-billed cuckoo. Organisms feeding within pelagic-
11 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those
12 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
13 segregation (Grimaldo et al. 2009). Modeled effects of mercury concentrations from changes in
14 operations of water conveyance facilities on largemouth bass did not differ substantially from
15 existing conditions; therefore, results also indicate that yellow-billed cuckoo mercury tissue
16 concentrations would not measurably increase as a result of water conveyance facilities
17 implementation.

18 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
19 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
20 Thus, Alternative 4A restoration activities that create newly inundated areas could increase
21 bioavailability of mercury. In general, the highest methylation rates are associated with high tidal
22 marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers
23 et al. 2008). Mercury is generally elevated throughout the Delta, and restoration of the lower
24 potential areas in total may result in generalized, very low level increases of mercury. Given that
25 some species have existing elevated mercury tissue levels, these low level increases could result in
26 some level of effects. Environmental Commitment 12 would be implemented to address the risk that
27 low level increases in methylmercury could add to the current elevated concentrations in tissue.

28 Because of the complex and very site-specific factors that would determine if mercury becomes
29 mobilized into the foodweb, *Environmental Commitment 12 Methylmercury Management* is included
30 to provide for site-specific evaluation for each restoration project. If a project is identified where
31 there is a high potential for methylmercury production that could not be fully addressed through
32 restoration design and adaptive management, alternate restoration areas would be considered.
33 Environmental Commitment 12 would be implemented in coordination with other similar efforts to
34 address mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis
35 Section. This Environmental Commitment would include the following actions.

- 36 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
37 mercury methylation and bioavailability.
- 38 ● Define design elements that minimize conditions conducive to generation of methylmercury in
39 restored areas.
- 40 ● Define adaptive management strategies that can be implemented to monitor and minimize
41 actual postrestoration creation and mobilization of methylmercury.

42 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
43 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
44 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,

1 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 2 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 3 classes within a species. In addition, the effect of selenium on a species can be confounded by
 4 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 5 2009).

6 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 7 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 8 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 9 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 10 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 11 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 12 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 13 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 14 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 15 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
 16 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 17 levels of selenium have a higher risk of selenium toxicity.

18 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 19 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
 20 exacerbate bioaccumulation of selenium in avian species, including western yellow-billed cuckoo.
 21 Tidal and nontidal marsh restoration has the potential to mobilize selenium, and, therefore, increase
 22 avian exposure from ingestion of prey items with elevated selenium levels. Thus, tidal marsh
 23 restoration activities that create newly inundated areas could increase bioavailability of selenium.
 24 Changes in selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that,
 25 relative to Existing Conditions and the No Action Alternative, construction and operation of
 26 proposed water conveyance facilities would not result in substantial, long-term increases in
 27 selenium concentrations in water in the Delta under any alternative.

28 There could be an effect on western yellow-billed cuckoo from increases in selenium associated with
 29 tidal restoration activities (Environmental Commitment 4); however, effects on the western yellow-
 30 billed cuckoo population are expected to be minimal because the amount of tidal restoration would
 31 total up to 22 acres. Any effects would be addressed through the implementation of *AMM27*
 32 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
 33 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
 34 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
 35 selenium management to reduce selenium concentrations and/or bioaccumulation would be
 36 evaluated separately for each restoration effort as part of project design and implementation. This
 37 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
 38 design.

39 **NEPA Effects:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 4A
 40 implementation could have adverse effects on the species through the modification of habitat and
 41 potential for direct mortality. Changes in water operations would not be expected to result in
 42 increased mercury bioavailability to western yellow-billed cuckoo. Restoration actions that would
 43 create high and low tidal marsh, which is western yellow-billed cuckoo habitat, could provide
 44 biogeochemical conditions for methylation of mercury in the newly inundated soils. There is
 45 potential for increased exposure of the foodwebs to methylmercury in these areas, with the level of

1 exposure dependent on the amounts of mercury available in the soils and the biogeochemical
2 conditions. However, the amount of tidal restoration would total up to 22 acres, and potential
3 exposure to methylmercury resulting from these acres of restoration would not be expected to
4 adversely affect the western yellow-billed cuckoo population. Implementation of Environmental
5 Commitment 12, which contains measures to assess the amount of mercury before project
6 development, followed by appropriate design and adaptation management, would minimize the
7 potential for any effects of increased methylmercury exposure.

8 Tidal habitat restoration could result in increased exposure of western yellow-billed cuckoo to
9 selenium; however, the amount of tidal restoration would total up to 22 acres, and potential
10 exposure to selenium resulting from these acres of restoration would not be expected to adversely
11 affect the western yellow-billed cuckoo population. Any effects would be addressed through the
12 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
13 restoration design elements to reduce the potential for bioaccumulation of selenium and its
14 bioavailability in tidal habitats.

15 Because of the species' minimal presence in the study area, and with the incorporation of AMM1–
16 AMM7, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed*
17 *Cuckoo*, and *AMM27 Selenium Management* into Alternative 4A, indirect effects would not have an
18 adverse effect on western yellow-billed cuckoo.

19 **CEQA Conclusion:** Indirect effects on western yellow-billed cuckoo as a result of Alternative 4A
20 implementation could have a significant impact on the species from modification of habitat. Changes
21 in water operations would not be expected to result in increased mercury bioavailability to western
22 yellow-billed cuckoo. Restoration actions that would create high and low tidal marsh could provide
23 biogeochemical conditions for methylation of mercury in the newly inundated soils. There is
24 potential for increased exposure of the foodwebs to methylmercury in these areas, with the level of
25 exposure dependent on the amounts of mercury available in the soils and the biogeochemical
26 conditions. However, the amount of tidal restoration would total up to 22 acres, and potential
27 exposure to methylmercury resulting from these acres of restoration would not be expected to
28 adversely affect the western yellow-billed cuckoo population. Implementation of Environmental
29 Commitment 12, which contains measures to assess the amount of mercury before project
30 development, followed by appropriate design and adaptation management, would minimize the
31 potential for any effects of increased methylmercury exposure.

32 Tidal habitat restoration could result in increased exposure of western yellow-billed cuckoo to
33 selenium; however, the amount of tidal restoration would total up to 22 acres, and potential
34 exposure to selenium resulting from these acres of restoration would not be expected to adversely
35 affect the western yellow-billed cuckoo population. Any effects would be addressed through the
36 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
37 restoration design elements to reduce the potential for bioaccumulation of selenium and its
38 bioavailability in tidal habitats.

39 With the incorporation of AMM1–AMM7, *AMM22 Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least*
40 *Bell's Vireo*, *Western Yellow-Billed Cuckoo*, and *AMM27 Selenium Management* into Alternative 4A,
41 indirect effects as a result of Alternative 4A implementation would have a less-than-significant
42 impact on western yellow-billed cuckoo.

1 **Impact BIO-99: Periodic Effects of Inundation of Western Yellow-Billed Cuckoo Habitat as a**
2 **Result of Implementation of Alternative 4A**

3 No Alternative 4A components would result in periodic effects on western yellow-billed cuckoo.

4 **NEPA Effects:** No effect.

5 **CEQA Conclusion:** No impact.

6 **White-Tailed Kite**

7 This section describes the effects of Alternative 4A, including water conveyance facilities
8 construction and implementation of Environmental Commitments, on white-tailed kite. The habitat
9 model used to assess impacts on white-tailed kite includes nesting habitat and foraging habitat.
10 Most white-tailed kites in the Sacramento Valley are found in oak and cottonwood riparian forests,
11 valley oak woodlands, or other groups of trees and are usually associated with compatible foraging
12 habitat for the species in patches greater than 1,500 square meters (Erichsen et al. 1996). Modeled
13 foraging habitat for white-tailed kite consists of pasture and hay crops, compatible row and grain
14 crops and natural vegetation such as seasonal wetlands and annual grasslands (Erichsen et al.
15 1995).

16 Alternative 4A would result in both temporary and permanent losses of white-tailed kite modeled
17 habitat as indicated in Table 12-4A-40. The majority of the losses would result from the construction
18 of the water conveyance facilities. Although restoration for the loss of nesting and foraging habitat
19 would be initiated in the same timeframe as the losses, it could take one or more decades (for
20 nesting habitat) for restored habitats to replace the functions of habitat lost. This time lag between
21 impacts and restoration of habitat function would be minimized by specific requirements of *AMM39*
22 *White-Tailed Kite*, including the planting of mature trees. Full implementation of Alternative 4A
23 would also include the following Environmental Commitments and Resource Restoration and
24 Performance Principles which would benefit the white-tailed kite.

- 25 ● Restore or create up to 251 acres of valley/foothill riparian natural community (Environmental
26 Commitment 7).
- 27 ● Protect up to 103 acres of existing valley/foothill riparian natural community (Environmental
28 Commitment 3).
- 29 ● Restore, maintain, and enhance riparian areas to provide a mix of early-, mid- and late-
30 successional habitat types with a well-developed understory of dense shrubs (Resource
31 Restoration and Performance Principle VFR1).
- 32 ● Maintain a single contiguous patch of 100 acres of mature riparian forest in either CZ 4 or CZ
33 7. The mature riparian forest will be intermixed with a portion of the early- to mid-successional
34 riparian vegetation will be a minimum width of 330 feet where practicable (Resource
35 Restoration and Performance Principles VFR2 and VFR3).
- 36 ● Protect up to 1,060 acres of grassland and 11,870 acres of cultivated lands (Environmental
37 Commitment 3). The following Swainson's hawk Resource Restoration and Performance
38 Principles would be implemented as part of these acres and would also benefit white-tailed kite:
 - 39 ○ Conserve 1 acre of Swainson's hawk foraging habitat for each acre of lost foraging habitat in
40 minimum patch sizes of 40 acres (as part of the total cultivated lands protected) (Resource
41 Restoration and Performance Principle SH1).

- 1 ○ Protect Swainson’s hawk foraging habitat above 1 foot above mean sea level with at least
- 2 50% in very high-value habitat (see Table 12-4A-35 for a definition habitat value) (Resource
- 3 Restoration and Performance Principle SH2).
- 4 ○ Maintain and protect the small patches of important wildlife habitats associated with
- 5 cultivated lands within the conservation area, including isolated valley oak trees, trees and
- 6 shrubs along field borders and roadsides, remnant groves, riparian corridors, water
- 7 conveyance channels, grasslands, ponds, and wetlands (Resource Restoration and
- 8 Performance Principle CL1).

9 White-tailed kite is a fully protected species and take of white-tailed kite individuals is prohibited
 10 under Section 3511 of the Fish and Game Code. With the implementation of *AMM39 White-Tailed*
 11 *Kite*, construction activities would not result in take, and effects on the species would be minimized.
 12 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 13 management activities that would enhance these natural communities for the species and
 14 implementation of *AMM1-AMM7*, *AMM10 Restoration of Temporarily Affected Natural Communities*,
 15 and *AMM39 White-Tailed Kite*, impacts on white-tailed kite would not be adverse for NEPA purposes
 16 and would be less than significant for CEQA purposes.

17 **Table 12-4A-40. Changes in White-Tailed Kite Modeled Habitat Associated with Alternative 4A**
 18 **(acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Nesting	25	16
	Foraging	3,244	1,054
Total Impacts Water Conveyance Facilities		3,269	1,070
Environmental Commitments 4, 6-7, 9-11 ^a	Nesting	9	0
	Foraging	2,429	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		2,438	0
Total Nesting		34	16
Total Foraging		5,673	1,054
TOTAL IMPACTS		5,707	1,070

^a See discussion below for a description of applicable Environmental Commitments.

19

20 **Impact BIO-100: Loss or Conversion of Habitat for and Direct Mortality of White-Tailed Kite**

21 Alternative 4A would result in the combined permanent and temporary loss of up to 6,777 acres of
 22 modeled habitat (50 acres of nesting habitat and 6,727 acres of foraging habitat) for white-tailed
 23 kite (Table 12-4A-40). Project measures that would result in these losses are water conveyance
 24 facilities and transmission line construction, and establishment and use of reusable tunnel material
 25 areas, tidal habitat restoration (Environmental Commitment 4), riparian restoration,
 26 (Environmental Commitment 7), grassland restoration (Environmental Commitment 8), and
 27 nontidal marsh restoration (Environmental Commitment 10). Habitat enhancement and
 28 management activities (Environmental Commitment 11), which include ground disturbance or
 29 removal of nonnative vegetation, could also result in local habitat effects. In addition, maintenance
 30 activities associated with the long-term operation of the water conveyance facilities and other

1 physical facilities could affect white-tailed kite modeled habitat. Each of these individual activities is
2 described below.

- 3 • *Water Facilities Construction*: Construction of Alternative 4A water conveyance facilities would
4 result in the combined permanent and temporary loss of up to 41 acres of white-tailed kite
5 nesting habitat (25 acres of permanent loss and 16 acres of temporary loss). In addition, 2,298
6 acres of foraging habitat would be removed (3,244 acres of permanent loss, 1,054 acres of
7 temporary loss). Activities that would impact modeled white-tailed kite habitat consist of
8 tunnel, forebay, and intake construction, temporary access roads, and construction of
9 transmission lines. Most of the permanent loss of nesting habitat would occur where Intakes 1–3
10 impact the Sacramento River’s east bank between Freeport and Courtland. The riparian areas
11 here are very small patches, some dominated by valley oak and others by nonnative trees. Some
12 nesting habitat would be lost due to construction of a permanent access road from the new
13 forebay west to an reusable tunnel material disposal area. Permanent losses would also occur
14 along Lambert Road where permanent utility lines would be installed and from the construction
15 of an operable barrier at the confluence of Old River and the San Joaquin River. Temporary
16 losses of nesting habitat would result from the construction of a barge unloading facility west of
17 the intermediate forebay in Snodgrass Slough and where temporary work areas surround intake
18 sites. The riparian habitat in these areas is also composed of very small patches or stringers
19 bordering waterways, which are composed of valley oak and scrub vegetation. There are no
20 occurrences of nesting white-tailed kite that overlap with the construction footprint of water
21 conveyance facilities. White-tailed kite is a fully protected species and take is prohibited under
22 Section 3511 of the Fish and Game Code. If white-tailed kite were to nest in or adjacent to work
23 areas, the implementation of *AMM39 White-Tailed Kite* would avoid disturbance and nest
24 abandonment, mortality of eggs, nestlings, or fledglings by restricting construction activities
25 during the breeding season or establishing suitable buffers around active nests (see
26 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Impacts on foraging habitat would
27 occur throughout the central Delta in CZs 3–6, and CZ 8. Refer to the Terrestrial Biology
28 Mapbook for a detailed view of Alternative 4A construction locations. Impacts from water
29 conveyance facilities would occur within the first 10–14 years of Alternative 4A implementation.
- 30 • *Environmental Commitment 4 Tidal Natural Communities Restoration*: Tidal habitat restoration
31 site preparation and inundation would permanently remove an estimated 9 acres of white-tailed
32 kite nesting habitat and 256 acres of foraging habitat. The conversion of cultivated lands to tidal
33 wetlands over fairly broad areas within the tidal restoration footprints could result in the
34 removal or abandonment of nesting territories that occur within or adjacent to the restoration
35 areas. Trees would not be actively removed but tree mortality would be expected over time as
36 areas became tidally inundated.
- 37 • *Environmental Commitment 7 Riparian Natural Community Restoration*: Riparian restoration
38 would permanently remove approximately 251 acres of white-tailed kite foraging habitat.
- 39 • *Environmental Commitment 8 Grassland Natural Community Restoration*: Grassland restoration
40 would permanently convert approximately 1,070 acres of cultivated lands suitable for foraging
41 by white-tailed kite to grassland.
- 42 • *Environmental Commitment 10 Nontidal Marsh Restoration*: Restoration and creation of nontidal
43 freshwater marsh would result in the permanent conversion of 832 acres of cultivated lands to
44 nontidal marsh. This would not result in a loss of foraging habitat as both natural communities
45 are foraging habitat for white-tailed kite. Small patches of riparian vegetation that support

1 White-tailed kite nesting habitat may develop along the margins of restored nontidal marsh
2 restoration would also provide foraging habitat for the species.

- 3 • *Environmental Commitment 11 Natural Communities Enhancement and Management*: Habitat
4 management- and enhancement-related activities could remove up to 20 acres of white-tailed
5 kite foraging habitat. Activities could also disturb white-tailed kite nests if they were present
6 near work sites. A variety of habitat management actions that are designed to enhance wildlife
7 values in Alternative 4A-protected habitats may result in localized ground disturbances that
8 could temporarily remove small amounts of white-tailed kite habitat and reduce the functions of
9 habitat until restoration is complete. Ground-disturbing activities, such as removal of nonnative
10 vegetation and road and other infrastructure maintenance, are expected to have minor effects
11 on available white-tailed kite habitat and are expected to result in overall improvements to and
12 maintenance of habitat values. These effects cannot be quantified, but are expected to be
13 minimal and would be avoided and minimized by the AMMs listed below. BDCP Appendix 3.C
14 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
15 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. The implementation of
16 *AMM39 White-Tailed Kite* would avoid disturbance and nest abandonment by requiring
17 restrictions on construction activities during the breeding season or establishing nodisturbance
18 buffers.
- 19 • Permanent and temporary white-tailed kite nesting habitat losses from the above
20 Environmental Commitments would primarily consist of small, fragmented riparian stands.
21 Temporarily affected nesting habitat would be restored as riparian habitat within 1 year
22 following completion of construction activities as described in *AMM10 Restoration of*
23 *Temporarily Affected Natural Communities*. The restored riparian habitat would require 1 to
24 several decades to functionally replace habitat that has been affected and for trees to attain
25 sufficient size and structure suitable for nesting by white-tailed kite. *AMM39 White-Tailed Kite*
26 contains actions described below to reduce the effect of temporal loss of nesting habitat,
27 including the transplanting of mature trees and planting of trees near high-value foraging
28 habitat. The functions of agricultural and grassland communities that provide foraging habitat
29 for white-tailed kite are expected to be restored relatively quickly.
- 30 • *Water Facilities Operations and Maintenance*: Postconstruction operation and maintenance of
31 the above-ground water conveyance facilities and restoration infrastructure could result in
32 ongoing but periodic disturbances that could affect white-tailed kite use of the surrounding
33 habitat. Maintenance activities would include vegetation management, levee and structure
34 repair, and re-grading of roads and permanent work areas. Effects of operations and
35 maintenance activities on active white-tailed kite nests would be avoided by the implementation
36 of *AMM39 White-Tailed Kite* which would restriction activities during the breeding season or
37 require a construction buffer to minimize disturbance. If emergency repairs were required
38 during the breeding season that could potentially result in take, CDFW consultation would be
39 initiated (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*).
- 40 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
41 take of adult or fledged white-tailed kite if they were present in the study area, because they
42 would be expected to avoid contact with construction and other equipment. However, if white-
43 tailed kite were to nest in the construction area, construction-related activities, including
44 equipment operation, noise and visual disturbances could affect nests or lead to their
45 abandonment. White-tailed kite is a fully protected species and take is prohibited under Section
46 3511 of the Fish and Game Code. If active nests were present in or adjacent to work areas, the

1 implementation of *AMM39 White-Tailed Kite*, would restrict construction activities during the
2 breeding season, or require a construction buffer that would avoid disturbance and nest
3 abandonment, mortality of eggs, nestlings, or fledglings (Appendix 3B, *Environmental*
4 *Commitments, AMMs, and CMs*).

5 The following paragraphs summarize the combined effects discussed above and describe
6 Environmental Commitments, Resource Restoration and Performance Principles, and AMMs that
7 offset or avoid these effects. NEPA and CEQA conclusions are provided at the end of the section.

8 The study area supports approximately 14,069 acres of modeled nesting habitat and 507,922 acres
9 of modeled foraging habitat for white-tailed kite. Alternative 4A as a whole would result in the
10 permanent loss of and temporary effects on 50 acres of potential nesting habitat (<1% of the
11 potential nesting habitat in the study area) and the loss or conversion of 6,727 acres of foraging
12 habitat (1% of the foraging habitat in the study area). The locations of these losses are described
13 above in the analyses of individual Environmental Commitments.

14 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
15 be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for nesting
16 habitat, and 1:1 protection for foraging habitat. Using these ratios would indicate that 50 acres of
17 nesting habitat should be restored/created and 50 acres should be protected to mitigate the losses
18 of white-tailed kite nesting habitat. In addition, 6,727 acres of foraging habitat of should be
19 protected to compensate for the losses of white-tailed kite foraging habitat.

20 A total of 1,060 acres of grassland and 11,870 acres of cultivated lands would be protected through
21 Alternative 4A. Project proponents would commit to conserving 1 acre of Swainson's hawk foraging
22 habitat for every acre of lost foraging habitat which would protect up to a total of 6,805 acres of
23 white-tailed kite foraging habitat (Resource Restoration and Performance Principle SH1). These
24 acres of cultivated lands and grasslands would be located above -1 foot above mean sea level. At
25 least 50% of these lands would be in very high-value production for the Swainson's hawk (alfalfa)
26 (Resource Restoration and Performance Principle SH2). These Swainson's hawk Resource
27 Restoration and Performance Principles would be associated with Environmental Commitment 3
28 and would occur in the same timeframe as the construction and early restoration losses and would
29 compensate for effects on white-tailed kite foraging habitat.

30 Alternative 4A includes conservation commitments through *Environmental Commitment 7 Riparian*
31 *Natural Community Restoration* and *Environmental Commitment 3 Natural Communities Protection*
32 *and Restoration* to restore or create up to 251 acres and protect up to 103 acres of valley/foothill
33 riparian woodland, which would provide nesting habitat for white-tailed kite. Though this riparian
34 restoration would remove foraging habitat for the species (cultivated lands) it would create nesting
35 habitat, which is more of a limiting resource in the Delta. Riparian areas would be restored,
36 maintained, and enhanced to provide a mix of early-, mid- and late-successional habitat types with a
37 well-developed understory of dense shrubs (Resource Restoration and Performance Principle
38 VFR1). A single, contiguous patch of 100 acres of mature, riparian forest would be maintained in
39 either CZ 4 or CZ 7 (Resource Restoration and Performance Principle VFR2), as part of the acres of
40 restoration and protection under Environmental Commitment 7. In addition, small but essential
41 nesting habitat for white-tailed kite associated with cultivated lands would also be maintained and
42 protected such as isolated trees, tree rows along field borders or roads, or small clusters of trees in
43 farmyards or at rural residences (Environmental Commitment 3).

1 The 251 acres of restored riparian habitat would be initiated to offset the loss of modeled nesting
2 habitat, but would require one to several decades to functionally replace habitat that has been
3 affected and for trees to attain sufficient size and structure suitable for nesting by white-tailed kite.
4 This time lag between the removal and restoration of nesting habitat could have a substantial
5 impact on white-tailed kite. Nesting habitat is limited throughout much of the study area, consisting
6 mainly of intermittent riparian, isolated trees, small groves, tree rows along field borders, roadside
7 trees, and ornamental trees near rural residences. The removal of nest trees or nesting habitat
8 would further reduce this limited resource and could reduce or restrict the number of active white-
9 tailed kite nests within the study area until restored riparian habitat is sufficiently developed.

10 *AMM39 White-Tailed Kite* would implement a program to plant large mature trees, including
11 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
12 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
13 within the 125-acre block are removed. These mature trees would be supplemented with additional
14 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
15 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
16 addition, at least five trees (5-gallon container size) would be planted within the Alternative 4A
17 conservation area for every tree 20 feet or taller removed by construction. A variety of native tree
18 species would be planted to provide trees with differing growth rates, maturation, and life span.
19 Trees would be planted within the Alternative 4A conservation area in areas that support high-value
20 foraging habitat to increase nest sites, or within riparian plantings as a component of the riparian
21 restoration (Environmental Commitment 7) where they are in close proximity to suitable foraging
22 habitat. Replacement trees that were incorporated into the riparian restoration would not be
23 clustered in a single region of the study area, but would be distributed throughout the lands
24 protected as foraging habitat for white-tailed kite. Further details of AMM39 are provided in
25 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

26 The project also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
27 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
28 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
29 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM10*
30 *Restoration of Temporarily Affected Natural Communities*. The implementation of these AMMs, in
31 addition to *AMM39 White-Tailed Kite*, would avoid the risk of take of individuals in habitats adjacent
32 to work areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which
33 are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

34 **NEPA Effects:** The loss of white-tailed kite nesting and foraging habitat from Alternative 4A would
35 not be adverse under NEPA because project proponents have committed to avoiding and minimizing
36 effects from and to restoring and protecting an acreage that meets the typical mitigation ratios
37 described above. This habitat protection, restoration, management, and enhancement would be
38 guided by Resource Restoration and Performance Principles VFR1-VFR3, SH1, SH2, and CL1, AMM1-
39 AMM7, AMM10, and *AMM39 White-Tailed Kite*, which would restrict construction activities during
40 the breeding season and would avoid disturbance and nest abandonment, mortality of eggs,
41 nestlings, or fledglings and would be in place during all project activities. Considering these
42 commitments, losses and conversions of white-tailed kite habitat under Alternative 4A would not be
43 adverse.

44 **CEQA Conclusion:** The effects on white-tailed kite habitat from Alternative 4A would represent an
45 adverse effect as a result of habitat modification of a special-status species and potential for take in

1 the absence of Environmental Commitments and AMMs. However, project proponents have
 2 committed to habitat protection, restoration, management, and enhancement associated with
 3 Environmental Commitment 3, Environmental Commitment 7, and Environmental Commitment 11.
 4 These conservation activities would be guided by Resource Restoration and Performance Principles
 5 VFR1-VFR3, SH1, SH2, and CL1, AMM1-AMM6, AMM10, and *AMM39 White-Tailed Kite*, which would
 6 restrict construction activities during the breeding season and which would avoid disturbance and
 7 nest abandonment, mortality of eggs, nestlings, or fledglings and would be in place during all project
 8 activities. Considering these commitments, Alternative 4A would not result in a substantial adverse
 9 effect through habitat modifications and would not result in take of white-tailed kite pursuant to
 10 California Fish and Game Code Section 86. Therefore, Alternative 4A would have a less-than-
 11 significant impact on white-tailed kite under CEQA.

12 **Impact BIO-101: Effects on White-Tailed Kite Associated with Electrical Transmission**
 13 **Facilities**

14 There are several known occurrences of nesting white-tailed kite within 5 miles of the proposed
 15 transmission line alignment. While white-tailed kite flight behavior puts them regularly within the
 16 range of heights proposed for the new transmission lines (50 to 110 feet), their keen vision and high
 17 maneuverability substantially reduce powerline collision risk for the species. Like other diurnal
 18 raptors, white-tailed kites have highly developed eyesight (Jones et al. 2007), allowing them to
 19 detect small prey while hunting from relatively high altitudes. Keen eyesight also allows for
 20 detection and avoidance of other aerial objects, including above-ground utility lines. Like many
 21 other falcons, the white-tailed kite has long, narrow, tapered wings and body size that allow for
 22 efficient soaring flight and highly developed aerial maneuverability. White-tailed kite are at low risk
 23 of take from bird strike from the construction of new transmission lines based on its general
 24 maneuverability, its keen eyesight, and lack of flocking behavior (BDCP Attachment 5.J-2,
 25 *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Marking
 26 transmission lines with flight diverters that make the lines more visible to birds has been shown to
 27 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
 28 marking devices in the Central Valley could reduce avian mortality by 60%. With the
 29 implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines would be fitted with
 30 flight diverters, which would substantially reduce the risk of collisions with lines.

31 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
 32 adverse effect because the risk of bird strike is considered to be minimal based on the species'
 33 general maneuverability, keen eyesight, and lack of flocking behavior. In addition, *AMM20 Greater*
 34 *Sandhill Crane* contains the commitment to place bird strike diverters on all new powerlines, which
 35 would further reduce the risk of white-tailed kites colliding with project powerlines. Therefore, the
 36 construction and operation of new transmission lines would not result in an adverse effect on white-
 37 tailed kite.

38 **CEQA Conclusion:** The construction and presence of new transmission lines would not result in take
 39 of white-tailed kite pursuant to California Fish and Game Code Section 86 because the risk of bird
 40 strike is considered to be minimal based on the species' general maneuverability, keen eyesight, and
 41 lack of flocking behavior. In addition, *AMM20 Greater Sandhill Crane* contains the commitment to
 42 place bird strike diverters on all new powerlines, which would further reduce the risk of white-
 43 tailed kites colliding with project powerlines. Therefore, the construction and operation of new
 44 transmission lines would result in a less-than-significant impact on white-tailed kite.

Impact BIO-102: Indirect Effects of the Project on White-Tailed Kite

White-tailed kite nesting habitat within the vicinity of proposed construction areas could be indirectly affected by construction activities. Construction noise above background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (see BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and EIR/EIS Appendix 11F, *Substantive BDCP Revisions*). However, there are no available data to determine the extent to which these noise levels could affect white-tailed kite. Indirect effects associated with construction include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing operations outside the project footprint but within 1,300 feet from the construction edge. If white-tailed kite were to nest in or adjacent to work areas, construction and subsequent maintenance-related noise and visual disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the functions of suitable nesting habitat for these species. The implementation of *AMM39 White-Tailed Kite* would avoid the risk of take of individual white-tailed kites in habitats in or adjacent to work areas by restricting construction activities during the breeding season or establishing nodisturbance buffers around active nests. The use of mechanical equipment during water conveyance facilities construction could cause the accidental release of petroleum or other contaminants that could affect white-tailed kite in the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to white-tailed kite habitat could also affect the species. *AMM1-AMM7*, and *AMM39 White-tailed Kite*, would minimize the likelihood of such spills and ensure that measures are in place to prevent runoff from the construction area and negative effects of dust on active nests.

Methylmercury Exposure: Project activities have the potential to exacerbate bioaccumulation of mercury in avian species, including white-tailed kite. Marsh (tidal and nontidal) an restoration also has the potential to increase exposure to methylmercury. Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, Alternative 4A restoration activities that create newly inundated areas could increase bioavailability of mercury. Increased methylmercury associated with natural community restoration may indirectly affect white-tailed kite (see BDCP Appendix 5.D, *Contaminants*). However, the potential mobilization or creation of methylmercury within the study area varies with site-specific conditions and would need to be assessed at the project level. Due to the complex and very site-specific factors that would determine if mercury becomes mobilized into the foodweb, *Environmental Commitment 12 Methylmercury Management* is included to provide for site-specific evaluation for each restoration project. If a project is identified where there is a high potential for methylmercury production that could not be fully addressed through restoration design and adaptive management, alternate restoration areas would be considered. Environmental Commitment 12 would be implemented in coordination with other similar efforts to address mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This Environmental Commitment would include the following actions.

- Assess pre-restoration conditions to determine the risk that the project could result in increased mercury methylation and bioavailability
 - Define design elements that minimize conditions conducive to generation of methylmercury in restored areas.
- Define adaptive management strategies that can be implemented to monitor and minimize actual postrestoration creation and mobilization of methylmercury.

1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
5 2009). The effect of selenium toxicity differs widely between species and also between age and sex
6 classes within a species. In addition, the effect of selenium on a species can be confounded by
7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
8 2009).

9 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
10 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
11 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
12 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
13 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
14 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
15 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
16 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
17 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
18 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
19 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
20 levels of selenium have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
22 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
23 exacerbate bioaccumulation of selenium in avian species, including white-tailed kite. Marsh (tidal
24 and nontidal) restoration has the potential to mobilize selenium, and therefore increase avian
25 exposure from ingestion of prey items with elevated selenium levels. Thus, Alternative 4A
26 restoration activities that create newly inundated areas could increase bioavailability of selenium.
27 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was
28 determined that, relative to Existing Conditions and the No Action Alternative, water conveyance
29 facilities would not result in substantial, long-term increases in selenium concentrations in water in
30 the Delta under any alternative. However, it is difficult to determine whether the effects of potential
31 increases in selenium bioavailability associated with Environmental Commitment 4 would lead to
32 adverse effects on white-tailed kite.

33 Because of the uncertainty that exists with respect to the location of tidal restoration activities, there
34 could be a substantial effect on white-tailed kite from increases in selenium associated with
35 restoration activities. This effect would be addressed through the implementation of *AMM27*
36 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
37 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
38 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
39 selenium management to reduce selenium concentrations and/or bioaccumulation would be
40 evaluated separately for each restoration effort as part of design and implementation. This
41 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
42 design schedule.

43 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
44 could reduce white-tailed kite use of modeled habitat adjacent to work areas. Moreover, operation
45 and maintenance of the water conveyance facilities, including the transmission facilities, could result

1 in ongoing but periodic postconstruction disturbances that could affect use of the surrounding
 2 habitat by white-tailed kite. Noise, potential spills of hazardous materials, increased dust and
 3 sedimentation, and operations and maintenance of the water conveyance facilities under Alternative
 4 4A would not have an adverse effect on white-tailed kite with the implementation of AMM1–AMM7,
 5 and *AMM39 White-Tailed Kite* which would avoid the risk of take of individuals. Tidal habitat
 6 restoration could result in increased exposure of white-tailed kite to selenium. This effect would be
 7 addressed through the implementation of *AMM27 Selenium Management*, which would provide
 8 specific tidal habitat restoration design elements to reduce the potential for bioaccumulation of
 9 selenium and its bioavailability in tidal habitats. The indirect effects associated with noise and visual
 10 disturbances, potential spills of hazardous material, and increased exposure to selenium from
 11 Alternative 4A implementation would not have an adverse effect on white-tailed kite. Tidal habitat
 12 restoration is unlikely to have an adverse effect on white-tailed kite through increased exposure to
 13 methylmercury, as kites currently forage in tidal marshes where elevated methylmercury levels
 14 exist. However, it is unknown what concentrations of methylmercury are harmful to the species and
 15 the potential for increased exposure varies substantially within the study area. Site-specific
 16 restoration plans in addition to monitoring and adaptive management, described in *Environmental*
 17 *Commitment 12 Methylmercury Management*, would address the uncertainty of methylmercury
 18 levels in restored tidal marsh. The site-specific planning phase of marsh restoration would be the
 19 appropriate place to assess the potential for risk of methylmercury exposure for white-tailed kite,
 20 once site specific sampling and other information could be developed.

21 **CEQA Conclusion:** Noise, the potential for hazardous spills, increased dust and sedimentation, and
 22 operations and maintenance of the water conveyance facilities under Alternative 4A would have a
 23 less-than-significant impact on white-tailed kite with the implementation of AMM1–AMM7, and
 24 *AMM39 White-Tailed Kite*, which would avoid the risk of take of individuals. Tidal habitat restoration
 25 could result in increased exposure of white-tailed kite to selenium. This effect would be addressed
 26 through the implementation of *AMM27 Selenium Management*, which would provide specific tidal
 27 habitat restoration design elements to reduce the potential for bioaccumulation of selenium and its
 28 bioavailability in tidal habitats. The implementation of tidal natural communities restoration could
 29 result in increased exposure of white-tailed kite to methylmercury. However, it is unknown what
 30 concentrations of methylmercury are harmful to this species. *Environmental Commitment 12*
 31 *Methylmercury Management* includes provisions for project-specific Mercury Management Plans.
 32 Site-specific restoration plans that address the creation and mobilization of mercury, as well as
 33 monitoring and adaptive management as described in Environmental Commitment 12, would better
 34 inform potential impacts and address the uncertainty of methylmercury levels in restored tidal
 35 marsh in the study area on white-tailed kite. With these measures in place, the indirect effects
 36 associated with noise and visual disturbances, potential spills of hazardous material, and increased
 37 exposure to selenium from Alternative 4A implementation would have a less-than-significant impact
 38 on white-tailed kite.

39 **Impact BIO-103: Periodic Effects of Inundation of White-Tailed Kite Habitat as a Result of**
 40 **Implementation of Alternative 4A**

41 No Alternative 4A components would result in periodic effects on white-tailed kite.

42 **NEPA Effects:** No effect.

43 **CEQA Conclusion:** No impact.

Yellow-Breasted Chat

This section describes the effects of Alternative 4A, including water conveyance facilities construction and implementation of Environmental Commitments, on yellow-breasted chat. Yellow-breasted chat modeled habitat includes suitable nesting and migratory habitat as those plant alliances from the valley/foothill riparian modeled habitat that contain a shrub component and an overstory component. Primary nesting and migratory habitat is qualitatively distinguished from secondary habitat in Delta areas as those plant associations that support a greater percentage of a suitable shrub cover, particularly blackberry, and California wild rose, and have an open to moderately dense overstory canopy, using data from Hickson and Keeler-Wolf (2007). No distinction is made between primary and secondary habitat for Suisun Marsh/Yolo Basin habitats because supporting information is lacking.

Alternative 4A would result in both temporary and permanent losses of yellow-breasted chat modeled habitat as indicated in Table 12-4A-41. Full implementation of Alternative 4A would also include the following Environmental Commitments and Resource Restoration and Performance Principles which would benefit the yellow-breasted chat.

- Restore or create up to 251 acres of valley/foothill riparian natural community (Environmental Commitment 7).
- Protect up to 103 acres of existing valley/foothill riparian natural community (Environmental Commitment 3).
- Restore, maintain, and enhance riparian areas to provide a mix of early-, mid- and late-successional habitat types with a well-developed understory of dense shrubs (Resource Restoration and Performance Principle VFR1).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance these natural communities for the species and implementation of AMM1–AMM7, *AMM10 Restoration of Temporarily Affected Natural Communities* and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell’s Vireo, Western Yellow-Billed Cuckoo*, impacts on yellow-breasted chat would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-4A-41. Changes in Yellow-Breasted Chat Modeled Habitat Associated with Alternative 4A (acres)

Project Component	Nesting and Migratory	Permanent	Temporary
	Habitat Type		
Water Conveyance Facilities	Primary	15	10
	Secondary	15	9
Total Impacts Water Conveyance Facilities		30	19
Environmental Commitments 4, 6–7, 9–11 ^a	Primary	6	0
	Secondary	4	0
Total Impacts Environmental Commitments 4, 6–7, 9–11^a		10	0
Total Primary		21	10
Total Secondary		19	9
TOTAL IMPACTS		40	19

^a See discussion below for a description of applicable Environmental Commitments.

Impact BIO-104: Loss or Conversion of Habitat for and Direct Mortality of Yellow-Breasted Chat

Alternative 4A would result in the combined permanent and temporary loss of up to 59 acres of modeled nesting and migratory habitat for yellow-breasted chat (40 acres of permanent loss, 19 acres of temporary loss, Table 12-4A-41). Project measures that would result in these losses are water conveyance facilities and transmission line construction, and establishment and use of reusable tunnel material areas, and tidal habitat restoration (Environmental Commitment 4). Habitat enhancement and management activities (Environmental Commitment 11) which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other physical facilities could degrade or eliminate yellow-breasted chat habitat. Each of these individual activities is described below.

- *Water Facilities Construction:* Construction of Alternative 4A conveyance facilities would result in the combined permanent and temporary loss of up to 25 acres of primary habitat (15 acres of permanent loss, 10 acres of temporary loss). In addition, 24 acres of secondary habitat would be removed (15 acres of permanent loss, 9 acres of temporary loss, Table 12-4A-41). Activities that would impact modeled habitat consist of tunnel, forebay, and intake construction, permanent and temporary access roads, construction of transmission lines, barge unloading facilities and temporary work areas. Impacts from water conveyance facilities would occur in the central Delta in CZs 3–6, and 8. Most of the permanent loss of habitat would occur where Intakes 2, 3, and 5 impact the Sacramento River’s east bank between Freeport and Courtland. The riparian areas here are very small patches, some dominated by valley oak and others by nonnative trees. Some habitat would be lost due to construction of a permanent access road from the new forebay west to an reusable tunnel material disposal area. Permanent habitat loss would also occur along Lambert Road where permanent utility lines would be installed and from the construction of an operable barrier at the confluence of Old River and the San Joaquin River. Temporary loss of habitat would occur from the construction of a barge unloading facility west of the intermediate forebay in Snodgrass Slough and where temporary work areas surround intake sites. The riparian habitat in these areas is also composed of very small patches or stringers bordering waterways, which are composed of valley oak and scrub vegetation.
- Habitat loss from water conveyance facilities activities would have the potential to displace individuals, if present, and remove the functions and value of modeled habitat for nesting, protection, or foraging. There are no occurrences of yellow-breasted chat that overlap with the water conveyance facilities construction footprint. The implementation of *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell’s Vireo, Western Yellow-Billed Cuckoo* would minimize the effects of construction on nesting yellow-breasted chats if they were to occur in the area (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4A construction locations. Impacts from water conveyance facilities would occur within the first 10–14 years of Alternative 4A implementation.
- *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal habitat restoration site preparation and inundation would permanently remove an estimated 6 acres of modeled yellowbreasted chat primary habitat and 4 acres of modeled yellow-breasted chat secondary habitat.
- *Environmental Commitment 11 Natural Communities Enhancement and Management:* Habitat protection and management activities that could be implemented in protected yellow-breasted

1 chat habitats would be expected to maintain and improve the functions of the habitat. Yellow-
2 breasted chat would be expected to benefit from the increase in protected habitat, which would
3 maintain conditions favorable for the chat's use of the study area.

4 Habitat management- and enhancement-related activities could disturb yellow-breasted chat
5 nests if they are present near work sites. Equipment operation could destroy nests, and noise
6 and visual disturbances could lead to their abandonment, resulting in mortality of eggs and
7 nestlings. *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-*
8 *Billed Cuckoo* would ensure that these activities do not result in direct mortality of yellow-
9 breasted chat or other adverse effects.

10 Occupied habitat would be monitored to determine if there is a need to implement controls on
11 brood parasites (brown-headed cowbird) or nest predators. If implemented, these actions
12 would be expected to benefit the yellow-breasted chat by removing a potential stressor that
13 could, if not addressed, adversely affect the stability of newly established populations.

14 A variety of habitat management actions included in *Environmental Commitment 11 Natural*
15 *Communities Enhancement and Management* that are designed to enhance wildlife values in
16 restored riparian habitats may result in localized ground disturbances that could temporarily
17 remove small amounts of yellow-breasted chat habitat. Ground-disturbing activities, such as
18 removal of nonnative vegetation and road and other infrastructure maintenance activities, are
19 expected to have minor adverse effects on available yellow-breasted chat habitat and are
20 expected to result in overall improvements to and maintenance of yellow-breasted chat habitat
21 values.

- 22 ● *Water Facilities Operations and Maintenance*: Postconstruction operation and maintenance of
23 the above-ground water conveyance facilities and restoration infrastructure could result in
24 ongoing but periodic disturbances that could affect yellow-breasted chat use of the surrounding
25 habitat. Maintenance activities would include vegetation management, levee and structure
26 repair, and re-grading of roads and permanent work areas. These effects, however, would be
27 reduced by AMMs described below.
- 28 ● *Injury and Direct Mortality*: Construction is not expected to result in direct mortality of yellow-
29 breasted chat because adults and fledged young are expected to occur only in very small
30 numbers and, if present, would avoid contact with construction and other equipment. If yellow-
31 breasted chat were to nest in the vicinity of construction activities, equipment operation could
32 destroy nests and noise and visual disturbances could lead to nest abandonment. *AMM22 Suisun*
33 *Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo* would avoid
34 and minimize this effect.
- 35 ● Permanent and temporary habitat losses from the above Environmental Commitments would
36 primarily consist of small, fragmented riparian stands in CZ 2–CZ 8 that do not provide high-
37 value habitat for the species. Temporarily affected areas would be restored as riparian habitat
38 within 1 year following completion of construction activities as described in *AMM10 Restoration*
39 *of Temporarily Affected Natural Communities*. Although the effects are considered temporary, the
40 restored riparian habitat would require 5 years to several decades for ecological succession to
41 occur and for restored riparian habitat to functionally replace habitat that has been affected. The
42 majority of the riparian vegetation to be temporarily removed is early- to mid-successional;
43 therefore, the replaced riparian vegetation would be expected to have structural components
44 comparable to the temporarily removed vegetation within the first 5 to 10 years after the initial
45 restoration activities are complete.

1 The following paragraphs summarize the combined effects discussed above and describe
2 Environmental Commitments, Resource Restoration and Performance Principles, and AMMs that
3 offset or avoid these effects. NEPA and CEQA conclusions are provided at the end of the section.

4 The habitat model indicates that the study area supports approximately 14,547 acres of modeled
5 nesting and migratory habitat for yellow-breasted chat. Alternative 4A as a whole would result in
6 the permanent loss of and temporary effects on 59 acres of modeled habitat (less than 1% of the
7 modeled habitat in the study area). These losses would occur from the construction of the water
8 conveyance facilities and from *Environmental Commitment 4 Tidal Natural Communities Restoration*.
9 The locations of these losses would be in fragmented riparian habitat throughout the study area.

10 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
11 affected would be 1:1 for restoration/creation and 1:1 protection of dense shrubby successional
12 valley/foothill riparian habitat. Using these ratios would indicate that 59 acres of valley/foothill
13 riparian habitat should be restored/created and 59 acres should be protected to compensate for the
14 losses of yellow-breasted chat habitat.

15 Alternative 4A includes conservation commitments through *Environmental Commitment 7 Riparian*
16 *Natural Community Restoration* and *Environmental Commitment 3 Natural Communities Protection*
17 *and Restoration* to restore or create up to 251 acres and protect up to 103 acres of valley/foothill
18 riparian woodland. Riparian areas would be restored, maintained, and enhanced to provide a mix of
19 early-, mid- and late-successional habitat types with a well-developed understory of dense shrubs
20 (Resource Restoration and Performance Principle VFR1).

21 The project also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
22 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
23 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
24 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
25 *Restoration of Temporarily Affected Natural Communities*, and *AMM22 Suisun Song Sparrow, Yellow-*
26 *Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo*. All of these AMMs include elements
27 that would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
28 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
29 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
30 EIR/EIS.

31 **NEPA Effects:** The loss of yellow-breasted chat habitat from Alternative 4A would not be adverse
32 under NEPA because project proponents have committed to avoiding and minimizing effects from
33 and to restoring and protecting an acreage that meets the typical mitigation ratios described above.
34 This habitat protection, restoration, management, and enhancement would be guided by Resource
35 Restoration and Performance Principle VFR1, and by AMM1–AMM7, AMM10, and AMM22. These
36 environmental commitments and AMMs would be in place during all project activities. Considering
37 these commitments, losses and conversions of yellow-breasted chat habitat under Alternative 4A
38 would not be adverse.

39 **CEQA Conclusion:** The loss of yellow-breasted chat habitat from Alternative 4A would represent an
40 adverse effect in the absence of Environmental Commitments and AMMs as a result of habitat
41 modification and potential for direct mortality of a special-status species. However, habitat
42 protection and restoration associated with Environmental Commitment 3 and Environmental
43 Commitment 7, guided by Resource Restoration and Performance Principle VFR1 and by *AMM1*
44 *Worker Awareness Training*, *AMM2 Construction Best Management Practices and Monitoring*, *AMM3*

1 *Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill*
2 *Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge*
3 *Operations Plan, AMM10 Restoration of Temporarily Affected Natural Communities and AMM22*
4 *Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western Yellow-Billed Cuckoo,* would
5 be in place during all project activities. Considering these commitments, Alternative 4A would not
6 result in a substantial adverse effect through habitat modifications and would not substantially
7 reduce the number or restrict the range of yellow-breasted chat. Therefore, Alternative 4A would
8 have a less-than-significant impact on yellow-breasted chat under CEQA.

9 **Impact BIO-105: Fragmentation of Yellow-Breasted Chat Habitat as a Result of Constructing**
10 **the Water Conveyance Facilities**

11 Grading, filling, contouring, and other initial ground-disturbing activities for water conveyance
12 facilities construction may temporarily fragment modeled yellow-breasted chat habitat. This could
13 temporarily reduce the extent of and functions supported by the affected habitat. Any such habitat
14 fragmentation is expected to have no or minimal effect on the species.

15 **NEPA Effects:** Temporary fragmentation of habitat would not result in an adverse effect on yellow-
16 breasted chat. Any such habitat fragmentation is expected to have no or minimal effect on the
17 species.

18 **CEQA Conclusion:** Temporary fragmentation of habitat would have a less-than-significant impact on
19 yellow-breasted chat. Any such habitat fragmentation is expected to have no or minimal effect on
20 the species.

21 **Impact BIO-106: Effects on Yellow-Breasted Chat Associated with Electrical Transmission**
22 **Facilities**

23 Yellow-breasted chats are migratory and usually arrive at California breeding grounds in April from
24 their wintering grounds in Mexico and Guatemala. Departure for wintering grounds occurs from
25 August to September. These are periods of relative high visibility when the risk of powerline
26 collisions will be low. The species' small, relatively maneuverable body; its foraging behavior; and its
27 presence in the project area during the summer contribute to a low risk of collision with the
28 proposed transmission lines (BDCP Attachment 5.J-2, *Memorandum: Analysis of Potential Bird*
29 *Collisions at Proposed BDCP Transmission Lines*). Marking transmission lines with flight diverters
30 that make the lines more visible to birds has been shown to reduce the incidence of bird mortality
31 (Brown and Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could
32 reduce avian mortality by 60%. All new project transmission lines would be fitted with flight
33 diverters. Bird flight diverters would further reduce any potential for powerline collisions.

34 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
35 adverse effect on yellow-breasted chat because the risk of bird strike is considered to be minimal
36 based on the species' small, relatively maneuverable body; its foraging behavior; and its presence in
37 the project area during the summer during periods of high visibility. Under *AMM20 Greater Sandhill*
38 *Crane*, all new project transmission lines would be fitted with bird diverters, which would further
39 reduce any potential for powerline collisions.

40 **CEQA Conclusion:** The construction and presence of new transmission lines would have a less-than-
41 significant impact on yellow-breasted chat because the risk of bird strike is considered to be
42 minimal based on the species' small, relatively maneuverable body; its foraging behavior; and its

1 presence in the project area during the summer during periods of high visibility. Under *AMM20*
2 *Greater Sandhill Crane*, all new project transmission lines would be fitted with bird diverters, which
3 would further reduce any potential for powerline collisions.

4 **Impact BIO-107: Indirect Effects of the Project on Yellow-Breasted Chat**

5 Noise and visual disturbances associated with construction-related activities could result in
6 temporary disturbances that affect yellow-breasted chat use of modeled habitat adjacent to
7 proposed construction areas. Construction noise above background noise levels (greater than 50
8 dBA) could extend 500 to 5,250 feet from the edge of construction activities (see BDCP Appendix 5.J,
9 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
10 *Crane*, Table 5J.D-4, and EIR/EIS Appendix 11F, *Substantive BDCP Revisions*). However, there are no
11 available data to determine the extent to which these noise levels could affect yellow-breasted chat.
12 Indirect effects associated with construction include noise, dust, and visual disturbance caused by
13 grading, filling, contouring, and other ground-disturbing operations outside the project footprint but
14 within 1,300 feet from the construction edge. If yellow-breasted chat were to nest in or adjacent to
15 work areas, construction and subsequent maintenance-related noise and visual disturbances could
16 mask calls, disrupt foraging and nesting behaviors, and reduce the functions of suitable nesting
17 habitat for these species. These potential effects would be minimized with incorporation of *AMM22*
18 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* into the
19 Alternative 4A, which would ensure 250 foot no-disturbance buffers were established around active
20 nests. The use of mechanical equipment during water conveyance facilities construction could cause
21 the accidental release of petroleum or other contaminants that could affect yellow-breasted chat in
22 the surrounding habitat. The inadvertent discharge of sediment or excessive dust adjacent to
23 yellow-breasted chat habitat could also affect the species. *AMM1-AMM7*, including *AMM2*
24 *Construction Best Management Practices and Monitoring*, in addition to *AMM22 Suisun Song Sparrow*,
25 *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* would minimize the likelihood
26 of such spills from occurring and ensure that measures were in place to prevent runoff from the
27 construction area and any adverse effects of dust on active nests. If present, yellow-breasted chat
28 individuals could be temporarily affected by noise and visual disturbances adjacent to water
29 conveyance construction sites, reducing the use of an estimated 59 acres of modeled primary
30 nesting and migratory habitat and 119 acres of secondary nesting and migratory habitat. *AMM22*
31 *Suisun Song Sparrow*, *Yellow-Breasted Chat*, *Least Bell's Vireo*, *Western Yellow-Billed Cuckoo* would
32 avoid and minimize this effect on the species.

33 **Methylmercury Exposure:** The modeled primary habitat for yellow-breasted chat includes tidal
34 brackish emergent wetland and tidal freshwater emergent wetland in Suisun Marsh and the Delta
35 west of Sherman Island, and instream islands and White Slough Wildlife Area in the central Delta.
36 Chats typically occur in the high marsh zone near the upper limit of tidal flooding in salt and
37 brackish habitats. Low marsh, managed wetlands, and the upland fringe are considered secondary
38 habitat. Chats are a top predator in the benthic food chain; they nest and forage in dense vegetation
39 and prey on isopods, insects and arthropods from the surface of mud and vegetation They also
40 consume insects and seeds from bulrushes (*Schoenoplectus* spp.) and cattails (*Typha* spp.)
41 (Eddleman et al. 1994).

42 Largemouth bass was used as a surrogate species for analysis (see Appendix 11F, *Substantive BDCP*
43 *Revisions*). Results of the quantitative modeling of mercury effects on largemouth bass as a surrogate
44 species would overestimate the effects on yellow-breasted chat. Organisms feeding within pelagic-
45 based (algal) foodwebs have been found to have higher concentrations of methylmercury than those

1 in benthic or epibenthic foodwebs; this has been attributed to food chain length and dietary
2 segregation (Grimaldo et al. 2009). Modeled effects of mercury concentrations from changes in
3 operations of water conveyance facilities on largemouth bass did not differ substantially from
4 existing conditions; therefore, results also indicate that yellow-breasted chat mercury tissue
5 concentrations would not measurably increase as a result of water conveyance facilities
6 implementation.

7 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
8 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
9 Thus, Alternative 4A restoration activities that create newly inundated areas could increase
10 bioavailability of mercury. In general, the highest methylation rates are associated with high tidal
11 marshes that experience intermittent wetting and drying and associated anoxic conditions (Alpers
12 et al. 2008). Mercury is generally elevated throughout the Delta, and restoration of the lower
13 potential areas in total may result in generalized, very low level increases of mercury. Given that
14 some species have existing elevated mercury tissue levels, these low level increases could result in
15 some level of effects. Environmental Commitment 12 would be implemented to address the that risk
16 low level increases in methylmercury could add to the current elevated concentrations in tissue.

17 Because of the complex and very site-specific factors that would determine if mercury becomes
18 mobilized into the foodweb, *Environmental Commitment 12 Methylmercury Management* is included
19 to provide for site-specific evaluation for each restoration project. If a project is identified where
20 there is a high potential for methylmercury production that could not be fully addressed through
21 restoration design and adaptive management, alternate restoration areas would be considered.
22 Environmental Commitment 12 would be implemented in coordination with other similar efforts to
23 address mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis
24 Section. This Environmental Commitment would include the following actions.

- 25 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
26 mercury methylation and bioavailability.
- 27 ● Define design elements that minimize conditions conducive to generation of methylmercury in
28 restored areas.
- 29 ● Define adaptive management strategies that can be implemented to monitor and minimize
30 actual postrestoration creation and mobilization of methylmercury.

31 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
32 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
33 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
34 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
35 2009). The effect of selenium toxicity differs widely between species and also between age and sex
36 classes within a species. In addition, the effect of selenium on a species can be confounded by
37 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
38 2009).

39 The primary source of selenium bioaccumulation in birds is their diet (Ackerman and Eagles-Smith
40 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the trophic level
41 at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At Kesterson Reservoir
42 in the San Joaquin Valley, selenium concentrations in invertebrates have been found to be two to six
43 times the levels in rooted plants. Furthermore, bivalves sampled in the San Francisco Bay contained
44 much higher selenium levels than crustaceans such as copepods (Stewart et al. 2004). Studies

1 conducted at the Grasslands in Merced County recorded higher selenium levels in black-necked
2 stilts which feed on aquatic invertebrates than in mallards and pintails, which are primarily
3 herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which forage on
4 bivalves) have much higher selenium levels than shorebirds that prey on aquatic invertebrates
5 (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high levels of selenium
6 have a higher risk of selenium toxicity.

7 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
8 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
9 exacerbate bioaccumulation of selenium in avian species, including yellow-breasted chat. Tidal and
10 nontidal marsh restoration has the potential to mobilize selenium, and therefore increase avian
11 exposure from ingestion of prey items with elevated selenium levels. Thus, tidal marsh restoration
12 activities that create newly inundated areas could increase bioavailability of selenium. Changes in
13 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
14 Existing Conditions and the No Action Alternative, construction and operation of proposed water
15 conveyance facilities would not result in substantial, long-term increases in selenium concentrations
16 in water in the Delta under any alternative.

17 There could be an effect on yellow-breasted chat from increases in selenium associated with tidal
18 restoration activities (Environmental Commitment 4); however, effects on the yellow-breasted chat
19 population would be expected to be minimal because the amount of tidal restoration would total up
20 to 22 acres. Any effects would be addressed through the implementation of *AMM27 Selenium*
21 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
22 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
23 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
24 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
25 separately for each restoration effort as part of project design and implementation. This avoidance
26 and minimization measure would be implemented as part of the tidal habitat restoration design.

27 **NEPA Effects:** The potential for noise and visual disturbance, hazardous spills, increased dust and
28 sedimentation, and the potential impacts of operations and maintenance of the water conveyance
29 facilities would not result in an adverse effect on yellow-breasted chat with the incorporation of
30 *AMM1-AMM7*, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's Vireo, Western*
31 *Yellow-Billed Cuckoo* into Alternative 4A.

32 Changes in water operations would not be expected to result in increased mercury bioavailability to
33 yellow-breasted chat. Restoration actions that would create high and low tidal marsh, which is
34 yellow-breasted chat habitat, could provide biogeochemical conditions for methylation of mercury
35 in the newly inundated soils. There is potential for increased exposure of the foodwebs to
36 methylmercury in these areas, with the level of exposure dependent on the amounts of mercury
37 available in the soils and the biogeochemical conditions. However, the amount of tidal restoration
38 would total up to 22 acres, and potential exposure to methylmercury resulting from these acres of
39 restoration is not expected to adversely affect the yellow-breasted chat population. Implementation
40 of Environmental Commitment 12, which contains measures to assess the amount of mercury before
41 project development, followed by appropriate design and adaptation management, would minimize
42 the potential for any effects of increased methylmercury exposure.

43 Tidal habitat restoration could result in increased exposure of yellow-breasted chat to selenium;
44 however, the amount of tidal restoration would total up to 22 acres, and potential exposure to

1 selenium resulting from these acres of restoration would not be expected to adversely affect the
2 yellow-breasted chat population. Any effects would be addressed through the implementation of
3 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
4 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
5 habitats.

6 **CEQA Conclusion:** The potential for noise and visual disturbance, hazardous spills, increased dust
7 and sedimentation, and the potential impacts of operations and maintenance of the water
8 conveyance facilities would have a less-than-significant impact on yellow-breasted chat with the
9 incorporation of AMM1–AMM7, and *AMM22 Suisun Song Sparrow, Yellow-Breasted Chat, Least Bell's*
10 *Vireo, Western Yellow-Billed Cuckoo* into Alternative 4A.

11 Changes in water operations would not be expected to result in increased mercury bioavailability to
12 yellow-breasted chat. Restoration actions that would create high and low tidal marsh, which is
13 yellow-breasted chat habitat, could provide biogeochemical conditions for methylation of mercury
14 in the newly inundated soils. There is potential for increased exposure of the foodwebs to
15 methylmercury in these areas, with the level of exposure dependent on the amounts of mercury
16 available in the soils and the biogeochemical conditions. However, the amount of tidal restoration
17 would total up to 22 acres, and potential exposure to methylmercury resulting from these acres of
18 restoration is not expected to adversely affect the yellow-breasted chat population. Implementation
19 of Environmental Commitment 12, which contains measures to assess the amount of mercury before
20 project development, followed by appropriate design and adaptation management, would minimize
21 the potential for any effects of increased methylmercury exposure.

22 Tidal habitat restoration could result in increased exposure of yellow-breasted chat to selenium;
23 however, the amount of tidal restoration would total up to 22 acres, and potential exposure to
24 selenium resulting from these acres of restoration would not be expected to adversely affect the
25 yellow-breasted chat population. Any effects would be addressed through the implementation of
26 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
27 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
28 habitats.

29 **Impact BIO-108: Periodic Effects of Inundation of Yellow-Breasted Chat Habitat as a Result of**
30 **Implementation of Alternative 4A**

31 No Alternative 4A components would result in periodic effects on yellow-breasted chat.

32 **NEPA Effects:** No effect.

33 **CEQA Conclusion:** No impact.

34 **Cooper's Hawk and Osprey**

35 This section describes the effects of Alternative 4A, including water conveyance facilities
36 construction and implementation of Environmental Commitments, on Cooper's hawk and osprey.
37 Although osprey often nest on manmade structures such as telephone poles, and Cooper's hawk will
38 nest in more developed landscapes, modeled nesting habitat for these species is restricted to
39 valley/foothill riparian forest.

40 Alternative 4A would result in both temporary and permanent losses of Cooper's hawk and osprey
41 modeled habitat as indicated in Table 12-4A-42. Although restoration for the loss of nesting habitat

would be initiated in the same timeframe as the losses, it could take one or more decades for restored habitats to replace the functions of habitat lost. This time lag between impacts and restoration of habitat function would be minimized by specific requirements of *AMM18 Swainson's Hawk*, including the planting of mature trees. Full implementation of Alternative 4A would include the following Environmental Commitments and Resource Restoration and Performance Principles which would also benefit Cooper's hawk and osprey.

- Restore or create up to 251 acres of valley/foothill riparian natural community (Environmental Commitment 7).
- Protect up to 103 acres of existing valley/foothill riparian natural community (Environmental Commitment 3).
- Restore, maintain, and enhance riparian areas to provide a mix of early-, mid- and late-successional habitat types with a well-developed understory of dense shrubs (Resource Restoration and Performance Principle VFR1).
- Maintain a single contiguous patch of 100 acres of mature riparian forest in either CZ 4 or CZ 7 (Resource Restoration and Performance Principle VFR2).

As explained below, with the acres of restoration or protection included in the project, in addition to management activities to enhance natural communities for species and implementation of AMM1-AMM7, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM18 Swainson's Hawk*, and Mitigation Measure BIO-75, impacts on Cooper's hawk and osprey would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-4A-42. Changes in Cooper's Hawk and Osprey Modeled Habitat Associated with Alternative 4A (acres)

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Nesting	25	16
Total Impacts Water Conveyance Facilities		25	16
Environmental Commitments 4, 6-7, 9-11 ^a	Nesting	9	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		9	0
TOTAL IMPACTS		34	16

^a See discussion below for a description of applicable Environmental Commitments.

Impact BIO-109: Loss or Conversion of Habitat for and Direct Mortality of Cooper's Hawk and Osprey

Alternative 4A would result in the combined permanent and temporary loss of up to 50 acres (34 acres of permanent loss, 16 acres of temporary loss) of modeled nesting habitat for Cooper's hawk and osprey (Table 12-4A-42). Project measures that would result in these losses are water facilities and operation (which would involve construction of water conveyance facilities and transmission lines and establishment and use of reusable tunnel material areas), and tidal restoration (Environmental Commitment 4). Habitat enhancement and management activities (Environmental Commitment 11), which would include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other Alternative 4A physical facilities

1 could affect Cooper's hawk and osprey modeled habitat. Each of these individual activities is
2 described below.

- 3 • *Water Facilities Construction:* Construction of Alternative 4A water conveyance facilities would
4 result in the combined permanent and temporary loss of up to 41 acres of modeled Cooper's
5 hawk and osprey habitat (Table 12-4A-42). Of the 41 acres of modeled habitat that would be
6 removed for the construction of the conveyance facilities, 25 acres would be a permanent loss
7 and 16 acres would be a temporary loss of habitat. Activities that would impact modeled habitat
8 consist of tunnel, forebay, and intake construction, permanent and temporary access roads,
9 construction of transmission lines, barge unloading facilities and work areas. Most of the
10 permanent loss of nesting habitat would occur where Intakes 1–3 impact the Sacramento River's
11 east bank between Freeport and Courtland. The riparian areas here are very small patches,
12 some dominated by valley oak and others by nonnative trees. Some nesting habitat would be
13 lost due to construction of a permanent access road from the new forebay west to an reusable
14 tunnel material disposal area. Permanent losses would also occur along Lambert Road where
15 permanent utility lines would be installed and from the construction of an operable barrier at
16 the confluence of Old River and the San Joaquin River. Temporary losses of nesting habitat
17 would result from the construction of a barge unloading facility west of the intermediate forebay
18 in Snodgrass Slough and where temporary work areas surround intake sites. The riparian
19 habitat in these areas is also composed of very small patches or stringers bordering waterways,
20 which are composed of valley oak and scrub vegetation. Impacts from water conveyance
21 facilities would occur in the central Delta in CZ 3, CZ 4, CZ 5, CZ 6, and CZ 8. These losses would
22 have the potential to displace individuals, if present, and remove the functions and value of
23 potentially suitable habitat. There are no occurrences of Cooper's hawk or osprey that overlap
24 with the construction footprint for water conveyance facilities; however, Mitigation Measure
25 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*,
26 would be available to minimize impacts on Cooper's hawk and osprey if they were to nest in the
27 vicinity of construction activities. Refer to the Terrestrial Biology Mapbook for a detailed view of
28 Alternative 4A construction locations. Impacts from water conveyance facilities would occur
29 within the first 10–14 years of Alternative 4A implementation.
- 30 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal habitat restoration
31 would permanently remove up to 9 acres of potential Cooper's hawk and osprey nesting habitat.
32 Trees would not be actively removed but tree mortality would be expected over time as areas
33 became tidally inundated.
- 34 • *Environmental Commitment 11 Natural Communities Enhancement and Management:* Habitat
35 management- and enhancement-related activities could disturb Cooper's hawk and osprey nests
36 if they were present near work sites. A variety of habitat management actions included in
37 Environmental Commitment 11 that are designed to enhance wildlife values in Alternative 4A-
38 protected habitats may result in localized ground disturbances that could temporarily remove
39 small amounts of Cooper's hawk and osprey habitat and reduce the functions of habitat until
40 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
41 and road and other infrastructure maintenance, are expected to have minor effects on available
42 Cooper's hawk and osprey habitat and are expected to result in overall improvements to and
43 maintenance of habitat values. These effects cannot be quantified, but are expected to be
44 minimal and would be avoided and minimized by the AMMs listed below. BDCP Appendix 3.C
45 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
46 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

- 1 • Permanent and temporary habitat losses from the above Environmental Commitments would
2 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored
3 as riparian habitat within 1 year following completion of construction activities as described in
4 *AMM10 Restoration of Temporarily Affected Natural Communities*. Although the effects are
5 considered temporary, the restored riparian habitat would require 1 to several decades to
6 functionally replace habitat that has been affected and for trees to attain sufficient size and
7 structure suitable for nesting by Cooper's hawk or osprey. *AMM18 Swainson's Hawk* contains
8 actions described below to reduce the effect of temporal loss of nesting habitat, including the
9 transplanting of mature trees.
- 10 • *Water Facilities Operations and Maintenance*: Postconstruction operation and maintenance of
11 the above-ground water conveyance facilities and restoration infrastructure could result in
12 ongoing but periodic disturbances that could affect Cooper's hawk or osprey use of the
13 surrounding habitat. Maintenance activities would include vegetation management, levee and
14 structure repair, and re-grading of roads and permanent work areas. These effects, however,
15 would be reduced by AMMs described below.
- 16 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
17 direct mortality of adult or fledged Cooper's hawk or osprey if they were present in the project
18 area, because they would be expected to avoid contact with construction and other equipment. If
19 Cooper's hawk or osprey were to nest in the construction area, construction-related activities,
20 including equipment operation, noise and visual disturbances could affect nests or lead to their
21 abandonment, potentially resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
22 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would
23 be available to address these adverse effects on Cooper's hawk and osprey.

24 The following paragraphs summarize the combined effects discussed above and describe
25 Environmental Commitments, Resource Restoration and Performance Principles, and AMMs that
26 offset or avoid these effects. NEPA and CEQA conclusions are provided at the end of the section.

27 The study area supports approximately 14,069 acres of modeled nesting habitat for Cooper's hawk
28 and osprey. Alternative 4A as a whole would result in the permanent loss of and temporary effects
29 on 50 acres of potential nesting habitat (less than 1% of the potential nesting habitat in the study
30 area).

31 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
32 be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for nesting
33 habitat. Using these ratios would indicate that 50 acres of nesting habitat should be
34 restored/created and 50 acres should be protected to mitigate the losses of Cooper's hawk and
35 osprey nesting habitat.

36 The 251 acres of restored riparian habitat would be initiated to offset the loss of modeled nesting
37 habitat, but would require one to several decades to functionally replace habitat that has been
38 affected and for trees to attain sufficient size and structure suitable for nesting by Cooper's hawk or
39 osprey. This time lag between the removal and restoration of nesting habitat could have a
40 substantial impact on Cooper's hawk or osprey. Nesting habitat is limited throughout much of the
41 study area, consisting mainly of intermittent riparian, isolated trees, small groves, tree rows along
42 field borders, roadside trees, and ornamental trees near rural residences. The removal of nest trees
43 or nesting habitat would further reduce this limited resource and could reduce or restrict the

1 number of active Cooper's hawk or osprey nests within the study area until restored riparian habitat
2 is sufficiently developed.

3 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
4 transplanting trees scheduled for removal to compensate for the temporal loss of Swainson's hawk
5 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
6 within the 125-acre block are removed. These mature trees would be supplemented with additional
7 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
8 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
9 addition, at least five trees (5-gallon container size) would be planted within the Alternative 4A
10 conservation area for every tree 20 feet or taller removed by construction. A variety of native tree
11 species would be planted to provide trees with differing growth rates, maturation, and life span.
12 Trees would be planted within the Alternative 4A conservation area in areas that support high-value
13 Swainson's hawk foraging habitat to increase nest sites, or within riparian plantings as a component
14 of the riparian restoration (Environmental Commitment 7). Further details of AMM18 are provided
15 in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

16 The project also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
17 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
18 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
19 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM7 Barge Operations Plan, and AMM10*
20 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that
21 would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
22 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
23 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

24 **NEPA Effects:** The loss of Cooper's hawk and osprey nesting habitat from Alternative 4A would not
25 be adverse under NEPA because project proponents committed to avoiding and minimizing effects
26 from and to restoring and protecting an acreage that meets the typical mitigation ratios described
27 above. This habitat protection, restoration, management, and enhancement would be guided by
28 Resource Restoration and Performance Principle VFR1, and by AMM1-AMM7, AMM10, and *AMM18*
29 *Swainson's Hawk*, which would be in place during all project activities. In addition, Mitigation
30 Measure BIO-75 would be available to address potential impacts on nesting individuals. Considering
31 these commitments, losses and conversions of Cooper's hawk and osprey habitat under Alternative
32 4A would not be adverse.

33 **CEQA Conclusion:** The effects on Cooper's hawk and osprey habitat from Alternative 4A would
34 represent an adverse effect as a result of habitat modification of a special-status species and
35 potential for direct mortality in the absence of Environmental Commitments and AMMs. However,
36 project proponents have committed to habitat protection, restoration, management and
37 enhancement associated with Environmental Commitment 3, Environmental Commitment 7, and
38 Environmental Commitment 11. These conservation activities would be guided by Resource
39 Restoration and Performance Principle VFR1, and by AMM1-AMM6, AMM10, and *AMM18*
40 *Swainson's Hawk*, which would be in place during all project activities. In addition, Mitigation
41 Measure BIO-75 would be available to address potential impacts on nesting individuals. Considering
42 these commitments, Alternative 4A would not result in a substantial adverse effect through habitat
43 modifications and would not substantially reduce the number or restrict the range of Cooper's hawk
44 and osprey. Therefore, with the implementation of Mitigation Measure BIO-75, Alternative 4A would
45 have a less-than-significant impact on Cooper's hawk and osprey under CEQA.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 See Mitigation Measure BIO-75 under Impact BIO-75.

4 **Impact BIO-110: Effects on Cooper’s Hawk and Osprey Associated with Electrical**
5 **Transmission Facilities**

6 New transmission lines would increase the risk for bird-power line strikes, which could result in
7 injury or mortality of Cooper’s hawk and osprey. However, the flight behavior of these species, their
8 keen vision, and high maneuverability substantially reduce the risk of powerline collisions. The
9 existing network of transmission lines in the project area currently poses the same small risk for
10 Cooper’s hawk and osprey, and any incremental risk associated with the new power line corridors
11 would also be expected to be low. Marking transmission lines with flight diverters that make the
12 lines more visible to birds has been shown to reduce the incidence of bird mortality (Brown and
13 Drewien 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian
14 mortality by 60%. With the implementation of *AMM20 Greater Sandhill Crane*, all new transmission
15 lines would be fitted with flight diverters, which would further reduce any risk of collision with
16 lines.

17 **NEPA Effects:** The construction and presence of new transmission lines would not represent an
18 adverse effect because the risk of bird strike is considered to be minimal based on the flight
19 behavior, the general maneuverability, and keen eyesight of Cooper’s hawk and osprey. In addition,
20 *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters on all new
21 powerlines, which would further reduce any risk of mortality from bird strike for Cooper’s hawk
22 and osprey from the project. Therefore, the construction and operation of new transmission lines
23 under Alternative 4A would not result in an adverse effect on Cooper’s hawk and osprey.

24 **CEQA Conclusion:** The construction and presence of new transmission lines would not represent an
25 adverse effect because the risk of bird strike is considered to be minimal based on the flight
26 behavior, the general maneuverability, and keen eyesight of Cooper’s hawk and osprey. In addition,
27 *AMM20 Greater Sandhill Crane* contains the commitment to place bird strike diverters on all new
28 powerlines, which would further reduce any risk of mortality from bird strike for Cooper’s hawk
29 and osprey from the project. Therefore, the construction and operation of new transmission lines
30 under Alternative 4A would result in a less-than-significant impact on Cooper’s hawk and osprey.

31 **Impact BIO-111: Indirect Effects of the Project on Cooper’s Hawk and Osprey**

32 **Indirect Construction- and Operation-Related Effects:** Construction noise above background
33 noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction
34 activities (see BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
35 *Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and EIR/EIS Appendix 11F, *Substantive BDCP*
36 *Revisions*). However, there are no available data to determine the extent to which these noise levels
37 could affect Cooper’s hawk or osprey. If Cooper’s hawk or osprey were to nest in or adjacent to work
38 areas, construction and subsequent maintenance-related noise and visual disturbances could mask
39 calls, disrupt foraging and nesting behaviors, and reduce the functions of suitable nesting habitat for
40 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
41 *Disturbance of Nesting Birds*, would avoid the potential for adverse effects of construction-related
42 activities on survival and productivity of nesting Cooper’s hawk and osprey. The use of mechanical
43 equipment during water conveyance facilities construction could cause the accidental release of

1 petroleum or other contaminants that could affect Cooper's hawk and osprey in the surrounding
2 habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could
3 also have an adverse effect on these species. AMM1-AMM7, including *AMM2 Construction Best*
4 *Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that
5 measures are in place to prevent runoff from the construction area and negative effects of dust on
6 active nests.

7 **Methylmercury Exposure:** Project activities have the potential to exacerbate bioaccumulation of
8 mercury in avian species, including Cooper's hawk and osprey. Future operational impacts under
9 water conveyance facilities were analyzed using a DSM-2 based model to assess potential effects on
10 mercury concentration and bioavailability resulting from proposed flows. Subsequently, a
11 regression model was used to estimate fish-tissue concentrations under these future operational
12 conditions (evaluated starting operations or ESO). Results indicated that changes in total mercury
13 levels in water and fish tissues due to ESO were insignificant (see BDCP Appendix 5.D, *Contaminants*,
14 Tables 5D.4-3, 5D.4-4, and 5D.4-5).

15 Marsh (tidal and nontidal) restoration has the potential to increase exposure to methylmercury.
16 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
17 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains
18 (Alpers et al. 2008). Thus, Alternative 4A restoration activities that create newly inundated areas
19 could increase bioavailability of mercury. Species sensitivity to methylmercury differs widely and
20 there is a large amount of uncertainty with respect to species-specific effects. Increased
21 methylmercury associated with natural community restoration could indirectly affect cooper's hawk
22 and osprey, via uptake in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

23 The potential mobilization or creation of methylmercury within the project area varies with site-
24 specific conditions and would need to be assessed at the project level. Due to the complex and very
25 site-specific factors that will determine if mercury becomes mobilized into the foodweb,
26 *Environmental Commitment 12 Methylmercury Management*, is included to provide for site-specific
27 evaluation for each restoration project. If a project is identified where there is a high potential for
28 methylmercury production that could not be fully addressed through restoration design and
29 adaptive management, alternate restoration areas would be considered. Environmental
30 Commitment 12 would be implemented in coordination with other similar efforts to address
31 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
32 Environmental Commitment would include the following actions.

- 33 • Assess pre-restoration conditions to determine the risk that the project could result in increased
34 mercury methylation and bioavailability
- 35 • Define design elements that minimize conditions conducive to generation of methylmercury in
36 restored areas.

37 Define adaptive management strategies that can be implemented to monitor and minimize actual
38 postrestoration creation and mobilization of methylmercury.

39 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
40 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
41 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
42 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
43 2009). The effect of selenium toxicity differs widely between species and also between age and sex
44 classes within a species. In addition, the effect of selenium on a species can be confounded by

1 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
2 2009).

3 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
4 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
5 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
6 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
7 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
8 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
9 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
10 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
11 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
12 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
13 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
14 levels of selenium have a higher risk of selenium toxicity.

15 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
16 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
17 exacerbate bioaccumulation of selenium in avian species, including Cooper's hawk and osprey. Tidal
18 and nontidal marsh restoration has the potential to mobilize selenium, and therefore increase avian
19 exposure from ingestion of prey items with elevated selenium levels. Thus, tidal marsh restoration
20 activities that create newly inundated areas could increase bioavailability of selenium. Changes in
21 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
22 Existing Conditions and the No Action Alternative, water conveyance facilities would not result in
23 substantial, long-term increases in selenium concentrations in water in the Delta under any
24 alternative.

25 There could be an effect on Cooper's hawk and osprey from increases in selenium associated with
26 tidal restoration activities (Environmental Commitment 4); however, effects on the species
27 populations would be expected to be minimal because the amount of tidal restoration would total up
28 to 22 acres. Any effects would be addressed through the implementation of *AMM27 Selenium*
29 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
30 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
31 *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of selenium
32 management to reduce selenium concentrations and/or bioaccumulation would be evaluated
33 separately for each restoration effort as part of project design and implementation. This avoidance
34 and minimization measure would be implemented as part of the tidal habitat restoration design.

35 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
36 could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas. Moreover,
37 operation and maintenance of the water conveyance facilities, including the transmission facilities,
38 could result in ongoing but periodic postconstruction disturbances that could adversely affect
39 Cooper's hawk and osprey use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*
40 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, in addition to AMM1-
41 AMM7, would be available to address this adverse effect.

42 Tidal habitat restoration could result in increased exposure of Cooper's hawk and osprey to
43 selenium; however, the amount of tidal restoration would total up to 22 acres, and potential
44 exposure to selenium resulting from these acres of restoration would not be expected to adversely

1 affect species populations. Any effects would be addressed through the implementation of *AMM27*
2 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
3 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

4 The implementation of tidal natural communities restoration could result in increased exposure of
5 Cooper's hawk or osprey to methylmercury, through the ingestion of fish or small mammals in
6 tidally restored areas. However, it is currently unknown what concentrations of methylmercury are
7 harmful to these species and the potential for increased exposure varies substantially within the
8 study area. Implementation of Environmental Commitment 12, which contains measures to assess
9 the amount of mercury before project development, followed by appropriate design and adaptation
10 management, would minimize the potential for increased methylmercury exposure, and would
11 result in no adverse effect on Cooper's hawk and osprey.

12 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
13 facilities could reduce Cooper's hawk and osprey use of modeled habitat adjacent to work areas.
14 Moreover, operation and maintenance of the water conveyance facilities, including the transmission
15 facilities, could result in ongoing but periodic postconstruction disturbances that could affect
16 Cooper's hawk and osprey use of the surrounding habitat. Noise, the potential for hazardous spills,
17 increased dust and sedimentation, and operations and maintenance of the water conveyance
18 facilities under Alternative 4A would have a less-than-significant impact on Cooper's hawk and
19 osprey with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
20 *Surveys and Avoid Disturbance of Nesting Birds*, and AMM1-AMM7. The implementation of tidal
21 natural communities restoration could result in increased exposure of Cooper's hawk or osprey to
22 methylmercury, through the ingestion of fish or small mammals in tidally restored areas. This would
23 be a significant impact. However, it is currently unknown what concentrations of methylmercury are
24 harmful to these species and the potential for increased exposure varies substantially within the
25 study area. Implementation of Environmental Commitment 12 which contains measures to assess
26 the amount of mercury before project development, followed by appropriate design and adaptation
27 management, would minimize the potential for increased methylmercury exposure, and would
28 result in no adverse effect on Cooper's hawk and osprey.

29 Tidal habitat restoration also could result in increased exposure of Cooper's hawk and osprey to
30 selenium; however, the amount of tidal restoration would total up to 22 acres, and potential
31 exposure to selenium resulting from these acres of restoration would not be expected to adversely
32 affect species populations. Any effects would be addressed through the implementation of *AMM27*
33 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
34 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

35 With AMM1-AMM7 and Environmental Commitment 12 in place, and with the implementation of
36 Mitigation Measure BIO-75, the indirect effects of Alternative 4A implementation would not
37 substantially reduce the number or restrict the range of Cooper's hawk or osprey. Therefore, the
38 indirect effects of Alternative 4A implementation would have a less-than-significant impact on
39 Cooper's hawk or osprey.

40 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
41 **Disturbance of Nesting Birds**

42 See Mitigation Measure BIO-75 under Impact BIO-75.

Impact BIO-112: Periodic Effects of Inundation of Cooper’s Hawk and Osprey Nesting Habitat as a Result of Implementation of Alternative 4A

No Alternative 4A components would result in periodic effects on Cooper’s hawk and osprey.

NEPA Effects: No effect.

CEQA Conclusion: No impact.

Golden Eagle and Ferruginous Hawk

This section describes the effects of Alternative 4A, including water conveyance facilities construction and implementation of Environmental Commitments, on golden eagle and ferruginous hawk. Modeled foraging habitat for these species consists of grassland, alkali seasonal wetland, vernal pool complex, alfalfa, grain and hay, pasture, and idle cropland throughout the study area.

Alternative 4A would result in both temporary and permanent losses of golden eagle and ferruginous hawk modeled foraging habitat as indicated in Table 12-4A-43. Full implementation of Alternative 4A would include the following Environmental Commitments that would benefit golden eagles or ferruginous hawk.

- Protect up to 1,060 acres and restore up to 1,070 acres of grassland (Environmental Commitments 3 and Environmental Commitment 8).
- Protect up to 11,870 acres of cultivated lands (Environmental Commitment 3).
- Restore up to 48 acres and protect up to 188 acres of vernal pool/alkali seasonal wetland complex (Environmental Commitment 3 and Environmental Commitment 9).

Golden eagle is a fully protected species and California Fish and Game Code Section 86 prohibits take of individuals. With the implementation of *AMM20 Greater Sandhill Crane*, construction activities would not result in mortality of the species, which would avoid take pursuant to Section 86 of the California Fish and Game Code. As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities to enhance natural communities for species and implementation of AMM1–AMM7, impacts on golden eagle and ferruginous hawk would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-4A-43. Changes in Golden Eagle and Ferruginous Hawk Habitat Associated with Alternative 4A (acres)

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Foraging	1,978	537
Total Impacts Water Conveyance Facilities		1,978	537
Environmental Commitments 4, 6–7, 9–11 ^a	Foraging	2,427	0
Total Impacts Environmental Commitments 4, 6–7, 9–11^a		2,427	0
TOTAL IMPACTS		4,405	537

^a See discussion below for a description of applicable Environmental Commitments.

1 **Impact BIO-113: Loss or Conversion of Habitat for and Direct Mortality of Golden Eagle and**
2 **Ferruginous Hawk**

3 Alternative 4A would result in the combined permanent and temporary loss of up 4,942 acres of
4 modeled foraging habitat for golden eagle and ferruginous hawk (4,405 acres of permanent loss and
5 537 of temporary loss, Table 12-4A-43). Project measures that would result in these losses are
6 water conveyance facilities and transmission line construction, and establishment and use of
7 reusable tunnel material areas, tidal habitat restoration (Environmental Commitment 4), riparian
8 restoration, (Environmental Commitment 7), grassland restoration (Environmental Commitment 8),
9 vernal pool and alkali seasonal wetland restoration (Environmental Commitment 9) and nontidal
10 marsh restoration (Environmental Commitment 10). Habitat enhancement and management
11 activities (Environmental Commitment 11) could result in local adverse habitat effects. In addition,
12 maintenance activities associated with the long-term operation of the water conveyance facilities
13 and other physical facilities could degrade or eliminate foraging habitat for both species. Each of
14 these individual activities is described below.

- 15 • *Water Facilities Construction:* Construction of Alternative 4A conveyance facilities would result
16 in the combined permanent and temporary loss of up to 2,515 acres of modeled golden eagle
17 and ferruginous hawk habitat (1,978 acres of permanent loss, 537 acres of temporary loss).
18 Impacts would occur from the construction of Intakes 2, 3, and 5 and associated temporary
19 work areas and access roads in CZ 4 between Clarksburg and Courtland; construction of the
20 intermediate forebay; and from an reusable tunnel material storage area on Bouldin Island. The
21 construction of the permanent and temporary transmission line corridors through CZs 4–6 and
22 9 would also remove suitable foraging habitat for the species. Approximately 1,115 acres would
23 be affected by placement of an reusable tunnel material area west of the Clifton Court Forebay in
24 CZ 8. In addition, permanent habitat loss would result from the construction of the new forebay
25 south of the existing Clifton court Forebay in CZ 8. Some of the grassland habitat lost at the sites
26 of new canals south of Clifton Court Forebay is composed of larger stands of ruderal and
27 herbaceous vegetation and California annual grassland, which is also suitable foraging habitat
28 for the species. There are no occurrences of golden eagle or ferruginous hawk that intersect with
29 the water conveyance facilities footprint. Refer to the Terrestrial Biology Mapbook for a detailed
30 view of Alternative 4A construction locations. Impacts from water conveyance facilities would
31 occur within the first 10–14 years of Alternative 4A implementation.
- 32 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal habitat restoration
33 site preparation and inundation would permanently remove an estimated 254 acres of modeled
34 golden eagle and ferruginous hawk habitat. The majority of the acres lost would consist of
35 cultivated lands in the West Delta ROA.
- 36 • *Environmental Commitment 7 Riparian Natural Community Restoration:* Riparian restoration
37 would permanently remove approximately 251 acres of golden eagle and ferruginous hawk
38 foraging habitat.
- 39 • *Environmental Commitment 8 Grassland Natural Community Restoration:* Grassland restoration
40 would convert approximately 1,070 acres of cultivated lands into grasslands. These acres may
41 be temporarily unavailable for foraging raptors but would not permanently reduce foraging
42 habitat for either species.
- 43 • *Environmental Commitment 9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration:* The
44 intent of the Environmental Commitment is to match the acreage of restoration with the actual
45 acreage lost to other project measures (primarily water conveyance facilities). The current

1 estimate for vernal pool/alkali seasonal wetland complex restoration is 48 acres. The goal is for
2 no net loss of this natural community, consistent with the project's Resource Restoration and
3 Performance Principles. These acres may be temporarily unavailable for foraging raptors but
4 the project would not permanently reduce foraging habitat for either species.

- 5 • *Environmental Commitment 10 Nontidal Marsh Restoration*: Restoration and creation of nontidal
6 freshwater marsh would result in the permanent removal of 832 acres of golden eagle and
7 ferruginous hawk foraging habitat.
- 8 • *Environmental Commitment 11 Natural Communities Enhancement and Management*: A variety of
9 habitat management actions included in Environmental Commitment 11 that are designed to
10 enhance wildlife values in restored or protected habitats could result in localized ground
11 disturbances that could permanently remove 20 acres and temporarily remove small amounts
12 of golden eagle and ferruginous hawk foraging habitat. Ground-disturbing activities, such as
13 removal of nonnative vegetation and road and other infrastructure maintenance activities
14 would be expected to have minor adverse effects on available habitat for these species.
- 15 • *Operations and Maintenance*: Postconstruction operation and maintenance of the above-ground
16 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
17 disturbances that could affect golden eagle and ferruginous hawk use of the surrounding habitat.
18 Maintenance activities would include vegetation management, levee and structure repair, and
19 re-grading of roads and permanent work areas. These effects, however, would be reduced by
20 AMMs described below.
- 21 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
22 golden eagle and ferruginous hawk because foraging individuals would be expected to
23 temporarily avoid the increased noise and activity associated with construction areas.

24 The following paragraphs summarize the combined effects discussed above and describe
25 Environmental Commitments and AMMs that offset or avoid these effects. NEPA and CEQA
26 conclusions are provided at the end of the section.

27 Alternative 4A would remove 4,942 acres of modeled golden eagle and ferruginous hawk foraging
28 habitat. These effects would result from the construction of the water conveyance facilities and
29 implementing *Environmental Commitment 4 Tidal Natural Communities Restoration*, *Environmental*
30 *Commitment 7 Riparian Natural Communities Restoration*, *Environmental Commitment 8 Grassland*
31 *Natural Communities Restoration*, and *Environmental Commitment 10 Nontidal Marsh Restoration*.

32 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
33 would be 2:1 for protection of habitat. Using this ratio would indicate that 9,884 acres should be
34 protected to compensate for the losses of golden eagle and ferruginous hawk habitat. Project
35 proponents would commit to protect up to 1,060 acres of grassland, 188 acres of vernal pool/alkali
36 seasonal wetland complex, and 11,870 acres of cultivated lands, and to restore up to 1,070 acres of
37 grassland and 48 acres of vernal pool/alkali seasonal wetland complex which would provide
38 suitable habitat for golden eagle and ferruginous hawk.

39 The project also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
40 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
41 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
42 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
43 these AMMs include elements that would avoid or minimize the risk of affecting individuals and

1 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
2 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
3 of the Final EIR/EIS.

4 **NEPA Effects:** The loss of golden eagle and ferruginous hawk foraging habitat from Alternative 4A
5 would not be adverse under NEPA because project proponents have committed to avoiding and
6 minimizing effects and to restoring and protecting an acreage that exceeds the typical mitigation
7 ratios described above. This habitat protection, restoration, management, and enhancement would
8 be guided by and by AMM1–AMM7, which would be in place during all project activities. Considering
9 these commitments, losses and conversions of mountain plover habitat under Alternative 4A would
10 not be adverse.

11 **CEQA Conclusion:** The effects on golden eagle and ferruginous hawk foraging habitat from
12 Alternative 4A would represent an adverse effect as a result of habitat modification of a special-
13 status species in the absence of Environmental Commitments and AMMs. However, project
14 proponents have committed to habitat protection, restoration, management, and enhancement
15 associated with Environmental Commitment 3 and Environmental Commitment 11. These
16 conservation activities would be guided by and by AMM1–AMM7, which would be in place during all
17 project activities. Considering these commitments, Alternative 4A would not result in a substantial
18 adverse effect through habitat modifications. Therefore, Alternative 4A would have a less-than-
19 significant impact on golden eagle and ferruginous hawk under CEQA.

20 **Impact BIO-114: Effects on Golden Eagle and Ferruginous Hawk Associated with Electrical** 21 **Transmission Facilities**

22 Golden eagle and ferruginous hawk would be at low risk of bird strike mortality from the
23 construction of new transmission lines based on their maneuverability, their keen eyesight, their
24 lack of flocking behavior, and other factors assessed in the bird strike vulnerability analysis (BDCP
25 Attachment 5.J-2, *Memorandum: Analysis of Potential Bird Collisions at Proposed BDCP Transmission*
26 *Lines*). Marking transmission lines with flight diverters that make the lines more visible to birds has
27 been shown to reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008)
28 estimated that marking devices in the Central Valley could reduce avian mortality by 60%. With the
29 implementation of *AMM20 Greater Sandhill Crane*, all new transmission lines would be fitted with
30 flight diverters, which would substantially reduce the potential for powerline collisions.

31 **NEPA Effects:** Golden eagle and ferruginous hawk are already at a low risk of bird strike mortality
32 based on their general maneuverability, keen eyesight and lack of flocking behavior. All new
33 transmission lines constructed as a result of the project would be fitted with bird diverters, which
34 have been shown to reduce avian mortality by 60%. By implementing *AMM20 Greater Sandhill*
35 *Crane*, the construction and operation of transmission lines would not result in an adverse effect on
36 golden eagle or ferruginous hawk.

37 **CEQA Conclusion:** Golden eagle and ferruginous hawk are already at a low risk of bird strike
38 mortality based on their general maneuverability, keen eyesight and lack of flocking behavior. In
39 addition, *AMM20 Greater Sandhill Crane* contains the commitment to fit new transmission lines
40 constructed as a result of the project with bird diverters, which have been shown to reduce avian
41 mortality by 60%. By implementing *AMM20 Greater Sandhill Crane*, there would be no take of golden
42 eagle from the project pursuant to California Fish and Game Code Section 86, and the construction
43 and operation of transmission lines would have a less-than-significant impact on golden eagle and
44 ferruginous hawk.

1 **Impact BIO-115: Indirect Effects of the Project on Golden Eagle and Ferruginous Hawk**

2 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt
3 foraging, and reduce the functions of suitable foraging habitat for golden eagle and ferruginous
4 hawk. Construction noise above background noise levels (greater than 50 dBA) could extend 500 to
5 5,250 feet from the edge of construction activities (see BDCP Appendix 5.J, Attachment 5J.D, *Indirect*
6 *Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and
7 EIR/EIS Appendix 11F, *Substantive BDCP Revisions*). However, there are no available data to
8 determine the extent to which these noise levels could affect golden eagle or ferruginous hawk.
9 Indirect effects associated with construction include noise, dust, and visual disturbance caused by
10 grading, filling, contouring, and other ground-disturbing operations. The use of mechanical
11 equipment during water conveyance facilities construction could cause the accidental release of
12 petroleum or other contaminants that could affect these species or their prey in the surrounding
13 habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,
14 would minimize the likelihood of such spills from occurring. The inadvertent discharge of sediment
15 or excessive dust adjacent to golden eagle and ferruginous hawk grassland habitat could also have a
16 negative effect on the species. However, AMM1–AMM7 would also ensure that measures would be in
17 place to prevent runoff from the construction area and the negative effects of dust on wildlife
18 adjacent to work areas.

19 **NEPA Effects:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative 4A
20 implementation could have adverse effects on these species through the modification of habitat.
21 With the incorporation of AMM1–AMM7 into Alternative 4A, indirect effects as a result of
22 Alternative 4A implementation would not have an adverse effect on golden eagle and ferruginous
23 hawk.

24 **CEQA Conclusion:** Indirect effects on golden eagle and ferruginous hawk as a result of Alternative
25 4A implementation could have a significant impact on the species from modification of habitat. With
26 the incorporation of AMM1–AMM7 into Alternative 4A, indirect effects as a result of Alternative 4A
27 implementation would have a less-than-significant impact on golden eagle and ferruginous hawk.

28 **Impact BIO-116: Periodic Effects of Inundation on Golden Eagle and Ferruginous Hawk**
29 **Habitat as a Result of Implementation of Alternative 4A**

30 No Alternative 4A components would result in periodic inundation effects on golden eagle and
31 ferruginous hawk.

32 **NEPA Effects:** No effect.

33 **CEQA Conclusion:** No impact.

34 **Cormorants, Herons and Egrets**

35 This section describes the effects of Alternative 4A, including water conveyance facilities
36 construction and implementation of Environmental Commitments, on double-crested cormorant,
37 great blue heron, great egret, snowy egret, and black-crowned night heron. Modeled breeding
38 habitat for these species consists of valley/foothill riparian forest.

39 Alternative 4A would result in both temporary and permanent losses of cormorant, heron, and egret
40 modeled habitat as indicated in Table 12-4A-44. The majority of the losses would take place over an
41 extended period of time as tidal marsh is restored in the study area. Although restoration for the

1 loss of nesting habitat would be initiated in the same timeframe as the losses, it could take one or
 2 more decades for restored habitats to replace the functions of habitat lost. This time lag between
 3 impacts and restoration of habitat function would be minimized by specific requirements of *AMM18*
 4 *Swainson's Hawk*, including the planting of mature trees. Full implementation of Alternative 4A
 5 would include the following Environmental Commitments and Resource Restoration and
 6 Performance Principles which would benefit cormorants, herons, and egrets.

- 7 • Restore or create up to 251 acres of valley/foothill riparian natural community (Environmental
 8 Commitment 7).
- 9 • Protect up to 103 acres of existing valley/foothill riparian natural community (Environmental
 10 Commitment 3).
- 11 • Protect up to 119 acres of nontidal wetlands and create up to 832 acres of nontidal wetlands
 12 (Environmental Commitment 3 and Environmental Commitment 10).
- 13 • Restore or create up to 295 acres of tidal wetlands in the Delta (Environmental Commitment 4)
- 14 • Restore, maintain, and enhance riparian areas to provide a mix of early-, mid- and late-
 15 successional habitat types with a well-developed understory of dense shrubs (Resource
 16 Restoration and Performance Principle VFR1).

17 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 18 management activities to enhance natural communities for species and implementation of AMM1–
 19 AMM7, *AMM10 Restoration of Temporarily Affected Natural Communities*, *AMM18 Swainson's Hawk*,
 20 Mitigation Measure BIO-75, and Mitigation Measure BIO-117, impacts on cormorants, herons, and
 21 egrets would not be adverse for NEPA purposes and would be less than significant for CEQA
 22 purposes.

23 **Table 12-4A-44. Changes in Cormorant, Heron and Egret Modeled Habitat Associated with**
 24 **Alternative 4A (acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Nesting (Rookeries)	37	24
Total Impacts Water Conveyance Facilities		37	24
Environmental Commitments 4, 6-7, 9-11 ^a	Nesting (Rookeries)	11	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		11	0
TOTAL IMPACTS		48	24

^a See discussion below for a description of applicable Environmental Commitments.

25
 26 **Impact BIO-117: Loss or Conversion of Nesting Habitat for and Direct Mortality of**
 27 **Cormorants, Herons and Egrets**

28 Alternative 4A would result in the combined permanent and temporary loss of up to 72 acres of
 29 modeled nesting habitat (48 acres of permanent loss, 24 acres of temporary loss) for double-crested
 30 cormorant, great blue heron, great egret, snowy egret, and black-crowned night heron (Table 12-4A-
 31 44). Project measures that would result in these losses are water conveyance facilities and
 32 transmission line construction, and establishment and use of reusable tunnel material areas, and
 33 tidal natural communities restoration (Environmental Commitment 4). Habitat enhancement and
 34 management activities (Environmental Commitment 11) which include ground disturbance or

1 removal of nonnative vegetation, could result in local adverse habitat effects. In addition,
 2 maintenance activities associated with the long-term operation of the water conveyance facilities
 3 and other physical facilities could degrade or eliminate cormorant, heron, and egret modeled
 4 habitat. Each of these individual activities is described below.

- 5 • *Water Facilities Construction*: Construction of Alternative 4A water conveyance facilities would
 6 result in the combined permanent and temporary loss of up to 61 acres of modeled nesting
 7 habitat for cormorants, herons, and egrets. (Table 12-4A-44). Of the 61 acres of modeled habitat
 8 that would be removed for the construction of the conveyance facilities, 37 acres would be a
 9 permanent loss and 24 acres would be a temporary loss of habitat. Activities that would impact
 10 modeled nesting habitat consist of tunnel, forebay, and intake construction, permanent and
 11 temporary access roads, construction of transmission lines, barge unloading facilities, and
 12 temporary work areas. Most of the permanent loss of nesting habitat would occur where Intakes
 13 2, 3, and 5 impact the Sacramento River’s east bank between Freeport and Courtland. The
 14 riparian areas here are very small patches, some dominated by valley oak and others by
 15 nonnative trees. Some nesting habitat would be lost as a result of construction of a permanent
 16 access road from the new forebay west to an reusable tunnel material disposal area. Permanent
 17 losses would also occur along Lambert Road where permanent utility lines would be installed
 18 and from the construction of an operable barrier at the confluence of Old River and the San
 19 Joaquin River. Temporary losses of nesting habitat would result from the construction of a barge
 20 unloading facility west of the intermediate forebay in Snodgrass Slough and where temporary
 21 work areas surround intake sites. The riparian habitat in these areas is also composed of very
 22 small patches or stringers bordering waterways, which are composed of valley oak and scrub
 23 vegetation. Impacts from water conveyance facilities would occur in the central Delta in CZs 3–6,
 24 and CZ 8. Habitat loss from water conveyance facilities activities would have the potential to
 25 displace individuals, if present, and remove the functions and value of potentially suitable
 26 habitat. There are no CNDDDB or DHCCP occurrences of nesting cormorants, herons, or egrets
 27 that overlap with the construction footprint of water conveyance facilities; however, Mitigation
 28 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
 29 *Birds* and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to
 30 minimize impacts on cormorants, herons and egrets if they were to nest in the vicinity of
 31 construction activities. Refer to the Terrestrial Biology Mapbook for a detailed view of
 32 Alternative 4A construction locations. Impacts from water conveyance facilities would occur
 33 within the first 10–14 years of Alternative 4A implementation.
- 34 • *Environmental Commitment 4 Tidal Natural Communities Restoration*: Tidal habitat restoration
 35 site preparation and inundation would permanently remove an estimated 11 acres of nesting
 36 habitat for cormorants, herons and egrets. Trees would not be actively removed but tree
 37 mortality would be expected over time as areas became tidally inundated. Depending on the
 38 extent and value of remaining habitat, this could reduce use of these habitats by these species.
- 39 • *Environmental Commitment 11 Natural Communities Enhancement and Management*: Habitat
 40 management- and enhancement-related activities could disturb cormorant, heron, and egret
 41 nests if they were present near work sites. A variety of habitat management actions included in
 42 Environmental Commitment 11 that are designed to enhance wildlife values in Alternative 4A-
 43 protected habitats may result in localized ground disturbances that could temporarily remove
 44 small amounts of cormorant, heron, and egret habitat and reduce the functions of habitat until
 45 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
 46 and road and other infrastructure maintenance, are expected to have minor effects on available

1 habitat for these species and are expected to result in overall improvements to and maintenance
2 of habitat values. These effects cannot be quantified, but are expected to be minimal and would
3 be avoided and minimized by the AMMs listed below. BDCP Appendix 3.C describes the AMMs,
4 which have since been updated and which are provided in Appendix 3B, *Environmental*
5 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

- 6 • Permanent and temporary habitat losses from the above Environmental Commitments would
7 primarily consist of fragmented riparian stands. Temporarily affected areas would be restored
8 as riparian habitat within 1 year following completion of construction activities as described in
9 *AMM10 Restoration of Temporarily Affected Natural Communities*. Although the effects are
10 considered temporary, the restored riparian habitat would require years to several decades to
11 functionally replace habitat that has been affected and for trees to attain sufficient size and
12 structure for established rookeries. *AMM18 Swainson's Hawk* contains actions described below
13 to reduce the effect of temporal loss of mature riparian habitat, including the transplanting of
14 mature trees.
- 15 • *Construction Operations and Maintenance*: Postconstruction operation and maintenance of the
16 above-ground water conveyance facilities and restoration infrastructure could result in ongoing
17 but periodic disturbances that could affect use of the surrounding habitat by cormorants, herons
18 or egrets. Maintenance activities would include vegetation management, levee and structure
19 repair, and re-grading of roads and permanent work areas. These effects, however, would be
20 reduced by AMMs described below.
- 21 • The primary impact of concern regarding double-crested cormorant, great blue heron, great
22 egret, snowy egret, and black-crowned night heron is the loss of existing known nest trees, and
23 other large trees associated with known nest sites. Because these species are highly traditional
24 in their use of rookeries, the establishment of new nest sites is unpredictable. To avoid adverse
25 effects on these species, existing known nest sites would have to be avoided. Mitigation Measure
26 BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and
27 and Mitigation Measure BIO-117, *Avoid Impacts on Rookeries*, would be available to address
28 these adverse effects on cormorants, herons, and egrets.
- 29 • Injury and Direct Mortality: If birds were to nest in the construction area, construction-related
30 activities, including equipment operation, noise and visual disturbances could affect nests
31 including any nests that are built on the ground (e.g. Cormorant nests that have been built on
32 the ground after nest trees fall over or die from stress and guano produced by a rookery) or lead
33 to their abandonment, potentially resulting in mortality of eggs and nestlings. Mitigation
34 Measure BIO-75 and Mitigation Measure BIO-117 would be available to address these effects on
35 cormorants, herons, and egrets.

36 The following paragraphs summarize the combined effects discussed above and describe
37 Environmental Commitments, Resource Restoration and Performance Principles, and AMMs that
38 offset or avoid these effects. NEPA and CEQA conclusions are provided at the end of the section.

39 Based on modeled habitat, the study area supports approximately 17,966 acres of modeled nesting
40 habitat for cormorants, herons, and egrets. Alternative 4A as a whole would result in the permanent
41 loss of and temporary effects on 72 acres of potential breeding habitat (<1% of the potential
42 breeding habitat in the study area).

43 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
44 be 1:1 for restoration/creation and 1:1 protection of valley/foothill riparian habitat for nesting

1 habitat. Using these ratios would indicate that 72 acres of nesting habitat should be
2 restored/created and 72 acres should be protected to mitigate the losses of cormorant, heron, and
3 egret nesting habitat.

4 The 251 acres of restored riparian habitat would be initiated in the first 10 years to offset the loss of
5 modeled nesting habitat, but would require one to several decades to functionally replace habitat
6 that has been affected and for trees to attain sufficient size and structure suitable for nesting by
7 cormorants, herons, and egrets. This time lag between the removal and restoration of nesting
8 habitat could have a substantial impact on cormorants, herons, and egrets. Nesting habitat is limited
9 throughout much of the study area, consisting mainly of intermittent riparian, isolated trees, small
10 groves, tree rows along field borders, roadside trees, and ornamental trees near rural residences.
11 The removal of nest trees or nesting habitat would further reduce this limited resource and could
12 reduce or restrict the number of active cormorant, heron, and egret nests within the study area until
13 restored riparian habitat is sufficiently developed.

14 *AMM18 Swainson's Hawk* would implement a program to plant large mature trees, including
15 transplanting trees scheduled for removal, to compensate for the temporal loss of Swainson's hawk
16 nest sites, defined as a 125-acre area where more than 50% of suitable nest trees (20 feet or taller)
17 within the 125-acre block are removed. These mature trees would be supplemented with additional
18 saplings and would be expected to reduce the temporal effects of loss of nesting habitat. The
19 plantings would occur prior to or concurrent with (in the case of transplanting) the loss of trees. In
20 addition, at least five trees (5-gallon container size) would be planted within the Alternative 4A
21 conservation area for every tree 20 feet or taller removed by construction. A variety of native tree
22 species would be planted to provide trees with differing growth rates, maturation, and life span.
23 Trees would be planted within the Alternative 4A conservation area to increase Swainson's hawk
24 nest sites, or within riparian plantings as a component of the riparian restoration (Environmental
25 Commitment 7). Further details of AMM18 are provided in Appendix 3B, *Environmental*
26 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

27 The project also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
30 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, and *AMM10*
31 *Restoration of Temporarily Affected Natural Communities*. All of these AMMs include elements that
32 would avoid or minimize the risk of affecting individuals and species habitats adjacent to work
33 areas. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
34 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

35 **NEPA Effects:** The loss of cormorant, heron, and egret nesting habitat from Alternative 4A would not
36 be adverse under NEPA because project proponents have committed to avoiding and minimizing
37 effects and to restoring and protecting an acreage that meets the typical mitigation ratios described
38 above. This habitat protection, restoration, management, and enhancement would be guided by
39 Resource Restoration and Performance Principle VFR1, and by AMM1-AMM7, AMM10, and *AMM18*
40 *Swainson's Hawk*, which would be in place during all project activities. In addition, Mitigation
41 Measure BIO-75 and Mitigation Measure BIO-117 would be available to address potential impacts
42 on nesting individuals. Considering these commitments, losses and conversions of cormorant, heron,
43 and egret habitat under Alternative 4A would not be adverse.

1 **CEQA Conclusion:** The effects on cormorant, heron, and egret habitat from Alternative 4A would
2 represent an adverse effect as a result of habitat modification of a special-status species and
3 potential for direct mortality in the absence of Environmental Commitments and AMMs. However,
4 project proponents have committed to habitat protection, restoration, management, and
5 enhancement associated with Environmental Commitment 3, Environmental Commitment 7, and
6 Environmental Commitment 11. These conservation activities would be guided by Resource
7 Restoration and Performance Principle VFR1, and by AMM1–AMM6, AMM10, and AMM18
8 *Swainson's Hawk*, which would be in place during all project activities. In addition, Mitigation
9 Measure BIO-75 and Mitigation Measure BIO-117 would be available to address potential impacts
10 on nesting individuals. Considering these commitments, Alternative 4A would not result in a
11 substantial adverse effect through habitat modifications and would not substantially reduce the
12 number or restrict the range of cormorants, herons, or egrets. Therefore, with the implementation of
13 Mitigation Measure BIO-75 and Mitigation Measure BIO-117, Alternative 4A would have a less-than-
14 significant impact on cormorants, herons, and egrets under CEQA.

15 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
16 **Disturbance of Nesting Birds**

17 See Mitigation Measure BIO-75 under Impact BIO-75.

18 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

19 Herons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries);
20 therefore, DWR will avoid direct impacts on rookeries and avoid or minimize indirect impacts
21 on rookeries.

22 **Impact BIO-118: Effects Associated with Electrical Transmission Facilities on Cormorants,**
23 **Hérons and Egrets**

24 New transmission lines would increase the risk for bird-power line strikes, which could result in
25 injury or mortality of cormorants, herons and egrets. New transmission lines would increase the
26 risk for bird-power line strikes. Waterbirds have a higher susceptibility to collisions than passerines,
27 raptors, and other birds. Marking transmission lines with flight diverters that make the lines more
28 visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
29 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
30 by 60%. With the implementation of AMM20 *Greater Sandhill Crane*, all new transmission lines
31 constructed as a result of the project would be fitted with flight diverters, which would reduce bird
32 strike risk of cormorants, herons, and egrets.

33 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
34 could result in injury or mortality of cormorants, herons, and egrets. The implementation of AMM20
35 *Greater Sandhill Crane* would require the installation of bird flight diverters on all new transmission
36 lines, which could reduce bird strike risk of cormorants, herons, and egrets by 60%. With the
37 installation of bird flight diverters, the construction and operation of new transmission lines under
38 Alternative 4A would not result in an adverse effect on cormorants, herons, and egrets.

39 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
40 could result in injury or mortality of cormorants, herons, and egrets. The implementation of AMM20
41 *Greater Sandhill Crane* would require the installation of bird flight diverters on all new transmission
42 lines, which could reduce bird strike risk of cormorants, herons, and egrets by 60%. With the

1 installation of bird flight diverters, the construction and operation of new transmission lines under
2 Alternative 4A would a less-than-significant impact on cormorants, herons, and egrets.

3 **Impact BIO-119: Indirect Effects of the Project on Cormorants, Herons and Egrets**

4 **Indirect Construction- and Operation-Related Effects:** Construction noise above background
5 noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction
6 activities (see BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP*
7 *Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and EIR/EIS Appendix 11F, *Substantive BDCP*
8 *Revisions*). However, there are no available data to determine the extent to which these noise levels
9 could affect cormorants, herons, or egrets. If cormorants, herons or egrets were to nest in or
10 adjacent to work areas, construction and subsequent maintenance-related noise and visual
11 disturbances could mask calls, disrupt foraging and nesting behaviors, and reduce the functions of
12 suitable nesting habitat for these species. Mitigation Measure BIO-75, *Conduct Preconstruction*
13 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*
14 *Impacts on Rookeries*, would avoid the potential for adverse effects of construction-related activities
15 on survival and productivity of nesting cormorants, herons or egrets. The use of mechanical
16 equipment during water conveyance facilities construction could cause the accidental release of
17 petroleum or other contaminants that could affect cormorants, herons or egrets in the surrounding
18 habitat. The inadvertent discharge of sediment or excessive dust adjacent to suitable habitat could
19 also have an adverse effect on these species. AMM1-AMM7, including *AMM2 Construction Best*
20 *Management Practices and Monitoring*, would minimize the likelihood of such spills and ensure that
21 measures are in place to prevent runoff from the construction area and negative effects of dust on
22 active nests.

23 **Methylmercury Exposure:** Project activities have the potential to exacerbate bioaccumulation of
24 mercury in avian species, including cormorants, herons or egrets. Future operational impacts under
25 water conveyance facilities were analyzed using a DSM-2 based model to assess potential effects on
26 mercury concentration and bioavailability resulting from proposed flows. Subsequently, a
27 regression model was used to estimate fish-tissue concentrations under these future operational
28 conditions (evaluated starting operations or ESO). Results indicated that changes in total mercury
29 levels in water and fish tissues due to ESO were insignificant (see BDCP Appendix 5.D, *Contaminants*,
30 Tables 5D.4-3, 5D.4-4, and 5D.4-5).

31 Marsh (tidal and nontidal) restoration has the potential to increase exposure to methylmercury.
32 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
33 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains
34 (Alpers et al. 2008). Thus, restoration activities that create newly inundated areas could increase
35 bioavailability of mercury. Species sensitivity to methylmercury differs widely and there is a large
36 amount of uncertainty with respect to species-specific effects. Increased methylmercury associated
37 with natural community restoration could indirectly affect cormorants, herons or egrets, via uptake
38 in lower trophic levels (as described in BDCP Appendix 5.D, *Contaminants*).

39 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
40 the foodweb, *Environmental Commitment 12 Methylmercury Management*, is included to provide for
41 site-specific evaluation for each restoration project. If a project is identified where there is a high
42 potential for methylmercury production that could not be fully addressed through restoration
43 design and adaptive management, alternate restoration areas would be considered. Environmental
44 Commitment 12 would be implemented in coordination with other similar efforts to address

1 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
2 Environmental Commitment would include the following actions.

- 3 • Assess pre-restoration conditions to determine the risk that the project could result in increased
4 mercury methylation and bioavailability
- 5 • Define design elements that minimize conditions conducive to generation of methylmercury in
6 restored areas.

7 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
8 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
9 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
10 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
11 2009). The effect of selenium toxicity differs widely between species and also between age and sex
12 classes within a species. In addition, the effect of selenium on a species can be confounded by
13 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
14 2009).

15 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
16 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
17 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
18 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
19 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
20 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
21 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
22 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
23 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
24 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
25 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
26 levels of selenium have a higher risk of selenium toxicity.

27 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
28 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
29 exacerbate bioaccumulation of selenium in avian species, including cormorants, herons, and egrets.
30 Marsh (tidal and nontidal) restoration has the potential to mobilize selenium, and therefore increase
31 avian exposure from ingestion of prey items with elevated selenium levels. Thus, Alternative 4A
32 restoration activities that create newly inundated areas could increase bioavailability of selenium.
33 Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it was
34 determined that, relative to Existing Conditions and the No Action Alternative, water conveyance
35 facilities would not result in substantial, long-term increases in selenium concentrations in water in
36 the Delta under any alternative. However, it is difficult to determine whether the effects of potential
37 increases in selenium bioavailability associated with Environmental Commitment 4 would lead to
38 adverse effects on cormorants, herons, and egrets.

39 Because of the uncertainty that exists with respect to the location of tidal restoration activities, there
40 could be a substantial effect on cormorants, herons, and egrets from increases in selenium
41 associated with restoration activities. This effect would be addressed through the implementation of
42 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
43 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
44 habitats (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the

1 effectiveness of selenium management to reduce selenium concentrations and/or bioaccumulation
2 would be evaluated separately for each restoration effort as part of design and implementation. This
3 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
4 design schedule.

5 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
6 could reduce cormorant, heron, and egret use of modeled habitat adjacent to work areas. Moreover,
7 operation and maintenance of the water conveyance facilities, including the transmission facilities,
8 could result in ongoing but periodic postconstruction disturbances that could affect cormorant,
9 heron, and egret use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
10 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*
11 *Impacts on Rookeries*, would be available to address adverse effects on nesting individuals in
12 addition to AMM1–AMM7. Tidal habitat restoration could result in increased exposure of
13 cormorants, herons, and egrets to selenium. This effect would be addressed through the
14 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
15 restoration design elements to reduce the potential for bioaccumulation of selenium and its
16 bioavailability in tidal habitats. The implementation of tidal natural communities restoration could
17 result in increased exposure of cormorants, herons or egrets to methylmercury through the
18 ingestion of fish in restored tidal areas. However, it is unknown what concentrations of
19 methylmercury are harmful to these species and the potential for increased exposure varies
20 substantially within the study area. Implementation of Environmental Commitment 12, which
21 contains measures to assess the amount of mercury before project development, followed by
22 appropriate design and adaptation management, would minimize the potential for increased
23 methylmercury exposure, and would result in no adverse effect on the species.

24 **CEQA Conclusion:** Impacts of noise, the potential for hazardous spills, increased dust and
25 sedimentation, and operations and maintenance of the water conveyance facilities would be less
26 than significant with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction*
27 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, and Mitigation Measure BIO-117, *Avoid*
28 *Impacts on Rookeries*, and AMM1–AMM7. The implementation of tidal natural communities
29 restoration could result in increased exposure of cormorants, herons or egrets to methylmercury,
30 through the ingestion of fish in tidally restored areas. This would be a significant impact. However, it
31 is unknown what concentrations of methylmercury are harmful to these species. Implementation of
32 Environmental Commitment 12, which contains measures to assess the amount of mercury before
33 project development, followed by appropriate design and adaptation management, would minimize
34 the potential for increased methylmercury exposure, and would result in no adverse effect on
35 cormorants, herons, and egrets. Tidal habitat restoration could result in increased exposure of
36 cormorants, herons, and egrets to selenium. This effect would be addressed through the
37 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
38 restoration design elements to reduce the potential for bioaccumulation of selenium and its
39 bioavailability in tidal habitats.

40 With AMM1–AMM7, AMM27, and Environmental Commitment 12 in place, the indirect effects of
41 Alternative 4A implementation would not substantially reduce the number or restrict the range of
42 cormorants, herons, and egrets. Therefore, the indirect effects of Alternative 4A implementation
43 would have a less-than-significant impact on cormorants, herons, and egrets.

1 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
2 **Disturbance of Nesting Birds**

3 See Mitigation Measure BIO-75 under Impact BIO-75.

4 **Mitigation Measure BIO-117: Avoid Impacts on Rookeries**

5 Hérons, egrets, and cormorants are highly traditional in their use of nest sites (rookeries),
6 therefore all direct and indirect impacts on rookeries must be avoided.

7 **Impact BIO-120: Periodic Effects of Inundation on Cormorants, Herons and Egrets as a Result**
8 **of Implementation of Alternative 4A**

9 No Alternative 4A components would result in periodic inundation effects on cormorants, herons,
10 and egrets.

11 **NEPA Effects:** No effect.

12 **CEQA Conclusion:** No impact.

13 **Short-Eared Owl and Northern Harrier**

14 This section describes the effects of Alternative 4A, including water conveyance facilities
15 construction and implementation of Environmental Commitments, on short-eared owl and northern
16 harrier. Modeled habitat for short-eared owl and northern harrier include tidal brackish and
17 freshwater emergent wetland, nontidal freshwater perennial emergent wetland, managed wetland,
18 other natural seasonal wetland, grassland, alkali seasonal wetland, vernal pool complex, and
19 selected cultivated lands (grain and hay crops, pasture [including alfalfa], rice, truck, nursery, and
20 berry crops [including tomatoes and melons], beets, and idle lands).

21 Alternative 4A would result in both temporary and permanent losses of modeled habitat for short-
22 eared owl and northern harrier as indicated in Table 12-4A-45. Full implementation of Alternative
23 4A would include the following Environmental Commitments and Resource Restoration and
24 Performance Principles which would benefit short-eared owl and northern harrier.

- 25 • Restore or create up to 295 acres of tidal wetlands in the north Delta (Environmental
26 Commitment 4).
- 27 • Restore or create up to 13.5 acres of *Schoenoplectus* and *Typha*-dominated tidal and nontidal
28 freshwater emergent wetland in patches greater than 0.55 acres at a location subject to CDFW
29 approval (Resource Restoration and Performance Principle CBR1).
- 30 • Protect up to 119 acres of nontidal wetlands and create up to 832 acres of nontidal wetlands
31 (Environmental Commitment 3 and Environmental Commitment 10).
- 32 • Restore up to 1,070 acres of grasslands (Environmental Commitment 8).
- 33 • Restore up to 48 acres and protect up to 188 acres of vernal pool/alkali seasonal wetland
34 complex (Environmental Commitment 3 and Environmental Commitment 9).
- 35 • Protect up to 1,060 acres of grassland and 11,870 acres of cultivated lands (Environmental
36 Commitment 3). The following Swainson's hawk Resource Restoration and Performance
37 Principles would be implemented as part of these acres:

- 1 ○ Conserve 1 acre of Swainson’s hawk foraging habitat for each acre of lost foraging habitat in
2 patch sizes of a minimum of 40 acres (Resource Restoration and Performance Principle
3 SH1).
- 4 ○ Protect Swainson’s hawk foraging habitat above 1 foot above mean sea level with at least
5 50% in very high-value habitat (see Table 12-4A-35 for a definition habitat value) (Resource
6 Restoration and Performance Principle SH2).

7 As explained below, with the restoration or protection of these amounts of habitat, in addition to
8 management activities that would enhance habitat for these species, AMM1-AMM7, *AMM27*
9 *Selenium Management* and Mitigation Measure BIO-75, impacts on short-eared owl and northern
10 harrier would not be adverse for NEPA purposes and would be less than significant for CEQA
11 purposes.

12 **Table 12-4A-45. Changes in Short-Eared Owl and Northern Harrier Modeled Habitat Associated**
13 **with Alternative 4A (acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Nesting and Foraging	2,231	724
Total Impacts Water Conveyance Facilities		2,231	724
Environmental Commitments 4, 6-7, 9-11 ^a	Nesting and Foraging	2,232	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		2,232	0
TOTAL IMPACTS		4,463	724

^a See discussion below for a description of applicable Environmental Commitments.

14

15 **Impact BIO-121: Loss or Conversion of Habitat for and Direct Mortality of Short-Eared Owl**
16 **and Northern Harrier**

17 Alternative 4A would result in the combined permanent and temporary loss of up to 5,187 acres of
18 modeled habitat for short-eared owl and northern harrier (of which 4,463 acres would be a
19 permanent loss and 724 acres would be a temporary loss of habitat, Table 12-4A-45). Project
20 measures that would result in these losses are water conveyance facilities and transmission line
21 construction, and establishment and use of reusable tunnel material areas, and tidal habitat
22 restoration (Environmental Commitment 4), riparian restoration, (Environmental Commitment 7),
23 grassland restoration (Environmental Commitment 8), and nontidal marsh restoration
24 (Environmental Commitment 10). Habitat enhancement and management activities (Environmental
25 Commitment 11), which include ground disturbance or removal of nonnative vegetation, could
26 result in local adverse habitat effects. In addition, maintenance activities associated with the long-
27 term operation of the water conveyance facilities and other physical facilities could degrade or
28 eliminate short-eared owl and northern harrier modeled habitat. Each of these individual activities
29 is described below.

- 30 ● *Water Facilities Construction:* Construction of Alternative 4A conveyance facilities would result
31 in the combined permanent and temporary loss of up to 2,955 acres of modeled short-eared owl
32 and northern harrier habitat (2,231 acres of permanent loss, 745 acres of temporary loss) from
33 CZs 3-6 and CZ 8. Activities that would impact modeled habitat include tunnel, forebay, and
34 intake construction, permanent and temporary access roads, construction of transmission lines,
35 and temporary work areas. The majority of habitat removed would consist of grassland and

1 alfalfa fields. There are no CNDDDB or DHCCP surveys records of occurrences of nesting short-
 2 eared owl that overlap with the construction footprint of water conveyance facilities. However,
 3 there are two DHCCP occurrences of northern harrier that overlap with the footprint of a shaft
 4 associated with the pumps at Clifton Court Forebay and a permanent transmission line north of
 5 the forebay. Two DHCCP occurrences also overlap with the temporary impact footprint from
 6 geotechnical explorations. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
 7 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize impacts on short-
 8 eared owl and northern harrier if they were to nest in the vicinity of construction activities.
 9 Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4A construction
 10 locations. Impacts from water conveyance facilities would occur within the first 10–14 years of
 11 Alternative 4A implementation.

- 12 ● *Environmental Commitment 4 Tidal Natural Communities Restoration*: Tidal restoration actions
 13 through Environmental Commitment 4 would restore up to an estimated 253 acres of tidal
 14 natural communities. These restored wetland areas could provide suitable nesting habitat for
 15 short-eared owl and northern harrier. Consequently, although existing nesting habitat for short-
 16 eared owl and northern harrier would be removed, restoration of wetland habitats is expected
 17 to benefit marsh associated ground nesting birds by increasing the value of their nesting habitat.
- 18 ● *Environmental Commitment 7 Riparian Natural Community Restoration*: Riparian restoration
 19 would permanently remove approximately 251 acres of short-eared owl and northern harrier
 20 foraging habitat.
- 21 ● *Environmental Commitment 8 Grassland Natural Community Restoration*: Grassland restoration
 22 would convert approximately 1,070 acres of cultivated lands into grasslands. These acres may
 23 be temporarily unavailable for foraging short-eared owl and northern harrier but would not
 24 permanently reduce foraging habitat for either species.
- 25 ● *Environmental Commitment 10 Nontidal Marsh Restoration*: Restoration and creation of nontidal
 26 freshwater marsh would result in the permanent removal of 832 acres of short-eared owl and
 27 northern harrier foraging habitat. Some portion of nontidal marsh restoration would be
 28 expected to provide habitat for both species.
- 29 ● *Environmental Commitment 11 Natural Communities Enhancement and Management*: A variety of
 30 habitat management actions included in Environmental Commitment 11 that are designed to
 31 enhance wildlife values in restored or protected habitats could result in localized ground
 32 disturbances that could permanently remove up to 20 acres and temporarily remove small
 33 amounts of modeled habitat. Ground-disturbing activities, such as removal of nonnative
 34 vegetation and road and other infrastructure maintenance activities, would be expected to have
 35 adverse effects on available habitat but would be expected to result in overall improvements to
 36 and maintenance of habitat values. Habitat management- and enhancement-related activities
 37 could affect short-eared owl and northern harrier nests. If either species were to nest in the
 38 vicinity of a worksite, equipment operation could destroy nests, and noise and visual
 39 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings.
 40 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
 41 *of Nesting Birds*, would be available to minimize these adverse effects.
- 42 ● *Water Facilities Operations and Maintenance*: Postconstruction operation and maintenance of
 43 the above-ground water conveyance facilities and restoration infrastructure could result in
 44 ongoing but periodic disturbances that could affect short-eared owl and northern harrier use of
 45 the surrounding habitat. Maintenance activities would include vegetation management, levee

1 and structure repair, and re-grading of roads and permanent work areas. These effects,
2 however, would be reduced by AMM1–AMM7 and Mitigation Measure BIO-75 as described
3 below.

- 4 • Injury and Direct Mortality: Construction-related activities would not be expected to result in
5 direct mortality of adult or fledged short-eared owl and northern harrier if they were present in
6 the project area, because they would be expected to avoid contact with construction and other
7 equipment. If either species were to nest in the construction area, construction-related
8 activities, including equipment operation, noise and visual disturbances could destroy nests or
9 lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-
10 75 would be available to minimize these adverse effects.

11 The following paragraphs summarize the combined effects discussed above and describe
12 Environmental Commitments, Resource Restoration and Performance Principles, and AMMs that
13 offset or avoid these effects. NEPA and CEQA conclusions are provided at the end of the section.

14 The study area supports approximately 406,784 acres of modeled nesting and foraging habitat for
15 short-eared owl and northern harrier. Alternative 4A would result in the permanent loss of and
16 temporary effects on 5,187 acres of modeled habitat for short-eared owl and northern harrier (<1%
17 of the modeled habitat in the study area). Of the 5,187 acres of modeled habitat impacted, 77 acres
18 consist of wetlands.

19 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by
20 water conveyance facilities would be 1:1 protection of non-wetland habitats and 1:1 protection and
21 1:1 restoration of wetland habitat. Using these typical ratios would indicate that 5,106 acres of
22 grassland and cultivated lands should be protected, 81 acres of wetlands should be restored or
23 created, and 81 acres of wetlands should be protected to compensate for the losses of short-eared
24 owl and northern harrier habitat.

25 Short-eared owl and northern harrier nest in tidal brackish and freshwater emergent wetland,
26 nontidal freshwater perennial emergent wetland, managed wetland, other natural seasonal wetland,
27 grassland, alkali seasonal wetland, vernal pool complex, and selected cultivated lands, which
28 includes alfalfa, irrigated pasture, and other grain fields. A total of 1,060 acres of grassland and
29 11,870 acres of cultivated lands would be protected through Alternative 4A. Within these acres of
30 grassland and cultivated lands protection, project proponents would commit to conserving 1 acre of
31 Swainson's hawk foraging habitat for every acre of lost foraging habitat (Resource Restoration and
32 Performance Principle SH1), which would total 6,717 acres and would also be suitable foraging
33 habitat for short-eared owl and northern harrier. These acres of cultivated lands and grasslands
34 would be located above 1 foot above mean sea level and at least 50% of these lands would be in very
35 high-value production for the Swainson's hawk (alfalfa) (Resource Restoration and Performance
36 Principle SH2).

37 In addition, 295 acres of tidal natural communities would be restored or created, 119 acres of
38 nontidal wetlands would be protected, 832 acres of nontidal wetlands would be created in the Delta,
39 1,070 acres of grassland would be restored, and 48 acres of vernal pool complex would be restored.
40 The restored and protected acres described above would provide suitable nesting and foraging
41 habitat for these species. Environmental Commitment 3, Environmental Commitment 4,
42 Environmental Commitment 8, Environmental Commitment 9, and Environmental Commitment 10
43 would occur in the same timeframe as the construction and early restoration losses.

1 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
2 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
3 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
5 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
6 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
7 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
8 of the Final EIR/EIS.

9 For the project to avoid adverse effects on individuals, preconstruction surveys would be required
10 to ensure that nests are detected and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction*
11 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address this
12 adverse effect.

13 **NEPA Effects:** The loss of short-eared owl and northern harrier nesting habitat from Alternative 4A
14 would not be adverse under NEPA because project proponents have committed to avoiding and
15 minimizing effects and to restoring and protecting an acreage that exceeds the typical mitigation
16 ratios described above. This habitat protection, restoration, management, and enhancement would
17 be guided by Resource Restoration and Performance Principles CBR1, SH1, and SH2, and by AMM1–
18 AMM7, which would be in place during all project activities. In addition, Mitigation Measure BIO-75
19 would be available to address potential impacts on nesting individuals. Considering these
20 commitments, losses and conversions of short-eared owl and northern harrier habitat under
21 Alternative 4A would not be adverse.

22 **CEQA Conclusion:** The effects on short-eared owl and northern harrier habitat from Alternative 4A
23 would represent an adverse effect as a result of habitat modification of a special-status species and
24 potential for direct mortality in the absence of Environmental Commitments and AMMs. However,
25 project proponents have committed to habitat protection, restoration, management and
26 enhancement associated with Environmental Commitment 3, Environmental Commitment 4,
27 Environmental Commitment 10, and Environmental Commitment 11. These conservation activities
28 would be guided by Resource Restoration and Performance Principles CBR1, SH1, and SH2, and by
29 AMM1–AMM7, which would be in place during all project activities. In addition, Mitigation Measure
30 BIO-75 would be available to address potential impacts on nesting individuals. Considering these
31 commitments, Alternative 4A would not result in a substantial adverse effect through habitat
32 modifications and would not substantially reduce the number or restrict the range of short-eared
33 owl and northern harrier. Therefore, with the implementation of Mitigation Measure BIO-75,
34 Alternative 4A would have a less-than-significant impact on short-eared owl and northern harrier
35 under CEQA.

36 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
37 **Disturbance of Nesting Birds**

38 See Mitigation Measure BIO-75 under Impact BIO-75.

39 **Impact BIO-122: Effects on Short-Eared Owl and Northern Harrier Associated with Electrical**
40 **Transmission Facilities**

41 New transmission lines would increase the risk that short-eared owl and northern harrier could be
42 subject to power line strikes, which could result in injury or mortality of these species. Short-eared
43 owl and northern harrier would be at low risk of bird strike mortality based on their keen eyesight

1 and largely ground-based foraging behavior (BDCP Attachment 5.J-2, *Memorandum: Analysis of*
 2 *Potential Bird Collisions at Proposed BDCP Transmission Lines*). The existing network of transmission
 3 lines in the project area currently poses the same small risk for these species, and any incremental
 4 risk associated with the new power line corridors would also be expected to be low. Marking
 5 transmission lines with flight diverters that make the lines more visible to birds has been shown to
 6 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
 7 marking devices in the Central Valley could reduce avian mortality by 60%. With the
 8 implementation of *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted
 9 with flight diverters, which would further reduce any bird strike risk of short-eared owl and
 10 northern harrier.

11 **NEPA Effects:** The construction and presence of new transmission lines would not result in an
 12 adverse effect on short-eared owl or northern harrier because the risk of bird strike is considered to
 13 be low for both species based on their keen eyesight and behavioral characteristics. New
 14 transmission lines would minimally increase the risk for short-eared owl and northern harrier
 15 power line strikes. All new transmission lines constructed as a result of the project would be fitted
 16 with bird diverters (*AMM20 Greater Sandhill Crane*), which have been shown to reduce avian
 17 mortality by 60% and which would further reduce any potential for powerline collisions. Therefore,
 18 the construction and operation of transmission lines under Alternative 4A would not result in an
 19 adverse effect on short-eared owl or northern harrier.

20 **CEQA Conclusion:** The construction and presence of new transmission lines would not result in a
 21 significant impact on short-eared owl or northern harrier because the risk of bird strike is
 22 considered to be low for both species based on their keen eyesight and behavioral characteristics.
 23 New transmission lines would minimally increase the risk for short-eared owl and northern harrier
 24 power line strikes. All new transmission lines constructed as a result of the project would be fitted
 25 with bird diverters (*AMM20 Greater Sandhill Crane*), which have been shown to reduce avian
 26 mortality by 60% and which would further reduce any potential for powerline collisions. Therefore,
 27 the construction and operation of transmission lines under Alternative 4A would result in a less-
 28 than-significant impact on short-eared owl or northern harrier.

29 **Impact BIO-123: Indirect Effects of the Project on Short-Eared Owl and Northern Harrier**

30 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
 31 with construction-related activities could result in temporary disturbances that affect short-eared
 32 owl and northern harrier use of modeled habitat. Construction noise above background noise levels
 33 (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (see
 34 BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
 35 *Facility on Sandhill Crane*, Table 5J.D-4, and EIR/EIS Appendix 11F, *Substantive BDCP Revisions*).
 36 However, there are no available data to determine the extent to which these noise levels could affect
 37 short-eared owl or northern harrier. Indirect effects associated with construction include noise,
 38 dust, and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
 39 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
 40 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
 41 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
 42 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use
 43 of mechanical equipment during water conveyance construction could cause the accidental release
 44 of petroleum or other contaminants that could affect these species or their prey in the surrounding
 45 habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and Monitoring*,

1 would minimize the likelihood of such spills from occurring and would ensure that measures are in
2 place to prevent runoff from the construction area and the negative effects of dust on wildlife
3 adjacent to work areas.

4 **Methylmercury Exposure:** Project activities have the potential to exacerbate bioaccumulation of
5 mercury in avian species, including short-eared owl and northern harrier. Marsh (tidal and nontidal)
6 restoration has the potential to increase exposure to methylmercury. Mercury is transformed into
7 the more bioavailable form of methylmercury in aquatic systems, especially areas subjected to
8 regular wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus,
9 Alternative 4A restoration activities that create newly inundated areas could increase bioavailability
10 of mercury. Species sensitivity to methylmercury differs widely and there is a large amount of
11 uncertainty with respect to species-specific effects. A detailed review of the methylmercury issues
12 associated with implementation of Alternative 4A are contained in Appendix 11F, *Substantive BDCP*
13 *Revisions*, which includes an overview of the Alternative 4A-related mechanisms that could result in
14 increased mercury in the foodweb, and how exposure of individual species to mercury may occur
15 based on feeding habits and where species habitat overlaps with the areas where mercury
16 bioavailability could increase. Increased methylmercury associated with natural community
17 restoration could indirectly affect short-eared owl and northern harrier, via uptake in lower trophic
18 levels (as described in BDCP Appendix 5.D, *Contaminants*).

19 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
20 the foodweb, *Environmental Commitment 12 Methylmercury Management* is included to provide for
21 site-specific evaluation for each restoration project. On a project-specific basis, where high potential
22 for methylmercury production is identified that restoration design and adaptive management
23 cannot fully address while also meeting restoration objectives, alternate restoration areas will be
24 considered. Environmental Commitment 12 will be implemented in coordination with other similar
25 efforts to address mercury in the Delta, and specifically with the DWR Mercury Monitoring and
26 Analysis Section. This Environmental Commitment would include the following actions.

- 27 • Assess pre-restoration conditions to determine the risk that the project could result in increased
28 mercury methylation and bioavailability
- 29 • Define design elements that minimize conditions conducive to generation of methylmercury in
30 restored areas.

31 Define adaptive management strategies that can be implemented to monitor and minimize actual
32 postrestoration creation and mobilization of methylmercury.

33 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
34 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
35 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
36 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
37 2009). The effect of selenium toxicity differs widely between species and also between age and sex
38 classes within a species. In addition, the effect of selenium on a species can be confounded by
39 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
40 2009).

41 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
42 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
43 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
44 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been

1 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
2 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
3 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
4 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
5 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
6 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
7 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
8 levels of selenium have a higher risk of selenium toxicity.

9 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
10 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
11 exacerbate bioaccumulation of selenium in avian species, including short-eared owl and northern
12 harrier. Marsh (tidal and nontidal) restoration have the potential to mobilize selenium, and
13 therefore increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
14 Alternative 4A restoration activities that create newly inundated areas could increase bioavailability
15 of selenium. Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it
16 was determined that, relative to Existing Conditions and the No Action Alternative, water
17 conveyance facilities would not result in substantial, long-term increases in selenium concentrations
18 in water in the Delta under any alternative. However, it is difficult to determine whether the effects
19 of potential increases in selenium bioavailability associated with Environmental Commitment 4
20 would lead to adverse effects on short-eared owl and northern harrier.

21 Because of the uncertainty that exists with respect to the location of tidal restoration activities, there
22 could be a substantial effect on short-eared owl and northern harrier from increases in selenium
23 associated with restoration activities. This effect would be addressed through the implementation of
24 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
25 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
26 habitats (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the
27 effectiveness of selenium management to reduce selenium concentrations and/or bioaccumulation
28 would be evaluated separately for each restoration effort as part of design and implementation. This
29 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
30 design schedule.

31 **NEPA Effects:** Indirect effects on short-eared owl and northern harrier as a result of constructing the
32 water conveyance facilities could have adverse effects on these species in the absence of
33 Environmental Commitments and AMMs. However, the implementation of AMM1–AMM7 would
34 help to reduce this effect. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*
35 *and Avoid Disturbance of Nesting Birds*, would also be available to address the adverse indirect
36 effects of construction on active nests. Tidal habitat restoration could result in increased exposure of
37 short-eared owl and northern harrier to selenium. This effect would be addressed through the
38 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
39 restoration design elements to reduce the potential for bioaccumulation of selenium and its
40 bioavailability in tidal habitats.

41 Increased methylmercury associated with natural community restoration could indirectly affect
42 short-eared owl and northern harrier, via uptake in lower trophic levels (as described in BDCP
43 Appendix 5.D, *Contaminants*). However, it is unknown what concentrations of methylmercury are
44 harmful to the species, and the potential for increased exposure varies substantially within the study
45 area. Implementation of Environmental Commitment 12, which contains measures to assess the

1 amount of mercury before project development, followed by appropriate design and adaptation
2 management, would minimize the potential for increased methylmercury exposure, and would
3 result in no adverse effect on short-eared owl and northern harrier.

4 **CEQA Conclusion:** Indirect effects of noise and visual disturbance, in addition to the potential for
5 hazardous spills or increased dust on short-eared owl and northern harrier and their habitat as a
6 result of Alternative 4A implementation would represent a substantial adverse effect in the absence
7 of Environmental Commitments and AMMs. This impact would be significant. The incorporation of
8 AMM1–AMM7 into Alternative 4A and the implementation of Mitigation Measure BIO-75, *Conduct*
9 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this
10 impact to a less-than-significant level. Tidal habitat restoration could result in increased exposure of
11 short-eared owl and northern harrier to selenium. This effect would be addressed through the
12 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
13 restoration design elements to reduce the potential for bioaccumulation of selenium and its
14 bioavailability in tidal habitats.

15 The implementation of tidal natural communities restoration could also result in increased exposure
16 of short-eared owl and northern harrier to methylmercury in restored tidal areas. However, it is
17 unknown what concentrations of methylmercury are harmful to these species and the potential for
18 increased exposure varies substantially within the study area. Implementation of Environmental
19 Commitment 12, which contains measures to assess the amount of mercury before project
20 development, followed by appropriate design and adaptation management, would minimize the
21 potential for increased methylmercury exposure, and would result in no adverse effect on short-
22 eared owl and northern harrier.

23 Indirect effects of Alternative 4A implementation would represent an adverse effect on short-eared
24 owl and northern harrier in the absence of other Environmental Commitments. This would be a
25 significant impact. With AMM1–AMM7 and Environmental Commitment 12 in place, and with the
26 implementation of Mitigation Measure BIO-75, indirect effects of Alternative 4A implementation
27 would not result in a substantial adverse effect through habitat modifications and would not
28 substantially reduce the number or restrict the range of either species. Therefore, the indirect
29 effects of Alternative 4A implementation would have a less-than-significant impact on short-eared
30 owl and northern harrier.

31 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
32 **Disturbance of Nesting Birds**

33 See Mitigation Measure BIO-75 under Impact BIO-75.

34 **Impact BIO-124: Periodic Effects of Inundation on Short-Eared Owl and Northern Harrier as a**
35 **Result of Implementation of Alternative 4A**

36 No Alternative 4A components would result in periodic inundation effects on short-eared owl and
37 northern harrier.

38 **NEPA Effects:** No effect.

39 **CEQA Conclusion:** No impact.

1 **Redhead and Tule Greater White-Fronted Goose**

2 Impacts, relevant protection and restoration actions, and mitigation requirements under CEQA are
3 generally discussed for waterfowl in the *General Terrestrial Biology*, section under Impacts BIO-178
4 through BIO-183. Further details of the methods of analysis for waterfowl and shorebirds can be
5 found in the *BDCP Waterfowl and Shorebird Effects Analysis* (Ducks Unlimited 2013). Tule greater
6 white-fronted goose is currently only known to occur in Susiun Marsh and there are no proposed
7 project activities that would affect habitats in Suisun Marsh under Alternative 4A.

8 **Mountain Plover**

9 This section describes the effects of Alternative 4A, including water conveyance facilities
10 construction and implementation of Environmental Commitments, on mountain plover. Mountain
11 plover does not breed in California, but winters in the study area. Modeled habitat for mountain
12 plover include grassland, alkali seasonal wetland, vernal pool complex, alfalfa, grain and hay,
13 pasture, and idle cropland throughout the study area.

14 Alternative 4A would result in both temporary and permanent losses of modeled habitat for
15 mountain plover as indicated in Table 12-4A-46. Full implementation of Alternative 4A would
16 include the following Environmental Commitments which could benefit the mountain plover.

- 17 ● Protect up to 1,060 acres and restore up to 1,070 acres of grassland (Environmental
18 Commitments 3 and Environmental Commitment 8).
- 19 ● Protect up to 11,870 acres of cultivated lands (Environmental Commitment 3).
- 20 ● Restore up to 48 acres and protect up to 188 acres of vernal pool/alkali seasonal wetland
21 complex (Environmental Commitment 3 and Environmental Commitment 9).

22 As explained below, with the restoration or protection of these amounts of habitat, in addition to
23 AMM1-AMM7, management activities that would enhance these natural communities for the
24 species, impacts on mountain plover would not be adverse for NEPA purposes and would be less
25 than significant for CEQA purposes.

26 **Table 12-4A-46. Changes in Mountain Plover Modeled Habitat Associated with Alternative 4A**
27 **(acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Wintering	1,978	537
Total Impacts Water Conveyance Facilities		1,978	537
Environmental Commitments 4, 6-7, 9-11 ^a	Wintering	2,427	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		2,427	0
TOTAL IMPACTS		4,405	537

^a See discussion below for a description of applicable Environmental Commitments.

28

29 **Impact BIO-125: Loss or Conversion of Habitat for and Direct Mortality of Mountain Plover**

30 Alternative 4A would result in the combined permanent and temporary loss of up to 4,942 acres of
31 modeled wintering habitat for mountain plover (4,405 acres of permanent loss and 537 of
32 temporary loss, Table 12-4A-46). Project measures that would result in these losses are water

1 conveyance facilities and transmission line construction, and establishment and use of reusable
2 tunnel material areas, and tidal habitat restoration (Environmental Commitment 4), riparian
3 restoration, (Environmental Commitment 7), grassland restoration (Environmental Commitment 8),
4 and nontidal marsh restoration (Environmental Commitment 10). Habitat enhancement and
5 management activities (Environmental Commitment 11) could result in local adverse habitat effects.
6 In addition, maintenance activities associated with the long-term operation of the water conveyance
7 facilities and other physical facilities could degrade or eliminate mountain plover modeled
8 wintering habitat. Each of these individual activities is described below.

- 9 • *Water Facilities Construction:* Construction of Alternative 4A conveyance facilities would result
10 in the combined permanent and temporary loss of up to 2,515 acres of modeled mountain
11 plover habitat (1,978 acres of permanent loss, 537 acres of temporary loss). Impacts would
12 occur from the construction of Intakes 2, 3, and 5 and associated temporary work areas and
13 access roads in CZ 4 between Clarksburg and Courtland; construction of the intermediate
14 forebay; and from an reusable tunnel material storage area on Bouldin Island. The construction
15 of the permanent and temporary transmission line corridors through CZs 4–6 and 9 would also
16 remove suitable habitat for the species. Approximately 1,115 acres would be affected as a result
17 of the placement of an reusable tunnel material area west of the Clifton Court Forebay in CZ 8. In
18 addition, permanent habitat loss would result from the construction of the new forebay south of
19 the existing Clifton court Forebay in CZ 8. There are no CNDDDB occurrences of mountain plover
20 that intersect with the water conveyance facilities footprint. However, the study area does
21 overlap with the wintering range for the species. Refer to the Terrestrial Biology Mapbook for a
22 detailed view of Alternative 4A construction locations. Impacts from water conveyance facilities
23 would occur within the first 10–14 years of Alternative 4A implementation.
- 24 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal habitat restoration
25 site preparation and inundation would permanently remove an estimated 254 acres of modeled
26 mountain plover habitat. The majority of the acres lost would consist of cultivated lands in the
27 West Delta ROA.
- 28 • *Environmental Commitment 7 Riparian Natural Community Restoration:* Riparian restoration
29 would permanently remove approximately 251 acres of mountain plover wintering habitat.
- 30 • *Environmental Commitment 8 Grassland Natural Community Restoration:* Grassland restoration
31 would convert approximately 1,070 acres of cultivated lands into grasslands. These acres may
32 be temporarily unavailable for mountain plover but would not permanently reduce foraging
33 habitat for the species.
- 34 • *Environmental Commitment 10 Nontidal Marsh Restoration:* Restoration and creation of nontidal
35 freshwater marsh would result in the permanent removal of 832 acres of mountain plover
36 wintering habitat.
- 37 • *Environmental Commitment 11 Natural Communities Enhancement and Management:* A variety of
38 habitat management actions included in Environmental Commitment 11 that are designed to
39 enhance wildlife values in restored or protected habitats could result in localized ground
40 disturbances that could permanently remove 20 acres and temporarily remove small amounts
41 of mountain plover habitat. Ground-disturbing activities, such as removal of nonnative
42 vegetation and road and other infrastructure maintenance activities would be expected to have
43 minor adverse effects on available mountain plover habitat. Management of grasslands and
44 cultivated lands for mountain plover such as grazing or mowing would make habitat

1 temporarily unavailable for the species but would ultimately make the habitat more suitable for
2 mountain plover.

- 3 • *Water Conveyance Operations and Maintenance*: Postconstruction operation and maintenance of
4 the above-ground water conveyance facilities and restoration infrastructure could result in
5 ongoing but periodic disturbances that could affect mountain plover use of the surrounding
6 habitat. Maintenance activities would include vegetation management, levee and structure
7 repair, and re-grading of roads and permanent work areas. These effects, however, would be
8 reduced by AMMs described below.
- 9 • *Injury and Direct Mortality*: Construction would not be expected to result in direct mortality of
10 mountain plover because foraging individuals would be expected to temporarily avoid the
11 increased noise and activity associated with construction areas.

12 The following paragraphs summarize the combined effects discussed above and describe
13 Environmental Commitments, AMMs that offset or avoid these effects. NEPA and CEQA conclusions
14 are provided at the end of the section.

15 Alternative 4A would remove 4,942 acres of modeled mountain plover wintering habitat. These
16 effects would result from the construction of the water conveyance facilities and implementing
17 *Environmental Commitment 4 Tidal Natural Communities Restoration*, *Environmental Commitment 7*
18 *Riparian Natural Communities Restoration*, *Environmental Commitment 8 Grassland Natural*
19 *Communities Restoration*, and *Environmental Commitment 10 Nontidal Marsh Restoration*.

20 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
21 would be 2:1 for protection of habitat. Using this ratio would indicate that 9,884 acres should be
22 protected to compensate for the losses of mountain plover wintering habitat. Due to the
23 conservative nature of the impact analysis, both grassland and cultivated lands were included in the
24 impact model, however, only 686 acres of impact would be from loss of grasslands, some of which
25 would be suitable for mountain plover. Project proponents would commit to protect up to 1,060
26 acres of grassland, 188 acres of vernal pool/alkali seasonal wetland complex, and 11,870 acres of
27 cultivated lands, and to restore up to 1,070 acres of grassland and 48 acres of vernal pool/alkali
28 seasonal wetland complex which could provide suitable wintering habitat for mountain plover.
29 *Environmental Commitment 11 Natural Communities Enhancement and Management* would be
30 implemented to ensure that sufficient acres of grassland and cultivated lands were managed to
31 provide suitable habitat for mountain plover and other species with similar habitat requirements.

32 The project also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
33 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
34 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
35 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
36 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
37 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
38 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
39 of the Final EIR/EIS.

40 **NEPA Effects:** The loss of mountain plover wintering habitat from Alternative 4A would not be
41 adverse under NEPA because project proponents have committed to avoiding and minimizing
42 effects and to restoring and protecting an acreage that exceeds the typical mitigation ratios
43 described above. AMM1–AMM7 would be in place during all project activities. Considering these

1 commitments, losses and conversions of mountain plover habitat under Alternative 4A would not be
2 adverse.

3 **CEQA Conclusion:** The effects on mountain plover wintering habitat from Alternative 4A would
4 represent an adverse effect as a result of habitat modification of a special-status species and
5 potential for direct mortality in the absence of Environmental Commitments and AMMs. However,
6 project proponents have committed to habitat protection, restoration, management, and
7 enhancement associated with Environmental Commitment 3 and Environmental Commitment 11.
8 AMM1–AMM7 would be in place during all project activities. Considering these commitments,
9 Alternative 4A would not result in a substantial adverse effect through habitat modifications and
10 would not substantially reduce the number or restrict the range of mountain plover. Therefore,
11 Alternative 4A would have a less-than-significant impact on mountain plover under CEQA.

12 **Impact BIO-126: Effects on Mountain Plover Associated with Electrical Transmission** 13 **Facilities**

14 Mountain plovers congregate in flocks during the winter and travel between grasslands and
15 cultivated lands that provide foraging habitat for the species. This flocking behavior puts them at
16 risk of collisions with powerlines. However, plovers exhibit low wing loading and high aspect-ratio
17 wings and as a result can maneuver relatively quickly around an obstacle such as a transmission
18 line. Their wing structure and design allows for rapid flight and quick, evasive actions. Marking
19 transmission lines with flight diverters that make the lines more visible to birds has been shown to
20 reduce the incidence of bird mortality (Brown and Drewien 1995). Yee (2008) estimated that
21 marking devices in the Central Valley could reduce avian mortality by 60%. Plovers are primarily
22 visual foragers and therefore, the risk for collision would be further reduced by *AMM20 Greater*
23 *Sandhill Crane*, which would require the installation of bird flight diverters on all new transmission
24 lines in the study area.

25 **NEPA Effects:** New transmission lines are not expected to have an adverse effect on mountain plover
26 because the probability of bird-powerline strikes is highly unlikely due to their flight behaviors. The
27 implementation of *AMM20 Greater Sandhill Crane*, which would require the installation of bird flight
28 diverters on all new transmission lines, would further reduce any potential for mortality. Therefore,
29 the construction and operation of new transmission lines under Alternative 4A would not result in
30 an adverse effect on mountain plover.

31 **CEQA Conclusion:** New transmission lines would have a less-than-significant impact on mountain
32 plover because the probability of bird-powerline strikes is highly unlikely due to their flight
33 behaviors. The implementation of *AMM20 Greater Sandhill Crane*, which would require the
34 installation of bird flight diverters on all new transmission lines, would further reduce any potential
35 for mortality. Therefore, the construction and operation of new transmission lines under Alternative
36 4A would result in a less-than-significant impact on mountain plover.

37 **Impact BIO-127: Indirect Effects of the Project on Mountain Plover**

38 Construction- and subsequent maintenance-related noise and visual disturbances could disrupt
39 foraging, and reduce the functions of suitable foraging habitat for mountain plover. Construction
40 noise above background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the
41 edge of construction activities (see BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*
42 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and EIR/EIS Appendix
43 11F, *Substantive BDCP Revisions*). However, there are no available data to determine the extent to

1 which these noise levels could affect mountain plover. Indirect effects associated with construction
 2 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
 3 disturbing operations. The use of mechanical equipment during water conveyance facilities
 4 construction could cause the accidental release of petroleum or other contaminants that could affect
 5 these species or their prey in the surrounding habitat. AMM1–AMM7 would minimize the likelihood
 6 of such spills from occurring. The inadvertent discharge of sediment or excessive dust adjacent to
 7 mountain plover wintering habitat could also have a negative effect on the species. However,
 8 AMM1–AMM7 would also ensure that measures would be in place to prevent runoff from the
 9 construction area and the negative effects of dust on wildlife adjacent to work areas.

10 **NEPA Effects:** Indirect effects on mountain plover as a result of Alternative 4A implementation could
 11 have adverse effects on the species through the modification of habitat. With the implementation of
 12 AMM1–AMM7, indirect effects as a result of Alternative 4A implementation would not have an
 13 adverse effect mountain plover.

14 **CEQA Conclusion:** Indirect effects on mountain plover as a result of Alternative 4A implementation
 15 could have a significant impact on the species from modification of habitat. With the implementation
 16 of AMM1–AMM7, indirect effects as a result of Alternative 4A implementation would have a less-
 17 than-significant impact on mountain plover.

18 **Impact BIO-128: Periodic Effects of Inundation on Mountain Plover as a Result of**
 19 **Implementation of Alternative 4A**

20 No Alternative 4A components would result in periodic inundation effects on mountain plover.

21 **NEPA Effects:** No effect.

22 **CEQA Conclusion:** No impact.

23 **Black Tern**

24 This section describes the effects of Alternative 4A, including water conveyance facilities
 25 construction and implementation of Environmental Commitments, on black tern. Modeled nesting
 26 habitat for black tern in the study area is currently limited to rice in CZ 2.

27 Alternative 4A would not result in effects on modeled habitat for black tern as indicated in Table 12-
 28 4A-47. There is no modeled habitat for the species in the water conveyance facilities footprint and
 29 proposed areas of tidal restoration under Alternative 4A.

30 **Table 12-4A-47. Changes in Black Tern Modeled Habitat Associated with Alternative 4A (acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Nesting	0	0
Total Impacts Water Conveyance Facilities		0	0
Environmental Commitments 4, 6–7, 9–11 ^a	Nesting	0	0
Total Impacts Environmental Commitments 4, 6–7, 9–11^a		0	0
TOTAL IMPACTS		0	0

^a See discussion below for a description of applicable Environmental Commitments.

31

1 **Impact BIO-129a: Loss or Conversion of Habitat for and Direct Mortality of Black Tern**

2 No habitat would be lost or converted and there would be no direct mortality of black tern under
3 Alternative 4A. As noted above, water conveyance facilities and Environmental Commitment 4
4 activities would not be implemented within or adjacent to Conservation Zone 2, which is the only
5 portion of the study area where the species is known to occur.

6 **NEPA Effects:** No effect.

7 **CEQA Conclusion:** No impact.

8 **Impact BIO-129b: Indirect Effects of the Project on Black Tern**

9 No indirect effects on black tern were identified under Alternative 4A. As noted above, water
10 conveyance facilities and Environmental Commitment 4 activities would not be implemented within
11 or adjacent to Conservation Zone 2, which is the only portion of the study area where the species is
12 known to occur.

13 **NEPA Effects:** No effect.

14 **CEQA Conclusion:** No impact.

15 **Impact BIO-129c: Periodic Effects of Inundation on Black Tern Nesting Habitat as a Result of**
16 **Implementation of Alternative 4A**

17 No Alternative 4A components would result in periodic inundation effects on black tern habitat
18 under Alternative 4A.

19 **NEPA Effects:** No effect.

20 **CEQA Conclusion:** No impact.

21 **California Horned Lark and Grasshopper Sparrow**

22 This section describes the effects of Alternative 4A, including water conveyance facilities
23 construction and implementation of Environmental Commitments, on California horned lark and
24 grasshopper sparrow. The primary impact of concern for grasshopper sparrow and California
25 horned lark would be the loss of breeding habitat in the project area, which includes grassland
26 vernal pool complex, and alkali seasonal wetland natural communities and selected cultivated lands
27 including grain and hay crops and pasture. Alternative 4A would result in both temporary and
28 permanent losses of modeled breeding habitat for California horned lark and grasshopper sparrow
29 as indicated in Table 12-4A-48. Full implementation of Alternative 4A would include the following
30 Environmental Commitments which could benefit the California horned lark and the grasshopper
31 sparrow.

- 32 • Protect up to 1,060 acres and restore up to 1,070 acres of grassland (Environmental
33 Commitments 3 and Environmental Commitment 8).
- 34 • Protect up to 11,870 acres of cultivated lands (Environmental Commitment 3).
- 35 • Restore up to 48 acres and protect up to 188 acres of vernal pool/alkali seasonal wetland
36 complex (Environmental Commitment 3 and Environmental Commitment 9).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance habitat for these species and implementation of AMM1-AMM7 and Mitigation Measure BIO-75, impacts on California horned lark and grasshopper sparrow would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-4A-48. Changes in California Horned Lark and Grasshopper Sparrow Modeled Habitat Associated with Alternative 4A (acres)

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Breeding	1,978	537
Total Impacts Water Conveyance Facilities		1,978	537
Environmental Commitments 4, 6-7, 9-11 ^a	Breeding	2,427	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		2,427	0
TOTAL IMPACTS		4,405	537

^a See discussion below for a description of applicable Environmental Commitments.

Impact BIO-130: Loss or Conversion of Habitat for and Direct Mortality of California Horned Lark and Grasshopper Sparrow

Alternative 4A would result in the combined permanent and temporary loss of up to 4,942 acres of modeled nesting habitat for California horned lark and grasshopper sparrow (of which 4,405 acres would be a permanent loss and 537 acres would be a temporary loss of habitat, Table 12-4A-48). Project measures that would result in these losses are water conveyance facilities and transmission line construction, and establishment and use of reusable tunnel material areas, and tidal habitat restoration (Environmental Commitment 4), riparian restoration, (Environmental Commitment 7), grassland restoration (Environmental Commitment 8), and nontidal marsh restoration (Environmental Commitment 10). Habitat enhancement and management activities (Environmental Commitment 11) could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other physical facilities could degrade or eliminate California horned lark and grasshopper sparrow modeled habitat. Each of these individual activities is described below.

- Water Facilities Construction:* Construction of Alternative 4A conveyance facilities would result in the combined permanent and temporary loss of up to 2,515 acres of modeled California horned lark and grasshopper sparrow habitat (1,978 acres of permanent loss, 537 acres of temporary loss). Impacts would result from the construction of Intakes 2, 3, and 5 and associated temporary work areas and access roads in CZ 4 between Clarksburg and Courtland; construction of the intermediate forebay; and from an reusable tunnel material storage area on Bouldin Island. The construction of the permanent and temporary transmission line corridors through CZs 4-6 and 9 would also remove suitable foraging habitat for the species. Approximately 1,115 acres would be affected as the result of the placement of an reusable tunnel material area west of the Clifton Court Forebay in CZ 8. In addition, permanent habitat loss would result from the construction of the new forebay south of the existing Clifton court Forebay in CZ 8. Grasshopper sparrows were detected in DHCCP surveys south of Byron Highway in CZ 8 (1 occurrence) and east of Intakes 2 and 3 (6 occurrences), in the Stone Lakes NWR. However, the water conveyance facilities footprint does not overlap with any grasshopper sparrow or California horned lark occurrences. Mitigation Measure BIO-75, *Conduct*

1 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would require
2 preconstruction surveys and the establishment of no-disturbance buffers and would be
3 available to address adverse effects on nesting California horned larks or grasshopper sparrows.
4 Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4A construction
5 locations. Impacts from water conveyance facilities would occur within the first 10–14 years of
6 Alternative 4A implementation.

- 7 ● *Environmental Commitment 4 Tidal Natural Communities Restoration*: Tidal habitat restoration
8 site preparation and inundation would permanently remove an estimated 254 acres of modeled
9 California horned lark and grasshopper sparrow habitat. The majority of the acres lost would
10 consist of cultivated lands in the West Delta ROA.
- 11 ● *Environmental Commitment 7 Riparian Natural Community Restoration*: Riparian restoration
12 would permanently remove approximately 251 acres of California horned lark and grasshopper
13 sparrow habitat.
- 14 ● *Environmental Commitment 8 Grassland Natural Community Restoration*: Grassland restoration
15 would convert approximately 1,070 acres of cultivated lands into grasslands. These acres may
16 be temporarily unavailable for California horned lark and grasshopper sparrow during
17 restoration, but would not permanently reduce habitat availability for either species.
- 18 ● *Environmental Commitment 10 Nontidal Marsh Restoration*: Restoration and creation of nontidal
19 freshwater marsh would result in the permanent removal of 832 acres of California horned lark
20 and grasshopper sparrow habitat.
- 21 ● *Environmental Commitment 11 Natural Communities Enhancement and Management*: A variety of
22 habitat management actions included in Environmental Commitment 11 that are designed to
23 enhance wildlife values in restored or protected habitats could result in localized ground
24 disturbances that could permanently remove 20 acres and temporarily remove small amounts
25 of modeled habitat. Ground-disturbing activities, such as removal of nonnative vegetation
26 (mechanical or grazing) and road and other infrastructure maintenance activities, would be
27 expected to have minor adverse effects on available habitat and would be expected to result in
28 overall improvements to and maintenance of habitat values for California horned lark and
29 grasshopper sparrow.
- 30 ● Habitat management- and enhancement-related activities could disturb California horned lark
31 and grasshopper sparrow nests. If either species were to nest in the vicinity of a worksite,
32 equipment operation could destroy nests, and noise and visual disturbances could lead to their
33 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct*
34 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available
35 to address these adverse effects.
- 36 ● *Water Facilities Operations and Maintenance*: Postconstruction operation and maintenance of
37 the above-ground water conveyance facilities and restoration infrastructure could result in
38 ongoing but periodic disturbances that could affect California horned lark and grasshopper
39 sparrow use of the surrounding habitat. Maintenance activities would include vegetation
40 management, levee and structure repair, and re-grading of roads and permanent work areas.
41 These effects, however, would be reduced by AMM1–AMM7 and Mitigation Measure BIO-75 as
42 described below.
- 43 ● *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
44 direct mortality of adult or fledged California horned lark and grasshopper sparrow if they were

1 present in the project area, because they would be expected to avoid contact with construction
2 and other equipment. If either species were to nest in the construction area, construction-
3 related activities, including equipment operation, noise and visual disturbances could destroy
4 nests or lead to their abandonment, resulting in mortality of eggs and nestlings. Mitigation
5 Measure BIO-75 would be available to address these adverse effects.

6 The following paragraphs summarize the combined effects discussed above and describe
7 Environmental Commitments and AMMs that offset or avoid these effects. NEPA and CEQA
8 conclusions are provided at the end of the section.

9 Alternative 4A would remove 4,942 acres of modeled California horned lark and grasshopper
10 sparrow habitat. These effects would result from the construction of the water conveyance facilities
11 and implementing *Environmental Commitment 4 Tidal Natural Communities Restoration*,
12 *Environmental Commitment 7 Riparian Natural Communities Restoration*, *Environmental*
13 *Commitment 8 Grassland Natural Communities Restoration*, and *Environmental Commitment 10*
14 *Nontidal Marsh Restoration*.

15 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
16 would be 2:1 for protection of habitat. Using this ratio would indicate that 9,884 acres should be
17 protected to compensate for the losses of California horned lark and grasshopper sparrow habitat.
18 Due to the conservative nature of the impact analysis, both grassland and cultivated lands were
19 included in the impact model, however, only 686 acres of impact would be from loss of grasslands,
20 some of which would be suitable for horned lark and grasshopper sparrow. Project proponents
21 would commit to protect up to 1,060 acres of grassland, 188 acres of vernal pool/alkali seasonal
22 wetland complex, and 11,870 acres of cultivated lands, and to restore up to 1,070 acres of grassland
23 and 48 acres of vernal pool/alkali seasonal wetland complex, which could provide suitable habitat
24 for California horned lark and grasshopper sparrow. *Environmental Commitment 11 Natural*
25 *Communities Enhancement and Management* would be implemented to ensure that sufficient acres
26 of grassland and cultivated lands were managed to provide suitable habitat for California horned
27 lark, grasshopper sparrow, and other species with similar habitat requirements.

28 The project also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
32 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
33 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
34 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
35 of the Final EIR/EIS.

36 **NEPA Effects:** The loss of California horned lark and grasshopper sparrow habitat from Alternative
37 4A would not be adverse under NEPA because project proponents have committed to avoiding and
38 minimizing effects and to restoring and protecting an acreage that exceeds the typical mitigation
39 ratios described above. AMM1–AMM7 would be in place during all project activities. In addition,
40 Mitigation Measure BIO-75 would be available to address potential impacts on nesting individuals.
41 Considering these commitments, losses and conversions of California horned lark and grasshopper
42 sparrow under Alternative 4A would not be adverse.

43 **CEQA Conclusion:** The effects on California horned lark and grasshopper sparrow habitat from
44 Alternative 4A would represent an adverse effect as a result of habitat modification of a special-

1 status species and potential for direct mortality in the absence of Environmental Commitments and
2 AMMs. However, project proponents have committed to habitat protection, restoration,
3 management, and enhancement associated with Environmental Commitment 3 and Environmental
4 Commitment 11. AMM1–AMM7 would be in place during all project activities. In addition, Mitigation
5 Measure BIO-75 would be available to address potential impacts on nesting individuals. Considering
6 these commitments, Alternative 4A would not result in a substantial adverse effect through habitat
7 modifications and would not substantially reduce the number or restrict the range of California
8 horned lark and grasshopper sparrow. Therefore, with the implementation of Mitigation Measure
9 BIO-75, Alternative 4A would have a less-than-significant impact on California horned lark and
10 grasshopper sparrow under CEQA.

11 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
12 **Disturbance of Nesting Birds**

13 See Mitigation Measure BIO-75 under Impact BIO-75.

14 **Impact BIO-131: Effects on California Horned Lark and Grasshopper Sparrow and Associated**
15 **with Electrical Transmission Facilities**

16 New transmission lines would increase the risk for bird-power line strikes, which could result in
17 injury or mortality of grasshopper sparrow and California horned lark. *AMM20 Greater Sandhill*
18 *Crane* would minimize the risk of bird strikes by installing flight-diverters on new and selected
19 existing powerlines.

20 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
21 could result in injury or mortality of grasshopper sparrow and California horned lark. With the
22 implementation of *AMM20 Greater Sandhill Crane*, the effect of new transmission lines on California
23 horned lark and grasshopper sparrow would not be adverse.

24 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
25 could result in injury or mortality of grasshopper sparrow and California horned lark. With the
26 incorporation of *AMM20 Greater Sandhill Crane*, new transmission lines would have a less-than-
27 significant impact on grasshopper sparrow and California horned lark.

28 **Impact BIO-132: Indirect Effects of the Project on California Horned Lark and Grasshopper**
29 **Sparrow**

30 Noise and visual disturbances associated with construction-related activities could result in
31 temporary disturbances that affect California horned lark and grasshopper sparrow use of modeled
32 habitat. Construction noise above background noise levels (greater than 50 dBA) could extend 500
33 to 5,250 feet from the edge of construction activities (see BDCP Appendix 5.J, Attachment 5J.D,
34 *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4,
35 and EIR/EIS Appendix 11F, *Substantive BDCP Revisions*). However, there are no available data to
36 determine the extent to which these noise levels could affect California horned lark or grasshopper
37 sparrow. Indirect effects associated with construction include noise, dust, and visual disturbance
38 caused by grading, filling, contouring, and other ground-disturbing operations. Construction-related
39 noise and visual disturbances could disrupt nesting and foraging behaviors, and reduce the
40 functions of suitable habitat which could result in an adverse effect on these species. Mitigation
41 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
42 *Birds*, would be available to minimize adverse effects on active nests. The use of mechanical

1 equipment during water conveyance construction could cause the accidental release of petroleum or
2 other contaminants that could affect these species or their prey in the surrounding habitat. AMM1–
3 AMM7, including *AMM2 Construction Best Management Practices and Monitoring*, would minimize
4 the likelihood of such spills. The inadvertent discharge of sediment or excessive dust adjacent to
5 California horned lark and grasshopper sparrow nesting habitat could also have a negative effect on
6 these species. AMM1–AMM7 would ensure that measures are in place to prevent runoff from the
7 construction area and the negative effects of dust on wildlife adjacent to work areas.

8 **NEPA Effects:** Indirect effects on California horned lark and grasshopper sparrow as a result of
9 Alternative 4A implementation could have adverse effects on these species through the modification
10 of habitat and potential for direct mortality. Potential mortality of California horned lark and
11 grasshopper sparrow would be an adverse effect without preconstruction surveys to ensure that
12 nests are detected and avoided. In conjunction with AMM1–AMM7, Mitigation Measure BIO-75
13 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
14 available to address this effect.

15 **CEQA Conclusion:** Indirect effects on California horned lark and grasshopper sparrow as a result of
16 Alternative 4A implementation could have a significant impact on these species. The incorporation
17 of AMM1–AMM7 into Alternative 4A and the implementation of Mitigation Measure BIO-75, *Conduct*
18 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this
19 impact to a less-than-significant level.

20 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
21 **Disturbance of Nesting Birds**

22 See Mitigation Measure BIO-75 under Impact BIO-75.

23 **Impact BIO-133: Periodic Effects of Inundation on California Horned Lark and Grasshopper**
24 **Sparrow as a Result of Implementation of Alternative 4A**

25 No Alternative 4A components would result in periodic inundation effects on California horned lark
26 or grasshopper sparrow.

27 **NEPA Effects:** No effect.

28 **CEQA Conclusion:** No impact.

29 **Least Bittern and White-Faced Ibis**

30 This section describes the effects of Alternative 4A, including water conveyance facilities
31 construction and implementation of Environmental Commitments, on least bittern and white-faced
32 ibis. Modeled breeding habitat for least bittern and white-faced ibis includes tidal freshwater,
33 nontidal freshwater emergent wetlands, managed wetlands, and other natural seasonal wetlands in
34 CZ 2, 4, and 11. Alternative 4A would result in both temporary and permanent losses of modeled
35 habitat for least bittern and white-faced ibis as indicated in Table 12-4A-49. Full implementation of
36 Alternative 4A would include the following Environmental Commitments and Resource Restoration
37 and Performance Principles that would also benefit least bittern and white-faced ibis.

- 38 • Restore or create up to 13.5 acres of *Schoenoplectus* and *Typha*-dominated tidal and nontidal
39 freshwater emergent wetland in patches greater than 0.55 acres in the central Delta
40 (Environmental Commitment 4 and Resource Restoration and Performance Principle CBR1).

- Protect up to 119 acres of nontidal wetlands and create up to 832 acres of nontidal wetlands (Environmental Commitments 3 and 10).

As explained below, with the restoration or protection of these amounts of habitat, in addition to management activities that would enhance habitat for these species (including *Environmental Commitment 12 Methylmercury Management*) and implementation of AMM1–AMM7, and AMM27 *Selenium Management* and Mitigation Measure BIO-75, impacts on least bittern and white-faced ibis would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-4A-49. Changes in Least Bittern and White-Faced Ibis Modeled Habitat Associated with Alternative 4A (acres)

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Nesting	1	3
Total Impacts Water Conveyance Facilities		1	3
Environmental Commitments 4, 6–7, 9–11 ^a	Nesting	5	0
Total Impacts Environmental Commitments 4, 6–7, 9–11^a		5	0
TOTAL IMPACTS		6	3

^a See discussion below for a description of applicable Environmental Commitments.

Impact BIO-134: Loss or Conversion of Habitat for and Direct Mortality of Least Bittern and White-Faced Ibis

Alternative 4A would result in the combined permanent and temporary loss of up to 11 acres of modeled habitat for least bittern and white-faced ibis (6 acres of permanent loss and 3 of temporary loss, Table 12-4A-49). Project measures that would result in these losses are water conveyance facilities and transmission line construction, and establishment and use of reusable tunnel material areas, and tidal habitat restoration (Environmental Commitment 4). Habitat enhancement and management activities (Environmental Commitment 11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other physical facilities could degrade or eliminate least bittern and white-faced ibis habitat. Each of these individual activities is described below.

- *Water Facilities Construction:* Construction of Alternative 4A conveyance facilities would result in the combined permanent and temporary loss of up to 4 acres of modeled least bittern and white-faced ibis habitat (1 acre of permanent loss, 3 acres of temporary loss) from CZ 4. Permanent impacts on habitat would result from a reusable tunnel material storage site north of Twin Cities Road and east of the intermediate forebay. Temporary impacts would result from the construction of two temporary transmission lines, one extending east along Lambert Road from the Lambert Road Vent Shaft, and one extending south from the Lambert Road Vent Shaft to the intermediate forebay. The construction footprint for water conveyance facilities does not overlap with any occurrences of least bittern or white-faced ibis. However, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize effects on least bittern and white-faced ibis if they were to nest in the vicinity of the construction footprint. Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4A construction locations. Impacts from water conveyance facilities would occur within the first 10–14 years of Alternative 4A implementation.

- 1 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal habitat restoration
2 site preparation and inundation would permanently remove an estimated 5 acres of modeled
3 least bittern and white-faced ibis habitat.
- 4 • *Environmental Commitment 11 Natural Communities Enhancement and Management:* A variety of
5 habitat management actions included in Environmental Commitment 11 that are designed to
6 enhance wildlife values in restored or protected habitats could result in localized ground
7 disturbances that could temporarily remove small amounts of least bittern and white-faced ibis
8 habitat. Ground-disturbing activities, such as removal of nonnative vegetation and road and
9 other infrastructure maintenance activities, would be expected to have minor adverse effects on
10 available least bittern and white-faced ibis habitat.
- 11 • *Water Facilities Operations and Maintenance:* Postconstruction operation and maintenance of
12 the above-ground water conveyance facilities and restoration infrastructure could result in
13 ongoing but periodic disturbances that could affect least bittern and white-faced ibis use of the
14 surrounding habitat. Maintenance activities would include vegetation management, levee and
15 structure repair, and re-grading of roads and permanent work areas. These effects, however,
16 would be reduced by AMM1–AMM7. Mitigation Measure BIO-75, *Conduct Preconstruction*
17 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to further reduce
18 effects.
- 19 • *Injury and Direct Mortality:* Construction-related activities would not be expected to result in
20 direct mortality of least bittern and white-faced ibis because adults and fledged young would be
21 expected to avoid contact with construction and other equipment. However, if either species
22 were to nest in the construction area, equipment operation, noise and visual disturbances could
23 destroy nests or lead to their abandonment, resulting in mortality of eggs and nestlings.
24 Construction-related activities could also flush least bittern adults from nests and lead to
25 collision with man-made objects (Sterling 2008). Mitigation Measure BIO-75 would require
26 preconstruction surveys in and adjacent to work areas and, if nests were present, nodisturbance
27 buffers would be implemented.

28 The following paragraphs summarize the combined effects discussed above and describe
29 Environmental Commitments, Resource Restoration and Performance Principles, and AMMs that
30 offset or avoid these effects. NEPA and CEQA conclusions are provided at the end of the section.

31 Alternative 4A would result in the permanent loss of and temporary effects on 9 acres (6 acres of
32 permanent loss, 3 acres of temporary loss) of least bittern and white-faced ibis habitat.

33 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected would
34 be 1:1 for restoration/creation and 1:1 protection of least bittern and white-faced ibis habitat. Using
35 these ratios would indicate that 9 acres of habitat should be restored and 9 acres of habitat should
36 be protected to compensate for the losses of least bittern and white-faced ibis habitat.

37 Alternative 4A includes the following conservation commitments: 13.5 acres of tidal freshwater
38 emergent wetland would be restored or created (Resource Restoration and Performance Principle
39 CBR1) and 119 acres of nontidal wetlands would be protected, and 832 acres of nontidal wetlands
40 would be created. These would be implemented as part of Environmental Commitment 4, and
41 Environmental Commitment 10 and would be more than sufficient to compensate for impacts on
42 least bittern and white-faced ibis habitat.

1 The project also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
2 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
3 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
4 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, and AMM7 Barge Operations Plan.*

5 If least bittern or white-faced ibis were to nest in or adjacent to work areas, construction-related
6 activities, including equipment operation, noise and visual disturbances could destroy nests or lead
7 to their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would
8 be available to address this potentially adverse effect.

- 9 • **NEPA Effects:** The loss of least bittern and white-faced ibis nesting habitat from Alternative 4A
10 would not be adverse under NEPA because project proponents have committed to avoiding and
11 minimizing effects and to restoring and protecting an acreage that exceeds the typical mitigation
12 ratios described above. This habitat protection, restoration, management, and enhancement
13 would be guided by Resource Restoration and Performance Principle CBR1, and by AMM1–
14 AMM7, which would be in place during all project activities. In addition, Mitigation Measure BIO-
15 75 would be available to address potential impacts on nesting individuals. Considering these
16 commitments, losses and conversions of least bittern and white-faced ibis habitat under
17 Alternative 4A would not be adverse.

18 **CEQA Conclusion:**

- 19 • The effects on least bittern and white-faced ibis habitat from Alternative 4A would represent an
20 adverse effect as a result of habitat modification of a special-status species and potential for
21 direct mortality in the absence of Environmental Commitments and AMMs. However, project
22 proponents have committed to habitat protection, restoration, management, and enhancement
23 associated with Environmental Commitment 3, Environmental Commitment 4, Environmental
24 Commitment 10, and Environmental Commitment 11. These conservation activities would be
25 guided by Resource Restoration and Performance Principle CBR1 and by AMM1–AMM7, which
26 would be in place during all project activities. In addition, Mitigation Measure BIO-75 would be
27 available to address potential impacts on nesting individuals. Considering these commitments,
28 Alternative 4A would not result in a substantial adverse effect through habitat modifications and
29 would not substantially reduce the number or restrict the range of least bittern and white-faced
30 ibis. Therefore, with the implementation of Mitigation Measure BIO-75, Alternative 4A would
31 have a less-than-significant impact on least bittern and white-faced ibis under CEQA.

32 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 33 **Disturbance of Nesting Birds**

34 See Mitigation Measure BIO-75 under Impact BIO-75.

35 **Impact BIO-135: Effects on Least Bittern and White-Faced Ibis Associated with Electrical** 36 **Transmission Facilities**

37 New transmission lines would increase the risk for bird-power line strikes, which could result in
38 injury or mortality of least bittern and white-faced ibis. Waterbirds have a higher susceptibility to
39 collisions than passerines, raptors, and other birds. Bitterns and ibises have a high wing loading/low
40 aspect ratio which limits their maneuverability and make them more vulnerable to collisions rather
41 than more agile species (see BDCP Appendix 5.J, Attachment 5J.C, *Analysis of Potential Bird Collisions*
42 *at Proposed BDCP Powerlines*). Marking transmission lines with flight diverters that make the lines

1 more visible to birds has been shown to reduce the incidence of bird mortality (Brown and Drewien
2 1995). Yee (2008) estimated that marking devices in the Central Valley could reduce avian mortality
3 by 60%. All new project transmission lines would be fitted with flight diverters which would reduce
4 bird strike risk of least bittern and white-faced ibis.

5 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
6 could result in injury or mortality of least bittern and white-faced ibis. Bitterns and ibises have a
7 high wing loading/low aspect ratio which limits their maneuverability and make them more
8 vulnerable to collisions rather than more agile species. The implementation of *AMM20 Greater*
9 *Sandhill Crane* would require the installation of bird flight diverters on all new transmission lines,
10 which could reduce bird strike risk of least bittern and white-faced ibis by 60%. With the installation
11 of bird flight diverters, the construction and operation of new transmission lines under Alternative
12 4A would not result in an adverse effect on least bittern and white-faced ibis.

13 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
14 could result in injury or mortality of least bittern and white-faced ibis. Bitterns and ibises have a
15 high wing loading/low aspect ratio which limits their maneuverability and make them more
16 vulnerable to collisions rather than more agile species. The implementation of *AMM20 Greater*
17 *Sandhill Crane* would require the installation of bird flight diverters on all new transmission lines,
18 which could reduce bird strike risk of least bittern and white-faced ibis by 60%. With the installation
19 of bird flight diverters, the construction and operation of new transmission lines under Alternative
20 4A would result in a less-than-significant impact on least bittern and white-faced ibis.

21 **Impact BIO-136: Indirect Effects of the Project on Least Bittern and White-Faced Ibis**

22 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
23 with construction-related activities could result in temporary disturbances that affect least bittern
24 and white-faced ibis use of modeled habitat. Construction noise above background noise levels
25 (greater than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (see
26 BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance*
27 *Facility on Sandhill Crane*, Table 5J.D-44, and EIR/EIS Appendix 11F, *Substantive BDCP Revisions*).
28 However, there are no available data to determine the extent to which these noise levels could affect
29 least bittern or white-faced ibis. Indirect effects associated with construction include noise, dust,
30 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
31 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
32 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
33 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
34 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use
35 of mechanical equipment during water conveyance construction could cause the accidental release
36 of petroleum or other contaminants that could adversely affect these species or their prey in the
37 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
38 *Monitoring*, would minimize the likelihood of such spills from occurring and would ensure that
39 measures were in place to prevent runoff from the construction area and the negative effects of dust
40 on wildlife adjacent to work areas.

41 **Methylmercury Exposure:** Marsh (tidal and nontidal) restoration has the potential to increase
42 exposure to methylmercury. Mercury is transformed into the more bioavailable form of
43 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
44 tidal marshes and flood plains (Alpers et al. 2008). Thus, Alternative 4A restoration activities that

1 create newly inundated areas could increase bioavailability of mercury. Species sensitivity to
2 methylmercury differs widely and there is a large amount of uncertainty with respect to species-
3 specific effects. A detailed review of the methylmercury issues associated with implementation of
4 Alternative 4A are contained in Appendix 11F, *Substantive BDCP Revisions*. The review includes an
5 overview of the Alternative 4A-related mechanisms that could result in increased mercury in the
6 foodweb, and how exposure of individual species to mercury may occur based on feeding habits and
7 where species habitat overlaps with the areas where mercury bioavailability could increase.
8 Increased methylmercury associated with natural community restoration could indirectly affect
9 least bittern and white-faced ibis, via uptake in lower trophic levels (as described in BDCP Appendix
10 5.D, *Contaminants*).

11 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
12 the foodweb, *Environmental Commitment 12 Methylmercury Management* is included to provide for
13 site-specific evaluation for each restoration project. On a project-specific basis, where high potential
14 for methylmercury production is identified that restoration design and adaptive management
15 cannot fully address while also meeting restoration objectives, alternate restoration areas will be
16 considered. Environmental Commitment 12 would be implemented in coordination with other
17 similar efforts to address mercury in the Delta, and specifically with the DWR Mercury Monitoring
18 and Analysis Section. This Environmental Commitment would include the following actions.

- 19 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
20 mercury methylation and bioavailability
- 21 ● Define design elements that minimize conditions conducive to generation of methylmercury in
22 restored areas.
- 23 ● Define adaptive management strategies that can be implemented to monitor and minimize
24 actual postrestoration creation and mobilization of methylmercury.

25 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
26 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
27 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
28 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
29 2009). The effect of selenium toxicity differs widely between species and also between age and sex
30 classes within a species. In addition, the effect of selenium on a species can be confounded by
31 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
32 2009).

33 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
34 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
35 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
36 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
37 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
38 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
39 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
40 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
41 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
42 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
43 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
44 levels of selenium have a higher risk of selenium toxicity.

1 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
2 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
3 exacerbate bioaccumulation of selenium in avian species, including least bittern and white-faced
4 ibis. Marsh (tidal and nontidal) restoration has the potential to mobilize selenium, and therefore
5 increase avian exposure from ingestion of prey items with elevated selenium levels. Thus,
6 Alternative 4A restoration activities that create newly inundated areas could increase bioavailability
7 of selenium. Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it
8 was determined that, relative to Existing Conditions and the No Action Alternative, water
9 conveyance facilities would not result in substantial, long-term increases in selenium concentrations
10 in water in the Delta under any alternative. However, it is difficult to determine whether the effects
11 of potential increases in selenium bioavailability associated with Environmental Commitment 4
12 would lead to adverse effects on least bittern and white-faced ibis.

13 Because of the uncertainty that exists with respect to the location of tidal restoration activities, there
14 could be a substantial effect on least bittern and white-faced ibis from increases in selenium
15 associated with restoration activities. This effect would be addressed through the implementation of
16 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
17 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
18 habitats (see Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the
19 effectiveness of selenium management to reduce selenium concentrations and/or bioaccumulation
20 would be evaluated separately for each restoration effort as part of design and implementation. This
21 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
22 design schedule.

23 **NEPA Effects:** Indirect effects on least bittern and white-faced ibis as a result of constructing the
24 water conveyance facilities could have adverse effects on these species in the absence of
25 Environmental Commitments and AMMs. However, the implementation of AMM1–AMM7 would
26 help to reduce this effect. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*
27 *and Avoid Disturbance of Nesting Birds*, would also be available to address the adverse indirect
28 effects of construction on active nests. Tidal habitat restoration could result in increased exposure of
29 least bittern and white-faced ibis to selenium. This effect would be addressed through the
30 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
31 restoration design elements to reduce the potential for bioaccumulation of selenium and its
32 bioavailability in tidal habitats.

33 Increased methylmercury associated with natural community restoration could indirectly affect
34 least bittern and white-faced ibis, via uptake in lower trophic levels (as described in BDCP Appendix
35 5.D, *Contaminants*). However, it is unknown what concentrations of methylmercury are harmful to
36 the species, and the potential for increased exposure varies substantially within the study area.
37 Implementation of Environmental Commitment 12, which contains measures to assess the amount
38 of mercury before project development, followed by appropriate design and adaptation
39 management, would minimize the potential for increased methylmercury exposure, and would
40 result in no adverse effect on least bittern and white-faced ibis.

41 **CEQA Conclusion:** Indirect effects of noise and visual disturbance, in addition to the potential for
42 hazardous spills or increased dust on least bittern and white-faced ibis and their habitat as a result
43 of Alternative 4A implementation, would represent a substantial adverse effect in the absence of
44 other Environmental Commitments and AMMs. This impact would be significant. The incorporation
45 of AMM1–AMM7 into Alternative 4A and the implementation of Mitigation Measure BIO-75, *Conduct*

1 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce this
2 impact to a less-than-significant level. Tidal habitat restoration could result in increased exposure of
3 least bittern and white-faced ibis to selenium. This effect would be addressed through the
4 implementation of *AMM27 Selenium Management*, which would provide specific tidal habitat
5 restoration design elements to reduce the potential for bioaccumulation of selenium and its
6 bioavailability in tidal habitats. The implementation of tidal natural communities restoration could
7 result in increased exposure of least bittern and white-faced ibis to methylmercury in restored tidal
8 areas. However, it is unknown what concentrations of methylmercury are harmful to these species
9 and the potential for increased exposure varies substantially within the study area. Implementation
10 of Environmental Commitment 12, which contains measures to assess the amount of mercury before
11 project development, followed by appropriate design and adaptation management, would minimize
12 the potential for increased methylmercury exposure, and would result in no adverse effect on least
13 bittern and white-faced ibis.

14 Indirect effects of Alternative 4A implementation would represent an adverse effect on least bittern
15 and white-faced ibis in the absence of other Environmental Commitments. This would be a
16 significant impact. With AMM1–AMM7, *AMM27 Selenium Management*, and Environmental
17 Commitment 12 in place, and with the implementation of Mitigation Measure BIO-75, indirect
18 effects of Alternative 4A implementation would not result in a substantial adverse effect through
19 habitat modification and would not substantially reduce the number or restrict the range of either
20 species. Therefore, the indirect effects of Alternative 4A implementation would have a less-than-
21 significant impact on least bittern and white-faced ibis.

22 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
23 **Disturbance of Nesting Birds**

24 See Mitigation Measure BIO-75 under Impact BIO-75.

25 **Impact BIO-137: Periodic Effects of Inundation on Least Bittern and White-Faced Ibis as a**
26 **Result of Implementation of Alternative 4A**

27 No Alternative 4A components would result in periodic inundation effects on least bittern or white-
28 faced ibis.

29 **NEPA Effects:** No effect.

30 **CEQA Conclusion:** No impact.

31 **Loggerhead Shrike**

32 This section describes the effects of Alternative 4A, including water conveyance facilities
33 construction and implementation of Environmental Commitments, on loggerhead shrike. Modeled
34 habitat for loggerhead shrike includes both high-value and low-value modeled habitat. High-value
35 habitat includes grassland, vernal pool complex and alkali seasonal wetland natural communities in
36 addition to cultivated lands, including pasture and grain and hay crops. Breeding shrikes require
37 shrubs and tall trees for perching and nest placement, and are generally associated with riparian
38 edge grasslands (Humble 2008) or cultivated lands with associated trees and shrubs. Loggerhead
39 shrike modeled habitat is overestimated as it does not differentiate between lands with or without
40 associated nesting vegetation or nesting and perching vegetation structures. Low-value habitat
41 includes row crops such as truck and berry crops and field crops which are not considered to be

1 valuable habitat for the species but were included in the model as they may provide foraging
2 opportunities.

3 Alternative 4A would result in both temporary and permanent losses of modeled habitat for
4 loggerhead shrike as indicated in Table 12-4A-50. Full implementation of Alternative 4A would
5 include the following Environmental Commitments and Resource Restoration and Performance
6 Principles which would benefit loggerhead shrike.

- 7 ● Protect up to 1,060 acres of grassland and 11,870 acres of cultivated lands (Environmental
8 Commitment 3). The following Swainson's hawk Resource Restoration and Performance
9 Principles would be implemented as part of these acres.
 - 10 ○ Conserve 1 acre of Swainson's hawk foraging habitat for each acre of lost foraging habitat in
11 patch sizes of a minimum of 40 acres (Resource Restoration and Performance Principle
12 SH1).
 - 13 ○ Protect Swainson's hawk foraging habitat above 1 foot above mean sea level with at least
14 50% in very high-value habitat (see Table 12-4A-35 for a definition habitat value)
15 production (Resource Restoration and Performance Principle SH2).
- 16 ● Of the 1,060 acres of grasslands protected, protect up to 227 acres of grasslands on the
17 landward side of levees adjacent to restored floodplain to provide flood refugia and foraging
18 habitat for riparian brush rabbit (Resource Restoration and Performance Principle RBR5).
- 19 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
20 lands that occur in cultivated lands within the conservation area, including isolated valley oak
21 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
22 water conveyance channels, grasslands, ponds, and wetlands (Resource Restoration and
23 Performance Principle CL1).
- 24 ● Restore up to 1,070 acres of grasslands (Environmental Commitment 8).
- 25 ● Restore or create up to 251 acres of valley/foothill riparian natural community (Environmental
26 Commitment 7).
- 27 ● Protect up to 103 acres of existing valley/foothill riparian natural community (Environmental
28 Commitment 3).
- 29 ● Restore, maintain, and enhance riparian areas to provide a mix of early-, mid- and late-
30 successional habitat types with a well-developed understory of dense shrubs (Resource
31 Restoration and Performance Principle VFR1).

32 As explained below, with the restoration or protection of these amounts of habitat, in addition to
33 management activities that would enhance habitat for the species and implementation of AMM1-
34 AMM7, AMM10, and Mitigation Measure BIO-75, impacts on loggerhead shrike would not be adverse
35 for NEPA purposes and would be less than significant for CEQA purposes.

1 **Table 12-4A-50. Changes in Loggerhead Shrike Modeled Habitat Associated with Alternative 4A**
2 **(acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	High-value	1,978	537
	Low-value	1,269	441
Total Impacts Water Conveyance Facilities		3,247	978
Environmental Commitments 4, 6-7, 9-11 ^a	High-value	2,239	0
	Low-value	0	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		2,239	0
Total High-value		4,217	537
Total Low-value		1,269	441
TOTAL IMPACTS		5,486	978

^a See discussion below for a description of applicable Environmental Commitments.

3

4 **Impact BIO-138: Loss or Conversion of Modeled Habitat for and Direct Mortality of**
5 **Loggerhead Shrike**

6 Alternative 4A would result in the combined permanent and temporary loss of up to 6,457 acres of
7 modeled habitat for loggerhead shrike (of which 4,747 acres is of high-value and 1,710 acres is of
8 low value, Table 12-4A-50). Project measures that would result in these losses are water
9 conveyance facilities and transmission line construction, and establishment and use of reusable
10 tunnel material areas, and tidal habitat restoration (Environmental Commitment 4), riparian
11 restoration, (Environmental Commitment 7), grassland restoration (Environmental Commitment 8),
12 and nontidal marsh restoration (Environmental Commitment 10). Habitat enhancement and
13 management activities (Environmental Commitment 11) could result in local adverse habitat effects.
14 In addition, maintenance activities associated with the long-term operation of the water conveyance
15 facilities and other physical facilities could degrade or eliminate loggerhead shrike modeled habitat.
16 Each of these individual activities is described below.

- 17 • *Water Facilities Construction:* Construction of Alternative 4A conveyance facilities would result
18 in the combined permanent and temporary loss of up to 2,515 acres of high-value loggerhead
19 shrike habitat (1,978 acres of permanent loss, 537 acres of temporary loss). In addition, 1,710
20 acres of low-value habitat would be removed (1,269 acres of permanent loss, 441 acres of
21 temporary loss). Impacts would occur from the construction of Intakes 2, 3, and 5 and
22 associated temporary work areas and access roads in CZ 4 between Clarksburg and Courtland;
23 construction of the intermediate forebay; and from a an reusable tunnel material storage area
24 on Bouldin Island. The construction of the permanent and temporary transmission line
25 corridors through CZs 4-6 and 9 would also remove suitable foraging habitat for the species.
26 Approximately 1,115 acres would be affected by the placement of and reusable tunnel material
27 area west of the Clifton Court Forebay in CZ 8. In addition, permanent habitat loss would result
28 from the construction of the new forebay south of the existing Clifton court Forebay in CZ 8.
29 Temporarily affected areas (grassland, cultivated lands, and associated shrubs or trees) would
30 be restored within 1 year following completion of construction activities as described in *AMM10*
31 *Restoration of Temporarily Affected Natural Communities.*

1 Loggerhead shrikes nest in high abundance in shrubs associated with the grasslands to the
 2 south and to the west of Clifton Court Forebay. Shrikes were detected using this area at a much
 3 higher rate than other grasslands and areas in the Delta during DHCCP surveys (see Appendix
 4 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*). Impacts
 5 from water conveyance facilities that overlap with recorded loggerhead shrike nest occurrences
 6 (from CNDDDB and DHCCP surveys) include the construction of the new forebay (5 occurrences),
 7 the reusable tunnel material storage area north-west of the existing forebay (2 occurrences),
 8 permanent transmission line south of Clifton Court Road and west of the existing Clifton Court
 9 Forebay (1 occurrence), a permanent transmission line that extends along the northern extent
 10 of the reusable tunnel material storage areas west of the existing forebay (1 occurrence).
 11 Mitigation Measure BIO-75 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
 12 *of Nesting Birds*, would require preconstruction surveys and the establishment of no-
 13 disturbance buffers and would be available to address adverse effects on nesting loggerhead
 14 shrikes. Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4A
 15 construction locations. Impacts from water conveyance facilities would occur within the first
 16 10–14 years of Alternative 4A implementation.

- 17 ● *Environmental Commitment 4 Tidal Natural Communities Restoration*: Tidal habitat restoration
 18 site preparation and inundation would permanently remove an estimated 66 acres of high-value
 19 loggerhead shrike habitat.
- 20 ● *Environmental Commitment 7 Riparian Natural Community Restoration*: Riparian restoration
 21 would permanently remove approximately 251 acres of high-value loggerhead shrike habitat.
- 22 ● *Environmental Commitment 8 Grassland Natural Community Restoration*: Grassland restoration
 23 would convert approximately 1,070 acres of cultivated lands into grasslands. These acres may
 24 be temporarily unavailable for loggerhead shrike but would not permanently reduce foraging
 25 habitat for the species.
- 26 ● *Environmental Commitment 10 Nontidal Marsh Restoration*: Restoration and creation of nontidal
 27 freshwater marsh would result in the permanent removal of 832 acres of high-value loggerhead
 28 shrike habitat.
- 29 ● *Environmental Commitment 11 Natural Communities Enhancement and Management*: A variety of
 30 habitat management actions included in Environmental Commitment 11 that are designed to
 31 enhance wildlife values in restored or protected habitats could result in localized ground
 32 disturbances that could permanently remove 20 acres and temporarily remove small amounts
 33 of modeled habitat. Ground-disturbing activities, such as removal of nonnative vegetation and
 34 road and other infrastructure maintenance activities, would be expected to have minor adverse
 35 effects on available habitat and would be expected to result in overall improvements to and
 36 maintenance of habitat values. Fences (e.g., barbed wire) installed as part of Environmental
 37 Commitment 11, in or adjacent to protected grasslands and cultivated lands could benefit
 38 loggerhead shrike by providing hunting perches and impalement opportunities.

39 Habitat management- and enhancement-related activities could disturb loggerhead shrike nests.
 40 If either species were to nest in the vicinity of a worksite, equipment operation could destroy
 41 nests if shrubs and trees in grasslands or cultivated lands were removed, and noise and visual
 42 disturbances could lead to their abandonment, resulting in mortality of eggs and nestlings.
 43 Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance*
 44 *of Nesting Birds*, would be available to address these adverse effects.

- 1 • *Water Facilities Operations and Maintenance*: Postconstruction operation and maintenance of
2 the above-ground water conveyance facilities could result in ongoing but periodic disturbances
3 that could affect loggerhead shrike use of the surrounding habitat. Maintenance activities would
4 include vegetation management, levee and structure repair, and re-grading of roads and
5 permanent work areas. These effects, however, would be reduced by AMMs and Mitigation
6 Measure BIO-75 as described below.
- 7 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
8 direct mortality of adult or fledged loggerhead shrike if they were present in the project area,
9 because they would be expected to avoid contact with construction and other equipment. If
10 either species were to nest in the construction area, construction-related activities, including
11 equipment operation, noise and visual disturbances could destroy nests or lead to their
12 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be
13 available to address these potential effects.

14 The following paragraphs summarize the combined effects discussed above and describe
15 Environmental Commitments, Resource Restoration and Performance Principles, and AMMs that
16 offset or avoid these effects. NEPA and CEQA conclusions are provided at the end of the section.

17 Alternative 4A as a whole would result in the permanent loss of and temporary effects on 4,747
18 acres of high-value loggerhead shrike habitat and 1,710 acres of low-value loggerhead shrike
19 habitat. These effects would result from the construction of the water conveyance facilities and
20 implementing *Environmental Commitment 4 Tidal Natural Communities Restoration*, *Environmental*
21 *Commitment 7 Riparian Natural Communities Restoration*, *Environmental Commitment 8 Grassland*
22 *Natural Communities Restoration*, and *Environmental Commitment 10 Nontidal Marsh Restoration*.
23 The typical NEPA and CEQA project-level mitigation ratio for those natural communities affected
24 would be 2:1 protection of high-value habitat. Using this ratio would indicate that 9,494 acres
25 should be protected to compensate for the loss of high-value habitat. The loss of low-value habitat
26 would not require mitigation because a large proportion of the low-value habitat would result from
27 the conversion and enhancement to high-value habitats. In addition, *AMM10 Restoration of*
28 *Temporarily Affected Natural Communities* would require that temporary impacts on riparian
29 habitat, grasslands with trees and shrubs available for nestings, and cultivated lands would be
30 restored relatively quickly after completion of construction.

31 A total of 1,060 acres of grassland and 11,870 acres of cultivated lands would be protected and
32 1,070 acres of grassland would be restored through *Environmental Commitment 3* and
33 *Environmental Commitment 8*. As part of these acres of protection, project proponents would
34 commit to conserving 1 acre of Swainson's hawk foraging habitat for every acre of lost foraging
35 habitat, which would total 6,805 acres and would be located above 1 foot above mean sea level
36 (Resource Restoration and Performance Principle SH1). At least 50% of protected Swainson's hawk
37 foraging habitat would be in very high-value production (Resource Restoration and Performance
38 Principle SH2) (alfalfa) which would also provide suitable high-value habitat for loggerhead shrike.
39 Alternative 4A also contains Resource Restoration and Performance Principle CL1 to maintain and
40 protect the small patches of important wildlife habitats associated with cultivated lands that occur
41 in cultivated lands within the conservation area, including isolated valley oak trees, trees and shrubs
42 along field borders and roadsides which provide nesting habitat for loggerhead shrike. Resource
43 Restoration and Performance Principle RBR5 would protect up to 227 acres of grasslands on the
44 landward sides of levees adjacent to restored floodplain which would also benefit loggerhead shrike.
45 These Resource Restoration and Performance Principles would be associated with Environmental

1 Commitment 3 and would occur in the same timeframe as the construction and early restoration
2 losses and would benefit loggerhead shrike.

3 Alternative 4A also includes conservation commitments through *Environmental Commitment 7*
4 *Riparian Natural Community Restoration* and *Environmental Commitment 3 Natural Communities*
5 *Protection and Restoration* to restore or create up to 251 acres and protect up to 103 acres of
6 valley/foothill riparian woodland. Riparian areas would be restored, maintained, and enhanced to
7 provide a mix of early-, mid- and late-successional habitat types with a well-developed understory of
8 dense shrubs. *AMM18 Swainson's Hawk* includes a measure to plant large mature trees, including
9 transplanting trees scheduled for removal. Trees would be planted in areas that support high-value
10 Swainson's hawk foraging habitat within or adjacent to conserved cultivated lands, or as a
11 component of the riparian restoration (*Environmental Commitment 7*) where they are in close
12 proximity to suitable foraging habitat. Locating tree plantings and riparian restoration adjacent to
13 Swainson's hawk foraging habitat would also provide suitable nesting habitat for loggerhead shrike.

14 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
15 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
16 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
17 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
18 *Affected Natural Communities*. All of these AMMs include elements that would avoid or minimize the
19 risk of affecting individuals and loggerhead shrike habitat adjacent to work areas. BDCP Appendix
20 3.C describes the AMMs, which have since been updated and which are provided in Appendix 3B,
21 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

22 Preconstruction surveys for loggerhead shrike would be required to ensure that nests are detected
23 and avoided. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
24 *Disturbance of Nesting Birds*, would be available to address this adverse effect.

25 **NEPA Effects:** The loss of loggerhead shrike habitat from Alternative 4A would not be adverse under
26 NEPA because project proponents have committed to avoiding and minimizing effects and to
27 restoring and protecting an acreage that exceeds the typical mitigation ratios described above. This
28 habitat protection, restoration, management, and enhancement associated with *Environmental*
29 *Commitment 3*, *Environmental Commitment 7*, *Environmental Commitment 8*, and *Environmental*
30 *Commitment 11*. These conservation actions would be guided by Resource Restoration and
31 Performance Principles SH1, SH2, CL1, RBR5, and VFR1, and by AMM1–AMM6, *AMM10 Restoration*
32 *of Temporarily Affected Natural Communities*, and *AMM18 Swainson's Hawk*, which would be in place
33 during all project activities. In addition, Mitigation Measure BIO-75 would be available to address
34 potential impacts on nesting individuals. Considering these commitments, losses and conversions of
35 loggerhead shrike habitat under Alternative 4A would not be adverse.

36 **CEQA Conclusion:** The effects on loggerhead shrike habitat from Alternative 4A would represent an
37 adverse effect as a result of habitat modification of a special-status species and potential for direct
38 mortality in the absence of *Environmental Commitments* and AMMs. However, project proponents
39 have committed to habitat protection, restoration, management, and enhancement (including the
40 maintenance of important habitat characteristics such as trees and shrubs) associated with
41 *Environmental Commitment 3*, *Environmental Commitment 7*, *Environmental Commitment 8*, and
42 *Environmental Commitment 11*. These conservation activities would be guided by Resource
43 Restoration and Performance Principles SH1, SH2, CL1, RBR5, and VFR1, and by AMM1–AMM6,
44 AMM1–AMM6, *AMM10 Restoration of Temporarily Affected Natural Communities*, and *AMM18*

1 *Swainson's Hawk*, which would be in place during all project activities. In addition, Mitigation
2 Measure BIO-75 would be available to address potential impacts on nesting individuals. Considering
3 these commitments, Alternative 4A would not result in a substantial adverse effect through habitat
4 modifications and would not substantially reduce the number or restrict the range of loggerhead
5 shrike. Therefore, with the implementation of Mitigation Measure BIO-75, Alternative 4A would
6 have a less-than-significant impact on loggerhead shrike under CEQA.

7 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
8 **Disturbance of Nesting Birds**

9 See Mitigation Measure BIO-75 under Impact BIO-75.

10 **Impact BIO-139: Effects on Loggerhead Shrike Associated with Electrical Transmission**
11 **Facilities**

12 Loggerhead shrike's small, relatively maneuverable body; its lack of flocking behavior, and its
13 diurnal foraging behavior, contribute to a low risk of collision with the proposed transmission lines.
14 Marking transmission lines with flight diverters that make the lines more visible to birds has been
15 shown to reduce the incidence of bird mortality (Brown and Drewien 1995). For example, Yee
16 (2008) estimated that marking devices in the Central Valley could reduce avian mortality by 60%.
17 As described in *AMM20 Greater Sandhill Crane*, all new project transmission lines would be fitted
18 with flight diverters, which would substantially reduce any potential for mortality of loggerhead
19 shrike individuals from powerline collisions.

20 **NEPA Effects:** Loggerhead shrike's small, relatively maneuverable body,; its lack of flocking
21 behavior, and its diurnal foraging behavior contribute to a low risk of collision with the proposed
22 transmission lines In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird
23 strike diverters on all new transmission lines, which would substantially reduce the risk of bird
24 strike for loggerhead shrike from the project. Therefore, the construction and operation of new
25 transmission lines under Alternative 4A would not result in an adverse effect on loggerhead shrike.

26 **CEQA Conclusion:** Loggerhead shrike's small, relatively maneuverable body, its lack of flocking
27 behavior, and its diurnal foraging behavior contribute to a low risk of collision with the proposed
28 transmission lines In addition, *AMM20 Greater Sandhill Crane* contains the commitment to place bird
29 strike diverters on all new transmission lines, which would substantially reduce the risk of bird
30 strike for loggerhead shrike from the project. Therefore, the construction and operation of new
31 transmission lines under Alternative 4A would result in a less-than-significant impact on loggerhead
32 shrike.

33 **Impact BIO-140: Indirect Effects of the Project on Loggerhead Shrike**

34 Noise and visual disturbances associated with construction-related activities could result in
35 temporary disturbances that affect loggerhead shrike use of modeled habitat. Construction noise
36 above background noise levels (greater than 50 dBA) could extend 500 to 5,250 feet from the edge
37 of construction activities (see BDCP Appendix 5.J, Attachment 5J.D, *Indirect Effects of the*
38 *Construction of the BDCP Conveyance Facility on Sandhill Crane*, Table 5J.D-4, and EIR/EIS Appendix
39 11F, *Substantive BDCP Revisions*). However, there are no available data to determine the extent to
40 which these noise levels could affect loggerhead shrike. Indirect effects associated with construction
41 include noise, dust, and visual disturbance caused by grading, filling, contouring, and other ground-
42 disturbing operations. Construction-related noise and visual disturbances could disrupt nesting and

1 foraging behaviors, and reduce the functions of suitable habitat which could result in an adverse
2 effect on these species. Indirect effects from construction of the new forebay in CZ 8 could result in
3 substantial effects on active loggerhead shrike nests. DHCCP surveys in 2009 detected 10 nest sites
4 south-west of the Clifton Court Forebay (see Appendix 12C, *2009 to 2011 Bay Delta Conservation*
5 *Plan EIR/EIS Environmental Data Report*) and the large expanses of grassland in CZ 8 provide high-
6 value nesting habitat for the species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
7 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects
8 on active nests. The use of mechanical equipment during water conveyance facilities construction
9 could cause the accidental release of petroleum or other contaminants that could affect these
10 species or their prey in the surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best*
11 *Management Practices and Monitoring*, would minimize the likelihood of such spills. The inadvertent
12 discharge of sediment or excessive dust adjacent to loggerhead shrike nesting habitat could also
13 have a negative effect on these species. AMM1–AMM7 would ensure that measures are in place to
14 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to
15 work areas.

16 **NEPA Effects:** Indirect effects on loggerhead shrike as a result of Alternative 4A implementation
17 could have adverse effects on these species through the modification of habitat and potential for
18 direct mortality. Construction of the new forebay in CZ 8 would have the potential to disrupt nesting
19 loggerhead shrikes in the highly suitable habitat surrounding Clifton Court Forebay and adjacent to
20 work areas. The potential for mortality of loggerhead shrike would be an adverse effect without
21 preconstruction surveys to ensure that nests are detected and avoided. In conjunction with AMM1–
22 AMM7, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
23 *Disturbance of Nesting Birds*, would be available to address this adverse effect.

24 **CEQA Conclusion:** Indirect effects on loggerhead shrike as a result of Alternative 4A implementation
25 could have a significant impact on these species. Construction of the new forebay in CZ 8 would have
26 the potential to disrupt nesting loggerhead shrikes in the highly suitable habitat surrounding Clifton
27 Court Forebay and adjacent to work areas. The incorporation of AMM1–AMM7 into Alternative 4A
28 and the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*
29 *and Avoid Disturbance of Nesting Birds*, would reduce this impact to a less-than-significant level.

30 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
31 **Disturbance of Nesting Birds**

32 See Mitigation Measure BIO-75 under Impact BIO-75.

33 **Impact BIO-141: Periodic Effects of Inundation on Loggerhead Shrike as a Result of**
34 **Implementation of Alternative 4A**

35 No Alternative 4A components would result in periodic inundation effects on loggerhead shrike.

36 **NEPA Effects:** No effect.

37 **CEQA Conclusion:** No impact.

38 **Song Sparrow “Modesto” Population**

39 This section describes the effects of Alternative 4A, including water conveyance facilities
40 construction and implementation of Environmental Commitments, on Modesto song sparrow. The
41 Modesto song sparrow is common and ubiquitous throughout the project area, excluding CZ 11, and

1 modeled habitat for the species includes managed wetlands, tidal freshwater emergent, nontidal
2 freshwater emergent, and valley/foothill riparian vegetation communities.

3 Alternative 4A would result in both temporary and permanent removal of Modesto song sparrow
4 habitat in the quantities indicated in Table 12-4A-51. Full implementation of Alternative 4A would
5 include the following Environmental Commitments and Resource Restoration and Performance
6 Principles which would benefit Modesto song sparrow.

- 7 • Restore or create up to 251 acres of valley/foothill riparian natural community (Environmental
8 Commitment 7).
- 9 • Protect up to 103 acres of existing valley/foothill riparian natural community (Environmental
10 Commitment 3).
- 11 • Restore or create up to 295 acres of tidal wetlands in the north Delta (Environmental
12 Commitment 4).
- 13 • Restore or create up to 13.5 acres of *Schoenoplectus* and *Typha*-dominated tidal and nontidal
14 freshwater emergent wetland in patches greater than 0.55 acres at a location subject to CDFW
15 approval (Resource Restoration and Performance Principle CBR1).
- 16 • Protect up to 119 acres of nontidal wetlands and create up to 832 acres of nontidal wetlands
17 (Environmental Commitments 3 and 10).

18 As explained below, with the restoration or protection of these amounts of habitat, with AMM1–
19 AMM7 and AMM10 *Restoration of Temporarily Affected Natural Communities* in place, and with the
20 implementation of Mitigation Measure BIO-75, impacts on Modesto song sparrow would not be
21 adverse for NEPA purposes and would be less than significant for CEQA purposes.

22 **Table 12-4A-51. Changes in Modesto Song Sparrow Modeled Habitat Associated with Alternative**
23 **4A (acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Nesting	56	63
Total Impacts Water Conveyance Facilities		56	63
Environmental Commitments 4, 6–7, 9–11 ^a	Nesting	31	0
Total Impacts Environmental Commitments 4, 6–7, 9–11^a		31	0
TOTAL IMPACTS		87	63

^a See discussion below for a description of applicable Environmental Commitments.

24
25 **Impact BIO-142: Loss or Conversion of Habitat for and Direct Mortality of Modesto Song**
26 **Sparrow**

27 Alternative 4A would result in the combined permanent and temporary loss of up to 150 acres of
28 modeled habitat for Modesto song sparrow (87 acres of permanent loss and 63 acres of temporary
29 loss, Table 12-4A-51). Project measures that would result in these losses are water conveyance
30 facilities and transmission line construction, and establishment and use of reusable tunnel material
31 areas, and tidal habitat restoration (Environmental Commitment 4). Habitat enhancement and
32 management activities (Environmental Commitment 11), which include ground disturbance or
33 removal of nonnative vegetation, could result in local adverse habitat effects. In addition,

1 maintenance activities associated with the long-term operation of the water conveyance facilities
2 and other physical facilities could degrade or eliminate Modesto song sparrow modeled habitat.
3 Temporarily affected areas would be restored as riparian habitat within 1 year following completion
4 of construction activities as described in *AMM10 Restoration of Temporarily Affected Natural*
5 *Communities*. Although the effects are considered temporary, the restored riparian habitat would
6 require a period of time for ecological succession to occur for restored riparian habitat to
7 functionally replace habitat that has been affected. Each of these individual activities is described
8 below.

- 9 • *Water Facilities Construction*: Construction of Alternative 4A conveyance facilities would result
10 in the combined permanent and temporary loss of up to 119 acres of modeled Modesto song
11 sparrow habitat (56 acres of permanent loss, 63 acres of temporary loss) from CZs 3–6 and CZ 8.
12 The water conveyance facilities construction footprint overlaps with 77 Modesto song sparrow
13 occurrences and the species is ubiquitous throughout the Delta. The reusable tunnel material
14 storage areas throughout the central Delta overlap with 24 occurrences, shaft locations along
15 the tunnel alignment overlap with 9 occurrences, the permanent transmission line overlaps with
16 6 occurrences, and 1 occurrence overlaps with the construction of the new forebay in CZ 8. In
17 addition, areas temporarily affected overlap with species occurrences, including the
18 construction of a transmission line (1 occurrence) and geotechnical exploration zones along the
19 tunnel alignment (17 occurrences). Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
20 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would require preconstruction surveys and
21 the establishment of no-disturbance buffers and would be available to address adverse effects
22 on nesting Modesto song sparrows. Refer to the Terrestrial Biology Mapbook for a detailed view
23 of Alternative 4A construction locations. Construction of the water conveyance facilities and the
24 resultant impacts would occur within the first 10–14 years of Alternative 4A implementation.
- 25 • *Environmental Commitment 4 Tidal Natural Communities Restoration*: Tidal habitat restoration
26 site preparation and inundation would result in the conversion of an estimated 31 acres of
27 Modesto song sparrow riparian habitat.
- 28 • *Environmental Commitment 6 Channel Margin Enhancement*: Channel margin habitat
29 enhancement could result in removal of small amounts of valley/foothill riparian habitat along
30 4.6 miles of river and sloughs. The extent of this loss cannot be quantified at this time, but the
31 majority of the enhancement activity would occur along waterway margins where riparian
32 habitat stringers exist, including levees and channel banks. The improvements would occur
33 within the study area on sections of the Sacramento, San Joaquin and Mokelumne Rivers, and
34 along Steamboat and Sutter Sloughs. Some of the restored riparian habitat in the channel margin
35 would be expected to support nesting habitat for Modesto song sparrow.
- 36 • *Environmental Commitment 11 Natural Communities Enhancement and Management*: A variety of
37 habitat management actions included in Environmental Commitment 11 that are designed to
38 enhance wildlife values in restored or protected habitats could result in localized ground
39 disturbances that could temporarily remove small amounts of modeled habitat. Ground-
40 disturbing activities, such as removal of nonnative vegetation and road and other infrastructure
41 maintenance activities, would be expected to have minor adverse effects on available habitat
42 and would be expected to result in overall improvements to and maintenance of habitat values.
43 Habitat management- and enhancement-related activities could affect Modesto song sparrow
44 nests. If the individuals were to nest in the vicinity of a worksite, equipment operation could
45 destroy nests, and noise and visual disturbances could lead to their abandonment, resulting in

1 mortality of eggs and nestlings. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
2 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address these adverse
3 effects.

- 4 • *Water Facilities Operations and Maintenance*: Postconstruction operation and maintenance of
5 the above-ground water conveyance facilities and restoration infrastructure could result in
6 ongoing but periodic disturbances that could affect Modesto song sparrow use of the
7 surrounding habitat. Maintenance activities would include vegetation management, levee and
8 structure repair, and re-grading of roads and permanent work areas. These effects, however,
9 would be reduced by AMMs described below.
- 10 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
11 direct mortality of adult or fledged Modesto song sparrow if they were present in the project
12 area, because they would be expected to avoid contact with construction and other equipment. If
13 the species were to nest in the construction area, construction-related activities, including
14 equipment operation, noise and visual disturbances could destroy nests or lead to their
15 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be
16 available to address these effects.

17 The following paragraphs summarize the combined effects discussed above and describe
18 Environmental Commitments, Resource Restoration and Performance Principles, and AMMs that
19 offset or avoid these effects. NEPA and CEQA conclusions are provided at the end of the section.

20 Alternative 4A would remove 150 acres of modeled habitat (87 permanent, 63 temporary) for
21 Modesto song sparrow in the study area. These effects would result from the construction of the
22 water conveyance facilities and implementing *Environmental Commitment 4 Tidal Natural*
23 *Communities Restoration*.

24 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
25 affected would be 1:1 for restoration/creation and 1:1 protection of habitat. Using these ratios
26 would indicate that 150 acres of suitable habitat should be restored/created and 150 acres should
27 be protected to compensate for the losses of 150 acres of Modesto song sparrow habitat. Habitat
28 that would be restored or protected to benefit Modesto song sparrow would include valley/foothill
29 riparian and tidal and nontidal wetlands.

30 Alternative 4A includes conservation commitments through *Environmental Commitment 4 Tidal*
31 *Natural Communities Restoration*, *Environmental Commitment 7 Riparian Natural Community*
32 *Restoration*, and *Environmental Commitment 3 Natural Communities Protection and Restoration* to
33 restore or create up to 251 acres and protect up to 103 acres of valley/foothill riparian woodland.
34 Riparian areas would be restored, maintained, and enhanced to provide a mix of early-, mid- and
35 late-successional habitat types with a well-developed understory of dense shrubs. In addition, 295
36 acres of tidal wetlands would be restored or created, 119 acres of nontidal wetlands would be
37 protected, and 832 acres of nontidal wetlands would be created.

38 The project also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
41 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*.

42 If Modesto song sparrow were to nest in or adjacent to work areas, construction-related activities,
43 including equipment operation, noise and visual disturbances could destroy nests or lead to their

1 abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75 would be
2 available to address this potentially adverse effect.

3 **NEPA Effects:** The loss of Modesto song sparrow nesting habitat from Alternative 4A would not be
4 adverse under NEPA because project proponents have committed to avoiding and minimizing
5 effects and to restoring and protecting an acreage that exceeds the typical mitigation ratios
6 described above. This habitat protection, restoration, management, and enhancement would be
7 guided by Resource Restoration and Performance Principle CBR1, and by AMM1–AMM7, which
8 would be in place during all project activities. In addition, Mitigation Measure BIO-75 would be
9 available to address potential impacts on nesting individuals. Considering these commitments,
10 losses and conversions of Modesto song sparrow habitat under Alternative 4A would not be adverse.

11 **CEQA Conclusion:** The effects on Modesto song sparrow habitat from Alternative 4A would
12 represent an adverse effect as a result of habitat modification of a special-status species and
13 potential for direct mortality in the absence of other Environmental Commitments and AMMs.
14 However, project proponents have committed to habitat protection, restoration, management, and
15 enhancement associated with Environmental Commitment 3, Environmental Commitment 4,
16 Environmental Commitment 7, Environmental Commitment 10, and Environmental Commitment
17 11. These conservation activities would be guided by Resource Restoration and Performance
18 Principle CBR1, and by AMM1–AMM6, which would be in place during all project activities. In
19 addition, Mitigation Measure BIO-75 would be available to address potential impacts on nesting
20 individuals. Considering these commitments, Alternative 4A would not result in a substantial
21 adverse effect through habitat modifications and would not substantially reduce the number or
22 restrict the range of Modesto song sparrow. Therefore, with the implementation of Mitigation
23 Measure BIO-75, Alternative 4A would have a less-than-significant impact on Modesto song sparrow
24 under CEQA.

25 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
26 **Disturbance of Nesting Birds**

27 See Mitigation Measure BIO-75 under Impact BIO-75.

28 **Impact BIO-143: Effects on Modesto Song Sparrow Associated with Electrical Transmission**
29 **Facilities**

30 New transmission lines would increase the risk for bird-power line strikes, which could result in
31 injury or mortality of Modesto song sparrow. Existing lines currently pose this risk for Modesto song
32 sparrow and the incremental increased risk from the construction of new transmission lines is not
33 expected to adversely affect the population.

34 **NEPA Effects:** The incremental increased risk of bird-powerline strikes from the construction of new
35 transmission lines would not adversely affect the Modesto song sparrow population.

36 **CEQA Conclusion:** The incremental increased risk of bird-powerline strikes from the construction of
37 new transmission lines would have a less-than-significant impact on the Modesto song sparrow
38 population.

39 **Impact BIO-144: Indirect Effects of the Project on Modesto Song Sparrow**

40 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
41 with construction-related activities could result in temporary disturbances that affect Modesto song

1 sparrow use of modeled habitat. Construction noise above background noise levels (greater than 50
2 dBA) could extend 500 to 5,250 feet from the edge of construction activities (see BDCP Appendix 5.J,
3 Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on Sandhill*
4 *Crane*, Table 5J.D-4, and EIR/EIS Appendix 11F, *Substantive BDCP Revisions*). However, there are no
5 available data to determine the extent to which these noise levels could affect Modesto song
6 sparrow. Indirect effects associated with construction include noise, dust, and visual disturbance
7 caused by grading, filling, contouring, and other ground-disturbing operations. Construction-related
8 noise and visual disturbances could disrupt nesting and foraging behaviors, and reduce the
9 functions of suitable habitat which could result in an adverse effect on these species. Mitigation
10 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
11 *Birds*, would be available to minimize adverse effects on active nests. The use of mechanical
12 equipment during water conveyance construction could cause the accidental release of petroleum or
13 other contaminants that could affect these species or their prey in the surrounding habitat. AMM1–
14 AMM7 including *AMM2 Construction Best Management Practices and Monitoring* would minimize the
15 likelihood of such spills from occurring. The inadvertent discharge of sediment or excessive dust
16 adjacent to Modesto song sparrow could also have a negative effect on these species. AMM1–AMM7
17 would ensure that measures are in place to prevent runoff from the construction area and the
18 negative effects of dust on wildlife adjacent to work areas.

19 **Methylmercury Exposure:** Marsh (tidal and nontidal) restoration has the potential to increase
20 exposure to methylmercury. Mercury is transformed into the more bioavailable form of
21 methylmercury in aquatic systems, especially areas subjected to regular wetting and drying such as
22 tidal marshes and flood plains (Alpers et al. 2008). Thus, Alternative 4A restoration activities that
23 create newly inundated areas could increase bioavailability of mercury. Species sensitivity to
24 methylmercury differs widely and there is a large amount of uncertainty with respect to species-
25 specific effects. Increased methylmercury associated with natural community restoration could
26 indirectly affect Modesto song sparrow, via uptake in lower trophic levels (as described in BDCP
27 Appendix 5.D, *Contaminants*).

28 The potential mobilization or creation of methylmercury within the project area varies with site-
29 specific conditions and would need to be assessed at the project level. Due to the complex and very
30 site-specific factors that will determine if mercury becomes mobilized into the foodweb,
31 *Environmental Commitment 12 Methylmercury Management* is included to provide for site-specific
32 evaluation for each restoration project. If a project is identified where there is a high potential for
33 methylmercury production that could not be fully addressed through restoration design and
34 adaptive management, alternate restoration areas would be considered. Environmental
35 Commitment 12 would be implemented in coordination with other similar efforts to address
36 mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis Section. This
37 Environmental Commitment would include the following actions.

- 38 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
39 mercury methylation and bioavailability
- 40 ● Define design elements that minimize conditions conducive to generation of methylmercury in
41 restored areas.
- 42 ● Define adaptive management strategies that can be implemented to monitor and minimize
43 actual postrestoration creation and mobilization of methylmercury.

1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
 2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
 3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
 4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
 5 2009). The effect of selenium toxicity differs widely between species and also between age and sex
 6 classes within a species. In addition, the effect of selenium on a species can be confounded by
 7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
 8 2009).

9 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
 10 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
 11 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
 12 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
 13 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
 14 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
 15 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
 16 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
 17 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
 18 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
 19 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
 20 levels of selenium have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
 22 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
 23 exacerbate bioaccumulation of selenium in avian species, including Modesto song sparrow. Tidal
 24 and nontidal marsh restoration has the potential to mobilize selenium, and therefore increase avian
 25 exposure from ingestion of prey items with elevated selenium levels. Thus, tidal marsh restoration
 26 activities that create newly inundated areas could increase bioavailability of selenium. Changes in
 27 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
 28 Existing Conditions and the No Action Alternative, water conveyance facilities would not result in
 29 substantial, long-term increases in selenium concentrations in water in the Delta under any
 30 alternative.

31 There could be an effect on Modesto song sparrow from increases in selenium associated with tidal
 32 restoration activities (Environmental Commitment 4); however, effects on the Modesto song
 33 sparrow population would be expected to be minimal as the amount of tidal restoration would total
 34 up to 22 acres. Any effects would be addressed through the implementation of *AMM27 Selenium*
 35 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
 36 potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see Appendix 3B,
 37 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS). Furthermore, the effectiveness
 38 of selenium management to reduce selenium concentrations and/or bioaccumulation would be
 39 evaluated separately for each restoration effort as part of project design and implementation. This
 40 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
 41 design.

42 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
 43 could reduce Modesto song sparrow use of modeled habitat adjacent to work areas. Moreover,
 44 operation and maintenance of the water conveyance facilities, including the transmission facilities,
 45 could result in ongoing but periodic postconstruction disturbances that could adversely affect

1 Modesto song sparrow use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct*
2 *Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, in addition to AMM1-
3 AMM7, would be available to address this adverse effect.

4 Tidal habitat restoration could result in increased exposure of Modesto song sparrow to selenium;
5 however, the amount of tidal restoration would total up to 22 acres, and potential exposure to
6 selenium resulting from these acres of restoration would not be expected to adversely affect the
7 Modesto song sparrow population. Any effects would be addressed through the implementation of
8 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
9 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
10 habitats.

11 The implementation of tidal natural communities restoration could result in increased exposure of
12 Modesto song sparrow to methylmercury in tidally restored areas. However, it is currently unknown
13 what concentrations of methylmercury are harmful to the species and the potential for increased
14 exposure varies substantially within the study area. Implementation of Environmental Commitment
15 12, which contains measures to assess the amount of mercury before project development, followed
16 by appropriate design and adaptation management, would minimize the potential for increased
17 methylmercury exposure, and would result in no adverse effect on Modesto song sparrow.

18 **CEQA Conclusion:** Noise and visual disturbances from the construction of water conveyance
19 facilities could reduce Modesto song sparrow use of modeled habitat adjacent to work areas.
20 Moreover, operation and maintenance of the water conveyance facilities, including the transmission
21 facilities, could result in ongoing but periodic postconstruction disturbances that could affect
22 Modesto song sparrow use of the surrounding habitat. Noise, the potential for hazardous spills,
23 increased dust and sedimentation, and operations and maintenance of the water conveyance
24 facilities under Alternative 4A would have a less-than-significant impact on Modesto song sparrow
25 with the implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
26 *Surveys and Avoid Disturbance of Nesting Birds*, and AMM1-AMM7. The implementation of tidal
27 natural communities restoration could result in increased exposure of Modesto song sparrow to
28 methylmercury in tidally restored areas. This would be a significant impact. However, it is currently
29 unknown what concentrations of methylmercury are harmful to these species and the potential for
30 increased exposure varies substantially within the study area. Implementation of Environmental
31 Commitment 12, which contains measures to assess the amount of mercury before project
32 development, followed by appropriate design and adaptation management, would minimize the
33 potential for increased methylmercury exposure, and would result in no adverse effect on Modesto
34 song sparrow.

35 Tidal habitat restoration could result in increased exposure of Modesto song sparrow to selenium;
36 however, the amount of tidal restoration would total up to 22 acres, and potential exposure to
37 selenium resulting from these acres of restoration would not be expected to adversely affect the
38 Modesto song sparrow population. Any effects would be addressed through the implementation of
39 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
40 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
41 habitats.

42 With AMM1-AMM7 and Environmental Commitment 12 in place, and with the implementation of
43 Mitigation Measure BIO-75, the indirect effects of Alternative 4A implementation would not
44 substantially reduce the number or restrict the range of Modesto song sparrow. Therefore, with the

1 implementation of Mitigation Measure BIO-75, the indirect effects of Alternative 4A implementation
2 would have a less-than-significant impact on Modesto song sparrow.

3 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
4 **Disturbance of Nesting Birds**

5 See Mitigation Measure BIO-75 under Impact BIO-75.

6 **Impact BIO-145: Periodic Effects of Inundation on Modesto Song Sparrow as a Result of**
7 **Implementation of Alternative 4A**

8 No Alternative 4A components would result in periodic inundation effects on Modesto song
9 sparrow.

10 **NEPA Effects:** No effect.

11 **CEQA Conclusion:** No impact.

12 **Bank Swallow**

13 This section describes the effects of Alternative 4A, including construction and implementation of
14 Environmental Commitments, on bank swallow. Bank swallows nest in colonies along rivers,
15 streams, or other water and require fine textured sandy soils in vertical banks to create their
16 burrows. There is little suitable habitat for bank swallow in the study area because most of the
17 erodible banks have been stabilized with of levee revetment. The placement of rock revetment
18 prevents the lateral migration of rivers, removing the natural river process that creates vertical
19 banks through erosion (Bank Swallow Technical Advisory Committee 2013, Stillwater Sciences
20 2007). An estimated 70–90% of the bank swallow population in California nests along the
21 Sacramento and Feather Rivers (Bank Swallow Technical Advisory Committee 2013) upstream of
22 the study area. However, there are three CNDDDB records of bank swallow colonies in the study area:
23 two in CZ 2 north of Fremont Weir, and one in CZ 5 on Brannan Island, just west of Twitchell Island.

24 The closest natural community to represent modeled habitat for bank swallow is valley foothill
25 riparian. Although there are impacts to the valley foothill riparian natural community along the
26 northeast corner of Clifton Court Forebay, at the intermediate forebay, and on Bouldin Island, it is
27 highly unlikely that the habitat in these locations is suitable for bank swallow (alluvial soils that
28 form steep, eroded banks that have not been stabilized with levee revetment). Reusable tunnel
29 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that the
30 substrate would provide suitable nesting habitat for the species. However, if reusable tunnel
31 material areas were to become suitable for swallows over time, Mitigation Measure BIO-146 *Active*
32 *Bank Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*,
33 would avoid impacts on nesting bank swallows by requiring surveys to be conducted prior to the
34 removal of reusable tunnel material. Alternative 4A would not result in the direct loss of modeled
35 habitat for bank swallow. However, indirect effects of noise and visual disturbance from
36 *Environmental Commitment 4 Tidal Natural Communities Restoration* could impact bank swallow
37 colonies if they were present near work areas. In addition, there is uncertainty with respect to how
38 water flows upstream of the study area would affect bank swallow habitat.

39 As explained below, impacts on bank swallow under Alternative 4A would not be adverse for NEPA
40 purposes and would be less than significant for CEQA purposes with the implementation of

1 mitigation measures to monitor colonies and address the uncertainty of upstream operations on the
2 species.

3 **Table 12-4A-52. Changes in Bank Swallow Modeled Habitat Associated with Alternative 4A (acres)^a**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Nesting	0	0
Total Impacts Water Conveyance Facilities		0	0
Environmental Commitments ^b	Nesting	0	0
Total Impacts Environmental Commitments		0	0
TOTAL IMPACTS		0	0

^a See Appendix 12E, *Detailed Accounting of Direct Effects of Alternatives on Natural Communities and Covered Species*, for a detailed breakdown of Environmental Commitments' effects.

^b See discussion below for a description of applicable Environmental Commitments.

4

5 **Impact BIO-146: Indirect Effects of Implementation of Alternative 4A on Bank Swallow**

6 Noise and visual disturbances during restoration activities from *Environmental Commitment 4 Tidal*
7 *Natural Communities Restoration* including operation of earthmoving equipment and human
8 activities at work sites, could result in temporary disturbances that cause bank swallow to abandon
9 active nest burrows adjacent to construction areas. Bank swallow colonies with occupied burrows
10 have been recorded in CZ 5 and construction-related disturbances could result in an adverse effect
11 on individuals. Various activities related to *Environmental Commitment 11 Natural Communities*
12 *Enhancement and Management* could also have indirect impacts on bank swallow.

13 **NEPA Effects:** Construction activities associated with habitat restoration could adversely affect bank
14 swallow colonies in the absence of other measures. Noise and visual disturbances could result in
15 adverse effects on bank swallows including abandonment of nests if active colonies were present
16 within 500 feet of work areas. Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be*
17 *Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would be available to address this
18 effect.

19 **CEQA Conclusion:** Construction activities associated with habitat restoration could represent an
20 adverse effect on bank swallow colonies as a result of modification of habitat and potential mortality
21 of special status species in the absence of other measures. This impact would be significant. Noise
22 and visual disturbances could result in significant impacts on bank swallows if active colonies were
23 present within 500 feet of work areas. Implementation of Mitigation Measure BIO-146, *Active Bank*
24 *Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be Minimized*, would
25 reduce this impact to a less-than-significant level.

26 **Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect**
27 **Effects on Bank Swallow Will Be Minimized**

28 To the extent practicable, project proponents will not conduct restoration activities during the
29 bank swallow nesting season (April 1 through August 31). If restoration activities cannot be
30 avoided during nesting season, a qualified biologist will conduct preconstruction surveys to
31 determine if active bank swallow nesting colonies are present within 500 feet of work areas. If

1 no active nesting colonies are present, no further mitigation is required. Reusable tunnel
2 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that
3 the substrate would provide suitable nesting habitat for the species. However, reusable tunnel
4 material sites could become suitable for swallows over time. Surveys of reusable tunnel material
5 areas that have been present for at least 1 year, allowing the substrate to stabilize, will be
6 conducted prior to the removal of reusable tunnel material.

7 If active colonies are detected, DWR will establish a nondisturbance buffer (determined by DWR
8 in consultation with CDFW and the Bank Swallow Technical Advisory Committee) around the
9 colony during the breeding season. In addition, a qualified biologist will monitor any active
10 colony within 500 feet of construction to ensure that construction activities do not affect nest
11 success.

12 **Impact BIO-147: Effects of Upstream Reservoir and Water Conveyance Facilities Operations** 13 **on Bank Swallow**

14 Bank swallows are a riparian species that have evolved to deal with a dynamic system that changes
15 with annual variation in variables such as rainfall, or late snowpack runoff. The primary threat to the
16 species is loss of nesting habitat from the placement of rock revetment for levee stabilization.
17 Because of this limited available habitat, and the reduction of natural river process, the species is
18 highly sensitive to 1) reductions in winter flows which are necessary to erode banks for habitat
19 creation, and 2) high flows during the breeding season. The potential impacts of changes in
20 upstream flows during the breeding season on bank swallows are the flooding of active burrows and
21 destruction of burrows from increased bank sloughing. Bank swallows arrive in California and begin
22 to excavate their burrows in March, and the peak egg-laying occurs during April and May (Bank
23 Swallow Technical Advisory Committee 2013). Therefore, increases in flows after the swallows have
24 nested and laid eggs in the burrows could result in the loss of nests. On the Sacramento River,
25 breeding season flows between 14,000 and 30,000 cfs have been associated with localized bank
26 collapses that resulted in partial or complete colony failure (Stillwater Sciences 2007).

27 The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations
28 on the Sacramento River (Sacramento River at Keswick, Sacramento River upstream of Red Bluff,
29 Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-
30 flow channel at Thermalito Dam, and Feather River at the confluence with the Sacramento River).
31 Flows were estimated for wet years, above normal years, below normal years, dry years, and critical
32 years. An average also was estimated (see Chapter 5, Section 5.3.1, *Methods for Analysis*, a
33 description of the model).

34 On the Sacramento River at the Keswick and Red Bluff gauges, mean monthly flows under
35 Alternative 4A could increase between April and August in below normal, dry, and critical years
36 based on modeling assumptions and output (see Table 1 in Section 11C.4.1.1 and Table 3 in Section
37 11C.4.1.2 of Appendix 11C, *CALSIM II Model Results Utilized in the Fish Analysis*). The increased flows
38 could lead to inundation of active colonies. However, model outputs indicate that flows under
39 Existing Conditions and the predicted flows in year 50 without the project (NAA) also show
40 increases in flows during the breeding season (April through August) in these water year types.
41 Similar trends are shown for the Feather River (see Table 15 in Section 11C.4.1.8 and Table 17 in
42 Section 11C.4.1.9 of Appendix 11C). In addition, at the Verona flow gauge on the Sacramento River in
43 average water years (see Table 7 in Section 11C.4.1.4 of Appendix 11C) flows are predicted to be
44 greater than 14,000 cfs during the breeding season (April through August,) which could lead to bank

1 collapse. However, flows of this height are recorded under Existing Conditions at this flow gage and
2 are also predicted at year 50 without the project (NAA).

3 **NEPA Effects:** High spring flows on the Sacramento and Feather Rivers may already be impacting
4 bank swallow colonies during the breeding season, and predicted flows under Alternative 4A would
5 not differ substantially from those under the No Action Alternative. However, because of the
6 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding
7 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.
8 Soil type, high winter flows, and low spring flows all contribute to successful nesting of bank
9 swallow, and even moderate changes in seasonal flows could have an adverse effect on breeding
10 success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate*
11 *Winter and Spring Flows Upstream of the Study Area*, would be available to address the uncertainty of
12 potential adverse effects of upstream operations on bank swallow.

13 **CEQA Conclusion:** High spring flows on the Sacramento and Feather Rivers may already be
14 impacting bank swallow colonies during the breeding season, and predicted flows under Alternative
15 4A would not differ substantially from those under Existing Conditions. However, because of the
16 complexity of variables that dictate suitable habitat for the species, there is uncertainty regarding
17 the potential for and magnitude of impacts on bank swallow from changes in upstream operations.
18 There are many variables that dictate suitable habitat for the species that cannot be clearly
19 quantified, and seasonal changes in flow could increase or decrease suitable habitat for bank
20 swallow depending on soil type and location of current colonies. Implementation of Mitigation
21 Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of*
22 *the Study Area*, would address this potential significant impact and further determine if additional
23 mitigation is required for bank swallow.

24 **Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and** 25 **Spring Flows Upstream of the Study Area**

26 To address the uncertainty of the impact of upstream spring flows on existing bank swallow
27 habitat, DWR will continue to support annual monitoring³ of existing colonies upstream of the
28 study area. DWR will collect data to be used for quantifying the magnitude of flows that would
29 result in loss of active nest sites or degradation of available nesting habitat, and the extent to
30 which changes in SWP operations attributable solely to the California WaterFix are the cause of
31 such impacts. If DWR determines that changes in SWP operations attributable solely to the
32 California WaterFix have caused loss of active nest sites or degradation of available nesting
33 habitat, replacement habitat will be established at a minimum of 2:1 for the length of bank
34 habitat affected. Replacement habitat will consist of removing bank revetment to create habitat
35 for bank swallow at a location subject to CDFW approval (Bank Swallow Technical Advisory
36 Committee 2013).

37 **Yellow-Headed Blackbird**

38 This section describes the effects of Alternative 4A, including water conveyance facilities
39 construction and implementation of Environmental Commitments, on yellow-headed blackbird. The

³ Bank swallow colonies have historically been and are currently monitored by DWR, USFWS, and CDFW in association with the Bank Swallow Technical Advisory Committee, which is a diverse coalition of state and federal agency and nongovernmental organization personnel, created in response to the continued decline of bank swallow populations on the Sacramento River.

1 habitat model used to assess impacts on yellow-headed blackbird includes nesting habitat and
 2 foraging habitat. Modeled nesting habitat includes tidal freshwater emergent wetland, other natural
 3 seasonal wetland, nontidal freshwater perennial emergent wetland, and managed wetland. These
 4 natural communities support aquatic insects which are important prey items for yellow-headed
 5 blackbird young (Beedy 2008). Modeled foraging habitat for yellow-headed blackbird consists of
 6 cultivated lands and noncultivated land cover types known to support abundant insect populations,
 7 including corn, pasture, and feedlots.

8 Alternative 4A would result in both temporary and permanent losses of yellow-headed blackbird
 9 modeled habitat as indicated in Table 12-4A-53. Full implementation of Alternative 4A would
 10 include the following Environmental Commitments and Resource Restoration and Performance
 11 Principles which would also benefit yellow-headed blackbird.

- 12 • Restore or create up to 295 acres of tidal wetlands in the north Delta (Environmental
 13 Commitment 4).
- 14 • Restore or create up to 13.5 acres of *Schoenoplectus* and *Typha*-dominated tidal and nontidal
 15 freshwater emergent wetland in patches greater than 0.55 acres at a location subject to CDFW
 16 approval (Environmental Commitment 4 and Resource Restoration and Performance Principle
 17 CBR1)
- 18 • Protect up to 119 acres of nontidal wetlands and create up to 832 acres of nontidal wetlands
 19 (Environmental Commitments 3 and 10).
- 20 • Protect up to 1,060 acres of grassland and 11,870 acres of cultivated lands (Environmental
 21 Commitment 3).

22 As explained below, with the restoration or protection of these amounts of habitat, in addition to
 23 management activities to enhance habitats for the species and implementation of AMM1–AMM7,
 24 *AMM27 Selenium Management*, Environmental Commitment 12, and Mitigation Measure BIO-75,
 25 impacts on yellow-headed blackbird would not be adverse for NEPA purposes and would be less
 26 than significant for CEQA purposes.

27 **Table 12-4A-53. Changes in Yellow-Headed Blackbird Modeled Habitat Associated with Alternative**
 28 **4A**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Nesting	19	39
	Foraging	2,652	656
Total Impacts Water Conveyance Facilities		2,671	695
Environmental Commitments 4, 6–7, 9–11 ^a	Nesting	21	0
	Foraging	2,239	0
Total Impacts Environmental Commitments 4, 6–7, 9–11^a		2,260	0
Total Nesting		40	39
Total Foraging		4,891	656
TOTAL IMPACTS		4,931	695

^a See discussion below for a description of applicable Environmental Commitments.

29

Impact BIO-148: Loss of Habitat for and Direct Mortality of Yellow-Headed Blackbird

Alternative 4A would result in the combined permanent and temporary loss of up to 5,626 acres of modeled habitat (79 acres of nesting habitat and 5,547 acres of foraging habitat) for yellow-headed blackbird (Table 12-4A-53). Project measures that would result in these losses are water conveyance facilities and transmission line construction, and establishment and use of reusable tunnel material areas, and tidal habitat restoration (Environmental Commitment 4), riparian restoration, (Environmental Commitment 7), grassland restoration (Environmental Commitment 8), and nontidal marsh restoration (Environmental Commitment 10). Habitat enhancement and management activities (Environmental Commitment 11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition, maintenance activities associated with the long-term operation of the water conveyance facilities and other physical facilities could degrade or eliminate yellow-headed blackbird suitable habitat. Each of these individual activities is described below.

- *Water Facilities Construction:* Construction of Alternative 4A water conveyance facilities would result in the combined permanent and temporary loss of up to 58 acres of yellow-headed blackbird nesting habitat (19 acres of permanent loss and 39 acres of temporary loss). In addition, 3,308 acres of foraging habitat would be removed (2,652 acres of permanent loss, 656 acres of temporary loss). Activities that would impact suitable yellow-headed blackbird habitat consist of tunnel, forebay, and intake construction, temporary access roads, and construction of transmission lines. The largest losses of foraging habitat would occur from loss of corn. There are no occurrences of yellow-headed blackbird that overlap with the construction footprint for water conveyance facilities. However, Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse effects on nesting yellow-headed blackbirds. Impacts from water conveyance facilities would occur in the central Delta in CZs 3–6, and CZ 8. Refer to the Terrestrial Biology Mapbook for a detailed view of Alternative 4A construction locations. Impacts from water conveyance facilities would occur within the first 10–14 years of Alternative 4A implementation.
- *Environmental Commitment 4 Tidal Natural Communities Restoration:* Site preparation and inundation from Environmental Commitment 4 would permanently remove or convert an estimated 21 acres of nesting habitat and 66 acres of foraging habitat.
- *Environmental Commitment 7 Riparian Natural Community Restoration:* Riparian restoration would permanently remove approximately 251 acres of yellow-headed blackbird foraging habitat.
- *Environmental Commitment 8 Grassland Natural Community Restoration:* Grassland restoration would convert approximately 1,070 acres of cultivated lands into grasslands. These acres may be temporarily unavailable for yellow-headed blackbird but would not permanently reduce foraging habitat for the species.
- *Environmental Commitment 10 Nontidal Marsh Restoration:* Restoration and creation of nontidal freshwater marsh would result in the permanent removal of 832 acres of yellow-headed blackbird foraging habitat. Resulting nontidal marsh creation could benefit yellow-headed blackbird by creating breeding habitat that also supports aquatic insects for foraging.
- *Environmental Commitment 11 Natural Communities Enhancement and Management:* Habitat management- and enhancement-related activities could disturb yellow-headed blackbird nests if they were present near work sites. A variety of habitat management actions included in

1 Environmental Commitment 11 that are designed to enhance wildlife values in protected
2 habitats may result in localized ground disturbances that could temporarily remove small
3 amounts of yellow-headed blackbird habitat and reduce the functions of habitat until
4 restoration is complete. Ground-disturbing activities, such as removal of nonnative vegetation
5 and road and other infrastructure maintenance, would be expected to have minor effects on
6 available yellow-headed blackbird habitat. These effects cannot be quantified, but are expected
7 to be minimal and would be avoided and minimized by the AMMs listed below. BDCP Appendix
8 3.C describes the AMMs, which have since been updated and which are provided in Appendix
9 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

- 10 • *Water Facilities Operations and Maintenance*: Postconstruction operation and maintenance of
11 the above-ground water conveyance facilities and restoration infrastructure could result in
12 ongoing but periodic disturbances that could affect yellow-headed blackbird use of the
13 surrounding habitat. Maintenance activities would include vegetation management, levee and
14 structure repair, and re-grading of roads and permanent work areas. These effects, however,
15 would be reduced by AMMs described below.
- 16 • *Injury and Direct Mortality*: Construction-related activities would not be expected to result in
17 direct mortality of adult or fledged yellow-headed blackbird if they were present in the study
18 area, because they would be expected to avoid contact with construction and other equipment. If
19 yellow-headed blackbird were to nest in the construction area, construction-related activities,
20 including equipment operation, noise and visual disturbances could destroy nests or lead to
21 their abandonment, resulting in mortality of eggs and nestlings. Mitigation Measure BIO-75,
22 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
23 available to address these adverse effects on yellow-headed blackbird.

24 The following paragraphs summarize the combined effects discussed above and describe other
25 Environmental Commitments, Resource Restoration and Performance Principles, and AMMs that
26 offset or avoid these effects. NEPA and CEQA conclusions are provided at the end of the section.

27 Alternative 4A would remove 5,626 acres (79 acres of nesting habitat and 5,547 acres of foraging
28 habitat) of yellow-headed blackbird nesting habitat in the study area. These effects would result
29 from the construction of the water conveyance facilities (58 acres of nesting habitat, 3,308 acres of
30 foraging habitat), and implementing other Environmental Commitments (*Environmental*
31 *Commitment 4 Tidal Natural Communities Restoration, Environmental Commitment 7 Riparian*
32 *Natural Community Restoration, Environmental Commitment 8 Grassland Natural Community*
33 *Restoration, and Environmental Commitment 10 Nontidal Marsh Restoration*, 21 acres of nesting
34 habitat and 2,239 acres of foraging habitat). Typical NEPA and CEQA project-level mitigation ratios
35 for those natural communities affected by water conveyance facilities would be 1:1 for
36 restoration/creation and 1:1 protection of nesting habitat, and 1:1 protection of foraging habitat.
37 Using these ratios would indicate that 79 acres of nesting habitat should be restored/created and 79
38 acres should be protected to compensate for the water conveyance facilities losses of 79 acres of
39 yellow-headed blackbird nesting habitat. In addition, 5,547 acres of foraging habitat should be
40 protected to compensate for the losses of yellow-headed blackbird foraging habitat.

41 Project proponents would commit to creating or restoring 295 acres of tidal wetlands, creating 832
42 acres of nontidal wetlands, and protecting 119 acres of nontidal wetlands. These acres of restoration
43 and protection would be more than sufficient to compensate for impacts on 79 acres of yellow-
44 headed blackbird nesting habitat. Alternative 4A would also protect up to 1,060 acres of grassland

1 and 11,870 acres of cultivated lands, which would provide suitable foraging habitat for yellow-
2 headed blackbird.

3 The Plan also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
4 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
5 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
6 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM7 Barge Operations Plan*. All of
7 these AMMs include elements that would avoid or minimize the risk of affecting individuals and
8 species habitats adjacent to work areas. BDCP Appendix 3.C describes the AMMs, which have since
9 been updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*,
10 of the Final EIR/EIS.

11 For the project to avoid adversely affecting individuals, preconstruction surveys for avian species
12 would be required to ensure that nests are detected and avoided. Mitigation Measure BIO-75,
13 *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
14 available to address this adverse effect.

15 **NEPA Effects:** The loss of yellow-headed blackbird nesting and foraging habitat from Alternative 4A
16 would not be adverse under NEPA because project proponents have committed to avoiding and
17 minimizing effects and to restoring and protecting an acreage that exceeds the typical mitigation
18 ratios described above. This habitat protection, restoration, management, and enhancement would
19 be guided by Resource Restoration and Performance Principle CBR1, and by AMM1–AMM7, which
20 would be in place during all project activities. In addition, Mitigation Measure BIO-75 would be
21 available to address potential impacts on nesting individuals. Considering these commitments,
22 losses and conversions of yellow-headed blackbird habitat under Alternative 4A would not be
23 adverse.

24 **CEQA Conclusion:** The effects on yellow-headed blackbird habitat from Alternative 4A would
25 represent an adverse effect as a result of habitat modification of a special-status species and
26 potential for direct mortality in the absence of Environmental Commitments and AMMs. However,
27 project proponents have committed to habitat protection, restoration, management, and
28 enhancement associated with Environmental Commitment 3, Environmental Commitment 4,
29 Environmental Commitment 10, and Environmental Commitment 11. These conservation activities
30 would be guided by Resource Restoration and Performance Principle CBR1, and by AMM1–AMM7,
31 which would be in place during all project activities. In addition, Mitigation Measure BIO-75 would
32 be available to address potential impacts on nesting individuals. Considering these commitments,
33 Alternative 4A would not result in a substantial adverse effect through habitat modifications and
34 would not substantially reduce the number or restrict the range of yellow-headed blackbird.
35 Therefore, with the implementation of Mitigation Measure BIO-75, Alternative 4A would have a less-
36 than-significant impact on yellow-headed blackbird under CEQA.

37 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
38 **Disturbance of Nesting Birds**

39 See Mitigation Measure BIO-75 under Impact BIO-75.

1 **Impact BIO-149: Effects on Yellow-Headed Blackbird Associated with Electrical Transmission**
2 **Facilities**

3 New transmission lines would increase the risk for bird-power line strikes, which could result in
4 injury or mortality of yellow-headed blackbirds. Yellow-headed blackbirds are colonial and have the
5 potential to collide with the proposed transmission lines when migrating in large flocks. However,
6 similar to tricolored blackbird behavior, daily flights associated with foraging likely occur in smaller
7 flocks at heights that are lower than the transmission lines (BDCP Attachment 5.J-2, *Memorandum:*
8 *Analysis of Potential Bird Collisions at Proposed BDCP Transmission Lines*). Marking transmission
9 lines with flight diverters that make the lines more visible to birds has been shown to reduce the
10 incidence of bird mortality (Brown and Drewien 1995). For example, Yee (2008) estimated that
11 marking devices in the Central Valley could reduce avian mortality by 60%. As described in *AMM20*
12 *Greater Sandhill Crane*, all new project transmission lines would be fitted with flight diverters, which
13 reduce the potential for yellow-headed blackbird collision with transmission lines.

14 Transmission line poles and towers also provide perching substrate for raptors, which are predators
15 on yellow-headed blackbird. Although there is potential for transmission lines to result in increased
16 perching opportunities for raptors and result in increased predation pressure on yellow-headed
17 blackbirds, the existing network of transmission lines in the study area currently poses this risk for
18 yellow-headed blackbirds, and any incremental risk associated with the new transmission line
19 corridors would not be expected to affect the study area population. Therefore, it is assumed that
20 the increased risk of predation on yellow-headed blackbird from an increase in raptor perching
21 opportunities would be minimal.

22 **NEPA Effects:** New transmission lines would increase the risk for bird-power line strikes, which
23 could result in injury or mortality of yellow-headed blackbird. *AMM20 Greater Sandhill Crane*
24 contains the commitment to place bird strike diverters on all new powerlines, which would reduce
25 the potential impact of the construction of new transmission lines on yellow-headed blackbird. The
26 increased risk of predation on yellow-headed blackbird from an increase in raptor perching
27 opportunities would be minimal. Therefore, the construction and operation of new transmission
28 lines under Alternative 4A would not result in an adverse effect on yellow-headed blackbird.

29 **CEQA Conclusion:** New transmission lines would increase the risk for bird-power line strikes, which
30 could result in injury or mortality of yellow-headed blackbird. *AMM20 Greater Sandhill Crane*
31 contains the commitment to place bird strike diverters on all new powerlines, which would reduce
32 the potential impact of the construction of new transmission lines on yellow-headed blackbird. The
33 increased risk of predation on yellow-headed blackbird from an increase in raptor perching
34 opportunities would be minimal. The construction and operation of new transmission lines under
35 Alternative 4A would not substantially reduce the number or restrict the range of the species and
36 would therefore result in a less-than-significant impact on yellow-headed blackbird.

37 **Impact BIO-150: Indirect Effects of the Project on Yellow-Headed Blackbird**

38 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
39 with construction-related activities could result in temporary disturbances that affect yellow-
40 headed blackbird use of suitable habitat. Construction noise above background noise levels (greater
41 than 50 dBA) could extend 500 to 5,250 feet from the edge of construction activities (see BDCP
42 Appendix 5.J, Attachment 5J.D, *Indirect Effects of the Construction of the BDCP Conveyance Facility on*
43 *Sandhill Crane*, Table 5J.D-4, and EIR/EIS Appendix 11F, *Substantive BDCP Revisions*), although there
44 are no available data to determine the extent to which these noise levels could affect yellow-headed

1 blackbird. Indirect effects associated with construction include noise, dust, and visual disturbance
 2 caused by grading, filling, contouring, and other ground-disturbing operations. Construction-related
 3 noise and visual disturbances could disrupt nesting and foraging behaviors, and reduce the
 4 functions of suitable habitat which could result in an adverse effect on these species. Mitigation
 5 Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting*
 6 *Birds*, would be available to minimize adverse effects on active nests. The use of mechanical
 7 equipment during water conveyance construction could cause the accidental release of petroleum or
 8 other contaminants that could affect the species in the surrounding habitat. The inadvertent
 9 discharge of sediment or excessive dust adjacent to yellow-headed blackbird habitat could also have
 10 a negative effect on the species. Where nests are located above open water, impacts of
 11 contamination, dust, and sediment in water could impact fledglings directly, or affect aquatic insect
 12 prey, which is important for feeding young. AMM1–AMM7 would minimize the likelihood of spills
 13 from occurring and ensure that measures are in place to prevent runoff from the construction area
 14 and the negative effects of dust on wildlife adjacent to work areas.

15 **Methylmercury Exposure:** Project activities have the potential to exacerbate bioaccumulation of
 16 mercury in avian species, including yellow-headed blackbird. Marsh (tidal and nontidal) restoration
 17 has the potential to increase exposure to methylmercury. Mercury is transformed into the more
 18 bioavailable form of methylmercury in aquatic systems, especially areas subjected to regular
 19 wetting and drying such as tidal marshes and flood plains (Alpers et al. 2008). Thus, Alternative 4A
 20 restoration activities that create newly inundated areas could increase bioavailability of mercury.
 21 Species sensitivity to methylmercury differs widely and there is a large amount of uncertainty with
 22 respect to species-specific effects. A detailed review of the methylmercury issues associated with
 23 implementation of Alternative 4A are contained in Appendix 11F, *Substantive BDCP Revisions*. The
 24 review includes an overview of the project-related mechanisms that could result in increased
 25 mercury in the foodweb, and how exposure of individual species to mercury may occur based on
 26 feeding habits and where the species habitat overlaps with the areas where mercury bioavailability
 27 could increase. Increased methylmercury associated with natural community restoration could
 28 indirectly affect yellow-headed blackbird, via uptake in lower trophic levels (as described in BDCP
 29 Appendix 5.D, *Contaminants*).

30 Due to the complex and very site-specific factors that determine if mercury becomes mobilized into
 31 the foodweb, *Environmental Commitment 12 Methylmercury Management* is included to provide for
 32 site-specific evaluation for each restoration project. On a project-specific basis, where high potential
 33 for methylmercury production is identified that restoration design and adaptive management
 34 cannot fully address while also meeting restoration objectives, alternate restoration areas will be
 35 considered. Environmental Commitment 12 would be implemented in coordination with other
 36 similar efforts to address mercury in the Delta, and specifically with the DWR Mercury Monitoring
 37 and Analysis Section. This Environmental Commitment would include the following actions.

- 38 ● Assess pre-restoration conditions to determine the risk that the project could result in increased
 39 mercury methylation and bioavailability
- 40 ● Define design elements that minimize conditions conducive to generation of methylmercury in
 41 restored areas.
- 42 ● Define adaptive management strategies that can be implemented to monitor and minimize
 43 actual postrestoration creation and mobilization of methylmercury.

1 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
2 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
3 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
4 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
5 2009). The effect of selenium toxicity differs widely between species and also between age and sex
6 classes within a species. In addition, the effect of selenium on a species can be confounded by
7 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
8 2009).

9 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
10 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
11 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
12 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
13 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
14 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
15 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
16 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
17 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
18 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
19 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
20 levels of selenium have a higher risk of selenium toxicity.

21 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
22 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
23 exacerbate bioaccumulation of selenium in avian species, including yellow-headed blackbird. Tidal
24 and nontidal marsh restoration has the potential to mobilize selenium, and, therefore, increase avian
25 exposure from ingestion of prey items with elevated selenium levels. Thus, tidal marsh restoration
26 activities that create newly inundated areas could increase bioavailability of selenium. Changes in
27 selenium concentrations are analyzed in Chapter 8, *Water Quality*, which concludes that, relative to
28 Existing Conditions and the No Action Alternative, construction and operation of proposed water
29 conveyance facilities would not result in substantial, long-term increases in selenium concentrations
30 in water in the Delta under any alternative.

31 There could be an effect on yellow-headed blackbird from increases in selenium associated with
32 tidal restoration activities (Environmental Commitment 4); however, effects on the yellow-headed
33 blackbird population would be expected to be minimal because the amount of tidal restoration
34 would total up to 22 acres. Any effects would be addressed through the implementation of *AMM27*
35 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
36 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats (see
37 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
38 selenium management to reduce selenium concentrations and/or bioaccumulation would be
39 evaluated separately for each restoration effort as part of project design and implementation. This
40 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
41 design.

42 **NEPA Effects:** Noise and visual disturbances from the construction of water conveyance facilities
43 could reduce yellow-headed blackbird use of modeled habitat adjacent to work areas. Moreover,
44 operation and maintenance of the water conveyance facilities, including the transmission facilities,
45 could result in ongoing but periodic postconstruction disturbances that could affect yellow-headed

1 blackbird use of the surrounding habitat. Mitigation Measure BIO-75, *Conduct Preconstruction*
2 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to address adverse
3 effects on nesting individuals in addition to AMM1–AMM7.

4 Tidal habitat restoration could result in increased exposure of yellow-headed blackbird to selenium;
5 however, the amount of tidal restoration would total up to 22 acres, and potential exposure to
6 selenium resulting from these acres of restoration would not be expected to adversely affect the
7 yellow-headed blackbird population. Any effects would be addressed through the implementation of
8 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
9 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
10 habitats.

11 The implementation of tidal natural communities restoration could result in increased exposure of
12 yellow-headed blackbird to methylmercury in restored tidal areas. However, it is unknown what
13 concentrations of methylmercury are harmful to these species and the potential for increased
14 exposure varies substantially within the study area. Implementation of Environmental Commitment
15 12, which contains measures to assess the amount of mercury before project development, followed
16 by appropriate design and adaptation management, would minimize the potential for increased
17 methylmercury exposure, and would result in no adverse effect on yellow-headed blackbird.

18 **CEQA Conclusion:** In the absence of AMMs, noise and visual disturbance, the potential for hazardous
19 spills, increased dust and sedimentation, and operations and maintenance of the water conveyance
20 facilities under Alternative 4A would represent an adverse effect. This impact would be significant.
21 The implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and*
22 *Avoid Disturbance of Nesting Birds*, and AMM1–AMM7, would reduce this impact to a less-than-
23 significant level.

24 The implementation of tidal natural communities restoration could result in increased exposure of
25 yellow-headed blackbird to methylmercury in restored tidal areas. However, it is unknown what
26 concentrations of methylmercury are harmful to these species and the potential for increased
27 exposure varies substantially within the study area. Implementation of Environmental Commitment
28 12, which contains measures to assess the amount of mercury before project development, followed
29 by appropriate design and adaptation management, would minimize the potential for increased
30 methylmercury exposure, and would result in no adverse effect on yellow-headed blackbird.

31 Tidal habitat restoration could result in increased exposure of yellow-headed blackbird to selenium;
32 however, the amount of tidal restoration would total up to 22 acres, and potential exposure to
33 selenium resulting from these acres of restoration would not be expected to adversely affect the
34 yellow-headed blackbird population. Any effects would be addressed through the implementation of
35 *AMM27 Selenium Management*, which would provide specific tidal habitat restoration design
36 elements to reduce the potential for bioaccumulation of selenium and its bioavailability in tidal
37 habitats.

38 Indirect effects of Alternative 4A implementation would represent an adverse effect on yellow-
39 headed blackbird in the absence of other Environmental Commitments. This would be a significant
40 impact. With AMM1–AMM7 and Environmental Commitment 12 in place, and with the
41 implementation of Mitigation Measure BIO-75, indirect effects of Alternative 4A implementation
42 would not result in a substantial adverse effect through habitat modifications and would not
43 substantially reduce the number or restrict the range of the species. Therefore, indirect effects of

1 Alternative 4A implementation would have a less-than-significant impact on yellow-headed
2 blackbird.

3 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
4 **Disturbance of Nesting Birds**

5 See Mitigation Measure BIO-75 under Impact BIO-75.

6 **Impact BIO-151: Periodic Effects of Inundation of Yellow-Headed Blackbird Nesting Habitat**
7 **as a Result of Implementation of Alternative 4A**

8 No Alternative 4A components would result in periodic inundation effects on yellow-headed
9 blackbird.

10 *NEPA Effects:* No effect.

11 *CEQA Conclusion:* No impact.

12 **Riparian Brush Rabbit**

13 The habitat model used to assess effects on the riparian brush rabbit consists of 38 vegetation
14 associations within the valley/foothill riparian natural community and adjacent grasslands. The
15 vegetation associations were selected based on a review of understory and overstory composition
16 from Hickson and Keeler-Wolf (2007) and species habitat requirements.

17 Just until recently, the only known naturally occurring populations of riparian brush rabbits were
18 confined to Caswell Memorial State Park (MSP), a 258-acre park supporting riparian oak woodland
19 on the Stanislaus River immediately southeast of the study area, and in the south Delta southwest of
20 Lathrop, which is within the study area (Williams and Basey 1986; Williams et al. 2002) (Figure 12-
21 46). On October 11, 2012 a single female riparian brush rabbit was captured near Durham Ferry
22 Road in riparian habitat along the San Joaquin River between Caswell MSP and Lathrop (Bradbury
23 pers. comm.). This is only the 2nd naturally occurring population documented outside of Caswell
24 MSP. Factors considered in assessing the value of adversely affected habitat for riparian brush
25 rabbit, to the extent information was available, included size and degree of isolation of habitat
26 patches, proximity to recorded species occurrences, and adjacency to conserved lands.

27 Alternative 4A would result in both temporary and permanent losses of riparian brush rabbit
28 modeled habitat as indicated in Table 12-4A-54. Alternative 4A would include the following
29 Environmental Commitments and associated Resource Restoration and Performance Principles to
30 benefit the riparian brush rabbit.

- 31 ● Increase the size and connectivity of the conservation area by acquiring lands adjacent to and
32 between existing conservation lands (Resource Restoration and Performance Principle L1).
- 33 ● Of the 103 acres of protected valley/foothill riparian natural community, protect and maintain
34 19 acres of early- to mid-successional riparian habitat that meets the ecological requirements of
35 the riparian brush rabbit and that is within or adjacent to or that facilitates connectivity with
36 existing occupied or potentially occupied habitat (Environmental Commitment 3 and Resource
37 Restoration and Performance Principle RBR1).
- 38 ● Of the 251 acres of restored valley/foothill riparian natural community, restore and maintain 19
39 acres of early- to mid-successional riparian habitat that meets the ecological requirements of the

1 riparian brush rabbit and that is within or adjacent to or that facilitates connectivity with
2 existing occupied or potentially occupied habitat (Environmental Commitment 7 and Resource
3 Restoration and Performance Principle RBR2).

- 4 • Create and maintain high-water refugia in the 19 acres of restored riparian brush rabbit habitat
5 and the 19 acres of protected riparian brush rabbit habitat, through the retention, construction
6 and/or restoration of high-ground habitat on mounds, berms, or levees, so that refugia are no
7 further apart than 66 feet (Resource Restoration and Performance Principle RBR3).
- 8 • In protected riparian areas that are occupied by riparian brush rabbit, monitor for and control
9 nonnative predators that are known to prey on riparian brush rabbit (Resource Restoration and
10 Performance Principle RBR4).
- 11 • Of the 1,060 acres of grasslands protected, protect up to 227 acres of grasslands on the
12 landward side of levees adjacent to restored floodplain to provide flood refugia and foraging
13 habitat for riparian brush rabbit (Resource Restoration and Performance Principle RBR5).

14 As explained below, with the restoration and protection of these amounts of habitat, in addition to
15 the AMMs to reduce potential effects, impacts on riparian brush rabbit would not be adverse for
16 NEPA purposes and would be less than significant for CEQA purposes.

17 **Table 12-4A-54. Changes in Riparian Brush Rabbit Modeled Habitat Associated with Alternative 4A**
18 **(acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Riparian	14	3
	Grassland	164	68
Total Impacts Water Conveyance Facilities		178	71
Environmental Commitments 4, 6-7, 9-11 ^a	Riparian	0	0
	Grassland	0	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		0	0
TOTAL IMPACTS		178	71

^a See discussion below for a description of applicable Environmental Commitments.

19
20 **Impact BIO-152: Loss or Conversion of Habitat for and Direct Mortality of Riparian Brush**
21 **Rabbit**

22 Alternative 4A would result in the permanent and temporary loss of up to 17 acres of riparian
23 habitat and 232 acres of associated grassland habitat for the riparian brush rabbit in the study area
24 (Table 12-4A-54). Environmental commitments that would result in these losses are conveyance
25 facilities construction and geotechnical investigation. Habitat enhancement and management
26 activities (Environmental Commitment 11), which include ground disturbance or removal of
27 nonnative vegetation, could result in local adverse habitat effects. Each of these individual activities
28 is described below. A summary statement of the combined impacts and NEPA effects and a CEQA
29 conclusion follow the individual activity discussions.

- 30 • *Water Facilities and Operation:* Development of Alternative 4A water conveyance facilities
31 would result in the permanent removal of approximately 14 acres of riparian habitat and
32 164 acres of associated grassland habitat and in the temporary removal of 3 acre of riparian

1 habitat and 68 acres of grassland habitat for riparian brush rabbit in CZ 8 (Table 12-4A-54).
2 There are no riparian brush rabbit occurrences in the water conveyance facilities construction
3 footprint. The riparian habitat that would be removed is of low value for the riparian brush
4 rabbit as it consists of several small, isolated patches surrounded by agricultural lands northeast
5 of Clifton Court Forebay. The associated grasslands are also of low value for the species: They
6 consist of long, linear strips that abut riparian habitat, but extend several miles from the
7 riparian habitat and, therefore, provide few if any opportunities for adjacent cover. Trapping
8 efforts conducted for the riparian brush rabbit in this area were negative (see Appendix 3.E,
9 *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*, in the BDCP). Refer
10 to the Terrestrial Biology Mapbook for a detailed view of Alternative 4A construction locations.

- 11 ● *Environmental Commitment 11 Natural Communities Enhancement and Management*: Protection
12 of up to 227 acres of grassland and 19 acres of riparian habitat, as well as restoration of up to 19
13 acres of riparian habitat would benefit riparian brush rabbit (Table 12-4A-54). A variety of
14 habitat management actions included in Environmental Commitment 11 that are designed to
15 enhance wildlife values in protected habitats may result in localized ground disturbances that
16 could temporarily remove small amounts of riparian brush rabbit habitat. Enhancement and
17 management actions in riparian brush rabbit habitat within the conservation area may include
18 invasive plant removal, planting and maintaining vegetation to improve and sustain habitat
19 characteristics for the species, and creating and maintaining flood refugia. These activities are
20 expected to have minor adverse effects on available riparian brush rabbit habitat and are
21 expected to result in overall improvements to and maintenance of riparian brush rabbit habitat
22 values over time. These effects cannot be quantified, but are expected to be minimal and would
23 be avoided and minimized through the AMMs listed below.
- 24 ● *Operations and maintenance*: Ongoing maintenance of project facilities are not expected to
25 adversely affect the riparian brush rabbit because the species is not expected to occur in the
26 vicinity of proposed facilities.
- 27 ● *Injury and direct mortality*: Water conveyance facility construction is not is not likely to result in
28 injury or mortality of individual riparian brush rabbit because the species is not likely to be
29 present in the areas that would be affected by this activity, based on live trapping results (see
30 Appendix 3.E, *Conservation Principles for the Riparian Brush Rabbit and Riparian Woodrat*, in the
31 BDCP). Valley foothill/riparian natural communities restoration would not result in injury or
32 mortality of the riparian brush rabbit because restoration projects would be designed to avoid
33 occupied riparian brush rabbit habitat and, if that is not possible, rabbits would be trapped and
34 relocated as described in AMM25 (see Appendix 3B, *Environmental Commitments, AMMs, and*
35 *CMS*).

36 The following paragraphs summarize the combined effects discussed above and describe other
37 Environmental Commitments and AMMs that offset or avoid these effects. NEPA effects and a CEQA
38 conclusion are also included.

39 There are 6,012 acres of modeled riparian brush rabbit habitat in the study area, consisting of
40 2,909 acres of riparian habitat and 3,103 acres of associated grassland habitat. Alternative 4A would
41 result in permanent and temporary effects combined on 17 acres of modeled riparian habitat (less
42 than 1% of the habitat in the study area) and 232 acres of modeled grassland habitat (less than 1%
43 of habitat in the study area) for riparian brush rabbit in CZ 6, CZ 7, and CZ 8.

1 These effects would result from the construction of the water conveyance facilities. The habitat
2 would be lost in the valley/foothill riparian and grassland natural communities. Most of the loss of
3 riparian brush rabbit habitat would be in an area unlikely to be occupied by the species in CZ 8.
4 Habitat loss in CZ 7, in areas known or likely to be occupied, would also occur. Riparian restoration
5 would be phased to minimize temporal habitat loss. Alternative 4A includes a commitment to
6 protect up to 464 acres of grassland and 17 acres of riparian habitat, and to restore up to 17 acres of
7 riparian habitat for riparian brush rabbit. The conserved habitat would also be part of a larger, more
8 contiguous, and less patchy area of protected and restored riparian natural community than what
9 currently exists in CZ 7 and would be contiguous with existing modeled riparian brush rabbit
10 habitat. The conserved habitat would also provide more specific ecological requirements of riparian
11 brush rabbit, including large patches of dense riparian brush; ecotonal edges that transition from
12 brush species to grasses and forbs, scaffolding plants to support vines that grow above flood levels;
13 a tree canopy that is open, if present; and high-ground refugia from flooding.

14 The project would also protect grasslands adjacent to suitable riparian vegetation in areas outside
15 the floodplain levees. These grasslands are expected to provide additional foraging opportunities for
16 the riparian brush rabbit and upland refugia during flood events. Grasslands on the landward side of
17 levees adjacent to restored floodplain will be restored or protected as needed to provide flood
18 refugia and foraging habitat for riparian brush rabbit.

19 Additionally, nonnative predators that are known to prey on riparian brush rabbit (e.g., feral dogs
20 and cats) would be monitored in protected and restored riparian and grassland areas that are
21 occupied by riparian brush rabbit and controlled as needed (Environmental Commitment 11).

22 Typical NEPA and CEQA project-level mitigation ratios for loss of riparian and grassland habitats
23 affected by water conveyance facilities would be 1:1 for restoration and protection of the
24 valley/foothill riparian natural community, and 2:1 for protection of grassland for riparian brush
25 rabbit. Using these ratios would indicate that 17 acres of riparian habitat should be restored, 17
26 acres of riparian habitat should be protected, and 464 acres of grassland should be protected for
27 riparian brush rabbit.

28 The project also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
29 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
30 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
31 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, *AMM7 Barge Operations Plan*, *AMM10*
32 *Restoration of Temporarily Affected Natural Communities*, and *AMM25 Riparian Woodrat and*
33 *Riparian Brush Rabbit*. These AMMs contain elements that avoid or minimize the risk of project
34 activities affecting habitats and species adjacent to work areas and storage sites. BDCP Appendix 3.C
35 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
36 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

1 **NEPA Effects:** The loss of riparian brush rabbit habitat and potential mortality under Alternative 4A
2 would not be an adverse effect because there is little likelihood of riparian brush rabbits being
3 present and because the project proponents have committed to protecting and restoring the acreage
4 required to meet the typical mitigation ratios described above. This habitat protection, restoration,
5 and enhancement would be guided by species-specific Resource Restoration and Performance
6 Principles L1 and RBR1-RBR5, and by AMM1–AMM6, AMM10, and AMM25, which would be in place
7 throughout the period of construction and operations. Considering these commitments, the effects
8 of Alternative 4A as a whole on riparian brush rabbit would not be an adverse effect.

9 **CEQA Conclusion:** Considering Alternative 4A's commitment to the protection, restoration, and
10 management of riparian brush rabbit habitat, Resource Restoration and Performance Principles L1
11 and RBR1-RBR5, and with the implementation of AMM1–AMM7, AMM10, and AMM25, the loss of
12 habitat or direct mortality of riparian brush rabbit as a result of implementing Alternative 4A would
13 not represent a substantial adverse effect through habitat modifications and would not substantially
14 reduce the number or restrict the range of the species. Therefore, the loss of habitat and potential
15 mortality under this alternative would have a less-than-significant impact on riparian brush rabbit
16 under CEQA.

17 **Impact BIO-153: Indirect Effects of Alternative 4A on Riparian Brush Rabbit**

18 Noise, lighting, and visual disturbances adjacent to construction activities could indirectly affect the
19 use of modeled riparian brush rabbit riparian habitat and of associated grassland habitat in the
20 study area. These construction activities would include water conveyance, geotechnical
21 investigation, and restoration activities. Water conveyance facilities construction would potentially
22 affect acres of adjacent riparian habitat and of associated grassland habitat: this construction would
23 occur in CZ 8 where there is suitable habitat for the species but surveys by ESRP did not indicate the
24 species is present in this area; therefore, the potential for adverse noise, lighting, and visual effects
25 from conveyance facility construction would be minimal. The use of mechanical equipment during
26 construction might cause the accidental release of petroleum or other contaminants that would
27 affect the riparian brush rabbit in adjacent habitat, if the species is present.

28 **NEPA Effects:** Implementation of AMM1–AMM7, AMM10, and AMM25, as part of implementing
29 Alternative 4A would avoid the potential for substantial adverse effects on riparian brush rabbits,
30 either indirectly or through habitat modifications or result in a substantial reduction in numbers or
31 a restriction in the range of riparian brush rabbits. Therefore, indirect effects of Alternative 4A
32 would not have an adverse effect on riparian brush rabbit.

33 **CEQA Conclusion:** Indirect effects from operations and maintenance as well as construction-related
34 noise, lighting, visual disturbances could affect riparian brush rabbit in riparian and grassland
35 habitats. The use of mechanical equipment during construction could cause the accidental release of
36 petroleum or other contaminants that could affect riparian brush rabbit. The inadvertent discharge
37 of sediment or excessive dust adjacent to riparian brush rabbit habitat could also have a negative
38 effect on the species. With implementation of AMM1–AMM7, AMM10, and AMM25 as part of
39 Alternative 4A, the project would avoid and minimize the potential for substantial adverse effects on
40 riparian brush rabbits, either indirectly or through habitat modifications and would not result in a
41 substantial reduction in numbers or a restriction in the range of riparian brush rabbits. Indirect
42 effects of Alternative 4A would have a less-than-significant impact on riparian brush rabbit.

1 **Impact BIO-154: Periodic Effects of Inundation of Riparian Brush Rabbit Habitat as a Result of**
 2 **Implementation of Alternative 4A**

3 No Alternative 4A components would result in periodic effects on riparian brush rabbit.

4 **NEPA Effects:** No effect.

5 **CEQA Conclusion:** No impact.

6 **Riparian Woodrat**

7 The habitat model used to assess effects for the riparian woodrat consists of selected plant alliances
 8 from the valley/foothill riparian natural community, geographically constrained to the south Delta
 9 portion of the study area in CZ 7, south of State Route 4 and Old River Pipeline along the Stanislaus,
 10 San Joaquin, Old, and Middle Rivers. Valley/foothill riparian areas along smaller drainages (Paradise
 11 Cut, Tom Paine Slough), and some larger streams in the northern portion of CZ 7 were excluded
 12 from the riparian woodrat habitat model due to a lack of trees or riparian corridors that were too
 13 narrow. Factors considered in assessing the value of affected habitat for the riparian woodrat, to the
 14 extent that information is available, include habitat patch size and connectivity.

15 The riparian woodrat is not known to occur in the study area. The only verified extant population of
 16 riparian woodrats rangewide is 2 miles east of the southern end of the study area in Caswell
 17 Memorial State Park along the Stanislaus River (Williams 1986:1-112; Williams 1993). Riparian
 18 woodrat may occur in small patches of valley oak riparian forest along the San Joaquin River from
 19 the southern tip of the study area north to approximately the Interstate 5 overcrossing near Lathrop
 20 (Figure 12-47).

21 Alternative 4A would not result in losses of riparian woodrat modeled habitat as indicated in Table
 22 12-4A-55. There is no modeled habitat for the species in either the water conveyance facilities or
 23 Environmental Commitment 4 (tidal restoration) footprint.

24 **Table 12-4A-55. Changes in Riparian Woodrat Modeled Habitat Associated with Alternative 4A**
 25 **(acres)**

Project Component	Permanent	Temporary
Total Impacts Water Conveyance Facilities	0	0
Total Impacts Environmental Commitments 4, 6-7, 9-11	0	0
TOTAL IMPACTS	0	0

26

27 **Impact BIO-155: Loss or Conversion of Habitat for and Direct Mortality of Riparian Woodrat**

28 No habitat would be lost or converted and there would be no direct mortality of riparian woodrat
 29 under Alternative 4A.

30 **NEPA Effects:** No effect.

31 **CEQA Conclusion:** No Impact.

32 **Impact BIO-156: Indirect Effects of Alternative 4A on Riparian Woodrat**

33 There would be no indirect effects on riparian woodrat from Alternative 4A.

1 **NEPA Effects:** No effect.

2 **CEQA Conclusion:** No Impact.

3 **Impact BIO-157: Periodic Effects of Inundation of Riparian Woodrat Habitat as a Result of**
4 **Implementation of Alternative 4A**

5 There would be no periodic inundation effects on riparian woodrat from Alternative 4A.

6 **NEPA Effects:** No effect.

7 **CEQA Conclusion:** No Impact.

8 **Salt Marsh Harvest Mouse**

9 The habitat model used to assess effects for the salt marsh harvest mouse includes six habitat types:
10 primary tidal marsh habitat, secondary tidal marsh habitat (low marsh), secondary upland habitat
11 adjacent to tidal marsh habitat, primary habitat within managed wetlands, secondary habitat within
12 managed wetlands (dominated by plants characteristic of low marsh), and upland habitats within
13 managed wetland boundaries. The tidal and managed wetland habitats were discriminated
14 recognizing that regardless of habitat value, managed wetlands are at high risk of catastrophic
15 flooding and have lower long-term conservation value than tidal wetlands.

16 Alternative 4A would not result in effects on modeled salt marsh harvest mouse habitat as indicated
17 Table 12-4A-56. There is no modeled habitat for the species in the water conveyance facilities
18 footprint and tidal restoration under Alternative 4A would not take place in Suisun Marsh, which is
19 the extent of known salt marsh harvest mouse habitat in the study area.

20 **Table 12-4A-56. Changes in Salt Marsh Harvest Mouse Modeled Habitat Associated with**
21 **Alternative 4A (acres)**

Project Component	Permanent	Temporary
Total Impacts Water Conveyance Facilities	0	0
Total Impacts Environmental Commitments 4, 6-7, 9-11 ^a	0	0
TOTAL IMPACTS	0	0

^a See discussion below for a description of applicable Environmental Commitments.

22

23 **Impact BIO-158: Loss or Conversion of Habitat for and Direct Mortality of Salt Marsh Harvest**
24 **Mouse**

25 No habitat would be lost or converted and there would be no direct mortality of salt marsh harvest
26 mouse under Alternative 4A. As noted above, water conveyance facilities and Environmental
27 Commitment 4 activities would not be implemented within or adjacent to Suisun Marsh, which is the
28 only portion of the study area where the species is known to occur.

29 **NEPA Effects:** No effect.

30 **CEQA Conclusion:** No impact.

1 **Impact BIO-159: Indirect Effects of Alternative 4A on Salt Marsh Harvest Mouse**

2 No indirect effects on salt marsh harvest mouse were identified under Alternative 4A. As noted
3 above, water conveyance facilities and Environmental Commitment 4 activities would not be
4 implemented within or adjacent to Suisun Marsh, which is the only portion of the study area where
5 the species is known to occur.

6 **NEPA Effects:** No effect.

7 **CEQA Conclusion:** No impact.

8 **Suisun Shrew**

9 This section describes the effects of Alternative 4A, including water conveyance facilities
10 construction and implementation of the Environmental Commitments, on the Suisun shrew. Primary
11 Suisun shrew habitat consists of all *Salicornia*-dominated natural seasonal wetlands and certain
12 *Scirpus* and *Typha* communities found within Suisun Marsh only. Low marsh dominated by
13 *Schoenoplectus acutus* and *S. californicus* and upland transitional zones within 150 feet of the tidal
14 wetland edge were classified separately as secondary habitat because they are used seasonally
15 (Hays and Lidicker 2000). All managed wetlands were excluded from the habitat model.

16 Alternative 4A would not result in effects on modeled Suisun shrew habitat as indicated in Table 12-
17 4A-57. There is no modeled habitat for the species in the water conveyance facilities footprint and
18 tidal restoration under Alternative 4A would not take place in Suisun Marsh.

19 **Table 12-4A-57. Changes in Suisun Shrew Modeled Habitat Associated with Alternative 4A (acres)**

Project Component	Permanent	Temporary
Total Impacts Water Conveyance Facilities	0	0
Total Impacts Environmental Commitments 4, 6-7, 9-11 ^a	0	0
TOTAL IMPACTS	0	0

^a See discussion below for a description of applicable Environmental Commitments.

20

21 **Impact BIO-160: Loss or Conversion of Habitat for and Direct Mortality of Suisun Shrew**

22 No habitat would be lost or converted and there would be no direct mortality of Suisun shrew under
23 Alternative 4A. As noted above, water conveyance facilities and Environmental Commitment 4
24 activities would not be implemented within or adjacent to Suisun Marsh, which is the only portion of
25 the study area where the species is known to occur.

26 **NEPA Effects:** No effect.

27 **CEQA Conclusion:** No Impact.

28 **Impact BIO-161: Indirect Effects of Alternative 4A on Suisun Shrew**

29 No indirect effects on Suisun shrew were identified under Alternative 4A. As noted above, water
30 conveyance facilities and Environmental Commitment 4 activities would not be implemented within
31 or adjacent to Suisun Marsh, which is the only portion of the study area where the species is known
32 to occur.

1 **NEPA Effects:** No effect.

2 **CEQA Conclusion:** No impact.

3 **San Joaquin Kit Fox and American Badger**

4 Within the study area, the modeled habitat for the San Joaquin kit fox and potential habitat for the
5 American badger is restricted to 5,327 acres of grassland habitat west of Clifton Court Forebay along
6 the study area's southwestern edge, in CZ 7–CZ 10. The study area represents the extreme
7 northeastern corner of the San Joaquin kit fox's range in California, which extends westward and
8 southward from the study area border. The northern range of the San Joaquin kit fox (including the
9 study area) was most likely marginal habitat historically and has been further degraded due to
10 development pressures, habitat loss, and fragmentation (Clark et al. 2007a). CNDDDB (California
11 Department of Fish and Wildlife 2013) reports twelve occurrences of San Joaquin kit foxes along the
12 extreme western edge of the project area within CZ 8, south of Brentwood (Figure 12-49). However,
13 Clark et al. (2007b) provide evidence that a number of CNDDDB occurrences in the northern portion
14 of the species' range may be coyote pups misidentified as San Joaquin kit foxes. Smith et al. (2006)
15 suggest that the northern range may possibly be a population sink for the San Joaquin kit fox. There
16 are five American badger records in the study area (California Department of Fish and Wildlife
17 2013). Two are from 1938 and no longer extant. The remaining three are all located in CZ 8, west of
18 Clifton Court Forebay.

19 Alternative 4A would result in both temporary and permanent losses of San Joaquin kit and
20 American badger habitat (Table 12-4A-58). Grassland restoration, and protection and management
21 of natural communities could affect modeled San Joaquin San Joaquin kit fox habitat and potential
22 American badger habitat. Alternative 4A would include the following Environmental Commitments
23 and associated Resource Restoration and Performance Principles to benefit the San Joaquin kit fox
24 which would also benefit American badger which uses similar habitat (see BDCP Chapter 3,
25 *Conservation Strategy*). The conservation strategy for the San Joaquin kit fox involves protecting and
26 enhancing habitat in the northern extent of the species' range to increase the likelihood that San
27 Joaquin kit fox may reside and breed in the project area; and providing connectivity to habitat
28 outside the project area.

- 29 ● Protect and improve habitat linkages that allow native terrestrial species to move between
30 protected habitats within and adjacent to the project area (Resource Restoration and
31 Performance Principle L2).
- 32 ● Protect up to 647 acres of grassland in the Byron Hills area where practicable and/or in other
33 appropriate locations (Environmental Commitment 3 and Resource Restoration and
34 Performance Principle G10).
- 35 ● Protect up to 188 acres and restore up to 48 acres of existing vernal pool/alkali seasonal
36 wetlands complexes in the greater Byron Hills including associated grasslands (Environmental
37 Commitments 3 and 9, and Resource Restoration and Performance Principle VP/AW1).
- 38 ● Increase burrow availability for burrow-dependent species in grasslands including grasslands
39 surrounding restored and protected vernal pool and alkali seasonal wetland complexes
40 (Resource Restoration and Performance Principle VP/AW6).
- 41 ● Increase prey abundance and accessibility, especially small mammals and insects, for grassland-
42 foraging species in grasslands and within restored and protected vernal pool and alkali seasonal
43 wetland complex (Resource Restoration and Performance Principle VP/AW7).

1 As explained below, with the restoration and protection of these amounts of habitat, in addition to
 2 the AMMs to reduce potential effects, impacts on San Joaquin kit fox and American badger would not
 3 be adverse for NEPA purposes and would be less than significant for CEQA purposes.

4 **Table 12-4A-58. Changes in San Joaquin Kit Fox Modeled Habitat Associated with Alternative 4A**
 5 **(acres)**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Modeled Habitat	258	68
Total Impacts Water Conveyance Facilities		258	68
Environmental Commitments 4, 6-7, 9-11 ^a	Modeled Habitat	4	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		0	0
TOTAL IMPACTS		262	68

^a See discussion below for a description of applicable Environmental Commitments.

6

7 **Impact BIO-162: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Kit Fox**
 8 **and American Badger**

9 Alternative 4A conveyance facilities construction would result in the permanent and temporary loss
 10 combined of 330 acres of grassland habitat for the San Joaquin kit fox in the study area (Table 12-
 11 4A-58). Because American badger uses grasslands for denning and foraging and may occupy the
 12 same range as the San Joaquin kit fox in the project area, effects are anticipated to be the same as
 13 those described for San Joaquin kit fox. Habitat enhancement and management activities
 14 (Environmental Commitment 11), which include ground disturbance or removal of nonnative
 15 vegetation, could result in local adverse habitat effects. Each of these individual activities is
 16 described below. A summary statement of the combined impacts and NEPA effects and a CEQA
 17 conclusion follow the individual activity discussions.

- 18 • *Water Facilities and Operation:* Construction of the conveyance facilities would result in the
 19 permanent loss of approximately 258 acres and the temporary loss of 68 acres of modeled San
 20 Joaquin kit fox and American badger habitat. This habitat is located in areas of naturalized
 21 grassland in a highly disturbed or modified setting on lands immediately adjacent to Clifton
 22 Court Forebay, in CZ 8. There are 3 San Joaquin kit fox and no American badger occurrences that
 23 overlap with the water conveyance facilities footprint.
- 24 • *Environmental Commitment 11 Natural Communities Enhancement and Management:* Protection
 25 of up to 647 acres of grassland would benefit San Joaquin kit fox and American badger
 26 individuals present in the area. A variety of habitat management actions included in
 27 Environmental Commitment 11 that are designed to enhance wildlife values on protected lands
 28 may result in localized ground disturbances that could temporarily remove small amounts of
 29 San Joaquin kit fox and American badger habitat near Clifton Court Forebay, in CZ 8. Ground-
 30 disturbing activities, such as removal of nonnative vegetation and road and other infrastructure
 31 maintenance activities, are expected to have minor effects on available habitat and are expected
 32 to result in overall improvements to and maintenance of San Joaquin kit fox and badger habitat
 33 values. However, management activities could result in injury or mortality of San Joaquin kit fox
 34 or American badger if individuals were present in work sites or if dens were located in the
 35 vicinity of habitat management work sites. *AMM24 San Joaquin Kit Fox* and Mitigation Measure
 36 *BIO-162: Conduct Preconstruction Survey for American Badger* would be implemented to ensure

1 that San Joaquin kit fox and American badger dens are avoided. AMM24 is described in
2 Appendix 3B, *Environmental Commitments, AMMs, and CMs*.

- 3 ● Operations and maintenance: Ongoing maintenance of project facilities would be expected to
4 have little if any adverse effect on San Joaquin kit fox or American badger. Postconstruction
5 operations and maintenance of the above-ground water conveyance facilities and restoration
6 infrastructure could result in ongoing but periodic disturbances that could affect either species'
7 use of the surrounding habitat near Clifton Court Forebay, in CZ 8. Maintenance activities would
8 include vegetation management, levee and structure repair, and regrading of roads and
9 permanent work areas. These effects, however, would be minimized with implementation of
10 AMM1–AMM6, AMM10, and AMM24 and with preconstruction surveys for the American badger,
11 as required by Mitigation Measure BIO-162, *Conduct Preconstruction Survey for American*
12 *Badger*.
- 13 ● Injury and direct mortality: Construction vehicle activity may cause injury to or mortality of
14 either species. If San Joaquin kit fox or American badger reside where activities take place (most
15 likely in the vicinity of Clifton Court Forebay, in CZ 8), the operation of equipment for land
16 clearing, construction, operations and maintenance, and restoration, enhancement, and
17 management activities could result in injury to or mortality of either species. Measures would be
18 implemented to avoid and minimize injury to or mortality of these species as described in
19 AMM1–AMM6, AMM10, and AMM24 (see Appendix 3B, *Environmental Commitments, AMMs, and*
20 *CMs*) and Mitigation Measure BIO-162.

21 The following paragraphs summarize the combined effects discussed above and describe other
22 Environmental Commitments and associated Resource Restoration and Performance Principles that
23 offset or avoid these effects. NEPA effects and a CEQA conclusion are also included.

24 There are 5,327 acres of modeled San Joaquin kit fox habitat in the study area. Alternative 4A as a
25 whole would result in the permanent loss of and temporary effects on 330 acres of associated
26 grassland habitat for San Joaquin kit fox and potential habitat for American badger, representing 6%
27 of the modeled habitat. These effects would result from construction of the water conveyance
28 facilities (326 acres) and natural communities enhancement and management activities (4 acres).

29 With full implementation of Alternative 4A, up to 647 acres of grassland would be protected in areas
30 where the San Joaquin kit fox and American badger are most likely to occur in the study area. In
31 addition, San Joaquin kit fox and American badger would benefit from the protection of up to 188
32 acres and restoration of up to 48 acres of existing vernal pool/alkali seasonal wetlands complexes in
33 the greater Byron Hills. Because San Joaquin kit fox home ranges are large (varying from
34 approximately 1 to 12 square miles; see Appendix 2.A, *Covered Species Accounts*, of the BDCP),
35 habitat connectivity is key to the conservation of the species. Grasslands would be acquired for
36 protection in locations that provide connectivity to existing protected breeding habitats in CZ 8 and
37 to other adjoining San Joaquin kit fox and American badger habitat within and adjacent to the
38 project area. Connectivity to occupied habitat adjacent to the project area would help ensure the
39 movement of San Joaquin kit foxes and American badger, if present, to larger habitat patches outside
40 of the project area in Contra Costa County. Grassland protection would focus in particular on
41 acquiring the largest remaining contiguous patches of unprotected grassland habitat, which are
42 located south of SR 4 in CZ 8 (see Appendix 2.A, *Covered Species Accounts*, of the BDCP). This area
43 connects to more than 620 acres of existing habitat that was protected under the East Contra Costa
44 County HCP/NCCP.

1 Grasslands in CZ 8 would also be managed and enhanced to increase prey availability and to
2 increase mammal burrows, which could benefit the San Joaquin kit fox and American badger by
3 increasing potential den sites, which are a limiting factor for the San Joaquin kit fox in the northern
4 portion of its range. These management and enhancement actions are expected to benefit the San
5 Joaquin kit fox as well as the American badger by increasing the habitat value of the protected
6 grasslands.

7 CZ 8 supports 74% of the modeled San Joaquin kit fox grassland habitat in the study area, and the
8 remainder of habitat consists of fragmented, isolated patches that are unlikely to support this
9 species. The project's commitment to protect the largest remaining contiguous habitat patches
10 (including grasslands and the grassland component of alkali seasonal wetland and vernal pool
11 complexes) in CZ 8 and to maintain connectivity with the remainder of the satellite population in
12 Contra Costa County would sufficiently offset the impacts resulting from water conveyance facilities
13 construction.

14 Typical NEPA and CEQA project-level mitigation ratio for the natural community that would be
15 affected would be 2:1 for protection of grassland. Using this ratio would indicate that 660 acres of
16 grassland should be protected for San Joaquin kit fox and American badger.

17 Alternative 4A also includes commitments to implement *AMM1 Worker Awareness Training, AMM2*
18 *Construction Best Management Practices and Monitoring, AMM3 Stormwater Pollution Prevention*
19 *Plan, AMM4 Erosion and Sediment Control Plan, AMM5 Spill Prevention, Containment, and*
20 *Countermeasure Plan, AMM6 Disposal and Reuse of Spoils, AMM10 Restoration of Temporarily Affected*
21 *Natural Communities, and AMM24 San Joaquin Kit Fox*. These AMMs contain elements that avoid or
22 minimize the risk of affecting habitats and species adjacent to work areas and storage sites. BDCP
23 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
24 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS. Remaining effects
25 would be addressed by implementation of Mitigation Measure BIO-162, *Conduct Preconstruction*
26 *Survey for American Badger*.

27 **NEPA Effects:** In the absence of the proposed Environmental Commitments, the effects on San
28 Joaquin kit fox and American badger habitat from Alternative 4A would represent an adverse effect
29 as a result of habitat modification and potential direct mortality of special-status species. However,
30 with habitat protection, restoration, management, and enhancement guided by Resource
31 Restoration and Performance Principles L2, VP/AW1, VP/AW6, VP/AW7, and G10 and guided by
32 AMM1–AMM6, AMM10, and AMM24, which would be in place throughout the construction period
33 and operations, and with implementation of Mitigation Measure BIO-162, the effects of Alternative
34 4A as a whole on San Joaquin kit fox and American badger would not be an adverse effect.

35 **CEQA Conclusion:** In the absence of the proposed Environmental Commitments, the effects on San
36 Joaquin kit fox and American badger habitat from Alternative 4A would represent a significant
37 impact as a result of habitat modification and potential direct mortality of a special-status species.
38 However, with habitat protection, restoration, management, and enhancement guided by Resource
39 Restoration and Performance Principles L2, VP/AW1, VP/AW6, VP/AW7, and G10, and guided by
40 AMM1–AMM6, AMM10, and AMM24, which would be in place throughout the time period of
41 construction and operations, and with implementation of Mitigation Measure BIO-162, the impact of
42 Alternative 4A as a whole on San Joaquin kit fox and American badger would be less than significant.

1 **Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger**

2 A qualified biologist provided by DWR will survey for American badger concurrent with the
3 preconstruction survey for San Joaquin kit fox and burrowing owl. If badgers are detected, the
4 biologist will passively relocate badgers out of the work area prior to construction if feasible. If
5 an active den is detected within the work area, DWR will establish a suitable buffer distance and
6 avoid the den until the qualified biologist determines the den is no longer active. Dens that are
7 determined to be inactive by the qualified biologist will be collapsed by hand to prevent
8 occupation of the den between the time of the survey and construction activities. In addition,
9 ground disturbance within project-related conservation areas within 50 feet of active American
10 badger dens would be prohibited. Existing trails would be closed within 250 feet of active
11 natal/pupping dens until young have vacated, and within 50 feet of other active dens. No dogs
12 would be allowed on conservation areas with active American badger populations. Rodent
13 control would be prohibited on areas with American badger populations to ensure rodent prey
14 availability. Mitigation Measure BIO-162 is applicable to all ground-disturbing activities related
15 to construction, restoration, and operations and maintenance.

16 **Impact BIO-163: Indirect Effects of Alternative 4A on San Joaquin Kit Fox and American**
17 **Badger**

18 Noise and visual disturbances outside the project footprint but within 250 feet of construction
19 activities could temporarily affect modeled San Joaquin kit fox habitat and potential American
20 badger. Water conveyance facilities operations and maintenance activities would include vegetation
21 and weed control, rodent control, canal maintenance, infrastructure and road maintenance, levee
22 maintenance, and maintenance and upgrade of electrical systems. Rodent control would be
23 prohibited in areas with San Joaquin kit fox or American badger populations to ensure rodent prey
24 availability. While maintenance activities are not expected to remove San Joaquin kit fox and badger
25 habitat, operation of equipment could disturb small areas of vegetation around maintained
26 structures and could result in injury or mortality of individual foxes and badgers, if present. Given
27 the remote likelihood of active San Joaquin kit fox or badger dens in the vicinity of the conveyance
28 facility, the potential for this effect is small and would further be minimized with the
29 implementation of seasonal no-disturbance buffers around occupied dens, if any, and other
30 measures as described in AMM1-AMM6, AMM10, AMM24, and Mitigation Measure BIO-162.

31 **NEPA Effects:** Implementation of AMM1-AMM6, AMM10, and AMM24, and Mitigation Measure BIO-
32 162 *Conduct Preconstruction Survey for American Badger*, would avoid the potential for substantial
33 adverse effects on San Joaquin kit fox or American badger, either indirectly or through habitat
34 modifications. These measures would also avoid and minimize effects that could substantially
35 reduce the number of San Joaquin kit fox or American badger, or restrict either species' range.
36 Therefore, the indirect effects of Alternative 4A would not have an adverse effect on San Joaquin kit
37 fox or American badger.

38 **CEQA Conclusion:** Indirect effects from Environmental Commitment operations and maintenance as
39 well as construction-related noise and visual disturbances could impact San Joaquin kit fox and
40 American badger. With implementation of AMM1-AMM6, AMM10, and AMM24 as part of
41 Alternative 4A construction, operation, and maintenance, the project would avoid the potential for
42 significant adverse effects on either species, either indirectly or through habitat modifications, and
43 would not result in a substantial reduction in numbers or a restriction in the range of either species.

In addition, Mitigation Measure BIO-162 as described above, would further reduce of the potential for indirect effects of Alternative 4A on American badger to a less-than-significant level.

Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger

Please see Mitigation Measure BIO-162 under Impact BIO-162.

San Joaquin Pocket Mouse

Habitat for San Joaquin pocket mouse consists of the grassland natural community throughout the study area. The species requires friable soils for burrowing. Alternative 4A would result in both temporary and permanent losses of San Joaquin pocket mouse habitat as indicated in Table 12-4A-59. Alternative 4A would also include the following Environmental Commitments and associated Resource Restoration and Performance Principles that would likely benefit San Joaquin pocket mouse.

- Protect up to 1,060 acres of grasslands (Environmental Commitment 3).
- Restore up to 1,070 acres of grasslands (Environmental Commitment 8).
- Sustain a mosaic of grassland vegetation alliances, reflecting localized water availability, soil chemistry, soil texture, topography, and disturbance regimes, with consideration of historical states (Resource Restoration and Performance Principle G3).

As explained below, with protection and management of this amounts of habitat, Alternative 4A’s impacts on San Joaquin pocket mouse would not be adverse for NEPA purposes and would be less than significant for CEQA purposes.

Table 12-4A-59. Changes in San Joaquin Pocket Mouse Habitat Associated with Alternative 4A (acres)

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Grassland	467	158
Total Impacts Water Conveyance Facilities		467	158
Environmental Commitments 4, 6–7, 9–11 ^a	Grassland	61	0
Total Impacts Environmental Commitments 4, 6–7, 9–11^a		61	0
TOTAL IMPACTS		528	158

^a See discussion below for a description of applicable Environmental Commitments.

Impact BIO-164: Loss or Conversion of Habitat for and Direct Mortality of San Joaquin Pocket Mouse

Alternative 4A would result in the combined permanent and temporary loss of up to 686 acres of habitat for San Joaquin pocket mouse, of which 528 acres would be a permanent loss and 158 acres would be a temporary loss of habitat (Table 12-4A-59). Project measures that would result in these losses are water conveyance facilities and transmission line construction, and establishment and use of RTM areas, and *Environmental Commitment 4 Tidal Natural Communities Restoration*. The majority of habitat loss would result from water conveyance facilities. Habitat enhancement and management activities (Environmental Commitment 11), which include ground disturbance or removal of nonnative vegetation, could result in local adverse habitat effects. In addition,

1 maintenance activities associated with the long-term operation of the water conveyance facilities
2 could degrade or eliminate San Joaquin pocket mouse habitat. Each of these individual activities is
3 described below. A summary statement of the combined impacts and NEPA and CEQA conclusions
4 follows the individual activity discussions.

- 5 • *Water Facilities and Operation*: Construction of Alternative 4A conveyance facilities would result
6 in the combined permanent and temporary loss of up to 625 acres of potential San Joaquin
7 pocket mouse habitat (467 acres of permanent loss, 158 acres of temporary loss) in CZ 3–CZ 6
8 and CZ 8. The majority of grassland that would be removed would be in CZ 8, from the
9 modifications to Clifton Court Forebay. Refer to the Terrestrial Biology Mapbook for a detailed
10 view of Alternative 4A construction locations. Construction of the forebay would affect the area
11 where there is a record of San Joaquin pocket mouse (California Department of Fish and Game
12 2012).
- 13 • *Environmental Commitment 4 Tidal Natural Communities Restoration*: Implementation would
14 permanently inundate or remove an estimated 40 acres of potential San Joaquin pocket mouse
15 habitat. The losses would occur in one or more of the ROAs established for tidal restoration (see
16 Figure 12-1).
- 17 • *Environmental Commitment 6 Channel Margin Enhancement*: Channel margin habitat
18 enhancement could result in removal of small amounts of potential San Joaquin pocket mouse
19 habitat along 4.6 miles of river and sloughs. The extent of this loss cannot be quantified at this
20 time, but the majority of the enhancement activity would occur along waterway margins where
21 grassland habitat stringers exist, including along levees and channel banks. The improvements
22 would occur within the study area on sections of the Sacramento, San Joaquin and Mokelumne
23 Rivers, and along Steamboat and Sutter Sloughs.
- 24 • *Environmental Commitment 7 Riparian Natural Community Restoration*: Environmental
25 Commitment 7 would permanently remove an estimated 1 acre of potential San Joaquin pocket
26 mouse habitat.
- 27 • *Environmental Commitment 11 Natural Communities Enhancement and Management*: The
28 protection of up to 1,060 acres of grassland for wildlife species is expected to benefit San
29 Joaquin pocket mouse by protecting existing habitats from potential loss or degradation that
30 otherwise could occur with future changes in existing land use. Habitat management and
31 enhancement-related activities could cause disturbance or direct mortality to San Joaquin
32 pocket mouse if they are present near work areas.
- 33 • A variety of habitat management actions included in *Environmental Commitment 11 Natural*
34 *Communities Enhancement and Management* that are designed to enhance wildlife values in
35 restored or protected habitats could result in localized ground disturbances that could
36 temporarily remove small amounts of San Joaquin pocket mouse habitat. Ground-disturbing
37 activities, such as removal of nonnative vegetation and road and other infrastructure
38 maintenance activities, would be expected to have minor adverse effects on habitat and would
39 be expected to result in overall improvements to and maintenance of habitat values. Noise and
40 visual disturbance from management-related equipment operation could temporarily displace
41 individuals or alter the behavior of the species if adjacent to work areas. Alternative 4A
42 enhancement and management actions designed for western burrowing owl would also be
43 expected to benefit San Joaquin pocket mouse.

- 1 • Operations and Maintenance: Postconstruction operation and maintenance of the above-ground
2 water conveyance facilities and restoration infrastructure could result in ongoing but periodic
3 disturbances that could affect San Joaquin pocket mouse use of the surrounding habitat.
4 Maintenance activities would include vegetation management, levee and structure repair, and
5 re-grading of roads and permanent work areas. These effects, however, would be reduced by
6 AMMs and environmental commitments as described below.
- 7 • Injury and Direct Mortality: Construction could result in direct mortality of San Joaquin pocket
8 mouse if present in construction areas.

9 The following paragraphs summarize the combined effects discussed above and describe other
10 Environmental Commitments that offset or avoid these effects. NEPA and CEQA impact conclusions
11 are also included.

12 The habitat model indicates that the study area supports approximately 78,047 acres of potential
13 habitat for San Joaquin pocket mouse. Alternative 4A as a whole would result in the permanent loss
14 of and temporary effects on 686 acres of grasslands that could be suitable for San Joaquin pocket
15 mouse (1% of the habitat in the study area). These effects would result from the construction of the
16 water conveyance facilities. Alternative 4A includes a commitment to protect up to 1,060 acres of
17 grassland (Environmental Commitment 3) and restore up to 1,070 acres of grassland
18 (Environmental Commitment 8). Alternative 4A's commitment to sustain a mosaic of grassland
19 vegetation alliances, reflecting localized water availability, soil chemistry, soil texture, topography,
20 and disturbance regimes would protect a diversity of habitats that San Joaquin pocket mouse could
21 use. All protected habitat would be managed under *Environmental Commitment 11 Natural*
22 *Communities Enhancement and Management*.

23 Typical NEPA and CEQA project-level mitigation ratios for those natural communities affected by the
24 project would be 2:1 protection of grassland habitat. Using these typical ratios would indicate that
25 1,372 acres of grassland natural communities should be protected to mitigate the loss of 686 acres
26 of grassland.

27 The project also includes commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
28 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
29 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containments and*
30 *Countermeasure Plan*, and *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
31 *Affected Natural Communities*. All of these AMMs include elements that avoid or minimize the risk of
32 affecting habitats and species adjacent to work areas and RTM storage sites. BDCP Appendix 3.C
33 describes the AMMs, which have since been updated and which are provided in Appendix 3B,
34 *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

35 **NEPA Effects:** In the absence of the Environmental Commitments, the effects on San Joaquin pocket
36 mouse habitat and potential mortality of a special-status species resulting from Alternative 4A
37 would represent an adverse effect. However, project proponents have committed to habitat
38 protection and management associated with Environmental Commitment 3 and Environmental
39 Commitment 11. This habitat protection and management would be guided by Resource Restoration
40 and Performance Principle G3, and by AMM1–AMM6 and AMM10, which would be in place during
41 construction. Considering these commitments, losses of San Joaquin pocket mouse and potential
42 mortality under Alternative 4A would not be an adverse effect.

1 **CEQA Conclusion:** Considering Alternative 4A's commitment to the protection and management of
2 grasslands and with the implementation of Resource Restoration and Performance Principle G3 and
3 AMM1-AMM6 and AMM10, the loss of habitat or direct mortality through implementation of
4 Alternative 4A would not result in a substantial adverse effect through habitat modifications and
5 would not substantially reduce the number or restrict the range of San Joaquin pocket mouse.
6 Therefore, the loss of habitat or potential mortality under this alternative would have a less-than-
7 significant impact on San Joaquin pocket mouse under CEQA.

8 **Impact BIO-165: Indirect Effects of Alternative 4A on San Joaquin Pocket Mouse**

9 Construction activities associated with water conveyance facilities, Environmental Commitments,
10 and ongoing habitat enhancement, as well as operations and maintenance of above-ground water
11 conveyance facilities, including the transmission facilities, could result in ongoing periodic
12 postconstruction disturbances and noise with localized effects on San Joaquin kit pocket mouse and
13 its habitat. These potential effects would be minimized and avoided through AMM1-AMM6, and
14 AMM10, which would be in effect throughout the construction phase.

15 Water conveyance facilities operations and maintenance activities would include vegetation and
16 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
17 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance
18 activities are not expected to remove pocket mouse habitat, operation of equipment could disturb
19 small areas of vegetation around maintained structures and could result in injury or mortality of
20 individual pocket mice, if present.

21 **NEPA Effects:** Implementation of the AMMs listed above would avoid the potential for substantial
22 adverse effects on San Joaquin pocket mouse, either indirectly or through habitat modifications.
23 These measures would also avoid and minimize effects that could substantially reduce the number
24 of San Joaquin pocket mouse, or restrict the species' range. Therefore, the indirect effects of
25 Alternative 4A would not have an adverse effect on San Joaquin pocket mouse.

26 **CEQA Conclusion:** Indirect effects from Environmental Commitment operations and maintenance as
27 well as construction-related noise and visual disturbances could impact San Joaquin pocket mouse.
28 With implementation of AMM1-AMM6, and AMM10, as part of Alternative 4A construction,
29 operation, and maintenance, Alternative 4A would avoid the potential for adverse effects on either
30 species, either indirectly or through habitat modifications, and would not result in a substantial
31 reduction in numbers or a restriction in the range of the species. Therefore, the indirect effects
32 under this alternative would have a less-than-significant impact on San Joaquin pocket mouse under
33 CEQA.

34 **Special-Status Bat Species**

35 Special-status bat species with potential to occur in the study area employ varied roost strategies,
36 from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as
37 tunnels, buildings, and bridges. Various roost strategies could include night roosts, maternity roosts,
38 migration stopover, or hibernation. The habitat types used to assess effects for special-status bats
39 roosting habitat includes valley/foothill riparian natural community, developed lands and
40 landscaped trees, including eucalyptus, palms and orchards. Potential foraging habitat includes all
41 riparian habitat types, cultivated lands, developed lands, grasslands, and wetlands.

1 There is potential for at least thirteen different bat species to be present in the study area (Figure
2 12-51), including four California species of special concern and nine species ranked from low to
3 moderate priority by the Western Bat Working Group (see Appendix 12A, *Special-Status Species with*
4 *Potential to Occur in the Study Area*, Table 12A-2). In 2009, DHCCP conducted a large-scale effort
5 that involved habitat assessments, bridge surveys, and passive acoustic monitoring surveys for bats
6 (see Appendix 12C, *2009 to 2011 Bay Delta Conservation Plan EIR/EIS Environmental Data Report*,
7 for details on methods and results, and Table 12A-2 in Appendix 12A). The majority of the parcels
8 assessed during field surveys contained bat foraging and roosting features and were considered
9 highly suitable habitat. At the time of the 2009 field surveys, DWR biologists initially identified 145
10 bridges in their survey area. Eleven of the 145 bridges were not accessible and thirteen were
11 determined to not be suitable for bats. Evidence of bat presence was observed at six of the bridges
12 and bat sign (guano, urine staining, odor, or vocalizations) was observed at 26 of the bridges.
13 Biologists observed Mexican free-tailed bats at four of the bridges and unidentified species at the
14 remaining two bridges. One of these bridges, over the Yolo Causeway, was used by approximately
15 10,000 Mexican free-tailed bats, indicating a maternity roost. A second roost site of about 50
16 individuals was observed under a bridge in eastern Solano County.

17 The remaining 89 bridges contained structural features that were considered conducive to
18 maternity, solitary, day and/or night roosting. Night roosts may have crevices and cracks but more
19 often have box beams or other less protected roosting spots where bats rest temporarily while
20 feeding. Day roosts are commonly found in bridges with expansion joints, crevices, or cracks where
21 bats are protected from predators and weather. Seventeen bridges in the survey area had no
22 potential for roosting because they lacked surface features from which bats could hang and offered
23 no protection from weather or predators.

24 Alternative 4A would result in both temporary and permanent losses of foraging and roosting
25 habitat for special-status bats as indicated in Table 12-4A-60. Protection and restoration for special-
26 status bat species focuses on habitats and does not include manmade structures such as bridges.
27 Alternative 4A would include the following conservation and Resource Restoration and
28 Performance Principles to benefit special-status bats.

- 29 ● Protect up to 13,302 acres and restore up to 2,496 acres of high-value natural communities. This
30 objective involves protecting and restoring a variety of habitat types described below that
31 would also benefit special-status bats (see Table 3-9 in Chapter 3, *Description of Alternatives*).
- 32 ● Protect up to 1,060 acres and restore up to 1,070 acres of grassland (Environmental
33 Commitment 3 and Environmental Commitment 8).
- 34 ● Restore grasslands to connect fragmented patches of protected grassland and to provide upland
35 habitat (Resource Restoration and Performance Principal G1).
- 36 ● Restore and sustain a mosaic of grassland vegetation alliances, reflecting localized water
37 availability, soil chemistry, soil texture, topography, and disturbance regimes, with
38 consideration of historical states (Resource Restoration and Performance Principal G3).
- 39 ● Increase the extent, distribution, and density of native perennial grasses intermingled with
40 other native species, including annual grasses, geophytes, and other forbs (Resource Restoration
41 and Performance Principal G4).
- 42 ● Protect up to 11,870 acres of cultivated lands (Environmental Commitment 3).

- 1 • Maintain and protect the small patches of important wildlife habitats associated with cultivated
2 lands that occur in cultivated lands within the conservation area, including isolated valley oak
3 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
4 water conveyance channels, grasslands, ponds, and wetlands (Resource Restoration and
5 Performance Principal CL1).
- 6 • Target cultivated land conservation to provide connectivity between other conservation lands
7 wetlands (Resource Restoration and Performance Principal CL2).
- 8 • Restore up to 48 acres and protect up to 188 acres of vernal pool/alkali seasonal wetland
9 complex (Environmental Commitment 3 and Environmental Commitment 9).
- 10 • Protect up to 119 acres and restore up to 832 acres of nontidal marsh (Environmental
11 Commitment 3 and Environmental Commitment 10).
- 12 • Protect up to 6 acres of ponds (Resource Restoration and Performance Principle G2).
- 13 • Restore up to 295 acres of tidal natural communities (Environmental Commitment 4).
- 14 • Restore up to 251 acres and protect up to 103 acres of valley/foothill riparian natural
15 community (Environmental Commitment 3 and Environmental Commitment 7).

16 As explained below, with the restoration and protection of these amounts of habitat, in addition to
17 mitigation measures to reduce potential effects, impacts on special-status bats would not be adverse
18 for NEPA purposes and would be less than significant for CEQA purposes.

19 **Table 12-4A-60. Changes in Special-Status Bat Roosting and Foraging Habitat Associated with**
20 **Alternative 4A**

Project Component	Habitat Type	Permanent	Temporary
Water Conveyance Facilities	Roosting	64	200
	Foraging	4,496	3,459
Total Impacts Water Conveyance Facilities		4,560	3,659
Environmental Commitments 4, 6-7, 9-11 ^a	Roosting	5	0
	Foraging	0	0
Total Impacts Environmental Commitments 4, 6-7, 9-11^a		5	0
TOTAL IMPACTS		4,565	3,659

^a See discussion below for a description of applicable Environmental Commitments.

21

22 **Impact BIO-166: Loss or Conversion of Habitat for and Direct Mortality of Special-Status Bats**

23 Alternative 4A would result in the permanent and temporary loss combined of up to 264 acres of
24 roosting habitat and 8,224 acres of foraging habitat for special-status bats from water conveyance
25 facilities construction and from tidal restoration (Environmental Commitment 4). Habitat
26 enhancement and management activities (Environmental Commitment 11) could result in local
27 adverse effects. In addition, maintenance activities associated with the long-term operation of the
28 water conveyance facilities and other project facilities could affect special-status bat roosting
29 habitat. A summary of combined impacts and NEPA effects and a CEQA conclusion follows the
30 individual activity discussions.

- 1 ● *Water Facilities and Operation:* Construction of Alternative 4A conveyance facilities would result
2 in the permanent loss of approximately 64 acres of roosting habitat and 4,496 acres of foraging
3 habitat in the study area. Development of the water conveyance facilities would also result in
4 the temporary removal of up to 200 acres of roosting habitat and up to 3,459 acres of foraging
5 habitat for special-status bats in the study area (Table 12-4A-60). DWR identified two bridges
6 with potential night roosting habitat in the forebay embankment area and tunnel muck area that
7 could be permanently affected by construction for water conveyance facilities. Additional
8 roosting habitat affected by construction and operations includes valley/foothill riparian natural
9 community, developed lands and landscaped trees, including eucalyptus, palms and orchards.
- 10 ● *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal habitat restoration
11 site preparation and inundation would result in the loss of approximately 5 acres of roosting
12 habitat. The roosting habitat that would be removed consists of relatively small and isolated
13 patches along canals and irrigation ditches surrounded by cultivated lands in the Union Island
14 and Roberts Island areas, and several small patches along the San Joaquin River. Mitigation
15 Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective*
16 *Measures*, requires that tidal natural communities restoration avoid effects on roosting special-
17 status bats.
- 18 ● *Environmental Commitment 11 Natural Communities Enhancement and Management:*
19 Implementation of Alternative 4A would result in an overall benefit to special-status bats within
20 the study area through protection and restoration of their foraging and roosting habitats. The
21 majority of affected acres would convert agricultural land to natural communities with higher
22 potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and
23 periodically inundated lands. Restored foraging habitats primarily would replace agricultural
24 lands. Restored habitats are expected to be of higher function because the production of flying
25 insect prey species is expected to be greater in restored wetlands and uplands on which
26 application of pesticides would be reduced relative to affected agricultural habitats. Noise and
27 visual disturbances during implementation of riparian habitat management actions could result
28 in temporary disturbances that, if bat roost sites are present, could cause temporary
29 abandonment of roosts. This effect would be minimized with implementation of Mitigation
30 Measure BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective*
31 *Measures*.
- 32 ● *Operations and maintenance:* Ongoing facilities operation and maintenance is expected to have
33 little if any adverse effect on special-status bats. Postconstruction operation and maintenance of
34 the above-ground water conveyance facilities and restoration infrastructure could result in
35 ongoing but periodic disturbances that could affect special-status bat use of the surrounding
36 habitat in the Cache Slough area, and the north and south Delta (CZ 1, CZ 2, CZ 4, CZ 5, CZ 6, CZ 7,
37 and CZ 8). Maintenance activities would include vegetation management, levee and structure
38 repair, and regrading of roads and permanent work areas. These effects, however, would be
39 minimized with implementation of the mitigation measures described below.
- 40 ● *Injury and direct mortality:* In addition, to habitat loss and conversion, construction activities,
41 such as grading, the movement of construction vehicles or heavy equipment, and the installation
42 of water conveyance facilities components and new transmission lines, may result in the direct
43 mortality, injury, or harassment of roosting special-status bats. Construction activities related to
44 the Environmental Commitments could have similar affects. Preconstruction surveys would be
45 conducted and if roosting or maternity sites are detected, seasonal restrictions would be placed
46 while bats are present, as described below in the mitigation measures.

1 The following paragraphs summarize the combined effects discussed above and describe other
2 Alternative 4A activities that offset or avoid these effects. NEPA effects and CEQA conclusions are
3 also included.

4 Because the majority of affected acres would convert agricultural land to natural communities with
5 higher potential foraging and roosting value, such as riparian, tidal and nontidal wetlands, and
6 periodically inundated lands this analysis focuses only on losses to roosting habitat resulting from
7 water conveyance facilities and Environmental Commitment 4.

8 Alternative 4A would permanently or temporarily affect 269 acres of roosting habitat for special-
9 status bats as a result of implementing water conveyance facilities (264 acres roosting habitat) and
10 Environmental Commitment 4 (5 acres roosting habitat). Only 72 acres of the 269 acres of roosting
11 habitat losses would be in valley/foothill riparian habitat Alternative 4A would restore up to 251
12 acres and protect up to 103 acres of valley/foothill riparian roosting habitat and 15,798 acres of
13 additional foraging habitat in natural communities and developed lands. Restored foraging habitats
14 would replace primarily cultivated lands. Restored habitats are expected to be of higher function
15 because the production of flying insect prey species is expected to be greater in restored wetlands
16 and uplands on which application of pesticides would be reduced relative to affected agricultural
17 habitats.

18 Implementation of Alternative 4A would result in an overall benefit to special-status bats within the
19 study area through protection and restoration of approximately 15,798 acres of their foraging and
20 roosting habitats. The target for total protected and restored acreage is based on the sum of all
21 natural community acreage targets. Achieving this is intended to protect and restore natural
22 communities, species-specific habitat elements, and species diversity on a landscape-scale.
23 Achieving this is also intended to conserve representative natural and seminatural landscapes in
24 order to maintain the ecological integrity of large habitat blocks, including desired ecosystem
25 function, and biological diversity.

26 Should any of the special-status bat species be detected roosting in the study area, construction of
27 water conveyance facilities and restoration activities would have an adverse effect on roosting
28 special-status bats. Noise and visual disturbances and the potential for injury or mortality of
29 individuals associated within implementation of the restoration activities on active roosts would be
30 minimized with implementation of Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for*
31 *Roosting Bats and Implement Protective Measures*. Environmental commitments would sufficiently
32 offset the adverse effects resulting from effects from water conveyance facilities and Environmental
33 Commitment 4.

34 Typical NEPA and CEQA project-level mitigation ratios for those natural communities that would be
35 affected for roosting habitat would be 1:1 for restoration and protection of the valley/foothill
36 riparian natural community. Using these ratios would indicate that 72 acres of riparian habitat
37 should be restored and 72 acres of riparian habitat should be protected.

38 The project also contains commitments to implement *AMM1 Worker Awareness Training*, *AMM2*
39 *Construction Best Management Practices and Monitoring*, *AMM3 Stormwater Pollution Prevention*
40 *Plan*, *AMM4 Erosion and Sediment Control Plan*, *AMM5 Spill Prevention, Containment, and*
41 *Countermeasure Plan*, *AMM6 Disposal and Reuse of Spoils*, and *AMM10 Restoration of Temporarily*
42 *Affected Natural Communities*. These AMMs include elements that avoid or minimize the risk of
43 construction activity affecting habitat and species adjacent to work areas and storage sites. BDCP

1 Appendix 3.C describes the AMMs, which have since been updated and which are provided in
2 Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EISS.

3 **NEPA Effects:** The losses of roosting and foraging habitat for special-status bats associated with
4 implementing Alternative 4A are not expected to result in substantial adverse effects on special-
5 status bats, either directly or through habitat modifications, and would not result in a substantial
6 reduction in numbers or a restriction in the range of special-status bats because the project
7 proponents have committed to protecting the acreage required to meet the typical mitigation ratios
8 described above. The losses of roosting and foraging habitat for special-status bats, in the absence of
9 the Environmental Commitments, would represent an adverse effect as a result of habitat
10 modification and potential direct mortality of a special-status species. However, with habitat
11 protection and restoration associated with the Environmental Commitments and Resource
12 Restoration and Performance Principles, the implementation of AMM1–AMM6, and AMM10, and
13 with implementation of Mitigation Measure BIO-166, the effects of Alternative 4A as a whole on
14 special-status bats would not be adverse.

15 **CEQA Conclusion:** The permanent loss of roosting habitat from Alternative 4A would be mitigated
16 through implementation of Mitigation Measure BIO-166, which would ensure there is no significant
17 impact under CEQA on roosting special-status bats, either directly or through habitat modifications
18 and no substantial reduction in numbers or a restriction in the range of special-status bats. The
19 project also contains commitments to implement habitat protection and restoration associated with
20 the Environmental Commitments and Resource Restoration and Performance Principles, and
21 AMM1–6 and AMM10, which would offset the loss of foraging habitat. These AMMs include elements
22 that avoid or minimize the risk of project activities affecting habitat and species adjacent to work
23 areas and storage sites. BDCP Appendix 3.C describes the AMMs, which have since been updated and
24 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
25 EIR/EIS.

26 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and** 27 **Implement Protective Measures**

28 The following measure was designed to avoid and minimize adverse direct and indirect effects
29 on special-status bats. However, baseline data are not available or are limited on how bats use
30 the study area, and on individual numbers of bats and how they vary seasonally. Therefore, it is
31 difficult to determine if there would be a substantial reduction in species numbers. Bat species
32 with potential to occur in the study area employ varied roost strategies, from solitary roosting in
33 foliage of trees to colonial roosting in trees and artificial structures, such as buildings and
34 bridges. Daily and seasonal variations in habitat use are common. To obtain the highest
35 likelihood of detection, preconstruction bat surveys will be conducted by DWR and will include
36 these components.

- 37 ● Identification of potential roosting habitat within project footprint.
- 38 ● Daytime search for bats and bat sign in and around identified habitat.
- 39 ● Evening emergence surveys at potential day-roost sites, using night-vision goggles and/or
40 active full-spectrum acoustic monitoring where species identification is sought.
- 41 ● Passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from
42 dusk to dawn over multiple nights.

- 1 • Additional on-site night surveys as needed following passive acoustic detection of special
2 status bats to determine nature of bat use of the structure in question (e.g., use of structure
3 as night roost between foraging bouts).
- 4 • Qualified biologists will have knowledge of the natural history of the species that could
5 occur in the study area and experience using full-spectrum acoustic equipment. During
6 surveys, biologists will avoid unnecessary disturbance of occupied roosts.

7 ***Preconstruction Bridges and Other Structure Surveys***

8 Before work begins on the bridge/structure, qualified biologists will conduct a daytime search
9 for bat sign and evening emergence surveys to determine if the bridge/structure is being used
10 as a roost. Biologists conducting daytime surveys would listen for audible bat calls and would
11 use naked eye, binoculars, and a high-powered spotlight to inspect expansion joints, weep holes,
12 and other bridge features that could house bats. Bridge surfaces and the ground around the
13 bridge/structure would be surveyed for bat sign, such as guano, staining, and prey remains.

14 Evening emergence surveys will consist of at least one biologist stationed on each side of the
15 bridge/structure watching for emerging bats from a half hour before sunset to 1–2 hours after
16 sunset for a minimum of two nights within the season that construction would be taking place.
17 Night-vision goggles and/or full-spectrum acoustic detectors shall be used during emergence
18 surveys to assist in species identification. All emergence surveys would be conducted during
19 favorable weather conditions (calm nights with temperatures conducive to bat activity and no
20 precipitation predicted).

21 Additionally, passive monitoring with full-spectrum bat detectors will be used to assist in
22 determining species present. A minimum of four nights of acoustic monitoring surveys will be
23 conducted within the season that the construction would be taking place. If site security allows,
24 detectors should be set to record bat calls for the duration of each night. To the extent possible,
25 all monitoring will be conducted during favorable weather conditions (calm nights with
26 temperatures conducive to bat activity and no precipitation predicted). The biologists will
27 analyze the bat call data using appropriate software and prepare a report with the results of the
28 surveys. If acoustic data suggest that bats may be using the bridge/structure as a night roost,
29 biologists will conduct a night survey from 1–2 hours past sunset up to 6 hours past sunset to
30 determine if the bridge is serving as a colonial night roost.

31 If suitable roost structures would be removed, additional surveys may be required to determine
32 how the structure is used by bats, whether it is as a night roost, maternity roosts, migration
33 stopover, or for hibernation.

34 ***Preconstruction Tree Surveys***

35 If tree removal or trimming is necessary, qualified biologists will examine trees to be removed
36 or trimmed for suitable bat roosting habitat. High-value habitat features (large tree cavities,
37 basal hollows, loose or peeling bark, larger snags, palm trees with intact thatch, etc.) will be
38 identified and the area around these features searched for bats and bat sign (guano, culled insect
39 parts, staining, etc.). Riparian woodland, orchards, and stands of mature broadleaf trees should
40 be considered potential habitat for solitary foliage roosting bat species.

1 If bat sign is detected, biologists will conduct evening visual emergence survey of the source
2 habitat feature, from a half hour before sunset to 1–2 hours after sunset for a minimum of two
3 nights within the season that construction would be taking place. Methodology should follow
4 that described above for the bridge emergence survey.

5 Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector
6 will be used to assist in determining species present. These surveys would be conducted in
7 coordination with the acoustic monitoring conducted for the bridge/structure.

8 ***Protective Measures for Bats using Bridges/Structures and Trees***

9 Avoidance and minimization measures shall be necessary if it is determined that bats are using
10 the bridge/structure or trees as roost sites and/or sensitive bats species are detected during
11 acoustic monitoring. Appropriate measures will be determined by DWR in consultation with
12 CDFW and shall include, as applicable, the measures listed below.

- 13 • Ensure that bats are protected from noise, vibrations, and light that result from construction
14 activities associated with water conveyance facilities, conservation components and ongoing
15 habitat enhancement, as well as operations and maintenance of above-ground water
16 conveyance facilities, including the transmission facilities. This would be accomplished by
17 either directing noise barriers and lights inward from the disturbance or ensuring that the
18 disturbances do not extend more than 300 feet from the point source.
- 19 • Disturbance of the bridge will be avoided between March 1 and October 31 (the maternity
20 period) to avoid impacts on reproductively active females and dependent young.
- 21 • Installation of exclusion devices from March through October 31 to preclude bats from
22 occupying the bridge during construction. Exclusionary devices will only be installed by or
23 under the supervision of an experienced bat biologist.
- 24 • Tree removal will be avoided between April 15 and September 15 (the maternity period for
25 bat species that use trees) to avoid impacts on pregnant females and active maternity roosts
26 (whether colonial or solitary).
- 27 • Tree removal will be conducted between September 15 and October 31 to the maximum
28 extent feasible, which corresponds to a time period when bats would not likely have entered
29 winter hibernation and would not be caring for flightless young. If weather conditions
30 remain conducive to regular bat activity beyond October 31, later tree removal may be
31 considered in consultation with CDFW.
- 32 • Trees will be removed in pieces, rather than felling the entire tree.
- 33 • If a maternity roost is located, whether solitary or colonial, that roost will remain
34 undisturbed with a buffer as determined in consultation with CDFW until September 15 or
35 until a qualified biologist has determined the roost is no longer active.
- 36 • If a non-maternity roost is found, that roost will be avoided to the maximum extent feasible
37 and an appropriate buffer established in consultation with CDFW. Every effort would be
38 made to avoid the roost to the maximum extent feasible, as methods to evict bats from trees
39 are largely untested. However, if the roost cannot be avoided, eviction would be attempted
40 and procedures designed in consultation with CDFW to reduce the likelihood of mortality of
41 evicted bats. In all cases:

- 1 ○ Eviction will not occur before September 15th and will match the timeframe for tree
2 removal approved by CDFW.
 - 3 ○ Qualified biologists will carry out or oversee the eviction tasks and monitor the tree
4 trimming/removal.
 - 5 ○ Eviction will take place late in the day or in the evening to reduce the likelihood of
6 evicted bats falling prey to diurnal predators.
 - 7 ○ Eviction will take place during weather and temperature conditions conducive to bat
8 activity.
 - 9 ○ Special-status bat roosts would not be disturbed.
- 10 Eviction procedures shall include but are not limited to:
- 11 ○ Pre-eviction surveys to obtain data to inform the eviction approach and subsequent
12 mitigation requirements. Relevant data may include the species, sex, reproductive status
13 and/or number of bats using the roost, and roost conditions themselves such as
14 temperature and dimensions. Surveys may include visual emergence, night vision,
15 acoustic, and/or capture.
 - 16 ○ Structural changes may be made to the roost, performed without harming bats, such
17 that the conditions in the roost are undesirable to roosting bats and the bats leave on
18 their own (e.g., open additional portals so that temperature, wind, light and
19 precipitation regime in the roost change).
 - 20 ○ Noninjurious harassment at the roost site to encourage bats to leave on their own, such
21 as ultrasound deterrents or other sensory irritants.
 - 22 ● Prior to removal/trimming, after other eviction efforts have been attempted, any confirmed
23 roost tree would be shaken, repeatedly struck with a heavy implement such as an axe and
24 several minutes should pass before felling trees or trimming limbs to allow bats time to
25 arouse and leave the tree. The biologists should search downed vegetation for dead and
26 injured bats. The presence of dead or injured bats would be reported to CDFW.

27 Compensatory mitigation at a 1:1 ratio for the loss of roosting habitat would be accomplished by
28 the restoration of up to 251 acres and protection of up to 103 acres of valley/foothill riparian
29 habitat. Compensation may include the construction and installation of suitable replacement
30 roosting habitat onsite as described below. Depending on the species and type of roost lost,
31 various roost replacement habitats have met with some success (e.g., bat houses, “bat bark,”
32 planting cottonwood trees, leaving palm thatch in place rather than trimming). The creation of
33 natural habitat onsite is generally preferable to artificial.

34 Artificial roosts are often unsuccessful, and care must be taken to determine as closely as
35 possible the conditions in the natural roost to be replaced. Even with such care, artificial habitat
36 may fail. Several artificial roosts have been highly successful in replacing bridge roost habitat
37 when incorporated into new bridge designs. “Bat bark” has been successfully used by Arizona
38 Department of Game and Fish to create artificial crevice-roosting bat habitat mounted on pine
39 trees (Mering and Chambers 2012: 765). Bat houses have at best an inconsistent track record
40 but information is mounting on how to create successful houses. There is no single protocol or
41 recipe for bat-house success. Careful study of the roost requirements of the species in question;
42 the particular conditions at the lost roost site including temperature, orientation of the

1 openings, airflow, internal dimensions and structures (cavity vs. crevice, etc.) should increase
2 the chances of designing a successful replacement.

3 Restoring riparian woodland with plantings shows signs of success in Colorado. Western red bat
4 activity has been positively correlated with increased vegetation and tree growth, canopy
5 complexity and restoration acreage at cottonwood-willow restoration sites along the Lower
6 Colorado River (Broderick 2012: 39). These complex woodland areas would ultimately provide
7 a wider range of bat species with preferred roost types, including both foliage-roosting and
8 crevice-/cavity-roosting bats.

9 **Impact BIO-167: Indirect Effects of Alternative 4A on Special-Status Bats**

10 Construction activities associated with water conveyance facilities, restoration activities, and
11 ongoing habitat enhancement, as well as operations and maintenance of above-ground water
12 conveyance facilities, including the transmission facilities, could result in ongoing periodic
13 disturbances from light, vibrations, and noise with localized effects on special-status bats and their
14 roosting habitat.

15 Water conveyance facilities operations and maintenance activities would include vegetation and
16 weed control, ground squirrel control, canal maintenance, infrastructure and road maintenance,
17 levee maintenance, and maintenance and upgrade of electrical systems. While maintenance
18 activities are not expected to remove special-status bat habitat, operation of equipment could
19 disturb small areas of vegetation around maintained structures and could result in disturbances to
20 roosting bats, if present. Mitigation Measure BIO-166, *Conduct Preconstruction Surveys for Roosting
21 Bats and Implement Protective Measures*, is available to address these adverse effects.

22 Increased exposure to methylmercury associated with tidal natural communities restoration would
23 potentially indirectly affect special-status bat species. *Environmental Commitment 12 Methylmercury
24 Management* describes the process by which tidal natural communities restoration may increase
25 methyl mercury levels in wetlands in the study area. Mercury has been found in high concentrations
26 in some bat species, such as the Indiana bat. Many bat species forage heavily on aquatic insects,
27 which might result in rapid bioaccumulation (Evers et al. 2012). Measures described in
28 *Environmental Commitment 12 Methylmercury Management* are expected to reduce the effects of
29 methylmercury on special-status bat species resulting from tidal natural communities restoration.

30 **NEPA Effects:** Implementation of the Mitigation Measure BIO-166 for special-status bats would
31 avoid the potential for substantial adverse effects on roosting special-status bats, either indirectly or
32 through habitat modifications. This mitigation measure and *Environmental Commitment 12
33 Methylmercury Management* would also avoid and minimize effects that could substantially reduce
34 the number of special-status bats, or restrict species' range. Therefore, the indirect effects of
35 Alternative 4A would not have an adverse effect on special-status bats.

36 **CEQA Conclusion:** Indirect effects from Environmental Commitments, operations and maintenance
37 as well as construction-related noise and visual disturbances could have a significant impact on
38 special-status bat species, either indirectly or through habitat modifications. Mitigation Measure
39 BIO-166, *Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures*, and
40 *Environmental Commitment 12 Methylmercury Management* would reduce this impact to a less-than-
41 significant level by reducing the likelihood for impacts to occur to roosting bats and would ensure
42 Alternative 4A would not result in a substantial reduction in numbers or a restriction in the range of
43 species.

1 **Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and**
2 **Implement Protective Measures**

3 See Mitigation Measure BIO-166 under Impact BIO-166.

4 **Impact BIO-168: Periodic Effects of Inundation of Special-Status Bat Habitat as a Result of**
5 **Implementation of Alternative 4A**

6 There would be no periodic effects of inundation on special-status bats or their habitat.

7 *NEPA Effects:* No effects.

8 *CEQA Conclusion:* No impacts.

9 **Plant Species**

10 **Vernal Pool Species**

11 Seventeen special-status plant species occur in vernal pools in the study area (Tables 12-2 and 12-3,
12 summarized in Table 12-4A-61). The vernal pool habitat model used for the impact analysis on
13 vernal pool species was developed for the BDCP and was based on vegetation types and associations
14 from various data sets. The model was used to create maps showing the distribution of vernal pool
15 habitat in the study area according to three habitat types in which these species are known to occur,
16 including vernal pool complex, degraded vernal pool complex, and alkali seasonal wetland habitat.
17 Vernal pool complex habitat consists of vernal pools and uplands that display characteristic vernal
18 pool and swale visual signatures that have not been significantly impacted by agricultural or
19 development practices. Degraded vernal pool complex habitat consists of habitat that ranges from
20 areas with vernal pool and swale visual signatures that display clear evidence of significant
21 disturbance due to plowing, discing, or leveling to areas with clearly artificial basins such as shallow
22 agricultural ditches, depressions in fallow fields, and areas of compacted soils in pastures. Because
23 wetlands in the degraded vernal pool complex are inundated during the wet season and may have
24 historically been located in or near areas with natural vernal pool complex, they may support
25 individuals or small populations of species that are found in vernal pools and swales. However, they
26 do not possess the full complement of ecosystem and community characteristics of natural vernal
27 pools, swales and their associated uplands and they are generally ephemeral features that are
28 eliminated during the course of normal agricultural practices. A small amount of alkali seasonal
29 wetland habitat was included in the model because alkaline vernal pools are also present in some
30 areas mapped as alkali seasonal wetland.

31 Because each of the vernal pool species addressed in this EIR/EIS have specific microhabitat
32 affinities, and because vernal pool habitat within the study area is highly heterogeneous with
33 respect to habitat parameters such as soil type and pool depth, the vernal pool habitat model greatly
34 overestimates the extent of habitat in the study area occupied by each species. However, the vernal
35 pool habitat model is likely to encompass all or most of the potential area within which special-
36 status vernal pool plant species would occur. Therefore, it is not likely to underestimate the extent
37 of occupied habitat or to underestimate the effects of Alternative 4A.

1 Full implementation of Alternative 4A and compliance with Resource Restoration and Performance
2 Principle VPS1 would include the following conservation commitment to benefit special-status
3 vernal pool plant species

- 4 • Protect at least two currently unprotected occurrences of alkali milk-vetch in the Altamont Hills
5 or Jepson Prairie core recovery areas (Resource Restoration and Performance Principle VPS1).

6 The construction activities proposed under Alternative 4A could have impacts on special-status
7 vernal pool plant species. Modeled habitat is within the proposed footprint for the Alternative 4A
8 water conveyance facilities. One known occurrence of a special-status plant species is within the
9 proposed footprint for the Alternative 4A water conveyance facilities. Table 12-4A-61 summarizes
10 the acreage of modeled vernal pool habitat in the study area and the number of occurrences of each
11 special-status vernal pool species in the study area.

1 **Table 12-4A-61. Summary of Impacts on Vernal Pool Plant Species under Alternative 4A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Vernal pool complex	9,557	29	-	-	Potential habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Degraded vernal pool complex	2,576	17	-	-	Potential habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Alkali Seasonal Wetland	188	2	-	-	Potential habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Total	12,321	49	-	-	Potential habitat loss from construction of the water conveyance facilities and tidal wetland restoration
Species					
Alkali milk-vetch	-	-	16	1	Population loss from construction of the water conveyance facilities
Dwarf downingia	-	-	12	0	None
Boggs Lake hedge-hyssop	-	-	1	0	None
Legenere	-	-	8	0	None
Heckard's peppergrass	-	-	4 ^a	0	None
Ferris' milk-vetch	-	-	6	0	None
Vernal pool smallscale	-	-	2	0	None
Hogwallow starfish	-	-	0	0	None
Ferris' goldfields	-	-	4	0	None
Contra Costa goldfields	-	-	7	0	None
Cotula-leaf navarretia	-	-	5	0	None
Baker's navarretia	-	-	3	0	None
Colusa grass	-	-	1	0	None
Bearded popcorn-flower	-	-	4	0	None
Delta woolly marbles	-	-	3	0	None
Saline clover	-	-	9	0	None
Solano grass	-	-	1	0	None

^a One additional occurrence is in alkali seasonal wetlands.

2

1 **Impact BIO-169: Effects on Habitat and Populations of Vernal Pool Plants**

2 Under Alternative 4A, construction of the water conveyance facilities would affect habitat for
3 special-status vernal pool species and one occurrence of a special-status vernal pool species.

- 4 • *Water Facilities and Operations*: Twenty-three acres of modeled vernal pool habitat, 19.4 acres
5 of critical habitat for Contra Costa goldfields, and one known occurrence of the 17 vernal pool
6 species are within the proposed footprint for the Alternative 4A water conveyance facilities. One
7 occurrence of alkali milk-vetch in CZ 8 would be crossed by an electric transmission line. Under
8 Alternative 4A, construction and operation of the water conveyance facilities could affect
9 undiscovered occurrences of the seventeen special-status plant species.
- 10 • The east-west transmission line would not affect four special-status vernal pool species that
11 occur in the study area. One occurrence each of dwarf downingia, legenera, Heckard's
12 peppergrass, and Boggs Lake hedge-hyssop are within the east-west transmission line study
13 area. However, the transmission line would not cross any of the occurrences.
- 14 • *Environmental Commitment 3 Natural Communities Protection and Restoration*: Alternative 4A
15 proposes to benefit special-status vernal pool plants by protecting 188 acres of vernal pool
16 complex and alkali seasonal wetland complex. The protected vernal pool habitat would be
17 managed and enhanced to sustain populations of native vernal pool species.
- 18 • *Environmental Commitment 4 Tidal Natural Communities Restoration*: Tidal habitat restoration is
19 estimated to result in the inundation of 26 acres of modeled habitat for vernal pool species and
20 could, therefore, potentially affect special-status vernal pool plants. However, under this
21 Environmental Commitment, no tidal habitat restoration would be implemented in habitat for
22 special-status plant species. No known occurrences of special-status vernal pool species would
23 be affected by tidal restoration.
- 24 • *Environmental Commitment 6 Channel Margin Enhancement*: No vernal pool habitat or
25 occurrences of special-status vernal pool plant species are present within the general areas
26 proposed for channel margin habitat enhancement. Therefore, channel margin habitat
27 enhancement would have no impacts on special-status vernal pool species.
- 28 • *Environmental Commitment 7 Riparian Natural Community Restoration*: No vernal pool habitat
29 or occurrences of special-status vernal pool plant species are present within the general areas
30 proposed for riparian habitat enhancement. Therefore, riparian habitat enhancement would
31 have no impacts on special-status vernal pool species.
- 32 • *Environmental Commitment 9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: If,
33 through unforeseen circumstances, construction of the water conveyance facilities results in the
34 net loss of vernal pool habitat, environmental commitments would be implemented to
35 compensate for that loss. Because vernal pool complex restoration would focus on habitat that
36 had been cleared and leveled but maintained an intact duripan or claypan, the likelihood of
37 affecting any special-status vernal pool plant species would be low. However, vernal pool
38 restoration could adversely affect remnant populations of special-status vernal pool species or
39 affect vernal pool habitat adjacent to the restoration areas.
- 40 • *Environmental Commitment 10 Nontidal Marsh Restoration*: Nontidal marsh restoration would
41 take place through conversion of cultivated lands. Therefore, nontidal marsh restoration would
42 avoid vernal pool habitat and would have no impacts on special-status vernal pool plant species.

1 • *Avoidance and Minimization Measures*: Effects on special-status vernal pool plant species
2 potentially resulting from implementation of Alternative 4A would be avoided or minimized
3 though *AMM11 Covered Plant Species, AMM2 Construction Best Management Practices and*
4 *Monitoring, AMM12 Vernal Pool Crustaceans, and AMM30 Transmission Line Design and*
5 *Alignment Guidelines*. AMM11 prohibits ground disturbance or hydrologic disturbance within
6 250 feet of existing vernal pools. In addition, AMM11 specifies that individual projects be
7 designed to avoid critical habitat for listed plant and wildlife vernal pool species. AMM12 limits
8 the direct removal of vernal pool crustacean habitat to no more than 10 wetted acres and the
9 indirect effect to no more than 20 wetted acres. AMM12 also requires that that tidal natural
10 communities restoration or other ground-disturbing project activities in Conservation Zones 1
11 and 11 not result in the adverse modification of primary constituent elements of critical habitat
12 for vernal pool fairy shrimp, conservancy fairy shrimp, and vernal pool tadpole shrimp. These
13 protections would also apply to critical habitat for Contra Costa goldfields, where it overlaps
14 with critical habitat for these vernal pool crustaceans. AMM30 specifies that the alignment of
15 proposed transmission lines will be designed to avoid sensitive terrestrial and aquatic habitats
16 when siting poles and towers, to the maximum extent feasible. BDCP Appendix 3.C describes the
17 AMMs, which have since been updated and which are provided in Appendix 3B, *Environmental*
18 *Commitments, AMMs, and CMs*, of the Final EIR/EIS.

19 In addition, Environmental Commitment 3 includes Resource Restoration and Performance
20 Principle VPS1 to protect two occurrences of alkali milk-vetch.

21 In summary, no adverse effects on special-status vernal pool plants would be expected from
22 implementing Alternative 4A. Construction of the water conveyance facilities could affect one
23 species, alkali milk-vetch, although adverse effects on this species would be avoided or minimized
24 though implementation of AMM11 and AMM30. No other known occurrences of special-status
25 vernal pool species would be affected under Alternative 4A. Beneficial effects on special-status
26 vernal pool plants could occur by protecting 188 acres of vernal pool complex and by protecting
27 occurrences of alkali milk-vetch.

28 The GIS analysis estimated that up to 49 acres of vernal pool habitat could be adversely affected by
29 proposed activities. Under *Environmental Commitment 9 Vernal Pool and Alkali Seasonal Wetland*
30 *Complex Restoration*, up to 49 acres of vernal habitat would be restored to compensate for the loss.
31 However, the actual effect on habitat for special-status vernal pool plant species is expected to be
32 much less than the estimated impact because Alternative 4A limits the total loss of wetted vernal
33 pool habitat resulting from specific projects to 10 acres (approximately 67 acres of vernal pool
34 complex) (AMM12). At the proposed restoration ratios of 1:1 (prior to impact) and 1.5:1
35 (concurrent with impact), between 49 and 73.5 acres of vernal pool complex restoration would be
36 required to compensate for the loss of modeled habitat for special-status vernal pool plants. This
37 would be consistent with typical NEPA and CEQA project-level mitigation ratios for vernal pool
38 impacts.

39 **NEPA Effects**: The loss of modeled habitat for vernal pool plant species would be minimized by
40 AMM12 and offset through the environmental commitments, and effects of constructing the water
41 conveyance facilities on one occurrence of alkali milk-vetch would be avoided through AMM30.
42 Therefore, Alternative 4A would not result in adverse effects on federally listed vernal pool plant
43 species.

1 **CEQA Conclusion:** Because loss of modeled habitat for vernal pool plant species would be offset
2 through restoration, and because impacts on occurrences of special-status vernal pool plant species
3 would be avoided, implementation of Alternative 4A would not result in a reduction in the range or
4 numbers of 17 special-status vernal pool plant species in the study area. Therefore, impacts on
5 special-status vernal pool plant species would be less than significant. No mitigation is required.

6 **Alkali Seasonal Wetland Species**

7 Eight special-status plant species occur in alkali seasonal wetlands in the study area (Tables 12-2,
8 12-3, summarized in Table 12-4A-62). Alkali seasonal wetland habitat was modeled separately for
9 four plant species occurring in seasonal alkali wetlands. Because this analysis relies on the data
10 developed for the BDCP, models were only available for species covered under the BDCP. Habitat
11 models were not developed for the four alkali seasonal wetland species not proposed for coverage
12 under the BDCP.

13 The San Joaquin spearscale habitat model approximated the distribution of suitable San Joaquin
14 spearscale habitat in the study area according to the species' preferred habitat types, intersected
15 with soil series and slope position. Historical and current records of San Joaquin spearscale in the
16 study area indicate that its current distribution is limited to alkaline soil areas with shallow basin or
17 swale microtopography along the western border of the study area. The vegetation cover of the
18 alkaline soils is typically a combination of alkaline soil-adapted species and annual grasses,
19 including annual ryegrass and Mediterranean barley. Habitat types used for the model included
20 alkali seasonal wetlands, vernal pool complex, and grasslands. Soil series used in the model
21 consisted of either clays or clay loams with alkaline horizons. San Joaquin spearscale typically
22 occurs in swales or in level terrain but occasionally occurs on the lower slopes adjacent to streams
23 or swales or where seeps are present. Because some of the soil series with which San Joaquin
24 spearscale is associated can occur on hillsides, slope was used to limit the extent of the model to the
25 toe of the slope where these soils occur by excluding areas with slope greater than 1%. Land uses
26 that are incompatible with the species' habitat requirements, such as modeled habitat polygons
27 falling on leveled or developed lands, were removed from the model.

28 Modeled habitat for brittlescale was mapped as hydrologic features such as stream corridors and
29 playa pools located on alluvium associated with the Montezuma Block along the western boundary
30 of the study area or on alluvium associated with tertiary formations located along the southwest
31 boundary of the study area. Stream corridors (intermittent and perennial) that intersected these
32 geologic units were selected and truncated at the point at which they encountered the upper
33 elevation of intertidal marsh. The corridors were buffered 50 feet (15.2 meters) on either side of
34 their centerlines to capture the estimated maximum extent of alluvium deposits in proximity to the
35 streams. Mapped habitat that was occupied by urban or intensive agricultural uses was removed
36 from the model.

37 The habitat model for heartscale was based on the species distribution in the study area (Solano and
38 Yolo Counties) and on the soil types and plant communities within which it occurs. Potential habitat
39 was determined by intersecting the GIS coverage for three parameters: 1) Yolo and Solano County
40 boundaries; 2) Solano, Pescadero, and Willows soils; and 3) grassland, alkali seasonal wetland, and
41 vernal pool complex natural communities. The model excluded areas that have been developed or
42 cultivated, i.e., where the topography, soils, and hydrology have been substantially altered.

1 Delta button-celery habitat was modeled as alkali seasonal wetland complex, vernal pool complex,
2 other natural seasonal wetland, and grassland occurring on Brentwood, Grangerville, Marcuse,
3 Solano, and Vernalis soil map units within the San Joaquin Basin (i.e., south of the mainstem San
4 Joaquin River). For this species, land cover north of the Discovery Bay area where intensive
5 agriculture was classified as annual grassland were manually deleted from the area of predicted
6 habitat. Additionally, other areas of potential habitat that have been developed were also manually
7 deleted.

8 Full implementation of Alternative 4A and compliance with Resource Restoration and Performance
9 Principle ASWS1 would include Environmental Commitments to benefit special-status alkali
10 seasonal wetland species.

- 11 • Protect two currently unprotected occurrences of San Joaquin spearscale in Conservation Zones
12 1, 8, or 11 (Resource Restoration and Performance Principle ASWS1).

13 Modeled habitat for Delta button-celery would be adversely affected by construction of the
14 Alternative 4A water conveyance facilities. One population of crownscale also would be adversely
15 affected by construction of the water conveyance facilities. No adverse effects on palmate-bracted
16 bird's-beak or recurved larkspur would be expected. Table 12-4A-62 summarizes the acreage of
17 modeled alkali seasonal wetland habitat in the study area and the number of occurrences of each
18 special-status alkali seasonal wetland plant species in the study area.

1 **Table 12-4A-62. Summary of Impacts on Seasonal Alkali Wetland Plant Species under Alternative 4A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
San Joaquin spearscale modeled habitat	14,933	96	-	-	Potential habitat loss from construction of water conveyance facilities and tidal wetlands restoration
Brittlescale modeled habitat	451	1	-	-	Potential habitat loss from tidal wetlands restoration
Heartscale modeled habitat	6,528	14	-	-	Potential habitat loss from tidal wetlands restoration
Delta button-celery modeled habitat	3,361 ^a	97	-	-	Habitat loss from construction of water conveyance facilities
Alkali seasonal wetlands	3,723	2	-	-	Potential habitat loss from construction of water conveyance facilities and tidal wetlands restoration
Species					
San Joaquin spearscale	-	-	19	1	Population loss from construction of water conveyance facilities
Brittlescale	-	-	8	0	None
Heartscale	-	-	3	0	None
Delta button-celery	-	-	1 ^b	0	None
Heckard's peppergrass	-	-	1 ^c	0	
Crownscale	-	-	17	1	Population loss from construction of water conveyance facilities
Palmate-bracted bird's-beak	-	-	1	0	None
Recurved larkspur	-	-	4	0	None
^a A portion of this acreage consists of riparian habitat. ^b A second occurrence in study area is in riparian habitat. ^c Four additional occurrences of Heckard's peppergrass are associated with vernal pools.					

2

3 **Impact BIO-170: Effects on Habitat and Populations of Alkali Seasonal Wetland Plants**

4 Alternative 4A would have potential adverse effects on modeled habitat for San Joaquin spearscale,
 5 brittlescale, heartscale, and Delta button-celery. It would also have adverse effects on occurrences of
 6 San Joaquin spearscale and crownscale. Under Alternative 4A, construction of the Clifton Court
 7 Forebay would permanently remove 75 acres of modeled habitat for San Joaquin spearscale and 97
 8 acres of modeled habitat for Delta button-celery. This could be an adverse effect, depending on
 9 whether or not the affected modeled habitat is actually occupied by the species. Modeled habitat is
 10 assumed to encompass all potential habitat for a species and may therefore overestimate the area

1 actually occupied. One known occurrence of San Joaquin spearscale near the forebay would be
2 affected by facilities construction. Delta button-celery is not known to occur in CZ 8; the nearest
3 known occurrence, in CZ 9, would not be affected. Construction of the water conveyance facilities
4 would permanently remove about 1.5 acre of habitat occupied by crownscale at the Clifton Court
5 Forebay. All or most of the occurrence would be directly affected. Construction of the water
6 conveyance facilities would not affect brittlescale, heartscale, Heckard's peppergrass, palmate-
7 bracted bird's-beak, or recurved larkspur.

- 8 • *Environmental Commitment 3 Natural Communities Protection and Restoration:* Alternative 4A
9 would benefit alkali seasonal wetland plants by including alkali seasonal wetland in the 188
10 acres of vernal pool complex habitat that would be protected and 48 that would be restored. The
11 protected alkali seasonal wetland habitat would be managed and enhanced to sustain
12 populations of native plant species.
- 13 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal habitat restoration is
14 estimated to result in the inundation of modeled habitat for brittlescale (1 acre), heartscale (14
15 acres), and San Joaquin spearscale (21 acres), potentially affect special-status vernal pool plants.
16 However, under this Environmental Commitment, no tidal habitat restoration would be
17 implemented in habitat for special-status plant species. Therefore, tidal habitat restoration
18 would not affect special-status alkali seasonal wetland species.
- 19 • *Environmental Commitment 6 Channel Margin Enhancement:* No alkali seasonal wetland habitat
20 or occurrences of special-status alkali seasonal wetland plant species are present within the
21 general areas proposed for channel margin habitat enhancement. Therefore, channel margin
22 habitat enhancement would have no impacts on special-status alkali seasonal wetland species.
- 23 • *Environmental Commitment 7 Riparian Natural Community Restoration:* No alkali seasonal
24 wetland habitat or occurrences of special-status alkali seasonal wetland plant species are
25 present within the general areas proposed for riparian habitat enhancement. Therefore, riparian
26 habitat enhancement would have no impacts on special-status alkali seasonal wetland species.
- 27 • *Environmental Commitment 9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration:*
28 Although some vernal pools are alkaline, alkali seasonal wetlands in the study area consist of
29 alkali grassland, alkali meadow, or iodine bush scrub. Therefore, vernal pool restoration would
30 avoid alkali seasonal wetland habitat and would have no impacts on special-status alkali
31 seasonal wetland plants. In addition, the Environmental Commitments would compensate for
32 the loss of alkali seasonal wetlands resulting from other Environmental Commitments by
33 restoring vernal pool complex that includes alkali seasonal wetlands to achieve no net loss of
34 this habitat.
- 35 • *Environmental Commitment 10 Nontidal Marsh Restoration:* Nontidal marsh restoration would
36 take place through conversion of cultivated lands. Therefore, nontidal marsh restoration would
37 avoid alkali seasonal wetland habitat and would have no impacts on special-status alkali
38 seasonal wetland plant species.

39 *Avoidance and Minimization Measures:* Effects on special-status alkali seasonal wetland plants
40 potentially resulting from implementation of the water conveyance facilities would be avoided or
41 minimized through *AMM2 Construction Best Management Practices and Monitoring*, *AMM11 Covered*
42 *Plant Species*, and *AMM30 Transmission Line Design and Alignment Guidelines*. Under AMM11,
43 surveys for special-status plant species would be performed during the planning phase of projects,
44 and any impacts on populations of special-status species would be avoided through project design

1 or subsequently minimized though AMM2. In addition, AMM11 prohibits ground disturbance or
2 hydrologic disturbance within 250 feet of existing vernal pools, which would protect those species
3 with modeled habitat that includes vernal pool complex. Occurrences of special-status species in
4 vernal pools near tidal wetlands would not be affected by tidal habitat restoration where critical
5 habitat for vernal pool species is present and would be avoided under AMM11. AMM30 requires that
6 transmission line construction avoid any losses of alkali seasonal wetland complex natural
7 community. BDCP Appendix 3.C describes the AMMs, which have since been updated and which are
8 provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final EIR/EIS.

9 In summary, only one known occurrence of a special-status alkali seasonal wetland species
10 (crownscale) would be affected under Alternative 4A. AMM11 would be implemented to avoid an
11 adverse effect on the San Joaquin spearscale occurrence.

12 The primary effect of Alternative 4A on special-status alkali seasonal wetland plant species would be
13 the loss of potential (i.e., modeled) habitat for San Joaquin spearscale and Delta button-celery.
14 Approximately 1 acre of this habitat loss would be alkali seasonal wetlands. The actual effect on
15 modeled habitat for alkali seasonal wetland species is expected to be somewhat less than the
16 estimated impact because some of this habitat is composed of vernal pool complex, and the total loss
17 of wetted vernal pool habitat is limited to 10 acres (approximately 67 acres of vernal pool complex)
18 (AMM12). Loss of modeled habitat would be compensated for by restoring or creating vernal pool
19 complex, alkali seasonal wetlands, and grasslands, in proportion to the amount of each habitat
20 removed. At the proposed restoration ratios of 1:1 (prior to impact) and 1.5:1 (concurrent with
21 impact), between 67 and 100.5 acres of vernal pool complex restoration would be required to
22 compensate for the loss of modeled habitat composed of vernal pool complex. Loss of modeled
23 habitat composed of grasslands would be compensated for by restoring grassland habitat on a 1:1
24 basis. These compensation levels would be consistent with typical NEPA and CEQA project-level
25 mitigation ratios for impacts on vernal pools, alkali seasonal wetlands, and grasslands.

26 Alternative 4A would have a small beneficial effect on special-status alkali seasonal wetland plants
27 by protecting a small amount of alkali seasonal wetland habitat. The environmental commitments
28 also include protecting 2 occurrences of San Joaquin spearscale.

29 **NEPA Effects:** Under Alternative 4A, loss of modeled habitat for alkali seasonal wetland plant
30 species would be offset through restoration of grassland, vernal pool, and alkali seasonal wetland
31 habitat (Environmental Commitment 8, Environmental Commitment 9), and impacts on one
32 occurrence of San Joaquin spearscale would be avoided through AMM11. With avoidance and
33 habitat restoration, these effects would not be adverse. The loss of one occurrence of crownscale, a
34 non-listed species, would result in a reduction in the range and numbers of this species and would
35 be an adverse effect. Adverse effects on crownscale could be avoided or offset through
36 implementation of Mitigation Measure BIO-170.

37 **CEQA Conclusion:** Because loss of modeled habitat for alkali seasonal wetland plant species would
38 be offset through restoration, and because impacts on occurrences of special-status alkali seasonal
39 wetland species would be avoided, impacts on alkali seasonal wetlands as a result of implementing
40 Alternative 4A would not result in substantially reducing the number or restricting the range of
41 seven special-status alkali seasonal wetland plant species. However, Environmental Commitments
42 that benefit or protect listed species do not apply to nonlisted species, and loss of the crownscale
43 population at Clifton Court Forebay would be a significant impact. Implementation of Mitigation
44 Measure BIO-170 would reduce this impact to a less-than-significant level.

1 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Special-**
2 **Status Plant Species**

3 DWR will evaluate all projects for their impacts on special-status plant species, avoid or
4 minimize impacts on species that occur on project sites, and compensate for impacts on species.
5 All impacts on diamond-petaled California poppy and caper-fruited tropidocarpum shall be
6 avoided. Impacts on other special-status plant species shall be avoided to the extent feasible,
7 and any unavoidable impacts shall be compensated for.

- 8 ● DWR shall conduct surveys for special-status plant species within and adjacent to all project
9 sites. Special-status plant surveys required for project-specific permit compliance will be
10 conducted during the planning phase to allow design of the individual restoration projects
11 to avoid adverse modification of habitat for specified plant species if feasible. The purpose of
12 these surveys will be to verify that the locations of special-status species identified in
13 previous record searches or surveys are extant, identify any new special-status plant species
14 occurrences, and cover any portions of the project area not previously surveyed. The extent
15 of mitigation of direct loss of or indirect effects on special-status plant species will be based
16 on these survey results.
- 17 ● All surveys shall be conducted by qualified biologists using the using *Guidelines for*
18 *Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate*
19 *Plants* (U.S. Fish and Wildlife Service 1996) and *Protocols for Surveying and Evaluating*
20 *Impacts to Special Status Native Plant Populations and Natural Communities* (California
21 Department of Fish and Game 2009) during the season that special-status plant species
22 would be evident and identifiable, i.e., during their blooming season. Locations of special-
23 status plant species in proposed construction areas will be recorded using a GPS unit and
24 flagged.
- 25 ● The construction monitoring plan for the protection of special-status fish, wildlife, and plant
26 species, prepared by DWR before implementing an approved project, will provide for
27 construction activity monitoring in areas identified during the planning stages and
28 species/habitat surveys as having special-status plant species.
- 29 ● Where surveys determine that a special-status plant species is present in or adjacent to a
30 project site, direct and indirect impacts of the project on the species shall be avoided if
31 feasible through the establishment of 250-foot activity exclusion zones surrounding the
32 periphery of the occurrences, within which no ground-disturbing activities shall take place,
33 including construction of new facilities, construction staging, or other temporary work
34 areas. Activity exclusion zones for special-status plant species shall be according to a 250-
35 foot buffer surrounding the periphery of each special-status plant species occurrence, the
36 boundaries of which shall be clearly marked with standard orange plastic construction
37 exclusion fencing or its equivalent. The establishment of activity exclusion zones shall not be
38 required if no construction-related disturbances will occur within 250 feet of the occurrence
39 periphery. The size of activity exclusion zones may be reduced through consultation with a
40 qualified biologist and with concurrence from USFWS or CDFW based on project site-
41 specific conditions.
- 42 ● Where avoidance of impacts on a special-status plant species is infeasible, DWR will
43 compensate for loss of individuals or occupied habitat of a special-status plant species
44 through the acquisition, protection, and subsequent management in perpetuity of other
45 existing occurrences at a 2:1 ratio (preservation: impact). DWR will provide detailed

1 information to USFWS and CDFW on the location of the preserved occurrences, quality of
2 the preserved habitat, feasibility of protecting and managing the areas in-perpetuity,
3 responsible parties, and other pertinent information. If suitable occurrences of a special-
4 status plant species are not available for preservation, then the project shall be redesigned
5 to remove features that would result in impacts on that species.

6 **Grassland Species**

7 Twelve special-status plant species occur in grasslands in the study area (Tables 12-2, 12-3,
8 summarized in Table 12-4A-63). The only modeled plant species occurring in grassland is Carquinez
9 goldenbush. Because this analysis relies on the data developed for the BDCP, models were only
10 available for species covered under the BDCP. Habitat models were not developed for the six
11 grassland species not proposed for coverage under the BDCP.

12 Carquinez goldenbush modeled habitat included hydrological features such as stream corridors on
13 alluvium derived from the Montezuma Formation. Stream corridors (intermittent and perennial)
14 that intersected these geologic units were selected and truncated at the point at which they
15 encountered the upper elevation of intertidal marsh. The corridors were buffered 50 feet (15
16 meters) on either side in an effort to capture the estimated maximum extent of alluvium deposits in
17 close proximity to the actual rivers/streams.

18 Of 78,047 acres of grasslands in the study area, Alternative 4A would adversely affect 678 acres
19 under Alternative 4A. No known occurrences of special-status grassland plant species would be
20 affected. Table 12-4A-63 summarizes the acreage of grassland habitat in the study area and the
21 number of occurrences of each special-status grassland species in the study area.

1 **Table 12-4A-63. Summary of Impacts on Grassland Plant Species under Alternative 4A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Carquinez goldenbush modeled habitat	1,346	1	-	-	Potential habitat loss from tidal wetland restoration
Grassland	78,047	678	-	-	Habitat loss from construction of water conveyance facilities and tidal wetland restoration
Species					
Carquinez goldenbush	-	-	10	0	None
Big tarplant	-	-	5	0	None
Round-leaved filaree	-	-	2	0	None
Pappose tarplant	-	-	7	0	None
Parry's rough tarplant	-	-	5	0	None
Small-flowered morning-glory	-	-	0	0	None
Diamond-petaled poppy	-	-	1	0	None
Stinkbells	-	-	1	0	None
Fragrant fritillary	-	-	4	0	None
Gairdner's yampah	-	-	0	0	None
Streamside daisy ^a	-	-	1	0	None
Caper-fruited tropidocarpum	-	-	8	0	None
^a This species actually occurs in upland woodland, a habitat that has not been mapped or quantified for analysis of Alternative 4A.					

2

3 **Impact BIO-171: Effects on Habitat and Populations of Grassland Plants**

4 Alternative 4A would have no expected effects on known occurrences of special-status plant species
5 that occur in grasslands. However, the loss of 678 acres of grassland would have the potential to
6 affect undocumented populations of special-status grassland species.

7 No modeled habitat for Carquinez goldenbush and no known occurrences of the 12 special-status
8 grassland plant species are within the proposed footprint for the Alternative 4A water conveyance
9 facilities. About 647 acres of grassland habitat would be affected by construction of the water
10 conveyance facilities. However, this grassland habitat consists of small patches of herbaceous
11 ruderal vegetation along levees that do not provide habitat for special-status grassland species.
12 Therefore, under Alternative 4A, construction and operation of the water conveyance facilities
13 would not affect the 12 special-status grassland species.

14 • *Environmental Commitment 3 Natural Communities Protection and Restoration:* Alternative 4A
15 would preserve 1,060 acres of grassland habitat. Protection of grassland habitat may also
16 protect undiscovered occurrences of special-status plant species.

17 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal habitat restoration is
18 estimated to result in the loss of 26 acres of grassland habitat, including 1 acre of modeled

1 habitat for Carquinez goldenbush. However, under this environmental commitment, no tidal
2 habitat restoration would be implemented in habitat for special-status plant species. No other
3 occurrences of special-status grassland plants are within portions of the study area potentially
4 suitable for tidal restoration. Therefore, tidal restoration would have no impacts on known
5 occurrences of special-status grassland plants.

- 6 • *Environmental Commitment 6 Channel Margin Enhancement*: No known occurrences of special-
7 status grassland plants are present within the general areas proposed for channel margin
8 habitat enhancement. Areas mapped as grassland along levees that would be affected by channel
9 margin habitat enhancement are small patches of ruderal vegetation along levees that do not
10 provide habitat for special-status grassland species and are not modeled habitat for Carquinez
11 goldenbush. Therefore, channel margin habitat enhancement would have no impacts on special-
12 status grassland plants.
- 13 • *Environmental Commitment 7 Riparian Natural Community Restoration*: No modeled habitat for
14 Carquinez goldenbush or known occurrences of special-status grassland plants are present
15 within the general areas (along levees and in cultivated lands) proposed for riparian habitat
16 enhancement. Therefore, riparian habitat enhancement would have no impacts on special-status
17 grassland plant species.
- 18 • *Environmental Commitment 9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*:
19 Vernal pool complex includes vernal pools as well as the surrounding grassland matrix. Because
20 the habitat to be restored would consist of areas of former vernal pool complex that have been
21 leveled for cultivation, special-status grassland plant species would not be present. Therefore,
22 vernal pool complex restoration would not affect special-status grassland plant species.
- 23 • *Environmental Commitment 10 Nontidal Marsh Restoration*: Nontidal marsh restoration would
24 take place through conversion of cultivated lands. Therefore, nontidal marsh restoration would
25 avoid grassland habitat and would have no impacts on special-status grassland plant species.
- 26 • *Avoidance and Minimization Measures*: Potential effects on undiscovered populations of special-
27 status grassland plants would be avoided or minimized through *AMM11 Covered Plant Species*,
28 and *AMM2 Construction Best Management Practices and Monitoring*. Under AMM11, surveys for
29 special-status plant species would be performed during the planning phase of projects, and any
30 impacts on populations of special-status species would be avoided through project design or
31 subsequently minimized through AMM2. BDCP Appendix 3.C describes the AMMs, which have
32 since been updated and which are provided in Appendix 3B, *Environmental Commitments*,
33 *AMMs, and CMs*, of the Final EIR/EIS.

34 **NEPA Effects:** Implementation of Alternative 4A would result in no adverse effects on federally
35 listed grassland plant species.

36 **CEQA Conclusion:** Alternative 4A would have no impacts on special-status grassland species. No
37 mitigation is required.

38 **Valley/Foothill Riparian Species**

39 Four special-status plant species occur in valley/foothill riparian habitat in the study area (Tables
40 12-2, 12-3, summarized in Table 12-4A-64). Habitat modeling was done for two species, Delta
41 button celery and slough thistle. Because this analysis relies on the data developed for the BDCP,
42 models were only available for species covered under the BDCP. Habitat models were not developed
43 for the two valley/foothill species not proposed for coverage under the BDCP.

1 The valley/foothill riparian habitat model for Delta button-celery and slough thistle was mapped as
 2 all of the study area along the flood plain of the San Joaquin River between the levees from the
 3 Mossdale Bridge to Vernalis. Whether or not this modeled habitat is actually occupied by Delta
 4 button-celery and slough thistle is unknown; all known occurrences of these species within the area
 5 of modeled habitat are believed to be extirpated.

6 Of 17,966 acres of valley/foothill riparian habitat in the study area, Alternative 4A would affect 73
 7 acres, none of which is modeled habitat for Delta button-celery and slough thistle. Table 12-4A-64
 8 summarizes the acreage of modeled habitat for Delta button-celery and slough thistle and the
 9 number of occurrences of each special-status riparian species in the study area.

10 **Table 12-4A-64. Summary of Impacts on Valley/Foothill Riparian Plant Species under Alternative**
 11 **4A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Delta button-celery modeled habitat	3,361 ^a	0	–	–	None
Slough thistle modeled habitat	1,834	0	–	–	None
Valley/foothill riparian habitat	17,966	73	–	–	Habitat loss from construction of water conveyance facilities
Species					
Delta button-celery	–	–	1 ^b	0	None
Slough thistle	–	–	2	0	None
Northern California black walnut	–	–	1	0	None
Wright’s trichocoronis	–	–	1	0	None

^a A portion of this acreage consists of alkali seasonal wetland.
^b A second occurrence is in alkali seasonal wetland.

12

13 **Impact BIO-172: Effects on Habitat and Populations of Valley/Foothill Riparian Plants**

14 No extant occurrences of Delta button-celery, slough thistle, Northern California black walnut, or
 15 Wright’s trichocoronis are present in the study area. Therefore, no impacts on special-status
 16 valley/foothill riparian plant species are expected. Modeled habitat for Delta button-celery and
 17 slough thistle, which may support undocumented occurrences of these species, would not be
 18 affected by construction of the water conveyance facilities.

19 Construction of the water conveyance facilities would remove 73 acres of valley/foothill riparian
 20 habitat under Alternative 4A. However, no modeled habitat and no known occurrences of the four
 21 special-status valley/foothill riparian species are within the proposed footprint for the Alternative
 22 4A water conveyance facilities. Therefore, under Alternative 4A, construction and operation of the
 23 water conveyance facilities would not affect special-status valley/foothill riparian species.

- 1 ● *Environmental Commitment 3 Natural Communities Protection and Restoration:* Alternative 4A
2 would protect up to 103 acres of existing valley/foothill riparian forest in CZ 7. This action
3 would have no substantial effects on special-status valley/foothill plants because no extant
4 occurrences of special-status valley/foothill plants are present in the study area.
- 5 ● *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal habitat restoration
6 would inundate an estimated 5 acres of valley/foothill riparian habitat. However, no modeled
7 habitat and no known occurrences of the four special-status valley/foothill riparian plants are
8 within the portions of the study area potentially suitable for tidal restoration. Therefore, tidal
9 restoration would not affect the special-status valley/foothill riparian plants.
- 10 ● *Environmental Commitment 6 Channel Margin Habitat Enhancement:* No modeled habitat or
11 occurrences of special-status valley/foothill riparian plants are present within the general areas
12 proposed for channel margin habitat enhancement. Therefore, channel margin habitat
13 enhancement would have no impacts on special-status valley/foothill riparian plant species.
- 14 ● *Environmental Commitment 7 Riparian Natural Community Restoration:* No extant occurrences of
15 special-status valley/foothill riparian plant species are present within the general areas
16 proposed for riparian habitat restoration. Therefore, riparian habitat restoration would have no
17 impacts on special-status valley/foothill riparian plant species.
- 18 ● *Environmental Commitment 9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration:* No
19 occurrences of special-status valley/foothill riparian plant species are present within areas
20 proposed for vernal pool and alkali seasonal wetland complex restoration. Therefore, vernal
21 pool complex restoration would have no impacts on special-status valley/foothill riparian
22 species.
- 23 ● *Environmental Commitment 10 Nontidal Marsh Restoration:* Nontidal marsh restoration would
24 take place through conversion of cultivated lands. Therefore, nontidal marsh restoration would
25 avoid valley/foothill riparian habitat and would have no impacts on special-status
26 valley/foothill riparian plant species.
- 27 ● *Avoidance and Minimization Measures:* Effects on Delta button-celery and slough thistle would
28 be avoided or minimized through *AMM11 Covered Plant Species* and *AMM2 Construction Best*
29 *Management Practices and Monitoring*. Under AMM11, surveys for special-status plant species
30 would be performed during the planning phase of projects, and any impacts on populations of
31 special-status species would be avoided through project design or subsequently minimized
32 through AMM2. BDCP Appendix 3.C describes the AMMs, which have since been updated and
33 which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of the Final
34 EIR/EIS.

35 Because no extant occurrences of special-status valley/foothill riparian plants are known to occur in
36 the study area, Alternative 4A is not expected to adversely affect any special-status valley/foothill
37 riparian plants. Modeled habitat for both Delta button-celery and slough thistle would be affected.
38 Under AMM11, surveys for special-status plants would be performed during the planning phase for
39 floodplain restoration. If Delta button-celery or slough thistle were found to be present in the
40 floodplain restoration area, then the project would be designed to avoid impacts on the populations.
41 Therefore, Alternative 4A would not have an adverse effect on these species.

42 **NEPA Effects:** Implementation of Alternative 4A would not have an adverse effect on federally listed
43 valley/foothill riparian plant species.

1 **CEQA Conclusion:** Alternative 4A would have no impact on special-status valley/foothill riparian
2 plant species. No mitigation is required.

3 **Tidal Wetland Species**

4 Eight special-status plant species occur in tidal wetlands in the study area (Tables 12-2, 12-3,
5 summarized in Table 12-4A-65). Five tidal wetland habitat models were developed for special-
6 status plant species occurring in tidal wetland habitat. Because this analysis relies on the data
7 developed for the BDCP, models were only available for species covered under the BDCP. Habitat
8 models were not developed for the Bolander's water hemlock, which was not proposed for coverage
9 under the BDCP.

10 Modeled habitat for Mason's lilaepsis and Delta mudwort was mapped as areas within 10 feet (3
11 meters) on either side of the landward boundary of tidal perennial aquatic land cover type, which
12 was obtained from the BDCP GIS vegetation data layer.

13 The side-flowering skullcap model mapped the distribution of suitable habitat in the study area
14 according to the species' habitat association with woody riparian habitat. The model selected Delta
15 riparian vegetation types providing the habitat characteristics that side-flowering skullcap seems to
16 require, namely, woody substrate in freshwater tidal areas. The model included vegetation subunits
17 of the BDCP Valley Riparian natural community characterized by California dogwood, white alder,
18 and arroyo willow.

19 The modeled habitat for soft bird's-beak consisted of pickleweed- and saltgrass-dominated
20 vegetation units located west of the Antioch Bridge. Modeled habitat for these two plant species was
21 mapped as areas within 10 feet (3 meters) on either side of the landward boundary of tidal
22 perennial aquatic land cover types. The model used all Tidal Brackish Emergent Wetland polygons
23 that were limited by specific vegetation units that are known to be closely associated with soft
24 bird's-beak habitat.

25 Habitat for Delta tule pea and Suisun Marsh aster was modeled separately based on the salinity of
26 the water. For the tidal freshwater emergent wetland BDCP land cover type, modeled habitat was
27 mapped as the area within 10 feet (3 meters) of the landward side of the landward boundary,
28 exclusively where this land cover type is adjacent to grassland, vernal pool complex, valley/foothill
29 riparian, or cultivated land habitats cover types. For brackish water areas in and near Suisun Marsh,
30 the model used all tidal brackish emergent wetland polygons within an elevation range of 7 to 10
31 feet (2 to 3 meters) to capture elevations 1 foot (30 centimeters) below intertidal to 2 feet (60
32 centimeters) above intertidal.

33 The modeled habitat for Suisun thistle in and near Suisun Marsh consists of all tidal brackish
34 emergent wetland polygons with the appropriate vegetation. This included vegetation units
35 dominated by saltscale, saltgrass, pickleweed, and broad-leaved peppergrass.

36 Full implementation of Alternative 4A and compliance with Resource Restoration and Performance
37 Principles TWS1 and TWS2 would include the following Environmental Commitments to minimize
38 impacts on tidal wetland species.

- 39 • No net loss of Mason's lilaepsis and delta mudwort occurrences within restoration sites
40 (Resource Restoration and Performance Principle TWS1).
- 41 • No net loss of Delta tule pea and Suisun Marsh aster occurrences within restoration sites
42 (Resource Restoration and Performance Principle TWS2).

1 Of 17,357 acres of tidal wetlands in the study area, Alternative 4A would affect 11 acres of tidal
 2 freshwater emergent wetland including areas that are modeled habitat for Mason’s lilaepsis, Delta
 3 mudwort, side-flowering skullcap, Delta tule pea, and Suisun Marsh aster. Known occurrences
 4 Mason’s lilaepsis, side-flowering skullcap, and Suisun Marsh aster would be affected. Table 12-4A-
 5 65 summarizes the acreage of modeled habitat for special-status tidal wetland species and the
 6 number of occurrences of each special-status tidal wetland plant species in the study area.

7 **Table 12-4A-65. Summary of Impacts on Tidal Wetland Plant Species under Alternative 4A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Delta mudwort/ Mason’s lilaepsis modeled habitat	6,081	37	–	–	Potential habitat loss from construction of water conveyance facilities
Side-flowering skullcap modeled habitat	2,497	7	–	–	Potential habitat loss from construction of water conveyance facilities
Soft bird’s-beak modeled habitat	1,228	0	–	–	None
Delta tule pea/Suisun Marsh aster modeled habitat	5,853	2	–	–	Potential habitat loss from construction of water conveyance facilities
Suisun thistle modeled habitat	1,281	0	–	–	None
Tidal brackish emergent wetland	8,501	0	–	–	None
Tidal freshwater emergent wetland	8,856	11	–	–	Habitat loss from construction of water conveyance facilities
Species					
Delta mudwort	–	–	58	0	None
Delta tule pea	–	–	106	0	
Mason’s lilaepsis	–	–	181	8	Occurrences affected by construction of water conveyance facilities
Side-flowering skullcap	–	–	12	1	Occurrence affected by construction of water conveyance facilities
Soft bird’s-beak	–	–	13	0	None
Suisun Marsh aster	–	–	164	3	Occurrences affected by construction of water conveyance facilities
Suisun thistle	–	–	4	0	None
Bolander’s water hemlock	–	–	8	0	None

8

9 **Impact BIO-173: Effects on Habitat and Populations of Tidal Wetland Plants**

10 Alternative 4A would have adverse effects on tidal marsh special-status plant species.

1 The individual effects of each relevant Environmental Commitment are addressed below. A
2 summary statement of the combined impacts and NEPA and CEQA conclusions follows the
3 individual activity discussions.

4 *Water Facilities and Operations:* Construction of the Alternative 4A water conveyance facilities
5 would remove 37 acres of modeled habitat for delta mudwort and Mason's lilaepsis, 7 acres of
6 modeled habitat for side-flowering skullcap, and 2 acres of modeled habitat for Delta tule pea and
7 Suisun Marsh aster. The extent to which modeled habitat is actually occupied by these species is not
8 known; however, eight occurrences of Mason's lilaepsis, three occurrences of Suisun Marsh aster,
9 and one occurrence of side-flowering skullcap in the study area could be affected by construction
10 impacts. No known occurrences of the other special-status tidal wetland species would be affected
11 by construction of the water conveyance facilities.

- 12 • *Environmental Commitment 3 Natural Communities Protection and Restoration:* Alternative 4A
13 does not specifically propose to protect any habitat or occurrences of tidal wetland plants nor
14 does it propose active restoration of affected habitat or occurrences.
- 15 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* As stated in this
16 Environmental Commitment, no tidal habitat restoration would be implemented in habitat for
17 special-status plant species. Therefore, tidal habitat restoration would not affect modeled
18 habitat for Mason's lilaepsis and Delta mudwort or any occurrences of tidal wetland special-
19 status plant species.
- 20 • *Environmental Commitment 6 Channel Margin Enhancement:* Effects of channel margin
21 enhancement were not analyzed. Channel margin enhancement could have adverse effects on
22 tidal wetland plants through direct removal and habitat modification. However, it would
23 compensate for effects on these species by improving the habitat functions of the channel
24 margins as a result of riprap removal and creation of floodplain benches. Side-flowering skullcap
25 would benefit from installation of large woody material, which it appears to colonize.
- 26 • *Environmental Commitment 7 Riparian Natural Community Restoration:* Riparian habitat
27 restoration is not expected to adversely affect special-status tidal wetland plants. Preparatory
28 work that involves habitat disturbance would occur during implementation of Environmental
29 Commitment 4. Riparian plantings carried out for Environmental Commitment 7 would be
30 placed in floodplain areas, not in tidal wetlands.
- 31 • *Environmental Commitment 8 Grassland Natural Community Restoration:* No tidal wetlands or
32 occurrences of special-status tidal wetland plants are present within areas proposed for
33 grassland communities restoration. Therefore, grassland communities restoration would have
34 no impacts on special-status tidal wetland plant species.
- 35 • *Environmental Commitment 9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration:* No
36 tidal wetlands or occurrences of special-status tidal wetland plant species are present within
37 areas proposed for vernal pool complex restoration. Therefore, vernal pool complex restoration
38 would have no impacts on special-status tidal wetland plant species.
- 39 • *Environmental Commitment 10 Nontidal Marsh Restoration:* Nontidal marsh restoration would
40 take place through conversion of cultivated lands. Therefore, nontidal marsh restoration would
41 avoid tidal wetland habitat and would have no impacts on special-status tidal wetland plant
42 species.

1 *Avoidance and Minimization Measures*: Effects on special-status tidal wetland plant species
2 potentially resulting from construction of the water conveyance facilities would be avoided or
3 minimized though *AMM11 Covered Plant Species*, *AMM2 Construction Best Management Practices and*
4 *Monitoring*, and *AMM30 Transmission Line Design and Alignment Guidelines*. Under AMM11, surveys
5 for special-status plant species would be performed during the planning phase of projects, and any
6 impacts on populations of special-status species would be avoided through project design or
7 subsequently minimized though AMM2. AMM30, which specifies that the alignment of proposed
8 transmission lines will be designed to avoid sensitive terrestrial and aquatic habitats when siting
9 poles and towers to the maximum extent feasible, would avoid some impacts on Mason's lilaepsis
10 and side-flowering skullcap. BDCP Appendix 3.C describes the AMMs, which have since been
11 updated and which are provided in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, of
12 the Final EIR/EIS.

13 In summary, the GIS analysis indicates that Alternative 4A would result in the loss of modeled
14 habitat for five special-status species and result in adverse effects on known occurrences of three of
15 the special-status species occurring in tidal wetlands.

16 Delta mudwort could lose 37 acres of modeled habitat, but no known occurrences would be affected.
17 Channel margin enhancement (Environmental Commitment 6) and riparian natural community
18 restoration (Environmental Commitment 7) will consider the potential for creating habitat for Delta
19 mudwort; creation of suitable habitat under these measures could also help offset this habitat loss.
20 Although active restoration of this species is not proposed, natural expansion of populations into the
21 restored habitat may take place

22 Mason's lilaepsis could lose 37 acres of modeled habitat), including all or part of eight occurrences.
23 Tidal habitat restoration activities (Environmental Commitment 4) would increase the extent of
24 habitat available for colonization by Mason's lilaepsis, which could offset this habitat loss. Although
25 active restoration of this species is not proposed, the natural expansion of populations into the
26 restored habitat may take place. The Environmental Commitments include post-implementation
27 monitoring of affected occurrences and occurrences in conservation areas to confirm that no net
28 loss of occurrences has been achieved.

29 Both of these species (Delta mudwort, Mason's lilaepsis) are widespread in the study area with
30 many occurrences. Habitat modification and loss are the primary stressors that are responsible for
31 their decline and that currently limit their distribution and abundance. Therefore, restoring habitat
32 and improving habitat functions for these species would provide a reasonable expectation that the
33 distribution and abundance of these species would also improve. Because a relatively small amount
34 of modeled habitat would be adversely affected, it is likely that the initial adverse effects of
35 construction activities on these species would be offset and that the overall effect of Alternative 4A
36 on these species would not be adverse.

37 Side-flowering skullcap could lose one occurrence. Under AMM11, this occurrence would be
38 surveyed for, and because this is a tidal freshwater wetland species, avoidance of the habitat during
39 project construction would be highly likely. No active restoration of this species is proposed, and no
40 post-implementation monitoring of affected occurrences and occurrences in conservation areas
41 would be done. Because impacts on occurrences of side-flowering skullcap would be avoided, the
42 overall effect of Alternative 4A on this species would not be adverse.

43 **NEPA Effects**: The loss of modeled and occupied habitat for special-status tidal wetland plants
44 would be offset through tidal habitat restoration (Environmental Commitment 4). Therefore,

1 implementation of Alternative 4A would result in no adverse effects on eight special-status tidal
2 wetland plant species in the study area.

3 **CEQA Conclusion:** Because loss of occurrences and modeled habitat for special-status tidal habitat
4 plant species would be offset through habitat restoration, impacts on special-status tidal wetland
5 plants as a result of implementing Alternative 4A would not be significant.

6 **Inland Dune Species**

7 Five special-status plant species occur in inland dune habitat in the study area. No habitat models
8 were prepared for inland dune habitat. Table 12-4A-66 summarizes the acreage of inland dune
9 habitat in the study area and the number of occurrences for each special-status inland dune species
10 in the study area.

11 **Table 12-4A-66. Summary of Impacts on Inland Dune Plants under Alternative 4A**

	Acreage in Study Area	Acreage Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Inland Dunes	19	0	-	-	None
Species					
Hoover's cryptantha	-	-	1	0	None
Antioch Dunes buckwheat	-	-	1	0	None
Mt. Diablo buckwheat	-	-	1	0	None
Contra Costa wallflower	-	-	3	0	None
Antioch Dunes evening-primrose	-	-	9	0	None

12

13 **Impact BIO-174: Effects on Habitat and Populations of Inland Dune Plants**

14 Alternative 4A would have no adverse effects on inland dune species (Table 12-4A-66). No
15 construction activities would take place where the species occur. No specific actions to benefit
16 inland dune species are proposed.

17 **NEPA Effects:** Implementation of Alternative 4A would not affect special-status inland dune species.

18 **CEQA Conclusion:** Implementation of Alternative 4A would have no impacts on inland dune species.
19 No mitigation is required.

20 **Nontidal Wetland Species**

21 Six special-status plant species occur in nontidal wetlands in the study area. Table 12-4A-67
22 summarizes the acreage of nontidal wetland habitat in the study area and the number of
23 occurrences of each special-status nontidal wetland species in the study area.

1 **Table 12-4A-67. Summary of Impacts on Nontidal Wetland Plant Species under Alternative 4A**

	Acres in Study Area	Acres Affected	Occurrences in Study Area	Occurrences Affected	Impacts
Habitat					
Nontidal freshwater aquatic	5,567	2,339	-	-	Loss or disturbance of habitat from construction of water conveyance facilities and tidal habitat restoration
Nontidal freshwater perennial emergent wetland	1,509	6	-	-	Loss or disturbance of habitat from construction of water conveyance facilities and tidal habitat restoration
Species					
Watershield	-	-	3	1	Loss of habitat from construction of water conveyance facilities
Bristly sedge	-	-	18	3	Loss of occurrences from construction of water conveyance facilities
Woolly rose-mallow ^a	-	-	121	14	Loss of occurrences from construction of water conveyance facilities
Eel grass pondweed	-	-	1	0	None
Sanford's arrowhead	-	-	23	1	Loss of occurrences from construction of water conveyance facilities
Marsh skullcap ^a	-	-	1	0	None

^a Also occurs in valley/foothill riparian habitat.

2

3 **Impact BIO-175: Effects on Habitat and Populations of Nontidal Wetland Plants**

4 Under Alternative 4A, known occurrences watershield, bristly sedge, woolly rose-mallow, and
5 Sanford's arrowhead would be within the proposed footprint for the water conveyance facilities and
6 could be adversely affected. Alternative 4A would have no adverse effects on eel-grass pondweed or
7 marsh skullcap.

8 Construction of the Alternative 4A water conveyance facilities would adversely affect four special-
9 status plant species occurring in nontidal wetlands. One of three watershield occurrences in CZ 5 on
10 Bouldin Island could be affected by construction of the water conveyance facilities. This is a
11 historical occurrence that has not been observed since 1893, and it may be extirpated (California
12 Department of Fish and Wildlife 2013). Three occurrences of bristly sedge in CZ 4 and CZ 5,
13 including approximately 1.54 acres of occupied habitat, would be affected by construction of the
14 water conveyance facilities. Fourteen occurrences of woolly rose-mallow would be affected. Six
15 occurrences in CZ 4 could be removed during construction of the intake facilities and disposal of
16 RTM, and four occurrences in CZ 6 and four occurrences in CZ 8 could be affected by construction of
17 other facilities and by geotechnical investigations. Construction of the water conveyance facilities
18 could remove occupied habitat at one occurrence of Sanford's arrowhead in CZ 4. Under Alternative

1 4A, construction and operation of the water conveyance facilities could affect 77 acres of nontidal
2 wetlands, which could have adverse effects on undiscovered occurrences of the six special-status
3 nontidal wetland plant species.

- 4 • *Environmental Commitment 3 Natural Communities Protection and Restoration*: No specific
5 natural communities protection is proposed for nontidal wetlands under Alternative 4A.
6 Therefore, no occurrences of special-status nontidal plants are proposed for protection.
- 7 • *Environmental Commitment 4 Tidal Natural Communities Restoration*: No habitat or known
8 occurrences of special-status nontidal wetland plants are present within the general areas
9 proposed for tidal habitat restoration. Therefore, tidal habitat restoration would have no
10 adverse effects on special-status nontidal wetland plants.
- 11 • *Environmental Commitment 6 Channel Margin Enhancement*: No known occurrences of special-
12 status nontidal wetland plant species are present within the general areas proposed for channel
13 margin habitat enhancement. Therefore, channel margin habitat enhancement would have no
14 impacts on known occurrences of special-status nontidal wetland species.
- 15 • *Environmental Commitment 7 Riparian Natural Community Restoration*: No known occurrences
16 of special-status nontidal wetland plant species are present within the general areas proposed
17 for riparian habitat restoration. Therefore, riparian habitat restoration would have no impacts
18 on known occurrences of special-status nontidal wetland species.
- 19 • *Environmental Commitment 8 Grassland Natural Community Restoration*: No known occurrences
20 of special-status nontidal wetland plant species are present within areas proposed for grassland
21 communities restoration. Therefore, grassland communities restoration would have no impacts
22 on special-status nontidal wetland species.
- 23 • *Environmental Commitment 9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration*: No
24 known occurrences of special-status nontidal wetland plants are present within areas proposed
25 for vernal pool complex restoration. Therefore, vernal pool complex restoration would have no
26 impacts on special-status nontidal wetland plants.
- 27 • *Environmental Commitment 10 Nontidal Marsh Restoration*: Nontidal marsh restoration would
28 take place through conversion of cultivated lands. Therefore, nontidal marsh restoration would
29 avoid existing nontidal marsh and would have no adverse effects on special-status nontidal
30 wetland plants. Alternative 4A may benefit nontidal wetland species by creating 832 acres of
31 nontidal freshwater marsh, including components of nontidal perennial aquatic and nontidal
32 freshwater perennial emergent wetland communities, and by maintaining and enhancing the
33 habitat functions of protected and created nontidal wetland habitats for special-status and other
34 native species. However, no specific actions to benefit special-status species are proposed.

35 Under Alternative 4A, 119 acres of nontidal marsh would be restored. However, these wetlands
36 would be restored primarily as habitat for giant garter snake. These habitat restoration activities
37 would be unlikely to expand the amount of habitat available to watershield, bristly sedge, woolly
38 rose-mallow, and Sanford's arrowhead, and potential loss of habitat or occurrences resulting from
39 construction activities would not be compensated for. Moreover, because special-status nontidal
40 wetland plant species are not addressed by Environmental Commitments, the species protections
41 afforded to listed species under the AMMs do not apply to these species, and the effects of
42 Alternative 4A on these species would be adverse. Implementation of Mitigation Measure BIO-170,
43 *Avoid, Minimize, or Compensate for Impacts on Special-Status Plant Species*, would reduce these
44 effects.

1 **NEPA Effects:** Implementation of Alternative 4A could result in a reduction in the range and
2 numbers of watershield, bristly sedge, woolly rose-mallow, and Sanford's arrowhead, four nontidal
3 wetland species, which would be an adverse effect. Adverse effects on these species could be
4 avoided or offset through implementation of Mitigation Measure BIO-170.

5 **CEQA Conclusion:** Under Alternative 4A, construction of the water conveyance facilities could result
6 in a reduction in the range and numbers of watershield, bristly sedge, woolly rose-mallow, and
7 Sanford's arrowhead. These impacts would be significant. Implementation of Mitigation Measure
8 BIO-170 would reduce these impacts to a less-than-significant level.

9 **Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Special-**
10 **Status Plant Species**

11 Please see Mitigation Measure BIO-170 under Impact BIO-170.

12 **General Terrestrial Biology**

13 **Wetlands and Other Waters of the United States**

14 Alternative 4A actions would both permanently and temporarily remove or convert wetlands and
15 open water that are regulated by USACE under Section 404 of the CWA. The 404 regulations and
16 relevant information on mitigating the effects of impact on wetlands and other waters of the United
17 States are described in Section 12.2.1.1. The methods used to conduct these analyses are described
18 in Section 12.3.2.4, *Methods Used to Assess Wetlands and Other Waters of the United States*. Waters of
19 the United States data used for this analysis is based on a verified wetland delineation from the
20 USACE that was completed in early 2015. The waters of the United States were mapped at a finer
21 scale than that which was done for the natural community mapping for the BDCP and therefore the
22 acreages of these two datasets differ when compared to each other. The waters of the United States
23 mapping identified numerous agricultural ditches and seasonal wetlands occurring within and
24 associated with cultivated lands, which explains the majority of the difference.

25 **Impact BIO-176: Effects of Constructing Water Conveyance Facilities on Wetlands and Other**
26 **Waters of the United States**

27 Alternative 4A proposes the construction, maintenance, and operation of water conveyance facilities
28 within, or requiring the unavoidable fill of, waters of the United States. The estimated fill of
29 jurisdictional waters associated with this alternative is described in Table 12-4A-68 below. Based on
30 the methodology used to conduct this analysis, the losses would occur at intake, tunnel, pipeline,
31 canal, and RTM and borrow/spoil storage sites, transmission corridors, and multiple temporary
32 work areas associated with the construction activity. The permanent waters of the United States
33 losses would occur at various locations along the modified pipeline/tunnel alignment. The majority
34 of the loss would result from the expansion of Clifton Court Forebay, new transmission lines,
35 construction of Alternative 4A's three intake structures along the eastern bank of the Sacramento
36 River between Clarksburg and Courtland in the north Delta, and at the RTM storage sites associated
37 with tunnel construction at various locations between Lambert Road and Twin Cities Road, on
38 Bouldin Island, and on Byron Tract, adjacent to Clifton Court Forebay.

39 The temporary effects on waters of the United States would also occur mainly at the three intake
40 construction sites along the eastern bank of the Sacramento River, and at barge unloading facilities

1 in the San Joaquin River, Snodgrass Slough, Potato Slough, Connection Slough, Old River, and West
2 Canal. An additional temporary effect would result from dredging of Clifton Court Forebay.

3 **Table 12-4A-68. Estimated Fill of Waters of the United States Associated with the Construction of**
4 **Water Conveyance Facilities under Alternative 4A**

Wetland/Water Type	Permanent Impact	Temporary Impacts Treated as Permanent ^a	Temporary Impact ^b	Total Impact ^c
Agricultural Ditch	42.2	13.2	0	55.4
Alkaline Wetland	10.4	0.1	0	10.5
Clifton Court Forebay	257.9	0	1,930.6	257.9
Conveyance Channel	7.1	2.9	0	10.0
Depression	29.3	6.2	0	35.5
Emergent Wetland	56.8	14.7	0	71.5
Forest	7.2	5.2	0	12.4
Lake	23.2	0	0	23.2
Scrub-Shrub	12.7	3.7	0	16.3
Seasonal Wetland	114.5	10.0	0	124.5
Tidal Channel	15.3	65.6	0	80.8
Vernal Pool	0.3	0	0	0.3
Total	577	121	1,931	698

^a Temporary impacts treated as permanent are temporary impacts expected to last over one year. These impact sites will eventually be restored to pre-project conditions; however, due to the duration of effect, compensatory mitigation will be included for these areas.

^b Temporary impacts are due to dredging Clifton Court Forebay.

^c Total does not include temporary impacts on Clifton Court Forebay because these would just be temporary disturbance to open water, which typically do not require compensatory mitigation.

5
6 The majority of the impacts on wetlands and waters of United States would be on wetlands found
7 within cultivated lands (mostly agricultural ditches and seasonal wetlands) and waters associated
8 with Clifton Court Forebay. The impacted seasonal wetlands mapped within the Conveyance
9 Planning Area, as described in Section 12.3.2.4, *Methods Used to Assess Wetlands and Other Waters of*
10 *the United States*, all occur in the central Delta within plowed agricultural fields and would be mostly
11 affected by the RTM storage sites and transmission line construction. The effects on Clifton Court
12 Forebay would primarily result from the establishment of new embankments around and across the
13 existing forebay. The forebay would be expanded to the south by an additional 450 acres of storage
14 space resulting in a net gain of open water in the forebay.

15 Unavoidable impacts on waters of the United States would be offset such that the loss of acreage and
16 functions due to construction activities are fully compensated. Wetland functions are defined as a
17 process or series of processes that take place within a wetland. These include the storage of water,
18 transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have
19 value for the wetland itself, for surrounding ecosystems, and for people. Functions can be grouped
20 broadly as habitat, hydrologic/hydraulic, or water quality. Not all wetlands perform all functions nor
21 do they perform all functions equally well. The location and size of a wetland may determine what
22 functions it will perform. For example, the geographic location may determine its habitat functions,

1 and the location of a wetland within a watershed may determine its hydrologic/hydraulic or water-
 2 quality functions. Many factors determine how well a wetland will perform these functions: climatic
 3 conditions, quantity and quality of water entering the wetland, and disturbances or alteration within
 4 the wetland or the surrounding ecosystem. Wetland disturbances may be the result of natural
 5 conditions, such as an extended drought, or human activities, such as land clearing, dredging, or the
 6 introduction of nonnative species. Wetlands are among the most productive habitats in the world,
 7 providing food, water, and shelter for fish, shellfish, birds, and mammals, and serving as a breeding
 8 ground and nursery for numerous species. Many endangered plant and animal species are
 9 dependent on wetland habitats for their survival. Hydrologic and hydraulic functions are those
 10 related to the quantity of water that enters, is stored in, or leaves a wetland. These functions include
 11 such factors as the reduction of flow velocity, the role of wetlands as ground-water recharge or
 12 discharge areas, and the influence of wetlands on atmospheric processes. Water-quality functions
 13 include the trapping of sediment, pollution control, and the biochemical processes that take place as
 14 water enters, is stored in, or leaves a wetland.

15 The functions of the waters of the United States that would be temporarily or permanently impacted
 16 by this alternative vary greatly depending primarily on existing land uses and historical levels of
 17 disturbance. Generally, agricultural ditches and conveyance channels, which are regularly
 18 maintained and often devoid of vegetation, support only minimal hydraulic function (water
 19 conveyance), with virtually no water quality or habitat function. With respect to Clifton Court
 20 Forebay, the facility is regularly maintained, but supports some hydrologic, hydraulic, and water
 21 quality functions (e.g., reduction of velocity, groundwater recharge, and trapping of sediment). Tidal
 22 channels affected by this alternative support functions in all three categories, but the level at which
 23 these functions perform vary depending on setting, size, and level of disturbance. The alkaline
 24 wetlands and vernal pools exist in non-native grasslands and have been subjected to some
 25 disturbance due to past land uses. Although these features likely support habitat, water quality, and
 26 hydrologic/hydraulic functions, the capacity of these features to perform such functions vary
 27 depending on the overall ecological setting and level of disturbance. Functions associated with
 28 emergent wetland, forest, and scrub-shrub, depend primarily on the location of these habitat types.
 29 Where they exist as in-stream (in-channel islands) or as the thick band of habitat adjacent to a
 30 waterway, these features are expected to function at a high level. However, where these habitats
 31 exist as thin bands, or where they are situated in agricultural fields, their habitat functions will be
 32 considerably lower. All of the wetlands classified as seasonal wetlands occur in agricultural fields. As
 33 such, their habitat functions have been greatly compromised, but they retain some water quality and
 34 hydrologic/hydraulic function. Like seasonal wetlands, most depressions occur within agricultural
 35 areas; however the depressions may support wetland vegetation at their edges. The areas mapped
 36 as lake are the dredged borrow ponds created during the construction of Interstate 5. Although
 37 relatively small, each lake is likely performing functions from all three categories.

38 A functional assessment of wetlands proposed for fill will be conducted during the development of
 39 the Conceptual Mitigation Plan as part of the Clean Water Act permitting process. The results of this
 40 assessment will be compared to the expected functions at the proposed mitigation site(s) such that
 41 it can be confirmed that the compensatory mitigation will in fact accomplish full functional
 42 replacement of impacted wetlands. All impacted wetlands will be replaced with fully functional
 43 compensatory wetland habitat demonstrating high levels of habitat, water quality, and
 44 hydrologic/hydraulic function. Since many impacted wetlands will be significantly less than high
 45 function, the compensatory mitigation will result in a net increase in wetland function.

1 The proposed project was designed to avoid waters of the United States to the maximum extent
2 practicable. Each of the conveyance components has been located in upland areas where it was
3 feasible to do so. Once construction begins, AMM2 and AMM6 would be implemented, as described
4 in the AMMs set out in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, to further avoid
5 and minimize effects on waters of the United States as well as on special-status species. The AMMs
6 would be implemented during all phases of a project, from siting through design, construction, and
7 on to operations and maintenance. The AMMs that pertain specifically to waters of the United States
8 are *AMM1 Worker Awareness Training, AMM2 Construction Best Management Practices and*
9 *Monitoring, AMM3 Stormwater Pollution Prevention Plan, AMM4 Erosion and Sediment Control Plan,*
10 *AMM5 Spill Prevention, Containment, and Countermeasure Plan, AMM6 Disposal and Reuse of Spoils,*
11 *AMM7 Barge Operations Plan, AMM10 Restoration of Temporarily Affected Natural Communities,*
12 *AMM12 Vernal Pool Crustaceans, AMM30 Transmission Line Design and Alignment Guidelines, AMM34*
13 *Construction Site Security, and AMM36 Notification of Activities in Waterways.*

14 The implementation of measures to avoid and minimize impacts on habitat for aquatic species and
15 species which utilize aquatic habitats, such as California tiger salamander, giant garter snake,
16 California red legged frog, western pond turtle, riparian woodrat, and riparian brush rabbit, will also
17 result in further avoidance and minimization of effects to waters of the United States.

18 Aside from wetland habitats that would be created as a result of implementing Environmental
19 Commitment 4–Environmental Commitment 10 described for Alternative 4A, some of which could
20 serve the dual purpose of offsetting effects to species and mitigating impacts on waters of the United
21 States, more specific mitigation is required to ensure that there is no net loss of wetland functions
22 and values as a result of implementing Alternative 4A pursuant to USACE’s and U.S. EPA’s Mitigation
23 Rule (see Section 12.2.1.1). Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters*
24 *of the United States* would be available to address adverse impacts on waters of the United States.

25 **NEPA Effects:** The permanent and temporary loss of wetlands and waters of the United States as a
26 result of constructing Alternative 4A water conveyance facilities would be a substantial effect if not
27 compensated by wetland restoration and protection. This loss would represent a fill of water of the
28 U.S. as defined by Section 404 of the CWA. The project proponents would implement AMM1–AMM7,
29 AMM10, AMM12, AMM30, AMM34, and AMM36, which would avoid and minimize fill of wetlands
30 and waters and any indirect effects on wetlands and waters. However, specific mitigation would be
31 required to ensure that Alternative 4A does not result in a loss of functions and values of waters of
32 the United States and thus that the affect is not adverse. Mitigation Measure BIO-176, *Compensatory*
33 *Mitigation for Fill of Waters of the United States*, would be available to reduce these effects such that
34 they are not adverse.

35 **CEQA Conclusion:** The permanent and temporary loss of wetlands and waters of the United States
36 as a result of constructing Alternative 4A water conveyance facilities would be a significant impact.
37 Specific mitigation would be required to ensure that Alternative 4A does not result in a loss of
38 functions and values of waters of the United States. Mitigation Measure BIO-176, *Compensatory*
39 *Mitigation for Fill of Waters of the United States*, would be available to reduce the impact to a less-
40 than-significant level. Additionally, Alternative 4A would restore up to 1,134 acres of wetlands as
41 part of the proposed project, which would include 295 acres of tidal marsh restoration
42 (Environmental Commitment 4), 7 acres of vernal pool/alkali seasonal wetlands (Environmental
43 Commitment 9; 48 acres of vernal pool complex assuming a wetland density of 15%), and 832 acres
44 of nontidal marsh restoration (Environmental Commitment 10). In addition, Alternative 4A would
45 restore up to 251 acres of riparian habitat (Environmental Commitment 7), some portion of which

1 may also qualify as forested or scrub-shrub wetland. In addition, 4.6 miles of levees will have
2 channel margin enhancement conducted on them (Environmental Commitment 6), which would
3 include improving channel geometry and restoring riparian, marsh, and mudflat habitats on the
4 water side of levees.

5 The success in implementing these Environmental Commitments would be assured through
6 effectiveness monitoring, which includes success criteria, and adaptive management as outlined in
7 the *Adaptive Management and Monitoring* sections of the BDCP for tidal marsh restoration (BDCP
8 Chapter 3, *Conservation Strategy*, Section 3.4.4.4), channel margin enhancement (BDCP Section
9 3.4.6.4), valley/foothill riparian restoration (BDCP Section 3.4.7.4), vernal pool and alkali seasonal
10 wetland complex restoration (BDCP Section 3.4.9.4), and nontidal marsh restoration (BDCP Section
11 3.4.10.3). All restored areas will be secured in fee-title or through conservation easements.

12 Alternative 4A would also protect and manage the following natural communities that contain
13 wetlands: 103 acres of valley/foothill riparian, 188 acres of vernal pool/alkali seasonal wetland
14 complex, and 119 of nontidal marsh. In addition, 1,060 acres of grasslands and 11,870 acres of
15 cultivated lands will be protected and managed, which would likely include areas of seasonal
16 wetlands, ponds, and agricultural ditches.

17 Alternative 4A also includes the following Resource Restoration and Performance Principles (see
18 Table 3-12 in Chapter 3, *Description of Alternatives*) to further guide the Environmental
19 Commitments that would also contribute to establishing and maintaining the functions and values of
20 restored and protected waters of the United States.

- 21 ● Restore or create vernal pool and alkali seasonal wetland complex to achieve no net loss of
22 wetted acres (Resource Restoration and Performance Principle VP/AW2).
- 23 ● Provide appropriate seasonal flooding characteristics for supporting and sustaining vernal pool
24 and alkali seasonal wetland complex species (Resource Restoration and Performance Principle
25 VP/AW4).
- 26 ● In grasslands surrounding protected and created vernal pools and alkali seasonal wetlands
27 complex, increase the extent, distribution, and density of native perennial grasses intermingled
28 with other native species, including annual grasses, geophytes, and other forbs (Resource
29 Restoration and Performance Principle VP/AW6).
- 30 ● Increase the size and connectivity of protected vernal pool and alkali seasonal wetland complex
31 in the greater Byron Hill area (Resource Restoration and Performance Principle VP/AW3).
- 32 ● Protect up to six acres of stock ponds and other aquatic features within protected grasslands to
33 provide aquatic breeding habitat for native amphibians and aquatic reptiles (Resource
34 Restoration and Performance Principle G2).
- 35 ● Maintain and enhance aquatic features in grasslands to provide suitable inundation depth and
36 duration and suitable composition of vegetative cover to support breeding for amphibian and
37 aquatic reptile species (Resource Restoration and Performance Principle G7).
- 38 ● Maintain and protect the small patches of important wildlife habitats associated with cultivated
39 lands that occur in cultivated lands within the conservation area, including isolated valley oak
40 trees, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors,
41 water conveyance channels, grasslands, ponds, and wetlands (Resource Restoration and
42 Performance Principle CL1).

- 1 ● Create and protect nontidal marsh consisting of a mosaic of nontidal perennial aquatic and
2 nontidal freshwater emergent wetland natural communities, which will include suitable habitat
3 characteristics for western pond turtle (Resource Restoration and Performance Principle
4 WPT1).
- 5 ● Create aquatic habitat for the giant garter snake will be connected to the protected rice land or
6 equivalent-value habitat (Resource Restoration and Performance Principle GGS1).
- 7 ● Protect, restore, and/or create rice land or equivalent-value habitat (e.g., perennial wetland) for
8 the giant garter snake in Conservation Zones 4 and/or 5 (Resource Restoration and
9 Performance Principle GGS3).
- 10 ● Create at least 320 acres of managed wetlands (part of the nontidal wetland restoration
11 acreage) in minimum patch sizes of 40 acres within the Greater Sandhill Crane Winter Use Area
12 in CZs 3, 4, 5, or 6, with consideration of sea level rise and local seasonal flood events. The
13 wetlands will be located within 2 miles of existing permanent roost sites and protected in
14 association with other protected natural community types (excluding nonhabitat cultivated
15 lands) at a ratio of 2:1 upland to wetland to provide buffers around the wetlands (Resource
16 Restoration and Performance Principle GSC2).
- 17 ● Create at least two 90-acre wetland complexes within the Stone Lakes NWR project boundary.
18 The complexes will be no more than 2 miles apart and will help provide connectivity between
19 the Stone Lakes and Cosumnes River Preserve greater sandhill crane populations. Each complex
20 will consist of at least three wetlands totaling at least 90 acres of greater sandhill crane roosting
21 habitat, and will be protected in association with other protected natural community types
22 (excluding nonhabitat cultivated lands) at a ratio of at least 2:1 uplands to wetlands (i.e., two
23 sites with at least 90 acres of wetlands each). One of the 90-acre wetland complexes may be
24 replaced by 180 acres of cultivated lands (e.g., cornfields) that are flooded following harvest to
25 support roosting cranes and provide highest-value foraging habitat, provided such substitution
26 is consistent with the long-term conservation goals of Stone Lakes NWR for greater sandhill
27 crane (Resource Restoration and Performance Principle GSC3).

28 The project proponents will also implement AMM1-AMM7, AMM10, AMM12, AMM30, AMM34, and
29 AMM36, which would avoid and minimize fill of wetlands and waters and any indirect effects to
30 wetlands and waters. As stated above, specific mitigation would be required to ensure that
31 Alternative 4A does not result in a loss of functions and values of waters of the United States.
32 Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters of the United States*, would
33 be available to reduce the impact to a less-than-significant level.

34 **Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United**
35 **States**

36 All mitigation proposed as compensatory mitigation would be subject to specific success criteria,
37 success monitoring, long-term preservation, and long-term maintenance and monitoring
38 pursuant to the requirements of the Mitigation Rule. All compensatory mitigation shall fully
39 replace lost function through the mechanisms discussed below which will result in restoration
40 and/or creation of habitat with at least as much function and value as those of the impacted
41 habitat. In some cases, the mitigation habitat will afford significantly higher function and value
42 than that of impacted habitat.

1 Compensation ratios are driven by type, condition, and location of replacement habitat as
2 compared to type, condition and location of impacted habitat. Compensatory mitigation usually
3 includes restoration, creation, or rehabilitation of aquatic habitat. The USACE does not typically
4 accept preservation as the only form of mitigation; use of preservation as mitigation typically
5 requires a very high ratio of replacement to impact. It is anticipated that ratios will be a
6 minimum of 1:1, depending on the factors listed above.

7 Compensatory mitigation will consist of restoration, creation, and/or rehabilitation of aquatic
8 habitat. Typically, impacted habitat will be replaced in-kind, although impacts on some habitat
9 types such as agricultural ditches, conveyance channels, and Clifton Court Forebay, will be
10 mitigated out-of-kind with higher functioning habitat types such as riparian wetland, marsh,
11 and/or seasonal wetland. Compensatory mitigation shall be accomplished by one, or a
12 combination of the following methods:

- 13 • Purchase credits for restored/created/rehabilitated habitat at an approved wetland
14 mitigation bank;
- 15 • On-site (adjacent to the project footprint) restoration or rehabilitation of wetlands
16 converted to uplands due to past land use activities (such as agriculture) or functionally
17 degraded by such activities;
- 18 • On-site (adjacent to the project footprint) creation of aquatic habitat;
- 19 • Off-site (within the Delta) restoration or rehabilitation of wetlands converted to uplands
20 due to past land use activities (such as agriculture) or functionally degraded by such
21 activities;
- 22 • Off-site (within the Delta) creation of aquatic habitat; and/or
- 23 • Payment into the Corps' Fee-in-Lieu program.

24 *Purchase of Credits or Payment into Fee-in-Lieu Program*

25 It is envisioned that purchase of bank credits and/or payment into a fee-in-lieu program will be
26 utilized for habitat types that would be difficult to restore or create within the Delta. Examples
27 are vernal pool habitat, which requires an intact hardpan or other impervious layer and very
28 specific soil types, and alkali seasonal wetland, which requires a specific set of chemical soil
29 parameters. It is anticipated that only a small amount of compensatory mitigation will fall into
30 these categories.

31 *On-Site Restoration, Rehabilitation and/or Creation*

32 Much of the Delta consists of degraded or converted habitat that is more or less functioning as
33 upland. Opportunities will be sought where on-site restoration, rehabilitation, and/or creation
34 could occur immediately adjacent to the project footprint. It is anticipated that some of the
35 compensatory mitigation will fall into this category.

36 *Off-Site Restoration, Rehabilitation and/or Creation*

37 There exists, within the immediate vicinity of the project area, Delta land which has been subject
38 to agricultural practices or other land uses which have degraded or even converted wetlands
39 that existed historically. Sites within the Delta will be evaluated for their restoration,
40 rehabilitation, and/or creation potential. It is anticipated that most of the compensatory
41 mitigation will fall into this category.

1 Compensatory mitigation will result in no net loss of acreage of waters of the United States and
2 will accomplish full functional replacement of impacted wetlands. All impacted wetlands will be
3 replaced with fully functioning wetland habitat demonstrating high levels of habitat, water
4 quality, and hydrologic/hydraulic function. Since many impacted wetlands are likely to function
5 at significantly less than high levels, the compensatory mitigation will result in a significant net
6 increase in wetland function.

7 **Impact BIO-177: Effects of Implementing Environmental commitments (Environmental**
8 **Commitment 4–Environmental Commitment 10) on Wetlands and Other Waters of the United**
9 **States**

10 The habitat protection and restoration activities associated with Alternative 4A’s Environmental
11 Commitments (Environmental Commitment 4–Environmental Commitment 10) could alter the
12 acreages and functions and values of wetlands and waters of the United States in the study area.
13 Because these Environmental Commitments have not been defined to the level of site-specific
14 footprints, it is not possible to specifically delineate and quantify these effects on wetlands and
15 waters; however the project would conduct tidal restoration (Environmental Commitment 4),
16 riparian restoration (Environmental Commitment 7), grasslands restoration (Environmental
17 Commitment 8), and nontidal marsh restoration (Environmental Commitment 10) in areas that
18 would likely contain wetlands. Of the 2,448 acres of restoration proposed for the project, 2,344
19 acres (96%) are planned to take place in cultivated lands that likely contain agricultural ditches and
20 seasonal wetlands (as was identified during the delineation for the Conveyance Planning Area). The
21 proportion of cultivated areas that actually contain waters and wetlands is expected to be low;
22 however for the purposes of this analysis a conservative estimate of 10% was applied to estimate
23 the amount of wetlands and waters that may be affected within these areas, which would be 234
24 acres, plus the 49 acres of wetland natural communities estimated to be affected by tidal restoration
25 brings the total estimate of wetland areas affected by restoration to 283 acres.

26 Alternative 4A would result in the restoration of approximately 1,175 acres of wetlands and waters
27 (tidal natural communities, vernal pool complex, and nontidal marsh), as well the protection and
28 management of 307 acres of wetland natural communities (vernal pool complex and nontidal
29 marsh) and 13,033 acres of other natural communities that likely contain some degree of wetlands
30 and waters (valley/foothill riparian, grasslands, and cultivated lands). As discussed above,
31 Alternative 4A would also implement AMMs, Resource Restoration and Performance Principles, and
32 adaptive management and monitoring together with these Environmental Commitments. The
33 Environmental Commitments and associated measures could serve the dual purpose of offsetting
34 effects to species and mitigation impacts on waters of the United State; however, more specific
35 mitigation is required to ensure that there is no net loss of wetland functions and values as a result
36 of implementing these Environmental Commitments under Alternative 4A pursuant to USACE’s and
37 U.S. EPA’s Mitigation Rule. Mitigation Measure BIO-176, *Compensatory Mitigation for Fill of Waters of*
38 *the United States*, would be available to address adverse impacts on waters of the United States.

39 **NEPA Effects:** The implementation of Environmental Commitment 4–Environmental Commitment
40 10 for Alternative 4A would potentially result in the conversion of wetlands and waters in cultivated
41 lands and along the margins of Delta channels. These wetlands and waters would likely be converted
42 to tidal and nontidal wetlands, including some open water, and possibly grasslands through
43 implementation of Environmental Commitment 4, Environmental Commitment 8, and
44 Environmental Commitment 10. Although, the increase in wetland acreage and wetland functions
45 from these Environmental Commitments could offset the effects on waters of the United States

1 occurring in these areas, implementation of Mitigation Measure BIO-176, *Compensatory Mitigation*
2 *for Fill of Waters of the United States*, would be required to ensure that these effects are not adverse.

3 **CEQA Conclusion:** The implementation of Environmental Commitment 4–Environmental
4 Commitment 10 for Alternative 4A would potentially result in the conversion of wetlands and
5 waters in cultivated lands and along the margins of Delta channels. These wetlands and waters
6 would likely be converted to tidal and nontidal wetlands, including some open water, and possibly
7 grasslands through implementation of Environmental Commitment 4, Environmental Commitment
8 8, and Environmental Commitment 10. Although, the increase in wetland acreage and wetland
9 functions from these Environmental Commitments could offset the effects on waters of the United
10 States occurring in these areas, implementation of Mitigation Measure BIO-176, *Compensatory*
11 *Mitigation for Fill of Waters of the United States*, would be required to ensure that the impacts are
12 reduced to a less-than-significant level.

13 **Shorebirds and Waterfowl**

14 This section describes the effects of Alternative 4A, including water conveyance facilities
15 construction and implementation of the Environmental Commitments, on shorebirds and waterfowl.
16 Managed wetlands, tidal and nontidal natural communities, grasslands, vernal pools, alkali seasonal
17 wetlands, and cultivated lands (including grain and hay crops, pasture, field crops, rice, and idle
18 lands) provide freshwater nesting, feeding, and resting habitat for a large number of Pacific flyway
19 waterfowl and shorebirds.

20 Alternative 4A would result in both temporary and permanent losses of shorebird and waterfowl
21 habitat. Full implementation of Alternative 4A would also include the following Environmental
22 Commitments and associated Resource Restoration and Performance Principles that would benefit
23 shorebirds and waterfowl through habitat restoration and protection.

- 24 ● Restore or create up to 37 acres of tidal wetlands in the north Delta (Environmental
25 Commitment 4).
- 26 ● Restore or create up to 22 acres of *Schoenoplectus* and *Typha*-dominated tidal and nontidal
27 freshwater emergent wetland in patches greater than 0.55 acres in the south Delta
28 (Environmental Commitment 10 and Resource Restoration and Performance Principle CBR1).
- 29 ● Protect up to 119 acres of nontidal wetlands and create up to 832 acres of nontidal wetlands
30 (Environmental Commitment 3 and Environmental Commitment 10).
- 31 ● Protect up to 1,060 acres of grassland and 11,870 acres of cultivated lands (Environmental
32 Commitment 3).
- 33 ● Restore up to 1,070 acres of grassland (Environmental Commitment 8).
- 34 ● Restore vernal pool complex and alkali seasonal (Environmental Commitment 9).

35 **Impact BIO-178: Loss or Conversion of Habitat for Waterfowl and Shorebirds as a Result of** 36 **Water Conveyance Facilities Construction**

37 Development of the water conveyance facilities would result in the permanent removal of
38 approximately 22 acres of managed wetland, 3 acres of tidal wetlands, 61 acres of nontidal
39 wetlands, 1 acre of alkali seasonal wetland, 19 acres of vernal pool complex, 467 acres of grasslands,
40 and 3,768 acres of suitable cultivated lands (including grain and hay crops, pasture, field crops, rice,
41 and idle lands). In addition, 29 acres of managed wetland, 15 acres of tidal wetlands, 15 acres of

1 nontidal wetlands, 3 acres of vernal pool complex, 158 acres of grasslands, and 1,339 acres of
2 suitable cultivated lands would be temporarily impacted. No rice would be impacted as a result of
3 constructing the water conveyance facilities. These losses of habitat would occur within the first 10-
4 14 years of Alternative 4A implementation in the Delta.

5 A total of 1,060 acres of grassland and 11,870 acres of cultivated lands would be protected and
6 1,070 acres of grassland would be restored through Alternative 4A. In addition, 295 acres of tidal
7 freshwater emergent wetland would be restored or created and 119 acres of nontidal wetlands
8 would be protected, and 832 acres of nontidal wetlands would be created in the Delta. The restored
9 and protected acres described above would provide suitable nesting and/or foraging habitat for
10 these species. These conservation actions would be associated with the aforementioned
11 Environmental Commitments and would occur in the same timeframe as the construction losses.
12 Construction activities could have an adverse effect on nesting shorebirds or waterfowl if they were
13 present in or adjacent to work areas and could result in destruction of nests or disturbance of
14 nesting and foraging behaviors. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird*
15 *Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on
16 nesting birds.

17 **NEPA Effects:** Habitat loss from construction of the Alternative 4A water conveyance facilities would
18 not result in an adverse effect on shorebirds and waterfowl because of the acres of natural
19 communities and cultivated lands that would be restored and protected. If waterfowl were present
20 in or adjacent to work areas, construction activities could result in destruction of nests or
21 disturbance of nesting and foraging behaviors, which would be an adverse effect on nesting
22 shorebirds and waterfowl. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys*
23 *and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse effects on nesting
24 birds.

25 **CEQA Conclusion:** Habitat loss from construction of the Alternative 4A water conveyance facilities
26 would have a less-than-significant impact on shorebirds and waterfowl because of the acres of
27 natural communities and cultivated lands that would be restored and protected. If waterfowl were
28 present in or adjacent to work areas, construction activities could result in destruction of nests or
29 disturbance of nesting and foraging behaviors, which would be a significant impact. Implementation
30 of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of*
31 *Nesting Birds*, which would identify birds prior to disturbance and would allow for avoidance
32 measures, would reduce this impact on nesting birds to a less-than-significant level.

33 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid**
34 **Disturbance of Nesting Birds**

35 See Mitigation Measure BIO-75 under Impact BIO-75.

36 **Impact BIO-179: Loss or Conversion of Habitat for Wintering Waterfowl as a Result of**
37 **Implementation of Alternative 4A Environmental Commitments**

38 The implementation of Environmental Commitments would result in the permanent loss or
39 conversion of 2,295 acres of cultivated lands and natural communities suitable for wintering
40 waterfowl.

- 41 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal habitat restoration
42 site preparation and inundation would permanently remove an estimated 20 acres of managed

1 wetlands, 1 acre of nontidal wetlands, 25 acres of vernal pool complex, 1 acre of alkali seasonal
2 wetland, 40 acres of grassland, and 54 acres of cultivated lands.

- 3 • *Environmental Commitment 7 Riparian Natural Community Restoration:* Riparian restoration
4 would permanently remove approximately 1 acre of grassland and 251 acres of cultivated lands.
- 5 • *Environmental Commitment 8 Grassland Natural Community Restoration:* Grassland restoration
6 would convert approximately 1,070 acres of cultivated lands into grasslands.
- 7 • *Environmental Commitment 10 Nontidal Marsh Restoration:* Restoration and creation of nontidal
8 freshwater marsh would result in the permanent removal of 832 acres of cultivated lands

9 A total of 1,060 acres of grassland and 11,870 acres of cultivated lands would be protected and
10 1,070 acres of grassland would be restored through Alternative 4A. In addition, 295 acres of tidal
11 freshwater emergent wetland would be restored or created and 119 acres of nontidal wetlands
12 would be protected, and 832 acres of nontidal wetlands would be created in the Delta. Some portion
13 of these wetlands would be expected to provide suitable habitat for wintering waterfowl. The
14 restored and protected acres described above would provide foraging habitat for wintering
15 waterfowl and the acres of cultivated lands protected would provide adequate food sources and
16 resting habitat for waterfowl species. Restoration and protection acres would be associated with
17 Environmental Commitment 3, Environmental Commitment 4, Environmental Commitment 8,
18 Environmental Commitment 9, and Environmental Commitment 10 and would occur in the same
19 timeframe as the construction and early restoration losses. Environmental Commitment 11 would
20 be implemented to guide management of cultivated lands and wetlands for shorebird and waterfowl
21 species.

22 **NEPA Effects:** The loss or conversion of 2,295 acres of cultivated lands and natural communities
23 suitable for wintering waterfowl would not be adverse under NEPA because project proponents
24 have committed to restoring and protecting an acreage that exceeds the typical mitigation ratios for
25 cultivated lands (1:1 protection). This habitat protection and restoration would not be expected to
26 substantially alter food productivity for wintering waterfowl in the Delta. Therefore the
27 implementation of Alternative 4A would not represent an adverse effect on wintering waterfowl.

28 **CEQA Conclusion:** The loss or conversion of 2,295 acres of cultivated lands and natural communities
29 suitable for shorebirds and waterfowl would not represent a substantial impact because project
30 proponents have committed to restoring and protecting an acreage that exceeds the typical
31 mitigation ratios for cultivated lands (1:1 protection). This habitat protection and restoration would
32 not be expected to substantially alter food productivity for wintering waterfowl in the Delta.
33 Therefore the implementation of Alternative 4A would have a less-than-significant impact on
34 wintering waterfowl.

35 **Impact BIO-180: Loss or Conversion of Habitat for Breeding Waterfowl from Implementation** 36 **of Alternative 4A Environmental Commitments**

37 The implementation of Environmental Commitments would result in the permanent loss or
38 conversion of 88 acres of natural communities suitable for breeding waterfowl.

- 39 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* Tidal habitat restoration
40 site preparation and inundation would permanently remove an estimated 20 acres of managed
41 wetlands, 1 acre of nontidal wetlands, 25 acres of vernal pool complex, 1 acre of alkali seasonal
42 wetland, and 40 acres of grassland.

- 1 • *Environmental Commitment 7 Riparian Natural Community Restoration*: Riparian restoration
2 would permanently remove approximately 1 acre of grassland.

3 Alternative 4A would protect up to 119 acres and create up to 832 acres of nontidal marsh. In
4 addition, 295 acres of tidal freshwater wetlands would be restored in the Delta which would be
5 expected to contain water during the breeding period (March through July). Up to 119 acres of
6 nontidal wetlands would be protected and 832 acres of nontidal wetlands would be created in the
7 Delta. Restoration and protection acres would be associated with Environmental Commitment 3,
8 Environmental Commitment 4, and Environmental Commitment 8, Environmental Commitment 10
9 and would occur in the same timeframe as the construction and early restoration losses.
10 Environmental Commitment 11 would be implemented to guide management of habitat for
11 breeding waterfowl. Construction activities could have an adverse effect on nesting waterfowl if
12 they were present in or adjacent to work areas and could result in destruction of nests or
13 disturbance of nesting and foraging behaviors. Mitigation Measure BIO-75, *Conduct Preconstruction*
14 *Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be available to minimize adverse
15 effects on nesting birds.

16 **NEPA Effects:** Habitat loss from the implementation of Environmental Commitments would not
17 result in an adverse effect on breeding waterfowl because of the acres of natural communities and
18 cultivated lands that would be restored and protected. If waterfowl were present in or adjacent to
19 work areas, construction activities could result in destruction of nests or disturbance of nesting and
20 foraging behaviors, which would be an adverse effect on nesting waterfowl. Mitigation Measure BIO-
21 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, would be
22 available to minimize adverse effects on nesting birds.

23 **CEQA Conclusion:** Habitat loss from the implementation of Environmental Commitments would not
24 result a significant impact on breeding waterfowl because of the acres of natural communities and
25 cultivated lands that would be restored and protected. If waterfowl were present in or adjacent to
26 work areas, construction activities could result in destruction of nests or disturbance of nesting and
27 foraging behaviors, which would be a significant impact. Implementation of Mitigation Measure BIO-
28 75, *Conduct Preconstruction Nesting Bird Surveys and Avoid Disturbance of Nesting Birds*, which
29 would require identification of birds prior to disturbance and would allow for avoidance measures,
30 would reduce this impact on nesting birds to a less-than-significant level.

31 **Impact BIO-181: Loss or Conversion of Habitat for Shorebirds from the Implementation of** 32 **Alternative 4A Environmental Commitments**

33 Shorebird use of the study area varies by species and fluctuates both geographically and by habitat
34 type throughout the year. Shallow flooded agricultural fields and wetlands support large numbers of
35 wintering and migrating shorebirds (Shuford et al. 1998), particularly least and western sandpipers,
36 dunlin, greater yellowlegs and long-billed dowitcher. Rice lands of the Sacramento Valley provide
37 important breeding habitat for shorebirds such as American avocet, killdeer, and black-necked stilt
38 (Shuford et al. 2004) and have been designated as a Western Hemisphere Shorebird Reserve
39 Network Site of International Importance (Hickey et al. 2003). Managed wetlands provide suitable
40 foraging and roosting habitat for shorebirds; black-necked stilts, avocets, and yellowlegs use this
41 habitat type almost exclusively. Vernal pool complex and alkali seasonal wetland also provide
42 nesting habitat for American avocet (Shuford et al. 2004). Water depth in all of these habitat types is
43 an important habitat variable as the majority of shorebird species require water depths of
44 approximately 10–20 cm for foraging (Isola et al. 2000, Hickey et al. 2003).

1 **Managed Wetlands**

2 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
3 managed wetland habitat suitability (Table 1, ICF International 2013): black-necked stilt
4 (*Himantopus mexicanus*), greater yellowlegs (*Tringa melanoleuca*), and long-billed dowitcher
5 (*Limnodromus scolopaceus*). Dunlin (*Calidris alpina*), least sandpiper (*Calidris minutilla*),
6 semipalmated plover (*Charadrius semipalmatus*), and western sandpiper (*Calidris mauri*), had a rank
7 2 for managed wetland habitat suitability. Black-bellied plover (*Pluvialis squatarola*) and whimbrel
8 (*Numenius phaeopus*) both had rank 3 for managed wetland habitat suitability.

9 No managed wetlands would be converted or lost from the implementation of Environmental
10 Commitment 4, Environmental Commitment 7, or Environmental Commitment 10. However, 832
11 acres of nontidal marsh would be created under Environmental Commitment 10.

12 **Cultivated Lands**

13 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
14 cultivated lands habitat suitability (Table 1, ICF International 2013): killdeer (*Charadrius*
15 *vociferous*), long-billed curlew, and whimbrel within pasture habitat. Long-billed dowitcher and
16 killdeer both had a rank 2 for idle crop habitat suitability and black-bellied plover was ranked 2 for
17 pasture habitat. Red-necked phalarope (*Phalaropus lobatus*) and Wilson's phalarope (*Phalaropus*
18 *tricolor*) were both ranked 2 for grain and hay crops. Long-billed dowitcher, dunlin, least sandpiper,
19 and long-billed curlew were all ranked 3 for rice habitat suitability and killdeer was ranked 3 for
20 field crop habitat suitability.

21 Within the Delta, 54 acres of cultivated lands would be permanently converted to tidal wetlands as a
22 result of tidal restoration (Environmental Commitment 4), 251 acres would be permanently lost as a
23 result of riparian restoration (Environmental Commitment 7), 1,070 acres would be converted to
24 grassland as a result of grassland restoration (Environmental Commitment 8), and 832 acres would
25 be converted to nontidal wetlands as a result of nontidal marsh restoration (Environmental
26 Commitment 10).

27 **Tidal Wetlands**

28 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
29 tidal mudflat habitat suitability (Table 6, ICF International 2013): black-bellied plover, dunlin, least
30 sandpiper, marbled godwit (*Limosa fedoa*), semipalmated plover, short-billed dowitcher
31 (*Limnodromus griseus*), western sandpiper, and willet (*Tringa semipalmata*). Long-billed curlew
32 (*Numenius americanus*) and whimbrel both had a rank 2 for tidal mudflat habitat suitability.
33 American avocet (*Recurvirostra americana*) was ranked 3 for tidal mudflat habitat suitability. For
34 tidal brackish emergent wetland/tidal freshwater emergent wetland, willet was ranked 2 and long-
35 billed curlew and whimbrel were both ranked 3 for habitat suitability.

36 No tidal wetlands would be converted or lost from the implementation of Environmental
37 Commitment 4, Environmental Commitment 7, Environmental Commitment 8, or Environmental
38 Commitment 10. However, 295 acres of tidal wetlands would be created under Environmental
39 Commitment 4.

1 **Nontidal Wetlands**

2 According to Stralberg et al. 2011, the following species of shorebirds had a rank 1 designation for
3 nontidal wetland habitat suitability (Table 6, ICF International 2013): red-necked phalarope and
4 Wilson’s phalarope for nontidal freshwater perennial emergent wetland and American avocet for
5 alkali seasonal wetland complex. Greater yellowlegs had a rank 2 for vernal pool complex habitat
6 suitability. Red-necked phalarope and western sandpiper were both ranked 3 for alkali seasonal
7 wetland habitat suitability and greater yellowlegs was ranked 3 for nontidal freshwater perennial
8 emergent wetland habitat suitability.

9 No nontidal wetlands would be converted or lost from the implementation of Environmental
10 Commitment 4, Environmental Commitment 7, or Environmental Commitment 10. However, 832
11 acres of nontidal wetlands would be created under Environmental Commitment 10.

12 The protection and restoration of natural communities would also include management and
13 enhancement actions under *Environmental Commitment 11 Natural Communities Enhancement and*
14 *Management*. The following management activities to benefit shorebirds would be considered for
15 implementation under Environmental Commitment 11 in areas where they would not conflict with
16 other species management.

17 ● Managed wetlands and Nontidal Wetlands:

18 ○ Managed wetlands can be potentially manipulated to provide the optimum water depths
19 for foraging shorebirds and islands for nesting (Hickey et al. 2003).

20 ○ During fall and spring, stagger the timing and location of draining and flooding to optimize
21 the extent of shallow-water habitat; varying depths within the wetland unit helps to create
22 temporal variation in foraging opportunities. During warm, dry springs when wetland units
23 dry quickly, wetland units can be re-supplied with water to extend habitat availability for
24 shorebirds.

25 ○ Provide open, shallow water habitat adjacent to minimally vegetated, shallowly sloped
26 edges for nesting shorebirds between April and July.

27 ○ Provide islands with little to no vegetation to increase the likelihood of shorebird roosting
28 and nesting.

29 ○ Create low slopes on islands and levees; gradual angles (10–12:1) are better than steep
30 angles.

31 ○ Limit levee maintenance during the nesting season (April through July). However, mowing
32 the center of levees is fine.

33 ○ Potentially add material to levees or to islands to encourage nesting for some species.

34 ● Cultivated Lands:

35 ○ Maintaining a mosaic of dry and flooded crop types, and varying water depths will promote
36 a diverse community of waterbirds, including shorebirds, during fall migration and winter
37 (Shuford et al. 2013).

38 ○ To provide wintering habitat for multiple waterbird guilds, including shorebirds, use a
39 combination of flooding practices that include one-time water application and maintenance
40 flooding while also providing unflooded habitat (Strum et al. *in review*).

- 1 ○ The post-harvest flooding of winter wheat and potato fields in early fall (July- September)
2 can provide substantial benefits to shorebirds at a time of very limited shallow-water
3 habitat on the landscape (Shuford et al. 2013).
- 4 ○ Stagger the drawdown of flooded rice and other winter-flooded agricultural fields to
5 prolong the availability of flooded habitat (Iglecia et al. 2012). Be aware of soil type
6 because this practice may not be as effective on soils that drain quickly.
- 7 ○ Remove as much stubble as possible in rice and other agricultural fields after harvest to
8 increase the potential shorebird habitat on intentionally flooded or unflooded fields that
9 may passively gather rain water (Iglecia et al. 2012).
- 10 ○ Shallowly flood available agricultural fields during July, August, and September to provide
11 early fall migration habitat for shorebirds. Fields should be free of vegetation prior to
12 flooding, have minimal micro-topography (e.g., no large clods), and should remain flooded
13 for up to three week periods (after three weeks, vegetation encroachment reduces habitat
14 value for shorebirds; ICF International 2013).
- 15 ○ Manage levee habitats to have minimal vegetation but do not spray herbicide directly or
16 drive on levees during the nesting season (April–July, Iglecia et al. 2012).
- 17 ○ Maintain a minimum top-width of 30 inches for levees, based on increased avocet use of
18 wider levees (Iglecia et al. 2012).
- 19 ○ When possible, flood fields with nesting habitat (modified levees and islands) in late April
20 to provide nesting habitat for American avocets (Iglecia et al. 2012).
- 21 ○ Finer grained substrate (clods smaller than a fist) in rice and other agricultural fields may
22 be more appealing for nesting shorebirds (Iglecia et al. 2012).
- 23 ○ Maintain gently sloping levees and island sides (10–12:1; Iglecia et al. 2012).
- 24 ○ Islands should be disked along with the rest of the field after harvest to help inhibit
25 vegetation growth (Iglecia et al. 2012).

26 **NEPA Effects:** Alternative 4A implementation would result in the conversion of cultivated lands in
27 the Delta to tidal and nontidal wetlands. The result would be a loss of the primary habitat of black-
28 necked stilt, American avocet, greater yellowlegs, and long-billed dowitcher and a gain in the
29 primary habitat of black-bellied plover, dunlin, least sandpiper, marbled godwit, semipalmated
30 plover, short-billed dowitcher, western sandpiper, and willet. While losses of cultivated lands would
31 be incurred, protection, enhancement, and management of 11,870 acres of cultivated lands would
32 likely have substantial benefits for select species of wintering and breeding shorebirds. This is
33 because impacts on crop types would be distributed across all crop types, while protection would
34 focus primarily on pasture lands, grain and hay, corn, and rice types. While the protection,
35 enhancement, and management of these crop types are being driven by Swainson’s hawk, giant
36 garter snake, and greater sandhill crane, they would also benefit shorebirds with the
37 implementation of the management actions outlined in *Environmental Commitment 11 Natural*
38 *Communities Enhancement and Management*. Habitat conversion would not be expected to result in
39 an adverse effect on shorebird populations in the study area.

40 **CEQA Conclusion:** Alternative 4A implementation would result in the conversion of cultivated lands
41 in the Delta to tidal and nontidal wetlands. The result would be a loss of the primary habitat of
42 black-necked stilt, American avocet, greater yellowlegs, and long-billed dowitcher and a gain in the

1 primary habitat of black-bellied plover, dunlin, least sandpiper, marbled godwit, semipalmated
2 plover, short-billed dowitcher, western sandpiper, killdeer, and willet. While losses of cultivated
3 lands would be incurred, protection, enhancement, and management of 11,870 acres of cultivated
4 lands would likely have substantial benefits for select species of wintering and breeding shorebirds.
5 This is because impacts on crop types would be distributed across all crop types, while protection
6 would focus primarily on pasture lands, grain and hay, corn, and rice types. While the protection,
7 enhancement, and management of these crop types are being driven by Swainson's hawk, giant
8 garter snake, and greater sandhill crane, they would also benefit shorebirds with the
9 implementation of the management actions outlined in *Environmental Commitment 11 Natural*
10 *Communities Enhancement and Management*. Habitat conversion would not be expected to adversely
11 affect shorebird populations in the study area. With the protection and restoration of acres in the
12 Delta watershed, in addition to the implementation of the management actions outlined in
13 *Environmental Commitment 11 Natural Communities Enhancement and Management*, habitat
14 conversion would be expected to have a less-than-significant impact on shorebird populations in the
15 study area.

16 **Impact BIO-182: Effects on Shorebirds and Waterfowl Associated with Electrical** 17 **Transmission Facilities**

18 New transmission lines installed in the study area would increase the risk for bird-power line
19 strikes, which could result in injury or mortality of shorebirds and waterfowl. The existing network
20 of power lines in the study currently poses a risk for shorebirds and waterfowl in the Delta. New
21 transmission lines would increase this risk and have an adverse effect on shorebird and waterfowl
22 species in the absence of other avoidance and minimization measures. The implementation of
23 *AMM20 Greater Sandhill Crane* would reduce potential effects through the installation of flight-
24 diverters on new transmission lines and selected existing transmission lines in the study area.

25 **NEPA Effects:** New transmission lines would increase the risk for shorebird and waterfowl power
26 line strikes which could have a substantial adverse effect as a result of direct mortality. This impact
27 would be significant. With the implementation of *AMM20 Greater Sandhill Crane*, the potential effect
28 of the construction of new transmission lines on shorebird and waterfowl would not be adverse.

29 **CEQA Conclusion:** New transmission lines would increase the risk for shorebird and waterfowl
30 power line strikes which could have a substantial adverse effect as a result of direct mortality. This
31 impact would be significant. The implementation of *AMM20 Greater Sandhill Crane* would reduce the
32 potential impact of powerline strikes from the construction of new transmission lines on shorebirds
33 and waterfowl to a less-than-significant level.

34 **Impact BIO-183: Indirect Effects of Plan Implementation on Shorebirds and Waterfowl**

35 **Indirect Construction- and Operation-Related Effects:** Noise and visual disturbances associated
36 with construction-related activities could result in temporary disturbances that affect shorebird and
37 waterfowl use of modeled habitat. Indirect effects associated with construction include noise, dust,
38 and visual disturbance caused by grading, filling, contouring, and other ground-disturbing
39 operations. Construction-related noise and visual disturbances could disrupt nesting and foraging
40 behaviors, and reduce the functions of suitable habitat which could result in an adverse effect on
41 these species. Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
42 *Disturbance of Nesting Birds*, would be available to minimize adverse effects on active nests. The use
43 of mechanical equipment during water conveyance construction could cause the accidental release

1 of petroleum or other contaminants that could affect shorebirds and waterfowl or their prey in the
2 surrounding habitat. AMM1–AMM7, including *AMM2 Construction Best Management Practices and*
3 *Monitoring*, would minimize the likelihood of such spills from occurring. The inadvertent discharge
4 of sediment or excessive dust adjacent to shorebirds and waterfowl in the study area could also have
5 a negative effect on these species. AMM1–AMM7 would ensure that measures were in place to
6 prevent runoff from the construction area and the negative effects of dust on wildlife adjacent to
7 work areas.

8 **Methylmercury Exposure:** Project activities have the potential to exacerbate bioaccumulation of
9 mercury in shorebird and waterfowl species. Mercury is transformed into the more bioavailable
10 form of methylmercury in aquatic systems, especially areas subjected to regular wetting and drying
11 such as tidal marshes and flood plains (Alpers et al. 2008). Bioaccumulation of methylmercury
12 varies by species as there are taxonomic differences in rates of detoxification within the liver
13 (Eagles-Smith et al. 2009). Organisms feeding within pelagic-based (algal) foodwebs have been
14 found to have higher concentrations of methylmercury than those in benthic or epibenthic
15 foodwebs; this has been attributed to food chain length and dietary segregation (Grimaldo et al.
16 2009). That is, the pelagic food chain tends to be longer than the benthic food chain, which allows
17 for greater biomagnification of methylmercury in top predators. Also, there is less prey diversity at
18 the top of the pelagic food chain than in the benthic food chain; pelagic top predators eat smaller fish
19 and little else, while benthic top predators consume a variety of organisms, many of which are lower
20 in the food chain than fishes and thus have less potential for methylmercury biomagnification.
21 Shorebirds and waterfowl that forage on invertebrates and bivalves, may therefore have lower
22 concentrations of methylmercury than diving ducks that forage on fish. A detailed review of the
23 methylmercury issues associated with implementation of Alternative 4A are contained in Appendix
24 11F, *Substantive BDCP Revisions*. The review includes an overview of the project-related
25 mechanisms that could result in increased mercury in the foodweb, and how exposure of individual
26 species to mercury may occur based on feeding habits and where species habitat overlaps with the
27 areas where mercury bioavailability could increase.

28 Largemouth bass was used as a surrogate species for analysis and the modeled effects of mercury
29 concentrations from changes in water operations under water conveyance facilities on largemouth
30 bass did not differ substantially from existing conditions (see Appendix 11F, *Substantive BDCP*
31 *Revisions*); therefore, results also indicate that shorebird and waterfowl mercury tissue
32 concentrations would not measurably increase as a result of water conveyance facilities
33 implementation.

34 Mercury is transformed into the more bioavailable form of methylmercury in aquatic systems,
35 especially areas subjected to regular wetting and drying such as tidal marshes and flood plains.
36 Thus, Alternative 4A restoration activities that create newly inundated areas (Environmental
37 Commitment 4) could increase bioavailability of mercury. In general, the highest methylation rates
38 are associated with high tidal marshes that experience intermittent wetting and drying and
39 associated anoxic conditions (Alpers et al. 2008). Mercury is generally elevated throughout the
40 Delta, and restoration of the lower potential areas in total may result in generalized, very low level
41 increases of mercury. Given that some species have elevated mercury tissue levels without the
42 project, these low level increases could result in some level of effects. Restoration in Suisun Marsh
43 would convert managed wetlands to tidal wetlands, which would be expected to result in an overall
44 reduction in mercury methylation.

1 Due to the complex and very site-specific factors that will determine if mercury becomes mobilized
2 into the foodweb, Environmental Commitment 12, is included to provide for site-specific evaluation
3 for each restoration project. On a project-specific basis, where high potential for methylmercury
4 production is identified that restoration design and adaptive management cannot fully address
5 while also meeting restoration objectives, alternate restoration areas will be considered.
6 Environmental Commitment 12 will be implemented in coordination with other similar efforts to
7 address mercury in the Delta, and specifically with the DWR Mercury Monitoring and Analysis
8 Section. This Environmental Commitment will include the following actions.

- 9 • Assess pre-restoration conditions to determine the risk that the project could result in increased
10 mercury methylation and bioavailability
- 11 • Define design elements that minimize conditions conducive to generation of methylmercury in
12 restored areas.
- 13 • Define adaptive management strategies that can be implemented to monitor and minimize
14 actual postrestoration creation and mobilization of methylmercury.

15 **Selenium Exposure:** Selenium is an essential nutrient for avian species and has a beneficial effect in
16 low doses. However, higher concentrations can be toxic (Ackerman and Eagles-Smith 2009,
17 Ohlendorf and Heinz 2009) and can lead to deformities in developing embryos, chicks, and adults,
18 and can also result in embryo mortality (Ackerman and Eagles-Smith 2009, Ohlendorf and Heinz
19 2009). The effect of selenium toxicity differs widely between species and also between age and sex
20 classes within a species. In addition, the effect of selenium on a species can be confounded by
21 interactions with the effects of other contaminants such as mercury (Ackerman and Eagles-Smith
22 2009).

23 The primary source of selenium bioaccumulation in birds is through their diet (Ackerman and
24 Eagles-Smith 2009, Ohlendorf and Heinz 2009) and selenium concentration in species differs by the
25 trophic level at which they feed (Ackerman and Eagles-Smith 2009, Stewart et al. 2004). At
26 Kesterson Reservoir in the San Joaquin Valley, selenium concentrations in invertebrates have been
27 found to be two to six times the levels in rooted plants. Furthermore, bivalves sampled in the San
28 Francisco Bay contained much higher selenium levels than crustaceans such as copepods (Stewart et
29 al. 2004). Studies conducted at the Grasslands in Merced County recorded higher selenium levels in
30 black-necked stilts which feed on aquatic invertebrates than in mallards and pintails, which are
31 primarily herbivores (Paveglio and Kilbride 2007). Diving ducks in the San Francisco Bay (which
32 forage on bivalves) have much higher selenium levels than shorebirds that prey on aquatic
33 invertebrates (Ackerman and Eagles-Smith 2009). Therefore, birds that consume prey with high
34 levels of selenium have a higher risk of selenium toxicity.

35 Selenium toxicity in avian species can result from the mobilization of naturally high concentrations
36 of selenium in soils (Ohlendorf and Heinz 2009) and project activities have the potential to
37 exacerbate bioaccumulation of selenium in avian species, including shorebird and waterfowl
38 species. Marsh (tidal and nontidal) and floodplain restoration have the potential to mobilize
39 selenium, and therefore increase avian exposure from ingestion of prey items with elevated
40 selenium levels. Thus, Alternative 4A restoration activities that create newly inundated areas could
41 increase bioavailability of selenium (see Chapter 3, *Conservation Strategy*, of the BDCP for details of
42 restoration). Changes in selenium concentrations were analyzed in Chapter 8, *Water Quality*, and it
43 was determined that, relative to Existing Conditions and the No Action Alternative, water
44 conveyance facilities would not result in substantial, long-term increases in selenium concentrations

1 in water in the Delta under any alternative. However, it is difficult to determine whether the effects
2 of potential increases in selenium bioavailability associated with Environmental Commitment 4
3 would lead to adverse effects on shorebirds and waterfowl species.

4 Because of the uncertainty that exists at this programmatic level of review, there could be a
5 substantial effect on shorebirds and waterfowl from increases in selenium associated with
6 restoration activities. This effect would be addressed through the implementation of *AMM27*
7 *Selenium Management*, which would provide specific tidal habitat restoration design elements to
8 reduce the potential for bioaccumulation of selenium and its bioavailability in tidal habitats, (see
9 Appendix 3B, *Environmental Commitments, AMMs, and CMs*). Furthermore, the effectiveness of
10 selenium management to reduce selenium concentrations and/or bioaccumulation would be
11 evaluated separately for each restoration effort as part of design and implementation. This
12 avoidance and minimization measure would be implemented as part of the tidal habitat restoration
13 design schedule.

14 **NEPA Effects:** Noise and visual disturbances from the construction of Alternative 4A water
15 conveyance facilities could reduce shorebird and waterfowl use of modeled habitat adjacent to work
16 areas. Moreover, operation and maintenance of the water conveyance facilities, including the
17 transmission facilities, could result in ongoing but periodic postconstruction disturbances that could
18 affect shorebird and waterfowl use of the surrounding habitat. AMM1–AMM7 would minimize these
19 effects, and Mitigation Measure BIO-75, *Conduct Preconstruction Nesting Bird Surveys and Avoid*
20 *Disturbance of Nesting Birds*, would be available to address adverse effects on nesting individuals.

21 Tidal habitat restoration could result in increased exposure of shorebirds and waterfowl to
22 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
23 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
24 potential for bioaccumulation of selenium and its bioavailability in tidal habitats. Therefore, the
25 indirect effects associated with noise and visual disturbances, and increased exposure to selenium
26 from Alternative 4A implementation would not have an adverse effect on shorebirds and waterfowl.

27 Changes in water operations under water conveyance facilities would not be expected to result in
28 increased mercury bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could
29 result in increased exposure of California least tern to methylmercury. There is potential for
30 increased exposure of the foodwebs to methylmercury in these areas, with the level of exposure
31 dependent on the amounts of mercury available in the soils and the biogeochemical conditions.
32 However, the concentrations of methylmercury that are harmful varies by species, and the potential
33 for increased exposure varies substantially within the study area. Implementation of Environmental
34 Commitment 12, which contains measures to assess the amount of mercury before project
35 development, followed by appropriate design and adaptation management, would minimize the
36 potential for increased methylmercury exposure, and would result in no adverse effect on
37 shorebirds and waterfowl.

38 **CEQA Conclusion:** Indirect effects that include noise and visual disturbance, potential hazardous
39 spills, increased dust and sedimentation, and increased methylmercury and selenium exposure as a
40 result of Alternative 4A water conveyance facilities construction and operation and maintenance
41 would represent an adverse effect as a result of habitat modification and potential for direct
42 mortality of shorebirds and waterfowl in the absence of the environmental commitments and
43 AMMs. This would be a significant impact.

1 AMM1–AMM7, and implementation of Mitigation Measure BIO-75, *Conduct Preconstruction Nesting*
2 *Bird Surveys and Avoid Disturbance of Nesting Birds*, would reduce potential adverse effects of noise,
3 visual disturbance and potential for spills, dust, and sedimentation.

4 Tidal habitat restoration could result in increased exposure of shorebirds and waterfowl to
5 selenium. This effect would be addressed through the implementation of *AMM27 Selenium*
6 *Management*, which would provide specific tidal habitat restoration design elements to reduce the
7 potential for bioaccumulation of selenium and its bioavailability in tidal habitats.

8 Changes in water operations under water conveyance facilities would not be expected to result in
9 increased mercury bioavailability or exposures to Delta foodwebs. Tidal habitat restoration could
10 result in increased exposure of California least tern to methylmercury. There is potential for
11 increased exposure of the foodwebs to methylmercury in these areas, with the level of exposure
12 dependent on the amounts of mercury available in the soils and the biogeochemical conditions. This
13 could result in a significant impact. However, the concentrations of methylmercury that are harmful
14 varies by species, and the potential for increased exposure varies substantially within the study
15 area. Implementation of Environmental Commitment 12 which contains measures to assess the
16 amount of mercury before project development, followed by appropriate design and adaptation
17 management, would minimize the potential for increased methylmercury exposure, and would
18 result in no adverse effect on shorebirds and waterfowl.

19 Therefore, with AMM1–AMM7, AMM27, and Environmental Commitment 12 in place, in addition to
20 the implementation of Mitigation Measure BIO-75, the indirect effects of Alternative 4A
21 implementation would not result in a substantial adverse effect through habitat modification or
22 potential mortality. Therefore, the indirect effects of Alternative 4A implementation would have a
23 less-than-significant impact on shorebirds and waterfowl.

24 **Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid** 25 **Disturbance of Nesting Birds**

26 See Mitigation Measure BIO-75 under Impact BIO-75.

27 **Common Wildlife and Plants**

28 Common wildlife and plants are widespread, often abundant, species that are not all covered under
29 laws or regulations that address conservation or protection of individual species. Common wildlife
30 do have some level of protection under California Fish and Game Code and most bird species have
31 protections under the Migratory Bird Treaty Act. Examples of common wildlife and plants occurring
32 in the study area are provided within the discussion for each natural community type in Section
33 12.1.2.2, *Special-Status and Other Natural Communities*. Impacts on common wildlife and plants
34 would occur through the same mechanisms discussed for natural communities and special-status
35 wildlife and plants for each alternative.

36 **Impact BIO-184: Effects on Habitat and Populations of Common Wildlife and Plants**

37 Effects on habitat of common wildlife and plants, including habitat removal and conversion, are
38 discussed in the analysis of Alternative 4A effects on natural communities (Impacts BIO-1 through
39 BIO-21). In general, effects on habitat of common wildlife and plants would not be adverse. Through
40 the course of implementing the project over a 15-year time period, several natural communities and
41 land cover types would be reduced in size, primarily from construction of the water conveyance

1 facility, but also from restoration of other natural communities. Grassland, managed wetland and
2 cultivated lands would be reduced in acreage, so the common species that occupy these habitats
3 would be affected. However, the losses in acreage and value of these habitats would be offset by
4 protection, restoration, enhancement, and management actions under Alternative 4A, including
5 *Environmental Commitment 3 Natural Communities Protection and Restoration, Environmental*
6 *Commitment 4 Tidal Natural Communities Restoration, Environmental Commitment 6 Channel Margin*
7 *Enhancement, Environmental Commitment 7 Riparian Natural Community Restoration, Environmental*
8 *Commitment 9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration, Environmental*
9 *Commitment 10 Nontidal Marsh Restoration, and Environmental Commitment 11 Natural*
10 *Communities Enhancement and Management.* In addition, the AMMs contained in Appendix 3B,
11 *Environmental Commitments, AMMs, and CMs,* would be in place to reduce or eliminate the potential
12 to adversely affect both special-status and common wildlife and plants.

13 Direct effects on common wildlife and plants from constructing water conveyance facilities and
14 implementing Environmental Commitments would include construction or inundation-related
15 disturbances that result in injury or mortality of wildlife or plants and the immediate displacement
16 of wildlife, including increased traffic on local roads from construction vehicles that could increase
17 wildlife mortality and impede wildlife movement. Effects of construction traffic on wildlife moving
18 in the vicinity of Stone Lakes NWR would be minimized by *AMM20 Greater Sandhill Crane*, which
19 includes a measure for the installation of a vegetation screen or other noise and visual barrier along
20 Hood Franklin Road for the benefit of cranes, which would be a minimum of 5 feet high (above the
21 adjacent elevated road, if applicable) and which would provide a continuous surface impenetrable
22 by light. This measure would potentially direct wildlife wishing to cross Hood Franklin toward the
23 overcrossing of the canal that links the Stone Lakes properties just east of the town of Hood. The
24 overcrossing includes strips of terrestrial habitat on either side of the canal.

25 Indirect effects include project-related disturbances to nearby wildlife and plants during
26 construction (e.g., disruption of breeding and foraging behaviors from noise and human activity,
27 habitat degradation from fugitive dust and runoff) and effects occurring later in time (e.g., collisions
28 of birds with transmission lines, habitat fragmentation, vegetation management). Indirect effects
29 could result both from construction and from operations and maintenance (e.g., ground
30 disturbances could result in the spread and establishment of invasive plants).

31 **NEPA Effects:** The direct and indirect effects associated with implementing the Environmental
32 Commitments of Alternative 4A would not be adverse because the Environmental Commitments and
33 AMMs also expand and protect natural communities, avoid or minimize effects on special-status
34 species, prevent the introduction and spread of invasive species, and enhance natural communities.
35 These actions would result in avoiding and minimizing effects on common wildlife and plants as
36 well.

37 **CEQA Conclusion:** Construction and operation of the water conveyance facilities and habitat
38 restoration activities would have impacts on common wildlife and plants in the study area through
39 habitat loss and through direct or indirect loss or injury of individuals. The loss of habitat would not
40 be substantial, because habitat restoration would increase the amount and extent of habitat
41 available for use by most common wildlife and plant species. Environmental commitments to avoid
42 or minimize effects on special-status species, and to enhance natural communities also would result
43 in avoiding and minimizing effects on common wildlife and plants. Consequently, implementation of
44 Alternative 4A is not expected to cause any populations of common wildlife or plants to drop below

1 self-sustaining levels, and this impact would be less than significant. No mitigation would be
2 required.

3 **Wildlife Corridors**

4 Essential Connectivity Areas (ECAs) are lands likely to be important to wildlife movement between
5 large, mostly natural areas at the state wide level. The ECAs form a functional network of wildlands
6 that are considered important to the continued support of California's diverse natural communities.
7 Four general areas were identified within the study area that contain ECAs (Figure 12-2). The BDCP
8 also identified important landscape linkages in the Plan Area to guide reserve design, which can also
9 be seen on Figure 12-2.

10 **Impact BIO-185: Effects of Alternative 4A on Wildlife Corridors**

11 Alternative 4A water conveyance facilities would cross two of the ECAs identified during the
12 analysis, the Stone Lake-Yolo Bypass ECA and the Mandeville Island-Staten Island ECA.

13 The construction of Intakes 2 and 3, temporary tunnel work areas, and RTM areas would occur
14 within the Stone Lake-Yolo Bypass ECA. These activities would result in the permanent loss of
15 narrow strips of riparian vegetation along the Sacramento River and the permanent and temporary
16 loss of cultivated lands. Alternative 4A would not substantially increase impediments to movement
17 of any nonavian wildlife that could move from Stone Lakes to Yolo Bypass because the Sacramento
18 River and Sacramento River Deep Water Ship Channel already create a barrier to dispersal for
19 nonavian species. However, the conversion of riparian and cultivated lands and the presence of the
20 intakes would locally constrict the north-south movement of nonavian terrestrial species in the area
21 between the Sacramento River and the Southern Pacific Dredger Cut west of Stone Lakes, as well as
22 the east-west movement between Stone Lakes and the east bank of the Sacramento River. No
23 records of wildlife species were identified within these construction footprints, though there are
24 several records for Swainson's hawk in the vicinity. Though there would be losses in Swainson's
25 hawk foraging habitat and potential nesting habitat in these areas, these losses would not
26 substantially impede the movements of Swainson's hawks in the area. The loss in habitat is
27 addressed in the Swainson's hawk effects analysis.

28 The addition of temporary transmission lines within the Stone Lake-Yolo Bypass ECA, which would
29 be in place for approximately 7 years, could adversely affect birds during periods of low visibility.
30 Sandhill cranes that are known to roost at Stones Lakes could particularly be adversely affected by
31 the addition of the north-south running transmission line to the west of Stone Lakes and by the east-
32 west transmission line between Stone Lakes and the Cosumnes Preserve; however, this line would
33 generally parallel an existing transmission line. Because the proposed east-west transmission line
34 parallels an existing line and would only be in place for approximately 7 years it would not likely
35 create a barrier to the future movement of cranes in this area (see impact discussions for greater
36 and lesser sandhill cranes).

37 The Alternative 4A conveyance facilities would also pass through the Mandeville Island-Staten
38 Island ECA, which also has several know roost locations for greater sandhill crane. Within this ECA,
39 Alternative 4A would result in the construction of a large RTM disposal area on Bouldin Island,
40 permanent access roads on Bouldin and Mandeville Islands, and temporary transmission lines
41 across most of the ECA. As discussed above, the temporary transmission lines could adversely affect
42 the movement of cranes and other bird species during periods of low visibility. The RTM disposal
43 area may create a physical barrier to movement for some species and could make this area unusable

1 as wildlife habitat for close to 10 years during the tunnel construction. The access roads are mostly
2 located on existing dirt and paved roads and would therefore not create any new physical barriers
3 but could temporarily increase road mortality during periods of construction. The conveyance
4 alignment at this location would be within the tunnel and thus not create a barrier to wildlife
5 movement.

6 Alternative 4A conveyance facilities would create some localized disruption in wildlife movement
7 and the temporary and permanent transmission lines would create additional barriers to movement
8 for avian species during periods of low visibility. However, overall the Alternative 4A alignment
9 would not create substantial barriers to movement between ECAs because the majority of the
10 alignment consists of a tunnel that would be beneath riparian corridors, which are the most likely
11 dispersal routes for terrestrial animals in the majority of the study area, and because the large
12 surface impacts (the intakes) are in areas that already have barriers to movement for nonavian
13 terrestrial species (Sacramento River and Sacramento River Deep Water Ship Channel).

14 Restoration activities may occur in some of the ECAs. These activities would generally improve the
15 movement of wildlife within and outside of the study area. In addition, the preservation of restored
16 lands (Environmental Commitment 3) and the enhancement and management of these areas
17 (Environmental Commitment 11) would improve and maintain wildlife corridors within the study
18 area.

19 **NEPA Effects:** Alternative 4A conveyance facilities would create local barriers to dispersal but
20 overall the restoration activities would improve opportunities for wildlife dispersal within the study
21 area and between areas outside of the study area and therefore overall Alternative 4A would not
22 adversely affect wildlife corridors.

23 **CEQA Conclusion:** Alternative 4A conveyance facilities would create local barriers to dispersal and
24 create barriers to safe movement of avian species during periods of low visibility but overall the
25 restoration activities would improve opportunities for wildlife dispersal within the study area and
26 between areas outside of the study area and therefore overall Alternative 4A would result in less-
27 than-significant impacts on wildlife corridors.

28 **Invasive Plant Species**

29 The invasive plant species that primarily affect each natural community in the study area, which
30 include water hyacinth, perennial pepperweed, giant reed, and Brazilian waterweed, are discussed
31 in Section 12.1.4, *Invasive and Noxious Plant Species*. Invasive species compete with native species
32 for resources and can alter natural communities by altering fire regimes, hydrology (e.g.,
33 sedimentation and erosion), light availability, nutrient cycling, and soil chemistry but also have the
34 potential to harm human health and the economy by adversely affecting natural ecosystems, water
35 delivery, flood protection systems, recreation, agricultural lands, and developed areas (Randall and
36 Hoshovsky 2000). The construction and restoration activities associated with Alternative 4A could
37 result in the introduction or spread of invasive plant species by creating temporary ground
38 disturbance that provides opportunities for colonization by invasive plants in the study area.

39 The primary mechanisms for the introduction of invasive plants as the result of implementation of
40 Alternative 4A are listed here.

- 41 ● Grading, excavation, grubbing, and placement of fill material.
- 42 ● Breaching, modification, or removal of existing levees and construction of new levees.

- 1 • Modification, demolition, and removal of existing infrastructure (e.g., buildings, roads, fences,
 - 2 electric transmission and gas lines, irrigation infrastructure).
 - 3 • Maintenance of infrastructure.
 - 4 • Removal of existing vegetation and planting/seeding of vegetation.
 - 5 • Maintaining vegetation and vegetation structure (e.g., grazing, mowing, burning, trimming).
 - 6 • Dredging waterways.
- 7 Clearing operations and the movement of vehicles, equipment, and construction materials in the
- 8 study area would facilitate the introduction and spread of invasive plants by bringing in or moving
- 9 seeds and other propagules. These effects would result from four activities.
- 10 • Spreading chipped vegetative material from clearing operations over topsoil after earthwork
 - 11 operations are complete.
 - 12 • Importing, distributing, storing, or disposing of fill, RTM, borrow, spoil, or dredge material.
 - 13 • Traffic from construction vehicles (e.g., water and cement trucks) and personal vehicles of
 - 14 construction staff.
 - 15 • Transport of construction materials and equipment within the study area and to/from the study
 - 16 area.

17 Table 12-4A-69 lists the acreages of temporary disturbance in each natural community in the study

18 area that would result from implementation of Alternative 4A.

19 **Table 12-4A-69. Summary of Temporary Disturbance in Natural Communities under Alternative 4A**

Natural Community	Temporary Impacts (acres)
Tidal perennial aquatic	2,098
Tidal brackish emergent wetland	0
Tidal freshwater emergent wetland	15
Valley foothill riparian	31
Grassland	151
Inland dune scrub	0
Alkali seasonal wetland complex	0
Vernal pool complex	3
Other natural seasonal wetland	0
Nontidal freshwater perennial emergent wetland	6
Nontidal perennial aquatic	10
Managed wetlands	29
Cultivated lands	1,309
Total	3,652

20

1 **Impact BIO-186: Adverse Effects on Natural Communities Resulting from the Introduction**
2 **and Spread of Invasive Plant Species**

3 Alternative 4A would have adverse effects on natural communities as a result of the introduction
4 and spread of invasive plant species through implementation of water conveyance facilities,
5 Environmental Commitment 3, Environmental Commitment 4, Environmental Commitment 6,
6 Environmental Commitment 7, Environmental Commitment 9, Environmental Commitment 10 and
7 AMM6. No adverse effects are expected from implementation of other project-related
8 Environmental Commitments.

- 9
- 10 • *Water Facilities and Operations:* Construction of the Alternative 4A water conveyance facilities
11 would result in the temporary disturbance of 3,652 acres that would provide opportunities for
colonization by invasive plant species.
 - 12 • *Environmental Commitment 3 Natural Communities Protection and Restoration:* The restoration
13 activities in the natural communities located in planned conservation areas would result in the
14 temporary disturbance of restoration areas that would provide opportunities for colonization
15 by invasive plant species.
 - 16 • *Environmental Commitment 4 Tidal Natural Communities Restoration:* The activities associated
17 with the restoration of tidal perennial aquatic, tidal mudflat, tidal freshwater emergent wetland,
18 and tidal brackish emergent wetland in ROAs would result in the temporary disturbance of tidal
19 areas that would provide opportunities for colonization by invasive plant species. These adverse
20 effects would be reduced by designing restoration projects to minimize the establishment of
21 nonnative submerged aquatic vegetation, and early restoration projects would be monitored to
22 assess the response of nonnative species to restoration designs and local environmental
23 conditions. If indicated by monitoring results, the project proponents would implement invasive
24 plant control measures in restored natural communities to help ensure the establishment of
25 native marsh plain plant species. Additionally, the project proponents would actively remove
26 submerged and floating aquatic vegetation in subtidal portions of tidal natural community
27 restoration sites.
 - 28 • *Environmental Commitment 6 Channel Margin Enhancement:* The temporary effects of channel
29 margin enhancement were not estimated because specific locations for this activity and their
30 areal extent have not been developed. Channel margin enhancement (Sacramento River
31 between Freeport and Walnut Grove, San Joaquin River between Vernalis and Mossdale,
32 Steamboat and Sutter Sloughs, and salmonid migration channels in the interior Delta) would
33 result in the temporary disturbance of channel areas that would provide opportunities for
34 colonization by invasive plant species.
 - 35 • *Environmental Commitment 7 Riparian Natural Community Restoration:* The restoration of
36 valley/foothill riparian habitat would result in the temporary disturbance of riparian areas that
37 would provide opportunities for colonization by invasive plant species.
 - 38 • *Environmental Commitment 9 Vernal Pool and Alkali Seasonal Wetland Complex Restoration:* The
39 restoration of vernal pool and alkali seasonal wetland complexes, primarily in CZ 8, would result
40 in the temporary disturbance of grassland areas that would provide opportunities for
41 colonization by invasive plant species.
 - 42 • *Environmental Commitment 10 Nontidal Marsh Restoration:* Nontidal marsh restoration, which
43 would take place through conversion of agricultural lands primarily in CZ 4, would result in the
44 temporary disturbance of fallow agricultural areas that would provide opportunities for

1 colonization by invasive plant species. These adverse effects would be reduced by monitoring
2 the development of marsh vegetation to determine if nonnative vegetation needs to be
3 controlled to facilitate the establishment of native marsh vegetation or if restoration success
4 could be improved with supplemental plantings of native species. If indicated by monitoring,
5 nonnative vegetation control measures and supplemental plantings would be implemented.

- 6 • *Avoidance and Minimization Measures: AMM6 Disposal and Reuse of Spoils* would have adverse
7 effects if spoils, RTM, dredged material, or chipped vegetative materials containing viable
8 invasive plant propagules are used as topsoil in uninfested areas.

9 The adverse effects that would result from the introduction and spread of invasive plants through
10 colonization of temporarily disturbed areas would be minimized by implementation of
11 Environmental Commitment 11, AMM4, AMM10, and AMM11.

12 *Environmental Commitment 11 Natural Communities Enhancement and Management* would reduce
13 these adverse effects by implementing invasive plant control within the Alternative 4A restoration
14 areas to reduce competition on native species, thereby improving conditions for special-status
15 species, ecosystem function, and native biodiversity. The invasive plant control efforts would target
16 new infestations that are relatively easy to control or the most ecologically damaging nonnative
17 plants for which effective suppression techniques are available. In aquatic and emergent wetland
18 communities, Brazilian waterweed, perennial pepperweed, barbggrass, and rabbitsfoot grass would
19 be controlled (and tidal mudflats would be maintained). In riparian areas, invasive plant control
20 would focus on reducing or eliminating species such as Himalayan blackberry, giant reed, and
21 perennial pepperweed. In grassland areas, techniques such as grazing and prescribed burning may
22 be used to decrease the cover of invasive plant species.

23 Implementation of AMM4, AMM10, and AMM11 would also reduce the adverse effects that could
24 result from construction activities. The AMMs provide methods to minimize ground disturbance,
25 guidance for developing restoration and monitoring plans for temporary construction effects, and
26 measures to minimize the introduction and spread of invasive plants. AMM4 would involve the
27 preparation and implementation of an erosion and sediment control plan that would control erosion
28 and sedimentation and restore soils and vegetation in affected areas. The restoration and
29 monitoring plans for implementation of AMM10 would involve methods for stockpiling, storing, and
30 restoring topsoil, revegetating disturbed areas, monitoring and maintenance schedules, adaptive
31 management strategies, reporting requirements, and success criteria. AMM10 would also include
32 planting native species appropriate for the natural community being restored, with the exception of
33 some borrow sites in cultivated lands that would be restored as grasslands.

34 AMM11 specifies that the project proponent would retain a qualified botanist or weed scientist prior
35 to clearing operations to determine if affected areas contain invasive plants. If areas to be cleared do
36 contain invasive plants, then chipped vegetation material from those areas would not be used for
37 erosion control but would be disposed of to minimize the spread of invasive plant propagules (e.g.,
38 burning, composting). During construction of the water conveyance facilities and construction
39 activities associated with the Environmental Commitments, construction vehicles and construction
40 machinery would be cleaned prior to entering construction sites that are in or adjacent natural
41 communities other than cultivated lands and prior to entering any Alternative 4A restoration sites
42 or conservation lands other than cultivated lands. Vehicles working in or travelling off paved roads
43 through areas with infestations of invasive plant species would be cleaned before travelling to other
44 parts of the study area. Cleaning stations would be established at the perimeter of Alternative 4A
45 activities along construction routes as well as at the entrance to conservation area lands. Biological

1 monitoring would include locating and mapping locations of invasive plant species within the
2 construction areas during the construction phase and the restoration phase. Infestations of invasive
3 plant species would be targeted for control or eradication as part of the restoration and revegetation
4 of temporarily disturbed construction areas.

5 **NEPA Effects:** The implementation of AMM4, AMM10, and AMM11, and Environmental Commitment
6 11 would reduce the potential for the introduction and spread of invasive plants and avoid or
7 minimize the potential effects on natural communities and special-status species; therefore, these
8 effects would not be adverse.

9 **CEQA Conclusion:** Under Alternative 4A, impacts on natural communities from the introduction or
10 spread of invasive plants as a result of implementing Alternative 4A would not result in the long-
11 term degradation of a sensitive natural community due to substantial alteration of site conditions
12 and would, therefore, be considered less than significant. No mitigation would be required.

13 **Compatibility with Plans and Policies**

14 **Impact BIO-187: Compatibility of the Proposed Water Conveyance Facilities and Other** 15 **Environmental Commitments with Federal, State, or Local Laws, Plans, Policies, or Executive** 16 **Orders Addressing Terrestrial Biological Resources in the Study Area**

17 Constructing the water conveyance facilities and implementing associated Environmental
18 Commitments for Alternative 4A have the potential for being incompatible with plans and policies
19 related to managing and protecting terrestrial biological resources of the study area. A number of
20 laws, plans, policies, programs, and executive orders that are relevant to actions in the study area
21 provide guidance for terrestrial biological resource issues as overviewed in Section 12.2, *Regulatory*
22 *Setting*. This overview of plan and policy compatibility evaluates whether Alternative 4A would be
23 compatible or incompatible with such enactments, rather than whether impacts would be adverse
24 or not adverse, or significant or less than significant. If the incompatibility relates to an applicable
25 plan, policy, or executive order adopted to avoid or mitigate terrestrial biological resource effects,
26 then an incompatibility might be indicative of a related significant or adverse effect under CEQA and
27 NEPA, respectively. Such physical effects of Alternative 4A on terrestrial biological resources are
28 addressed in the impacts on natural communities and species. The following is a summary of
29 compatibility evaluations related to terrestrial biological resources for laws, plans, policies, and
30 executive orders relevant to the project.

31 **Federal and State Legislation**

- 32 • The federal Clean Water Act, Endangered Species Act, Fish and Wildlife Coordination Act,
33 Migratory Bird Treaty Act, Rivers and Harbors Act and Marine Mammal Protection Act all
34 contain legal guidance that either directly or indirectly promotes or stipulates the protection
35 and conservation of terrestrial biological resources in the process of undertaking activities that
36 involve federal decisionmaking. The goals and objectives contained in Alternative 4A that
37 provide the major guidance for implementing the various project elements of Alternative 4A are
38 all designed to promote the long-term viability of the natural communities, special-status
39 species, and common species that inhabit the study area. While some of the Environmental
40 Commitments of the alternative involve permanent and temporary loss of natural communities
41 and associated habitats during facilities construction and expansion of certain natural
42 communities, the long-term implementation of the project would provide for the long-term
43 viability and expansion of the habitats and special-status species populations in the study area.

1 Alternative 4A Environmental Commitments would be compatible with the policies and
2 directives for terrestrial biological resources contained in these federal laws.

- 3 ● The California Endangered Species Act, California Native Plant Protection Act, Porter-Cologne
4 Water Quality Control Act, and Natural Communities Conservation Planning Act are state laws
5 that have relevance to the management and protection of terrestrial biological resources in the
6 study area. Each of these laws promotes consideration of wildlife and native vegetation either
7 through comprehensive planning or through regulation of activities that may have an adverse
8 effect on the terrestrial and aquatic natural resources of the state. Alternative 4A contains goals
9 and objectives that have been developed to promote the species protection and natural resource
10 conservation that are directed by these state laws. Alternative 4A Environmental Commitments
11 would be compatible with the policies and directives contained in these laws.
- 12 ● The *Johnston-Baker-Andal-Boatwright Delta Protection Act of 1992 (Delta Protection Act)* and the
13 *Sacramento-San Joaquin Delta Reform Act*, which updated the Delta Protection Act, promote the
14 maintenance and protection of natural resources and the protection of agricultural land uses in
15 the Delta's primary zone through the goals and policies contained in the 2009 updated Land Use
16 and Resources Management Plan (LURMP). While nothing in the LURMP is binding on state
17 agencies that are project proponents, the LURMP does promote restoration and enhancement of
18 habitats for the terrestrial and aquatic species of the Delta on public land. The project's goals
19 and objectives would be compatible with these LURMP goals (Delta Protection Commission
20 2010).
- 21 ● The *Suisun Marsh Preservation Act* of 1974 was designed to protect the Suisun Marsh for long-
22 term use as wildlife habitat, with a goal of preserving and enhancing the quality and diversity of
23 the Marsh's aquatic and wildlife habitats. Alternative 4A would not affect Suisun Marsh;
24 therefore, it would be compatible with the intent of the Suisun Marsh Preservation Act.

25 ***Plans, Programs, and Policies***

- 26 ● *The Delta Plan*, which was developed by the Delta Stewardship Council in compliance with the
27 2009 Sacramento-San Joaquin Delta Reform Act, is mandated to achieve two co-equal goals:
28 provide for a more reliable water supply for California and protect, restore, and enhance the
29 Delta ecosystem. The co-equal goals are to be achieved in a manner that protects and enhances
30 the unique cultural, recreational, natural resource, and agricultural values of the Delta as an
31 evolving place. The project is intended to contain water management and Environmental
32 Commitments consistent with the Delta Plan. The Delta Stewardship Council will determine
33 whether the project is compatible with the goals and objectives of the Delta Plan prior to its
34 approval. The compatibility of the project with the Delta Plan is considered in detail in Section
35 13.2.2.2, *The Delta Plan*.
- 36 ● *California Wetlands Conservation Policy*, which was adopted by Executive Order in 1993,
37 promotes a long-term gain in the quantity, quality and permanence of wetlands acreages and
38 values in California. The project's Environmental Commitments that provide for an expansion of
39 wetland acreage and quality in the Delta are compatible with the intent of the California
40 Wetlands Conservation Policy.
- 41 ● *The North American Waterfowl Management Plan (NAWMP)* and *Central Valley Joint Venture*
42 *(CVJV)* strive to maintain and expand wetlands and uplands for waterfowl and shorebirds in the
43 major basins of California's Central Valley. The NAWMP is a management plan jointly approved
44 by the United States and Canada in 1986. It contains general guidance from the principal wildlife

1 management agencies of the two countries for sustaining abundant waterfowl populations by
 2 conserving landscapes through self-directed partnerships (joint ventures) that are guided by
 3 sound science. The CVJV is the joint venture established for overseeing NAWMP implementation
 4 in the Central Valley. The CVJV is made up of 21 conservation organizations, state and federal
 5 government agencies, and one corporation that have formed a partnership to improve the
 6 habitat conditions for breeding and nonbreeding waterfowl, breeding and nonbreeding
 7 shorebirds, waterbirds, and riparian-dependent songbirds in the Central Valley. The CVJV's
 8 2006 Implementation Plan (Central Valley Joint Venture 2006) establishes conservation
 9 objectives and priorities for these bird groups within the basins of the Central Valley. The
 10 project study area includes all or portions of three Implementation Plan basins— the Delta, Yolo
 11 and Suisun basins. The 2006 Implementation Plan contains basin-specific objectives for wetland
 12 restoration, protection of existing wetland habitats, wetland enhancement, adequate power and
 13 water supplies for wetland management, agricultural land enhancement, farmland easements
 14 that maintain waterfowl food resources on agricultural land, and farmland easements that
 15 buffer existing wetlands from urban and residential growth.

16 Implementation of the Alternative 4A Environmental Commitments would result in reductions
 17 in cultivated land and managed wetland acreage in the Delta only; however, increases in tidal
 18 and nontidal wetlands in this basin would be another result. The project also contains a
 19 significant commitment to long-term protection of agricultural land (over 9,000 acres) for
 20 waterfowl, shorebirds and other sensitive wildlife species. The sum of these actions would be
 21 consistent with the objectives of the Implementation Plan.

- 22 • *Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan, Cosumnes River Preserve*
 23 *Management Plan, Brannan Island and Franks Tract State Recreation Areas General Plan, and the*
 24 *Lower Sherman Island Wildlife Area Land Management Plan* are primarily designed to preserve
 25 and enhance the natural resource and recreation qualities of these areas. Implementing
 26 Alternative 4A, especially construction of water conveyance facilities, and land modification
 27 associated with Environmental Commitment 4 restoration activities, could create temporary
 28 disruptions to the terrestrial biological resource management activities in these management
 29 areas. The proposed intermediate forebay and the RTM area on Zacharias Island fall within the
 30 Stone Lakes Cooperative Wildlife Management Area identified in the Stone Lakes Wildlife
 31 Refuge CCP. The primary objective of the Cooperative Wildlife Management Area is to maintain
 32 lands in private ownership and continue agricultural production but also allow USFWS to
 33 pursue a number of approaches to conserve and manage lands, depending on the preferences of
 34 willing landowners. The location of the intermediate forebay is an area that is entirely planted in
 35 vineyard, which has very little to no habitat value for wildlife species. The RTM area is used for
 36 hay or grain production, which does have high value for wildlife species. Project activities in
 37 these areas would conflict with the CCP.

38 The ultimate goals of aquatic and terrestrial habitat enhancement and restoration contained in
 39 the project would be compatible with the overall long-term management goals of these areas.
 40 Proposed restoration areas in the Delta would be designed to be compatible with and to
 41 complement the current management direction for these areas and would be required to adapt
 42 restoration proposals to meet current policy established for managing these areas.

- 43 • *Suisun Marsh Preservation Agreement and Suisun Marsh Plan* are the most recent efforts by the
 44 state and federal agencies responsible for Suisun Marsh to maintain its long-term viability as
 45 managed wetlands and wildlife habitat, consistent with the Suisun Marsh Preservation Act.

1 Alternative 4A would not directly or indirectly affect the Suisun Marsh and its natural habitats;
2 therefore, it would be consistent with the Plan's management goals.

- 3 ● *California Aquatic Invasive Species Management Plan* does not address terrestrial invasive
4 species. Implementation of the project's habitat management objectives affect terrestrial species
5 that utilize study area aquatic habitats. These effects are positive in that the project's objectives
6 are to control and remove invasive aquatic species that are detrimental to native aquatic and
7 terrestrial species. Implementation of project's Environmental Commitments would be
8 undertaken with the goal of avoiding any further spread of aquatic invasive species. Alternative
9 4A would, therefore, be compatible with the objectives of the California Aquatic Invasive Species
10 Management Plan.
- 11 ● *Habitat Conservation Plans and Natural Community Conservation Plans* are the subject of a
12 detailed analysis in Section 12.3.6, *Effects on Other Conservation Plans*. The analysis considers
13 the compatibility of the alternatives with all HCPs and NCCPs that share planning area with the
14 study area. The Alternative 4A study area overlaps geographically with six conservation plans.
15 The water conveyance facilities construction actions would still overlap with the South
16 Sacramento, San Joaquin, East Contra Costa and East Alameda County planning areas, but there
17 would be little effect on implementation of the HCP/NCCPs for these areas. The Environmental
18 Commitments associated with Alternative 4A would remove relatively small acreages of
19 primarily cultivated land in all six of the overlapping plan areas (Yolo, Solano, South
20 Sacramento, East Contra Costa, East Alameda and San Joaquin County HCP/NCCPs). The
21 consistency analysis below indicates that the degree to which the competition for conservation
22 lands would impact the conservation goals of other plans is limited. Alternative 4A would have
23 much less risk from competition for conservation lands. In most cases, because of the flexibility
24 for acquisition targets incorporated into Alternative 4A and other plans, the potential conflict
25 would be manageable, and significant conflicts with the implementation of overlapping plans
26 could be avoided. In certain cases, especially pertaining to similar restoration objectives,
27 perceived conflicts may also represent opportunities for collaboration to jointly achieve similar
28 conservation goals. Because implementing Alternative 4A would not result in a conflict with the
29 provisions of an adopted HCP, NCCP or other approved local, regional or state habitat
30 conservation plan, there would be a less-than-significant impact.

31 **Executive Orders**

- 32 ● *Executive Order 11990: Protection of Wetlands* requires all federal agencies to consider wetland
33 protection in their policies and actions. The project proposes to protect, enhance and expand the
34 wetlands of the study area, and, therefore, would be compatible with Executive Order 11990.
- 35 ● *Executive Order 13112: Invasive Species* directs federal agencies to prevent and control the
36 introduction and spread of invasive species in a cost-effective and environmentally sound
37 manner. Alternative 4A construction and restoration actions have the potential to both
38 introduce and spread invasive species in the study area. Implementation of AMM11, described
39 in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, could make Alternative 4A
40 implementation compatible with Executive Order 13112.
- 41 ● *Executive Order 113443: Facilitation of Hunting Heritage and Wildlife Conservation* directs
42 federal agencies whose activities affect public land management, outdoor recreation, and
43 wildlife management to facilitate the expansion and enhancement of hunting opportunities, and
44 the management of game species and their habitat. Alternative 4A Environmental Commitments

1 that involve conversion of cultivated land and managed wetland to tidal and nontidal wetlands
2 and other natural communities would conflict with the hunting expansion and enhancement
3 aspects of this executive order. Refer to Chapter 15, *Recreation*, for a detailed analysis of the
4 effects of alternatives on hunting opportunities. The habitat protection and expansion
5 Environmental Commitments of Alternative 4A would be compatible with the executive order's
6 goal of facilitating the management of habitats for some game species.

7 **NEPA Effects:** The potential plan and policy incompatibilities of implementing Alternative 4A
8 identified in the analysis above indicate the potential for a physical consequence to the environment.
9 The primary physical consequence of concern is the conversion of cultivated land and managed
10 wetland to natural wetland and riparian habitat in the study area. The physical effects are discussed
11 in the *Shorebirds and Waterfowl* analysis above, and no additional NEPA effects determination is
12 required related to the compatibility of the alternative with relevant plans and polices. The reader is
13 referred to Chapter 13, Section 13.2, *Regulatory Setting*, for a further discussion of the
14 responsibilities of state and federal agencies to comply with local regulations, and a discussion of
15 the relationship between plan and policy consistency and physical consequences to the
16 environment.

17 **CEQA Conclusion:** The potential plan and policy incompatibilities of implementing Alternative 4A
18 identified in the analysis above indicate the potential for a physical consequence to the environment.
19 The primary physical consequence of concern is the conversion of cultivated land and managed
20 wetland to natural wetland and riparian habitat in the study area. The physical effects are discussed
21 in the *Shorebirds and Waterfowl* analysis above, and no additional CEQA conclusion is required
22 related to the compatibility of the alternative with relevant plans and polices. The reader is referred
23 to Chapter 13, Section 13.2, *Regulatory Setting*, for a further discussion of the responsibilities of
24 state and federal agencies to comply with local regulations, and a discussion of the relationship
25 between plan and policy consistency and physical consequences to the environment.

1 **12.3.4.3 Alternative 2D—Dual Conveyance with Modified**
 2 **Pipeline/Tunnel and Intakes 1, 2, 3, 4, and 5 (15,000 cfs;**
 3 **Operational Scenario B)**

4 Alternative 2D is generally similar to Alternative 4A except that Alternative 2D includes two
 5 additional intakes (Intakes 1 and 4) along the Sacramento River and operates under a different
 6 operational scenario. Like Alternative 4A, this alternative would not serve as an NCCP/HCP and thus
 7 the analysis below only considers construction and operation of the conveyance facilities and only
 8 includes the Environmental Commitments necessary to fully mitigate the project’s impacts under
 9 CEQA and NEPA. Other than the increased impacts from the intakes and associated restoration
 10 actions, the effects from Alternative 2D would be relatively the same as those under Alternative 4A;
 11 therefore, Alternative 2D is considered here in a summary fashion. The reader is referred to the
 12 discussion of Alternative 4A for a detailed analysis of impacts that would be associated with
 13 implementing Alternative 2D. The impacts associated with Alternatives 2D and 4A were derived by
 14 comparing the alternative with the No Action Alternative for NEPA purposes, and with Existing
 15 Conditions for CEQA purposes.

16 Operations under Alternative 2D would be similar, but not identical, to those described under
 17 Operational Scenario B (see Chapter 3, Section 3.6.4.2, *North Delta and South Delta Water*
 18 *Conveyance Operational Criteria*). These operations would include both new and existing water
 19 conveyance facilities once the new north Delta facilities are completed and become operational,
 20 thereby enabling joint management of north and south Delta diversions. Operations included in this
 21 alternative for south Delta export facilities would replace the south Delta operations currently
 22 implemented in compliance with the USFWS (2008) and NMFS (2009) BiOps. The north Delta
 23 intakes and the head of Old River barrier would be new facilities for the SWP and CVP and would be
 24 operated as described in Chapter 3, Section 3.6.4.2. Alternative 2D operations include a preference
 25 for south Delta pumping in July through September to provide limited flushing for improving
 26 general water quality conditions and reduced residence times. The operational scenario under
 27 Alternative 2D would have a greater operational capacity than the Alternative 4A operational
 28 scenario would have (15,000 cfs compared with 9,000 cfs).

29 **Comparative Differences in Effects for Alternatives 2D and 4A**

30 The principal differences in effects between these two alternatives are related to the differing
 31 construction footprints of the water conveyance facilities and the differences in proposed
 32 restoration efforts. The Alternative 2D water conveyance facilities would entail construction of two
 33 additional north Delta intakes (Intakes 1 and 4). Intake 1 would be located northeast of Clarksburg
 34 on the east side of the river, and Intake 4 would be located just south of Hood, also on the east side
 35 of the river. There also would be a large RTM disposal area and a new permanent transmission line
 36 between Intakes 1 and 2. The operational scenario for Alternative 2D (Scenario B) is also different
 37 from Alternative 4A (Scenario H3–H4), but the difference in water operations would not
 38 significantly change the operational effects on terrestrial biological resources in the study area.
 39 Under Alternative 4A, geotechnical exploration within conveyance construction areas would cause
 40 temporary impacts. Alternative 2D would not cause geotechnical exploration impacts.

41 As a result of the greater impacts from Alternative 2D, additional restoration and protection
 42 acreages would be required under the Environmental Commitments to achieve the applicable
 43 regulatory standards under ESA Section 7 and CESA Section 2081(b). The restoration actions would

1 themselves result in effects on natural communities where they are likely to occur. Specific locations
 2 for implementing many of the restoration commitments have not been identified at this time.
 3 Therefore, the analysis considers typical activities that would be undertaken for implementation of
 4 the habitat restoration and provides an estimate of what acreages of natural communities would be
 5 lost or converted by these activities. These activities under Alternative 2D would generally be the
 6 same as those under Alternative 4A but would result in additional impacts on grassland and
 7 cultivated lands natural communities. The effects from these activities are summarized below in
 8 Table 12-2D-1. The temporary impacts from geotechnical exploration under Alternative 4A were not
 9 included for the comparison of temporary impacts for Alternative 2D to Alternative 4A in Table 12-
 10 2D-1.

11 Due to the addition of the two intakes and their associated pumps and pipelines, the additional RTM
 12 disposal area, and the additional restoration under the Environmental Commitments, Alternative 2D
 13 would create differences in the permanent and temporary loss of natural communities and
 14 cultivated lands when compared with Alternative 4A (Table 12-2D-1). Alternative 2D would
 15 permanently remove 8 more acres of valley/foothill riparian habitat along the Sacramento River, 8
 16 acres more of grassland, 74 acres more of managed wetlands, 5 more acres of tidal perennial aquatic
 17 habitat, and 919 acres more of cultivated land when compared with Alternative 4A.

18 During the water conveyance facilities construction process, Alternative 2D would result in 10 fewer
 19 acres of temporary loss of natural communities when compared with Alternative 4A because Intake
 20 4 under Alternative 2D would be placed within the large intake work area under Alternative 4A that
 21 is located just south of the town of Hood (see Figure 3-2). The difference is due to decreased
 22 temporary impacts on cultivated lands (32 fewer acres); however, Alternative 2D would also result
 23 in greater impacts on tidal perennial aquatic (14 acres more), valley foothill riparian (4 acres more),
 24 and grassland (3 acres more) natural communities as a result of two more intakes along the
 25 Sacramento River. No temporary impacts from restoration actions are anticipated because all
 26 restoration activities would take place within in the footprint of the proposed restoration site.

27 These differences in permanent loss of habitat associated with water conveyance construction and
 28 habitat restoration would create some differences in effects on wildlife, primarily birds that utilize
 29 croplands for foraging and some species that utilize managed wetlands in the north Delta. The
 30 increase in permanent loss of cultivated land associated with Alternative 2D would result in a larger
 31 loss of habitat for species such as tricolored blackbird, greater sandhill crane, Swainson's hawk,
 32 white-tailed kite, western burrowing owl, short-eared owl, loggerhead shrike, northern harrier, and
 33 California horned lark. The increase in impacts on managed wetland would result in increased
 34 impacts on, white-tailed kite, northern harrier, yellow-head blackbird, and short-eared owl but the
 35 particular area of managed wetland that would be affected is not identified as suitable for greater
 36 sandhill crane (i.e., is not included as part of the species' modeled habitat). Alternative 2D would
 37 also result in an increase in the loss of riparian habitat along the Sacramento River, which would
 38 affect nesting habitat for Swainson's hawk, white-tailed kite, cormorants, herons, egrets, and
 39 migratory habitat for birds moving along the Sacramento River corridor. Alternative 2D would also
 40 result in greater impacts on giant garter snake aquatic and upland habitats.

41 Overall, the temporary losses of habitat for species would be less under Alternative 2D than under
 42 Alternative 4A, except for species restricted primarily to riparian habitats such as valley elderberry
 43 longhorn beetle, least Bell's vireo, and yellow-breasted chat, and species restricted to tidal perennial
 44 aquatic habitat, such as California least tern, where impacts would increase. Species with relative
 45 decreases in temporary habitat losses include greater sandhill crane, Swainson's hawk, tricolored

blackbird, western burrowing owl, and white-tailed kite. Overall, when combining permanent and temporary impacts, Alternative 2D would result in greater impacts on species than Alternative 4A.

. Alternative 2D would also affect 35 more acres of jurisdictional wetlands and waters as regulated by Section 404 of the CWA, when compared with Alternative 4A (Table 12-2D-2). Refer to Table 12-4A-68 for a summary of Alternative 4A jurisdictional waters and wetlands impacts. The majority of this difference is due to impacts on tidal channel and scrub-shrub wetlands (as mapped for the wetland delineation) as a result of construction of the intakes along the Sacramento River.

The Environmental Commitments described in Chapter 3, *Description of Alternatives*, Section 3.6.3 and the acreages of these commitments presented in Table 3-10, in Chapter 3, would provide for protection, enhancement, and restoration of habitats affected under Alternative 2D. In addition, the Resource Restoration and Performance Principles in Table 3-12 in Chapter 3, *Description of Alternatives*, would further guide the environmental commitments in mitigating the effects on terrestrial biological resources. AMM1–AMM7, AMM10, AMM12–AMM15, AMM18, AMM20–AMM25, AMM27, AMM30, AMM38, and AMM39, described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, would be available to further avoid and minimize impacts, and preparation of an adaptive management and monitoring program as would likely be required during the ESA Section 7 and CESA Section 2081(b) process would further avoid, minimize, and mitigate the effects of Alternative 2D.

Table 12-2D-1. Alternative 2D Effects on Natural Communities Relative to Alternative 4A (acres)

Natural Community	Permanent Impacts from Alternative 2D						Permanent Impact Total	Permanent Impact Difference from Alternative 4A	Temporary Impacts Alternative 2D	Temporary Impact Difference from Alternative 4A
	Water Conveyance	EC 4 – Tidal Restoration	EC 7 – Riparian Restoration	EC 8 – Grassland Restoration	EC 10 – Nontidal Restoration	EC 11 – Enhancement and Management				
Tidal perennial aquatic	285	0	0	0	0	0	285	5	2,010	15
Tidal brackish emergent wetland	0	0	0	0	0	0	0	0	0	0
Tidal freshwater emergent wetland	1	0	0	0	0	0	1	0	8	0
Valley/foothill riparian	44	11	0	0	0	0	55	8	22	4
Nontidal perennial aquatic	58	2	0	0	0	0	60	0	3	0
Nontidal freshwater perennial emergent wetland	2	1	0	0	0	0	3	0	2	0
Alkali seasonal wetland complex	1	1	0	0	0	0	2	0	0	0
Vernal pool complex	19	25	0	0	0	0	44	0	3	0
Managed wetland	91	20	0	0	0	0	111	74	15	0
Other natural seasonal wetland	0	0	0	0	0	0	0	0	0	0
Grassland	475	41	1	0	0	20	537	8	136	3
Inland dune scrub	0	0	0	0	0	0	0	0	0	0
Cultivated lands	3,876	196	291	1,088	1,356	0	6,808	919	872	-32

20

1 **Table 12-2D-2. Alternative 2D Effects on Jurisdictional Wetlands and Waters Relative to Alternative 4A**
2 **(acres)**

Wetland/Water Type	Alternative 2D Impacts on Jurisdictional Wetlands and Waters				Difference from 4A ^d
	Permanent Impact	Temporary Impacts Treated as Permanent ^a	Temporary Impact ^b	Total Impact ^c	
Agricultural Ditch	45.3	13.5	0	58.8	3.4
Alkaline Wetland	10.4	0.1	0	10.5	0
Clifton Court Forebay	257.9	0	1,930.6	257.9	0
Conveyance Channel	7.1	2.9	0	10.0	0
Depression	29.3	6.2	0	35.5	0
Emergent Wetland	56.8	14.7	0	71.5	0
Forest	7.3	5.3	0	12.6	0.2
Lake	23.2	0	0	23.2	0
Scrub-Shrub	25.2	4.1	0	29.3	13.0
Seasonal Wetland	114.5	10.0	0	124.5	0
Tidal Channel	19.4	80.2	0	99.6	18.8
Vernal Pool	0.3	0	0	0.3	0
Total	597	137	1,931	734	35.4

^a Temporary impacts treated as permanent are temporary impacts expected to last more than 1 year. These impact sites would eventually be restored to pre-project conditions; however, because of the duration of effect, compensatory mitigation would be included for these areas.

^b Temporary impacts would result from dredging Clifton Court Forebay.

^c Total does not include temporary impacts on Clifton Court Forebay because these would be temporary disturbance to open water, which typically does not require compensatory mitigation.

^d Difference in total impacts between Alternatives 2D and 4A.

3

4 **NEPA Effects:** Alternative 2D would not have adverse effects on the terrestrial natural communities,
5 special-status species, and common species that occupy the study area. As with Alternative 4A, this
6 alternative also would not substantially disrupt wildlife movement corridors, significantly increase
7 the risk of introducing invasive species, reduce the value of habitat for waterfowl and shorebirds, or
8 conflict with plans and policies that affect the study area. As with Alternative 4A, Alternative 2D
9 would result in existing habitat converted by water conveyance facilities construction and
10 restoration actions but to a slightly larger degree than under Alternative 4A. The temporarily
11 affected habitat would be restored to its pre-project condition and the restoration under
12 Environmental Commitments 4, 6–8, 10, and 11 would permanently replace primarily cultivated
13 land with tidal and nontidal marsh, grassland, and riparian vegetation. The Environmental
14 Commitments would result in the protection of up to 15,012 acres and restoration of up to 3,085
15 acres of natural communities to offset effects. Where Environmental Commitments would not fully
16 offset effects, AMM1–AMM7, AMM10, AMM12–AMM15, AMM18, AMM20–AMM25, AMM27, AMM30,
17 AMM38, and –AMM39, and in some cases specific mitigation measures have been developed to avoid
18 and minimize adverse effects. Alternative 2D would not require mitigation measures beyond what is
19 proposed for Alternative 4A to offset effects.

20 **CEQA Conclusion:** Alternative 2D would not have significant and unavoidable impacts on the
21 terrestrial natural communities, special-status species, and common species that occupy the study
22 area. As with Alternative 4A, this alternative also would not significantly disrupt wildlife movement

1 corridors, significantly increase the risk of introducing invasive species, reduce the value of habitat
2 for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As with
3 Alternative 4A, existing habitat would be converted during construction of water conveyance
4 facilities and the associated restoration to offset these impacts. The temporarily affected habitat
5 would be restored to its pre-project condition and the restoration measures (Environmental
6 Commitments 4, 6–8, 10, and 11) would permanently replace primarily cultivated land with tidal and
7 nontidal marsh, grassland, and riparian vegetation. The Environmental Commitments would result
8 in the protection of up to 15,012 acres and restoration of up to 3,805 acres of natural communities
9 and, together with AMM1–AMM7, AMM10, AMM12–AMM15, AMM18, AMM20–AMM25, AMM27,
10 AMM30, AMM38, and AMM39, and in some cases specific mitigation measures would mitigate the
11 projects impacts to a less-than-significant-level. Alternative 2D would not require mitigation
12 measures beyond what is proposed for Alternative 4A to offset effects.

13 As with Alternative 4A, Alternative 2D would require several mitigation measures to be adopted to
14 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
15 measures would be needed beyond the Environmental Commitments and AMMs provided by
16 Alternative 2D. The relevant mitigation measures, which are included in detail in the analysis of
17 Alternative 4A, are as follows:

- 18 ● Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 19 ● Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 20 ● Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status
21 Reptiles and Implement Applicable AMMs
- 22 ● Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect
23 Effects on Colonies Will Be Minimized
- 24 ● Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid
25 Disturbance of Nesting Birds
- 26 ● Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 27 ● Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect
28 Effects on Bank Swallow Will Be Minimized
- 29 ● Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring
30 Flows Upstream of the Study Area
- 31 ● Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 32 ● Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement
33 Protective Measures
- 34 ● Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Special-Status
35 Plant Species
- 36 ● Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United States

12.3.4.4 Alternative 5A—Dual Conveyance with Modified Pipeline/Tunnel and Intake 2 (3,000 cfs; Operational Scenario C)

Alternative 5A is generally similar to Alternative 4A except that it has only one intake (Intake 2) along the Sacramento River compared with the three under Alternative 4 A (Intakes 2, 3, and 5) and operates under a different operational scenario. Like Alternative 4A, this alternative would not serve as an NCCP/HCP and thus the analysis below only considers construction and operation of the conveyance facilities and only includes the Environmental Commitments necessary to fully mitigate the projects impacts under CEQA and NEPA. Other than the decreased impacts from the intakes and associated restoration actions, the effects from Alternative 5A would be relatively the same as those under Alternative 4A; therefore, Alternative 5A is considered here in a summary fashion. The reader is referred to the discussion of Alternative 4A for a detailed analysis of impacts that would be associated with implementing Alternative 5A. The impacts associated with Alternatives 5A and 4A were derived by comparing the alternative with the No Action Alternative for NEPA purposes, and with Existing Conditions for CEQA purposes.

Operational components of the water conveyance facilities under Alternative 5A would be similar, but not identical, to those described under Scenario C in Chapter 3, Section 3.6.4.2, *North Delta and South Delta Water Conveyance Operational Criteria*. These operations would include both new and existing water conveyance facilities once the new north Delta facilities are completed and become operational, thereby enabling joint management of north and south Delta diversions. Alternative 5A operations include a preference for south Delta pumping in July through September to provide limited flushing for improving general water quality conditions and reduced residence times. The operational scenario under Alternative 5A would have less operational capacity than the Alternative 4A operational scenario would have (3,000 cfs compared with 9,000 cfs).

Comparative Differences in Effects for Alternatives 5A and 4A

The principal differences in effects between these two alternatives would be related to the differing construction footprints of the water conveyance facilities and the differences in proposed restoration efforts. The Alternative 5A water conveyance facilities would entail construction of one north Delta intake (Intake 2). Intake 2 would be located southeast of Clarksburg on the east side of the river, which is the same location of Intake 2 under Alternative 4A. The operational scenario for Alternative 5A (Scenario C) is also different from Alternative 4A (Scenario H3–H4), but the difference in water operations would not significantly change the operational effects on terrestrial biological resources in the study area.

As a result of fewer impacts from Alternative 5A, less habitat restoration and protection would be required under the Environmental Commitments to achieve the applicable regulatory standards under ESA Section 7 and CESA Section 2081(b). These restoration actions would themselves result in affects on natural communities where they are likely to occur. Specific locations for implementing many of the restoration commitments have not been identified at this time. Therefore, the analysis considers typical activities that would be undertaken for implementation of the habitat restoration and provides an estimate of what acreages of natural communities would be lost or converted by these activities. These activities under Alternative 5A would generally be the same as those under Alternative 4A but would result in fewer impacts on valley foothill riparian, grasslands, tidal perennial aquatic, and cultivated lands natural communities. The effects from these activities are summarized below in Table 12-5A-1.

1 Due to having fewer intakes and associated infrastructure and the decreased restoration under the
2 Environmental Commitments, Alternative 5A would have fewer permanent and temporary losses of
3 natural communities and cultivated lands when compared with Alternative 4A (Table 12-5A-1).
4 Alternative 5A would permanently remove 5 fewer acres of valley/foothill riparian habitat along the
5 Sacramento River, 13 fewer acres of grassland, 3 fewer acres of tidal perennial aquatic, and 226
6 acres fewer of cultivated land when compared with Alternative 4A.

7 During the water conveyance facilities construction process, Alternative 5A would involve less
8 temporary loss of habitat when compared with Alternative 4A. The differences would consist of
9 fewer impacts on cultivated lands east of the river (100 acres less), grassland along the river levee
10 (3 acres less), tidal perennial aquatic within the river channel (18 acres less), and valley/foothill
11 riparian along the river levee (5 acres less). No temporary impacts from restoration actions are
12 anticipated because all restoration activities would take place within in the footprint of the
13 proposed restoration site.

14 These differences in permanent loss of habitat associated with water conveyance construction and
15 habitat restoration would create relatively minor differences in effects on wildlife. The decrease in
16 permanent loss of cultivated lands creates the largest difference between the two alternatives'
17 impacts on wildlife. Alternative 5A would result in less loss of habitat for sandhill cranes, tricolored
18 blackbird, western burrowing owl, Swainson's hawk, white-tailed kite, short-eared owl, loggerhead
19 shrike, northern harrier, and California horned lark. The reduction in impacts on valley/foothill
20 riparian habitat would result fewer impacts on breeding habitat for raptors, herons and egrets,
21 Swainson's hawk, Cooper's hawk, and white-tailed kite, and migratory habitat for species that use
22 the river corridor, such as western yellow-billed cuckoo. Alternative 5A would also result in fewer
23 impacts on giant garter snake.

24 Alternative 5A would also cause slightly fewer temporary losses of cultivated land, grassland and
25 valley/foothill riparian natural communities and thus decrease the impacts on the species that use
26 these areas relative to Alternative 4A. There would be fewer acres of foraging habitat temporarily
27 lost for sandhill cranes, tricolored blackbird, Swainson's hawk, white-tailed kite, short-eared owl,
28 loggerhead shrike, northern harrier, and California horned lark.

29 Alternative 5A would also permanently affect 25 fewer acres of jurisdictional wetlands and waters
30 as regulated by Section 404 of the CWA, when compared with Alternative 4A (Table 12-5A-2). Refer
31 to Table 12-4A-68 for a summary of Alternative 4A permanent and temporary jurisdictional waters
32 and wetlands impacts. The majority of this difference is due to fewer impacts on tidal channel (21
33 fewer acres) with a small difference in impacts on scrub-shrub wetlands (3 fewer acres) as a result
34 of fewer intakes along the Sacramento River.

35 The Environmental Commitments described in Chapter 3, *Description of Alternatives*, Section 3.6.3.3
36 and the acreages of these commitments presented in Table 3-11, in Chapter 3, would provide for
37 protection, enhancement, and restoration of habitats affected under Alternative 5A. In addition, the
38 Resource Restoration and Performance Principles in Table 3-12, in Chapter 3, would further guide
39 the Environmental Commitments in mitigating the effects on terrestrial biological resources. AMM
40 1-AMM7, AMM10, AMM12-AMM15, AMM18, AMM20-AMM25, AMM27, AMM30, AMM38, and
41 AMM39, described in Appendix 3B, *Environmental Commitments, AMMs, and CMs*, would be available
42 to further avoid and minimize impacts, and preparation of an adaptive management and monitoring
43 program as would likely be required during the ESA Section 7 and CESA Section 2081(b) process
44 would further avoid, minimize, and mitigate the effects of Alternative 5A.

1 **Table 12-5A-1. Alternative 5A Effects on Natural Communities Relative to Alternative 4A (acres)**

Natural Community	Permanent Impacts from Alternative 5A							Permanent Impact Difference from Alternative 4A	Temporary Impacts Alternative 5A	Temporary Impact Difference from Alternative 4A
	Water Conveyance	EC 4 – Tidal Restoration	EC 7 – Riparian Restoration	EC 8 – Grassland Restoration	EC 10 – Nontidal Restoration	EC 11 - Enhancement and Management	Permanent Impact Total			
Tidal perennial aquatic	277	0	0	0	0	0	277	-3	1,977	-18
Tidal brackish emergent wetland	0	0	0	0	0	0	0	0	0	0
Tidal freshwater emergent wetland	1	0	0	0	0	0	1	0	8	0
Valley/foothill riparian	32	10	0	0	0	0	42	-5	14	-5
Nontidal perennial aquatic	58	2	0	0	0	0	60	0	3	0
Nontidal freshwater perennial emergent wetland	2	1	0	0	0	0	3	0	2	0
Alkali seasonal wetland complex	1	1	0	0	0	0	2	0	0	0
Vernal pool complex	19	25	0	0	0	0	44	0	3	0
Managed wetland	16	20	0	0	0	0	36	0	15	0
Other natural seasonal wetland	0	0	0	0	0	0	0	0	0	0
Grassland	454	40	1	0	0	20	515	-13	130	-3
Inland dune scrub	0	0	0	0	0	0	0	0	0	0
Cultivated lands	3,386	190	212	1,043	832	0	5,663	-226	804	-100

2

1 **Table 12-5A-2. Alternative 5A Effects on Jurisdictional Wetlands and Waters Relative to Alternative 4A**
2 **(acres)**

Habitat Type	Alternative 5A Impacts on Jurisdictional Wetlands and Waters			Total Impact ^c	Difference from 4A ^d
	Permanent Impact	Temporary Impacts Treated as Permanent ^a	Temporary Impact ^b		
Agricultural Ditch	41.7	12.7	0	54.4	-1.0
Alkaline Wetland	10.4	0.1	0	10.5	0.0
Clifton Court Forebay	257.9	0	1,930.6	257.9	0.0
Conveyance Channel	7.1	2.9	0	10.0	0.0
Depression	29.3	6.2	0	35.5	0.0
Emergent Wetland	56.8	14.7	0	71.5	0.0
Forest	7.2	4.8	0	23.2	-0.5
Lake	23.2	0	0	23.2	0.0
Scrub-Shrub	11.2	1.9	0	13.0	-3.4
Seasonal Wetland	114.5	10.0	0	124.5	0.0
Tidal Channel	11.5	48.4	0	59.9	-20.9
Vernal Pool	0.3	0	0	0.3	0
Total	571	102	1,931	673	-25

^a Temporary impacts treated as permanent are temporary impacts expected to last more than 1 year. These impact sites would eventually be restored to pre-project conditions; however, because of the duration of effect, compensatory mitigation would be included for these areas.

^b Temporary impacts would result from dredging Clifton Court Forebay.

^c Total does not include temporary impacts on Clifton Court Forebay because these would be temporary disturbance to open water, which typically does not require compensatory mitigation.

^d Difference in total impacts between Alternatives 5A and 4A.

3

4 **NEPA Effects:** Alternative 5A would not have adverse effects on the terrestrial natural communities,
5 special-status species and common species that occupy the study area. As with Alternative 4A, this
6 alternative also would not substantially disrupt wildlife movement corridors, significantly increase
7 the risk of introducing invasive species, reduce the value of habitat for waterfowl and shorebirds, or
8 conflict with plans and policies that affect the study area. As with Alternative 4A, Alternative 5A
9 would result in existing habitat converted by water conveyance facility construction and habitat
10 restoration actions but to a slightly smaller degree. The temporarily affected habitat would be
11 restored to its pre-project condition and the restoration under Environmental Commitments 4, 6–8,
12 10, and 11 would permanently replace primarily cultivated land with tidal and nontidal marsh,
13 grassland, and riparian vegetation. The Environmental Commitments would result in the protection
14 of up to 12,728 acres and restoration of up to 2,428 acres of natural communities to offset effects.
15 Where Environmental Commitments would not fully offset effects, AMM1–AMM7, AMM10, AMM12–
16 AMM15, AMM18, AMM20–AMM25, AMM27, AMM30, AMM38, and AMM39, and in some cases
17 specific mitigation measures have been developed to avoid and minimize adverse effects.
18 Alternative 5A would not require mitigation measures beyond what is proposed for Alternative 4A
19 to offset effects.

20 **CEQA Conclusion:** Alternative 5A would not have significant and unavoidable impacts on the
21 terrestrial natural communities, special-status species and common species that occupy the study
22 area. As with Alternative 4A, this alternative also would not significantly disrupt wildlife movement
23 corridors, significantly increase the risk of introducing invasive species, reduce the value of habitat

1 for waterfowl and shorebirds, or conflict with plans and policies that affect the study area. As with
2 Alternative 4A, existing habitat would be converted construction of water conveyance facilities and
3 the associated restoration to offset these impacts. The temporarily-affected habitat would be
4 restored to its pre-project condition and the restoration measures (Environmental Commitments 4,
5 6–8, 10, and 11) would permanently replace primarily cultivated land with tidal and nontidal
6 marsh, grassland, and riparian vegetation. The Environmental Commitments would result in the
7 protection of up to 12,728 acres and restoration of up to 2,428 acres of natural communities and,
8 together with AMM1–AMM7, AMM10, AMM12–AMM15, AMM18, AMM20–AMM25, AMM27, AMM30,
9 AMM38, and AMM39, and some cases specific mitigation measures would mitigate the projects
10 impacts to a less-than-significant level. Alternative 5A would not require mitigation measures
11 beyond what is proposed for Alternative 4A to offset effects.

12 As with Alternative 4A, Alternative 5A would require several mitigation measures to be adopted to
13 reduce all effects on terrestrial biological resources to less-than-significant levels. These mitigation
14 measures would be needed beyond the Environmental Commitments and AMMs provided by
15 Alternative 5A. The relevant mitigation measures, which are included in detail in the analysis of
16 Alternative 4A, are as follows:

- 17 • Mitigation Measure BIO-42: Avoid Impacts on Delta Green Ground Beetle and its Habitat
- 18 • Mitigation Measure BIO-43: Avoid and Minimize Loss of Callippe Silverspot Butterfly Habitat
- 19 • Mitigation Measure BIO-55: Conduct Preconstruction Surveys for Noncovered Special-Status
20 Reptiles and Implement Applicable AMMs
- 21 • Mitigation Measure BIO-66: California Least Tern Nesting Colonies Shall Be Avoided and Indirect
22 Effects on Colonies Will Be Minimized
- 23 • Mitigation Measure BIO-75: Conduct Preconstruction Nesting Bird Surveys and Avoid
24 Disturbance of Nesting Birds
- 25 • Mitigation Measure BIO-117: Avoid Impacts on Rookeries
- 26 • Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect
27 Effects on Bank Swallow Will Be Minimized
- 28 • Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and Spring
29 Flows Upstream of the Study Area
- 30 • Mitigation Measure BIO-162: Conduct Preconstruction Survey for American Badger
- 31 • Mitigation Measure BIO-166: Conduct Preconstruction Surveys for Roosting Bats and Implement
32 Protective Measures
- 33 • Mitigation Measure BIO-170: Avoid, Minimize, or Compensate for Impacts on Noncovered
34 Special-Status Plant Species
- 35 • Mitigation Measure BIO-176: Compensatory Mitigation for Fill of Waters of the United States

1 12.3.5 Cumulative Effects

2 12.3.5.1 Assessment Methodology

3 The cumulative effects analysis for terrestrial biological resources addresses the potential for the
 4 project alternatives to act in combination with other past, present, and reasonably foreseeable
 5 future projects, programs or conditions to create a cumulatively significant adverse impact. The
 6 analysis also considers whether any incremental effect of the alternative is cumulatively
 7 considerable. Chapter 4, Section 4.2, *Resource Chapter Organization*, provides the regulatory and
 8 statutory basis for the cumulative analyses found in this document.

9 The geographic scope of the analysis for natural communities is the terrestrial biology study area
 10 (the BDCP Plan Area and the two transmission corridors that extend beyond the Plan Area) and
 11 lands immediately adjacent to this study area where past, present or reasonably foreseeable
 12 activities might indirectly affect the natural communities in the study area. While the natural
 13 communities extend beyond these boundaries, the focus of the actions that might affect these
 14 resources is the Delta and other lands involved in project conservation efforts. The geographic scope
 15 of the cumulative analysis for each of the covered and noncovered species varies, depending on the
 16 potential for other projects or programs to influence individuals that rely on the study area for some
 17 stage of their life history. For some wildlife species, such as migratory birds, this area includes their
 18 entire range within California. For other species whose individuals do not range beyond the study
 19 area and its immediate surroundings, the geographic range of the cumulative analysis has been
 20 limited to this smaller area. The geographic scope for cumulative effects from spread of invasive
 21 species is the study area.

22 The projects and programs that have been considered as part of the cumulative analysis have been
 23 drawn primarily from a list developed for this EIR/EIS and contained in Appendix 3D, *Defining*
 24 *Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*.
 25 This list was compiled in part by reviewing the projects addressed in the cumulative impacts
 26 analysis for the Delta Land Use and Resource Management Plan (Delta Protection Commission
 27 2010). The list was augmented by reviewing the Appendix 3A, *Identification of Water Conveyance*
 28 *Alternatives, Conservation Measure 1*, and other recent environmental documents for Delta-area
 29 projects, and by coordinating with local, state, and federal agencies that are sponsoring activities in
 30 the Delta area or on other lands within the relevant range of individual species. The list of past,
 31 present and reasonably foreseeable future projects and programs has been evaluated to determine
 32 which of these activities may have effects on terrestrial habitats and terrestrial species that are
 33 known to occur within the study area. The list of projects and programs relevant to terrestrial
 34 biological resources is contained in Table 12-8. Most of these projects and programs are also a part
 35 of the NAA that is addressed in Section 12.3.3.1, *No Action Alternative*, and in Section 12.3.4.1,
 36 *Impacts of No Action Alternative Early Long-Term*.

37 In addition, the effects of global climate change have been considered in addressing the cumulative
 38 effects of alternatives on terrestrial biological resources. Changes that might occur within the study
 39 area related to climate change are considered reasonably foreseeable and part of the cumulative
 40 condition that might combine with the effects of the implementation of project alternatives. Climate
 41 change is also considered an element of the No Action Alternatives (see Section 12.3.3.1 and Section
 42 12.3.4.1). Chapter 29, *Climate Change*, provides background and assumptions associated with
 43 climate change in the Plan Area, and also addresses general effects on terrestrial habitat and species.

1 To assess whether implementation of the alternatives would contribute to an adverse cumulative
 2 effect on the terrestrial biological resources of the study area, a judgment must first be made
 3 regarding potential adverse effects of the alternatives. Where adverse effects are anticipated, a
 4 determination must be made as to whether these effects would contribute to a cumulative adverse
 5 effect on a terrestrial biological resource. If there is a contribution to a cumulative adverse effect, a
 6 final judgment must be made as to whether the effect of the alternative represents a considerable
 7 contribution to the cumulative effect.

8 **Table 12-8. Effects on Terrestrial Biological Resources from Plans, Policies and Programs Considered for**
 9 **Cumulative Analysis**

Agency	Program/Project	Status	Description of Program/Project	Effects on Terrestrial Biological Resources
Alameda County	East Alameda County Conservation Strategy	Approved in 2011.	There is less than a 2% overlap with BDCP (4,643 acres) and this overlap only occurs in one conservation zone. The conservation strategy addresses the conservation needs of 19 species, including eight species that overlap with the BDCP. Currently no planned conservation activity in the overlap area, so the conservation strategy would not affect BDCP species in the Plan Area.	The East Alameda strategy has beneficial effects on eight of the BDCP covered species.
California Department of Fish and Wildlife	Calhoun Cut/Lindsey Slough Restoration		Increase intertidal marsh habitat and adjacent riparian habitat on 927 acres in Cache Slough ROA.	
California Department of Fish and Wildlife	Ecosystem Restoration Program Conservation Strategy	Ongoing implementation.	Created in 2000. Ongoing program to preserve, restore, and enhance terrestrial natural communities and ecosystems in the San Francisco Bay and Sacramento-San Joaquin Delta. Protected and restored more than 150,000 acres of habitat, including 3,900 acres and 59 miles of riparian and riverine aquatic habitat (as of 2010) after 7 of the planned 30 years of the project.	The conservation strategy creates beneficial impacts on the natural communities and special-status species discussed in this EIR/EIS.
California Department of Fish and Wildlife	Fremont Landing Conservation Bank	Ongoing implementation.	Enhances 40 acres of riparian habitat and restores 60 acres of riparian woodlands and sloughs.	This bank provides benefits for many riparian bird, reptile, and mammal species that occupy the Delta.

Agency	Program/Project	Status	Description of Program/Project	Effects on Terrestrial Biological Resources
California Department of Fish and Wildlife	Grizzly Island Wildlife Area Land Management Plan		Estuarine marsh that contains about 15,300 acres of wildlife habitat. Will continue to be managed for wildlife, with an emphasis on waterfowl, threatened and endangered species, and the resident tule elk herd.	Actions at this wildlife area will maintain and enhance managed wetland as some of the private wetland is converted to tidal marsh.
California Department of Fish and Wildlife	Lower Sherman Island Wildlife Area Land Management Plan	Ongoing implementation.	Directs habitat and species management on 3,100 acres of marsh and open water. The plan's goals are to restore and improve marsh and upland habitats for threatened and endangered species, control invasive species and allow for hunting and fishing recreation activities.	The plan has a positive effect on species of concern in the BDCP.
California Department of Fish and Wildlife	Private Lands Incentive Program		Includes 29,000 acres of habitat in Tulare Basin, Grasslands, Suisun Marsh, and Sacramento Valley. Encourages development and enhancement of habitat for shorebirds and waterfowl on private lands, and encourages wildlife-friendly farming practices.	This program has beneficial effects on waterfowl and shorebird species in the Plan Area.
California Department of Fish and Wildlife	Restoring Ecosystem Integrity in the Northwest Delta	Ongoing program.	Focused on habitat restoration. Currently concentrating acquisition efforts on 3 specific properties consisting of about 150 acres and baseline monitoring. The project centers on Calhoun Cut and Lindsay Slough in the Cache Slough ROA. The plan is designed to create a restored, protected corridor extending from Jepson Prairie to Prospect Island, doubling the overall acreage of marsh and riparian habitats, doubling the protected acres of vernal pool/perennial grasslands and increasing the abundance and local distribution of at risk and other native plant and animal species.	The program is consistent with BDCP goals for habitat restoration in the Cache Slough ROA.

Agency	Program/Project	Status	Description of Program/Project	Effects on Terrestrial Biological Resources
California Department of Fish and Wildlife	Staten Island Wildlife-Friendly Farming Demonstration	Ongoing program.	Objective is ecosystem restoration; 2,500–5,000 acres of corn will be flooded to increase habitat availability and to improve wildlife-friendly agriculture to foster recovery of at-risk species and to investigate effects of agriculture on water quality.	This program is focused on improving agricultural land as seasonal habitat for greater and lesser sandhill cranes, a target species of the BDCP.
California Department of Fish and Wildlife	Yolo Bypass Wildlife Area Land Management Plan	Ongoing program.	Provides for multiple use management of 16,000 acres of mixed agricultural, grassland and managed wetland habitats. This wildlife area is managed to support wintering waterfowl populations, shorebird migration, waterfowl hunting, and active wildlife observation, especially bird watching. This is accomplished by actively managing wetland habitats and providing for wildlife-friendly farming.	
Department of Water Resources	California Water Action Plan	Initiated in January 2014.	This plan lays out a roadmap for the next 5 years for actions that would fulfill 10 key themes. In addition, the plan describes certain specific actions and projects that call for improved water management throughout the state.	
California Department of Water Resources	Central Valley Flood Protection Plan		Proposes significant expansion of flood protection features in the study area, including expansion of the Yolo Bypass.	Plan implementation could conflict with the BDCP's effort to improve giant garter snake habitat just outside of the current floodway, and to improve fish passage through Yolo Bypass waterways.
California Department of Water Resources	Delta Levees Flood Protection Program	Ongoing program.	Includes modification to Delta levees within the Sacramento-San Joaquin Delta and portions of the Suisun Marsh, with a focus on western Delta island levees. The project works with 60 reclamation districts and strives to complete levee rehabilitation projects with no net loss of habitat in the Delta.	The program has some potential to remove grassland, emergent marsh, and riparian habitats in the short-term. Habitat losses would have to be offset with protection or restoration actions.

Agency	Program/Project	Status	Description of Program/Project	Effects on Terrestrial Biological Resources
California Department of Water Resources	FloodSAFE California		Promotes public safety through integrated flood management while protecting environmental resources; emphasizes action in the Delta. This program is very broad, but is designed to improve flood safety throughout the state while encouraging sound conservation actions that benefit California's native fish and wildlife and promote wildlife-friendly agricultural practices.	The program is not intended to reduce habitat values in the Delta.
California Department of Water Resources	Levee Repair-Levee Evaluation Program	Ongoing program.	Upgrading levees along the Sacramento and San Joaquin Rivers and Delta; 1,600 miles of levees included in Central Valley.	Most of the program efforts are geotechnical, bathymetric, and geomorphic evaluations that have little to no effect on terrestrial wildlife in the study area.
California Department of Water Resources and MOA Partners	Lower Yolo Restoration Project		In Cache Slough ROA, reintroduce tidal action to half of 3,408-acre Yolo Ranch. This project would eliminate existing agricultural land used primarily for grazing, and create tidal marsh for the benefit of special-status Delta anadromous and resident fish species.	The project is expected to be part of the BDCP's early implementation program. It will adversely affect some grassland species in favor of tidal marsh and riparian species.
California Department of Water Resources	Dutch Slough Tidal Marsh Restoration Project	Implementation began in 2012.	Converts 240–840 acres from agricultural uses and grazing to wetland, riparian, and upland habitats. The project also includes development of a recreation center at one end of the property.	The restoration will benefit tidal marsh and riparian habitats and species in the western Delta on lands with considerable topographic diversity and little to no land subsidence.
California Department of Water Resources, Bureau of Reclamation, Contra Costa Water District	Los Vaqueros Reservoir Expansion	Completed in 2012.	Project enlarged Los Vaqueros Reservoir to develop water supplies for environmental water management that supports fish protection, habitat management, and other environmental needs in the Delta.	

Agency	Program/Project	Status	Description of Program/Project	Effects on Terrestrial Biological Resources
California High Speed Rail Authority	Sacramento to Merced Section of High Speed Rail System		One possible alignment for the section from Sacramento to Merced would include major infrastructure construction along the I-5 corridor between French Camp and Lathrop, which would pass through the portion of the study area around the I-5 and Hwy. 120 junction. The potential alignment from the Bay Area to Stockton would cross the study area from the west near Tracy and head east to Lathrop. These alignments are within or parallel existing rail corridors.	The project has the potential to remove grassland and cultivated lands along existing rights-of-way in the study area.
California Partners in Flight	Riparian Habitat Joint Venture	Ongoing program.	Promotes and supports riparian conservation and enhancement, contributes to flood control and maximizes habitat available to wildlife. Protects and restores riparian areas with intact adjacent upland habitats.	The program has a positive influence on the value of riparian habitat.
Central Valley Joint Venture	Central Valley Joint Venture Program	Ongoing program.	Strives to protect, restore, and enhance wetlands. Contributes to habitat conservation on a total of 714,000 acres in California.	This program has the potential to convert agricultural land to managed wetland or natural wetlands.
Contra Costa County and East Contra Costa County Habitat Conservancy	East Contra Costa County HCP/NCCP	Approved in 2007. Ongoing implementation.	Encompasses about 175,000 acres and contains 30,000 acres of preserved land. Purpose is to purchase, restore, and permanently protect large, interconnected and biologically rich blocks of habitat. A 63,073 acre overlap with the BDCP boundary.	This HCP/NCCP will result in restoration of native grassland, vernal pools, and oak woodland on the southwestern edge of the BDCP Plan Area.
Contra Costa Water District	Contra Costa Canal Fish Screen Project	Completed in 2011.	Designed to restore Delta ecosystems.	Minor terrestrial biological impact at fish screen sites.
Contra Costa Water District, Bureau of Reclamation, and California Department of Water Resources	Contra Costa Water District Middle River Intake and Pump Station (Alternative Intake Project)	Completed in 2010.	Resulted in permanent conversion of 6–8 acres of rural agricultural land. Features about 12,000 feet of pipe across Victoria Island and under Old River.	Permanent conversion of rural agricultural land.

Agency	Program/Project	Status	Description of Program/Project	Effects on Terrestrial Biological Resources
Delta Conservancy	California EcoRestore	Initiated in 2015,	This program will accelerate and implement a suite of Delta restoration actions for up to 30,000 acres of fish and wildlife habitat by 2020.	
Delta Protection Commission	Land Use and Resource Management Plan		Outlines long-term land use requirements for the Sacramento-San Joaquin Delta. This plan directs the long-term protection of agricultural, recreational, and open space uses of the Delta and restricts urban and other types of development that would reduce the value of these uses.	The Plan supports protection and restoration of riparian and aquatic habitats in the Delta, and improvement in water quality in Delta channels.
National Marine Fisheries Service, Bureau of Reclamation, and Department of Water Resources	Biological Opinion on the Long-Term Operations of the Central Valley Project and State Water Project	Ongoing program.	Action area consists of the Oroville Reservoir, Feather River downstream of Oroville, Sacramento River downstream of Feather River, Sacramento-San Joaquin Delta, and adjacent habitats that are dependent on or influenced by waterways. Designed to conserve freshwater, estuarine, nearshore, and offshore aquatic habitats, for the benefit of federally protected fish species.	The project includes 8,000-acre tidal wetland restoration requirement, which will result in conversion of agricultural land and managed wetland in the Delta and Suisun Marsh.
Reclamation District 2093	Liberty Island Conservation Bank	Ongoing implementation.	Permits and approvals acquired in 2009. Project site is on northern tip of Liberty Island. Over 160 acres in the project site with about 50 acres proposed to be converted to open water channels, emergent marsh wetland, and riparian habitat.	Conservation bank focuses on Delta fish habitat but will restore 2.7 acres of riparian habitat.
Placer County Water Agency and Bureau of Reclamation	Sacramento River Water Supply Study	Study has begun.	Feasibility study under way to assess options for providing water supply to future growth in Sacramento-Placer Counties region. Includes potential new surface diversion from the Sacramento River upstream of the Delta.	

Agency	Program/Project	Status	Description of Program/Project	Effects on Terrestrial Biological Resources
Sacramento Area Flood Control Agency, Central Valley Flood Protection Board, and U.S. Army Corps of Engineers	Central Valley Flood Management Program	Ongoing program.	Supports flood management planning in Sacramento and San Joaquin Valleys. To be updated every 5 years with first update to be completed in 2017. Combined total of about 2.2 million acres of land within the Central Valley. The program supports improvements in flood management structures, including levees and bypasses.	Facilities improvements could result in removal of vegetation in the study area as flood control facilities are improved and expanded.
San Joaquin Council of Governments	San Joaquin County Multi-Species Habitat Conservation and Open Space Plan	Approved in 2011. Ongoing implementation.	Includes most of San Joaquin County. Assumes 100,000 acres of open land conversion and provides about 100,000 acres of preserves. About 35% of this plan overlaps with BDCP so competition for restoration sites and land acquisition would exist. There are 39 covered species in common and very similar land acquisition targets, such as riparian forests and grasslands.	The plan is likely to result in conversion of agricultural land to native vegetation, including riparian and grassland areas in the south and east Delta.
Semi Tropic Water Storage District	Delta Wetlands	Draft EIR issued in 2010 and a Final EIR certified in 2012.	Flood storage and habitat conservation project on four Delta islands. This project could convert four large Delta islands into 11,000 acres of freshwater storage and 9,000 acres of managed agricultural lands, wetlands, riparian areas and other types of wildlife habitat.	A significant amount of agricultural land could be removed from production.
Solano County	Solano County Multispecies Habitat Conservation Plan		Establishes habitat conservation goals for Solano County, including approximately 205,000 acres of the study area. This conservation plan focuses on protection and restoration of 13,000-15,000 acres of valley floor grassland and vernal pool habitat for a range of special-status species. Many of the target species are common with the BDCP, including fairy shrimp, Swainson's hawk, western burrowing owl, giant garter snake, California red-legged frog, and Mason's lilaeopsis.	

Agency	Program/Project	Status	Description of Program/Project	Effects on Terrestrial Biological Resources
U.S. Army Corps of Engineers	CALFED Levee Stability Program		Includes maintaining and improving levee stability in the Delta. Long-term strategy will include ecosystem restoration. Partially funds McCormack-Williamson Tract Restoration in Cosumnes-Mokelumne ROA. 1	The program's 500 acres of tidal and floodplain habitat restoration would expand habitats also targeted by the BDCP.
Bureau of Reclamation	Delta-Mendota Canal/California Aqueduct Intertie	Completed in April 2012.	Included construction of a pump and 500-foot pipeline between the two canals near the Jones Pumping Plant.	The majority of the habitat disturbed was nonnative annual grassland. No special-status plant community was affected.
Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Department of Water Resources, and Department of Fish and Wildlife	San Joaquin River Restoration Program	Ongoing program initiated in 2006.	150 miles of the river is planned for restoration, with an emphasis on improving fish passage and riparian habitats within and adjacent to the river's floodplain.	This program does not include lands within the BDCP Plan Area, but would provide habitat connections along the San Joaquin River upstream of the Plan Area.
Bureau of Reclamation and San Luis & Delta Mendota Water Authority	Agricultural Drainage Selenium Management Program	Under development.	San Joaquin Valley agricultural drainage control program designed to reduce agricultural-related discharges of selenium into the San Joaquin River and south Delta.	
U.S. Fish and Wildlife Service, Bureau of Reclamation, and California Department of Fish and Wildlife	San Joaquin Basin Action Plan		Includes a habitat acquisition and wetland enhancement project on 23,500 acres in northern San Joaquin River basin, outside of the BDCP Plan Area. This program is focused on supplying adequate water to state and federal refuges and managed wetlands in the San Joaquin Valley for the benefit of migratory waterfowl and other species that are supported by these managed wetlands. These habitats are elements of the larger Central Valley flyway that includes wetlands in the BDCP Plan Area	The plan benefits migratory waterfowl and other species supported by managed wetlands

Agency	Program/Project	Status	Description of Program/Project	Effects on Terrestrial Biological Resources
U.S. Fish and Wildlife Service and Sacramento County	South Sacramento Habitat Conservation Plan		Establishes conservation goals for south Sacramento County, including approximately 43,000 acres of the study area. This plan targets habitat restoration and preservation for 16 species that are common to the BDCP. Habitat improvements are sought for grassland, wetland, agricultural land and riparian areas. There is overlap in the demand for land acquisition sites between the BDCP and the South Sacramento Plan. The Plan also provides for an urban expansion area within the BDCP Plan Area.	Collaborative planning for the plan and the BDCP could improve the opportunities to create a continuous band of preserved land from giant garter snake populations in the White Slough area to Stone Lakes NWR and Cosumnes River Preserve.
U.S. Fish and Wildlife Service	Recovery Plan for Sacramento-San Joaquin Delta Native Fishes	Ongoing implementation.	Released in 1995, the recovery plan includes developing additional shallow water habitat, riparian vegetation zones and tidal marsh to restore wetland habitats for the benefit of 8 native species throughout the Bay-Delta ecosystem. The objective of the plan is to establish self-sustaining populations of the species included in the plan. The goals for chinook salmon, green sturgeon, and splittail include providing for a limited harvest that can be sustained. The estuary is to be managed so that it is better habitat for aquatic life in general and for the fish species of concern in particular. This plan complements the goals of the BDCP, for both terrestrial and aquatic species in the Delta.	

Agency	Program/Project	Status	Description of Program/Project	Effects on Terrestrial Biological Resources
U.S. Fish and Wildlife Service	Stone Lakes National Wildlife Refuge Comprehensive Conservation Plan	Ongoing implementation.	Directs habitat and species management on approximately 17,600 acres of grassland, agricultural land, managed wetland and riparian habitat. The managed lands of the refuge are a major conservation feature on the eastern boundary of the BDCP Plan Area. Lands within the refuge are owned in fee title or cooperatively managed with landowners through easements. The goals of the refuge are to conserve, restore and manage wetland, grassland, and riparian habitat for the benefit of fish, wildlife and plants, and special-status species; conserve enhance, and restore high quality migrating, wintering and breeding habitat for migrating birds; provide visitors with wildlife-dependent recreation, education and interpretation opportunities; and identify and protect cultural resources. The refuge represents an opportunity for cooperative habitat conservation between the USFWS and BDCP implementing entities.	
U.S. Fish and Wildlife Service, Bureau of Reclamation, and California Department of Water Resources	Biological Opinion on the Long-Term Operations of the Central Valley Project and State Water Project (delta smelt)	Ongoing program.	The opinion directs reasonable and prudent actions associated with the ongoing operation of the CVP and SWR, as they relate to the long-term survival of delta smelt. It directs actions associated with reducing entrainment of adult, juvenile and larval smelt in the south Delta pumps; improving habitat for smelt within the Delta by regulating river outflow, restoring or creating at least 8,000 acres of intertidal and related subtidal habitat for delta smelt in the Delta and Suisun Marsh; and initiating a monitoring and reporting program.	This program is a principal element in controlling west Delta and Suisun Marsh salinity levels that might affect terrestrial species and habitats.

Agency	Program/Project	Status	Description of Program/Project	Effects on Terrestrial Biological Resources
Yolo County	Yolo Natural Heritage Program Plan	First administrative draft plan released in June 2013.	Establishes habitat conservation goals for Yolo County (653,818 acres), including 111,383 acres of the BDCP study area. The principal areas of overlap are in the Yolo plan's Planning Units 17 and 18, northern and southern Yolo Bypass. This corresponds primarily with BDCP CZ 2. Thirty-two species are being considered for ESA and NCCPA coverage, including Swainson's hawk and giant garter snake. The Yolo plan proposes to restore or protect over 76,000 acres of valley oak woodland, valley foothill riparian, fresh emergent wetland, shrubland, agricultural land and grassland.	The plan provides the potential to work toward common habitat protection, restoration, and enhancement with the BDCP in the Yolo Bypass area.
Zone 7 Water Agency and Department of Water Resources	South Bay Aqueduct Improvement and Enlargement Project	Completed in 2012.	More than 40 miles of pipelines, a 500 acre-foot reservoir, and new pumping facilities.	Located outside of the BDCP Plan Area, the project removed grassland, riparian, and related habitats in the hills west of the Plan Area.

1

2 12.3.5.2 Cumulative Effects of the No Action Alternative

3 Effects of Past, Present and Reasonably Foreseeable Projects and Programs

4 The current conditions of study area biological resources are the byproduct of past and ongoing
5 human activity and natural processes. The present geographic range and condition of natural
6 communities, special-status and common plants and wildlife, and invasive species are described in
7 Section 12.1, *Environmental Setting/Affected Environment*. A brief synopsis of general environmental
8 conditions and their evolution in the study area is presented in Section 12.1.1, *Historical Trends in*
9 *Biodiversity of the Plan Area*. This discussion provides a context of gradually declining acreages of
10 natural habitat due to agricultural, urban development, flood control and water management
11 activities.

12 The various projects and programs listed in Table 12-8 will have cumulative effects on the existing
13 biological resources of the study area through the early long-term (year 15) and over the next 50
14 years. The most relevant elements of these projects and programs are their ability to modify land
15 use patterns, modify land management practices, and change the patterns of hydrology and
16 vegetation in the study area. Most of the local, state and federal land use and land management
17 programs that are affecting or will affect the Delta are designed to preserve open space and
18 agricultural lands, and to manage the resources of the area for multiple uses, including agriculture,
19 recreation, fish and wildlife habitat, flood protection and water management. The restoration
20 programs will increase primarily wetland and riparian natural communities by converting

1 agricultural land or managed wetland. The special-status and common plants and wildlife that rely
 2 on wetland and riparian habitats for some stage of their life will benefit from these changes over
 3 time. Other species that rely on agricultural land and managed wetland, but do not benefit from
 4 wetland and riparian expansion, may decline in the study area. On the upland fringes of the Delta,
 5 plans exist for small expansions of urban development that would remove primarily agricultural
 6 land uses. The management of state- and federally owned wildlife areas, including Grizzly Island,
 7 Sherman Island and Yolo Bypass State Wildlife Areas and Stone Lakes NWR, will continue to focus
 8 on multiple uses, including wildlife habitat improvement, public access for wildlife viewing, wildlife-
 9 friendly agricultural production, and hunting opportunities. Natural habitat will be improved and
 10 expanded. The principal changes that are likely to result from the various habitat conservation plans
 11 that overlap with the study area would be expected to include the restoration and protection of the
 12 habitats that support the same special-status species being addressed in the BDCP (see *Effects of*
 13 *Other BDCP Conservation Measures on Overlapping Conservation Plans*, below). These changes would
 14 be expected to result in increases of wetland, grassland and riparian habitats, and a decrease in
 15 agricultural lands, and possibly managed wetlands in the study area.

16 Implementation of the water management strategies associated with the programs listed in Table
 17 12-8 would not significantly modify the principal natural communities in the study area. These
 18 management strategies are designed, in part, to improve aquatic habitat conditions in the Delta for
 19 the benefit of special-status fish species. Periodic levee and channel maintenance activities
 20 associated with the flood management programs in Table 12-8 would result in localized
 21 disturbances to valley/foothill riparian, grassland, and tidal perennial aquatic natural communities,
 22 and to a lesser extent to tidal brackish and tidal freshwater emergent wetlands. To the extent that
 23 ongoing levee repair and replacement involves use of reinforcing rock and discouragement of
 24 replanting streamside vegetation, there could be a gradual decline in the extent and value of
 25 valley/foothill riparian habitat and grassland along minor and major waterways. Several of the
 26 water management and transportation projects listed in Table 12-8 require localized removal of
 27 natural communities and agricultural land for expanding infrastructure. Most of these activities are
 28 on the periphery or just outside of the study area, including the Contra Costa Water District fish
 29 screen and diversion structure modifications, the Delta Mendota Canal/California Aqueduct intertie
 30 project, the South Bay Aqueduct improvement project, and California High Speed Rail.

31 Even though the ELT period is significantly reduced from the No Action Alternative (LLT) time
 32 period, the overall direction of these existing and ongoing programs and policies that influence land
 33 conversion and land management in the study area would continue to be toward maintaining the
 34 mix of agricultural, recreational, water management, and wildlife uses in the Delta, Yolo Bypass, and
 35 Suisun Marsh. Some actions that will occur under the No Action Alternative (ELT) will expand
 36 natural and manmade terrestrial and wetland habitats that will benefit the special-status and
 37 common plants and wildlife with expanded and enhanced habitat in the study area. The potential
 38 will remain, however, for long-term trends in levee deterioration, global climate change, and seismic
 39 activity that could damage levees and result in significant changes in natural communities and
 40 cultivated lands.

41 **Effects of Global Climate Change**

42 As discussed in Chapter 29, *Climate Change*, global climate change is expected to result in many
 43 physical changes to the BDCP Plan Area. From a terrestrial biology perspective, the most significant
 44 changes would include a gradual rise in sea level, increasing water and air temperatures, more
 45 frequent drought and extreme rainfall events, and changes in the hydrologic patterns of the rivers

1 and the Delta channels that influence the terrestrial and aquatic habitats used by terrestrial plants
2 and wildlife. The BDCP climate change analysis included in Chapter 29 considers sea level increases
3 at various levels, including 18–55 inches during the Plan period (see Chapter 29, Section 29.3.1). Air
4 temperatures are projected to rise by 2–5 degrees F by 2050 and water temperatures are projected
5 to increase as some proportion (2–3 degrees F) of the air temperature rise (see Appendix 29C,
6 Section 29C.2.1). The changed frequency of drought and extreme rainfall events has not been
7 predicted, but these events are expected to be part of future California conditions with global
8 climate change. Hydrologic conditions in the rivers and Delta channels are expected to be altered by
9 changes in precipitation patterns, with a portion of precipitation shifting from snow to rainfall in the
10 winter months. This would increase river flows in winter and early spring, and decrease flows in the
11 remainder of the year as snowmelt runoff decreases. The changes in river flows would generate
12 subsequent changes in west Delta and Suisun Marsh salinity levels.

13 The physical changes in conditions in the study area related to the climate change described above,
14 especially the sea level rise, could change the distribution and value of study area habitats. The sea
15 level rise is expected to gradually inundate existing habitats on the periphery of the Delta, in the
16 lower Yolo Bypass, and the northern and southern edges of Suisun Marsh. This pattern of
17 inundation, which assumes a 55-inch sea level rise, is shown in Figure 29-1. Projected sea level rise
18 by around the early long term (2025) would range between 1.7 and 11.7 inches (see Table 29-2 in
19 Chapter 29, *Climate Change*). Tidal brackish and freshwater marsh could be gradually inundated and
20 converted to more subtidal habitat. In areas where there is no upland barrier (e.g., levees, roads,
21 residential development, agricultural fields), some portion of the tidal marsh may re-establish
22 upslope with the higher water levels if there is sufficient sediment available to provide an
23 appropriate substrate. However, decreases in sediment availability that have occurred in the Delta
24 and Suisun Marsh over time and that may continue may not keep pace if the higher estimated rates
25 of sea level rise occur (Barnard et al. 2013). The result could be a gradual loss of these tidal marshes.
26 Where barriers exist upslope of existing marsh, the tidal marsh habitat could be gradually inundated
27 and subtidal areas would remain. Subtidal habitat is less valuable to the special-status and common
28 terrestrial plants and wildlife of the study area. Low-lying upland grassland and riparian areas that
29 border the study area waterways could also be gradually converted to tidal marsh, but would be
30 expected to re-establish upslope where open ground exists and there are no physical barriers.
31 Where these deeper water incursions bisect existing wildlife corridors, the ability of certain species
32 to move and interact with adjacent populations would decrease. Population numbers of riparian,
33 grassland, and tidal marsh species would be likely to decrease and population distribution would be
34 altered. The habitats adjacent to study area waterways would also be exposed to more frequent
35 inundation and desiccation as precipitation levels show greater fluctuation.

36 Land subsidence, sea level rise, gradual or catastrophic levee failure, or a combination of these
37 conditions, should they occur, would result in flooding and inundation that could significantly
38 damage existing facilities and infrastructure, uproot and kill vegetation to an unknown extent,
39 permanently flood Delta islands, and drastically alter the salinity of Delta waterways and wetlands.
40 Depending on the extent and duration of flooding, significant short- and long-term changes could
41 occur in the availability of shallow tidal wetlands, riparian and grassland habitats and managed
42 lands useful to certain special-status and common species (e.g., cultivated lands, managed wetland).
43 Depending on the amount of human intervention to drain islands and rebuild levees, there may be a
44 gradual succession of habitats less valuable to the plant and animal species currently relying on the
45 Delta for growth and seed production, cover, breeding, nesting, resting, movement corridors and
46 foraging. Refer to Appendix 3E, *Potential Seismic and Climate Change Risks to SWP/CVP Water*

1 *Supplies*, for a further discussion of seismic and climate change effects that might occur in the study
 2 area under the no action condition. While similar risks would occur under implementation of the
 3 action alternatives, these risks may be reduced by BDCP-related levee improvements, along with
 4 implementation of those projects identified for the purposes of flood protection in Table 12-8.

5 The negative elements of global climate change described above would be a contributing factor to
 6 any cumulative effects of implementing the projects and programs that are part of the No Action
 7 scenario (Table 12-8). Any negative effects on terrestrial biological resources associated with the
 8 action alternatives (see below), when considered with all of the above effects of the No Action
 9 Alternative, could create adverse cumulative effects to these terrestrial biological resources.

10 **12.3.5.3 Concurrent Project Effects**

11 The terrestrial biological resources impact analyses for the BDCP alternatives contains separate
 12 sections for effects on 12 different natural communities, on cultivated land, and on 149 special-
 13 status wildlife and plant species. For each of these resources, the first impact discussion presented
 14 (e.g., *Impact BIO-44: Loss or Conversion of Habitat for and Direct Mortality of California Red-Legged*
 15 *Frog*) is structured to provide a concurrent analysis of the effects of CM1 and CM2–CM11, and CM18
 16 during the near-term time frame (the period in which CM1 would be constructed) and provides
 17 NEPA and CEQA conclusions for the near-term as well as the late long-term time periods of the Plan.
 18 The near-term analysis includes individual discussions of each Conservation Measure’s contribution
 19 to the effect. For many of the natural communities and associated habitats for the special-status
 20 species, the near-term construction of CM1 and the conversion of lands for restoration would jointly
 21 reduce the acreages of essential habitat at locations scattered throughout the Plan Area. To avoid a
 22 substantial short-term loss of essential habitat during the near-term period, many of the habitat
 23 protection and restoration actions (CM3, CM4, CM6, CM7, CM8, CM9, CM10, and CM11) would
 24 include early implementation schedules to allow habitat protection and habitat creation to keep
 25 pace with the gradual losses that would occur. The goal would be to avoid and minimize temporal
 26 losses in habitat acreage and value that could limit the range or reduce the long-term viability of the
 27 Plan Area’s sensitive biological resources.

28 Each of the BDCP alternatives would provide sufficient habitat protection and restoration acreage in
 29 the near-term to keep pace with habitat losses by including CMs and AMMs to avoid significant
 30 impacts, with small exceptions. The impacts on vernal pool habitat and its associated special-status
 31 vernal pool crustaceans generated by construction of CM1 for Alternatives 1C, 2C, and 6C (the
 32 western canal alignment) would require mitigation in the form of increasing the amount of vernal
 33 pool complex habitat to avoid significant impacts. Also, the construction of the extensive, linear CM1
 34 canals for Alternatives 1B, 1C, 2B, 2C, 6B, and 6C would contribute to a significant and unavoidable
 35 cumulative effect on wildlife movement corridors across the Sacramento-San Joaquin Delta. CM1
 36 construction for Alternatives 1B, 2B, and 6B would also create a significant and unavoidable
 37 cumulative impact by creating barriers to the movement and population connectivity of giant garter
 38 snakes in the western portion of the Plan Area.

39 The analyses for Alternatives 4A, 2D, and 5A address both the effects of constructing the water
 40 conveyance facilities and implementing the Environmental Commitments concurrently (restoration,
 41 enhancement, and protection), and the NEPA and CEQA conclusions are based on the overall effects
 42 of both the water facilities and the Environmental Commitments.

1 **12.3.5.4 Cumulative Effects of the Action Alternatives**

2 This cumulative analysis discusses both the BDCP alternatives (1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B,
3 6C, 7, 8, and 9) and the non-HCP Alternatives (4A, 2D, and 5A).

4 **BDCP Alternatives**

5 Based on the analyses presented in earlier parts of this chapter, the alternatives would have little or
6 no negative effect on nearly all of the terrestrial biological resources of concern in the study area.
7 For the BDCP alternatives, this is consistent with the goal of HCP/NCCP programs, which is to
8 improve the long-term viability of special-status species and their habitats. The positive effects of
9 implementing the BDCP are similar in all of the project alternatives other than the No Action
10 Alternative. There are relatively small variations in the acres affected by construction of the
11 alternative water conveyance facilities (CM1), but the restoration, protection, enhancement and
12 stressor reduction elements of the alternatives are the same for Alternatives 1A, 1B, 1C, 2A, 2B, 2C,
13 3, 4, 6A, 6B, 6C, 8 and 9. These elements of the BDCP have the greatest potential to modify natural
14 communities and affect special-status plants and wildlife. There are reductions in tidal marsh
15 restoration (CM4) associated with Alternative 5, and expansion of channel margin habitat
16 enhancement (CM6) and floodplain restoration (CM5) associated with Alternative 7 that create
17 significant variances from the rest of the alternatives. Where relevant, these differences are
18 addressed in the impact analysis that follows.

19 While construction and restoration activities in the near-term period of the alternatives would
20 temporarily or permanently remove natural communities and modeled habitat for special-status
21 plant and wildlife species, the near-, mid- and long-term conservation actions would replace,
22 enhance and in most cases expand habitat acres and value for these species. The positive effects the
23 alternatives would have on special-status species would also provide benefits to common terrestrial
24 wildlife and plants.

25 The potential adverse effects of implementing all of the BDCP alternatives include potential
26 disturbance of nesting colonies of bank swallows, should they be present adjacent to construction
27 activity at the north end of the Yolo Bypass, and the potential that BDCP-related changes in river
28 stage upstream of the study area on the Sacramento and Feather Rivers could adversely affect bank
29 swallow colonies. Though the alternatives using the east (Alternatives 1B, 2B, and 6B) and west
30 (Alternatives 1C, 2C, and 6C) alignments would provide the same conservation benefits as the other
31 alternatives, the construction of the canal portions of the conveyance facilities would create
32 substantial barriers to wildlife movement within and through the study area. Also, the canal
33 associated with the east alignment alternatives (1B, 2B, and 6B) would adversely affect movement
34 and connectivity between subpopulations of giant garter snake in the vicinity of White Slough in the
35 eastern Delta.

36 Because these are the only potential adverse effects that could combine with the projects and
37 programs in Table 12-8 and with global climate change to create a cumulatively considerable effect,
38 the discussion that follows is limited to these issues.

39 **Non-HCP Alternatives**

40 For Alternatives 4A, 2D, and 5A, the Environmental Commitments, resource guidelines, AMMs, and
41 mitigation measures presented are sufficient to avoid significant cumulative effects from the
42 combined losses due to water conveyance construction and restoration except for upstream effects

1 on bank swallows (see Impact BIO-189: *Cumulative Upstream Effects of Reservoir and Water*
2 *Conveyance Facilities Operations on Bank Swallow*).

3 **Impact BIO-188: Cumulative Indirect Effects of the Construction of Conservation Components**
4 **on Bank Swallow**

5 Noise and visual disturbances during restoration activities for all action alternatives could result in
6 temporary disturbances that cause bank swallow to abandon active nest burrows adjacent to
7 construction areas, and construction-related disturbances could result in an adverse effect on
8 individuals. The noise and visual disturbance could result from implementing *CM2 Yolo Bypass*
9 *Fisheries Enhancement*, and *CM4 Tidal Natural Communities Restoration* including operation of
10 earthmoving equipment and human activities at work sites. Bank swallow colonies with occupied
11 burrows have been recorded in CZ 2 and CZ 5. Various activities related to *CM11 Natural*
12 *Communities Enhancement and Management* could also have indirect impacts on bank swallow.
13 Alternatives 4A, 2D, and 5A would not include the CM2 (Yolo Bypass) restoration activities, so they
14 would not create the potential noise and visual disturbances that could affect bank swallow in CZ 2.

15 Other projects and programs listed in Table 12-8 also have the potential to directly or indirectly
16 affect bank swallow in the study area and in areas upstream of the study area along the Sacramento
17 and Feather Rivers.

- 18 • DWR Central Valley Flood Protection Plan (Yolo Bypass widening).
- 19 • DWR Delta Levees Flood Protection Program.
- 20 • DWR FloodSAFE California.
- 21 • Sacramento Area Flood Control Agency, Central Valley Flood Protection Board, and USACE
22 Central Valley Flood Management Program.
- 23 • UUSACE CALFED Levee Stability Program.
- 24 • Reclamation and Placer County Water Agency Sacramento River Water Supply Study

25 All of the flood control and levee protection programs and plans listed above could involve
26 modification and armoring of levees within the range of known bank swallow colonies adjacent to
27 and north of the study area. Additional bank protection could further reduce the availability of bank
28 swallow nesting sites and could involve indirect disturbance of active nesting colonies. The action
29 alternatives, in combination with the other projects and programs listed above, could result in
30 adverse effects on bank swallow nesting colonies that are individually limited but cumulatively
31 considerable.

32 **NEPA Effects:** The indirect disturbance to bank swallow nesting colonies caused by implementing
33 any action alternative, in combination with the potential direct and indirect effects on these colonies
34 caused by other past, present, or reasonably foreseeable projects and programs, would create an
35 adverse cumulative effect on this species adjacent to and north of the study area. The disturbances
36 could result in take of a state-listed threatened species. Although the potential effect of the
37 alternatives is restricted to few colonies, the state recognizes this species as both imperiled and
38 vulnerable because of its restricted range and low populations. Therefore, the effect of the
39 alternatives represents an adverse cumulative effect. Implementation of Mitigation Measure BIO-
40 146, *Active Bank Swallow Colonies Shall Be Avoided and Indirect Effects on Bank Swallow Will Be*
41 *Minimized*, would be available to address this effect.

1 **CEQA Conclusion:** The indirect disturbance to bank swallow nesting colonies caused by
 2 implementing any action alternative, in combination with the potential direct and indirect effects on
 3 these colonies caused by other past, present or reasonably foreseeable projects and programs,
 4 would create a significant cumulative impact on this species adjacent to and north of the study area.
 5 The disturbances could result in take of a state-listed threatened species. Although the potential
 6 cumulative effect is restricted to a single colony, the state recognizes this species as both imperiled
 7 and vulnerable because of its restricted range and low populations. The contribution of action
 8 alternatives to this cumulative impact is considered cumulatively considerable because construction
 9 of these alternatives related to the Yolo Bypass could indirectly affect this species. Implementation
 10 of Mitigation Measure BIO-146, *Active Bank Swallow Colonies Shall Be Avoided and Indirect Effects on*
 11 *Bank Swallow Will Be Minimized*, would reduce this impact less than cumulatively considerable.

12 **Mitigation Measure BIO-146: Active Bank Swallow Colonies Shall Be Avoided and Indirect**
 13 **Effects on Bank Swallow Will Be Minimized**

14 To the extent practicable, project proponents will not conduct restoration activities during the
 15 bank swallow nesting season (April 1 through August 31). If construction activities cannot be
 16 avoided during nesting season, a qualified biologist will conduct preconstruction surveys to
 17 determine if active bank swallow nesting colonies are present within 500 feet of work areas. If
 18 no active nesting colonies are present, no further mitigation is required. Reusable tunnel
 19 material areas are not expected to be colonized by nesting bank swallows, as it is unlikely that
 20 the substrate would provide suitable nesting habitat for the species. However, reusable tunnel
 21 material sites could become suitable for swallows over time. Surveys of reusable tunnel material
 22 areas that have been present for at least 1 year, allowing the substrate to stabilize, will be
 23 conducted prior to the removal of reusable tunnel material.

24 If active colonies are detected, project proponents will establish a nondisturbance buffer
 25 (determined in coordination with CDFW and the Bank Swallow Technical Advisory Committee)
 26 around the colony during the breeding season. In addition, a qualified biologist will monitor any
 27 active colony within 500 feet of construction to ensure that construction activities do not affect
 28 nest success.

29 **Impact BIO-189: Cumulative Upstream Effects of Reservoir and Water Conveyance Facilities**
 30 **Operations on Bank Swallow**

31 One the primary threats to bank swallows is loss of nesting habitat from the placement of rock
 32 revetment for levee stabilization. Because of this limited available habitat, and the reduction of
 33 natural river process, the species is highly sensitive to 1) reductions in winter flows which are
 34 necessary to erode banks for habitat creation, and 2) high flows during the breeding season. The
 35 potential impacts of changes in upstream flows during the breeding season on bank swallows are
 36 the flooding of active burrows and destruction of burrows from increased bank sloughing. Bank
 37 swallows arrive in California and begin to excavate their burrows in March, and the peak egg-laying
 38 occurs between April and May (Bank Swallow Technical Advisory Committee 2013). Therefore,
 39 increases in flows after the March when the swallows have nested and laid eggs in the burrows
 40 could result in the loss of nests. On the Sacramento River, breeding season flows between 14,000
 41 and 30,000 cfs have been associated with localized bank collapses which resulted in partial or
 42 complete colony failure (Stillwater Sciences 2007).

1 The CALSIM II modeling results of mean monthly flow were analyzed for three flow gauge stations
2 on the Sacramento (Sacramento River at Keswick, Sacramento River upstream of Red Bluff,
3 Sacramento River at Verona) and two flow gauge stations on the Feather River (Feather River high-
4 flow channel Thermalito Dam, and Feather River at the Confluence with the Sacramento River).
5 Flows were estimated for wet years, above normal years, below normal years, dry years, critical
6 years, and an average (see Chapter 5, Section 5.3.1, *Methods for Analysis*, for a description of the
7 model).

8 On the Sacramento River, at the Keswick and Red Bluff gauges, mean monthly flows under the action
9 alternatives 1–9 and potentially other cumulative projects would increase between April and August
10 in some water years which could lead to inundation of active colonies. However, the flows under
11 Existing Conditions and the predicted flows in the late long-term without the project also show
12 increases in flows during the breeding season (April–August) in these water year types. Similar
13 trends occur for the Feather River. In addition, under the action alternatives flows are predicted to
14 be greater than 14,000 cfs during the breeding season (April–August,) during certain water years
15 which could lead to bank collapse. However, flows of this height are recorded under Existing
16 Conditions at this flow gauge and are also predicted for the late long-term time without the project
17 (the No Action Alternative).

18 **NEPA Effects:** High spring flows on the Sacramento and Feather Rivers may already be impacting
19 bank swallow colonies during the breeding season, and predicted flows under the action
20 alternatives would not be substantially greater than under the No Action Alternative. However,
21 because of the complexity of variables that dictate suitable habitat for the species, there is
22 uncertainty regarding the potential for and magnitude of impacts on bank swallow from changes in
23 upstream operations. Soil type, high winter flows, and low spring flows all contribute to successful
24 nesting of bank swallow, and even moderate changes in seasonal flows could have an adverse effect
25 on breeding success for the species. Mitigation Measure BIO-147, *Monitor Bank Swallow Colonies and*
26 *Evaluate Winter and Spring Flows Upstream of the Study Area*, would be available to address the
27 uncertainty of potential adverse effects of upstream operations on bank swallow. Because the state
28 recognizes this species as both imperiled and vulnerable due to its restricted range and low
29 populations, any negative effect of the alternatives would represent a cumulatively considerable
30 contribution to an adverse cumulative effect.

31 **CEQA Conclusion:** High spring flows on the Sacramento and Feather Rivers may already be
32 impacting bank swallow colonies during the breeding season, and predicted flows under the action
33 alternatives would not be substantially greater than under the No Action Alternative. However,
34 because of the complexity of variables that dictate suitable habitat for the species, there is
35 uncertainty regarding the potential for and magnitude of upstream impacts on bank swallow from
36 changes in operations. There are many variables that dictate suitable habitat for the species that
37 cannot be clearly quantified, and seasonal changes in flow could increase or decrease suitable
38 habitat for bank swallow depending on soil type and location of current colonies. Mitigation
39 Measure BIO-147, *Monitor Bank Swallow Colonies and Evaluate Winter and Spring Flows Upstream of*
40 *the Study Area* would address this significant impact and further determine if additional mitigation
41 is required for bank swallow. Because the state recognizes this species as both imperiled and
42 vulnerable due to its restricted range and low populations, any adverse impact of the alternatives
43 would represent a cumulatively considerable contribution to a significant cumulative impact.

1 **Mitigation Measure BIO-147: Monitor Bank Swallow Colonies and Evaluate Winter and**
 2 **Spring Flows Upstream of the Study Area**

3 To address the uncertainty of the impact of upstream spring flows on existing bank swallow
 4 habitat, DWR will monitor existing colonies upstream of the study area and collect habitat
 5 suitability data including soil type, number of active burrows per colony, and height of average
 6 burrows. DWR will quantify the magnitude of spring flows that would result in potential
 7 mortality of active colonies. In addition, to determine the degree to which reduced winter flows
 8 are contributing to habitat loss, DWR will quantify the winter flows required for river meander
 9 to create suitable habitat through lateral channel migration and bank resurfacing. If impacts of
 10 upstream flows on bank swallow are identified, replacement habitat will be established at a
 11 minimum of 2:1 for the length of bank habitat affected. Replacement habitat will consist of
 12 removing bank revetment to create habitat for bank swallow at a location subject to CDFW
 13 approval (Bank Swallow Technical Advisory Committee 2013).

14 **Impact BIO-190: Cumulative Effect of Constructing Conveyance Facilities on Giant Garter**
 15 **Snake Movements and Connectivity between Subpopulations**

16 The construction of the conveyance facilities under the alternatives using the eastern alignments
 17 (Alternatives 1B, 2B, and 6B) would adversely affect movement and connectivity for the Coldani
 18 Marsh/White Slough subpopulation of giant garter in the study area. The facilities would eliminate
 19 Coldani Marsh/White Slough subpopulation connectivity with areas containing current or previous
 20 occurrences of giant garter snake, specifically in the vicinity of Stone Lakes NWR to the north and in
 21 the Delta to the southwest (Figure 12-15B). An unknown number of small agricultural ditches and
 22 drains between Disappointment Slough and Stone Lakes would be lost, rerouted, or directed into
 23 culverts and affect species' movements and connectivity. Siphons would be constructed underneath
 24 sloughs (Disappointment Slough, White Slough, Sycamore Slough, Hog Slough, and Beaver Slough)
 25 and Stone Lakes Drain, and a tunnel would be constructed under the Lost Slough/Mokelumne River
 26 area that connects with Snodgrass Slough. These sloughs and drains would still provide some
 27 aquatic habitat and opportunities for movement and connectivity between giant garter snakes in the
 28 vicinity of Stone Lakes NWR and the Coldani Marsh/White Slough subpopulation.

29 Other factors, projects, or programs also have the potential to directly or indirectly affect giant
 30 garter snake movements and connectivity in the study area.

- 31 ● Urbanization continues to be one of the greatest threats to the giant garter snake throughout
 32 much of its extant range. Environmental impacts associated with urbanization are loss of
 33 habitat, introduction of nonnative species with a resulting loss of biodiversity, fragmentation of
 34 habitat due to road construction, and degradation of habitat due to pollutants. Within the
 35 current range of the giant garter snake, cities that are rapidly expanding and, in some instances,
 36 intruding upon or otherwise impacting giant garter snake habitat include, Chico, Woodland,
 37 Yuba City, Marysville, Sacramento, Galt, Stockton, Gustine, Los Banos, Merced, and Fresno.
 38 Urbanization increasingly threatens the viability of giant garter snake populations as urban
 39 landscapes encroach on ever-diminishing habitat for this listed species, including eliminating
 40 rice agriculture that serves as an alternative habitat for the giant garter snake.
- 41 ● A number of HCPs have been issued by USFWS for projects anticipated to impact the giant garter
 42 snake, which include the San Joaquin County multi-species HCP, the East Contra Costa County
 43 HCP, and the PG&E San Joaquin Valley HCP. In addition, eight other HCPs that include areas
 44 within the range of the giant garter snake are currently being developed: Butte County, South

1 Sacramento, Solano County, Yolo County, Yuba/Sutter County, Placer County, PG&E Statewide
2 Operations and Maintenance, and PG&E Bay Area.

- 3 ● Giant garter snakes found in rice fields or agricultural canals are threatened by conversion of
4 rice crops to non-agricultural land uses and other crops such as grape-producing vineyards, fruit
5 or nut producing orchards, or annual row crops (e.g., cotton). Unlike flood irrigated rice fields,
6 other agricultural cropping systems do not hold sufficient water for long enough time periods to
7 create artificial, temporary wetlands.
- 8 ● The White Slough Wildlife Area (WSWA) is owned by DWR and managed by CDFW. WSWA
9 consists of 880 acres of man-made ditches, canals, and freshwater marshes with associated
10 grassland/upland habitats used for hunting and fishing. From 1974 to 1978, 13 rectangular
11 borrow pits were excavated from 1 to 5 miles west of I-5 to provide fill for freeway construction.
12 The pits are fed by groundwater and periodic runoff from precipitation, irrigation, and high
13 canal flows, creating a series of ponds characterized by vegetated sloping or vertical banks and
14 open water with adjacent uplands and high ground. As a management area, WSWA comprises a
15 discontinuous series of properties encompassing ponds 5–13, which occur along a roughly 11-
16 mile stretch between Thornton and Stockton. WSWA supports the preponderance of the Coldani
17 Marsh/ White Slough giant garter snake population, one of 13 giant garter snake populations
18 described in the USFWS 1999 *Draft Recovery Plan for the Giant Garter Snake*. In the 1970s, CDFW
19 stocked large-mouth bass, channel catfish, and red-eared sunfish in at least two of the ponds:
20 each of these species probably prey on giant garter snakes and compete with them for smaller
21 prey (58 FR 54053).
- 22 ● DWR Central Valley Flood Protection Plan (Yolo Bypass widening) proposes expansion of flood
23 protection features in the study, including expansion of the Yolo Bypass. This flood protection
24 improvement project would potentially conflict with BDCP's effort to improve giant garter snake
25 habitat just outside of the current floodway.
- 26 ● The NMFS, Reclamation and DWR BiOp on the long-term operations of the CVP and SWP
27 includes the Sacramento River downstream of Feather River, Sacramento-San Joaquin Delta, and
28 adjacent habitats that are dependent on or influenced by waterways. The BiOp includes
29 landscape designs to conserve freshwater, estuarine, nearshore, and offshore aquatic habitats,
30 for the benefit of federally protected fish species. Including 8,000-acre tidal wetland restoration
31 requirement, which would result in conversion of agricultural land and managed wetland in the
32 Delta and Suisun Marsh, which could negatively affect giant garter snake connectivity and
33 movement in the study area.
- 34 ● Sacramento Area Flood Control Agency, Central Valley Flood Protection Board, and USACE
35 Central Valley Flood Management Program is an ongoing program that supports flood
36 management planning in Sacramento and San Joaquin Valleys. The program supports
37 improvements in flood management structures, including levees and bypasses. Facilities
38 improvements could result in local removal of vegetation in the study area as flood control
39 facilities are improved and expanded which could include effects on giant garter snakes in the
40 study area.

41 Past development within the study area, including urbanization and the construction of irrigation
42 canals, levees, local roads, highways, agricultural development, and the development of wildlife
43 management areas, has already affected the ability for giant garter snake to move within and
44 through the study area.

1 **NEPA Effects:** The construction of the water conveyance facilities under Alternatives 1B, 2B, and 6B,
 2 in combination with past, present or reasonably foreseeable projects would create an adverse
 3 cumulative effect on giant garter snake movement and connectivity within and in the vicinity of the
 4 study area. The alternatives' effects represent a cumulatively considerable contribution to an
 5 adverse cumulative effect. The only ways to reduce the effects these alternatives would have on
 6 giant garter snake movement would be to eliminate the canals from these alternatives, which cannot
 7 be done because the canals are essential components of these alternatives, or to create numerous
 8 overpass structures along the canals, which would substantially increase the costs and would not
 9 fully address the habitat connectivity and movement needs of giant garter snake. For these reasons,
 10 there is no feasible mitigation to address this effect.

11 **CEQA Conclusion:** The construction of the water conveyance facilities under Alternatives 1B, 2B,
 12 and 6B, in combination with past, present or reasonably foreseeable projects would create a
 13 significant cumulative impact on giant garter snake movement and connectivity within and in the
 14 vicinity of the study area. The alternatives' impact would represent a cumulatively considerable
 15 contribution to a significant cumulative impact. This impact would be significant and unavoidable.
 16 The only ways to reduce the effects these alternatives would have on giant garter snake would be to
 17 eliminate the canals from these alternatives, which cannot be done because the canals are essential
 18 components of these alternatives, or to create numerous overpass structures along the canals, which
 19 would substantially increase the costs and would not fully address the habitat connectivity and
 20 movement needs of giant garter snake. For these reasons there is no feasible mitigation to reduce
 21 this impact to a less-than-significant level.

22 **Impact BIO-191: Cumulative Effect of Constructing Conveyance Facilities on Wildlife** 23 **Corridors**

24 The construction of the water conveyance facilities (CM1) under the alternatives using the eastern
 25 alignment (Alternatives 1B, 2B, and 6B) and western alignment (Alternatives 1C, 2C, and 6C) would
 26 adversely affect wildlife corridors within and through the study area. The intakes, forebays, and
 27 canal portions of these alternatives would create barriers to the movement of nonavian wildlife
 28 within and through the study area. Nonavian wildlife in large portions of the study area would be
 29 restricted to moving across the canals via roads and bridges that would likely act as deterrents to
 30 wildlife movement and would be a source of wildlife mortality. The canal for the eastern alignment
 31 would act as a major barrier to the movement of nonavian wildlife within the eastern portion of the
 32 Delta. The canals for the western alignment would create a substantial barrier to the east-west
 33 movement of nonavian wildlife from Clifton Court Forebay north to around the community of
 34 Knightsen, and to the north-south movement of wildlife from the town of Hood west to the
 35 Sacramento Deep Water Ship Channel. Avian species would also be subject to increased mortality
 36 where new transmission lines are installed; however, these lines would not serve as major barriers
 37 to avian species' ability to disperse within and through the study area.

38 One project listed in Table 12-8, the California High-Speed Rail, would also have the potential to
 39 adversely affect wildlife corridors in the study area and region. One of the proposed alignments for
 40 the Sacramento-to-Merced section of the California High Speed Rail would pass through the study
 41 area between French Camp and Lathrop, generally following the I-5 corridor and eventually heading
 42 east along State Route 120. A proposed option for the Bay Area-to-Central Valley alignment passes
 43 through the study area from just west of Tracy east to around Lathrop, a route that generally follows
 44 the existing Union Pacific Rail Road corridor. Both of these areas already have barriers to species

1 dispersal, but increased rail traffic and the speed of the trains could serve as deterrents and sources
2 of mortality to wildlife trying to cross these areas.

3 Past development within the study area, including the construction of irrigation canals, levees, local
4 roads, highways, and agricultural development, has already affected the ability for wildlife to move
5 within and through the study area.

6 **NEPA Effects:** The construction of the water conveyance facilities under Alternatives 1B, 1C, 2B, 2C,
7 6B, and 6C, in combination with past, present or reasonably foreseeable projects, would create an
8 adverse cumulative effect on wildlife corridors within and in the vicinity of the study area. The
9 alternatives' effects represent a cumulatively considerable contribution to an adverse cumulative
10 effect. The only ways to reduce the effects these alternatives would have on wildlife corridors would
11 be to eliminate the canals from these alternatives, which cannot be done because the canals are
12 essential components of these alternatives, or to create numerous overpass structures along the
13 canals, which would substantially increase the costs and would not fully address all of the
14 movement needs of the wildlife being considered (e.g., giant garter snake). For these reasons, there
15 is no feasible mitigation to address this effect.

16 **CEQA Conclusion:** The construction of the water conveyance facilities under Alternatives 1B, 1C, 2B,
17 2C, 6B, and 6C, in combination with past, present or reasonably foreseeable projects, would create a
18 significant cumulative impact on wildlife corridors within and in the vicinity of the study area. The
19 alternatives' impact would represent a cumulatively considerable contribution to a significant
20 cumulative impact. This impact would be significant and unavoidable. The only ways to reduce the
21 effects these alternatives would have on wildlife corridors would be to eliminate the canals from
22 these alternatives, which cannot be done because the canals are essential components of these
23 alternatives, or to create numerous overpass structures along the canals, which would substantially
24 increase the costs and would not fully address all of the movement needs of the wildlife being
25 considered (e.g., giant garter snake). For these reasons, there is no feasible mitigation to reduce this
26 impact to a less-than-significant level

27 **12.3.6 Effects on Other Conservation Plans**

28 **Impact BIO-192: Potential for Conflicts between Implementation of the BDCP and Other** 29 **Conservation Plans**

30 To comply with CEQA, potential conflicts with the provisions of an adopted HCP, NCCP, or other
31 approved local, regional, or state habitat conservation plan must be analyzed. Within or near the
32 study area, numerous HCPs, NCCPs, and other regional conservation plans have been permitted or
33 are in process, including those listed below.

- 34 • Placer County Conservation Plan (TRA Environmental Services 2011)
- 35 • Yuba-Sutter HCP/NCCP (Yuba County et al. 2011)
- 36 • Natomas Basin HCP (City of Sacramento et al. 2003)
- 37 • Yolo Natural Heritage Program (YNHP) (Yolo County Habitat/Natural Community Conservation
38 Plan Joint Powers Authority 2013)
- 39 • South Sacramento HCP (Sacramento County 2010)
- 40 • Solano County Multispecies HCP (Solano County MSHCP) (Solano County Water Agency 2009)

- 1 • East Contra Costa County HCP/NCCP (ECCCHCP/NCCP) (East Contra Costa Habitat Conservation
- 2 Plan Association 2006)
- 3 • San Joaquin County Multi-Species HCP and Open Space Plan (SJCMSHCP) (Jones & Stokes 2000)
- 4 • East Alameda County Conservation Strategy (EACCS) (East Alameda County Conservation
- 5 Strategy Steering Committee 2010)

6 Of these, the first three plans have little (less than 1%) or no physical overlap with the study area
 7 boundary and, thus, no potential for conflict with BDCP actions (Figure 12-3). The Placer County
 8 Conservation Plan is found in western Placer County and does not overlap with BDCP. The Yuba-
 9 Sutter HCP/NCCP covers Yuba and Sutter Counties and overlaps with less than 200 acres of the
 10 study area at the northern end of the Yolo Bypass (Table 12-9). The Natomas Basin HCP is found in
 11 northwestern Sacramento and southern Sutter Counties. This plan is adjacent to the study area but
 12 does not overlap with it. Because of the lack of overlap and the location of these plans upstream of
 13 BDCP, they are not discussed further in this section.

14 The remaining six plans overlap with the study area to varying extents (Table 12-9). Each of these
 15 six plans includes a conservation strategy that implements land restoration, enhancement and/or
 16 acquisition within or near their respective boundaries. The following discussion addresses whether
 17 the implementation of BDCP covered activities and conservation actions have the potential to
 18 conflict with these plans and their conservation strategies.

19 **Table 12-9. Summary Table of Conservation Plans that Overlap with BDCP**

Conservation Plan	Plan Status	Plan Area (ac)	Boundary Overlap with BDCP (ac)	Overlap Relative to Other Plans	Overlap relative to BDCP
East Contra Costa County HCP/NCCP	Approved in 2007	174,116	63,073	36.2%	7.3%
San Joaquin County MSHCP and Open Space Plan	Approved in 2001	912,386	317,355	34.8%	37.0%
East Alameda County Conservation Strategy	Approved in 2011	271,486	4,643	1.7%	0.5%
Solano County MSHCP	In Process	581,874	198,149	34.1 %	22.9%
South Sacramento HCP	In Process	374,733	41,130	11.0%	4.8%
Yolo Natural Heritage Program	In Process	653,818	111,383	17.1%	12.9%
Yuba-Sutter HCP/NCCP	In Process	469,137	198	0.04%	0.02%

Sources: ICF International 2011; Cal-Atlas Geospatial Clearinghouse; TRA Environmental Services
 2011; Solano County Water Agency 2009; Radmacher pers. comm.

20
 21 Table 12-10 lists the amount of conservation remaining in each of the three approved plans based
 22 on summary reports released in 2011. Because EACCS was just approved in 2011, no land has been
 23 acquired to date for its reserve system. The acreage provided in Table 12-10 is the estimated
 24 amount needed for the entire plan area under each plan, and is not limited to the overlap area.

1 **Table 12-10. Conservation Status of Approved Plans (acres)**

Plan	Target Reserve System Size	Current Reserve System Size	Amount Remaining to Acquire
East Contra Costa County HCP/NCCP*	30,300	4,589	25,711
San Joaquin County MSHCP**	100,841	8,942	91,899
East Alameda County Conservation Strategy***	N/A	0	N/A

Sources: ICF International 2011; San Joaquin Council of Governments 2010.

* Reserve System Size based on Maximum Development Scenario

** Based on estimated acreage of take according to mitigation ratios. Actual amount remaining likely to be much less.

*** Conservation Strategy is implemented project-by-project according to established mitigation ratios. Because the strategy is not dependent on a certain amount of development occurring, there is no target reserve system size.

2

3 **Effects of Water Conveyance Facilities Construction on Other Conservation Plans**

4 The BDCP conservation measures, or Environmental Commitments under the non-HCP alternatives,
5 that have the potential to affect overlapping conservation plans include the construction and
6 operation of new water conveyance facilities associated with the SWP and CVP, and the
7 implementation of restoration and acquisition actions and other conservation activities. The effects
8 of restoration, acquisition, and other conservation activities are discussed in the next section. To
9 quantify the potential effects of the construction of the water conveyance facilities on overlapping
10 plans, the permanent surface impacts of the construction of Alternatives 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3,
11 4, 4A, 5, 5A, 6A, 6B, 6C, 7, 8, and 9 were identified.

12 Construction of the water conveyance facilities would result in permanent surface disturbance
13 within the Plan Area. Depending upon the alternative, a portion of these impacts would occur
14 outside of the plan area boundaries for the six overlapping plans (Figure 12-4). The remaining
15 impacts would be small relative to the size of the overlapping plan areas, varying from less than
16 0.01% of total plan areas, to a maximum of 2.7% of the East Contra Costa County HCP/NCCP area
17 under Alternatives 1C, 2C, and 6C (4,755 acres of impacts within a 174,115-acre plan area).
18 Construction of the water conveyance facilities would reduce the amount of available cultivated land
19 for acquisition by overlapping conservation plans by as little as 5 acres in the East Alameda County
20 Conservation Strategy (Alternatives 2D, 4, 4A, and 5A) and as much as 14,050 acres in the San
21 Joaquin County HCP (Alternatives 1B, 2B, 6B).

22 The construction of the water conveyance facilities would avoid all existing reserve lands of the East
23 Contra Costa County HCP/NCCP because these lands are outside of the study area (Figure 12-4).
24 Similarly, construction of the water conveyance facilities using the west alignment, Modified
25 Pipeline/Tunnel Alignment, or Pipeline/Tunnel Alignment would avoid all existing reserve lands of
26 the San Joaquin County HCP (Figure 12-4). Construction of the east canal has the potential to
27 temporarily affect existing preserve lands of the San Joaquin County HCP near Sycamore Slough and
28 Walnut Grove. See the section below on this plan for details of these potential impacts and
29 mitigation measures.

1
2**Table 12-11. Impacts from Construction of Water Conveyance Facilities under the Alternatives Relative to Total Area of Overlapping Conservation Plans**

Plan	Plan Area (ac.)	Alternative	Permanent Surface Impacts (ac.)	Surface Impacts Relative to Plan (% of Plan Area)
East Alameda County Conservation Strategy	271,485	1A	228	0.08%
		1B	228	0.08%
		1C	23	0.01%
		2A	228	0.08%
		2B	228	0.08%
		2C	23	0.01%
		2D	5	<0.01%
		3	228	0.08%
		4	5	<0.01%
		4A	5	<0.01%
		5	228	0.08%
		5A	5	<0.01%
		6A	228	0.08%
		6B	228	0.08%
		6C	23	0.01%
		7	228	0.08%
8	228	0.08%		
9	11	0.00%		
East Contra Costa County HCP/NCCP	174,115	1A	1,258	0.72%
		1B	1,258	0.72%
		1C	4,755	2.73%
		2A	1,258	0.72%
		2B	1,258	0.72%
		2C	4,755	2.73%
		2D	1,823	1.05%
		3	1,258	0.72%
		4	1,823	1.05%
		4A	1,823	1.05%
		5	1,258	0.72%
		5A	1,823	1.05%
		6A	1,258	0.72%
		6B	1,258	0.72%
		6C	4,755	2.73%
		7	1,258	0.72%
8	1,258	0.72%		
9	166	0.10%		

Plan	Plan Area (ac.)	Alternative	Permanent Surface Impacts (ac.)	Surface Impacts Relative to Plan (% of Plan Area)
San Joaquin County Multi-Species Habitat Conservation and Open Space Plan	912,383	1A	1,290	0.14%
		1B	14,044	1.54%
		2A	1,296	0.14%
		2B	14,050	1.54%
		2C	6	0.00%
		2D	1,296	0.14%
		3	1,290	0.14%
		4	1,296	0.14%
		4A	1,296	0.14%
		5	1,290	0.14%
		5A	1,296	0.14%
		6A	1,290	0.14%
		6B	14,044	1.54%
Solano County Multi-Species HCP	581,872	1C	3,165	0.54%
		2C	3,165	0.54%
		6C	3,165	0.54%
South Sacramento HCP	374,732	1A	2,105	0.56%
		1B	3,988	1.06%
		2A	2,120	0.57%
		2B	3,988	1.06%
		2D	1,455	0.39%
		3	1,933	0.52%
		4	1,013	0.27%
		4A	1,013	0.27%
		5	1,861	0.50%
		5A	823	0.22%
		6A	2,105	0.56%
Yolo Natural Heritage Program Plan	653,818	6B	3,988	1.06%
		7	1,972	0.53%
		8	1,972	0.53%
		9	150	0.04%
		1C	5,403	0.83%
		2C	5,403	0.83%
		6C	5,403	0.83%

1 **Effects of BDCP Acquisition and Restoration on Other Conservation Plans**

2 Like the BDCP, each of the six overlapping conservation plans contains a conservation strategy
3 composed of a variety of actions or measures. Approved conservation plans (ECCCHCP/NCCP,
4 SJCMShCP, EACCS) are required to implement those actions in order to meet their permit
5 conditions. Proposed plans (YNHP, South Sacramento HCP, and Solano County MSHCP) are not yet
6 permitted but are far enough along in their development process to predict the nature and general
7 location of likely conservation actions. In all overlapping conservation plans (approved or in
8 process), the primary conservation actions are a combination of land preservation through
9 acquisition in fee title or conservation easement and restoration of natural communities. All of the
10 overlapping plans focus primarily on terrestrial species (see Table 1-4 in Chapter 1 of the BDCP for
11 the overlap of covered species) and, consequently, on the preservation and restoration of terrestrial
12 natural communities and adjacent wetland and stream systems.

13 This regional focus on land protection and conservation to benefit endangered species creates
14 opportunities for coordination, partnerships, and achieving common conservation goals. However,
15 the need to fulfill acquisition and restoration targets in geographically overlapping areas also
16 creates the potential for conflicts. For example, in certain areas, sites available for acquisition and
17 restoration with rare natural communities or physical conditions may be limited. This limitation
18 may cause plans to compete for conservation lands, particularly to meet HCP obligations that are
19 driven by mitigation-to-impact ratios.

20 Conservation components under Alternatives 1B, 1C, 2A, 2B, 2C, 3, 4, 6A, 6B, 6C, 8 and 9 would be the
21 same as those under Alternative 1A. Conservation components under Alternative 5 would be the same
22 as those under Alternative 1A, except that 25,000 acres, rather than 65,000 acres, of tidal habitat would
23 be restored. Conservation components under Alternative 7 would be similar to those under Alternative
24 1A, but 40 linear miles, rather than 20 linear miles, of channel margin habitat would be enhanced, and
25 20,000 acres, rather than 10,000 acres, of seasonally inundated floodplain would be restored to further
26 improve fish and wildlife habitat, particularly along the San Joaquin River.

27 Alternatives 4A, 2D, and 5A would not be implemented as HCP/NCCPs and would require substantially
28 less conservation relative to the other alternatives. Tidal habitat restoration would range between 292
29 and 300 acres, nontidal marsh restoration would range between 832 and 1,356 acres, channel margin
30 enhancement would range between 3.1 and 5.5 levee miles, and there would be no seasonally
31 inundated floodplain restoration. The cultivated lands needed for protection under the non-HCP
32 alternatives ranges between 11,301 and 13,432 acres, which is substantially less than the 48,625 acres
33 of cultivated lands proposed for protection under the BDCP alternatives. Alternatives 4A, 2D, and 5A
34 generally would result in the same or fewer impacts than the water conveyance facilities for the BDCP
35 alternatives and would require substantially less restoration and protection; therefore, the analysis
36 presented below focuses only on the BDCP alternatives, which have a greater potential for conflict with
37 the six overlapping plans.

38 This analysis addresses the potential for conflict by analyzing the conservation needs of the BDCP
39 and each of the six plans with substantial (more than 1%) overlap with the BDCP (Table 12-11).

1 **12.3.6.1 Methodology**

2 To understand the conservation issues of all plans relative to the overlap areas, several analyses
3 were conducted. First, a crosswalk table was developed for all natural community types with
4 restoration or acquisition targets in the BDCP. Because each plan uses a different land-cover dataset,
5 a crosswalk was created that broadly assimilates these land-cover types into six categories relevant
6 for conservation: wetlands, tidal, riparian, grassland, agriculture, and streams (Table 12-12). The
7 BDCP dataset contains both tidal and nontidal wetlands. Tidal wetlands were assigned to the “tidal”
8 community, while nontidal wetlands were assigned to the “wetland” community. Note that land
9 cover types without restoration or acquisition targets in the BDCP (e.g., chaparral, urban, conifer)
10 were not crosswalked because the analysis is limited to understanding how the implementation of
11 BDCP restoration and acquisition targets might affect other plans.

1 **Table 12-12. Crosswalk of BDCP Natural Communities with those of Overlapping Conservation Plans**

BDCP Natural Communities		ECCC HCP/NCCP	SJCM SHCP	EACCS	Solano MSHCP	South Sacramento HCP	YNHP
Wetlands	Vernal pool complex	Perennial Wetland	Vernal Pool Grassland	Alkali Wetland	Vernal Pools	Vernal Impoundment	(riparian and wetlands)
	Alkali seasonal wetland complex	Seasonal Wetland	Wetlands	Seasonal Wetland		Vernal Pool	
	Managed wetland	Alkali Wetland		Valley Sink Scrub		Vernal Swale	
	Nontidal freshwater perennial emergent wetland					Seasonal Wetlands	
	Other natural seasonal wetland					Freshwater Marsh	
Tidal	Tidal brackish emergent wetland/ Tidal freshwater emergent wetland		Delta Water's Edge*		Coastal Marsh		
	Tidal mudflat						
	Tidal perennial aquatic						
Riparian	Valley/foothill riparian ¹	Riparian Woodland Scrub	Riparian		Riparian Vegetation	Valley Oak Riparian Woodland	(riparian and wetlands)
						Mine Tailing Riparian Woodland	
						Mixed Riparian Woodland	
						Mixed Riparian Scrub	
Agriculture	Cultivated lands	Cropland	Flooded Field		Agriculture	Cropland	
			Agricultural			Vineyard	
						Orchards	
						Irrigated Pasture-Grassland	
Grassland	Grassland	Alkali Grassland	Grassland	Alkali Meadow and Scalds	Valley Floor Grasslands	Valley Grassland	Grasslands
		Annual Grasslands		California Annual Grassland			
Dune Scrub	Inland dune scrub						
Streams	Nontidal perennial aquatic (lakes, ponds, streams)	Perennial Streams	Submerged Aquatic Vegetation	Streams			

Notes: All natural communities are crosswalked to column B NOT to each other.

Crosswalk based on aggregated Preserve Types from 2000 SJC MSCP and Open Space Plan Table 5.4.2. Each preserve includes multiple vegetation types resulting in overlaps between the preserves and the major natural community types created by the crosswalking exercise.

1 The six natural community categories were analyzed for each of the six plans with respect to both
 2 acquisition and restoration. Tables 12-13 through 12-17 summarize the acquisition targets for each
 3 plan, if available. In order to roughly approximate potential acquisition needs of each plan in the
 4 overlap areas, the acquisition targets from each plan for each natural community type were
 5 multiplied by the proportion of each community type in the overlap area relative to each plan as a
 6 whole. This method assumes that acquisition will be evenly distributed throughout each plan area
 7 and roughly approximates potential acquisition in the overlapping zones. In cases where acquisition
 8 was focused geographically (i.e., did not fit this assumption), a “correction factor” was applied to
 9 account for underestimates or overestimates based on plan requirements and ICF’s familiarity with
 10 each overlapping plan. We used the U.S. Forest Service’s California Vegetation (CALVEG) and BDCP
 11 vegetation datasets to calculate the proportion of each natural community type in the overlap areas.
 12 Because the draft conservation strategy for the YCHP has not been released, acquisition targets were
 13 not provided, only the overlap acres (Table 12-17).

14 **Table 12-13. Estimated Overlap in Acquisition Activities by Major Natural Community Type for**
 15 **ECCCCHCP/NCCP**

East Contra Costa County HCP/NCCP					
	Overlap with BDCP	Plan-Wide Target (acres)	Correction Factor	Estimated Acquisition Needs in BDCP Plan Area (acres)	Notes
Agriculture	96%	400	1.04	400	All agriculture acquisition will occur in BDCP overlap area.
Grassland	11%	17,750	0.5	957	Most grassland will be protected outside of the BDCP overlap area; includes alkali grassland.
Riparian	60%	70	1	42	
Wetlands	94%	336	0.4	127	Most wetlands will be preserved in foothills, not agricultural areas.

16

1 **Table 12-14. Estimated Overlap in Acquisition Activities by Major Natural Community Type for San**
 2 **Joaquin County MSHCP and Open Space Plan**

San Joaquin County MSHCP and Open Space Plan ^a					
	Overlap with BDCP	Plan-Wide Target (acres)	Correction Factor	Estimated Acquisition Needs in BDCP Plan Area (acres)	Notes
Agriculture	40%	36,382	1	14,487	
Grassland	9%	12,744	1	1,099	Approximately half of the proposed tidal restoration would occur in the overlap area.
Riparian	81%	1,231	1	992	
Streams	71%	2,269	1	1,609	
Tidal	100%	6,048	0.6	3,629	
Wetlands	89%	701	1	624	

^a Planwide targets based on SJC MSHCP 2010 Annual Report for remaining acquisition acres. Tidal natural community corrected due to crosswalking of Delta's Water's Edge Preserve type, which contains riparian and other vegetative types

3

4 **Table 12-15. Acres of Estimated Overlap in Acquisition Activities by Major Natural Community**
 5 **Type for Solano County MSHCP**

Solano County MSHCP					
	Overlap with BDCP	Plan-Wide Target (acres)	Correction Factor	Estimated Acquisition Needs in BDCP Plan Area (acres)	Notes
Agriculture	29%	6,000	0.5	900	Most agricultural land will be acquired outside BDCP Plan Area to meet needs for Swainson's hawk mitigation
Grassland	19%	12,200	1	2,320	
Riparian	44%	1,050	1	462	
Tidal	84%	100	1	84	
Wetlands	94%	1,600	1	1,504	

6

7 **Table 12-16. Acres of Estimated Overlap in Acquisition Activities by Major Natural Community**
 8 **Type for South Sacramento HCP**

South Sacramento HCP				
	Overlap with BDCP	Plan-Wide Target (acres)	Correction Factor	Estimated Acquisition Needs in BDCP Plan Area (acres)
Agriculture	21%	11,405	1	2,381
Grassland	2%	26,835	1	596
Riparian	68%	1,228	1	837
Wetlands	75%	1,996	1	1,488

9

1 **Table 12-17. Overlap by Major Natural Community Type for Yolo Natural Heritage Program**

	Yolo Natural Heritage Program		
	Amount in Plan Area (acres)	Overlap with BDCP (acres)	Overlap
Agriculture	365,392	72,666	20%
Grassland	100,662	10,639	11%
Riparian	6,657	3,074	46%
Streams	6,105	1,157	19%
Tidal	4,949	4,926	100%
Wetlands	11,501	10,932	95%

2

3 **Effects of BDCP Acquisition of Cultivated Land on Other Conservation Plans**

4 By far the BDCP's largest land acquisition need is for cultivated land, which the BDCP calls
5 "cultivated lands." BDCP would acquire cultivated lands for three primary purposes. First, cultivated
6 land would be acquired to build the water conveyance facilities, as describe above and quantified in
7 Tables 12-18 through 12-21. Second, cultivated land would be acquired by BDCP for preservation as
8 foraging habitat for three covered species (Swainson's hawk, sandhill crane, and tricolored
9 blackbird). Finally, cultivated land would be acquired for restoration to tidal wetland, floodplains,
10 riparian woodland, or nontidal marsh.

11 This acquisition and preservation has the greatest potential for conflict with overlapping
12 conservation plans that have substantial needs for acquisition of cultivated lands to satisfy their
13 own conservation requirements. Acquisition by BDCP of cultivated land reduces the amount of such
14 land available for overlapping plans. The assessment of this potential conflict compares the amount
15 of cultivated land not already protected (i.e., that available for acquisition) with the need for
16 cultivated land by BDCP and each plan in the overlap area. The analysis also takes into account that
17 BDCP and each plan would remove cultivated lands through their own covered activities, further
18 reducing the available cultivated land for preservation. This assessment assumes all covered
19 activities in each plan are implemented and, therefore, all mitigation or conservation needs for
20 cultivated lands are realized in each plan. In reality, some plans may not have the development
21 assumed by the plan and, therefore, would not have the full need assumed by the plan for mitigation
22 or conservation (which is proportional to the development that occurs).

23 The cultivated preservation needs of BDCP and the other conservation plan are deemed to be
24 without conflict if the available cultivated land with full buildout is at least double the sum of the
25 needs of the two plans in the overlap area. This assumption is based on the need to have more
26 cultivated land for preservation than required to ensure that enough willing sellers are available for
27 each plan.

1 **Table 12-18. Amount of Cultivated Land Preservation by BDCP in Each Overlap Area (Pipeline/Tunnel Alignment; Alternatives 1A, 2A, 6A)**

Plan with Overlap	Amount of Unprotected Cultivated Land in Overlap Area ^a (acres)	Estimated Amount Lost to Covered Activities (acres)	Percent of Overlap of Each HCP with BDCP	Est. Amount Lost to Covered Activities in Overlap Area (acres)	Est. Amount Lost to BDCP Covered Activities in Overlap Area (acres)	Est. Preservation Need for each Plan in Overlap Area (acres)		Est. Preservation Need for BDCP in Overlap Area (acres)		Est. Cultivated Lands Available for Preservation at End of Permit Terms ^e (acres)	Total Preservation Needs in Overlap Areas (acres)		Est. Cultivated Lands Remaining After Preservation for Covered Activities and Restoration (acres)	
						Low	High	Low	High		Low	High	Low	High
East Alameda County Conservation Strategy	2,687	2,694	2%	54	78	100	1,000	100	176	2,555	100	1,176	2,455	1,380
East Contra Costa County HCP/NCCP	29,039	12,148	85%	10,326	1,140	400	400	1,460	2,562	17,573	1,860	2,562	15,713	14,611
San Joaquin County Multi-species Habitat Conservation and Open Space Plan	218,370	47,915	35%	16,770	32,580	14,487	36,382	7,400	12,987	169,090	21,887	49,369	146,203	119,721
Solano County MSHCP	59,307	60,140	34%	20,448	12,844	870	6,000	4,580	8,038	25,963	5,450	14,038	20,513	11,925
South Sacramento HCP	17,583	17,617	4.8%	846	3,556	2,381	11,405	960	1,685	12,127	3,341	13,090	8,786	(-963)
Yolo Natural Heritage Plan	55,609	47,915	17%	8,146	6,158	2,000	5,000	2,540	4,458	47,451	4,540	9,458	42,911	37,993
Total	382,595	196,420		44,926	56,356	20,328	60,187	17,040	29,905	274,759	37,278	90,092	237,481	184,667

^a Estimate based on data in each plan.

2

3 **Table 12-19. Amount of Cultivated Land Preservation by BDCP in Each Overlap Area (East Alignment; Alternatives 1B, 2B, and 6B)**

Plan with Overlap	Amount of Unprotected Cultivated Land in Overlap Area (acres)	Estimated Amount Lost to Covered Activities (acres)	Percent of Overlap of Each HCP with BDCP	Est. Amount Lost to Covered Activities in Overlap Area (acres)	Est. Amount Lost to BDCP Covered Activities in Overlap Area (acres)	Est. Preservation Need for each Plan in Overlap Area (acres)		Est. Preservation Need for BDCP in Overlap Area (acres)		Est. Cultivated Lands Available for Preservation at End of Permit Terms (acres)	Total Preservation Needs in Overlap Areas (acres)		EST. Cultivated Lands Remaining After Preservation for Covered Activities and Restoration (Acres)	
						Low	High	Low	High		Low	High	Low	High
East Alameda County Conservation Strategy	2,687	2,694	2%	54	79	100	1,000	100	176	2,554	100	176	2,354	1,378
East Contra Costa County MSHCP	29,039	12,148	85%	10,326	1,140	400	400	1,860	2,962	17,573	1,860	2,562	15,713	14,611
San Joaquin County MSHCP	218,370	47,915	35%	16,770	44,577	14,487	36,382	7,400	12,987	157,023	21,887	49,369	135,136	107,654
Solano County Multispecies HCP	59,307	60,140	34%	20,448	12,844	870	6,000	4,580	8,038	26,015 ¹	5,450	14,038	20,565	11,977
South Sacramento HCP	17,583	17,617	4.8%	846	4,024	2,381	11,405	960	1,685	12,713 ¹	3,341	13,090	9,372	(-376)
Yolo Natural Heritage Program Plan	55,609	47,915	17%	8,146	6,158	2,000	5,000	2,540	4,458	41,305	2,540	4,458	36,765	31,847
Total	382,595	188,429		56,589	68,822	20,238	60,187	20,000	35,100	257,184	37,278	90,093	219,906	167,091

¹ This does not meet the “double the sum of the two Plans” criterion for the highest estimated preservation needs.

1 **Table 12-20. Amount of Cultivated Land Preservation by BDCP in Each Overlap Area (West Alignment; Alternatives 1C, 2C and 6C)**

Plan with Overlap	Amount of Unprotected Cultivated Land in Overlap Area (acres)	Estimated Amount Lost to Covered Activities (acres)	Percent of Overlap of Each HCP with BDCP	Est. Amount Lost to Covered Activities in Overlap Area (acres)	Est. Amount Lost to BDCP Covered Activities in Overlap Area (acres)	Est. Preservation Need for each Plan in Overlap Area (acres)		Est. Preservation Need for BDCP in Overlap Area (low) (acres)	Est. Preservation Need for BDCP in Overlap Area (high) (acres)	Est. Cultivated Lands Available for Preservation at End of Permit Terms (acres)	Total Preservation Needs in Overlap Areas (acres)		EST. Cultivated Lands Remaining After Preservation for Covered Activities and Restoration (acres)	
						Low	High				Low	High	Low	High
East Alameda County Conservation Strategy	2,687	2,694	2%	54	0	100	1000	100	176	2,633	200	1,176	2,433	1,457
East Contra Costa County HCP/NCCP	29,039	12,148	85%	10,326	5,320	400	N/A	1,460	2,562	13,393	1,860	2,962	11,533	10,431
San Joaquin County MSHCP and Open Space Plan	218,370	47,915	35%	16,770	30,832	14,487	36,382	7,400	12,987	170,768	21,887	49,369	148,881	121,399
Solano County MSHCP	59,307	60,140	34%	20,448	16,373	870	6,000	4,580	8,038	22,486	5,450	14,038	17,036	8,448
South Sacramento HCP	17,583	17,617	4.8%	846	3	2,381	11,405	960	1,685	16,734	3,341	13,090	13,393	3,644
Yolo Natural Heritage Plan	55,609	47,915	17%	8,146	12,617	2,000	5,000	2,540	4,458	34,846	2,540	4,458	30,306	25,389
Total	382,595	188,429		56,589	65,145	20,000	35,100	17,040	29,905	260,861	37,040	65,005	223,821	195,856

2

3 **Table 12-21. Amount of Cultivated Land Preservation by BDCP in Each Overlap Area (Through Separate Corridors Alignment; Alternative 9)**

Plan with Overlap	Amount of Unprotected Cultivated Land in Overlap Area (acres)	Estimated Amount Lost to Covered Activities (acres)	Percent of overlap of Each Plan with BDCP	Est. Amount Lost to Covered Activities in Overlap Area (acres)	Est. Amount Lost to BDCP Covered Activities in Overlap Area (acres)	Est. Preservation Need for each Plan in Overlap Area (acres)		Est. Preservation Need for BDCP in Overlap Area (acres)		Est. Cultivated Lands Available for Preservation at End of Permit Terms (acres)	Total Preservation Needs in Overlap Areas (acres)		EST. Cultivated Lands Remaining After Preservation for Covered Activities and Restoration (acres)	
						Low	High	Low	High		Low	High	Low	High
East Alameda County Conservation Strategy	2,687	2,694	2%	54	8	100	1000	1,460	2,562	2,625	1,560	3,562	1,065	(-937)
East Contra Costa County HCP/NCCP	29,039	12,148	85%	10,326	257	400	400	7,400	12,987	18,456	7,800	13,387	10,656	5,069
San Joaquin County Multi-species Habitat Conservation and Open Space Plan	218,370	47,915	35%	16,770	32,841	14,487	36,382	100	176	168,759	14,587	36,558	154,172	132,201
Solano County Multispecies HCP	59,307	60,140	34%	20,448	12,844	870	6,000	4,580	8,038	26,015	5,450	14,038	20,565	11,977
South Sacramento HCP	17,583	17,617	4.8%	846	15	2,381	11,405	960	1,685	16,722	3,341	13,090	13,381	3,632
Yolo Natural Heritage Program Plan	55,609	47,915	17%	3,354	6,158	2,000	5,000	2,540	4,458	46,097	4,540	9,458	41,557	36,639
Total	382,595	188,420		51,797	52,123	20,138	60,187	20,000	35,100	278,675	37,278	90,093	241,397	188,582

1 One limitation of this analysis is that it is a snapshot at the end of the permit terms of each plan. In
 2 reality, each plan will be gradually preserving cultivated land in the overlap area at the same time.
 3 BDCP and overlapping plans would also be coordinating and cooperating in their land acquisition
 4 activities. For example, BDCP Chapter 3, Section 3.4.1.3.1, *Land Protection*, describes a process for
 5 coordination among BDCP, South Sacramento HCP, and San Joaquin Multiple Species Conservation
 6 Plan to ensure that sufficient lands are available in the overlap area for each plan to meet its
 7 conservation obligations. Additionally, for NCCPs in development that have planning agreements,
 8 discretionary projects within the plan area that are subject to CEQA are subject to review by the
 9 CDFW to ensure that they do not conflict with the preliminary conservation objectives of an NCCP
 10 under development (Fish and Game Code Section 2810(b)(8)). Both the gradual preservation in the
 11 overlap area over time and ongoing coordination would help to minimize any conflicts that might
 12 arise with individual acquisitions or with a gradual shortage that might arise near the end of the last
 13 permit.

14 Tables 12-22 through 12-25 summarize the restoration targets for each plan and estimate the
 15 overlap with BDCP. The restoration targets are multiplied by the percentage of overlap between
 16 each plan area and the BDCP to approximate the potential for competition over land cover for
 17 restoration. Like the analysis for Table 12-22, a correction factor was applied to targets and plans
 18 where additional information regarding the location of restoration was available. Because the draft
 19 conservation strategy for the YNHP has not been released, a restoration table was not developed.
 20 The acres of each natural community type relative the YNHP plan area and the overlap area are
 21 provided in Table 12-17.

22 **Table 12-22. Estimated Overlap in Restoration Activities by Major Natural Community Type for**
 23 **ECCCCHCP/NCCP**

East Contra Costa County Habitat Conservation Plan				
	Plan-Wide Target (acres)	Overlap	Correction Factor ^a	Estimated Overlap (acres)
Wetlands	315	36%	0.4	45
Riparian	55	36%	1	20

^a Wetlands are less likely to be restored within the BDCP Plan Area because of the location of existing preserves outside of the BDCP Plan Area (wetland restoration must occur on the preserves).

24
 25 **Table 12-23. Estimated Overlap in Restoration Activities by Major Natural Community Type for**
 26 **San Joaquin County MSHCP and Open Space Plan**

San Joaquin County MSHCP and Open Space Plan ^a				
	Plan-Wide Target (acres)	Overlap	Correction Factor	Estimated Overlap (acres)
Wetlands	350	35%	1	123
Riparian	751	45%	1	338

^a Table based on remaining acres for restoration from 2011 San Joaquin County MSHCP and Open Space Plan Annual Report. Vegetation management and enhancement in other natural community types (e.g., riparian) occurring in SJC MSHCP preserves acquired under the plan. However, specific targets for this restoration is not associated with the acreages provided for plan mitigation. Riparian includes: Great Valley Riparian Forest (R), Great Valley Oak Riparian Forest (R2), Arroyo Willow Thicket (R4), Great Valley Mixed Riparian Forest (R5), Riparian Scrub (RS2), and Great Valley Riparian Scrub(S)

Table 12-24. Estimated Overlap in Restoration Activities by Major Natural Community Type for Solano County MSHCP

Solano County MSHCP				
	Plan-Wide Target (acres)	Overlap	Correction Factor	Estimated Overlap (acres)
Wetlands	270–400	34%	1	62–92
Tidal	75–100	34%	2.94 ^a	75–100
Riparian	50	34%	1	17

^a All tidal wetland restoration is expected to occur in the overlap area.

Table 12-25. Estimated Overlap in Restoration Activities by Major Natural Community Type for South Sacramento HCP

South Sacramento HCP				
	Plan-Wide Target (acres)	Overlap	Correction Factor	Estimated Overlap (acres)
Wetlands	722	11%	1	79
Riparian	315	11%	1	35

Note that for Tables 12-13 through 12-25, if a plan did not set an acquisition or restoration target for a given natural community type, that community type was not included in the table.

Plan-Specific Analysis

East Contra Costa County

The ECCCHCP/NCCP was adopted in 2006 by Contra Costa County and the cities of Brentwood, Clayton, Pittsburg, and Oakley. Permits were issued in 2007 by USFWS and CDFW for a 30-year term. A joint powers authority of the agencies receiving the permits and the East Bay Regional Park District formed the East Contra Costa County Habitat Conservancy to implement the plan.

The HCP/NCCP provides regional conservation while improving and streamlining the permit process for endangered species. In 2012, the Corps issued a Regional General Permit to the East Contra Costa County Habitat Conservancy to provide additional streamlining for wetland regulations. Within the 174,115-acre plan area, the HCP/NCCP covers 8,670–11,853 acres of development and 1,126 acres of rural infrastructure projects. The HCP/NCCP requires creation of a preserve system of 23,800–30,300 acres that will be managed for the benefit of 28 covered species and their associated natural communities. The range of impacts and conservation requirements varies depending on whether the current urban limit lines of the participating cities are expanded.

The BDCP overlaps with the ECCCHCP/NCCP in the central western portion of the study area (Figure 12-3). The two plans have 15 covered species in common, including San Joaquin kit fox, western burrowing owl, and Swainson's hawk (BDCP Chapter 1, Table 1-4). While approximately 36% of the ECCCHCP plan area overlaps with that of the BDCP (Table 12-9), the overlap area is largely cultivated land outside of the urban limit lines of the county and participating cities.

The proposed preserve system for the ECCCHCP/NCCP occurs almost entirely outside of the BDCP boundary. Construction of the water conveyance facilities would have impacts in the ECCCHCP/NCCP plan area (e.g., new forebay adjacent to Clifton Court), but not on any existing

1 preserves. Some riparian acquisition and restoration may occur in the overlap area, particularly in
 2 the lower reaches of Marsh Creek or Kellogg Creek. Preservation and acquisition of riparian
 3 woodland and streams in the overlap area would not be likely to result in conflicts because each
 4 plan has many options for riparian restoration both inside and outside of the overlap area. These
 5 needs present an opportunity for coordination of East Contra Costa County Habitat Conservancy
 6 efforts with proposed tidal marsh restoration for the BDCP (see discussion below).

7 While acquisition and restoration needs of the ECCCHCP/NCCP for wetlands, grasslands, and
 8 riparian land cover are relatively low within the overlap area, all acquisition of cultivated lands will
 9 occur there (Table 12-13). Because the ECCCHCP/NCCP acquisition target for agriculture is only 400
 10 acres, and there are more than 30,000 acres of cultivated lands within the overlap area,
 11 implementation of the BDCP is not anticipated to conflict with the ability of ECCCHCP/NCCP to meet
 12 its conservation obligations. Each plan is expected to be able to meet its conservation requirements
 13 for cultivated lands easily; together, both plans would need less than 11% of the cultivated land
 14 available at the end of the permit term of both plans once covered activities “consumption” of
 15 cultivated land is taken into account.

16 Below is a description of specific BDCP actions and a brief discussion of how they might affect
 17 implementation of the ECCCHCP/NCCP Conservation Strategy.

- 18 • **Permanent Surface Disturbance.** The water conveyance facilities (CM1) would be located
 19 within the ECCCHCP/NCCP area (Subzone 6d), resulting in permanent surface impacts that may
 20 remove lands available for conservation. Under all BDCP alternatives, this represents less than
 21 3% of the total acreage within the ECCCHCP/NCCP area (Table 12-11), and land in this area is
 22 designated as having a “lower” level of acquisition effort by the ECCCHCP/NCCP, with the
 23 exception of “higher” priority acquisition lands near Byron Airport—an area where BDCP actions
 24 are not projected to occur.
- 25 • **Grasslands and Vernal Pools Restoration.** The northwest portion of CZ 8 of the BDCP
 26 overlaps with the southeast corner of the ECCCHCP/NCCP Acquisition Analysis Zone 6 (Figure
 27 12-3). Implementation of CM3 would secure and protect at least 1,000 acres of grassland and
 28 1,000 acres of wetlands (i.e., vernal pools and alkali seasonal wetland) within CZ 8. Within
 29 Acquisition Analysis Zone 6, ECCCHCP/NCCP intends to acquire 250–400 acres of agriculture,
 30 100–300 acres of grassland (i.e., alkali grasslands) and 20–40 acres of wetlands (i.e., alkali
 31 wetlands). Because more than half of BDCP CZ 8 lies outside of the ECCCHCP/NCCP,
 32 implementation of the BDCP conservation strategy is not likely to preclude any grassland or
 33 wetland acquisition and restoration for the ECCCHCP/NCCP. Grassland restoration is also
 34 targeted in BDCP CM8. Some of this restoration could take place in the southeast portion of the
 35 ECCCHCP/NCCP around Byron Airport. The ECCCHCP/NCCP does not target a specific acreage of
 36 grassland restoration, but does target lands surrounding Byron Airport for preservation.
 37 However, the BDCP area overlaps with a relatively small proportion of the total amount of
 38 grassland in ECCCHCP/NCCP area (Table 12-13).
- 39 • **Restoration of Dutch Slough.** BDCP CM4 identifies Dutch Slough, located with the
 40 ECCCHCP/NCCP area, as an area suitable for restoration, as does the ECCCHCP/NCCP. However,
 41 the BDCP targets tidal areas for restoration or acquisition while the ECCCHCP/NCCP targets
 42 riparian and stream communities, creating an opportunity for restoration synergies in streams,
 43 riparian, and tidal areas, including in Dutch Slough.

- 1 • **Riparian Habitat Restoration.** BDCP CM7 proposes 5,000 acres of riparian forest and scrub
2 protection, a portion of which may occur in CZs 6 and 8, which overlap with the ECCCHCP/NCCP
3 area (Figure 12-4). Table 12-13 indicates a moderate amount of overlap in riparian land cover
4 targeted for preservation, but little relative to the amount existing in the ECCCHCP/NCCP area
5 (less than 10%). Based on the proportion of overlap between the two plans, Table 12-22
6 indicates a relatively small area of potential overlap for riparian restoration priorities.

7 **San Joaquin County Multi-Species Habitat Conservation and Open Space Plan**

8 The SJCMShCP was permitted in 2000 and is administered by the San Joaquin Council of
9 Governments. This 50-year plan addresses 97 special-status plant, fish and wildlife species (47 of
10 which are on the federal permit) throughout most of San Joaquin County (more than 900,000 acres),
11 including a substantial portion of the eastern Delta. The plan participants include the County of San
12 Joaquin and the cities of Stockton, Lodi, Manteca, Tracy, Ripon, Escalon and Lathrop. Activities
13 covered under the plan include urban development, mining, expansion of existing urban boundaries,
14 nonagricultural activities occurring outside of urban boundaries, levee maintenance undertaken by
15 the San Joaquin Area Flood Control Agency, transportation projects, school expansions, nonfederal
16 flood control projects, new parks and trails, maintenance of existing facilities for non-federal
17 irrigation district projects, utility installation, maintenance activities, managing preserves, and
18 similar public agency projects.

19 The study area overlaps a substantial portion (almost 35%) of the SJCMShCP (Figure 12-3), which
20 itself overlaps approximately half of the legal Delta. The plans have 39 covered species in common,
21 including San Joaquin kit fox, western burrowing owl, giant garter snake, and Swainson's hawk
22 (BDCP Table 1-4). Within the overlapping area, the SJCMShCP targets for acquisition include flooded
23 fields, grasslands, riparian woodland, row and field crops, and wetlands. The potential exists for
24 competition for restoration sites and land acquisition in these land cover types. BDCP proposes to
25 acquire and restore freshwater tidal, seasonal floodplains, riparian forest, grassland, and nontidal
26 marsh in portions of the overlapping area. However, because the acquisition and restoration
27 requirements of the SJCMShCP are based upon mitigation ratios applicable to the natural
28 community types where impacts occur, and the plan operates on a "pay-as-you-go" basis, the
29 acquisition targets depend on the amount and location of impacts occurring within the county. In
30 the 11 years of plan implementation, the vast majority of impacts and, consequently, preservation
31 and creation efforts have occurred on cultivated land. The mitigation needs for other community
32 types, including wetlands and riparian areas, have been minimal (Tables 12-26 and 12-27). There
33 have been almost no impacts to wetlands in the SJCMShCP since its inception. Most of the impacts
34 with San Joaquin County occur on cultivated land; therefore, this land cover type has the greatest
35 potential for competition with BDCP. A more detailed assessment is provided below for each natural
36 community type.

1 **Table 12-26. SJCMShCP Preserve Acreages by SJCMShCP Zone with Overlap of BDCP**

Habitat Type	Central	Delta	Vernal Pool	Total
Wetlands	-	-	6.00	6.00
Agricultural	2,036.70	1,837.20	-	3,873.90
Agricultural and Grassland	360.00	-	-	360.00
Natural ^a	27.00	-	-	27.00
Total	2,423.70	1,837.20	6.00	4,260.90

^a This table includes preserves in the entirety of all SJCMShCP Zones, regardless of the proportion of each Zone that overlaps with BDCP. The SJCMShCP 2010 Annual Report does not identify specific habitat types within preserves. Natural Habitat Lands are lands which “retain natural vegetation and are not irrigated or cultivated agricultural lands.”

2

3 **Table 12-27. SJCMShCP Mitigation (acres) Owed from Existing Impacts by Habitat Type as of 2010**

Habitat Type	Central	Central/Southwest	Delta	Vernal Pool	Total
Wetlands	-	15.27	-	-	15.27
Tidal	0.07	-	-	-	0.07
Riparian	-	-	-	-	0.00
Agriculture	1,948.28	1,087.33 ^a	9.44	-	1,957.72
Grassland	17.21	-	-	0.85	18.06
Streams	66.13	50.46	-	-	116.59
Total	2,031.69	65.73	9.44	0.85	2,107.71

^a The SJCMShCP was partially through the easement acquisition process for a large grassland preserve of approximately 1,095 acres to close in 2011 which would negate the row and field crop mitigation acreage required in the Central/Southwest Zone.

4

5 Below is a description of specific BDCP actions and a discussion of their effects on implementation of
6 the SJCMShCP.

- 7
- 8 • **Permanent Surface Disturbance and Connectivity.** Under CM1, construction of water
9 conveyance facilities located in the SJCMShCP area would result in permanent surface impact
10 that would remove between 6 acres and 14,050 acres of land available for conservation (Table
11 12-11). However, under all BDCP alternatives, this land represents less than 1.6 % of the total
12 SJCMShCP area (Table 12-11). Above-ground conveyance would permanently impact habitat
13 connectivity for less mobile species. Although the eastern alignment (Alternative 1B) would not
14 affect known occurrences of giant garter snake in San Joaquin County, it would adversely affect
15 the giant garter snake population in the vicinity of White Slough in San Joaquin County by
16 impairing habitat connectivity in this area: this could affect the ability for SJCMShCP to achieve
its conservation goals for giant garter snake.
 - 17 • **Cultivated Lands Preservation.** The southern portion of the BDCP, including almost all of CZ 7,
18 the eastern portions of CZs 5, 6, and 8, and the southern portion of CZ 4, overlaps the SJCMShCP
19 area (Figure 12-4). There is an estimated 218,370 acres of cultivated land in the overlap area
20 that is not protected (Tables 12-18 through 12-21). Of this total, approximately 16,770 acres
21 would be lost to covered activities planned by the SJCMShCP and 32,580 acres expected under
22 Alternatives 1A, 2A and 6A. BDCP effects on cultivated lands would result primarily from

1 construction of the water facilities and restoration of tidal wetlands and floodplains in the South
 2 Delta and Cosumnes-Mokelumne ROAs. The SJCMShCP needs approximately 14,487–36,382
 3 acres of cultivated land acquisition to mitigate for the remaining impacts under that plan, or
 4 9%–22% of the total remaining. BDCP would need between 7,400–12,987 acres of acquisition in
 5 the overlap area (4%–8% of the total), depending on the habitat values of the cultivated land
 6 lost to covered activities. At the end of the permit terms, there would be an estimated 169,000
 7 acres of cultivated land available for preservation. The combined preservation needs of the
 8 SJCMShCP and the BDCP in the overlap area is between 21,887 and 49,369 acres, or 13%–30%
 9 of the total cultivated lands available for preservation. The Delta Wetlands Project (Delta
 10 Wetlands Project 2010), a water supply and habitat restoration project that is independent of
 11 SJCMShCP and BDCP, will require an additional estimated 20,000 acres of cultivated lands
 12 (11,000 acres for water storage and 9,000 acres of conservation easements to offset the loss of
 13 cultivated lands) within the overlap area: this would reduce the amount of lands available for
 14 preservation to 149,000. With implementation of the Delta Wetlands project, the preservation
 15 needs in the overlap area for the SJCMShCP and the BDCP would still constitute only 15%–33%
 16 of the total cultivated lands available for preservation. This analysis demonstrates that enough
 17 cultivated lands would remain to meet the conservation and mitigation needs of both plans,
 18 even after full implementation of covered activities. In reality, preservation would occur
 19 gradually over time, prior to full implementation of all covered activities. Nonetheless, this
 20 analysis provides a conservative assessment of the potential for conflict between BDCP and the
 21 SJCMShCP with respect to conservation and mitigation of cultivated lands. The east alignment
 22 (Alternatives 1B, 2B, and 6B) of the proposed water conveyance system poses potential impacts
 23 to the 783-acre East and West Nuss cultivated land preserves in the SJCMShCP. However, these
 24 impacts would be temporal in nature because the impacted area would be restored to pre-
 25 existing baseline conditions following the construction of the water conveyance facilities. Loss of
 26 cultivated lands habitat from the construction of the water conveyance facilities would have a
 27 less-than-significant impact on agriculturally-dependent species, such as Swainson’s hawk,
 28 because the enhancement and management of 8,000 acres of cultivated lands as foraging habitat
 29 for Swainson’s hawk distributed throughout Conservation Zones 1, 2, 3, 4, and 7 of the BDCP
 30 would provide ample foraging habitat for these species in the long term. Additionally, if the East
 31 Alignment alternative is chosen as the preferred alternative, the BDCP Implementation Office
 32 would pursue a temporary conservation easement over the affected preserve that would extend
 33 for the duration of the construction and restoration activities.

34 Each plan is expected to be able to meet its conservation requirements for cultivated lands
 35 easily; together, both plans would need less than 30% of the cultivated land available at the end
 36 of the permit term of both plans once covered activities “consumption” of cultivated land is
 37 taken into account.

- 38 • **Tidal Wetland Restoration.** There is a large amount of overlap between the SJCMShCP and
 39 BDCP in tidal areas (Table 12-14). The SJCMShCP does not include any requirements for tidal
 40 wetland preservation or restoration, so there would be no direct conflicts with BDCP on these
 41 targets. However, BDCP proposes to convert an estimated 2,200 acres of cultivated land to tidal
 42 wetlands. Under Alternative 5, tidal habitat restoration would be reduced from 65,000 acres to
 43 25,000 acres, which would not meet the BDCP restoration target for this natural community
 44 type. As a result, the extent to which the BDCP would support the recovery and long-term
 45 survival of the covered species that depend on these habitats would be substantially reduced
 46 compared with other BDCP alternatives.

1 The tidal restoration proposed in the South Delta ROA (CZ 7) has the potential to conflict with
 2 the existing 300-acre Ishizuka Preserve in the SJCMShCP. In addition, tidal restoration proposed
 3 in the Cosumnes/Mokelumne ROA (CZ 4) has potential to conflict with the existing 350-acre
 4 Wing Levee Road preserve in the SJCMShCP. These preserves provides protection for cultivated
 5 lands which the BDCP may convert to tidal natural communities. If tidal restoration occurs on
 6 one of these sites (or any other owned by the SJCMShCP), the BDCP Implementation Office
 7 would provide compensation to property owners for the conversion of existing land use and the
 8 associated economic losses. Additionally, the BDCP Implementation Office would coordinate
 9 with SJCMShCP to identify and acquire lands of equal or greater biological value to replace the
 10 conservation needs for SJCMShCP, as described in BDCP Chapter 3, Section 3.4.3, *Conservation*
 11 *Measure 3*. Mitigation Measure AG-1 requires the BDCP Implementation Office to develop an
 12 Agricultural Lands Stewardship Plan (ALSP) to preserve agricultural productivity of Important
 13 Farmland and land subject to Williamson Act contracts and to compensate off-site. In addition to
 14 Mitigation Measure AG-1, as discussed above in the cultivated land preservation section, the
 15 enhancement and management of 8,000 acres of cultivated lands as foraging habitat for
 16 Swainson's hawk distributed throughout Conservation Zones 1, 2, 3, 4, and 7 of the BDCP would
 17 provide ample foraging habitat for these species in the long term. Additional tidal restoration is
 18 targeted in the South Delta ROA (at least 5,000 acres) and the Cosumnes-Mokelumne ROA (up to
 19 1,500 acres). All of the South Delta ROA and approximately half of the Cosumnes-Mokelumne
 20 ROA are within the SJCMShCP plan area.

- 21 ● **Riparian Preservation and Restoration.** BDCP proposes to acquire 750 acres of riparian
 22 natural community in CZ 7 under CM7. In addition, BDCP would restore at least 5,000 acres of
 23 riparian woodland and forest in the Plan Area. Approximately 40–50% of the acquisition and
 24 restoration of riparian woodland and forest is expected to occur in the overlap area of San
 25 Joaquin County (i.e., up to 375 acres of preservation and 2,500 acres of restoration). The
 26 majority of the restoration would occur on cultivated lands.

27 The SJCMShCP has an estimated need of 992 acres of riparian woodland preservation in the
 28 overlap area (Table 12-14) and 25 acres of riparian restoration if all impacts to this community
 29 occur. The SJCMShCP permits allow removal of up to 750 acres of riparian woodland in San
 30 Joaquin County, most of which would occur in the study area (Table 12-23). There are an
 31 estimated 17,930 acres of riparian woodland and forest in the study area and approximately
 32 8,070 acres in the overlap area. This amount is enough to meet the riparian preservation and
 33 impact needs of both plans.

- 34 ● **Floodplain Restoration.** The SJCMShCP does not require restoration of floodplains so would
 35 not conflict with BDCP in this restoration action. In BDCP, CM5 calls for restoration of 10,000
 36 acres of seasonally inundated floodplains. Under Alternative 7, seasonally inundated floodplain
 37 restoration would be increased from 10,000 acres to 20,000 acres, which would increase costs
 38 and reduce the practicability of the conservation strategy, but would increase benefits to some
 39 covered species. Floodplains would be created by breaching and/or setting back existing levees
 40 and seasonally flooding cultivated lands, similar to what is done now in the Yolo Bypass. In this
 41 situation, cultivated lands continue to produce food but the periodic flooding limits the suitable
 42 crop types and the duration of the growing season. CM5 identifies the most promising
 43 opportunities for large-scale floodplain restoration as being in the south Delta along the San
 44 Joaquin, Old, and Middle Rivers all of which are located within the SJCMShCP area. Therefore,
 45 this action would cause the loss or degradation of cultivated lands within the restored
 46 floodplains. The amount of cultivated land affected is estimated at 7,750–9,100 acres. This

1 represents less than 2% of the total cultivated lands available for preservation within the
2 SJCMShCP area.

- 3 ● **Channel Margin Enhancement.** Channel margin enhancement (CM6) would be performed
4 along the Sacramento River between Freeport and Walnut Grove, and along the San Joaquin
5 River between Vernalis and Mossdale, which lies within the SJCMShCP area. Under Alternative
6 7, channel margin enhancement would be increased from 20 linear miles to 40 linear miles. This
7 alternative would increase costs and reduce the practicability of the conservation strategy, but
8 would increase benefits to some covered species. However, channel margin enhancements are
9 not likely to conflict with SJCMShCP conservation requirements. These actions are not likely to
10 convert a substantial amount of agricultural land, and the SJCMShCP is unlikely to need large
11 amounts of riparian or channel margin habitat to meet its mitigation requirements because of
12 the limited impacts to this land cover type in the county.

- 13 ● **Grassland Preservation and Restoration.** The BDCP target of 8,000 acres of grassland
14 preservation would occur in CZ 1 and 8, outside of the SJCMShCP area. The SJCMShCP plan also
15 has substantial grassland preservation needs but these would be met largely in the inner Coast
16 Range in southwestern San Joaquin County, outside of the study area (San Joaquin Council of
17 Governments 2010).

18 The BDCP may restore a portion of its target of 2,000 acres of grassland (CM8) in the western
19 portion of the SJCMShCP area, primarily from existing degraded grasslands. The SJCMShCP does
20 not specifically target grassland for restoration. However, based on the limited proportion of
21 grassland overlap between the plans (Table 12-14), potential conflicts in acquisition or
22 restoration targets are minimal.

- 23 ● **Nontidal Marsh Restoration.** CM10 of the BDCP targets 400 acres of nontidal marsh for
24 restoration, a portion of which could occur adjacent to habitat occupied by the Coldani
25 Marsh/White Slough giant garter snake population in CZ 4 within the SJCMShCP area. However,
26 the proposed restoration would be designed to meet the conservation goals of each plan for
27 giant garter snake and Swainson's hawk. This conservation measure is likely to provide a mutual
28 benefit to both plans, as the SJCMShCP specifies avoidance for known giant garter snake habitat.

29 **East Alameda County Conservation Strategy**

30 EACCS provides a mechanism for endangered species permitting under CESA and ESA within
31 271,485 acres of eastern Alameda County. The Conservation Strategy does not directly result in
32 permits for any participating local agency but provides a framework for endangered species
33 permitting of projects in the study area. The strategy was completed in early 2011 and is currently
34 being utilized by local jurisdictions. The plan was prepared by Alameda County; the cities of Dublin,
35 Livermore, and Pleasanton; Alameda County Waste Management Authority; the Alameda County
36 Congestion Management Agency; East Bay Regional Parks District; the Alameda County Resource
37 Conservation Service; the Natural Resource Conservation Service and in consultation with the
38 USFWS, CDFW, and the San Francisco Regional Water Quality Control Board. The conservation
39 strategy addresses the conservation needs of 19 species, including eight species that overlap with
40 the BDCP (BDCP Table 1-4). In June 2012, USFWS issued a programmatic Section 7 Biological
41 Opinion with the USACE that can be used for Clean Water Act Section 404 compliance using the
42 framework of the conservation strategy for federally-listed species.

1 Only a small portion of the northeastern corner of the EACCS study area overlaps with the study
 2 area (less than 2%) and the overlap occurs in one conservation zone only (zone 7 of the EACCS).
 3 There is little anticipated urban development in that area that would be permitted using the strategy
 4 guidelines, due in part to Alameda County Measure D, which does not allow for growth outside of
 5 the existing urban limit line for the county. However, several large commercial solar energy facilities
 6 have been proposed in the overlap area. Despite this, it is unlikely that BDCP implementation would
 7 negatively affect any of the provisions associated with EACCS or vice-versa.

8 Below is a description of specific BDCP activities and a brief discussion of the overlap with EACCS:

- 9 ● **Permanent Surface Impacts.** A small portion of the water conveyance facilities may be located
 10 in the EACCS area, resulting in permanent surface impacts of up to 4,755 acres that would
 11 remove lands available for conservation (Table 12-11). However, under all BDCP alternatives,
 12 this land only represents 2.73% of the total EACCS area.
- 13 ● **Restoration and Acquisition Overall.** CZ 8 of the BDCP intersects with Conservation Zone 7 of
 14 the EACCS. Within BDCP CZ 8 (Figure 12-3), BDCP would acquire or protect riparian forest and
 15 scrub, grassland, and vernal pool communities (CM7, CM8, and CM9, respectively). However,
 16 based on the relatively small amount of overlap between the two plans (Table 12-9), the
 17 potential for conflict is minimal.

18 **Solano County Multi-Species Habitat Conservation Plan**

19 The Solano County Water Agency is developing the Solano County MSHCP to support the issuance of
 20 an incidental take permit under the ESA for a period of 30 years. The plan covers activities within
 21 the Solano County Water Agency's contract service area, including the cities of Fairfield, Vacaville,
 22 Vallejo, Suisun City, the Solano Irrigation District, and the Maine Prairie Water District. The plan
 23 area also covers all of unincorporated Solano County and a small portion of Yolo County.

24 Primary conservation actions include preservation (primarily through avoidance), restoration,
 25 invasive species control, and improvement of water quality. The plan area covers 580,000 acres,
 26 which includes 12,000 acres of proposed development and the creation of reserve system to protect
 27 natural communities and habitat for covered species².

- 28 ● 10,500 to 11,500 acres of valley floor grassland and vernal pools.
- 29 ● 5,700 acres of cultivated lands, 1,000 of nesting and associated foraging habitat, and 1,000 of
 30 grassland/oak savanna for Swainson's hawk and burrowing owls.
- 31 ● 3,300 acres of upland habitat for the California red-legged frog and callippe silverspot butterfly.
- 32 ● 50 acres of riparian woodland.
- 33 ● 36 acres of freshwater marsh, pond, and seasonal wetlands.

34 The two plans share 29 covered species (BDCP Table 1-4), including Swainson's hawk, California
 35 clapper rail, and salt marsh harvest mouse.

36 The Solano County MSHCP overlaps substantially with the study area in Suisun Marsh and Cache
 37 Slough (Figure 12-2) including the entirety of BDCP CZs 1 and 11, the southern portions of CZs 2 and
 38 3, and a small, western portion of CZ 5. Most of the overlap area occurs within the Suisun Marsh and

² Conservation targets for the Solano HCP are based on a June 2011 working draft plan and are therefore preliminary.

1 Cache Slough, which the BDCP identifies as restoration opportunity areas. The Solano County
2 MSHCP identifies providing additional funding for management and restoration of Suisun Marsh and
3 the Delta as one of its main objectives. The areas of overlap, therefore, are likely to represent
4 opportunities for collaboration, based upon like objectives between BDCP and Solano County
5 MSHCP. Below is a description of specific BDCP action and a discussion of how they might affect the
6 Solano County MSHCP.

- 7 • **Floodplain Restoration.** The BDCP proposes to increase the frequency, duration, and
8 magnitude of floodplain inundation in the Yolo Bypass (CM2). This would restore habitat in the
9 Suisun Marsh and Cache Slough and bays downstream of the bypass that overlap with the
10 Solano County MSHCP area. Restoration targets for wetlands and tidal communities would be
11 designed to benefit covered species in common with both plans such as the giant garter snake.
- 12 • **Wetlands and Vernal Pools Restoration.** Within CZs 1 and 11, the BDCP intends to protect a
13 portion of the 600 acres of existing vernal pool complex in the Jepson-Prairie core vernal pool
14 recovery area (U.S. Fish and Wildlife Service 2005), a portion of the 400 acres of existing alkali
15 seasonal wetland complex, and at least 1,000 acres of existing grassland, which may include
16 vernal pool complex and several occurrences of covered plant species (see Table 12-15 for
17 summary of wetland acquisition). The BDCP proposes no net loss of vernal pool acreage, and a
18 portion of proposed restoration and acquisition which would occur in CZ 1 and/or CZ 11, both
19 of which overlap with the Solano County MSHCP plan area. The Solano County MSHCP does
20 identify acreage targets for wetlands restoration (Table 12-15), including vernal pools.
21 However, all of the vernal pool acquisition and restoration needs of the Solano County MSHCP
22 will be acquired from existing commercial mitigation banks that have adequate capacity to meet
23 the requirements of the Plan. Therefore, BDCP wetland preservation and restoration is not
24 expected to conflict with the Solano County MSHCP.
- 25 • **Cultivated Lands Preservation.** The cultivated land acquisition target for the Solano County
26 MSHCP is 5,700 acres of agricultural foraging habitat for Swainson's hawk and burrowing owl.
27 Most of the cultivated land preservation will take place in the northern or northeastern portion
28 of the county (near Dixon Ridge), which is outside of the study area. These areas have been
29 selected for preservation because they are cultivated with crops such as alfalfa, which is
30 preferred by Swainson's hawk as foraging habitat for. The BDCP may also maintain a portion of
31 non-rice agriculture as foraging habitat for Swainson's Hawk in CZs 1, 2, and 3, all three of which
32 overlap with the Solano County MSHCP (Figure 12-3). However, based on emphasis of the
33 Solano County MSHCP to preserve cultivated lands in the northern portion of the county, outside
34 of the areas where the Plans overlap, there is limited potential for conflicting acquisition and
35 restoration priorities.
- 36 • **Tidal Habitat Restoration.** The BDCP identifies the Cache Slough ROA as a substantial area of
37 land with elevations suitable for freshwater tidal natural community restoration (CM4). Almost
38 all of the Cache Slough ROA occurs in Solano County. This would result in the conversion of
39 approximately 5,000 to 7,000 cultivated lands to tidal natural communities. As described above,
40 neither the loss of cultivated land or the creation of tidal natural communities is expected to
41 conflict with the Solano County MSHCP conservation strategy, because the Cache Slough area is
42 only targeted for conservation by BDCP. The Solano County MSHCP targets 75–100 acres of tidal
43 habitat (coastal marsh habitat) for restoration (Table 12-15), with more than 50,000 acres
44 available in the overlap area. Consequently, there is minimal potential for conflicting acquisition
45 and restoration priorities.

1 South Sacramento Habitat Conservation Plan

2 The proposed South Sacramento HCP would address issues related to species conservation,
3 agricultural protection, and urban development in 341,000 acres of south Sacramento County. The
4 plan is being prepared by Sacramento County; the cities of Sacramento, Elk Grove, Galt, and Rancho
5 Cordova; Sacramento Regional County Sanitation District; and the Capital Southeast Connector Joint
6 Powers Authority. The HCP would cover 30 species of plants and wildlife, including 10 that are
7 state- or federally listed as threatened or endangered. The western extent of the South Sacramento
8 HCP plan area, approximately 11%, overlaps the study area Conservation Zone 4 (Figure 12-3).
9 Included in the overlap is a portion of the South Sacramento HCP's Urban Development Area. Sixteen
10 species are covered by both plans, including greater sandhill crane, Swainson's hawk, and giant
11 garter snake (BDCP Table 1-4).

12 The South Sacramento HCP, over its permit term, intends to conserve at least 41,923 acres, most of
13 which would be agricultural and grassland land cover types with limited overlap with the BDCP
14 (Table 12-9). The South Sacramento HCP also intends to restore 1,786 acres, most of which would
15 be wetland and riparian land cover types. Most of the preservation and restoration would be
16 directed towards Primary Conservation Zones identified by the plan. Small portions of the Primary
17 Conservations Zones for valley elderberry longhorn beetle, California tiger salamander, giant garter
18 snake, and western burrowing owl, and most of the Primary Conservation Zone for Swainson's hawk
19 overlap with BDCP. In these areas, the potential for conflict in acquisition efforts between the plans
20 would be greatest, but so would the potential for restoration collaboration, especially in regards to
21 freshwater marsh and giant garter snake habitat.

22 The South Sacramento HCP aims to preserve mostly grassland, by a ratio of more than 2:1 relative to
23 other land cover types, and the BDCP does not target grassland preservation in CZ 4, thereby
24 limiting the amount of potential conflict between the two plans overall. Approximately 41% (20,041
25 of 48,832 acres) of CZ 4 consists of existing protected lands, so there are ample opportunities in this
26 zone to link the reserve system with existing open space. Stone Lakes National Refuge Wildlife
27 Refuge and Cosumnes Preserve occupy a majority of the land in the northern half of CZ 4, which
28 signifies less private land ownership and potential conflicts in meeting the preservation targets of
29 both plans. The BDCP Implementing Office would protect a corridor that would be composed of
30 contiguous patches of agricultural, restored tidal, and nontidal wetlands, grassland, vernal pool
31 complex, and other seasonal wetlands. This corridor would extend from the Caldoni Marsh/White
32 Slough giant garter snake subpopulation area north to Stone Lakes National Wildlife Refuge, and to
33 the extent possible would also connect to the Cosumnes River Preserve. The corridor would be
34 configured to provide a giant garter snake movement habitat along this north-south corridor. Tables
35 12-16, 12-18 through 12-21 and 12-25 summarize potential overlap in acquisition and restoration
36 targets, respectively.

- 37 ● **Permanent Surface Disturbance.** The construction of the water conveyance facilities poses the
38 greatest permanent surface impacts to the South Sacramento HCP area (up to 3,988 acres under
39 the eastern alignment). However, because of the limited geographic overlap between the two
40 plans, and the Sacramento HCP's emphasis on acquisition of grassland, which is ample in the
41 South Sacramento HCP overall area (more than 175,000 acres available), there is limited
42 potential for conflicting acquisition priorities. Under CM1, construction of the water conveyance
43 facilities located in the South Sacramento HCP would result in permanent surface impacts that
44 would remove between 150 acres and 3,998 acres of land available for conservation (Table 12-

1 11). However, under all BDCP alternatives this represents less than 1.1 % of the total South
2 Sacramento HCP area (Table 12-11).

- 3 ● **Cultivated Lands Preservation.** The northeastern portion of the BDCP, including over half of
4 CZ 4 and the northern portion of CZ 5 (Figure 12-3). There is an estimated 17,583 acres of
5 cultivated land in the overlap area that is not protected (Tables 12-18 through 12-21). Of this
6 total, approximately 1,900 acres would be lost to covered activities planned by the South
7 Sacramento HCP and 3,556 acres expected under the BDCP. The water conveyance facilities
8 footprint impacts are the among the largest in the South Sacramento HCP area. BDCP impacts to
9 cultivated lands would occur primarily from construction of the water facilities and restoration
10 of tidal wetlands and floodplains in the Cosumnes-Mokelumne ROA. After subtracting all the
11 remaining impacts assumed from both plans, there would be an estimated 13,181 acres
12 available for preservation. The combined preservation needs of the South Sacramento HCP and
13 the BDCP in the overlap area is between 3,341 and 13,090 acres, or 25–99% of the total
14 cultivated lands available for preservation. If all the preservation needs of both plans were to be
15 acquired in the overlap area, there is potential for conflict in meeting the acquisition targets of
16 both plans. Alternative 1B poses the greatest impacts to the South Sacramento HCP overlap area
17 (4,024 acres), and could present conflicts in achieving cultivated land preservation targets for
18 both plans in the overlap area (Table 12-19). However, as discussed above, there is an estimated
19 60,000 acres of cultivated land remaining for preservation in the South Sacramento HCP area
20 that does not overlap with the BDCP study area, so both plans would easily be able to achieve
21 their cultivated land preservation targets. As described in BDCP Section 3.4.3, *Conservation*
22 *Measure 3*, if during the permit terms of the overlapping plans, the South Sacramento HCP is
23 unable to meet its mitigation requirements due to a lack of willing sellers and due in part to
24 acquisition by BDCP in the overlap area, a credit swap of easement(s) would be initiated.
25 Determination that this criterion has been met would be made jointly by CDFW, USFWS, the
26 BDCP Implementation Office, and the South Sacramento HCP implementing entity. Land owned
27 by the BDCP Authorized Entities or Supporting Partners in the overlap area in fee title or
28 conservation easements would be identified for their applicability to the South Sacramento HCP
29 conservation strategy. The South Sacramento HCP would acquire conservation easements or fee
30 title on land outside of the overlap area with equivalent or greater conservation value to BDCP
31 as the land identified in the criteria above. This land acquired would be within the BDCP Plan
32 Area but could be outside Sacramento County. As an alternative, the BDCP Authorized Entities
33 or Supporting Partners could acquire the additional lands with funds from the South
34 Sacramento HCP. Once the additional land is acquired outside of the overlap area, the BDCP land
35 within the overlap area would be transferred in fee title or conservation easement holder to the
36 South Sacramento HCP. The land acquired by the South Sacramento HCP outside of the plan area
37 with equivalent or greater conservation value to BDCP would be transferred to a BDCP
38 Authorized Entity or Supporting Partner. Once the transfers are complete, the credit assigned to
39 each plan for the conserved land would also be transferred. BDCP would ultimately acquire no
40 more than 3,000 acres in the overlap area with South Sacramento HCP.
- 41 ● **Tidal Habitat Restoration.** Approximately half of the proposed 3,072 acre Cosumnes
42 Mokelumne ROA overlaps with the South Sacramento HCP, resulting in an estimated 1,535 acres
43 of cultivated land converted into tidal natural communities. However, as discussed above, both
44 plans would easily achieve their cultivated lands preservation targets through the
45 implementation of MM AG-1 and the preservation of cultivated lands in the South Sacramento
46 HCP area that does not overlap with the BDCP study area.

- 1 ● **Nontidal Marsh Restoration.** The South Sacramento HCP proposes to restore 600 acres of
 2 nontidal wetland habitat in Caldoni Marsh/ White Slough, which overlaps with the CZ 4 of the
 3 BDCP. The BDCP proposes 200 acres of nontidal restoration in CZ 4. In total, the two plans
 4 propose to convert 800 acres of the approximately 1,700 available acres of cultivated land in the
 5 overlap area to nontidal wetland natural communities. This represents less than half of the total
 6 cultivated land available in the overlap area and as such both plans would be able to meet their
 7 restoration targets in this area. CZ 4 of the BDCP contains the Caldoni Marsh/White Slough
 8 subpopulation of giant garter snake, providing opportunities for joint preservation of
 9 agricultural land and restoration of nontidal and riparian habitats to protect and expand this
 10 subpopulation and create habitat connectivity with the giant garter snakes in the Stone Lakes
 11 area.
- 12 ● **Wetlands and Vernal Pools Restoration.** The BDCP proposes to protect 600 acres of existing
 13 vernal pool habitat and 400 acres of existing alkalai seasonal wetland complex, with the
 14 majority of the preservation occurring in CZ 1, 8, and 11. The South Sacramento HCP proposes
 15 to preserve a total of 1,048 acres of vernal pool, or vernal impoundment and 170 acres of vernal
 16 swale in a matrix of valley grassland, and restore a total of 363 acres of vernal pool or vernal
 17 impoundment in a matrix of valley grassland. The total preservation and restoration of vernal
 18 pools and alkalai seasonal wetlands proposed by the South Sacramento HCP is approximately
 19 1,800 acres, or 24%, of an estimated 7,500 acres available in the South Sacramento HCP area.
 20 The BDCP does not have specific requirements for vernal pools or alkalai seasonal wetland
 21 preservation in CZ 4, so there is minimal potential for conflict in achieving the preservation
 22 targets of the South Sacramento HCP in the overlap area.

23 **Yolo Natural Heritage Program**

24 The Yolo County NCCP/HCP Joint Powers Authority, consisting of five local public agencies, launched
 25 the YNHP in March 2007. Member agencies are Yolo County and the cities of Davis, Woodland, West
 26 Sacramento, and Winters. In addition, a representative of University of California, Davis, serves as an
 27 ex-officio member of the Joint Powers Authority board. The YNHP covers a 653,818-acre planning
 28 area, 17% of which overlaps with the BDCP. The YNHP documents are in development. The
 29 proposed list of covered species contains 32 sensitive species in five principal natural communities.
 30 The YNHP overlaps with the BDCP in the Yolo Bypass area (CZs 2 and 3) (Figure 12-3) and has 20
 31 species in common with the BDCP (BDCP Table 1-4). Within the overlapping area, the YNHP targets
 32 for acquisition include annual grasslands, riparian, and cultivated lands. BDCP proposes to acquire
 33 cultivated lands, acquire or restore grasslands, and restore nontidal marsh in portions of the
 34 overlapping area, primarily to benefit giant garter snake. Additionally, BDCP proposes tidal
 35 restoration in the Cache Slough ROA, which partly overlaps with the YNHP plan area. The potential
 36 exists for competition for restoration sites and land acquisition, but the overlap also creates
 37 opportunities for coordination, partnerships, and achieving common conservation goals.

38 Based on a simple analysis of the major natural community types for the intersecting area of the two
 39 plans (Table 12-17), there is significant overlap between tidal and wetland land cover types. In other
 40 words, most conservation targets for these land cover types in the YNHP would need to be
 41 addressed within the overlap area. However, the overlap area has more than 10,000 acres of
 42 mapped wetland available for acquisition or restoration and almost 5,000 acres of tidal land cover
 43 type. BDCP CM4 would restore or create at least 24,000 acres of tidal freshwater emergent wetland,
 44 a portion of which would be located in CZ 2 (within the overlap area). The BDCP targets 600 acres of
 45 nontidal marsh restoration (crosswalked to “wetlands” in this analysis), 200 acres of grassland

1 protection or restoration, and 700 acres of cultivated lands protection within or adjacent to habitat
 2 occupied by the giant garter snake Yolo/Willow Slough subpopulation in CZ 2, entirely within Yolo
 3 County. The YNHP also has conservation targets for giant garter snakes in this subpopulation, but it
 4 is focused in the YNHP Willow Slough Basin Planning Unit, only a small portion of which overlaps
 5 with the BDCP Plan Area. The two plans could work together to jointly achieve conservation for
 6 giant garter snake in the Yolo/Willow Slough subpopulation.

7 Below is a description of specific BDCP actions and a brief discussion of the overlap with YNHP.

- 8 • **Permanent Surface Disturbance.** Under CM1, water conveyance facilities located in the YNHP
 9 area would result in permanent surface impacts of up to 5,834 acres under Alternative 1C that
 10 may remove lands available for conservation (Table 12-11). There would be no permanent
 11 surface impacts of the water conveyance facilities from the other BDCP alternatives.
- 12 • **Cultivated Lands Preservation.** Within CZs 2 and 3, BDCP may protect a portion of the total
 13 conservation goal of 1,000 acres of cultivated lands as foraging habitat for Swainson's hawk
 14 (CM3), thus removing it from conservation under the YNHP. There is an approximately 17,500
 15 acres of cultivated land in the area where the BDCP overlaps with the YNHP. An estimated 6,158
 16 acres of cultivated would be lost under CM1 in the overlap area, approximately 35% of the
 17 cultivated land available for preservation. BDCP CM4 would restore or create at least 24,000
 18 acres of tidal freshwater emergent wetland, a portion of which would occur in CZ 2, within the
 19 overlap area.
- 20 • **Riparian Restoration.** CM7 would restore 5,000 acres of riparian forest and scrub in the BDCP
 21 Plan Area in association with restoration of tidal wetlands and floodplains. A portion of this
 22 restoration would occur in CZ 2, although most is expected to occur in CZ 7, outside the overlap
 23 area. The YNHP also has conservation targets for riparian but most of it is targeted for YNHP
 24 planning units outside the overlap area.
- 25 • **Floodplain Restoration.** Implementation of BDCP CM2 would increase the annual average
 26 inundation of the Yolo floodplain within the overlap area of the two plans. This measure would
 27 help to restore habitat in Cache Slough (a portion of which is within the YNHP area) for delta
 28 smelt, longfin smelt, and other BDCP covered fish species. The YNHP conservation strategy does
 29 not include any conservation measures within the Yolo Bypass, so an increase in inundation
 30 frequency and duration as a result of BDCP is not expected to affect the YNHP. BDCP will
 31 mitigate for any significant impacts on terrestrial species that would result from inundation.
- 32 • **Wetlands Restoration.** CM10 would restore 600 acres of nontidal marsh within or adjacent to
 33 habitat occupied by the giant garter snake Yolo/Willow Slough subpopulation in CZ 2.
 34 Approximately 58% of CZ 2 consists of protected land, and there remain ample opportunities to
 35 protect cultivated lands and associated natural communities in large blocks connected to open
 36 space. Yolo Bypass Wildlife Area and other open space lands owned by CDFW are present in the
 37 central and northern portions of CZ 2, while Liberty Island, owned by the Trust for Public Lands,
 38 and other land owners by the U.S. Army Corps of Engineers and the Bureau of Reclamation are
 39 present in the southern portion. Based on the amount of overlap between YNHP and BDCP areas
 40 (Table 12-9), there may be limited potential for conflict and possibilities for joint collaboration
 41 in restoration efforts.

1 **Effects of Other BDCP Conservation Measures on Overlapping Conservation Plans**

2 The BDCP contains management-based conservation measures designed to meet or contribute to
 3 the biological goals and objectives identified in BDCP Chapter 3, Section 3.3, *Biological Goals and*
 4 *Objectives*. Many of these conservation measures are designed to address “other stressors” of the
 5 BDCP covered fish. While many of these conservation measure are expected to occur within the
 6 overlapping conservation plans (Table 12-28), most would occur within the aquatic environment of
 7 the Delta, resulting in minimal overlap with the other conservation plans (which focus primarily on
 8 upland and terrestrial areas). Potential areas for overlap are identified in this section and are
 9 considered to be manageable and/or avoidable.

- 10 • *CM11 Natural Communities Enhancement and Management* outlines a suite of management
 11 techniques to be applied across the BDCP reserve system and for each natural community. CM11
 12 would overlap all other conservation plans and be applied wherever BDCP acquires land for the
 13 reserve system. The management techniques described in CM11 are similar or the same as those
 14 of the other conservation plans, so management is expected to be highly compatible where
 15 conservation lands of overlapping plans occur adjacent or near to each other.
- 16 • *CM13 Invasive Aquatic Vegetation Control* would be applied in aquatic systems throughout the
 17 BDCP Plan Area, with concentrated activities expected within the five ROAs. Therefore, this
 18 conservation measure is likely to overlap with most of the other conservation plans (Table 12-
 19 28). Invasive aquatic vegetation is a serious problem identified in several other conservation
 20 plans, so this BDCP conservation measure is expected to be consistent with the other
 21 overlapping plans.
- 22 • *CM14 Stockton Deep Water Ship Channel Dissolved Oxygen Levels* would only be applied in the
 23 Stockton Deep Water Ship Channel in San Joaquin County. This measure is compatible with the
 24 goals of the SJCMShCP, which also covers green sturgeon. This species is expected to be benefit
 25 from this conservation measure.
- 26 • *CM15 Localized Reduction of Predatory Fishes* would be applied in select locations throughout
 27 the Plan Area. The conservation measure is likely to be applied in the overlap areas of the
 28 SJCMShCP, Yolo HCP, and South Sacramento HCP, and may be applied in the Solano HCP and
 29 ECCC HCP/NCCP. Predator control measures would not conflict with existing or planned
 30 conservation plans because they would be applied in aquatic systems only, which does not
 31 overlap with most plans. Of these plans, only the SJCMShCP and Solano HCP cover fish also
 32 covered by BDCP.
- 33 • *CM18 Conservation Hatcheries* requires the establishment of new hatcheries, and the expansion
 34 of existing conservation propagation programs for delta and longfin smelt. CM18 would be
 35 implemented near Rio Vista in Solano County. A small amount of land would need to be acquired
 36 to build the longfin smelt hatchery. Because the planned site is already disturbed, this
 37 acquisition would not conflict with the Solano HCP.
- 38 • *CM19 Urban Stormwater Treatment, CM20 Recreational Users Invasive Species Program, and*
 39 *CM21 Nonproject Diversions*, would be implemented throughout the BDCP Plan Area and are
 40 likely to overlap with almost all of the other conservation plans. The exact locations of their
 41 implementation are not known because CM19 and CM21 rely on willing participants that have
 42 not been identified yet. Despite this uncertainty, these conservation measures are likely to be
 43 compatible with or at least not conflict with the other conservation plans because they are
 44 restricted to aquatic areas that are largely not addressed by the other conservation plans.

1 **Table 12-28. Potential Occurrence of Other BDCP Conservation Measures in Overlapping Conservation**
 2 **Plans**

BDCP Conservation Measure	ECCC HCP/NCCP	San Joaquin	EACCS	Solano MSHCP	South Sacramento HCP	YNHP
<i>CM11 Natural Communities Enhancement and Management</i>	Yes	Yes	Potentially	Yes	Yes	Yes
<i>CM12 Methylmercury Management</i>	W Delta ROA (Dutch Slough)	South Delta ROA	None	Suisun Marsh and Cache Slough ROAs	Cosumnes-Mokulemne ROA	Cache Slough ROA
<i>CM13 Invasive Aquatic Vegetation Control</i>	Yes	Yes	None	Yes	Yes	Yes
<i>CM14 Stockton Deep Water Ship Channel Dissolved Oxygen Levels</i>	None	Yes	None	None	None	None
<i>CM15 Localized Reduction of Predatory Fishes</i>	Potentially	Yes	None	Potentially	Yes	Yes
<i>CM16 Nonphysical Fish Barriers</i>	Unlikely	Yes	None	Potentially	Yes	Yes
<i>CM17 Illegal Harvest Reduction</i>	Potentially	Yes	None	Yes	Yes	Yes
<i>CM18 Conservation Hatcheries</i>	None	None	None	Yes	None	None
<i>CM19 Urban Stormwater Treatment</i>	Potentially	Potentially	None	Potentially	Potentially	Potentially
<i>CM20 Recreational Users Invasive Species Program</i>	Yes	Yes	None	Yes	Yes	Yes
<i>CM21 Nonproject Diversions</i>	Potentially	Potentially	None	Potentially	Potentially	Potentially

3

4 **12.3.6.2 CEQA Conclusion**

5 The BDCP overlaps geographically with six conservation plans. Impacts from construction and
 6 implementation of BDCP alternatives are not anticipated to affect implementation of the overlapping
 7 plans. Understanding whether BDCP acquisition and restoration goals would preclude the
 8 implementation of other conservation plans is more challenging. The analysis above indicates that
 9 the degree to which this competition would impact the conservation goals of other plans is limited.
 10 In most cases, because of the flexibility for acquisition targets incorporated into the BDCP and other
 11 plans, the potential conflict would be manageable, and significant conflicts with the implementation
 12 of overlapping plans could be avoided. Because the conservation strategy for the YNHP and South
 13 Sacramento HCP are not available, further analysis may be required at a later date. In certain cases,
 14 especially pertaining to similar restoration objectives, perceived conflicts may also represent
 15 opportunities for collaboration to jointly achieve similar conservation goals. Because implementing
 16 the BDCP would not result in a conflict with the provisions of an adopted HCP, NCCP or other
 17 approved local, regional or state habitat conservation plan, there would be a less-than-significant
 18 impact.

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